



3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018

ESW 3rd International Research conference on Ecotourism & Environment 29 to 31 July, 2018

Organized By



Environment & Social Welfare Society, Khajuraho

Under Govt. of MP., Firms & Society Act 1973 Reg. No. SC2707/2K

Email: eswsociety320@gmail.com

In association with



Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir,

Shalimar Campus, Srinagar, Jammu & Kashmir, India.

Editor

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Assisted by

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3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018

3rd International research conference: 2018

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Ecotourism & Environment

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Published by: Environment and Social Welfare Society, Khajuraho, Madhya Pradesh, India

Printed by: Aakrity offset, Chhatarpur, Madhya Pradesh, India



3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018



GOVERNOR
JAMMU & KASHMIR

RAJ BHAVAN
SRINAGAR-190001

I learn that the **Environment and Social Welfare Society (ESW), Khajuraho**, is shortly organizing the **3rd International Conference on "Ecotourism & Environment"** in collaboration with the Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir.

Jammu & Kashmir has a very high potential for the development of eco-tourism, particularly in view of the fast increasing demand from domestic and foreign tourists for eco friendly products.

I trust that the discussions in the projected Conference – in which academia, scientists, environmentalists and students from various Indian and foreign countries are expected to participate – shall focus on identified issues relating to the advancement of eco-tourism. The recommendations of this Conference will be of great benefit for promoting sustainable tourism in Jammu & Kashmir and other hill States.

I wish the Organisers of this Conference high success in their endeavour.

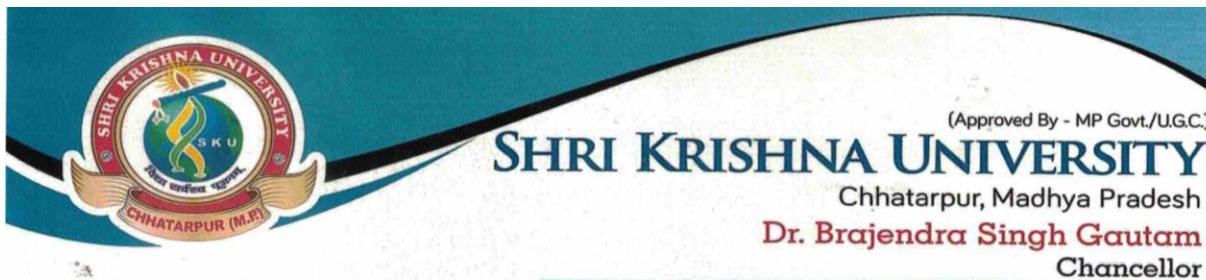
5th June, 2018

Srinagar.

(N.N. Vohra)



3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018



Ref.....

Date : 14/07/18.....

MESSAGE

I am glad to know that Environment and Social Welfare Society, Khajuraho, Madhya Pradesh, India is organizing its **ESW 3rd International conference on "Ecotourism & Environment"** in association with Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, Jammu & Kashmir, India during 29 to 31 July, 2018 at Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar Campus, Srinagar, Jammu & Kashmir, India.

Conference presents an opportunity for experts from Academia, Industry and other interested organizations to present and discuss the latest developments, trends and issues, including those on the potential societal impact and will meet its objective in delivering knowledge of Ecotourism & Environment.

I extended my warm greeting and felicitations to all those associated with the organization and express my best wishes to all the researcher, scientist, environmentalist and participants, for their valuable contributions to this International conference.

I convey my sincere best wishes to Dr. Ashwani Kumar Dubey, Organizing Secretary of the International conference and the entire team of the organizing committee for grand success of the Conference.


Dr. Brajendra Singh Gautam
Chancellor

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3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018

डॉ कैलाश चन्द्र
निदेशक
Dr Kailash Chandra
Director



भारत सरकार
भारतीय प्राणि सर्वेक्षण
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
Government of India
Zoological Survey of India
Ministry of Environment, Forest and Climate Change



MESSAGE
The 23rd May 2018

Greetings,

I am glad to learn that 'Environment & Social Welfare Society' is organizing the 3rd International Conference on "Ecotourism & Environment" jointly with Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, Jammu & Kashmir during 29 to 31 July, 2018. The conference provides the opportunity to the researchers, academicians and students to deliberate upon the vital and key issues pertaining to environment and biodiversity of the country and to share their ideas on the subject.

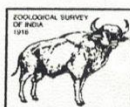
Ecotourism as a component of the green economy is one of the fastest growing segments of the tourism industry, and focuses on environmental conservation, socioeconomic development and capitalist development. Ecotourism not only helps in environmental conservation and socioeconomic development but also helps in increasing employment and entrepreneurship at local level.

India, as one of the world's Ecotourism rich countries is playing an important leadership role in a range of environmental concerns of tourism. I hope this International conference will provide an excellent platform to the researchers, academicians, students, stakeholders and local people of Jammu and Kashmir that it may lead to the formulation of strategies and policies for the sustainable use of natural resources and for a clean environment.

I greatly appreciate the efforts put in by the Society to take initiative at a very appropriate moment that will act as a motivation for the youth to take up such modern issues for advanced researches. I am told that several awards have also been instituted by the Society to recognise the research efforts of younger scientists from different corners of the country. I am sure this will go a long way to imbibe spirit to face challenges in the youth, and the platform provided by the Society shall give an opportunity to the youngsters for in depth interactions with experts from various prestigious Institutions and Universities of the country.

I convey my sincere best wishes to Dr. Ashwani Dubey, the Organising Secretary of the conference and the entire team of the organising committee of International Conference on "Ecotourism & Environment" for great success of the International Conference.


Dr. Kailash Chandra
Director



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3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018



Prof. (Dr.) Nazeer Ahmed
F.S.S.F.-S.I.T.S.-R.D. & F.C.M.
Vice-Chancellor

**Sher-e-Kashmir
University of Agricultural Sciences & Technology of Kashmir**

www.skuastkashmir.ac.in



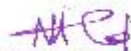
Message

I am delighted to learn that Environment and Social Welfare Society (ESW) Khajuraho, Madhya Pradesh is jointly organizing 3rd International Research Conference on Ecotourism and Environment with SKUAST-Kashmir from March 29-31st July, 2018. In recent times ecotourism has become important in building environmental and cultural awareness and respect; providing positive experiences for both visitors and hosts; direct financial benefits for conservation; generate financial benefits for both local people and private industry; deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries' political, environmental, and social climates; design, construct and operate low-impact facilities and recognize the rights and spiritual beliefs of the Indigenous People in the community and work in partnership with stakeholders to create empowerment. Now the need is to lay emphasis on fulfilling in letter and spirit the objectives of the Ecotourism not only at regional but at global level. I am sure that the ensuing International Conference will provide an excellent opportunity to the scientific fraternity, budding scholars and the students to interact and deliberate on new emerging issues and highlight the strategies of ecotourism in every possible aspect for the benefit of the mankind.

I believe that the presentations by experts on emerging trends and strategies in ecotourism shall have significant impact our tourism industry; biodiversity conservation and enrichment; natural resource management, and other environmental issues. The continued and constructive efforts are essentially required to meet the future of the tourism in an eco friendly manner, for which such conferences are very important.

I extend my heartiest congratulations and greetings to the organizers and participants of the International Conference.

I wish the conference a grand success.


(Nazeer Ahmed)

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3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018



Maharaja Chhatrasal Bundelkhand University
Chhatarpur (M.P.)

Prof. Priyavrat Shukla
Vice-Chancellor

Ref. R246/2018

Date : 24.05.2018

MESSAGE

I am delighted to know that Environment and Social Welfare Society, Khajuraho, Madhya Pradesh, India is organizing 3rd **ESW International conference on "Ecotourism & Environment"** jointly with Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, Jammu & Kashmir during 29 to 31 July, 2018 at Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar Campus, Srinagar, Jammu & Kashmir, India.

Conference presents an opportunity for experts from Academia, Industry and other interested organizations to present and discuss the latest developments, trends and issues, including those on the potential societal impact and will meet its objective in delivering knowledge of Ecotourism & Environment.

I would like to express my well wishes, appreciation and gratitude to all the participants, authors and stakeholders for their contributions to this International Conference. I convey my sincere best wishes to Dr. Ashwani Kumar Dubey, Organizing Secretary of the International conference and the entire team of the organizing committee of the conference for grand success of the Conference.

Prof Priyavrat Shukla
Vice Chancellor

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3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018



MONACHUS GROUP OF SCIENTIFIC RESEARCH AND ECOLOGICAL EDUCATION,
CONSTANTA, ROMANIA
ASSOCIATION OF RUPESTRAL HERITAGE OF SOUTHERN MOROCCO,
TINZOULINE, ZAGORA, MOROCCO

Agadir, Morocco
2/21/2018

To: Dear Prof. Dr. Ashwanti Kumar Dubey,
President & Organising Secretary
ESW 3rd International Conference on Ecotourism, India



MESSAGE

I am happy to know that ESW Society, Khajuraho is holding ESW 3rd International Conference on Ecotourism during 29 to 31 July, 2018 to be held at Sher-e-Kashmir University of Agricultural sciences and technology of Kashmir, Srinagar, Jammu & Kashmir. This great conference was designed for travel and hospitality professionals, infrastructure development executives, government policy-makers, tourism, as well as faculty members and students.

Ecotourism is present on the market, where for some time it has been an interesting niche; it is becoming increasingly important and satisfies the expectations of tourists seeking a holiday rich in cultural, environmental and social content. According to the World Tourism Organization, ecotourism is all forms of nature-based tourism in which the main motivation of tourists is the observation and enjoyment of nature and the traditional cultures that prevail in natural areas. This form of tourism aims to:

- Incorporates educational and interpretive features of the environment.
- It is usually, but not exclusively, organized for small groups of people by specialized tour operators. The service provider partners at the destination are typically small local businesses.
- It minimizes negative impacts on the natural and socio-cultural environment.

On this occasion, I extended my warm greeting and felicitations to all those associated with the organization. Finally, I hope the conference will help in exchanging the experience and come out with better solution of many questions related to ecotourism to achieve a national and international goal of this edition.

Geol. Abioui Mohamed

Ibn Zohr University, Morocco & Head of International Centre of Ecotourism,
MONACHUS Group of Scientific Research and Ecological Education, Romania

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3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018

About Environment & Social Welfare Society, Khajuraho, Madhya Pradesh

Environment & Social Welfare Society (ESW Society) *Dedicated to Environment, Education and Sciences & Technology entire India since bi-Millennium* is an ISO 9001:2015 certified organization of the India. Now it's worldwide known by its impact. ESW Society has been to develop relationship between Environment and Society envisions the promotion of Education and Sciences among the University, College and School students as well as in the society for Environment and Social welfare.

It is registered under the society Act 1973, Government of Madhya Pradesh, India on 31 January 2000 with No SC2707. It was affiliated by Nehru Yuva Kendra Sangathan, Ministry of Youth Affairs and Sports, Government of India. It accredited by Madhya Pradesh Jan Abhiyan Parishad, Government of Madhya Pradesh, since 2013, also enrolled in Navankur Yojana with enrollment number NV2016CHH0062 Dated 29/09/2016. It is also registered with NGO-PS, Government of India And having The NGO-Partnership System, Portal (NGO-DARPAN), NITI Aayog, (National Institution for Transforming India), Govt. of India. ID MP/2014/0076324. NGO Databases



Object of The ESW Society:

1. To establish, arrangement and management all around development in the field of Education and expansions of educational institutions.
2. To develop Ideal morality, Character building in the Children according to Indian tradition and Culture.
3. All around development of the Children. Arrange training programme to establish Self Employment Centre.
4. To organize Seminar for Environmental management, Pollution control, and establish Awareness centre for the same.
5. To make awareness for Social welfare. Check against Animal cruelty and to protect against cruelty and Tyranny.
6. Open animal house for improvement of animal health and provide necessary facility for them.
7. To highlight modern Technology, Computer, Games & Sports, Music, Art, Literature, and various languages Hindi, English, Urdu, and other foreign languages in the field of Education.
8. Establish Research Centre.



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About Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Jammu & Kashmir

Preamble

SHER-E-KASHMIR University of Agricultural Sciences and Technology (SKUAST), is a multi-campus university, named after great patriotic leader Jenab Sheikh Mohammad Abdullah popularly known as Sher-e-Kashmir. It was established in the year 1982 through an Act of the J&K Assembly, with its headquarter at Shalimar, Srinagar. In the year 1998-99, the University was renamed as Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-Kashmir) and its territorial jurisdiction redefined to Kashmir and Ladakh regions.

Mission

- Teaching, research and extension education services related to agriculture and allied sciences directed to food, nutritional and livelihood security
- University is committed to develop quality human resource, innovative technologies and their dissemination so as to serve the farming community of the State with dedication and zeal

Mandate

- Making provisions for imparting education in different branches of study in agriculture, horticulture, veterinary and animal sciences, forestry, fisheries, agricultural engineering, food science, environmental sciences, sericulture and other allied sciences
- Furthering the advancement of learning and research in agriculture and other allied sciences, with particular emphasis on temperate and cold arid agriculture
- Dissemination of such sciences and technologies to the rural farming community of the State through extension education services; and such other purposes as the University may from time to time determine

The beautiful city of Srinagar is spread around the world famous Dal lake. Weather in Srinagar is pleasant from April to September. You may require woollens occasionally during this time. The city has tourist attractions in the form of Mughal Gardens, Dal Lake and an international 18 hole Royal Springs Golf Course and international convention centre. Gulmarg, Sonmarg, Pahalgam and Yousmarg are the popular destinations from Srinagar. Each of them can be done as a day trip. Good hotels and lodges are available if you intend to stay overnight.

Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, have different Guest Houses (Chinar Ghar, Kamad Ghar, Ambri Ghar, Zaffaran Ghar) in its main campus (SKUAST-K, Shalimar) with all facilities for its guests.



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International Journal of Global Science Research (IJGSR)

Abbreviated title: Int. J. Glob. Sci. Res.

ISSN: 2348-8344 Paris

Journal Website: www.ijgsr.com

Started Year April 2014;

Frequency: Bi-annual (April & October)

Language: English & Hindi

Index Copernicus International ICV 2016: 62.6

NAAS score 2018: 2.76

Crossref DOI: 10.26540

Impact Factor 2017: 2.312

Subject: Environmental Sciences

Keywords: Global Science, Environmental Sciences, Biosciences, Earth and Atmospheric Sciences

License: Free for non-commercial use

Email: editor@ijgsr.com

IJGSR is Open access, Peer-reviewed, Refereed, Indexed, Biannual, Bilingual, Impacted Academic Journal. Under auspicious of: Environment & Social Welfare Society, India

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IMPACT FACTOR: A recent accomplishment for the journal has been the Impact Factor (2017) of **2.312** as a result of its genuine editorial efforts and consistent growth. IJGSR is part of the eco-friendly community and favors e-publication mode for being an online 'GREEN journal'

Editor-In-Chief



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MP Government, Firms & Society Act 1973/44 Redg. No. SC2707.2K
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EDITORIAL

Ecotourism is a growing segment of the global tourism industry that is making significant positive contributions to the environmental, social, cultural and economic well-being of destinations and local communities around the world. Offering market-linked long-term solutions, ecotourism provides effective economic incentives for conserving and enhancing bio-cultural diversity and helps protect the natural and cultural heritage of our beautiful planet. By increasing capacity building opportunities, ecotourism is also an effective vehicle for empowering local communities around the world to fight against poverty and to achieve sustainable development.

The ESW Society organizes its 3rd International Research Conference on “**Ecotourism & Environment**” in association with SKUAST-Kashmir. The Official Agenda for Sustainable Development adopted on 25 September 2015 for Sustainable Development Goals and its associated 169 targets, as the thrust area for work in Climate action provide a field for research and discussion. Since the 1st ESW National conference on “sustainable development of natural resources and wildlife conservation”, convened by ESW Society in 2014, a growing body of knowledge has been generated addressing the complex relationships between the Nature conservation and wildlife with important research activities on this subject. There is now a wide recognition of the urgent need for the environment, biodiversity, and tourism industry, national governments and international organizations to develop and implement strategies to face the global warming and to take preventive actions for future effects, as well as to mitigate tourism’s environmental impacts contributing to global warming. Furthermore, such strategies should take also into account the needs of developing countries in terms of Millennium Development Goals.

Keeping above serious issue in mind ESW Society, India President Dr. Ashwani Kumar Dubey has called for action on Partnerships for the Goal, and Nature conservation. To provide a platform to Educational Administrators, College Principals, Deans, Readers, Head of Departments, Professors, Assistant Professors, Scientists, Environmentalist, Stakeholders, Researchers, Young scientists and Students to disseminate knowledge related to Nature Conservation, Resource Management and possible solution by Technological Approach.

Dr. Ashwani Kumar Dubey



3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018

ACKNOWLEDGEMENT

This is an honor for **Environment and Social Welfare Society, Khajuraho**, to organize its ESW III International research conference on "Ecotourism & Tourism" during **29 to 31 July, 2018** at Kashmir in association with **Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir**, Shalimar Campus, Srinagar, Jammu & Kashmir, India.



I am Thankful to **Prof. Nazeer Ahmed** Honourable Vice Chancellor, **Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir**, Shalimar Campus, Srinagar, Jammu & Kashmir, India for its in association, inspiration and support to ESW Society for this Conference.

It is my privilege and pleasure to express my profound gratitude to our **VIP Guest** Honourable **Dr. A. Hameed Khan**, Senior Scientist, National Center for Medical Rehabilitation Research, National Institutes of Health, Bethesda, Maryland, USA. **Prof. Priyavrat Shukla**, Vice Chancellor, Maharaja Chhatrasal Bundelkhand University, Chhatarpur Madhya Pradesh, India and Honourable **O P Sharma**, Director Ecology, Environment & Remote Sensing, Jammu & Kashmir who have given very kindly, consented for Inaugural Programme of the Conference.

I acknowledge deeply to honourable **Mr. Abdul Lateef UL Zamaan Deva**, Chairman, Public Service Commission, Jammu & Kashmir for agreeing to request to Chief Guest the Valedictory & Award ceremony of Conference.

I am heartily thankful to honorable Invitee Guest and Chairperson Who have very kindly consented and given us an opportunity to share valuable thought which will provide milestone on the way of leading Scientists in the Conference.

I am thankful to all the contributors of the research abstracts who shared their research experiences with us, this Souvenir would not have been possible without them.

I am especially thankful to all delegates who actively participated in this Conference. I am thankful to Electronic and Print Media. I am profoundly thankful to my Board of Director, International advisory committee member, International coordinator, All members of ESW Society, Organizing committee, Coordinators, Registration, Protocol and Hall arrangement Committee, Accommodation committee, Transport and Food committee members for their invaluable cooperation, and those entire person who are directly or indirectly concerned with this conference.

Dr. Ashwani Kumar Dubey



3rd International Research Conference on Ecotourism & Environment 29 to 31 July, 2018

OBJECT OF ESW III INTERNATIONAL RESEARCH CONFERENCE

Object: To provide a platform to Vice Chancellors, Educational Administrators, College Principals, Deans, Professors, Readers, Associate Professors, Assistant Professors, Scientists, Environmentalist, Researchers, Young scientists and Post Graduate Students to disseminate knowledge related to Ecotourism & Environment.

Theme: To take some positive steps towards improving our Ecotourism & Environment for future generation.

Goal: The moral obligation to act sustainably as an obligation to protect the natural processes that form the context of human life and culture, emphasizing those large biotic and abiotic systems essential to human life, health, and flourishing culture. Ecotourism and Environment, which are understood as dynamic, self-organizing systems humans have evolved within, must remain 'healthy' if humans are to thrive. The principal goal of this conference will be to present some of the latest outstanding breakthroughs in Ecotourism and Environment, to bring together both young and experienced scientists from all regions of the world, and to open up avenues for research collaborations at regional and global level.

THE GENERAL TOPICS COVERED IN CONFERENCE WILL BE AS UNDER:

Ecotourism is a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small scale alternative to standard commercial mass tourism. **Ecosystem:** Aquatic, Terrestrial and Areal ecosystem, Ecology, Ecosystem and its conservation measure. **Wildlife:** Animal Behavior and Wildlife Conservation, Endangered, Threatened and Endemic Species Conservation, Strategy for wildlife conservation. **National and World Heritage:** Heritage and Tourism, Importance of tourist, Tourist need, Eco-Tourism.

Technological Approach for sustainable development: Method and Technique for Ecotourism and Environment management, Bio-indicator, Application of bio-technology, Rural bio-technology, Tools and technique, Bio-markers, Climate change and Ecosystem management. Role of N.G.O. for Ecotourism, Environment, Wildlife and Heritage conservation

The general topics covered in the conference: Research Needs in Ecotourism, Research Needs in Environment conservation, Action plane for Ecotourism and Environment, Policy in Ecotourism and Environment conservation, Sustainable Ecotourism Development, Guide and Ecotourism, Role of NGO in Ecotourism, Community based Ecotourism, Role of Biodiversity in Ecotourism, Needs of Stakeholders for Ecotourism, International and National Heritage conservation, Assessment of Environmental impacts of Ecotourism, The Existing Knowledge of Ecotourism, Biological and Ecological Impact of Tourism, Pollution in Tourism area, Environmental study of Tourism area, Natural resource management, Wildlife and Forest conservation, Technological Approach Lab to Land.



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Dr. Shamim Ahmad Banday, Poonch, Jammu & Kashmir



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INVITED LECTURE

**INDIAN ECONOMY GROWTH IN DOLLARS; STRATEGIES, RADICAL REMEDIES
OF GOLDEN CROWN JEWEL–THE MEDICAL TOURISM?**

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Indian medical tourism and economic growth are the two sides of the same coin. In modern era, where the modern civilization touched the mountainous peak at one hand while on the other hand its side effects generated many diseases in world. The treatment of the diseases need the affordable finances which varies income per capita/year of the family. In such issue our country India fulfills the needs of any family income/capita/year. In global scenario, though our country India is small in modern modalities, modern medical technologies but the intelligent brains of the Indian Doctors, paramedical staff, nice balanced vegetation attracted the foreigners to India for the treatment. Kinsley stated in 2002 the India has immense potentials.

Now the question arise before us that what is medical tourism?- simple answer is the foreigners visited to India for taking treatment by M visa provision. Now think over economic grow the played by our medical industries. As regard of the medical treatment, the hospitalization is not only the end, but pre and the post management of the patient with suitable, adoptable is the basic need to get rid from the pains and other dreadful scenario experienced by the patient during treatment. So a link package of treatment with the other adoptable factors must be the basic need to get revenue by Indian government.

Finally let us join our Indian hands massively with the foreigners, NRI, tourists agencies, hospitals, central govt. of India, ministry of health, ministry of tourism, ministry of tourism [central and state govt.] and other in view; to raise the economic graph of Indian revenue and the full satisfaction of medical tourists arrival [lethal and non-lethal diseases what so ever does not matter] to our India in any state.

In last, let us; enlightened the torch of this sparkling revenue getting project with full enthusiasm and heartily clippings and cooperation of each Indian.

Key Word Index: *medical tourism, treatment*

THE IMPACT OF HUMAN GENOME PROJECT ON CLIMATE CHANGE

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Fifteen years ago, we completed the Human Genome Project after breaking the genetic code and unlocking the secrets of life. We understood for the first time the inner working of a normal cell and how it becomes a cancer cell after exposure to Chemical pollution, radiations or genetic inheritance. In the Human Genome Project, we completely read the entire book of life of a human being. The book of life is made of 46 volumes (called chromosomes), which carry



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24,000 chapters (called genes) and the total books are written in four genetic letters (nucleotide: Adenine, Thymine, Guanine and Cytosine), and the total genetic content of these books is referred to as its Genome. The entire book of life is made of six billions and four hundred millions letters present in every cell in our bodies. Less than two percent of the genome codes for the protein. A minute change in the coding region (called mutations) even in a single letter of the genetic text of the coding region could produce a wrong protein that makes us ill or kill. Cells have the remarkable ability to keep track of their genetic contents and — when things go wrong - to step in and repair the damage before cancer or another life-threatening condition develops. But precisely how cells monitor the integrity of their genomes, identify problems, and intervene to repair broken or miscoded DNA has been one of Nature's closely held secrets. The completion of the Human Genome Project revealed that secrets for the first time. The DNA damage response is a routine event in the life of any cell. Stress caused by environmental factors such as exposure to ultraviolet light, ionizing radiation or other environmental chemicals pollutants or genetic inheritance or viral infection could cause DNA to break apart or rearrange its nucleotide base pairs in unhealthy ways. If such mutations are left unchecked, they could accumulate over time and lead, ultimately, to cause diseases including cancers.

The tool kit developed while sequencing Human Genome was used to sequence hundreds of species including plants. While sequencing Chloroplast Genome, the photosynthetic apparatus in plants which convert the pollutant Carbon dioxide into its food Carbohydrate and releasing Oxygen as its by-product, we realized that it is possible to reduce the level of Carbon dioxide by cultivating Chloroplast rich microbial life and spreading on the entire surface of Earth.

Plants first appeared on the Planet Earth about 400 million years ago. With the appearance of plants, Oxygen molecules appeared. The photosynthetic apparatus, the chloroplast, in plants started absorbing Carbon dioxide and started releasing Oxygen in the atmosphere. As forests thrive in the aerobic atmosphere, the evolution in many plants played significant role in converting the Carbon dioxide to Oxygen. Of all the plants, Maize is the winner. The fields of plants maize can efficiently assimilate and convert CO₂ to carbon products such as Carbohydrates during photosynthesis releasing Oxygen. As the Sun rays strike the forests on Earth surface, the Chloroplasts in the trees convert the Physical energy from Sun into Chemical energy Carbohydrates by photosynthesis. Chloroplast genome absorbs Carbon dioxide from the atmosphere and in the presence of Sunlight and Water; it converts the pollutant Carbon dioxide into its food Carbohydrate and release Oxygen. Most of the Earth is powered by photosynthesis. It was plants that introduced Oxygen on Earth's atmosphere. Using Genetic Engineering, we could introduce Chloroplast Genome rich plants worldwide to reduce the level of Carbon dioxide.



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ECOTOURISM AND THE HEALTH EFFECTS OF MOSQUITO BORN DISEASES

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Ecotourism is a form of tourism involving visiting undisturbed natural areas, Ecotourism is now defined as "responsible travel to natural areas that conserves the environment, Eco-tourism is not only travelling to such ecosystems, but also conserving them. It is now high time, we should start our efforts, hard work to save our earth for the purpose of learning about the environment and at the same time focus on wildlife and promotion of understanding and conservation of the environment."

Travel, migration, and displacement from one place to other place are significant characteristics of human being it leads to significant risk factor for infectious disease. Humans travel in numbers. Human travelers can easily carry person-to-person transmitted infections to any part of the world. The question arises that of how controllable an infection is that is directly transmitted from person to person, a key factor is the proportion of transmission that occurs before onset of symptoms. *Aedes albopictus*, originally found in Asia, has become widely dispersed beyond Asia and is now found in many parts the world. Dengue infection, which can lead to dengue hemorrhagic fever DHF can also, be transmitted from person to person while travelling to many places easily.

Study of infections in travelers has also provided new insights about transmission of vector born diseases like Malaria, Dengue, Chikungunea, Diarrhea, Viral diseases etc. Human serves as primary hosts for the mosquito-borne dengue and Chikungunea viruses, Malaria transmission occurs in many tropical and subtropical areas. *Plasmodium vivax*, *plasmodium falsiparum* are the parasites which are responsible for the transmission of malaria from one person to another while travelling and it leads major effects on ecotourism.

Any person, who goes to a country where malaria transmission occurs, should take precautions against this dreadful disease malaria. This includes tourists, business travelers, long-term travelers, , students, returning to their home countries to visit family, friends, and relatives. Standby emergency treatment is not a replacement for taking malaria prevention medicine when travelling to a country with a risk of malaria. Some groups of travelers, especially young children, pregnant women and individuals with a low immune system, are at high risk of developing serious illness if they become infected with malaria, due to the not proper care and prevention from mosquito biting. In pregnant women, malaria increases the risk of maternal death, and low birth weight, different serious mosquito born diseases also transmit from person to person while travelling like as Splenomegaly, Subdural hematoma, Cerebral malaria , Encephalitis etc.

Ecotourism is to visit to natural areas to conserve environment but simultaneously Iam coming on one conclusion that if we take proper care and efforts for our environment, we can ultimately save our earth and many lives.

Key Word Index: *Aedes aegypti*, *Dengue*, *Chikungunea*. *Plasmodium*, *Migration*



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EXPLORATION OF FLORISTIC DIVERSITY OF BELGAHNA RANGE DIST. BILASPUR IN CHHATTISGARH: POSSIBILITIES FOR ECOTOURISM

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Belgahna range falls in Marwahi forest division with Pendra Road as Head Quarter in Chhattisgarh. It occupies a thick and dense forest area, distributed in Maikal mountain ranges. The diversity has not been studied systematically excepting some efforts done by the State Forest Department.

Viewing this, the present investigation deals with some of the important aspects of the flora of Belgahna which was found to be very diverse and rich. Floristically it has been represented by 31 families of dicotyledonous and 4 monocotyledonous families, distributed in 72 genera and 79 species of seed plants (Angiosperms). Generic coefficient of the Belgahna range was 92.15%. This inferred that more intergeneric competition exists in the area. Phytosociologically herbs occupied high density values as compared to trees which is obvious due to the luxuriant growth of ground flora after rains when sampling was done.

High IVI values of these plants also show their good power of regeneration and greater ecological amplitude. Thirty two trees in Belgahna site, 31 in Tenganmada site, 28 in Khongsara site, 23 in Bhanwartank site and 23 trees were reported in Tatidhar site which clearly denotes that the vegetation is dominated by tree life form. Thus, the physiognomically vegetation is a 'forest'. High D.B.H. of tree species suggests their ecological success and also recalls for the allocation of more resources towards the trunks of the plants.

Most of the species found in this forest range seem to show a greater resilience to disturbances, such as, anthropogenic factors, grazing and other utilization pressures. But, it is also true that they again regenerate and maintain their composition, thus, exhibiting sustainability to a greater extent. That must be the reason why Belgahna range seems to be always dense, green, productive and ecologically viable maintaining ecological security.

Since it is well connected by means of transport and travel this can be made a very easily approachable place for nature lovers due to its beautiful topography and lush green forest cover.

Key Word Index: *Floristic diversity, forest, flora*



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ECOTOURISM

IMPACT OF CONFLICT ON THE MACROECONOMIC VARIABLES OF JAMMU & KASHMIR STATE: A CASE OF TOURISM SECTOR

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Jammu & Kashmir State is unique tourist destination in the sense as it offers attractions for varied type of tourists as Jammu is known for Pilgrim tourism, Kashmir for scenic and Ladakh for adventurous tourism. This kind of distinctiveness is seen only in the state of Jammu and Kashmir in the whole country. The state has a huge tourist potential while the growth and development of other sectors was restricted due to certain natural limitations. With the growth of population, there has been increase in the work force that needs to be engaged. Given the capacity of other sectors in the state, tourism has been the main sector which offers great scope to the growing able body work force. However, the on-going situation in the state has not only squeezed the space for adjustment but also left already absorbed large chunk jobless and adversely hit/affected the macroeconomic variables of the state economy. In this backdrop the present study has been undertaken to evaluate the impact of conflict on the macroeconomics variables and how it affected the physical¹, social, human² and institutional capital of the state. Being an agrarian economy, Jammu and Kashmir has a promising tourism sector which became the major target of the decade long unstable conditions. It is pertinent here to analyze the overall impact of conflict on the tourism sector of state economy. It was proved that tourism sector has both long-run as well as short-run causality running from real gross domestic product to other economic variables of the state economy during the conflict situation. So any underperformance in this sector would be detrimental for the growth of state economy. In order to revive the sector there is urgent need to invite all the stakeholders and evolve a strategy providing required incentives and concessions, to 'put the state back on the confidence map' so that the tourism sector would cope with the difficult situation and regain the sheen of its normal functioning and thereby would engage the masses in great numbers and benefit the state economy as well.

Key Word Index: *Tourism, Conflict, Macroeconomic Variables, Co-integration, Granger Causality, Unit Root*

¹ Violent conflicts result in the destruction or removal of physical capital, including bridges, buildings, and communications and energy sector infrastructure. This lowers standards of living in ways that cannot be captured by GDP measures.

² Destruction of Human Capital means the skills and abilities of a labor force alter as a result of conflict. As with physical capital, human capital flees a country during a conflict through migration. This could be because educated workers may have more means to quit a country, or it may be because they specifically are targeted for ideological or tactical reasons. Human capital is also lost through declines in health through the spread of diseases. Worsening health conditions, like declines in investment, affect economies well after war ends.



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SCOPE AND CHALLENGES IN ECOTOURISM: A COMPREHENSIVE STUDY IN INDIAN CONTEXT

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Tourism is one of the fastest growing industries with an annual average growth rate of 5%, and numbers of international travel might nearly double until 2020 compared to 2006. Having experienced a growth of 25% between 1995 and 2005, tourism today accounts for 10% of the world's economic activity and is one of the main generators of employment. Tourism is also a major source of Foreign Direct Investment (FDI) in many developing countries such as India, China, Bangla Desh, Sri Lanka. The tourism industry ranks about 6th in international trade after trade in fossil fuels, telecommunications and computer equipment, automotive products, and agriculture. According to the World Tourism Organisation (UNWTO), tourism that involves travelling to relatively undisturbed natural areas with the specified objective of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspect found in these areas is defined as ecotourism. An optimum number of environment friendly visitor activities, which do not have any serious impact on the ecosystem and the local community and the positive involvement of the local community in maintaining the ecological balance are some of its key elements. In the present paper the authors have given a comprehensive study on ecotourism pertaining to Indian context and its scope and challenges in coming years. Ecotourism in India may take a very important role in unorganized sectors especially those who are not employed or are not doing any regular job.

Key Word Index: *tourism, employment, UNWTO, environment friendly, unorganized sector.*

ECO-TOURISM IN LOLAB WITH PROSPECTIVE OF POVERTY ALLEVIATION AND NATURE CONSERVATION

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The International Ecotourism Society has defined Ecotourism as "Responsible travel to natural areas that conserves environment and improves well-being of local people. With a responsible tourism it's a potential of preserving the ecological integrity and conservation". It is a form of community tourism of which local people form an integral part. Highlights heritage value of wilderness and protected areas Uses indigenous, locally produced and ecologically sustainable materials for tourism activities. Lolab Valley located in district Kupwara of J&K



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recently introduced as tourist destination to masses could be an eco-tourist hub if maintained properly. The present aims at finding ways by which Lolab eco-tourism could be the source of poverty alleviation and at the same time making nature conservation a priority. Therefore, a survey was done using questionnaire method to record the responses of people of the valley towards the prospective of poverty alleviation and nature conservation. All the respondents agreed on poverty alleviation, infrastructural development and betterment of people, also people showed concerns about pollution, loss of cultural diversity, medicinal plant smuggling and threats to wildlife and mostly of the social issue like crime rate was the among the most highlighted issues.

Key Word Index: *Alleviation, Questionnaire, Smuggling, Indigenous*

ECOTOURISM AS A SUPPORTING LOCAL LIVELIHOOD: SURVEY OF MUGHAL GARDENS, SRINAGAR, JAMMU AND KASHMIR

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Kashmir is bestowed with rich wilderness as picturesque excellence of its ski resorts, mughal gardens, high snow-clad Himalayan mountains, beautiful valleys, alluring lakes and springs, thick backwoods, ageless grace of architecture and hill stations enhance its splendor. A preparatory study was directed at three Mughal gardens (Shalimar Bagh, Chasmashahi and Nishat Bagh) in the middle of spring period of Srinagar city, 2017. The methodology opted for this study was the Personal Interviews and Questionnaire in order to gather the attitude of visited tourists and information respectively. A total of 240 respondents was assessed which includes 83% of National tourists and 17% of International tourists. It was analyzed that only 58% tourists were satisfied with cleanness of Mughal gardens. Also the good proportions of tourists are willing to visit these famous gardens again with 79% for the aesthetic value. Ecotourism offers to environmentally and socially cognizant people and enable the visitors in self-awareness and learning of better approaches to live on this planet as ecotourism can lead to the overall development of J&K by acting as environment regulating force in Kashmir.

Key Word Index: *Ecotourism, livelihood, Mughal gardens, Tourists*



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ECOTOURISM AS TRANSFORMING TRAVEL: SURVEY OF FAMOUS TOURIST DESTINATION GULMARG IN KASHMIR HIMALAYA

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Gulmarg is situated at an altitude of 2730 m above sea level in the Baramulla District of Kashmir which is surrounded by snow covered mountains, lush green meadows, deep ravines, evergreen forested hills and valleys. Gulmarg forms the most popular or the golden triangle of tourism in Kashmir and is known for amazing skiing destination. The place is well-known for having one of the renowned car project which is called 'Gulmarg Gondola'. A preparatory study was conducted at Gulmarg during summer season (June, July and August) 2017. The methodology opted for this study was the Personal Interviews and Questionnaire in order to congregate the attitude of visited tourists and information respectively. A total of 360 respondents were assessed among which 71% were National tourists and 29% were International tourists. The results revealed that 68% tourists were satisfied with cleanness of the area. Also the good proportions of tourists are willing to visit this meadow land again with 89 % for its artistic value.

Key Word Index: *Ecotourism, Gulmarg, International tourists, National tourists*

KHNIFISS LAGOON-ESTUARINE COMPLEX (MOROCCO): A COASTAL, MARINE, DUNE AND SAHARAN ECOSYSTEM

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With a total area of 60 000 ha northeast of Tarfaya, southern Morocco. The Khnifis site is the only Saharan lagoon-estuarine complex in North Africa and the largest along the Moroccan Atlantic coast. It is located 120 km south of Tan-Tan and 70 km north of Tarfaya, the lagoon of Khnifiss is the largest lagoon of the Moroccan Atlantic. It is the only lagoon located in the Saharan bioclimatic stage.

This site offers natural landscapes of a magnificent beauty and an irresistible attraction ranging from lagoon coastal marine aspect and salty lake and dune aspect with a movement of sand orchestrated by the wind to the cliffs, high valleys, vegetation Saharan Africa, steppes, etc. Due to its morphology and dynamism, the Khnifis lagoon is considered a lagoon-estuarine complex that offers an astonishing diversity of biotopes in an austere desert environment but with sumptuous landscape beauty. The natural values of the site are enhanced by the presence of



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prehistoric and historical archaeological remains which have been the focus of multidisciplinary research in recent years. It is the most important of the protected areas of the Moroccan Atlantic coast as the main migration route for birds and for inland protected areas as an ecological corridor for Saharan fauna, identified as a priority biological and ecological interest (SIBE), in the context of the development and implementation of the Master Plan for Protected Areas. It is currently on the RAMSAR list to be set up as a national park, in addition to the littoral and lagoon zone, a marine part and a terrestrial one to encompass the coastal, marine, dune and Saharan ecosystem.

Key Word Index: *Marine Protected Areas, Khnifiss lagoon, National Park of Khnifiss, Marine tourism, Coastal Sahara, Morocco.*

ECOTOURISM: AN ADVERSITY IN ITSELF WITH SPECIAL REFERENCE TO JAMMU & KASHMIR

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Tourism industry is fastest growing service industry in the world and a source of employment generation & economic development with its multiplier effect. Jammu and Kashmir (J&K) has greater potential to become one of the best tourism destinations in the world with its geographic location, mesmerizing scenery, unending attractions and virgin valley. This state truly has been a perfect destination for ecotourism. Ecotourism being a product of tourism, intended as a low-impact alternative to conventional mass tourism which leaves behind a less negative impact on the environment, increase the level of education and activism among travellers, making them more enthusiastic and effective agents of conservation and serve as a viable mean of economic development for local communities. In other words, ecotourism is a mixture of conventional tourism with a twist of conservation and sustainable development. In J&K Ecotourism operations occasionally fail to live up to conservation ideals. Irrespective of many efforts made by the stockholders of ecotourism development to sustainably develop ecotourism projects keeping in view the natural and cultural preservation, the mass tourism brought many negative impacts beside the significant positive impacts on local environment. By going through the existing literature on the subject, the present study attempts to find out; if the image of ecotourism in J&K portrayed theoretically have the same implications when it comes to its practical applicability? Or the reality lies far away from the theory?

Key Word Index: *Tourism, J&K, Ecotourism, Conservation, Ecology, Local communities, Indigenous culture and sustainable development.*



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VULTURE RESTAURANTS: UNIQUE ECOTOURISM DESTINATIONS IN NEPAL

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Vulture, a fairly common natural scavenger birds about two decades ago are in grave danger of extinction across the Indian subcontinent now. Study in India indicates that Oriental White-backed Vultures declined by 99.9% over the period 1992 to 2007, and Long-billed and Slender-billed Vultures decreased by 96.8% over the same period and Red-headed Vulture declined by 91% from 1990s to 2003. Within Nepal, research and monitoring of vulture species has been undertaken in lowland areas and has revealed similar declines of 91% for Oriental White-backed Vulture and 96% for Slender-billed Vulture between 1995 and 2011. Due to similar declines elsewhere in South Asia in 1990s, four species out of nine species of vultures in Nepal, Oriental White-backed Vulture, Long-billed Vulture, Slender-billed Vulture and Red-headed Vulture were up listed by IUCN as “Critically Endangered” which is highest category of endangerment.

Vultures play a highly important ecological role through the rapid consumption of animal carcasses. They do safely disposing off dead animals and help in preventing the spread of zoonotic diseases. The losses of a major scavenger from the ecosystem have associated disease risks for wildlife, livestock and humans including the spread of rabies, anthrax, tuberculosis and brucellosis. They also have an important cultural role in the consumption of human dead bodies in sky burials within Nepal and Tibet. Among Lama People in Trans Himalayan range the dead human body is cut in to pieces and offered to vulture. In this dry environment where burial and incineration are impossible, vultures are the cleaner of the environment. In Hindu mythology, a vulture is said to be the carrier of God Sani (Saturn); and a vulture struggled with Ravana to stop kidnap of Sita in the Ramayan.

The main cause of these declines of vultures is veterinary drug diclofenac which is widely used to treat livestock in Asia. Vultures are highly susceptible to Non-Steroidal Anti-Inflammatory Drug, diclofenac; they are exposed to the drug through the carcasses of treated livestock. Vultures that consume tissue from diclofenac treated animal carcasses induced kidney failure with clinical signs of visceral gout.

In order to halt the decline of the critically endangered vultures in Nepal, Government of Nepal banned production and use of veterinary diclofenac in 2006; prepared and implemented the first Vulture Conservation Action Plan for Nepal (2009-13) and revised to Vulture Conservation Action Plan for Nepal (2015-19). The one of the milestone work on vulture conservation in Nepal is establishment of Vulture Restaurant which is now linked with the ecotourism.

A Vulture Restaurant is restaurant for vultures, not for humans. The community managed Vulture Restaurant popularly called Jatayu Restaurants are pioneer and unique concept among the conservation community. Now seven Vulture Restaurants are on operation in Nepal where safe food is provided to vultures. These Vulture Restaurants collect old and unproductive cattle from the farmers and rear them in Cow Rescue Centre. In Nepal cows are regarded as sacred animals and its killing is punishable by law. Thus, when cattle become old and unproductive,



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they are often a burden to farmers. Cow Rescue Centre of Vulture Restaurant is best alternative place to donate the cows where provide a good care until their natural death. After the natural death of cattle, carcass fed to the vultures.

The cattle carcasses are placed at a designated dining place where vultures then come to feed. A hide is ideally placed to observe the vultures while they feed without disturbing them. Visitors can also enjoy the aerial acrobatics performed by the vultures as they circle the area. These restaurants generally attract most species of resident as well as migrant vultures. There are also plenty of opportunities to study other raptors and a variety of other birds. A visitor centre also provides information on diverse aspects of these majestic creatures and the conservation efforts carried out to safeguard them. In addition, the visitor centre provides information on diclofenac or other potentially vulture-dangerous drugs, and the cultural and natural history of the area. This conservation effort is not only linked with biodiversity conservation, livelihoods are sustained through this as well. Vulture Restaurants have been an attraction to local and international tourism and have linked to promote ecotourism.

ECO-TOURISM IN LOLAB WITH PROSPECTIVE OF POVERTY ALLEVIATION AND NATURE CONSERVATION

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The International Ecotourism Society has defined Ecotourism as "Responsible travel to natural areas that conserves environment and improves well-being of local people. With a responsible tourism it's a potential of preserving the ecological integrity and conservation". It is a form of community tourism of which local people form an integral part. Highlights heritage value of wilderness and protected areas Uses indigenous, locally produced and ecologically sustainable materials for tourism activities. Lolab Valley located in district Kupwara of J&K recently introduced as tourist destination to masses could be an eco-tourist hub if maintained properly. The present study aims at finding ways by which Lolab eco-tourism could be the source of poverty alleviation and at the same time making nature conservation a priority. Therefore, a survey was done using questionnaire method to record the responses of people of the valley towards the prospective of poverty alleviation and nature conservation. All the respondents agreed on poverty alleviation, infrastructural development and betterment of people, also people showed concerns about different forms of pollution, loss of cultural diversity, medicinal plant smuggling and threats to wildlife and mostly the social issue like crime rate, population explosion, were among the most highlighted issues.

Key Word Index: *Alleviation, Questionnaire, Smuggling, Indigenous*



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**MODELING SPATIAL PATTERNS OF WARASGAON RESERVOIR WITH SPECIAL
REFERENCE TO ZOOPLANKTONS AND MONITORING SECCHI DISK
TRANSPARENCY OF RESERVOIR BY USING LISS III SENSOR**

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Warasgaon reservoir is located fifty kilometers away from Pune. Although there is little inflow of pollutants into the reservoir from point sources and nutrient inflow from agricultural runoff, now days; due to an increasing anthropogenic pressure due to its recreation and tourism value, it was sincerely felt by us to monitor water quality of reservoir as it is used as drinking source. Secchi disk transparency (SDT) is the simplest and efficient measure to monitor water quality of the reservoir. The Studies were carried out to find spatial and temporal variations in physicochemical characteristics of the surface water in Warasgaon from September 2012 to March 2013. Zooplanktons were collected every month during study period and identified .It was found that among zooplanktons; Copepods were dominant (46%), followed by Rotifers (36%) and Cladocerans (18%). Several parameters such as Spatial Distribution of pH, Electric Conductivity, Total Dissolved Solids, Hardness, Alkalinity, Acidity, Dissolved Oxygen Temperature, Salinity, Phosphate, Nitrate and Sulphate contents in these reservoirs were studied and were found to be within permissible limits. The multiple linear regression model based on green, red, NIR and red/SWIR found to be best fit ($r = 0.88$) to the in-situ data. The results showed Warasgaon reservoir was oligotrophic in condition during the December 2012. This study has demonstrated the utility of GIS and remote sensing combined with laboratory analysis for assessment and mapping of water quality of the reservoirs. Thus, studies on the physical, chemical and biological variables of reservoir water are fundamental to evaluate the impacts of various activities and help to formulate prevention and mitigation decisions.

Key Word Index: *Warasgaon, Spatial distribution maps, Copepods, Rotifers, Cladocerans, Secchi disk transparency, oligotrophic.*



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LEGAL FRAMEWORK OF SUSTAINABLE TOURISM: EXAMINING GLOBAL VS. INDIAN PERSPECTIVE

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Sustainable tourism or Ecotourism is a growing segment of the global tourism industry that is making significant positive contributions to the environmental, social, cultural and economic well-being of destinations and local communities around the world. The International legal framework regulating ecotourism is still incipient & at its budding stage despite the efforts undertaken by concerned actors. Global initiatives like the 1992 Convention on Biological Diversity (CBD) only indirectly deals with ecotourism. The other international legal instruments which deals with ecotourism are CITES, 1975, Rio Declaration, 1992, Agenda 21, the Berlin Declaration on Sustainable Tourism, 1997 among others. In the Indian context, general tourism policies are not congenial for ecotourism and as of now legislations regarding ecotourism in India are rare. Due to lack of legislations in the area and efficient supervision of the implementation of the policies made by the government, there are certain basic problems of pollution, destruction and disturbance to the wholesome environment. The laws and policies which were framed for protecting the environment contain few reflecting provisions related to ecotourism. To mention few important concerned laws are Wildlife Protection Act, 1972, Forest Conservation Act, 1980, Environment Protection Act, 1986, National Ecotourism Policy, 1998 among others deal directly or indirectly with ecotourism. There is an urgent need to frame effective legislations which will not only promote ecotourism in India but also integrates the local communities to help preserve the pristine quality of these natural areas.

TOWARDS AN ECOTOURISM POLICY: GLOBAL PRACTICES AND THE LESSONS FOR JAMMU AND KASHMIR

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Jammu and Kashmir, the Himalayan state, lying in the northern-most part of India, is famously known as *Paradise on Earth* for the fact that nature has bestowed the region with immense idyllic natural beauty and unique heritage and culture - an ideal ecotourism destination by all means. The tourist arrivals to the state have steadily kept increasing, even though the state has witnessed turmoil over the past three decades. Unfortunately the state has not seen a similar growth in the eco-friendly tourism infrastructure, even when tourism to the state is being



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promoted as a peace strategy. The lack of a robust tourism (more specifically ecotourism) policy in the state has led to the haphazard tourism development with uncontrolled consequences on the environment and the local communities. This study conducts an analysis on present state of ecotourism policy in the State, and proposes a sustainable ecotourism policy framework for the State. The study uses benchmarking approach to analyze ecotourism best practices within the country and from selected countries around the world. The proposed ecotourism policy framework will provide insights to the tourism policy makers in the state towards establishing a robust and sustainable ecotourism policy.

Key Word Index: *ecotourism, sustainability, policy, Jammu & Kashmir*

STRATEGIES OF REDUCE CUSTOMER'S NO-SHOW AT RESTAURANTS

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No-show reduction at restaurants can not only mitigate losses incurred when customers fail to honor a booking but also affect consumers' reservation behaviors. This study analyzed the ability of restaurant booking policies to mitigate no-shows as well as the negative impacts. We herewith to summarize the results of the interview and suggest four mitigating No-Show policies for restaurants, they are Re-offering seats, Overbooking, Partial reservations, and No-show penalties. These four methods are also the most common mitigation No-Show policies for restaurants. A survey was conducted to understand the booking policies of the Taiwanese restaurant industry. The findings indicated that each sector of the restaurant industry possesses unique characteristics. This study shows that restaurant differentiation is important in setting booking policies. Reservation no-shows cause problems to wasted capacity and result in restaurants' losses. Our goal is to solve the wasted capacity and mitigation no-show loss, and to offer recommendations on what restaurants should do. Study was found that the restaurant operators generally believed that it was effective to have no-show penalty. Only each restaurant still has its own operating factors that affect its execution ability; the study also found that restaurants of different sizes may have variant reservation policies.

Key Word Index: *No-show; reoffering seats; overbooking; partial reservations; no-show penalties*



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BANGUS: THE POTENTIAL ECOTOURISM PLACE OF DISTRICT KUPWARA, JAMMU AND KASHMIR, INDIA

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Tourism is one of the main economic industry of the state of Jammu and Kashmir, which is worldwide famous for its natural beauty. However, tourism development is limited to a few places in the valley, which is not only restricting socio-economic benefits but also producing negative environmental impacts on these places due to increasing tourist influx beyond carrying capacity. Bangus is an undeveloped tourist destination which offers many attractions to its visitors in terms of scenic beauty, wildlife and amicable climate. Ecotourism development of the place will not only reduce the tourism pressure to developed sites but will also help in socio-economic upliftment of the area. The study aims to explore ecotourism potential of the Bangus.

Key Word Index: *Bangus, Ecotourism, Carrying capacity, Scio-economic benefits*

ECOTOURISM AND SUSTAINABLE DEVELOPMENT IN A MARINE CONSERVATION ZONE OF MARINE NATIONAL PARK, GUJARAT

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Gujarat's coastline supports a large human population that is dependent on the rich coastal and marine resources and ecosystem services, which play a significant role in economic growth. These resources provide significant benefits to the coastal communities in terms of fisheries and tourism and supports their livelihoods. Gujarat has a 1600 km long coastline, which is the longest of any state in India. In the coastal zone is the most significant area in terms of marine biodiversity, the Gulf of Kachchh. The Gulf of Kachchh situated on the west coast of Gujarat. Ecotourism is an agenda that relates to and acknowledges various dimensions of sustainable development: economic growth, social equity, and environmental conservation. While providing the pleasure of a holiday, ecotourism also creates services that accommodate the sustainable development concept. Given the different opportunities and possibilities of local sustainable development through the implementation of ecotourism, confusion may be created about how best to implement ecotourism. Without proper management, ecotourism will lead instead to environmental damage. The objective of this research is to examine, identify, learn and discuss about supporting factors and potential problems and opportunities within ecotourism and local sustainable development. Further, ecosystem degradation and destruction are taking place



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due to conversion of habitats to other forms of land use, overexploitation of species and associated destructive harvesting practices, the spread of invasive alien species and the impacts of agricultural, domestic and industrial sewage and waste. This rich diversity necessitates the study on the present status of coastal bio-resource potential not only on the basis of physical-chemical, biological and ecological but also through cultural, economic and social development point of view of MNP (GoK).

Key Word Index: *Ecotourism, Sustainable, Gulf of Kachchh, Conservation, Gujarat.*

PHOTOGRAPHY AS THE PROMOTING SOURCE OF ECO-TOURISM

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Ecotourism is about the travelling to natural areas for recreation and learning. It is about the responsibility and sensitivity that promotes conservation, brings harmony among communities and enable the sustenance of local people. The nature's beauty and the natural resources that promote the cultural unity and economical stability need enough conservation. One of such sources that encourage tourism in eco friendly way is one of the passionate arts, called 'Photography'. The places that attract the tourists in a very appealing way is through the irresistible images captured through cameras. The photographic art help the tourist to take their tour towards the sites of their choices, like to the areas of captivating mountains and rivers, or to the monuments with preserved historical and religious values, or to meet the people depicting diversified traditions and culture. The pictures taken at such places do not interfere with the routine of people, animals or nature. The keepsakes so created through photography are always original and help one keep enlightened on the darkest days. The souvenirs and memories created with photographs indicate the immense support towards the handicrafts, natural environment, wildlife, local vegetation, tradition and cultural aspects, thereby enhancing the positive approach towards ecotourism. Though photography is an old technological concept, but alongwith the electronic media, it plays an important role in promoting ecotourism. The applicability of photography to ecotourism is the way to bring one close to nature, and gain relevancy to travelling, experiences and employment.

Key Word Index: *Ecotourism, Photography, Travelling, Camera.*



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HORTICULTURE AND TOURISM: IDENTIFYING RESEARCH

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Jammu and Kashmir is an important tourist destination of the country and has been a place of attraction for tourists since centuries. The lush green forests, sweet springs, perennial rivers, pictures que, alpiners scenery and pleasant climate of Kashmir valley has remained an internationally acclaimed tourist destination. The advance in science there is international recognition that horticulture has an important role to play in tourism, as it does in all aspects of human health and well-being. In recent years it has become evident that there is much to be gained by seeking to understand and fully utilize this role. Besides having natural beauty, the state of Jammu and Kashmir is only state in the country where almonds and saffron grow. Besides we have monopoly in other fruits like walnut, apple and cherry. Our state has grown hundreds of high-yielding varieties of fruits and vegetables which can be exploited for tourism purposes. Tourists in Kashmir want to make the purchase of apple, walnut, almonds, saffron which are known world over for their taste and quality. There is potential for arranging farm tours in collaborations with Krishi Vigyan Kendra's of Agriculture universities where tourists can get fresh fruits directly from the orchards. Also fruit blooms and flowering in different seasons can also be promoted in a big way throughout the year. This article provides information on basic tourism concepts for an audience not traditionally exposed to tourism. It aims to show the interrelationships between tourism, tourists and horticulture and gardening. It also examines briefly the media coverage of horticulture, horticultural features and horticultural events to show the direct interrelationship between tourism and horticulture. Horticulture tourism has a great scope for growing with the goal of minimizing impacts on the environment with support of local culture for bringing economic benefits. This paper will look at the need for cooperative research from horticulture and tourism professionals, as well as public and private professionals, concerned with such major community issues as economic development, environmental protections/remediation, and human health and welfare. It aims to show the interrelationships between tourism/tourists, horticulture and gardening with briefly examining the media coverage of horticulture, horticulture features and horticulture events to show the direct interrelationship between tourism and horticulture.

Key Word Index: *Horticulture, gardening, garden tourism and tourism.*



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PAMPORE WETLANDS-AN EMERGING RAY OF HOPE FOR ECOTOURISM

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Tourism plays a vital role in the economy of developing countries like India and is therefore accepted as the third significant industry sector in the national economy. Over the past years, India has witnessed a solid growth in a new concept of 'ecotourism' that is now developing as the fastest growing sector worldwide. Ecotourism warrants economic value on the conservation and promotes ecological integrity of wilderness areas, for the benefit of local people living in that area by providing them source of revenue. Its main objective is to protect aesthetic values of that area in an ecologically, socially and economically sustainable manner and to aware tourists about nature, environmental conservation, traditions and cultural heritage. Ecotourism has been incorporated as one of the strategies in the J&K state Forest Policy, 2011 under section 4.13. This new concept of ecotourism has boosted the sustainable livelihood model for the tribal and other backward communities living around natural and protected areas in the state of J&K as tourism has been the backbone of the state's economy. The valley of Kashmir is a land of lakes, wetlands, clear water streams, green grasses, magnificent- trees in lush green forests that are surrounded by snow-capped mountains. In Kashmir, migration of waterfowl towards the wetlands usually commences in the second week of August when icy winds begin to lash the valley and also when day and night temperatures differ by as much as 200C (Jamwal, 1991).Pampore is a small town in the South of Kashmir, where some satellite wetlands are located and dotted with archaeological marvels, renowned for its cash crop saffron (Kesar) production, not only in Asia but throughout the globe for its best quality. It is situated on the eastern bank of the river Jhelum, located at 34.02⁰ N and 74.93⁰ E with an average elevation of 1,574 meters (5,164 feet FSL). Chatlam Conservation Reserve and the other four associated wetlands including Fashkoori, Manibugh, Chandhara and Kranchu in Pampore supports a rich diversity of migratory birds coming from different parts of the world including Siberia and Central Asia during winter (Bacha, 1994).In Chatlam wetland, conservation of ecology is utmost for sustainable ecotourism. This Conservation Reserve is observed to be one of the significant wetland of Kashmir valley and detected as largest freshwater lake in south Kashmir. Although, the plateau area adjoining this wetland from south-western side is famous for the saffron cultivation that gives it a charming look in the months of October and November, when the saffron flowers are seen blooming all around on the Pampore fields. Therefore, it has an immense potential for ecotourism spot as we can enjoy here the fauna of migratory birds with the blooms of saffron flowers growing around the banks of wetland. Thus, it could be designated as "Saffron Wetland Park" where the tourists could come from different parts of the world to watch colorful migratory birds and saffron fields. Keeping in view the above considerations, Chatlam CR is really the 'Jewel of Pampore town'.

Key Word Index: *Ecotourism, wilderness, saffron, waterfowl, Chatlam wetland*



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ECOTOURISM-AN EFFECTIVE TOOL FOR SUSTAINABLE DEVELOPMENT

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Ecotourism is a component of tourism industry, which is focused on the enhancement or maintenance of natural systems and gaining economy benefit through tourism. Ecotourism not only maintain a fine balance between the requirements of tourism and ecology, but also is pivoted around the needs of the local communities for jobs and income generating employment. Thus, it involves carrying out of environment friendly activities, which enables the economic and social development of local communities. Primarily, it is based on experiencing and learning about nature, its landscape, flora, fauna and their habitats, and also about the artifacts from the locality. The symbiotic relationship between the environment and tourist activities is possible only when appropriate policies are formed, followed by careful planning and tactful management. The carefully operated ecotourism sites, that mostly includes local participation, is able to provide direct benefits that will reduce less sustainable activities that make use of natural and cultural resources. Ecotourism provides the alternate source of livelihood to local community which is more sustainable. The present review emphasizes on the aims and importance of Ecotourism in conserving resources and also in maintaining sustainable use of resources. The Ecotourism depends on being environmentally and ecologically sustainable and economically applicable as well, thus acting as an effective tool for sustainable development.

Key Word Index: *Sustainable development, Ecotourism, Natural resources, Ecofriendly environment, Tourism industry*

STIONIC EFFECT AND SEASONAL NUTRIENT DYNAMICS IN SOME EXOTIC APPLE CULTIVARS

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The study aimed to investigate the influence of leaf nutrient concentrations among different exotic cultivars on various rootstocks growing in the same conditions. As for as the rootstock are concerned MM₁₀₆ had the highest level of nutrient concentrations whereas M₉ had the lowest. The exotic cultivars like Vista Bella on MM₁₀₆ recorded highest leaf N (2.37, 2.38%) P (0.21, 0.20%), Zn (37.4, 34.8 ppm), B (44.07, 45.30 ppm) and Fe (83.6, 114.2 ppm). The Mollies Delicious on MM₁₀₆ recorded maximum Ca (1.65, 1.67%), N (2.36, 2.39%) and Cu (12.3, 14.5 ppm) content and highest K content (1.54, 1.55%) recorded in Starkrimson on both



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rootstocks. However, the maximum Mg content (0.30, 0.30%) and Cu (11.3, 9.2 ppm) was observed in Cooper IV on both rootstocks.

The seasonal variation of leaf nutrient content indicate that early maturing cultivars viz, Vista Bella and Mollies Delicious recorded increase in nutrient content upto 30th of June, thereafter the trend decreased, while as the mid-season cultivars like Starkrimson and Cooper IV observed a similar trend upto 15th of July and decreased thereafter. The seasonal variation of nutrients in leaves indicate stability period of various nutrients like N, P, Ca, Zn, Mg, B and Fe in early maturing cultivars like Vista Bella and Mollies Delicious from 15th of June to 15th of July, while as in mid-season cultivars Starkrimson and Cooper IV the stability in nutrient concentration was recorded from 30th June to 30th of July indicating the appropriate leaf sampling period for these exotic cultivars as against the sampling time of existing cultivars which is from mid-July to mid-August under similar conditions.

Key Word Index: *Rootstock, cultivar, seasonal variations, nutrient concentrations*

ECOTOURISM IN JAMMU AND KASHMIR WITH REFERENCE TO HORTICULTURE

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Natural attractions are geographical or biological features that have a specific appeal to the tourism market. Natural attractions include deserts, varieties of fruits, rainforests, alpine areas, woodlands, grasslands, mountains, beaches, swamps, caves, oceans, cliffs and rivers, as well as the unique life forms that inhabit those environments. Ecotourism may be considered as part of environmental conservation and refers to what the actual needs of the people are who are local to the area so that it can help to improve their quality of life. It also involves learning more about the history of other cities and preserving the historical landmarks. Tourism policy provides the guidelines, goals and objectives and tourism planning is the process of identifying objectives and defining evaluations. The economy of the State of Jammu and Kashmir is largely dependent on horticulture sector but tourism is still considered as the backbone of economy mainly due the large scale employment generation. Horticulture has an international recognition for having an important role to play in tourism, as it does in all aspects of human health and well-being. In recent years it has become evident that there is much to be gained by seeking to understand and fully utilize this role. Both the sectors if linked to each other may bring excellent results and attract people from every nook and corner of the world, especially from the rest of India. Besides having natural beauty, J&K is the only state in the country where almonds and saffron grow. J&K also has monopoly in cultivation of other fruits like apple, cherry, pear and some other temperate fruit species. The government has also prioritized focus on boosting horticulture and



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tourism sectors in the State and measures are afoot to improve economy by focused funding of projects under these sectors.

Key Word Index: *Jammu and Kashmir, horticulture, ecotourism, economy*

SERICULTURE PRACTICE-A BONE FOR AMELIORATING ECOTOURISM IN JAMMU AND KASHMIR

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Jammu & Kashmir is an important tourist destination of the country and has been a place of attraction for tourists since centuries. Jammu & Kashmir is known for its sericulture both in India and abroad. Seri tourism is a type of ecotourism that promotes tourism compiled with creation of awareness to the tourists about all the sericultural activities right from mulberry cultivation to the production of Silk fabrics. Sericulture industry is one of the most ancient industries of Jammu and Kashmir. The unique silk products include Crap, Chinon, Chiffon and Gorgett made up of 100% pure silk, byproduct cocoon craft in addition to mulberry green tea, mulberry fruit and its important commercial products like jam, squash etc. Kashmiri silk goods are renowned worldwide for their quality, color and shades. A leading Japanese scientist, Tazima upon his visit to India expressed that Kashmir in view of its favourable climatic conditions could be converted into silkworm gene bank for sustaining the sericulture industry of the whole world. More so because of geographical location of our state particularly Kashmir which harbours multifarious type of insects unique to the region which not only attract scientists with entomological background but also produces a platform for interaction to different communities through its broad ecotourism base. Among various sericultural zones in India, Kashmir owing to its salubrious climatic conditions, is the only traditional univoltine or bivoltine belt producing quality mulberry silk and as such occupies a place of pride in sericulture. Therefore, the state has good scope for Seri tourism because of its broad ecotourism base. Hence efforts should be made to promote Seri tourism in Jammu and Kashmir.

Key Word Index: *Cocoon craft, Geographical, Jam, Multifarious, Seri tourism and silk products.*



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POTENTIAL OF FOREST-BASED ECOTOURISM IN JAMMU AND KASHMIR– INDIA

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The state of Jammu & Kashmir occupies an area of 2,22,236 km² which accounts for 6.8 percent of the country and the area is divided into the three regions viz. Jammu, Kashmir and Ladakh and the state comprises of three distinct climatic regions i.e humid sub-tropical region of Jammu, the temperate Kashmir Valley and the cold arid deserts of Ladakh. There is vast variation in case of tourism potentials of these parts and ecotourism point of view, the state is full of opportunities. Ecotourism is an alternative form of tourism which embraces tourism in the biophysical environment in natural areas. It incorporates ecologically sustainable activities, conservation supporting measures and involvement of local communities. The potential ecotourism activities attractive to different types of tourists are Forest based activities, River bound activities and Culture bound activities. Kashmiri culture is a major tourist attraction, in particular for its traditional crafts, houseboats, wood carving and weaving. Ecotourism in Kashmir from forest view point is still negligible. Forest areas are important places for the protection of ecological systems and natural resources as well as for the provision of recreational and tourism opportunities for the people and there are few opportunities to earn income from them. Recreational forests of J&K state are full of natural beauties and resources. Local flora and fauna, natural environment, ecology and biodiversity are main characteristics of the forests which attract the tourists to enhance their environmental awareness. Ecotourism is one of the tools whereby people are encouraged to visit natural beauty of forests to promote action to conserve it. Forest ecotourism accommodates and entertains visitors in a way that is minimally intrusive or destructive to the environment and sustains and supports the native culture. Attracting genuine eco-tourists is a challenge. Ecotourism, especially when it is based on forests, minimal disturbance to the natural environment and socio-cultural setup should be maintained. In this regard, it is important to attract the nature-loving and conservation-oriented tourists.

Key Word Index: *Ecotourism, J&K, forest, sustainable environment*

CLIMATE CHANGE AND TOURISM IN KASHMIR VALLEY

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Climate Change and Tourism in the Kashmir valley have a strong influence on the tourism and recreation sector, including the environmental resources that are the foundation for tourism (e.g., species habitat for ecotourism, snow cover for skiing, water supply, etc.) and the



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length and quality of tourism seasons. 79% believe that “Human activity including industry and transportation is a significant cause of climate change”. Despite the growing significance of the tourism industry to the global economy and the obvious interrelationship with climate, a number of researchers have lamented that the vulnerability of individual tourism industries and tourism destinations to climate variability has not been adequately assessed. All tourism businesses and destinations will need to adapt in order to minimize risks and capitalize on new approaches in a sustainable way and it is no longer sufficient to rely on past experience. Kashmir has faced so many tough situations in the past in terms of climate change like 2014 massive floods, increasing no. of avalanches, drought like situations, heat waves, cold waves, torrential rains, thunder and hailstorm which causes great impact to the tourism industry as well. The Kashmir valley of Jammu and Kashmir is an important component of the global tourism industry and the natural environment is very important in determining the attractiveness of a region for tourism. Perhaps more important than changes in tourism season length will be the impact of climate change on the natural mountain environments on which tourism depends. The large majority of avalanche fatalities in Kashmir are people involved in recreation (skiing, snowmobiling, and mountaineering) and thus climate change may pose a greater avalanche risk to tourists visiting mountain areas of valley. Climate records show that the Himalayan Mountains of Kashmir valley have experienced a 1.5°C increase in average temperatures over the past century, almost three-times the global average of 0.6°C . All of the glaciers in this region have shown a strong decline over the same period and glaciers less than 100 m thick are expected to disappear over the next 30 to 40 years. The loss of glaciers has a direct impact on tourism operations. Winter festivals in Kashmir have experienced problems over the past few winters due to lack of snow and warmer than normal temperatures. To assess the impact of climate change on winter tourism in any region requires an understanding of the impacts on neighbouring winter recreation destinations. Climate change represents an important long-term challenge to the tourism industry and it will create new risks and opportunities for different segments of the tourism marketplace and alter the competitive relationship between tourism destinations. The development of a strategic research agenda to assess the implications of climate change for sustainable tourism and target the key informational needs of tourism decision makers (both in government and business) is required. Increased collaboration between climate change scientists, government tourism officials and the tourism industry is paramount to developing such a research program.

Key Word Index: *Tourism, Climate Change and Kashmir valley*

ECOTOURISM NEW GATEWAY TO NATURE

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Ecotourism is entirely new approach in tourism. Eco touring is a travel to natural areas without disturbing culture, history, environment and ecosystem of that areas and try to protect and conserve the natural habitat, resources ethics and tradition. Worship of nature and conservation area inseparable part of Indian culture and tradition. Worship of nature and conservation of epics are a inseparable part of Indian culture and tradition. Chipko movement is a very powerfull weapons to protact plant. New generation of India also applying this weapon to



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protact plant in Delhi. India having very rich and beautiful forest cover and biological diversities but achieving economical growth Indian exploiting nature, tragedy of Utrakhand is a recent example of it. In Madhya Pradesh we having beautiful ecopark for tourism these national park are helping to increase number of plant species and animal population, some are Khanha national park, Bandhavgrah national park, Pench national park.

Basically ecotourism is a travel to area of natural and ecological interest, observing wild life closely and learn about to conserve environment and help to improve the economical growth and providing employment to youth, and increasing, improving cottage and small scale industries of that area. Manipur, Mizoram, Kerala Lakshadweep having beautiful forest cover near about 77.69%, 86.27%, 52.30% and 90.33% respectively so these state attracting Indian and foreigner tourist and there number increasing day by day. These places providing so many facilities to tourist like adventure sports, rafting boat races, herbal massage center, meditation center, mud therapy to refresh and rejuvenate the tourist.

POTENTIAL OF ORGANIC FARMING FOR PROMOTION AND DEVELOPMENT OF AGRI-TOURISM IN LADAKH VALLEY

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Agri-tourism is the act of visiting a working farm or any agricultural, horticultural or agri-business operation for the purpose of enjoyment, education or active involvement in the activities of the farm or operation. Agri-tourism allows tourists to pick fruits and vegetables, ride camels, horses, taste honey, shop in gift shops and farm stands for local and regional produce or hand-crafted gifts, and much more. However every farm offers a different experience and different activities for all the family. Therefore, not all farms which offer agri-tourism opportunities /activities will be the same. Ladakh valley is mainly promoted as preferred cold arid sand done destination however, there is also the potential to develop and improve the agricultural sector. By doing so this will also attract tourists all around the globe for the agricultural aspect of the cold arid zone. One way of how this can be done is to increase agri-tourism in the cold arid belt. Therefore the aim of this study is to find out whether organic farming would have the potential to promote and develop agri-tourism in Ladakh.

This is done through interviewing a number of local tribal farmers including farm women and rural youth and organisations and discuss issues related to practice of organic farming in the region as well as their opinions and views whether they think organic farming can help to improve agri-tourism in Ladakh or not. From the interviews it was concluded that the majority of the respondents believe that organic farming or natural farming does have the potential to



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promote and develop agri-tourism and that it is important to offer organic produce in order to offer a genuine product to the tourist. Therefore, it can be concluded from the study that for promotion and development of agri-tourism, organic farming needs to be adopted in its fullest essence in the cold arid zone of Ladakh.

Key Word Index: *Agri-tourism, Organic farming, Ladakh Valley, Potential, Tourism*

CELLULOLYTIC BACTERIA: AN EFFECTIVE BIOLOGICAL TOOL FOR ECOFRIENDLY SOLID WASTE MANAGEMENT UNDER TEMPERATE CONDITIONS

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Microorganisms represent the major source of genetic diversity on earth. The prestige of microorganisms is due to their high metabolic versatility, which allows the inference about its potential for biotechnological applications, including enzyme production for industrial and environmental uses. In the present techno economic era, the energy and environmental crises developed due to disposal of huge amount of cellulosic materials as “waste.” As per the study, Srinagar city alone generates 407.84 tonnes of solid waste every day with 271 gm per day production with a majority of it being dumped at an open landfill site at Achan on the outskirts of the city. The two capital cities of the J&K state, Srinagar and Jammu, generate 770 tonnes of solid waste daily and in the absence of proper landfill sites and scientific disposal methods, this waste is emerging as a major source of air, water and soil pollution. Microorganism performs their metabolic processes rapidly and with remarkable specificity under ambient conditions, catalyzed complex substrates by their diverse enzyme-mediated reactions. An enzyme alternative to harsh chemical technologies has led to intensive exploration of natural microbial biodiversity to discover enzymes. There is a wide spectrum of microorganisms which can produce the variety of enzymes especially cellulase under appropriate conditions which is responsible for hydrolysis of cellulose. Cellulose is a fibrous, insoluble, crystalline polysaccharide. Cellulase catalyses hydrolysis of cellulose to D-glucose. Cellulose is the most abundant structural polysaccharide of plant cell walls with β -1, 4 - glucosidic linkages and represents almost 50% of the biomass synthesized by photosynthetic fixation of CO₂. Cellulose rich biodegradable materials are the most abundant renewable natural resources for soil and plant health management. It is therefore, vital to screen new cellulase producing strains in nature for eco friendly management of this complex molecule.

Key Word Index: *Cellulolytic Bacteria, Cellulose, Cellulase, Solid Waste Management.*



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TOURISM AND ITS IMPACT ON WORLD FAMOUS DAL LAKE, KASHMIR

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Tourism is regarded as one of the biggest revenue generating industry, which can generate jobs for thousands of people but at the same time it damages the very existence of the a particular tourist resort visited by tourists at a huge scale. Aquatic ecosystem are fragile ecosystems which are destroyed very quickly due to various human activities. Dal Lake is one of the World famous Lakes of the World located in the heart of Srinagar city of Jammu & Kashmir. The Dal lake catchment area is spread on about 314 sq.Kms. It contains mountain ranges on its North and North-East. Around the lake shore, the lower slopes of the catchments have been utilized for paddy cultivation, orchards and gardens. The North catchments comprise mainly outer suburbs of Srinagar city and are extensively used for paddy cultivation. Adverse land use and biotic interference in the catchments area have further aggravated the problem of sediment and nutrient inflow to the lake. Presently the area under Lake is being drastically converted into huge establishments to accommodate huge rush of tourists. In a similar manner the Dal Lake has been subjected to enormous anthropogenic pressure. This lake is main source of attraction for tourists and is the main source of economy for the people in its catchment area. The lake is highly populated with 50,000 inhabitants who live within the lake in various islands besides houseboats and doonga boats forcing the lake to shrink to a great extent due to illegal encroachments. There is tourist rush during the summer season who mainly reside in hotels and houseboats around the Lake. All the waste generated is dumped within the body of the lake which has caused a negative impact on the Lake health. Bottle neck competition for construction of big Hotels around the periphery of the lake has resulted in shrinkage in the size of the water body. Further, addition of wastes into the water body has accelerated the growth of aquatic weeds at an alarming rate. Siltation due to the cutting of trees on Telbal Nallaside has resulted in decrease in the depth of the lake. These stresses have degraded the scenic beauty of the Lake which is the main source of attraction for tourists and main source of economy for the people in its catchment area.

Key Word Index: *Dal Lake, Srinagar City, Pollution, Tourist, Economy*



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ECOTOURISM AND ITS ROLE IN SUSTAINABLE DEVELOPMENT

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Ecotourism, as an alternative tourism, involves visiting natural areas in order to learn, to study, or to carry out activities environmentally friendly, that is, a tourism based on the nature experience, which enables the economic and social development of local communities. Ecotourism is a sub-component of the field of sustainable tourism. It focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artifacts from the locality. Carefully planned and operated ecotourism sites, especially if it is village-based and includes local participation, is able to provide direct benefits that might offset pressure from other less sustainable activities that make use of natural and cultural resources. Therefore, ecotourism and its natural assets and raw materials to create, as well as directing people to travel is an attractive force. Ecotourism helps in community development by providing the alternate source of livelihood to local community which is more sustainable. Its aim is to conserve resources, especially biological diversity, and maintain sustainable use of resources, which can bring ecological experience to travelers, conserve the ecological environment and gain economic benefit. However, achieving the aims in ecotourism depends on whether they are environmentally and ecologically sustainable and economically applicable.

Key Word Index: *Ecotourism, Sustainable tourism, Community development, Economically applicable.*

IMPACTS OF TOURISM ON ENVIRONMENTAL ISSUES

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Tourism is one of the biggest and fastest growing sectors in the global economy and has significant environmental, cultural, social and economic effects, both positive and negative. Tourism can be a major tool for economic development, but, if not properly planned it can have destructive effects on biodiversity and pristine environments, and can result in the misuse of natural resources such as freshwater resources, forests etc. The adverse impact of tourism on the environment is that it not only undermines the basic resource for tourism, but also tells upon other non-tourist economic activities. To avoid these impacts tourism needs to be planned, managed and undertaken in a way that is environmentally sustainable, socially beneficial and economically viable. Negative impacts from tourism occur when the level of visitor use is greater than the environment's ability to cope with this use within acceptable limits of change.



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Uncontrolled conventional tourism poses potential threats to many natural areas around the world. It can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges into the environment, natural habitat loss, increased pressure on endangered species and heightened vulnerability to forest fires. Tourism is an important sector to any country for the development of the economy. But tourism industry is directly related to the environment. The quality of the environment, both natural and man-made, is essential to tourism. However, the relationship of tourism with the environment is complex. It involves many activities that can have adverse environmental effects. Many of these impacts are linked with the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses etc. The negative impacts of tourism development can gradually destroy environmental resources on which it depends. On the other hand, tourism has the potential to create beneficial effects on the environment by contributing to environmental protection and conservation.

Key Word Index: *Tourism, environmental issues, biodiversity, sustainability, resources, environmental pollution*

TOURISM AND IMPACTS ON HUMAN SOCIETY

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The most important components of the global economy are tourism. Tourism generates billions of dollars in revenues and millions of jobs throughout. It is considered by many communities, especially in emerging countries the only tool for development, and the only chance for increasing the quality of life. Thus the tourism industry has stretched from seaside to mountain resorts and from small villages to big metropolises. But at the same time, tourism started to show its uglier side. Both the actions of investors and of tourists are having negative impacts on the socio-cultural values and environmental assets of host communities all over the world. In the present paper we are trying to observe the impacts of tourism on society from three perspectives: economic, social and cultural, and environmental. From the economic perspective, tourism generates wealth and jobs, but the wealth leaks from the community and the jobs are mainly low-income. From the socio-cultural perspective, tourism brings together people from different backgrounds, cultures and traditions and promotes peace. But at the same time, due to



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globalization, many communities have lost their cultural identity and gave way to a Densification of their village or town. Last but not least, tourism helped create national parks and protected areas, where unique examples of flora and fauna can be found. But tourists have been proven to be a problem, because of the pollution they generate. Tourist entrepreneurs can also be blamed for a total disrespect to local traditions and the environment. The main problem from these negative impacts is that the local community is the only side that picks up the check for all the damages on the culture, tradition and, most importantly on the environment.

Key Word Index: *tourism, socio-cultural, environment, sustainability, negative impacts.*

SUSTAINABILITY OF ECOTOURISM DEVELOPMENT IN KASHMIR VALLEY

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Ecotourism in simple terms means management of tourism and conservation of nature in a way so as to maintain a fine balance between the requirements of tourism and ecology on the one hand and needs of the local communities for jobs, new skills, income generating employment and a better status for women on the other. The Himalayan region has for long been a popular tourism destination. Yet tourism creates environmental and socio-economic consequences, and mountain tourism is of particular concern because it is frequently espoused as a means of community development yet it also degrades the environment. Kashmir, often described as a “Paradise on earth”, is a sought-after tourist destination. However, the seasonal character of tourism and the concentration of tourism activities at a small number of locations, in the absence of better tourism policy, have triggered serious environmental and ecological concerns. Achieving the goals of sustainable development vis a vis environment and tourism in Jammu & Kashmir is only possible when we preserve and protect our environment by making ourselves and our younger generation aware about environment and ecology. Environmental education is a key driver for sustainable development and there is an urgent need of a greater coordination of Forest (including wildlife) and Tourism departments in J&K so that we can maintain the ability of our natural systems which further provide the natural resources, ecosystem and tourism services. Most of our state’s economy is dependent on natural resources and that is why there is a dire need to protect these resources. The role of Non Governmental Organizations is also of great importance for the development of ecotourism in Jammu & Kashmir. We need to preserve our natural resources for future generation without causing any harm to the nature and its other components.

Key Word Index: *Ecotourism, Sustainable development, Kashmir, Conservation.*



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INCURSION OF INVASIVE PESTS AND TO EXPLORE THEIR PATHWAYS FOR ECOTOURISM CONCERN IN LADAKH REGION FOR SOUND QUARANTINE REQUIREMENT

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Ladakh is the beautiful destination for both foreign and national tourists. The growth of tourism sector is swelling year after year. The list of invasive insect-pests in Ladakh region is numbering with the pace of arrival of tourists in the region. Though, the Ladakh region is bordered with china and Pakistan. Insects do have wings and fly from one country to another country. Recently the outbreak of new invasive pest in Ladakh is neither reported from Pakistan or either from china. The pest is polyphagous and defoliating the fruit as well as plantation crops. It has been thought that true Aryan race is located in Darcheik village and flow of tourists from India and other countries are visiting this place during summer months. Though, the region of Ladakh is cold arid and is bordered with China and Pakistan. The insect pests have not been either reported from Pakistan and China or even from Jammu And Kashmir State. So it is thought that these pests have arrived with the foreign tourists, and tourism sector in Ladakh is advancing beautifully but without any quarantine regulations in place at air ports and on national highways. It is very important to explore the pathways for ecotourism concern to curtail the herbivore damage on the varied hosts. Some caterpillars of moths have hairs, due to air currents, hairs are blown in the air, and such hairs are responsible for skin rashes and is considered threat to tourists and lead to environmental pollution. There is a dire need to speak and deliberate on this issue for safe guarding the ecotourism and environment for future generations

Key Word Index: *Ladakh, Insect-pests, Ecotourism*

THE ECONOMIC BENEFITS OF ECO-TOURISM

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Eco-tourism is considered as small scale alternative to standard commercial mass tourism. Its purpose is to educate the traveler, to provide funds for ecological conservation, to directly benefit the economic development and political empowerment of local communities, or to foster respect for different cultures and for human rights. A number of tour operators are attempting to sell the eco-tourism experience to potential travelers, thereby generating revenues



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for the business sector. In order to run the eco-tourism business, the business sector has to recruit local employees to work with them, such as office staff, activity staff, guides, cooks, drivers and resort staff; generating the economic multipliers in the local economy. Given the economic benefits of eco-tourism, the tour operators should comply with the rules, regulations, and the laws to prevent the over-exploiting natural resources or natural resources deterioration.

Key Word Index: *Mass tourism, Exploitation, Empowerment, Natural resource, Ecological*

ROLE OF ECOTOURISM IN ENVIRONMENT

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The role of ecotourism is to promote and preserve the natural environment. It deals with interaction with biotic components of the natural environments. Ecotourism is the tourism designed to contribute to the protection of the environment. It is becoming increasingly popular as an alternative to mass tourism. It has emerged as one of the fastest growing sector of the tourism market, influenced primarily by public demand for more environmentally responsible tourism. Ecological and environmental protection is the core content of ecotourism development. It is recommended that development of eco-lodges, opening up of wildlife corridors; reduction of charcoal burning and sand harvesting should be adopted. Teaching of environmental education should also be introduced as well as its application in all social, cultural and economic activities of the people. The purest form of ecotourism includes educating the public about the environment, and the impact humans have on the planet. By teaching conservation techniques and the enjoyment gained by sustainable travel, the tourists leave an enhanced desire to “do their part” in protecting Mother Earth. Ecotourism, with its potential to generate income and employment and its promise to protect natural environment and empower the local communities is advocated as an integral component of sustainable tourism. Tourist play a main role in ecotourism and more attention should be given to them. Economic growth through dollars spent by Eco tourists in local grocery stores, markets and campgrounds benefit areas which are typically disadvantaged.

Key Word Index: *Ecology, environment, tourism, local people, conservation*

USING MULTIVARIATE STATISTICS TO ASSESS THE ECO-TOURISM POTENTIAL OF WATER BODIES IN KASHMIR REGION

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One of the key issues in tourism management is evaluating the ecotourism potential of sites. Various methodologies have been developed to assess the ecotourism potential of sites which use geological and geo-morphological features, and also, ecological-cultural diversity of



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these sites. Multivariate statistical analysis has been used to assess independently which of the features are related with eco tourism potential. Techniques viz. PCA has been used to identify suitable variables associated to the implementation of recreational activities while cluster analysis has been used to identify distinct groups of adventure travellers.

Key Word Index: *Ecotourism, Multivariate Techniques, PCA, Cluster*

ROLE OF ECOTOURISM IN ENVIRONMENT

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The role of ecotourism is to promote and preserve the natural environment. It deals with interaction with biotic components of the natural environments. Ecotourism is the tourism designed to contribute to the protection of the environment. It is becoming increasingly popular as an alternative to mass tourism. It has emerged as one of the fastest growing sector of the tourism market, influenced primarily by public demand for more environmentally responsible tourism. Ecological and environmental protection is the core content of ecotourism development. It is recommended that development of eco-lodges, opening up of wildlife corridors; reduction of charcoal burning and sand harvesting should be adopted. Teaching of environmental education should also be introduced as well as its application in all social, cultural and economic activities of the people. The purest form of ecotourism includes educating the public about the environment, and the impact humans have on the planet. By teaching conservation techniques and the enjoyment gained by sustainable travel, the tourists leave an enhanced desire to “do their part” in protecting Mother Earth. Ecotourism, with its potential to generate income and employment and its promise to protect natural environment and empower the local communities is advocated as an integral component of sustainable tourism. Tourist play a main role in ecotourism and more attention should be given to them. Economic growth through dollars spent by Eco tourists in local grocery stores, markets and campgrounds benefit areas which are typically disadvantaged.

Key Word Index: *Ecology, environment, tourism, local people, conservation*



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TOURISM AND IMPACTS ON HUMAN SOCIETY

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The most important components of the global economy is tourism. Tourism generates billions of dollars in revenues and millions of jobs throughout. It is considered by many communities, especially in emerging countries the only tool for development, and the only chance for increasing the quality of life. Thus the tourism industry has stretched from seaside to mountain resorts and from small villages to big metropolises. But at the same time, tourism started to show its uglier side. Both the actions of investors and of tourists are having negative impacts on the socio-cultural values and environmental assets of host communities all over the world. In the present paper we are trying to observe the impacts of tourism on society from three perspectives: economic, social and cultural, and environmental. From the economic perspective, tourism generates wealth and jobs, but the wealth leaks from the community and the jobs are mainly low-income. From the socio-cultural perspective, tourism brings together people from different backgrounds, cultures and traditions and promotes peace. But at the same time, due to globalization, many communities have lost their cultural identity and gave way to a Densification of their village or town. Last but not least, tourism helped create national parks and protected areas, where unique examples of flora and fauna can be found. But tourists have been proven to be a problem, because of the pollution they generate. Tourist entrepreneurs can also be blamed for a total disrespect to local traditions and the environment. The main problem from these negative impacts is that the local community is the only side that picks up the check for all the damages on the culture, tradition and, most importantly on the environment.

Key Word Index: *tourism, socio-cultural, environment, sustainability, negative impacts*



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GLOBAL ASPECT ON MOUNTAIN ECOTOURISM

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Ecotourism is a part of environmental conservation, and understanding what the needs of the people are who are local to the area so that we can help to improve their quality of life. Ecotourism is valuable for people and the Planet as the rewards that come with the newness and the satisfying learning experiences of travel are irreplaceable, and these benefits can be enhanced through ecotourism. Many mountain communities around the world tend to promote ecotourism to alleviate problems of environmental degradation and under development. However, there is no understanding on what ecotourism is or should be, it is generally believed that ecotourism in the mountains will encourage responsible tourist behavior, conservation of important wildlife habitats and ecosystems, appreciation of local cultures and traditional life styles, and provision of sustainable forms of livelihood for people living in remote and communities. Any attempts towards mountain ecotourism should focus on sustainability; diversity; institutional reforms; gender equity; local, regional and global economic integration; local financial incentives; and peace and security. Furthermore, the potential for a system of ecotourism site designation must also be explored. This will set the stage for increased compliance and adherence to ecotourism criteria and indicators by eco tour operators, establish monitoring mechanisms, and offer mountain ecotourism destinations a platform for raising their profiles at the international level. Ecotourism is still a relatively small segment of the overall tourism sector. At the same time, it is the one of the fastest growing tourism segments and further rapid growth is expected in the future.

Key Word Index: *Ecotourism, Conservation, Communities, Mountain ecotourism, Diversity.*



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TOURISM AND ENVIRONMENTAL DESTRUCTION

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The concept of tourism as a phenomenon involves the movement of people within their own country or across the national borders. Tourism involves basically three elements namely man (human element as the creator of the act of tourism), space (the physical element to be necessarily covered by the 4 act itself), and time (the temporal element which is compared by the trip itself and the stay at the destination). The states are further sub-divided into districts. In the global scenario, India has a prime position in the field of tourism among world's Top 50 (Fifty) tourist destination countries. In India, tourism sector is the second largest net foreign exchange earner. The states are further sub-divided into districts. In the global scenario, India has a prime position in the field of tourism among world's Top 50 (Fifty) tourist destination countries. In India, tourism sector is the second largest net foreign exchange earner. Sustainable tourism is led by motives like spirit of enquiry, love of beauty, search for knowledge and respect for nature. It aims at quality tourism, which creates minimal damage to the natural, social and cultural fabric. If a proper sewage disposal system has not been installed for hotels, or other tourist boarding points there may be pollution of ground water from the sewage. Due to excessive use of internal combustion vehicle such as cars and buses used by and for tourists in a particular area creates air pollution. Noise generated by the concentration of tourists, tourist vehicles and sometimes by certain types of tourist attraction such as an amusement park may reach an uncomfortable and irritating level for residents of the area. The principle of product life cycle can be applied to tourism industry. Unless specific steps are taken, tourist destination areas and resources will inevitably become over-used, unattractive and eventually experience declining use. Environment aesthetics is the most significant pull factor innate in ecotourism destination.

Key Word Index: *Ecotourism, people, environment, importance and tourist.*



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COMMUNITY CAPACITY BUILDING: AN EMERGING CHALLENGE FOR TOURISM DEVELOPMENT

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Community capacity building is about collective knowledge and ability within the community itself; and this knowledge and ability is used to define problems and options from within the community. Literature and research evidence from health, education and agriculture highlight the importance of key elements of community capacity building occurring before specific development options or programmes are chosen or pursued. It is argued that traditional approaches to tourism planning such as community-based tourism or CBT, have taken insufficient account of the need to ensure that destination communities have the capacity to make informed decisions about tourism and to benefit more directly from tourism opportunities. The community capacity building model is instead suggested. This model places the creation or enhancement of a tourism knowledge base before decisions are made about tourism. This approach also includes the step of critically evaluating tourism against other development options and explicitly allows for a decision to be made not to pursue tourism at all. Once tourism is chosen as an option, the community capacity-building approach directs attention towards strategies and programmes to enhance the domains identified as critical to overall community capacity, including local leaders and entrepreneurs, coordination mechanisms, networks and equitable partnerships. These activities run parallel to specific planning for tourism and should enhance the destination community's abilities not only to implement the tourism plans, but also to retain control over the plans themselves.

Key Word Index: *Ecotourism, Conservation, Communities, Capacity building, Diversity.*



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SUSTENANCE OF FOREST ECOSYSTEM AND POSSIBILITIES OF ECOTOURISM IN JAMMU & KASHMIR

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Forests in association with variety of biotic and abiotic components form a vast ecosystem especially in mountainous regions. In consideration of the fact that forests with woodlands and huge biodiversity contribute significantly towards development of economy of the Jammu & Kashmir, a northern state of India, an attempt has been made in this study to investigate the forest ecosystem of the state, in relationship with various ecosystem goods and services provided by it and its role in attracting tourism, to explore option for ecotourism and sustain it in long run. It was observed that despite its role, the forest cover in the state has shown a decline of 20.23 lakh ha since early 1950s'. Although the contribution of domestic product generated in forest has increased over the year but its contribution is just around 2 per cent of State Net Domestic Product. Government with its state and centrally sponsored schemes have been putting in efforts for sustenance of this ecosystem, however, the public development expenditure in the forest sector has shown a decline both in absolute form and in terms of its intensity. The forest ecosystem provide spectrum of ecosystem goods and services towards the human recreational activities, a part of which is called tourism. While forest goods include timber and NTFPs, the huge chunk of use and non-use value goods and services that flow out of this ecosystem, not accounted earlier, is big in magnitude. The study ascertained huge value of its ecological services like maintenance of micro-climate, soil conservation, acting as water tower for plain and hot spot for biodiversity, etc that emanate out of this ecosystem. The forest ecosystem assumes yet more important role in changing scenario of climate. Estimates of Forest Growth Model emphasize upon rural literacy, enhancement of public investment in forestry, plantation and planned urbanization. Based upon various findings, the study put forth few policy options for sustenance of forest ecosystem for encouragement of ecotourism in virgin lush green forest environment.

Key Word Index: *Ecosystem Goods and Services, Forests, Ecotourism, Conservation*



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EMPIRICAL INVESTIGATION OF VISITORS' PERCEPTION FOR EXPORING OPTIONS FOR SUSTENANCE OF FOREST-BASED TOURISM IN KASHMIR

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Besides supplier of variety of goods, forests' role as source of ecosystem services to attract tourists is being increasingly recognized. The two way relationship between serenity of forests and tourism made it imperative to examine visitors' perception for exploring options for sustenance of forest based ecotourism. With this end, this study was conducted in four forest sites of Kashmir region viz, Dodhpathri, Thajiwas, Pahalgam and Gulmarg which assume importance in attracting tourists from across the world. The descriptive statistics of the study revealed that major portion of the visitors were from Kashmir region itself though a good proportion were from other states of India and abroad as well. Visitors to these sites were seen to have attained graduation or above educational level and belong to 30-60 years age-group which is expected to have concerns about exploring nature. The distinct services provided by different forest sites provide attraction to different class of tourists and steps are to be taken to enhance these services/amenities need to achieve better visitor satisfaction. Further male visitors outnumbered females in their visits to selected forest sites thereby indicating a possibility of attracting female visitors through specific campaigns. The results further revealed that among the various motivational factors, tourists have expressed different factors for different forest sites, the tourists coming for business purpose has got less response. Presence of water feature, lush green view and pleasant breeze have received maximum response as forest specific attribute motivating tourist towards forests. The attitudes of tourists towards forests revealed that they consider it as a national treasure and were of the opinion that this resource needs to be preserved on sustainable basis. Estimates of trip generation function revealed that forest specific attributes and ecological/scenic concerns of tourists have significantly determined visits to the forest sites. Based upon findings, the study putforth few policy suggestions for sustenance of forest based ecotourism in long run, of which Government with its Forest and Tourism Department need to launch a campaign to impart ecological and scenic concerns among urban/rural masses. Eco-tourism activities should be regulated in a manner that preserves the health, scenic beauty and natural attributes of the eco-tourism sites.

Key Word Index: *Visitors' perception, Forests, Ecotourism, Sustenance*



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HERITAGE AND TOURISM: CONTRIBUTION OF HERITAGE SITES TO TOURISM OF INDIA WITH SPECIAL REFERENCE TO KHAJURAHO

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Tourism is not limited to wandering from place to place it is a vast source of knowledge, amusement, development, communication etc. Since past it is playing a great role in development of Human beings in different aspects of daily life. Many travelers from different periods of history may be Ancient, Medieval and Modern period came to India either to wander, trade or collecting source of knowledge, They came in contact with our culture and result was fusion of different cultures. At present our Heritage sites are playing a great role in tourism. These heritage sites have provided a source of livelihood to many people living in nearby areas, it acts like the preserver of many cultures which may have extinct or already did. It has given an opportunity to tourists to become familiar with the cultural, historical aspects of India.

India has preserved its cultural heritage in various forms, may be in forms of various cultural, historical and religious sites. The great contribution refers to its forts, palaces and havelies, Religious influences displayed in its various temples, mosques, churches and gurudwaras. All of this and a lot more makes India one of the most preferred cultural destinations of the world. There are various famous tourist heritage sites in India which has contributed a lot to the tourism. For example we can see the importance of Khajuraho (a small town), and other historical sites like Sanchi, Panchmadi, Mandu, Gwalior, Ujjain, Chitrakoot in Madhya Pradesh.

Key Word Index: *Heritage, Tourism, Khajuraho, cultural heritage*

IMPACTS OF TOURISM ON ENVIRONMENTAL ISSUES

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Tourism is one of the biggest and fastest growing sectors in the global economy and has significant environmental, cultural, social and economic effects, both positive and negative. Tourism can be a major tool for economic development, but, if not properly planned it can have destructive effects on biodiversity and pristine environments, and can result in the misuse of natural resources such as freshwater resources, forests etc. The adverse impact of tourism on the environment is that it not only undermines the basic resource for tourism, but also tells upon other non-tourist economic activities. To avoid these impacts tourism needs to be planned, managed and undertaken in a way that is environmentally sustainable, socially beneficial and economically viable. Negative impacts from tourism occur when the level of visitor use is greater than the environment's ability to cope with this use within acceptable limits of change. Uncontrolled conventional tourism poses potential threats to many natural areas around the



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world. It can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges into the environment, natural habitat loss, increased pressure on endangered species and heightened vulnerability to forest fires. Tourism is an important sector to any country for the development of the economy. But tourism industry is directly related to the environment. The quality of the environment, both natural and man-made, is essential to tourism. However, the relationship of tourism with the environment is complex. It involves many activities that can have adverse environmental effects. Many of these impacts are linked with the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses etc. The negative impacts of tourism development can gradually destroy environmental resources on which it depends. On the other hand, tourism has the potential to create beneficial effects on the environment by contributing to environmental protection and conservation.

Key Word Index: *Tourism, environmental issues, biodiversity, sustainability, resources, environmental pollution*

ECOTOURISM: A TOOL FOR NATURE CONSERVATION

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The Ministry of Tourism is the nodal agency for the development and promotion of tourism in India and catering. In the year 1986, Tourism has been declared as 'Tourism Industry' by the government of India. On March 4, 1993, the United Nations Statistical Commission adopted WTO's (World Tourism Organisation's) recommendations on tourism. Ecotourism works towards the conservation of nature and biodiversity. It also promotes responsible travel, which can be initiated by minimum destruction, environmental growth, adventure, and preaching sustainable ways of living on the planet. In the process, ecotourism glorifies offbeat places, their rich culture, and centuries-old traditions. The advantages are many, as a traveler get to live moments, and nature as a whole gets to live. In the process, ecotourism glorifies offbeat places, their rich culture, and centuries-old traditions. The advantages are many; we as a traveler get to live moments, and nature as a whole gets to live. Ecotourism can be categorised as a tourism programme- "Nature based, ecologically sustainable, where education and interpretation is a major constituent and where local people are benefited. Various human activities have triggered an increase in the population of invasive species which make the survival of other species difficult. This directly hampers the food chain along with the habitat and leads to vulnerable existences in the ecosystem. Studies say that pollution and temperature rise shall destroy all the coral reefs in the next 20-40 years. The earth's biological treasures are thrashed and scientists are calling it the 6th mass extinction event. There are colourful tribal life-styles of the North Eastern States of Nagaland, Mizoram, Tripura and Manipur with their folk culture is also worth mention. In the central Indian states of Orissa and Madhya Pradesh, tribal village life has resulted in a variety of artistically executed handicrafts. India's mountains provide opportunities for mountaineering and trekking.

Key Word Index: *Ecotourism, nature, conservation, traditions and importance.*



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TOURISM AND IMPACTS ON HUMAN SOCIETY

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The most important components of the global economy is tourism. Tourism generates billions of dollars in revenues and millions of jobs throughout. It is considered by many communities, especially in emerging countries the only tool for development, and the only chance for increasing the quality of life. Thus the tourism industry has stretched from seaside to mountain resorts and from small villages to big metropolises. But at the same time, tourism started to show its uglier side. Both the actions of investors and of tourists are having negative impacts on the socio-cultural values and environmental assets of host communities all over the world. In the present paper we are trying to observe the impacts of tourism on society from three perspectives: economic, social and cultural, and environmental. From the economic perspective, tourism generates wealth and jobs, but the wealth leaks from the community and the jobs are mainly low-income. From the socio-cultural perspective, tourism brings together people from different backgrounds, cultures and traditions and promotes peace. But at the same time, due to globalization, many communities have lost their cultural identity and gave way to a Densification of their village or town. Last but not least, tourism helped create national parks and protected areas, where unique examples of flora and fauna can be found. But tourists have been proven to be a problem, because of the pollution they generate. Tourist entrepreneurs can also be blamed for a total disrespect to local traditions and the environment. The main problem from these negative impacts is that the local community is the only side that picks up the check for all the damages on the culture, tradition and, most importantly on the environment.

Key Word Index: *tourism, socio-cultural, environment, sustainability, negative impacts*

ECOTOURISM – A NEW ALTERNATIVE TOWARDS COMMERCIAL TOURISM

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Ecotourism involves visiting undisturbed natural areas and promoting responsible travels in order to conserve natural environment as well as for the well being of local people. Ecotourism can deeply help in promoting the culture of local communities and help them to earn some income for themselves. Increased tourism to sensitive natural areas can seriously destroy



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the integrity of ecosystem. Further climate change, political and social conditions can make tourism a risky business. Ecotourism thus can provide a better alternative in managing such situations. It will not only provide an economic development alternative for local communities, but can also increase the level of education and activism among travelers, making them more enthusiastic and effective agents of conservation. Thus, it is responsibility of government to promote ecotourism so that it can improve the life of locals to the area. It will also help in learning more about the history of other cities and preserving the historical landmarks.

Key Word Index: *Ecotourism, Sustainability, Climate change, Ecosystem.*

SAFFRON ECOTOURISM: A WAY TOWARDS ECONOMIC REVIVAL OF J&K SAFFRON SECTOR

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Ecotourism or sustainable tourism is a means of environmental conservation through which an eco-tourist comprehends needs of indigenous people residing in an eco-tourist destination and helps them to improvise their livelihood means sustainably. Ecotourism is very critical for revival of lost glory of important agricultural crops. The karewas of saffron fields turns into beautiful gardens during the month of October-November every year, when other plant species face autumn season. The month long flowering stage of saffron could attract tourists to take the beautiful glimpse of saffron bloom. The proper promotion of saffron ecotourism could attract thousands of people to visit saffron karewas of Jammu and Kashmir, which could inturn increase the livelihood of around 95,000 people through proper marketing and sale of genuine Kashmiri saffron. The current paper describes the potential of saffron ecotourism as a possible remedial measure to revive lost glory of saffron industry.

Key Word Index: *Ecotourism, Saffron, Kashmir, Sustainable.*

ECOTOURISM A KEY TO SUSTAINABLE DEVELOPMENT

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Ecotourism is a part of environmental conservation, it is considered as a subset of sustainable tourism and nature tourism because it represents a sustainable way of travelling in natural areas. Ecotourism promotes conservation of natural resources; it has low negative visitor impact and provides for beneficially active socio-economic involvement of local populations.



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Ecotourism clothes the sustainable tourism principles, but differs from it by aspects related to local community issues, interpretation for visitors to a particular destination and the number of visitors (Tuğba, 2013).

Sustainable development through ecotourism is a concerning issue in the world today. Many countries have ensured their regional development by this concept. In this concept, sustainable development may be occurred by the ecotourism and regional development simultaneously in an area. Ecotourism is a sustainable form of natural resource-based tourism (Tuğba, 2013) and focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artefacts from the locality (Dowling, 1997; Fennell, 1999). There is just a thin line of differentiation between sustainable tourism and ecotourism. Basic purposes of ecotourism are to preserve and utilize natural and cultural resources in a sustainable way and to enable economic development of local people (Eriksson, 2003). According to Rome (1999) Ecotourism is one strategy for supporting conservation and providing income for communities in and around protected areas. It can contribute to economic development and conservation of protected areas by: a) generating revenues that can be used to sustainably manage protected areas, b) providing local employment and c) inculcating a sense of community ownership. Ecotourism tries to raise environmental consciousness by exploring ecology and ecosystems and by providing environmental type experiences.

In order to provide sustainability in the ecotourism, it is necessary to know environmental, social and economical effects of ecotourism activities.

Key Word Index: *conservation, ecotourism, environment, sustainable.*

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UTILIZATION OF NATURAL RESOURCE MANAGEMENT FOR THE DEVELOPMENT OF ECO-TOURISM

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A number of places throughout the world have abundance of natural resources. But with the human encroachment and habitats, these resources are depleting. Without the sustainable use of certain resources, they are destroyed, and floral and faunal species are become extinct. Eco-tourism programs can be introduced for the conservation of these resources. Several plans and proper management programs can be introduced so that these resources remain untouched. It is expected that natural resource management through eco-development will reduce depletion of natural resources and environmental degradation to an acceptable level. It supports development and conservation of resources through generating local jobs, providing sense of community ownership. Local people will show their enthusiasm to project the natural resource when they get directly benefited from it. The basic idea behind eco-tourism is preserving natural resources while generating economic benefits from them. Moreover core principles of eco-tourism and natural resource management are interconnected and should not try to separate both.

Key Word Index: *Encroachment, Degradation, Conservation, Resource, Depletion.*



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ECONOMIC IMPACTS OF ECO TOURISM

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Economic impact of eco tourism refers to the change in sales, income, jobs or other parameter generated by eco tourism. A common goal of eco tourism is the generation of economic benefits, whether they be the profits for companies , jobs for communities or revenue for parks. Ecotourism plays a particularly important role because it can create jobs in remote regions that historically have benefited less from economic development programs than the more populous areas. Even a small number of jobs may be significant in communities where populations are low and alternatives are few. This economic impact can increase political and financial support for conservation. Protected areas, and nature conservation generally, provide many benefits to society, including preservation of biodiversity, maintenance of watersheds, and so on. However, the benefits associated with recreation and tourism in protected areas tend to be tangible. For example, divers at a marine park spend money on lodging, food, and other goods and services, thereby providing employment for local and non-local residents. These positive economic impacts can lead to increased support for the protected areas with which they are associated. This is one reason why ecotourism has been embraced as a means for enhancing conservation of natural resources. Predictably, the level of benefits varies widely as a result of differences in the quality of the attraction, access, and so on. In some cases, the number of jobs created will be low, but in rural areas even a few jobs can make a big difference. The impacts of ecotourism, or any economic activity, can be grouped into three categories: direct, indirect, and induced. Direct impacts are those arising from the initial tourism spending, such as money spent at a restaurant. The restaurant buys goods and services (inputs) from other businesses, thereby generating indirect impacts. In addition, the restaurant employees spend part of their wages to buy various goods and services, thereby generating induced impacts. A common priority is to increase economic benefits, and the traditional approach is to attract more visitors. Given that negative impacts (environmental, experiential, sociocultural, and economic) correspond, to varying degrees, to visitor numbers, generally it is preferable to increase local benefits by increasing spending per visitor; increasing backward linkages (reducing leakages); or increasing local participation in the industry.

Key Word Index: *Ecotourism, protected areas, economic, marine parks, nature, conservation, environmental, sociocultural, linkages, visitor, industry*



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ECO-TOURISM: ENCOURAGING CONSERVATION

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Eco-tourism has emerged as important sector of tourism industry not only nationally but internationally as well. The United Nations, have recognized eco-tourism's potential role in the sustainable development, that declared 2002 the "International Year of Eco-tourism". Eco-tourism is also encouraging conservation by many ways like the revenue derived from park-entrance fees and similar sources can help finance the protection and management of environmentally sensitive areas, local communities understanding the economic benefits of eco-tourism are often motivated to protect resources adapting conservationist attitudes, moreover local residents can benefit from the environmental education eco-tourism provides. Successful eco-tourism requires maximizing its environmental and economic benefits while minimizing ecological damage and disruption of local communities. To achieve such goals, eco-tourism development should be carefully planned from the beginning to ensure sustainability.

Key Word Index: *Conservation, Ecological, Tourism, Sustainable, Environment*



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ECO-TOURISM: A POTENTIAL THREAT TO LOCAL COMMUNITIES AND ECOSYSTEMS THEREBY ADDING TO EXPLOITATION

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Environmental deterioration and inequitable development may in some cases be exacerbated by eco-tourism. Eco-tourism is a potential threat to ecosystems as high volume tourism can damage the environment. Excessive entry into protected areas, especially when combined with high impact activities such as hiking or camping can be harmful. Moreover to develop sites for eco-tourism or create protected areas, government often resettles the indigenous inhabitants of a region. The Economies that become dependent on eco-tourism may be destabilized by fluctuating demand. Much eco-tourism is seasonal in nature and depends on such factors as foreign currency exchange rates, weather, and political stability in host countries. To ensure that eco-tourism fulfills its promise, policymakers, promoters, and participants should make sure that all tourism activities have minimal environmental impact, that such development is welcomed by local communities, and that it promotes stable and equitable economic development.

Key Word Index: Deterioration, Inequitable, Foreign, Indigenous, Protected

ECOTOURISM IN EMPOWERING THE LOCAL COMMUNITY

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The benefits of ecotourism for local communities can be broadly categorized as economic, socio-cultural and physical. The most direct economic benefits are the improvements in employment and income. The National Eco tourism plan recognizes that local communities living at ecotourism provides a viable economic option for such communities. Before ecotourism gained popularity, the extraction of natural resources for the purpose of economic development such as forest logging, mining were the only sources of income for these communities. However these activities will eventually lead to environmental damage and ecological imbalances. Ecotourism, on the other hand encourages responsible travel to natural areas that safeguard the integrity of the ecosystem and produces economic benefits for the local communities that can encourage conservation thus it is more sustainable development strategy protecting the ecosystem and at the same time serving as an income and employment provider for the local



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community. With regards to socio-cultural benefits, since ecotourists are travellers seeking unique and authentic travel experiences, there is an added incentive for local communities to retain their traditional heritage and lifestyles for long term viability. These include the preservations of religious architecture and symbols, rituals and ceremonies, arts and crafts and even music and dance. Finally, the most direct physical will be the conservation of the environment.

Key Word Index: *economic, socio-cultural, physical, local communities, heritage, architecture, rituals, ceremonies.*

PRINCIPLES AND VARIETY BENEFITS OF ECO-TOURISM

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Eco-tourism is all about responsible travel to natural areas to promote conservation, bring harmony among communities, and sustains well being of local people. However to participate in eco-tourism activities certain principles are to be followed as to build environmental and cultural awareness, provide positive experiences for both visitors and local people, provide financial benefits for both local people and private industry, Deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries political, environmental, and social climates and much more. There are varieties of benefits of eco-tourism; we not only learn about others but learn about ourselves than we could imagine .Eco-tourism gives us a completely different view of the world and challenges us open our minds to different ways of thinking.

Key Word Index: *Harmony, Sustain, Conservation, Social, Climate.*

ECOTOURISM AND ENVIRONMENT

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Ecotourism is a type of sustainable development which is responsible for reducing the impact that tourism has on naturally beautiful environments. Exploitation of Mother Nature in our quest for material wealth has resulted in global warming and massive pollution of our environment. There has been massive destruction of forest habitats in the name of development and tourism .Fortunately, ecotourism is emerging as one such responsible endeavor in India in



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order to undo some of this damage. People are today more conscious about undertaking ecotourism and their main aim is to ensure environmental safety. Ecotourism exploits natural environment while at the same time depending on their preservation. As a result eco tourism has increasingly become more articulated with environmental policies, in particular the creation of protected areas. Such policies have privileged those environments that are of interest to the ecotourism industry. They also have served to restrict competing forms of resource use. Eco tourism is vital growing sector of tourism industry which can significantly contribute to environmental protection, conservation and restoration of biological diversity and sustainable use of natural resources. Ecotourism allows countries and communities to build their economies without harming the environment which means that local wildlife can thrive and visitors can enjoy untouched destinations. Pristine sites and natural areas are identified as valuable and need to keep the attraction alive can lead to creation of national parks and wildlife parks. Eco tourism is thus a part of environmental conservation and understanding what the needs of the people are who are local to the area so that it can help to improve their quality of life. It also involves learning more about the history of other cities and preserving historical landmarks.

Key Word Index: *Eco tourism, biological diversity, natural, environment, pristine sites. Wild life, natural parks, forest habitat, historical landmarks*

PROMOTING SERICULTURE AS AN ECOTOURISM PROJECT-A PERSPECTIVE

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Ecotourism is an emerging concept for promotion and conservation of natural diversity under changing global climatic scenario. Jammu & Kashmir is a rare state in India with wonderful blend of all natural resources, hill resorts, mountains and rivers that attracts large number of tourists annually from all over the world. The state is blessed with a conducive environment for sericulture and production of bivoltine silk. Silk is regarded as a sustainable ecoproduct (ecotextile) from sericulture industry. Notably, sustainable eco-products are environment friendly and are a source of economy for local communities involved. In addition, the recent trend of ecoproducts being used in the fashion industry sets a rationale for vigorous revival of sericulture and promoting sericulture as an ecotourism project in Jammu and Kashmir.

Silk is the main product of sericulture and is produced in an ecofriendly manner and processed under eco-friendly regulations defined by agencies like OEKOTEX, IFOAM etc. Natural fibres including silk tend to have complex and distinctive internal and external features. These include variable diameters, cross sections and color banding. Therefore, natural fibres have an edge over artificial fibres. Among all the fibre classes, silk is most excellent natural fibre featuring above characteristics. Silk gains precedence over other fibres because of its lustre, softness and elegance. It is the only fibre which is directly woven into a fabric in its raw state. Pure silk knitted fabrics have very good scope because it is regarded as synonymous to



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elegance. Silk garments are prized for their vanity, versatility, wearability and comfort. Besides silk, mulberry fruits, mulberry based fruit jams are alternate products of sericulture.

Promoting sericulture as an ecotourism project will greatly boost this industry in the state of Jammu and Kashmir. Sericulture as an ecotourism project will act as a window for setting up of related economic units where sericulture products like silk garments, mulberry fruit and mulberry based fruit jams are produced and projected to the visiting tourists. The tourists will not only get the first hand opportunity for experiencing/observing production of these sericulture products, but they will also get a chance to acquire these products in their purest form at these units. Setting up hospitality facilities at these sericulture units for the tourist will be an additional source of revenue generation for the associated community. Taken together, there is a great potential for sericulture being promoted as an ecotourism project for boosting the rural economy in the state of Jammu and Kashmir.

Key Word Index: *Ecotextile, Silk, Ecotourism*

SAFFRON ECOTOURISM: A WAY TOWARDS ECONOMIC REVIVAL OF J&K SAFFRON SECTOR

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Ecotourism or sustainable tourism is a means of environmental conservation through which an eco-tourist comprehends needs of indigenous people residing in an eco-tourist destination and helps them to improvise their livelihood means sustainably. Ecotourism is very critical for revival of lost glory of important agricultural crops. The karewas of saffron fields turn into beautiful gardens during the month of October-November every year, when other plant species face autumn season. The month long flowering stage of saffron could attract tourists to take the beautiful glimpse of saffron bloom. The proper promotion of saffron ecotourism could attract thousands of people to visit saffron karewas of Jammu and Kashmir, which could in turn increase the livelihood of around 95,000 people through proper marketing and sale of genuine Kashmiri saffron. The current paper describes the potential of saffron ecotourism as a possible remedial measure to revive lost glory of saffron industry.

Key Word Index: *Ecotourism, Saffron, Kashmir, Sustainable.*



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ECOLOGICAL AND SOCIAL IMPACT OF ECO TOURISM

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Ecotourism is ideal for environmental management and protection. Ecotourism destinations have a full exhibition of nature with minimum human interference. It includes not only the sites but the characteristics and conservation of species as well as the activities of the human population found there. The first ecological impact to look at is the protection of fauna (animal life) and flora (plant life) in the biosphere. There's a diversity of species and as people visit and study about them, they learn of their uniqueness, beauty and role in the ecosystem (ecological niche), therefore learn to respect life regardless of what form and find means to protect them. Ecotourism destinations are made attractive to visitors and measures are placed to sustain them. Some include, reforestation, halting the spread of agricultural and settlement lands and halting of mineral mining. Also, ecotourism promotes wild life conservation in their natural habitat and the continuous production of biomass in the ecosystem so as the energy cycle and resultant food webs and chains are not disturbed. Finally, it encourages learning and innovation as man devises new methods of improving the environment, obtaining maximum benefits like food, the use of renewable energy, discovery of medicinal herbs, tracing sources of pathogenic diseases etc. Social impacts include promoting development of peripheral regions. Since most of these ecotourism destinations are found in areas far from big cities, it helps recognize the need for their development and resource allocation. It serves as a platform for knowing more about cultures and of peripheral regions. Finally ecotourism affects the development of the entire planet. As places are visited and knowledge is acquired, it reflects in our social lives. To conclude, ecotourism is very necessary to our development, both individual and globally and as a result should be given the required attention in order to maximize these benefits derived from it.

Key Word Index: *Ecological, flora, fauna, ecological niche, social, food web, cultural, medicinal herbs, resource allocation.*

STUDY ON ECOLOGICAL STATUS OF MUKUNDPUR RESCUE CENTRE OF WHITE TIGER DISTT. SATNA (M.P.) INDIA, WITH VIEWPOINT OF ECOTOURISM

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Ecotourism includes a type of corporate function. It may impact negatively the surrounding natural environmental conditions due to business operations including overuse of natural, non-renewable resources, deforestation, pollution wastage, degeneration of biodiversity etc. Ecosystem-based study establishes a framework for planning or restoring communities by



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linking the social, economic and ecological dimensions of a particular geographic area and using the natural environment as its foundation. The goal of the ecological based study is to conserve, maintain, restore or develop a vibrant community, viable economy and a healthy environment over the long term. It also recognizes the ecosystems change over time and are affected by human influences; however, these changes need to be monitored and balanced. The ecosystem-based process emulates natural processes to use natural resources in a sustainable way so that valuable resources are not depleted or degraded due to ecotourism. So this study is for a database of wild animals in the area of planned Zoo and Rescue Centre at Mukundpur, District Satna (M.P.), India. It has area of 82475 Sq. M including total VI zone with 38 reptiles, 247 birds, and 412 mammals. So this study was for carrying capacity of area and need of monitoring of local environment after establishment of rehabilitation of White Tiger in Mukundpur rescue Centre. This study included impact on niche of different wild animal, faecal load on habitat, management of water resource and also in reference of socio-economic status of local tribes with need of political and administrative bodies with academical studies. It may be helpful in further monitoring of habitat after establishment of Rescue Centre for White Tiger as well as overall impact on the local area.

Key Word Index: *Ecosystem-based Study, Mukundpur forest area, White Tiger, Impact on habitat, Resource management, Ecotourism.*

ECOLOGICAL IMPORTANCE OF MULBERRY

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Mulberry, a globally known as silkworm feeder has recently gained the attention of ecologists for the protection of environment. It is a perennial and woody plant. It has a huge ecological importance, such as, it is known to stabilize the adverse effects of heavy metals in the diverse polluted soils (i.e., phytoremediation properties), modification of saline soils, windbreak, water retention capacity, water and soil conservation etc. It is now globally known as carbon sink plant and has a potential to reduce the effect of global warming. It is an innovation in the sericulture industry which needs a boost. This article focuses on the ecological importance of mulberry which is a need of hour.

Key Word Index: *Mulberry, silkworm*



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ECO-TOURISM AND ECO-FLORICULTURE IS NEED OF AN HOUR

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Ecotourism is defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education" (TIES, 2015). Ecotourism is about *uniting conservation, communities, and sustainable travel*. This means that those who implement, participate in and market ecotourism activities should adopt the mentioned ecotourism principles: -Minimize physical, social, behavioural, and psychological impacts. -Build environmental and cultural awareness and respect. -Provide positive experiences for both visitors and hosts. -Provide direct financial benefits for conservation. -Generate financial benefits for both local people and private industry. -Deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries' political, environmental, and social climates. -Design, construct and operate low-impact facilities. -Recognize the rights and spiritual beliefs of the Indigenous People in your community and work in partnership with them to create empowerment. Keeping in view the prospectus of ecotourism in view we can imagine how ecotourism and floriculture can go side by side particularly in Jammu and Kashmir which is primarily a tourist hotspot. There is huge rush of tourists especially from opening of tulip garden in April to the end of amaranth pilgrimage in August. The Kashmir climatic conditions are very fragile and prone to anthropogenic activities, as the impact can be found with the erratic rainfall, storms, fluctuating temperatures, etc. With advances in transportation and information technology, even the most remote places in Kashmir are within reach of the travellers. In fact, floriculture and tourism is now of the largest sectors, contributing to states economy. These sectors could contribute more to the economy in case more and more rural youth are involved via eco-tourism/eco-floriculture. In response to increasing appreciation of nature experiences, a new travel ethic should be adopted, what is known today as Ecotourism. In order to promote sustainable and environmental friendly tourism in Kashmir valley the Govt. should articulated the tourism and floriculture sector with eco-tourism/eco-floriculture sectors.

Key Word Index: *Eco-tourism, Eco-floriculture, environment,*



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A STUDY ON ENVIRONMENTAL IMPACTS OF PILGRIMAGE TOURISM IN KASHMIR (J&K)

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Kashmir universally known as a heaven on earth is one of the most preferred destination of tourists worldwide. Tourism is one of the leading and fastest growing sectors in the global economy and has significant socio-economic, cultural and environmental effects, both positive and negative. There are number of tourist places but pilgrimage tourism has its own importance in J&K economy. Pilgrimage is one of the religious and cultural phenomena most common to human society throughout the globe which have powerful political, economic, social and cultural implications, and can affect world trade and health. The number of pilgrims to the Kashmir is increasing with each passing year. The aim of our study is to focus on biophysical carrying capacity which deals with the extent to which the natural environment is capable to tolerate external interference. In this paper, we examine pilgrimage tourist data of Kashmir valley (Amarnath Yattris) from 1989 to examine the trend and predict the tourists inflow. The results of our study shows that that Kashmir valley has a tremendous potential to absorb tourists, but at the same time the Researchers have shown that an increase in the number of visitors does not only make the area overcrowded, but also leads to the over exploitation of the natural resources, leading to serious damage to the natural habitat. We agree that tourism has economic importance but simultaneously it has put enormous pressures on the environment of the state such as soil erosion, increased pollution, waste generation, natural habitat loss and strains on water resources. The present paper aims to highlight the income effect and environmental impacts of pilgrimage tourism on the economy of J&K state with special reference to Shri Amarnath Yatra. It is concluded from our study that for the human welfare we have to set environment at priority and maintain a balance between environmental protection and the promotion of tourism.

Key Word Index: *Kashmir; Pilgrimage; Tourism; Carrying Capacity; Environment; Statistics*



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ECO-TOURISM A VIABLE OPTION FOR LIVELIHOOD AND SUSTENANCE IN JAMMU & KASHMIR

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Kashmir is blessed with a variety of natural beauty. But due to greed and overflow of tourists at places like Dal Lake, lots of problems like deforestation, air, water and land pollution have taken place. Kashmir possesses lots of undisturbed natural areas which provide a lot of scope for eco-tourism. It will also lead to the empowerment of local people who have suffered a lot due to political turmoil. Jammu and Kashmir with its natural diversity is one of the unspoiled places of the country for eco-tourism. Gulmarg, pahalgam, sonmarg, kokarnag are some of the best spots which are visited by tourists for eco-tourism in Jammu and Kashmir. Eco-tourism is much more than a phrase for those who love nature for travel and recreation. Resources are being exploited unscientifically at most of the places. There is unscientific harnessing of natural as well as human resources which makes environment and people vulnerable to various adverse effects like environmental degradation, floods, droughts, climate change, poverty, hunger, malnutrition, political and social tensions worldwide. Therefore, it is the perfect time for the development of ecotourism in Kashmir which can have a profound impact on all the spheres of life in the Valley of Kashmir.

PERCEPTION OF TOURISTS AND ROLE OF MEDIA: A CASE STUDY OF KASHMIR

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Tourism is the backbone of Kashmir economy. It is the bond of relationship between people of different areas. It is considered to be the central nerve of the state economy with both forward and backward linkages and trickle down effects. It contributes almost 16% of the state's domestic product. The success of the tourism to any region depends on various factors as role of media and perception of tourists related to that, because the tourists' perception of a destination's image as a preferred choice for travel is crucial. Tourists travel to fulfil their dreams also considered as to have a psychological relief from the motivators that aroused the travel needs. Motivation and satisfaction are closely interrelated like two sides of a coin and tourists determine the travel decisions based on their expectations. Social media also allows consumers to share their experiences and expand their interconnectivity through social networks which facilitate positive or negative review about a destination. Tourism is an 'information-intensive industry', whereas social media is information-abundant and therefore both are relevant to each other.



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In this context the study would attempt to access the relationship between the tourism in Kashmiri and the perception of tourists related to it. The second objective of the study would be to analyse the role of media on tourism.

Key Word Index: *Conflict, economy, Tourism, Jammu and Kashmir, Perceptions, Social media,*

ECOTOURISM, PERCEPTION OF TOURISTS AND ROLE OF MEDIA: A CASE OF KASHMIR TOURISM INDUSTRY

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Tourism is the backbone of Kashmir economy. It is the bond of relationship between people of different areas. It is considered to be the central nerve of the state economy with both forward and backward linkages and trickle down effects. It contributes almost 16% of the state's domestic product. The success of the tourism to any region depends on various factors as role of media and perception of tourists related to that, because the tourists' perception of a destination's image as a preferred choice for travel is crucial. Tourists travel to fulfil their dreams also considered as to have a psychological relief from the motivators that aroused the travel needs. Motivation and satisfaction are closely interrelated like two sides of a coin and tourists determine the travel decisions based on their expectations. Social media also allows consumers to share their experiences and expand their interconnectivity through social networks which facilitate positive or negative review about a destination. Tourism is an 'information-intensive industry', whereas social media is information-abundant and therefore both are relevant to each other.

In this context the study would attempt to access the relationship between the tourism in Kashmiri and the perception of tourists related to it. The second objective of the study would be to analyse the role of media on tourism.

Key Word Index: *Conflict, economy, Tourism, Jammu and Kashmir, perceptions, social media*

EXPLORING ECOLOGY, ENVIRONMENT, BIODIVERSITY AND PLANTS OF THE EPIC RAMAYANAPERIOD TO PROMOTE ECOTOURISM OF THE REGION

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All living beings existing on earth along with plants, animals, microbes, soil, water etc., that is, the different life forms, their genes and ecosystems make up the biodiversity of the earth. So also in the ancient Indian Epic *Ramayana* there are references of the flora and fauna, ecology, environment, biodiversity, the geography and forestry mentioning large number of plant species.



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The value and wonder of biodiversity in the *Ramayana* has been described beautifully and is replete with superb descriptions of nature's glory. It revolves around two major events, namely Rama's fourteen year exile in the forests and the rescue of Sita from captivity in Lanka. There were dense forests in Naimisharanya, Chitrakoot, Dandakaranya, and Panchavati which abounded in wildlife. Further, the *Ramayana* is geographically very correct. Every site on Rama's route is still identifiable with several plants and animal species that had been mentioned in the *Ramayana* still existed in the same places. The stage of the epic includes a wide swathe of territory that stretches from present day Uttar Pradesh through Madhya Pradesh, Maharashtra and Karnataka up to Lanka beyond the sea. The area covers four major ecosystems, namely, the tropical deciduous forests, the dry and moist deciduous forests, the Alpine region of Himalayas, and the evergreen tropical rain forests of Sri Lanka with details of geographical distribution, principal flora and fauna, water elements and their environmental importance. Thus, the authenticity of the flora and fauna in Valmiki's *Ramayana* is a fascinating source for a study of the changing ecology of Rama's route from Ayodhya to Sri Lanka between epic period and today. The paper presents vivid account of plants mentioned in *Ramayana* one of the two great epics of our country. This study will be useful to develop ecotourism of the region and would be an impetus for further research.

Key Word Index: *Ramayana, Ecotourism, Ecology, Environment, Biodiversity, Forest types, Flora*

RURAL TOURISM: AN EXQUISITE CONCEPT FOR EMPLOYMENT GENERATION

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With increased number of tourists visiting the country side, there will be a boost in the income level of the people due to increased level of trade among the people. This will also generate jobs among the youths. A small break in the mundane life always acts as a great mood lifter. Generally, people like to take this break by travelling and exploring new places. However, time and affordability play an important role in selecting the destination. Traditional tourist spots are often quite congested during the peak tourist seasons. Countryside has always been a stress reliever for the urban people. Since majority of the society has now been urbanized, rural tourism is increasingly becoming popular among the urban population. More than fifty per cent of the world's population lives in urban areas, a proportion that is expected to increase to 66 per cent by 2050. According to World Urbanization Prospects by UN DESA's Population Division (2014), the largest urban growth will take place in India, China and Nigeria. These three countries will account for 37 per cent of the projected growth of the world's urban population between 2014 and 2050. By 2050, India is projected to add 404 million urban dwellers, China 292 million and Nigeria 212 million.

Key Word Index: *tourists, trade, peak tourist season, urbanized, rural tourism.*



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SUSTAINABLE SAFFRON PRODUCTION FOR ECO-TOURISM DEVELOPMENT

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Saffron (*Crocus sativus* L.) the most expensive and prized spice is regarded as a pivotal economy regulating factor for the development of Jammu and Kashmir State. It is one of the important commercial activities of rich heritage of Kashmir Valley and is of key importance in eco tourism development. It has shown to have distinct anticancer activities. However, the crop has a very low harvest yield (stigma/biomass). In view of that, the cultivation improvement for increasing the yield of the crop is very important which can be realized by following improved cultural methods. A field experiment was conducted at Dryland (Karewa) Agriculture Research Station, Budgam for 4 years during 2007-2010 to study the effect of different fertility management practices on saffron and the results were further tested in farm trials under one of the flagship programmes of NAIP during 2009-2014. The amount of Farm yard manure was applied at 0, 30 and 60 tha^{-1} and inorganic nitrogen at 0, 45 and 90 kg ha^{-1} of, respectively along with azotobacter. The relative economics revealed that the highest net returns (Rs 5.56 lakh ha^{-1} year⁻¹) were obtained with the treatment combination of $A_1 F_{60} N_{90}$ with azotobacter followed by (Rs 5.20 lakh ha^{-1} year⁻¹) $A_0 F_{60} N_{90}$, without azotobacter followed by the treatment combination of $A_1 F_{60} N_{45}$ and $A_0 F_{60} N_{45}$. Corm yield were averaged for one year, average saffron yield were taken, the additional labour for distribution of FYM were taken into consideration i.e. 2 labour per ton of FYM. The results suggest that the integrated nutrient management could be fruitful in sustaining the crop production for eco tourism development.

ECOTOURISM VIS-À-VIS SUSTAINABLE ENVIRONMENT

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Tourism especially international tourism is one of the world's fastest growing industries. The world has seen an increase in international tourist arrivals from 25 million in 1950 to 664 million in 1994. In its most basic sense, tourism can be defined as the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes. Tourism is the world's largest employer, generating, directly and indirectly, nearly 200 million jobs or some 10% of the jobs globally. Ecotourism is a new concept in tourism, which was originally sparked off by the idea of making harmonious co-existence with nature a reality once again. As defined by The International Ecotourism Society, it is the responsible travel to natural areas, which conserves the environment and sustains the well being of local people. The World Tourism Organization



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(WTO) has estimated that ecotourism is worth some \$20 billion a year, and together with nature-based tourism, accounts for 20% of global international travel. Any tourism program which is: nature – based, ecologically sustainable, where education and interpretation is a major concept and where local people are benefited can be called ecotourism. In developing countries particularly India ecotourism adoption can be achieved by encouraging the involvement of local communities in the industry to practice stewardship of their natural resources. Raising children with the knowledge about the costs and benefits of ecotourism puts them at a great advantage for generations to come, making continuing a sustainable tourism practice much more likely.

Key Word Index: *Tourism, Ecotourism, Sustainable environment*

IMPACT OF TOURISM AND INFRASTRUCTURE DEVELOPMENT ON ECOLOGY OF KASHMIR VALLEY

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Kashmir has the honour of being one of the magnificent tourist magnets in the northern Himalayan belt, endowed by nature with the bestowment of continuous tourist attraction. The present investigation is based on the impact of tourism development and creation of infrastructures at different spots of the Kashmir valley. It was observed that more than 50 per cent hotel owners, residents, Government servants, tourist guides, taxi drivers and *shikarawallas* hold that, with tourism the quality of life has deteriorated in Kashmir valley. The respondents overwhelmingly confirm that encroachments are common in Srinagar city than in other tourist spots. Encroachments have been made near the Lakes (Dal, Wullar and Manasbal). In Srinagar city shops, kitchens and bathrooms are constructed illegally on roadsides. Construction of shops on unauthorised land in the city and at tourist spots is common. The number of Ghats has increased along the banks of Jhelum. These Ghats enhances water pollution making the places dirty with obnoxious odours. This shows that the flow of tourist and increase in the growth of tourist infrastructures are of immense ecological concern. The multiple growths of tourist towns have decreased the environmental carrying capacity and at the same time threatening the geo-ecological milieu of these resorts. Both Gulmarg and Pahalgam experiences considerable environmental changes as a consequences of construction of tourist buildings, roads and pavements, gardens and parks, catering establishment and all what has been done in the name of infrastructure development.

Key Word Index: *Ecotourism, Problems, Development, Impact, Environment.*



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IMPACT OF TOURISM ON BIODIVERSITY OF VALLEY OF KASHMIR

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Tourism is the lifeline of Jammu and Kashmir and all possible efforts need to be undertaken for retaining, maintaining and sustaining it. The present study deliberates the impact of Tourism on Biodiversity in the Valley of Kashmir and it was observed that more than 70 per cent of shopkeepers, tourist guides, taxi drivers, *shikarawallas*, pony keepers and labourers consider tourism not a threat to wildlife of Kashmir. Animal lover tourists visit breeding places, nests and habitats of animals and birds, close range of photography, illegal hunting and shooting and pollution at tourist places are the main dangers that shatter their peace, believe the respondents who approve of such peril to the wildlife. Further, more than 60 per cent of the respondents consider tourism adversely effective to the flora of Kashmir due to camp fire; trampling and repeated use of treks depleted the vegetation cover. It is quite cleared that 70 to 90 per cent of the population of sample households opine that tourist activities have resulted in reduction of pastures and disappearance of natural springs in the valley of Kashmir. These changes in the biodiversity may envisage erratic changes in the biosphere of the region which in the long run may deteriorate the ecology beyond redemption. According to one estimate, 30 per cent of the J & K states population is directly or indirectly connected with the tourism industry so it is important that Kashmir issue may be solved peacefully as it is because of this lingering issue, millions of people are facing immense hardships and a state of uncertainty and instability which in due course of time can threaten the diversity of plants and animals which are biggest tourist attraction.

Key Word Index: *Tourism, biodiversity, flora, fauna and natural springs*

ECO-TOURISM IN KASHMIR VALLEY

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Eco-tourism an entirely new approach in tourism which is preserving travel to natural areas to appreciate the cultural and natural history of the environment, taking care & not to disturb the integrity of ecosystem, while creating economic opportunities that make conservation and protection of natural resources advantageous to the local people. Today the entire world is facing deep crisis and is in the danger of being doomed because of the rich forest areas and biological diversities have been relentlessly divested to erect concrete walls which led to global



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warming and green house effects. India the land of varied geography boasts an abundant source of flora and fauna with numerous rare and endangered species in its surroundings, today India has many wildlife sanctuaries, national parks, botanical and zoological gardens which are working towards the protection, conservation and enhancement of ecosystem, there are different eco-places and destinations in India like Coorg, Himalayas, Garhwal, Goa, Kerala, Kodaikanal, like the places mentioned here our Kashmir valley doesn't fall in the list despite having tremendous scope as far as eco-tourism is concerned, our valley is laden with wide range of eco-tourism places to explore. Our valley has rich flora and fauna which has earned this place international recognition. The well preserved biodiversity of our valley is a tourist trapper. Despite having huge potential we are lagging as compared to other places mentioned above, so the Govt. of India in common and department of tourism Jammu and Kashmir in particular need to take adequate steps at the earliest to explore the potential places under the umbrella of Eco-tourism.

Key Word Index: *Eco-tourism, Eco-system, Eco-places, Biodiversity.*

RURAL TOURISM AS AN INSTRUMENT OF COMMUNITY DEVELOPMENT: A CASE OF AGLASUN

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In today's world of globalization 'Urban' always gets more priority in terms of development. In most of the cases, rural falls behind and stays vulnerable in the development trajectories, though in sustainable development process, the development is perceived in economical, social, environmental and ecological dimensions for both urban and rural. In the process of development, rural tourism already have proved its success in many region, mostly in developing countries. Through rural tourism a rural community can boost up their socio-economic growth following the steps of Social Innovation. Rural tourism is very much close to ecotourism since rural displays the most magnificent natural resources as well as local traditional and cultural heritages. This research tries to see rural tourism as an instrument of community development which would be social, cultural, economical, environmental and holistically sustainable creating an alternative economy. The case of Ağlasun, Turkey has been taken as a case-study to understand their assets, strength and possibilities in the context of rural tourism and how their potentials can be valorized for a socially innovative local development.

Key Word Index: *Rural tourism, eco tourism, social innovation, alternative economy, community development, sustainable development.*



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ECOTOURISM: A WAY FORWARD FOR BIODIVERSITY CONSERVATION

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Biodiversity, combination of two vital words "bio and diversity" pertaining to the variation of life. Biodiversity typically measures variation at the genetic, the species and the ecosystem level. Biodiversity provides goods and services such as food, fiber, medicine, air, water purification, climate regulation, erosion control and nutrient cycling. Biodiversity also plays an imperative role in economic sectors that drive development, including agriculture, forestry, fisheries and tourism. Biodiversity is destructed by factors such as human health, security and culture. Biodiversity conservation and sustainable development are two interrelated branches focusing on social progress, economic growth and environmental protection on one side, and ecosystem conservation on the other. In order to conserve the environment the conservation of biodiversity is vital. For the biodiversity conservation ecotourism supports significantly. Ecotourism is a type of tourism having some basic principles such as minimally impacting on the environment, learning about and respecting the local culture and environment, obtaining positive experiences for all, learning about the local, political and environmental issues, ensuring that your spending contributes to the conservation of the area and in preserving a special habitat such as wildlife etc.

Key Word Index: Biodiversity, Conservation, Environmental issues, Ecotourism.

PROMOTION OF ECOTOURISM TO FOSTER SUSTAINABLE DEVELOPMENT AND CONSERVATION

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Many countries have promoted Eco-tourism ventures to ameliorate the problems of environmental degradation and underdevelopment. Although, there is no argument on what ecotourism is and how it should be. However, it is generally believed that this form of tourism will foster responsible tourist behavior, conservation of important wildlife habitats and ecosystems, appreciation of local cultures and traditional lifestyles, and provision of sustainable forms of livelihood for people living in remote areas and communities. Likewise, Kashmir valley is blessed with vast treasures of tourist destinations, most of which are located in or near forest



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areas or near important wildlife habitats. Every year millions of tourists visit these places which overburdens the natural capacity if not treated properly, deteriorating the environment and the wildlife habitats, which can be seen in most of the tourist destinations of the valley. With eco-tourism policies such places can be limited only to eco-tourists having responsibility and care towards nature and its resources and also to create awareness among others about the importance of such resources, which can not only help in conservation but also in sustainable development. This study emphasizes the eco-tourism as the means of conservation of environment and suggests that the steps should be taken to promote such ventures on a large scale as it has already begun in various other countries.

Key Word Index: *Eco-tourism, Environment, Conservation, Sustainable development.*

ECO-TOURISM AND ITS IMPACT ON LIVELIHOOD OF TRIBAL AREAS OF KASHMIR VALLEY

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Tourism is considered as the backbone of economy of Jammu and Kashmir in general and Kashmir valley in particular. Every year millions of tourists visit the valley for its scenic and attractive destinations. With the advent of Eco-tourism, not only tourists are satisfied but also the nature is conserved. Similarly, the tribal areas of Kashmir valley are located in the most scenic and beautiful spots which are increasingly becoming eco-tourist destinations because of the natural beauty, also the eco-tourists are often motivated by the chance to experience tribal culture and by their traditional way of living. More and more tourists are being attracted to these areas which increases their pace of modernization in many aspects of life. Many remote and inaccessible tribal areas are now accessible with better road and transport connectivity due to the impact of Eco-tourism. Likewise, many more facilities which they were deprived of are now being provided to them. Moreover this also becomes a means of income generating activity for these tribal people. The present study emphasizes the potential and treasure of ecotourism in the scheduled areas of Kashmir which are largely dominated by tribal communities. Further, the study suggests to promote the ecotourism in the tribal areas and to establish plans which can not only increase the ecotourism on one hand but also conserve the nature on the other hand in a sustainable manner. The study again recommends that if ecotourism is developed properly it can not only attract tourists from far and near but can also generate more revenue for the inhabitants of the tribal regions of Kashmir valley.

Key Word Index: *Eco-tourism, tribal areas, tourist destination, modernization, community development.*



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ECOTOURISM IS AS A DEVELOPMENT STRATEGY

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Ecotourism is a sub-component of the field of sustainable tourism. Ecotourism's perceived potential as an effective tool for sustainable development. Ecotourism, as an alternative tourism, involves visiting natural areas in order to learn, to study, or to carry out activities environmentally friendly, that is, a tourism based on the nature experience, which enables the economic and social development of local communities. It focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artefacts from the locality. A symbiotic and complex relationship between the environment and tourist activities is possible when this philosophy can be translated into appropriate policy, careful planning and tactful practicum. Carefully planned and operated ecotourism sites, especially if it is village-based and includes local participation, is able to provide direct benefits that might offset pressure from other less sustainable activities that make use of natural and cultural resources. Ecotourism, natural resources, cultural heritage, rural lifestyle and an integrated tourism is a type of local economic activities. Therefore, ecotourism in natural and cultural areas was carried out with a number of elements in their natural landscape and cultural landscape (water, vista, topography, vegetation, clean air), as well as in the variety of recreational activities suitable for all kinds of environments. Therefore, ecotourism and its natural assets and raw materials to create, as well as directing people to travel is an attractive force. Ecotourism helps in community development by providing the alternate source of livelihood to local community which is more sustainable. Its aim is to conserve resources, especially biological diversity, and maintain sustainable use of resources, which can bring ecological experience to travellers, conserve the ecological environment and gain economic benefit.

Key Word Index: *Ecotourism, Sustainable, Development, Environmental, Experience, Livelihood*



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ROLE OF ECOTOURISM IN ENVIRONMENTAL CONSERVATION AND SOCIO-ECONOMIC DEVELOPMENT

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Ecotourism as a component of the green economy is one of the fastest growing segments of the tourism industry, and focuses on environmental conservation, socioeconomic development and capitalist development. With an objective to identify and quantify impacts of ecotourism on environmental conservation, social and cultural heritage preservation, economic development and enhancement of livelihoods. It can be observed that socioeconomic variables had a positive effect on tourism participation with the exception of age and landholding status having a negative effect. Ecotourism helps in environmental conservation and socioeconomic development. It also helps in increasing employment and entrepreneurship at a local level. Income and expenditure of local people had increased because of ecotourism. Participation in ecotourism, the education level, an increase in productive human capital and an increase in income had enhanced people's livelihoods. So, awareness and education programmes related to tourism, and strategies to increase the length of stay of visitors would be recommended. It is a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small scale alternative to standard commercial mass tourism. It means responsible travel to natural areas conserving the environment and improving the well-being of the local people. Its purpose may be to educate the traveller, to provide funds for ecological conservation, to directly benefit the economic development and political empowerment of local communities, or to foster respect for different cultures and for human rights. Since the 1980s, ecotourism has been considered a critical endeavour by environmentalists, so that future generations may experience destinations relatively untouched by human intervention. Several university programs use this description as the working definition of ecotourism.

Key Word Index: *Ecotourism, Socioeconomic development, Entrepreneurship, Livelihood*



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ECOTOURISM A KEY TO SUSTAINABLE DEVELOPMENT

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Ecotourism is a part of environmental conservation, it is considered as a subset of sustainable tourism and nature tourism because it represents a sustainable way of travelling in natural areas. Ecotourism promotes conservation of natural resources, it has low negative visitor impact and provides for beneficially active socio-economic involvement of local populations. Ecotourism clothes the sustainable tourism principles, but differs from it by aspects related to local community issues, interpretation for visitors to a particular destination and the number of visitors (Tuğba, 2013).

Sustainable development through ecotourism is a concerning issue in the world today. Many countries have ensured their regional development by this concept. In this concept, sustainable development may be occurred by the ecotourism and regional development simultaneously in an area. Ecotourism is a sustainable form of natural resource-based tourism (Tuğba, 2013) and focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artefacts from the locality (Dowling, 1997; Fennell, 1999). There is just a thin line of differentiation between sustainable tourism and ecotourism. Basic purposes of ecotourism are to preserve and utilize natural and cultural resources in a sustainable way and to enable economic development of local people (Eriksson, 2003). According to Rome (1999) Ecotourism is one strategy for supporting conservation and providing income for communities in and around protected areas. It can contribute to economic development and conservation of protected areas by: a) generating revenues that can be used to sustainably manage protected areas, b) providing local employment and c) inculcating a sense of community ownership. Ecotourism tries to raise environmental consciousness by exploring ecology and ecosystems and by providing environmental type experiences. In order to provide sustainability in the ecotourism, it is necessary to know environmental, social and economical effects of ecotourism activities.

Key Word Index: conservation, ecotourism, environment, sustainable.

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ECOTOURISM: AN ECOLOGICAL, ENVIRONMENTAL AND ECONOMICAL PERSPECTIVE TOWARDS SUSTAINABILITY

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Ecological Tourism or Ecotourism according to the World Tourism Organization (WTO) can be defined as: “all forms of tourism in which the tourists’ main motivation is the observation and appreciation of nature, that contribute to the conservation of, and that generate minimal impacts on the natural environment and cultural heritage”. Tourism has significant potential as a driver for growth for the world economy. The tourism economy represents 5 per cent of world GDP, while it contributes to 6-7 per cent of total employment. International tourism ranks fourth (after fuels, chemicals and automotive products) in global exports, with an industry value of US\$1trillion a year. The Himalayan state of Uttarakhand is endowed with 64.81% of its area under forests hence supporting rich biodiversity with a variety of flora and fauna, which attracts thousands of tourists. Thus it becomes imperative for the state to conserve its rich biodiversity while at the same time promote ecologically sustained tourism which aims at providing livelihood for its people. Ecotourism a significant tool for economic and sustainable development of the country Environmentally – sustainable, Economically – viable, Socially – equitable, Ecotourism involves a lot of participants, often with conflicting interests: stakeholders, rural development agents, the tourism industry, government, local population, different organizations and institutions.

Key Word Index: *Ecological Tourism, Ecotourism, Himalayan, Sustainability, Uttarakhand.*

ECOTOURISM AND SUSTAINABILITY IN INDIA

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Ecotourism generally defined as responsible travel to natural areas that conserves the environment, sustains the well being of the local people and involves interpretation and education. Ecotourism plays a great role towards socio- economic changes. There is an immediate impact on the host environment due to the direct contact of visitors and also an indirect impact on the local economy and the society. Tourism in ecologically sensitive area needs close monitoring. In short tourism in nature based areas should be ecologically sustainable. Ecotourism could be a tool for environmental conservation local empowerment poverty alleviation and so on. So it requires well planning on the basis of regulations. It enjoys a



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significant superiority over general tourism with regard to tourist arrivals and economic social and environmental benefits. It can be concluded that ecotourism development and protection of environment can be made possible with the careful planning and execution by the government departments' tourist officials along with the cooperation of the public. In future ecotourism will continue to grow in several parts of the world as a profitable way of life. It has both positive and negative impacts on environmental, social and economic aspects of the country. Due to the high rate of beneficial impacts, it is helping in the overall development of the community, country and the whole world. So, there is need of cooperation among different stakeholders, training of ecotourism to tourism entrepreneurs and appropriate management policy for sustainable implementation of ecotourism projects.

Key Word Index: *Ecotourism, Environment, Sustainability, Benefits.*

ECO-TOURISM AS A MEANS OF PROMOTING INCOME GENERATION

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Change is the law of nature and is inevitable as we need to use the scenic beauty of our landscape. Let a new form of tourism lead our economic progress and environmental conservation simultaneously. The issues of creation of durable employment and conservation of environment in the country are critical for sustainable development and march towards becoming a developed nation. The growing population of the country is reducing the per capita land holding. At the same time, farming (which only contribute to around 16 per cent of the GDP but provides livelihood to more than 60 per cent of the rural labour) is becoming non-profitable due to several factors, including the climactic vagaries, poor implementation of schemes and lopsided agriculture reforms. New technological innovations are imperative, along with the exploration of new policy options to meet the objectives of ushering India into the comity of developed world. As observed by famous American writer Mark Twain, "India is a fabulous world of splendours and rages, the one country under the sun with an imperishable interest, the one land that all men desire to see." It is, therefore, no wonder to see that despite poor infrastructure, India is the fourth largest favoured destination for holidays and tourism; and tourism the second largest foreign exchange earner of the country. It is a fact that tourism has been creating 47 per cent of the employment annually. However, reckless tourism is sending warning signals as its causes damage to the environment and thus adversely impacts the livelihood of the locals and contribute to pollution, degradation and emission. To ward off these evils, the concept of eco-tourism has emerged. Considering the scenic diversified beauty of the country's landscape, eco-tourism can be a game-changer for both the creation of sustainable employment opportunities as well as conservation of our forests and environmental resources. Eco-tourism preserves the local natural surroundings, culture and promotes livelihood for the local people. European countries earn more than 75 per cent of their revenue from forests through eco-tourism rather than from cutting



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down forests and selling the timber. Eco-tourism deserves to be the central part of the developmental planning process.

Key word Index: *landscape, tourism, economic progress, environmental conservation, eco-tourism and employment opportunities*



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ENVIRONMENT

A SCIENTIFIC TOUR TO ANTARCTICA

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Generally, Antarctica is not a tourist spot and tourism activities are prohibited. As per Antarctica treaty, this place can be explored only for scientific and peaceful purposes. Tourism companies are required by the Antarctic Treaty to have a permit to visit Antarctica. Many sea cruises by cruise ships include a landing by helicopter. Some land visits may include mountaineering, skiing or even a visit to the South Pole. A few courtiers are providing limited tourism services on very high tariffs and providing opportunities to explore the pristine world and allowing skiing, boating, tracking over there.

Author was fortunate to visit Antarctica for scientific research in Antarctica for environmental monitoring and impact assessment studies, because it's very important to evaluate the negative impact of anthropogenic activities on various environmental components. Human interference and settlements is the emerging issue in various part of South Pole including east Antarctica. Many environmental studies were carried out and a few are in the progress in Vestfold Hills, Larsemann Hills and Schirmacher Oasis in East Antarctica. Long term environmental studies were carried out in east Antarctica during the austral summer seasons of various Indian Scientific Expeditions to Antarctica (26th ISEA to 30th ISEA) by SIIR at Larsemann Hills and Schirmacher Oasis for Ambient Air Quality, Freshwater Quality, Marine Water Quality, Soil & Sediment Quality, Noise level Monitoring, Solid waste generation, Biodiversity assessment, etc. A comprehensive work was carried out before and during the construction of Bharti Station, hence the detailed study after commissioning of Bharti Station is equally important and must be carried out to evaluate the impacts on various environmental components.

Key Word Index: *Antarctic Environment, environmental monitoring, Impact assessment, tourism*

BIOMATERIALS WASTE AS ELECTRODES FOR SUPER CAPACITOR

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The earth, water and air are not a gift to us from our parents but a loan from our children. Energy is at the heart of most critical economic, environmental and developmental issues of facing the world today. Clean efficient, affordable and reliable energy services are indispensable for global prosperity. Developing countries in particular need to expand access to reliable and



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modern energy services if they reduce wastage of energy while at the same time increasing, productivity, enhancing competitiveness and promoting economic growth. Biodegradable wastes and uses provide cost effective, incentives for reduced emission is supply and increased end-use-efficiency will therefore be critical for reducing the risk of irreversible, pollution climate change.

Among the energy storage devices Supercapacitor have shown to be suitable for these criteria a wide ranging selection of carbon based materials such as activated carbons (ACs) template carbon, carbon nonfibres and graphene are currently being investigated for use as electrode materials for EDLC application .Nevertheless AC are the leading choice for supercapacitor applications due to its abundance and price efficiency. In addition to their satisfactory capacitance performance in the general range from 40 to 100.F Hence extensive research has been dedicated on new approaches for producing activated carbon materials with high porosity levels in a cost effective way.

Activated carbon (AC) With unique surface charecteristics is a feasible material for such energy storage apart from non-linearity between surfaces area and specific capacitance ,parameters like poresize, porevolume, poresize distribution and size of the electrolytes ion greatly influence EDLC performance.AC for supercapacitor application can be produced from a variety of carbonaceous materials such as coal, wood ,coconut shells, camphor, waste newspaper, bamboo plant, orange peels etc. More energy can be stored on the high surface area carbon electrode as the carbon surfaces provide more electrode/electrolyte interface for the double layer.

Key Word Index: *EDLC, ACs, Supercapacitor.*

AIR PURIFIER DRONE

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Pollution is the introduction of contaminants into the natural environment that cause adverse change and air pollution occurs when harmful substances including particulates and biological molecules are introduced into earth's atmosphere. It is significant risk factor for a number of pollution related diseases and health conditions including respiratory infection and lung cancer. Air pollution can be controlled by physical and chemical processes treatment. This air purifier drone used to purify the air in which air was treated by high pressure water and some specific chemical's spray released from nozzle at the open environment in which sediment the dust particles and as well as harmful gases such as Sox, Nox, sulpher and carbon were absorbed by water and some specific chemical's and by the help of sensor present in it detects wether all the harmful content present in is neutralized and air is fit for us.



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DANIONINE FISHES OF DEHRA DUN, UTTARAKHAND

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The general fish fauna of Dehra Dun has attracted the attention of various workers during the past but no update account on danionine and other groups is available.

During the present study an emphasis was laid on updating present taxonomic status of danionine fishes belonging to family Cyprinidae, besides their other features and conservation status. These belong to 13 species under 8 genera, viz. *Barilius* Hamilton, 1822 *Cabdio* Hamilton, 1822, *Danio* Hamilton, 1822, *Devario* Heckel, 1843, *Esomus* Swainson, 1839, *Opsarius* McClelland, 1838, *Raiamas* Jordan, 1919 and *Rasbora* Bleeker, 1859. Some of which are interesting for their aesthetic value and trade in aquarium keeping.

Key Word Index: *Danionine Fishes of Dehra Dun.*

CURRENT STATUS AND DIVERSITY OF ORNAMENTAL FISHES IN FLOODPLAIN LAKES (*CHAURS*) OF NORTH BIHAR, INDIA

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Shifting nature of the river Kosi in its lower course has given rise to numerous wetlands in plains of north Bihar, India, supporting significant fishery in this region. The present study highlights current status and diversity of ornamental fishes in the floodplain wetlands of Madhepura district of north Bihar. The study was carried out at Tarawe *chaur*, Gamharia *chaur* and Ghelar *chaur*, located in the river Kosi basin between latitude 25°34'N to 26°07'N and longitude 86°19'E to 87°07'E. The fishes were sampled during September 2012 to August 2013 with the assistance of the local fishermen. The fish communities of the studied floodplain lakes were comprised of 57 species belonging to 37 genera, 20 families and 8 orders. The family Cyprinidae show maximum number of species followed by Bagridae, Cobitidae, Channidae, Siluridae, Mastacembelidae, Chandidae, Belontidae and others. Of these, 31 species belonging to 20 genera, 12 families and 4 orders were recorded as potential ornamental fish. These fishes were sorted into 10 major groups, like medium carp (*Labeo calbasu*), minor carp (*Amblypharyngodon mola*, *Barilius barila*), air-breathing catfish (*Clarias batrachus*), non air-breathing catfish (*Mystus tengra*, *Mystus vittatus*), murrels (*Channa striatus*, *Channa gachua*, *Channa marulius*), perches (*Anabas testudineus*), puntius (*Puntius conchoni*, *Puntius sarana*, *Puntius sophore*, *Puntius chola*, *Puntius terio*), loaches (*Nemacheilus botia*, *Botia lohachata*, *Lepidocephalus thermalis*, *Lepidocephalus guntea*) and miscellaneous (*Glossogobius giurus*, *Chela laubuca*, *Danio dangila*, *Esomus danricus*, *Ailia coila*, *Gudusia chapra*, *Colisa faciatius*, *Colisa lalius*) and weed fishes (*Pseudambassis ranga*, *Pseudambassis baculis*, *Chanda nama*).



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Of the recorded ornamental fish, 2 species were assessed as endangered, 9 vulnerable, 8 low risk near threatened and 6 low risk least concern, while the status of 6 species were unevaluated. The study reveals that most of the available ornamental fish species were endemic to this region. The less fishing would save endangered and vulnerable fish species. Emphasis should be given to large-scale propagation and conservation of local varieties of ornamental fishes for better economic returns.

Key Word Index: *Floodplain lakes, fish diversity, indigenous, ornamental fish, conservation status*

CHARACTERIZATIONS OF LOCAL MAIZE (*ZEA MAYS* L.) BIODIVERSITY FOR FOOD AND NUTRITIONAL SECURITY UNDER TEMPERATE KASHMIR CONDITIONS

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In the State of J & K, maize is the main crop in terms of acreage and is staple food for the people living in highly inaccessible areas. Local maize biodiversity in the form of landrace population are valuable resources which have the potential to contribute enormously towards the millennium development goals of food security, poverty alleviation, environmental protection and sustainable development. Farmers are continuously growing these landraces and conserving them by use to serve as sources for food and nutritional security. The AICRP maize centre at DARS, Budgam collected documented and characterized 50 landraces of maize using morphological and molecular markers to identify putative traits for further improvement during 2015-18. Sufficient amount of variability was noticed in the set of landraces.

Key Word Index: *crop, biodiversity*

DIVERSITY OF HEMIPTERA FAUNA OF INDIAN HIMALAYAS

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Insecta is represented by 10,53,578 species from the world including 65,047 species from India which is about 6.17% of the total global fauna. The hemipteran fauna of Indian Himalaya has been explored thoroughly, consulting published literature which revealed about 2,123 species from six Himalayan states, Jammu and Kashmir, Uttarakhand, Himachal Pradesh, Sikkim, Arunachal Pradesh, and West Bengal (Darjeeling district). Beside this 137 species of hemipteran species were identified from the survey of Himalayas. This study will help in the study of hemipteran pest and True bug fauna of Jammu and Kashmir as well as Himalayas.

Key Word: *Jammu and Kashmir, hemipteran pest and True bug fauna.*



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EXPLORATION OF AN UNDERUTILIZED HERB, *ATRIPLEX HORTENSIS* FROM KASHMIR FOR POTENTIAL BIOACTIVE CONSTITUENTS LINKED TO THEIR ANTIOXIDANT AND ANTIDIABETIC ACTIVITY

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Atriplex Hortensis (commonly known as Wastahakh) is an underutilized vegetable in the Kashmir region. This vegetable is believed to be highly nutritional and quite health beneficial, however, the crop is highly unexplored. Therefore, the aim of the current investigation was to profile different *Atriplex Hortensis* ecotypes collected from different districts of Kashmir for their nutrients and phytochemicals, bioactivities and correlate their presence with the antidiabetic potential of this vegetable so as to recommend it as an antidiabetic agent for better management of diabetes. In the current investigation, it was observed that the *Atriplex Hortensis* ecotypes found in Kashmir region are quite rich nutritionally and a good source of essential minerals (Ca, Mg, Fe, Zn, Mn, Cu, S, P), phytochemicals (kaemferol, quercetin, dopa, dopamine sitosterol, quercetin), essential amino acids (Arg, Leu, Phe, Lys, Val), vitamins (riboflavin, folic acid, ascorbic acid) and unsaturated fatty acids. Further, these *Atriplex Hortensis* ecotypes exhibit a much higher phenolic linked antioxidant potential as well as potent antihyperglycemic activities (via inhibiting the key enzymes of carbohydrate metabolism (including α -amylase, α -glucosidase and invertase) under *in vitro* conditions with a significant positive correlation with their metabolite content, thereby, creating a valuable approach for amelioration of diabetes to a greater extent. The present study reveals a clear link between the nutritional, phytochemical profile and the *in vitro* antidiabetic potential of *Atriplex Hortensis* ecotypes, however, further research is needed before recommending its usage for diabetes management.

Key Word Index: *Antidiabetic, Nutritional, Phytochemicals, Antioxidant, Antihyperglycemic, Metabolite*



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AN ECOFRIENDLY APPROACH FOR INCREASING ZINC AVAILABILITY IN SOILS

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Zinc deficiency in the soils not only affects the crop yields, but also the nutritional quality and the human health. The microbial transformation of unavailable forms of soil zinc to available form is a cost effective, eco-friendly and long term solution to mitigate zinc deficiency issues. Out of 105 bacterial strains isolated from Ladakh region of J&K state, only 13 isolates solubilised zinc on ZnO and Zn₃(PO₄)₂ supplemented media after 48 hours of incubation at 20⁰C. Qualitative screening at 0⁰C, 1⁰C, 3⁰C, 5⁰C, 7⁰C, 15⁰C and 20⁰C after 48 hours, ZnSB (Pd) identified as *Pseudomonas extremorientalis* based on 16SrRNA partial sequencing with NCBI gene bank accession KU500615, showed maximum solubilization efficiency of 234.91% on ZnO and 236.48 % on Zn₃(PO₄)₂ supplemented medium at 20⁰C, the same isolate released maximum zinc of 25.174 µg zinc/ml broth from ZnO and 17.489 µg zinc/ml broth from Zn₃(PO₄)₂ at 20⁰C after 20 days of incubation during quantitative screening. Under *in-vitro* this strain ZnSB (Pd) showed the highest HCN, ammonia and IAA production was used in a field experiment on apple crop comprised of six treatments viz., (1) un-inoculated control, (2) Vermicompost, (3) ZnSB(Pd), (4) VAM(vesicular arbuscular mycorrhiza), (5) VC + ZnSB(Pd) and (6) VAM + VC + ZnSB(Pd) in randomized block design with 5 replications. Field experiment revealed that ZnSB(Pd) + VAM + VC showed increased organic carbon (1.86 %), dehydrogenase (79.38 µg TPF/ 24 hr g⁻¹ soil), urease (13.61 mg NH₄ -N g⁻¹ soil), nitrate reductase (9.31 µg/ml/hr), soil respiration (7.18 mg CO₂ /hr/100 gm soil), Soil microbial biomass carbon (154.26 mg kg⁻³ soil) and Soil microbial biomass nitrogen (97.64 µg kg⁻¹ soil) in the rhizosphere soils of apple. Water soluble, exchangeable and oxide bound zinc was increased while as carbonate bound, organically complexed and residual zinc decreased under the treatment ZnSB(Pd)+VAM+VC. This study has much relevance to the conference theme by providing an eco-friendly solution to zinc deficiency which in turn is in consonance with the ecotourism policy of the state government.

Key Word Index: *Ecofriendly nutrient input, Zinc solubilizing bacteria.*



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ISOLATION AND CHARACTERIZATION OF COLD ACTIVE ENZYME PRODUCING BACTERIA FROM WASTE DUMPING SITE

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In Kashmir valley the management of municipal solid waste (MSW) becomes a greater challenge during cold environmental conditions (winters) due to slower microbial activities. However, waste dumping sites are considered of inhabiting a diverse group of waste degrading bacteria that could be used for rapid composting of organic solid waste through production of cold active enzymes.

In the present study, Achan landfill site was selected as sampling site and 10 random samples were collected during winter season in sterile polythene bags. A total of 25 distinct bacteria were isolated on nutrient agar media at 10°C by following serial dilution and spread plate technique. The isolates were screened qualitatively for the production of various enzymes viz. cellulases, proteases and xylanases. Out of 25 isolates only 8 isolates showed enzyme producing potential by forming hydrolysis zones on different media at lower temperatures. The isolates were then screened quantitatively and it was found that only three isolates viz. CBAW₂, PBLF₃ and HB₂ showed significantly higher enzyme activities. However, the isolate CBAW₂ was most efficient with highest cellulase activity (1.50U/ml), protease activity (1.75U/ml) and xylanase activity (1.41U/ml). The isolates were identified on the basis of morphological, cellular and biochemical characteristics. The isolate CBAW₂ belonged to genus *Bacillus*, PBLF₃ belonged to genus *Pseudomonas* and the isolate HB₂ belonged to genus *Bacillus*. It was concluded that land fill site harbors a diverse group of cold active waste degrading bacteria that could be used for development of efficient bacterial consortium for rapid composting of organic solid waste component of municipal solid waste (MSW). The end product of this study may be used with greater promise as an effective input for the better management of biodegradable residues at tourist places even during the cold weather.

Key Word Index: *Biodegradable waste management, ecotourism promotion.*



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**DEVELOPMENT AND VALIDATION OF HPTLC BASED METHOD FOR
QUANTIFICATION OF TRIGONELLINE IN FENUGREEK
(*TRIGONELLA FOENUM GRAECUM*) SEEDS**

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The present research work was undertaken to develop and validate a sensitive, fast, and reproducible high performance thin-layer chromatographic method for analysis of trigonelline in fenugreek seeds. Chromatographic analysis was carried out using TLC aluminium plates precoated with silica gel G60F254 as stationary phase and the samples were sprayed with the help of CAMAG Linomat5 TLC applicator. For optimization of the method, the different combinations of extraction solvents and mobile phases were tested, the methanol was found to be the ideal extraction solvent and the best separation was achieved in n-propanol: methanol: water (10:1.5:15:0.25, v/v/v/v) as mobile phase. Densitometric scanning of the plates in the UV mode with the deuterium source set at 270nm was used for quantification of trigonelline. This method gave compact spots with retardation factor (R_f) value corresponding to 0.40 ± 0.02 for trigonelline. The method was validated as per ICH guidelines in terms of LOD, LOQ, specificity, precision (intraday and interday), accuracy, and robustness. Accuracy of the method was checked by recovery study of three different levels with the average percentage recovery of 99.13 ± 0.26 for 0.40 ± 0.02. While employing this method, the dried fenugreek seed samples were found to contain trigonelline in the range of 0.069 % to 0.386 % (w/w). This method is being reported for the first time and could be successfully applied for quantification and routine quality control of this marker compound in several plant samples, herbal extracts, and market preparations.

Key Word Index: *Trigonelline, Fenugreek, HPTLC, LOD, LOQ, R_f*



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INTEGRATED FARMING SYSTEM: AN ECOFRIENDLY APPROACH FOR SUSTAINABLE AGRICULTURE-A REVIEW

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Sustainable development in agriculture must include integrated farming system (IFS) with efficient soil, water, crop and pest management practices, which are environmentally friendly and cost effective. Under the gradual shrinking of land holding, horizontal expansion of land is not possible. Hence, vertical integration of land based enterprises within the socio-economic environment of the farmers will make farming more profitable and dependable. Therefore, Integrated Farming systems can be proved as viable approach represents an appropriate combination of farm enterprises, viz. crop production, horticulture, livestock, fishery, forestry and poultry etc. in specific farming situation to address the problems of sustainable economic growth of farming communities. Hence, it is viewed as a powerful tool for natural and human resource management in developing countries. This is multidisciplinary whole farm approach and very effective in solving the problems of small and marginal farmers. This approach not only increases income and employment opportunity to farm household but protect the environment through recycling of the crop and animal wastes within the farm itself.

Key Word Index: *IFS, Ecosystem, Soil health, Pest management.*

MAJOR NUTRIENT STATUS IN SOILS OF PULWAMA DISTRICT OF KASHMIR VALLEY

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A study was undertaken to assess the status of available major nutrients in soils of Pulwama district of J&K state. About 45 representative surface (0-45 cm) soil samples were collected from farmer's field of each block. The soil samples were analyzed for physio-chemical properties like pH, EC, OC, available N, P₂O₅ and K₂O. Soils of Pulwama district are moderately acidic to neutral in reaction, pH 6.2 with low soluble salt content (EC 0.31 dsm⁻¹). The organic carbon status of soil was medium (0.96 percent). The available N, P₂O₅ and K₂O content in these soils ranges from 187 to 679, 18 to 78.6 and 97.3 to 676.8 Kg/ha with a mean value of 213.27, 34.19 and 284.84 kg/ha respectively. On the basis of nutrient index value, soils of district were low in available nitrogen, marginal in available Phosphorous and slightly high in available



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potassium status. The present investigation provides preliminary information of fertility status of apple/field crop growing soils of Pulwama district of J&K which shall help in the formulation of nutrient management schedule in future for the better productivity of field/fruits in future.

Key Word Index: *Soils, Nutrients, Pulwama, Organic carbon*

RESPONSE OF GREEN GRAM (*VIGNA RADIATA L*) TO RHIZOBIUM IN ASSOCIATION WITH DIFFERENT SOURCES OF SULPHUR ON GROWTH AND CHEMICAL PROPERTIES OF SOIL

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A field experiment was conducted on clay loam soil, low in available N (220kg/ha), P₂O₅ (14kg/ha) and K₂O (164kg/ha) at crop research farm of regional research station RRS FAO wadura sopore SKUAST K. The experiment was laid out in 4x2 factorial randomized block design with eight treatments and three replications. The pH of soil was 7.5 and status of organic carbon was 0.85%. the seeds of green gram were sown at 30cm x 15cm spacing. The experiment included 10 treatments. It was concluded that application of gypsum @ 60kg/ha + Rhizobium inoculation (c₄l₁) was found to be superior over all treatments for growth and yield of green gram. The yield was found maximum 126.33 gm/plot (c₄l₁) in comparison with (c₀l₀) which was recorded with minimum yield of 110.00gm/plot.

Key Word Index: *Green gram, Sulphur, Rhizobium, Growth, Yield.*

DIRECT AND RESIDUAL EFFECT OF SULPHUR ON DRY MATTER PRODUCTION OF RICE (*ORYZA SATIVA L.*) UNDER RICE-MUSTARD CROPPING SEQUENCE IN ENTISOLS OF PULWAMA DISTRICT OF KASHMIR VALLEY

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An on farm trial (OFT) were conducted at seven locations of Awantipora block, in district Pulwama during kharif and rabi seasons of 2016-2017 to study the direct and residual effect of sulphur on dry matter production of rice in rice-mustard cropping sequence. Results revealed that out of different sources and levels of Sulphur treatments, the treatment receiving RDF + FYM (t/ha) + ZnSO₄ (20 kg/ha) + 45 kg Sulphur/ha recorded the highest dry matter in both direct and residual rice at active tillering (43.57 and 41.68 q/ha) panicle initiation (54.39 and 50.68 q/ha) grain filling stage (73.69 and 67.09 q/ha) and at harvesting time (55.03 and 50.69 q/ha) in straw and (49.17 and 45.60 q/ha) in grain respectively.

Key Word Index: *Rice, Sulphur, Dry matter, Cropping, Pulwama.*



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EFFICACY OF SOME FUNGICIDES AND BIO-CONTROL AGENTS AGAINST TUBER ROT (*FUSARIUMSOLANI*) OF KALA ZEERA (*BUNIUMPERSICUM*)

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Six non-systemic fungicides viz., captan 50 WP, copper oxychloride 50 WP, dodine 65 WP, mancozeb 75 WP, propineb 70 WP and zineb 80 WP and five systemic fungicides viz., bitertanol 25 WP, carbendazim 50 WP, difenconazole 25 EC, hexaconazole 5EC, and myclobutanil 10 WP were evaluated against tuber rot of kalazeera caused by *Fusariumsolani*. The *in-vitro* evaluation of non-systemic fungicides through poisoned food technique at five different concentrations viz., 50, 100, 250, 500 and 1000 ppm on active ingredient basis (a.i) indicated that dodine was most effective exhibiting mean mycelial growth inhibition of 70.86 per cent followed by mancozeb (56.59%). Copper oxychloride proved least effective and resulted in only 24.06 per cent mean inhibition of mycelial growth. Among the systemic fungicides, evaluated at concentrations viz., 25, 50, 100, 200 and 500 ppm on active ingredient basis (a.i), carbendazim proved most effective exhibiting mean mycelial growth inhibition of 92.00 per cent followed by bitertanol and hexaconazole with 88.22 and 84.01 per cent mean mycelial growth inhibition, respectively. Myclobutanil proved least effective and resulted in only 56.65 per cent mean inhibition of mycelial growth. Five strains of *Trichoderma viride* strains designated as Tv-1, Tv-2, Tv-3, Tv-4, Tv-5 and two strain of *Trichoderma harzianum* designated as Th-1 and Th-2 were also evaluated against tuber rot pathogen. Among the bio-control agents Tv-2 was most efficacious and resulted in 62.30 mean mycelial growth inhibition followed by Tv-1 with 61.00 per cent mean inhibition of mycelial growth. *Trichoderma harzianum* (Th-2) proved least efficacious and resulted in only 45.40 per cent mean inhibition of mean mycelial growth.

Key Word Index: Bio-control, Kala zeera, *Fusariumsolani*, In-vitro, non-systemic fungicides, systemic fungicides



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DIALLEL ANALYSIS OVER ENVIRONMENTS FOR YIELD AND ITS ATTRIBUTING TRAITS IN TOMATO (*SOLANUM LYCOPERSICUM* L.)

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Forty five F₁ hybrids produced in a diallel fashion and their 10 parents were grown in an RBD to generate information on the genetics of yield attributing traits following components of variation and diallel analysis. Components of variation analysis suggested that both fixable and non-fixable gene effects were involved in the inheritance. The component analysis revealed the preponderance of non-additive gene effects in the inheritance of traits. Net dominance effect was significant and positive for most of the traits indicating positive direction of dominance. Positive and significant 'F' values for number of primary branches/plant, flesh thickness, number of fruits per plant, average fruit weight and fruit yield/plant indicated positive direction of dominance. Average degree of dominance was more than unity in all the traits indicating over-dominance. Non-significant values of t^2 and deviation of regression coefficient from unity depicted the absence of epistasis for all the traits in all the environments and pooled analysis.

Key Word Index: *Diallel, Yield, Traits, Tomato (Solanum lycopersicum L.)*

PHYTOPLANKTON COMMUNITY RESPONSE TO CHANGING WATER QUALITY CHARACTERISTICS OF SUBTROPICAL LAKE MANSAR, JAMMU, JAMMU AND KASHMIR

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Lake Mansar, a sweet water lake in Shiwalik range fed by underground springs with abundant phytoplankton communities was studied during January to December 2014. The study revealed the occurrence of 58 genera and 92 species of the different classes of alga. Chlorophyceae was found to be the most dominant class with 31 genera and 57 species of followed by Bacillariophyceae 15 genera and 20 species, Cyanophyceae 9 genera and 11 species, Euglenophyceae 2 genera and 2 species and 1 genera and 2 species of Dinophyceae. Quantitatively phytoplankton population range of different algal classes were as Chlorophyceae, 2.62×10^5 ind./l (December) winter, 25.7×10^5 ind./l (September), Bacillariophyceae, 0.24×10^5 ind./l (December) winter 12.01×10^5 ind./l (August), Cyanophyceae, 0.92×10^5 ind./l (November) winter and 7.48×10^5 ind./l (August). Dinophyceae represented bimodal peak in September (0.86×10^5 ind./l) and in April (0.57×10^5 ind./l), while as, Euglenophyceae, showed bimodal peak



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April (0.59×10^5 ind./l) and September (0.35×10^5 ind./l). Water parameters viz. pH (7.12-8.42), conductivity (0.130-0.300mS/cm), free CO₂ (0-12.65mg/l), alkalinity (78.62-164.15mg/l), DO (3.65-10.8mg/l), BOD (1.25-3.25mg/l), calcium (20.40mg/l), magnesium (5.5-9.5mg/l), tot. hardness (81.6-133.40mg/l), nitrate (1.19-3.63), phosphate (0.06-0.87mg/l). The lake supports variety of plant and animal life due to its good water quality having DO and less calcium & magnesium salts which is a condition found in most of the mesotrophic lakes. Lake due to tourism and other anthropogenic activities is under a threat and thus shows some pollution content which need to be cared to save it for future generation. The nutrient enrichment due to the anthropogenic pressure around the lake, deteriorates not only its water quality but also influences the phytoplankton populations and diversity.

Key Word Index: *Phytoplankton, Mansar lake, mesotrophic lake, Chlorophyceae, Bacillariophyceae*

PHENOLS AND FLAVONOIDS AS SECONDARY METABOLITES PRESENT IN THE DIFFERENT EXTRACTS OF *OXALIS CORNICULATA* LINN.

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This study is aimed to study the Qualitative and Quantitative content in the plant *Oxalis corniculata* Linn extracts of ethyl acetate and acetone *Oxalis corniculata* L plant is rich in antioxidants, edible leaves, sour in taste and is important to the Ayurveda medicine. Total phenolic content and total flavonoid content was estimated of the plant in the extracts of ethyl acetate and acetone. The phenolic content was estimated with Folin ciocalteu reagent and Gallic acid as standard. Flavonoid content was estimated by colorimetric method in Rutin with different concentrations. Total flavonoid and phenolic content of *Oxalis corniculata* extracts was observed by using the spectral analysis. The mean and standard deviation was calculated to both the extracts. The observations were recorded in the Tabular form and graphical form. The phenolic content and flavonoid content of both the extracts of ethyl acetate and acetone was calculated. Both the extracts showed the goodness of phenols and flavonoids. Acetone extract showed more goodness of phenols and flavonoids.

Key Word Index: *Antioxidants, phenols, flavonoids, extracts and Oxalis corniculata*



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SEASONAL STUDIES ON FOOD AND FEEDING HABIT OF DIFFERENT AGE GROUPS OF *GARRA GOTYLA GOTYLA* (GRAY) INHABITING RIVER TAWI

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The study deals with the seasonal variation, relative abundance, Gastro-somatic index (GaSI) and relative gut length (RLG) values of different age groups viz. 0⁺, 1⁺, 2⁺, 3⁺ & 4⁺ of *Garra gotyla gotyla* ranging from 4.2 to 14.7 cm TL, captured from different sections of River Tawi. (Latitude 32° 02' 20.23" N & Longitude 75° 16' 56.14" E) The result revealed that fish is planktyherbivorous and bottom feeder feeding on approximately 75.03%, 76.13 %, 78.82 %, 79.88%, and 81.52% phytoplanktons in 0⁺, 1⁺, 2⁺, 3⁺ & 4⁺ age groups respectively. The RLG values was observed to increase from 0⁺ (5.51) age group to 4⁺ (6.82) age group while GaSI was maximum (12.65) in immature 0⁺ age group and decreases with increase in the fish age.

Key Word Index: *Garra gotyla gotyla*, *Gastro-Somatic Index*, *Relative Gut Length*, *Planktyherbivorous*, *River Tawi*.

ECOLOGICAL ROLE OF MULBERRY IN THE CONTEXT OF CLIMATE CHANGE

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Some environmental problems by their very nature are global in scope. Perhaps the most immediate environmental threat that we today face as a global community is the threat of climate change. It is a major threat to the survival of the species and integrity of ecosystems worldwide. Statistically Climate change is a significant variation in either the mean state of climate or its vulnerability. Climatic models predict a 1.0 to 4.8^oC average increase in temperature up to 2100 century, and the potential impact of global climate change depends on the combined effects of climate e.g. temperature, precipitation, humidity etc. and other components like soil moisture, atmospheric CO₂ and troposphere ozone (O₃). The global temperature is rising every year and a series of record- breaking weather events are causing havoc world over. Land surface temperatures in January and February are more than 1^oC higher than the average of those months. Under the current climate change scenario mulberry plays a significant role in the mitigation strategies. The growth of the silkworm and its host plants are largely controlled by the surrounding climate. It is predicted that, global warming affects the cultivation area of various crops including mulberry. In cereals and seed crops, water stress conditions may lead to lower yields whereas warmer temperatures will shorten the length of growing season and reduce yields. As mulberry is a C3 plants and its physiology is totally different from C4 plants. The C3 plants are relatively inefficient in using CO₂ and as a result these plants grow better in cooler moist environments with elevated CO₂ concentrations. Mulberry can be used as an efficient tool in flood prone and drought prone areas owing to its deep root system and ability to thrive even



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under the harsh soil conditions. Mulberry has also been found to possess fair amount of tolerance to insect pests whose outbreak is expected to enhance as a result of impact of climate change. It also offers a good scope to be used as a phytoremediant plant for environmental detoxification.

Key Word Index: *Climate, mulberry, mitigation, silkworm, environment.*

CARBON SEQUESTRATION IN SOILS- A MITIGATION STRATEGY AGAINST CLIMATE CHANGE

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Carbon sequestration is the long term storage of carbon in oceans, soils, vegetation, and geologic formations. Although oceans store most of the Earth's carbon, soils contain approximately 75% of the carbon pool on land — three times more than the amount stored in living plants and animals (McLeod *et al.*, 2011). Soils play a key role in the global carbon cycle. They can be a source or a sink of carbon and influence CO₂ concentrations in the atmosphere. Sequestration of atmospheric carbon is one of the mitigation measures for countering anthropogenic climate change due to excessive emission of greenhouse gases. There are five global C pools viz, oceanic pool, geological, pedological, atmospheric and biotic (Lal, 2004). Terrestrial systems can mitigate the increase of atmospheric CO₂ by sequestering C into vegetation and soils. Carbon capture and storage (or sequestration) is receiving increasing attention as one tool for reducing carbon dioxide concentrations in the atmosphere. Land use change, inappropriate agricultural practice, and climate change can all lead to a net release of C from soils to the atmosphere, enhancing the problems of greenhouse gas release (Nguyen, 2011). The estimated amount of C stored in world soils is about 1100 to 1600 Pg, more than twice the C in living vegetation (560 Pg) or in the atmosphere (750 Pg) (Sundquist, 1993). In arid and semi-arid climates, soil carbon sequestration can also occur from the conversion of CO₂ from air found in soil into inorganic forms such as secondary carbonates; however, the rate of inorganic carbon formation is comparatively low (Lal, 2010). The SOC concentration in most cultivated soils is less than 5 g/kg compared with 15 to 20 g/kg in uncultivated soils. Low SOC concentration is attributed to plowing, removal of crop residue and other biosolids, and mining of soil fertility (Pal *et al.*, 2009). Important strategies of soil C sequestration include restoration of degraded soils, and adoption of recommended management practices (RMPs) of agricultural and forestry soils (Post and Kwon, 2009). Furthermore the use of adequate quantity of organic matter and shifting towards Organic farming can eventually lead to more carbon sequestration with time.

Key Word Index: *Anthropogenic, Carbon sequestration, Carbon pools, Restoration*



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REMOTE SENSING APPLICATIONS IN BIODIVERSITY

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Viewing the earth from space is now crucial to the understanding of the influence of man's activities on his natural resource base over time. Remote sensing techniques have proved to be powerful tool for the monitoring of various referred environmental features, such as vegetation cover, soil erosion, as well as urban expansion and more generally, the variations in the LULC over a period of time. Satellite-derived vegetation map and various landscape ecological parameters (*viz.*, patch shape, patch size, number of patches, porosity, fragmentation, interspersion and juxtaposition) have been analyzed to characterize various habitat ecosystems. The part of the electro-magnetic spectrum that is most widely used in remote sensing extends from the visible wavelengths, through progressively longer wavelengths, to the microwave and radio wavelengths used by radar systems. The limited ranges of human vision and conventional photography are apparent. Many features, particularly vegetation and water, show unique variations in the infra-red parts of the electro-magnetic spectrum. Thermal infra-red can be used to detect areas with high rates of evaporation or evapo-transpiration, due to their lower temperatures relative to their surroundings, as well as zones of thermal pollution in water, which could be caused by chemicals or hot water discharges from power stations. Finally, at wavelengths of millimetres to metres, the microwave or radio pulses utilised by radar systems are particularly useful for mapping soil moisture contents and areas of inundation, with the added advantage of being able to 'see' through cloud cover. Radar systems are particularly effecting at measuring surface roughness and thereby mapping the texture and shape of features on the surface of the Earth. Further, satellite data have become a major application in change detection because of the repetitive coverage of the satellites at short intervals. Remote sensing and geospatial technologies find tremendous application in rapid spatial and temporal monitoring as well as assessment of biodiversity resources and hence in formulation of concrete policy frameworks for their sustainable management.

Key Word Index: *Remote Sensing, Satellite, Monitoring, Application, Radar*

FLORISTIC COMPOSITION OF AN ALPINE GRASSLAND IN GULMARG, KASHMIR

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Floristic composition of high-altitude alpine grassland, located in Baramulla district of India administrated Jammu and Kashmir, was investigated. The grassland comprises two sites (a) protected site and (b) grazed site with diverse habitat types and seasonal effect. The degree of disturbance is most severe on the protected site while at grazed site grazing was main disturbance factor. A total of 64 species belonging to 23 families and 56 genera were recorded in the



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Gulmarg grassland. Five dominant families were Poaceae (14 spp.), Asteraceae (6 spp.), Lamiaceae (6 spp.), Fabaceae (5 spp.), Polygonaceae (5 spp.), Caryophyllaceae (4 spp.), Plantaginaceae (4 spp.), Rosaceae (4 spp.) and Apiaceae (2 spp.). The number of species were found higher (42) in the protected site while it was found lower (21) in grazed site. In terms of life form spectrum, the vegetation is characterized by high proportion of hemicryptophytes indicating a heavy biotic interference in the form of overgrazing. The maximum similarity index value (74%) was found in the autumn seasons. Although the species richness was found highest in Protected site and occurrence of some rare and useful species in this site demands a long term conservation plan, if their survival was to be continued in this grassland.

Key Word Index: *Alpine grassland, floristic composition, grazing, species richness and conservatio*

ROLE OF AGRO FORESTRY IN SOIL CARBON SEQUESTRATION

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In increase in atmosphere carbon dioxide (CO₂) concentration due to emission from fossil fuel combustion is contributing to recent climate change which is among the major challenge facing the world. Carbon is accumulating in atmosphere at the rate of 3.5 pg (pg=10¹⁵ or billion tons) per annum resulting from the burning of fossil and fuel and conversion of tropical forest to agriculture production. CO₂ level can be lower to the great extent by adopting Agroforestry system which is worked as sustainable management system for land use". Agroforestry helps in reducing carbon level by taking carbon dioxide out from the atmosphere and storing it in the terrestrial, oceanic or aquatic ecosystem known as carbon sequestration. Agroforestry are believed to have higher potential to sequester carbon as compare to agriculture crops as it tree can keep carbon intact and longer. It's not only sequester carbon but also help in conserving soil nutrient and enhancing the soil fertility. Agroforestry with eucalyptus, Acacia with poplar reported an increase in soil organic content in agroforestry system. The IPPC (Intergovernmental panel on climate change) United Nations, estimated that area currently under Agroforestry worldwide is 400 million hectare with an estimated carbon gain of 0.72 mg C/he/yr with potential for sequester is (1 Tg= 10¹² or 1 million tons) therefore adoption of agroforestry system can sequester large quantities of carbon in the soil, plant biomass and wood products. Agroforestry could be one of the best option for storing atmospheric carbon in soil sink thereby adopting various AGF practices like cropping, intercropping, silvopature, riparian buffer, forest farming and various land use system can be used for reducing carbon level and reduces greenhouse gases and mitigate climate change.

Key Word Index: *Agroforestry, climate change, CO₂, land use systems and carbon*



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PHYTOSOCIOLOGICAL STATUS OF TREES AND SHRUBS OF ROMSHI RANGE OF SHOPIAN FOREST DIVISION IN KASHMIR VALLEY

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The present investigation entitled “Phytosociological status of trees and shrubs of Romshi Range of Shopian Forest Division in Kashmir valley, India” was conducted in Shopian district in Jammu and Kashmir India during 2015-2016. A total of 16 plant species were recorded from the study area out of which 8 were trees and 8 were shrubs. The maximum average density in case of trees was found for *Picea smithiana* (400/ha), whereas in case of shrubs it was recorded in *Parrotiopsis jacquemontiana* (622/ha). Among trees *Abies pindrow* exhibited highest frequency value of 100% at Walkhain (2600-2800m). In case of shrubs *Parrotiopsis jacquemontiana* were the most frequent species at Kooler (2200-2400m). The maximum average basal area in case of trees was found for *Abies pindrow* (158.76 m²/ha) at Walkhain (2600-2800m). In shrubs it was found maximum for *Parrotiopsis jacquemontiana* (3.65 m²/ha) at Kooler (2200-2400m). The IVI of the tree species indicated that *Abies pindrow* was most dominant species at Walkhain (2600-2800m) with IVI value of (172.41). In case of shrubs the maximum IVI was recorded in *Viburnum grandiflorum* with IVI value of (168.11). Among trees the maximum value of Shannon Weiner diversity index was (1.66) at Gadder (2400-2600m) whereas the minimum value (0.69) was recorded at Walkhain (2600-2800m). In case of shrubs Shannon Weiner diversity index shows a decreasing trend from Kooler (2200-2400m) to Walkhain (2600-2800m) with maximum value of (1.74) at Kooler (2200-2400m). In trees the maximum value of the species richness index (1.15) was at Gadder (2400-2600m), whereas in case of shrubs the maximum value of the index was (0.96) at Gadder (2400-2600m).

Key Word Index: *Phytosociology, flora, IVI, species richness and diversity index.*

COMPARATIVE STUDY ON PHYSICO-CHEMICAL ALTERATIONS IN WATER QUALITY OF PRE-MONSOON AND POST- MONSOON SEASON AT MAHESWER DAM, MADHYA PRADESH

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Background: Narmada River is considered to be the holy river of the state Madhya Pradesh and one of the 13 prominent rivers of India, which covers 98,797 sq km of total water-shed area. It is one of the most important wests flowing rivers of India and also considered to be the lifeline of Madhya Pradesh. Fresh water is one of the most important components of living organism for healthy living. Narmada River water is used for various purposes such as drinking, bathing, irrigation etc. This natural resource is being polluted by indiscriminate disposal of sewage,



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industrial waste and human activities which affect quality of river water and related water-bodies such as dam. Therefore, it is necessary for monitoring the water quality by analysis of various physicochemical parameters. The objective of this study is to evaluate and compared the water quality of Maheswar dam region of pre-monsoon and post- monsoon season, however no reports available till to date regarding water quality assessment of Maheswar dam regions.

Methods: The present paper deals first time to analyze the water physico-chemical parameters of the Maheswar dam regions. Samples were collected pre-monsoon (Feb-May 2017) and post-monsoon (Oct-Jan 2018) season wise from sampling site for analyzing the various physicochemical parameters such as temperature, pH, TDS, total hardness, calcium hardness, magnesium hardness, chloride, dissolve oxygen, BOD and COD were determined in the laboratory. The water samples collected were analyzed, as per standard methods parameters such as pH, turbidity were measured in-situ. The physico-chemical parameters were determined as per standard methods of APHA (2002).

Results: Results of this study suggest that raised values of physico-chemical parameters indicate the pollution of revering water during post-monsoon season due to domestic wastes, municipal sewage, and agricultural run-off that influence the water quality directly or indirectly. Statistical analysis carried out for pre-monsoon and post-monsoon water quality through evaluates average values (AV), standard deviation (SD) and standard error (SE).

Key Word Index: BOD, COD, DO, pH, TDS.

MANAGEMENT OF RICE BLAST (*Pyricularia grisea*) IN MUSHK BUDJI THROUGH FUNGICIDES UNDER TEMPERATE AGRO CLIMATIC CONDITIONS OF KASHMIR

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Seven popular fungicides viz., tricyclazole 45% + hexaconazole 10 WG, tricyclazole 18% + mancozeb 62% , tricyclazole 75 WP , hexaconazole 5EC, mancozeb 75 WP, mancozeb 63% WP + carbendazim 12% WP and cabendazim 50 WP were evaluated for management of rice blast (*Pyricularia grisea*) in scented popular rice variety Mushk budji during kharif 2015 and 2016 under temperate agro-climatic conditions of Kashmir. Four foliar sprays of each fungicide at their recommended concentrations were separately applied. The foliar sprays of each fungicide were applied separately at early tillering, maximum tillering, before flowering and soft dough stage of rice crop. Two years of experimentation revealed that tricyclazole 75 WP was most efficacious in management of disease and resulted in mean disease incidence of 22.50 per cent, mean disease intensity of 12.37 per cent, neck blast incidence of 9.25 per cent and a grain yield of 36.00 qha⁻¹. Tricyclazole 45% + hexaconazole 10 WG was next in efficacy with mean disease incidence, intensity and neck blast incidence of 33.25, 15.10 and 11.75 per cent and a grain yield 34.90 qha⁻¹, respectively. Tricyclazole 18% + mancozeb 62%; mancozeb 63% WP +



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carbendazim 12% WP; carbendazim 50 WP and hexaconazole 5 EC resulted in disease incidence of 36.15, 37.00, 38.00 and 39.75 per cent, mean disease intensity of 16.95, 20.75, 23.90 and 29.75 per cent while mean neck blast incidence was 14.75, 17.25, 20.25 and 29.47 per cent with a consequent grain yield of 33.80, 33.00, 32.25 and 29.70 qha⁻¹, respectively. Mancozeb 75 WP was found least efficacious and resulted in highest mean disease incidence, intensity and neck blast incidence of 43.50, 33.75 and 26.25 per cent and resulted in a grain yield of 27.90 qha⁻¹, respectively. However it was significantly superior than the untreated control where mean disease incidence, intensity and neck blast incidence was 92.25, 58.37 and 36.75 per cent and grain yield was 21.00 qha⁻¹, respectively.

Key Word Index: *Fungicides, Kashmir, Management, Mushk budji, Pyricularia grisea, Rice blast,*

EFFECT OF STORAGE CONDITIONS ON ANTHOCYANINS, CAROTENOIDS AND COLOR QUALITY OF *PRUNELLA VULGARIS* L. OF KASHMIR VALLEY

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Prunella vulgaris L. (Self Heal) belonging to family Lamiaceae is a herbaceous plant with erect stem. It grows near irrigation channels, rice fields and moist areas. The objective of the present study was to analyze the total anthocyanins, total carotenoids, and the color characteristics of its inflorescence. The stability and color quality of pigments (anthocyanins and carotenoids) were assessed by quantifying the pigments and recording their color quality under ambient and refrigerated storage conditions at 10 days interval at 0, 10, 30, 40, 50, 60, 70, 80 and 90 days after collection. Results revealed that the total anthocyanin content (mg/100 g) and total carotenoid content (mg/100 g) ranged between 232.51 to 512.56 mg/100 g and 0.002 to 0.040 mg/100 g. Highest pigment content was recorded at 0 days of storage. With increase in days of storage pigment content decreased in both plant material and extract. Pigment degradation was more in the plant material as compared to the plant extract. L*, a*, b*, Chroma (C*), Hue angle (H°) and total color change (ΔE) changed with increase in days of storage. The L* value ranged from 28.29 to 44.08, a*, b*, H°, C* and ΔE values ranged from 32.64 to 36.87, -49.77 to -41.63, -53.47 (306.53°) to -51.65 (308.35°), 52.90 to 60.64, 71.87 to 92.30. With the increase in days of storage a*, C* and ΔE values were increased while L*, b*, H° values were reduced. From the present study it was concluded that *Prunella vulgaris* L. contained superior levels of anthocyanin content, thus it can be used as a raw material for extraction of purple edible food colour.

Key Word Index: *Anthocyanin, Madder, Carotenoids, Hunter Lab, Prunella vulgaris L.*



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BREEDING IMPACT IN QUALITY OF STONE FRUIT PRODUCTION

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The stone fruits are such as apricots, cherries, peaches, nectarines and plums, cultivated primarily for their edible fleshy mesocarp, and almonds, cultivated primarily for their edible seeds. The stone fruits have been grown and bred for thousands of years, but during the last few decades, significant progress has been achieved in the breeding of species of *Prunus*, in order to obtain new cultivars adapted to different biotic or abiotic conditions, as well as responding to consumer demands for quality. In most countries, where stone fruits are grown both research institutions and private breeders are involved in improvement programs. Breeding in stone fruit was oriented towards increasing the size of fruit and improving their aesthetic aspect and quality characteristics. Molecular biology has permitted an understanding of genome structure and genetic diversity of *Prunus*, particularly for cherries and plums. Wide genetic variability exists in most stone fruit species and remains to be exploited. Increased knowledge of *Prunus* genetics is emerging from analysis of inheritance of fruit characters and yield. New sources of resistance and different strategies of breeding are required including monogenic and polygenic resistance, and genetic transformation. An increase in availability of new resistant germplasm, although not always of commercial level, is foreseeable in the short and medium term. The future development of stone fruits must be related to environmental adaptability as a consequence of climatic changes and the necessity to adapt species and cultivars to new zones of cultivation.

Key Word Index: *Stone fruit, Prunus, breeding, yield and conservation.*

EFFECT OF VERMI-COMPOST ON SOIL FERTILITY AND CROP PRODUCTIVITY

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Earthworms restore and improve soil fertility and significantly boost crop productivity. Earthworms excreta is a nutritive 'organic fertilizer' rich in humus, N, P, K macronutrients, beneficial soil microbes—'nitrogen-fixing & phosphate solubilizing bacteria. Earthworms and its excreta promise to usher in the 'Second Green Revolution' by completely replacing destructive agrochemicals which are more harmful for farmers and their farmland. Earthworms and its excreta (Vermiwash) are scientifically proving as both 'growth promoters & protectors' for crop plants. It's increase the productivity of corn, wheat, tomato and egg-plants it displayed excellent growth performances in terms of height of plants, colour & texture of leaves, appearance of flowers & fruits, seed ears etc. as compared to chemical fertilizers. Vermi-compost work as a 'slow-release fertilizer' while chemical fertilizers release their nutrients rather quickly in soil and



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soon get depleted. Significant amount of 'chemical nitrogen' is lost from soil due to oxidation in sunlight. However, with application of vermi-compost the 'organic nitrogen' tends to be released much faster from the excreted 'humus' by worms and those mineralised by them and the net overall efficiency of nitrogen (N) is considerably greater than that of chemical fertilizers. Vermicompost can promote growth from 50 to 100% over conventional compost & 30 to 40% over chemical fertilizers besides protecting the soil and the agro-ecosystem while producing 'nutritive and tasty food' at a much economical cost (at least 50- 75% less) as compared to the costly chemical fertilizers.

Key Word Index: *Vermi-compost, Earthworm, Productivity, Soil fertility.*

DETERMINATION OF ANIONIC SURFACTANTS CONCENTRATION (MBASS) IN STREET DUST AROUND SRINAGAR CITY, KASHMIR VALLEY, JAMMU & KASHMIR

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Study of anionic surfactants concentration as Methylene Blue Active Substances (MBASs) in street dust were studied at three locations around Srinagar city of Kashmir valley. Six study sites were selected two sites at each location around Lal Chowk (site I & site II), Shere-e-Kashmir park (site III & site IV) and S.P. College campus (site V & site VI). The samples were collected on monthly basis from July to December 2015. The results revealed concentration of MBAS ranged between (0.178-0.119 $\mu\text{mol/g}$, site I: 0.167-0.119 $\mu\text{mol/g}$, site II: 0.180-0.150 $\mu\text{mol/g}$, site III: 0.180-0.150 $\mu\text{mol/g}$, site IV: 0.140-0.101 $\mu\text{mol/g}$, site V: 0.140-0.101 $\mu\text{mol/g}$, site VI: 0.140-0.101 $\mu\text{mol/g}$). The over all results depicted highest anionic surfactants at site III & site IV (Shere-e-Kashmir park) 0.480 $\mu\text{mol/g}$ and lowest (0.101 $\mu\text{mol/g}$) at S.P.College campus. The mean values showed site III & site IV high in anionic surfactants concentration (0.164 $\mu\text{mol/g}$). The monthly trend depicted high concentration of MBAS during July to September and low October to December. The study concluded that high amount of anionic surfactants recorded at site III & site IV (Shere-e-Kashmir park) is expected due to motor vehicles and other anthropogenic sources such as combustion, road dust and cleaning related activities. The study recommends that surfactants arise from vehicular traffic can be reduced by proper management of vehicular traffic, construction of fly over at high traffic areas, burying the garbage /litter instead of burning particularly during autumn season when the leaf fall is at peak in Kashmir valley.

Key Word Index: *Surfactants, MBAS, Srinagar, Street dust, Vehicles*



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EVALUATION OF NEWLY INTRODUCED AND REDESIGNED MOUNTAGES FOR SERIPOSITION OF MULBERRY SILKWORM (*BOMBYX MORI* L.) IN KASHMIR

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Three mountages one newly introduced and others redesigned viz-a-viz Rotary mountage (from South India), Mounting frame mountage and Plastic frame mountages (developed at C.O.T.S, Mirgund) alongwith plastic collapsible mountages were evaluated for their performance with paddy grass as control at College of Temperate Sericulture, Mirgund. During spring rearing of 2016 & 2017 respectively. Mature worms of silkworm *Bombyx mori* L. were mounted for seriposition of cocoons on these mountages and observations for various parameters like ERR by number and weight, single cocoon weight, shell weight, shell ratio and filament length etc. were recorded. It was observed that there is significant difference in various qualitative & quantitative parameters of cocoons harvested from these mountages. Mortality of mounted worms was minimum i.e 2.56% in rotary mountage which is statistically at par with plastic collapsible mountage (2.49%) followed by plastic frame mountage (5.72%) . The highest mortality of 9.74% was observed in Paddy straw. The yield of cocoons per 10,000 larvae (by weight) was maximum i.e 20.960kg in plastic mountages which is at par with 19.550kg recorded in rotary mountage. These are followed by 17.425 & 17.350 kg recorded in mounting frame mountage and plastic frame mountages respectively. The lowest weight of 15.750kg was recorded in paddy straw. The yield of cocoons per 10,000 larvae (by No) was maximum in plastic collapsible mountage (9686) which is at par with 9623 & 9358 recorded in rotary & mounting frame mountage respectively . The highest cocoon weight of 2.15 g was recorded with plastic collapsible mountage which is at par with 2.03 g recorded in rotary mountage and 1.91g recorded with mounting frame mountage. The lowest cocoon weight of 1.81 g was recorded in paddy straw. In case of post cocoon parameters the highest average filament length of 972.67 m was recorded in cocoons harvested from rotary mountage which is at par with 957.67 and 871.67m recorded in plastic mountages and mounting frame mountages respectively. The highest raw silk percentage of 13.97 was recorded in cocoons harvested from rotary mountage which is at par with 13.86% recorded in cocoons harvested from plastic collapsible mountages. These are followed by 12.03 & 11.99% recorded in cocoons harvested from mounting frame mountage and plastic frame mountage respectively. Out of these evaluated mountages it was observed that after plastic collapsible mountage, rotary mountage and mounting frame mountage are superior in comparison to other mountages. These mountages will be introduced in the field for large scale trials. All these mountages subjected for evaluation have various advantages like maintenance of ample aeration, formation of least number of double cocoons, maintenance of proper shape & size of cocoons, etc. In addition to this harvesting can be done easily which finally results in better production cocoon crop thereby giving sufficient returns to rearers.

Key Word Index: Rotary mountage, Seriposition, *Bombyx mori*.L, mounting



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EFFECT OF VARIOUS SOIL MANAGEMENT PRACTICES ON ECOLOGICAL INTEGRITY AND FRUIT YIELD IN LOW DENSITY APPLE ORCHARDS

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Soil management techniques play an important role in limiting root competition and improving soil structure, biodiversity and nutrient richness. The results presented in this paper were obtained from three years (2014-2016) field experiment in apple low density orchards of the age of 20 years, located at the Koil, Pulwama – J&K. In the experiment, the soil management techniques were applied in the tree rows and the drive allays, and was constructed under following design: NT) no-tillage with multi –species ground cover moved twice during growing season; MT) Minimum-tillage with twoploughings a year (20-25 cm deep) one at the sowing time of intercrop (mustard) during November-December and second after harvesting the intercrop during May; and CT) conventional-tillage, with fourploughings (20-25 cm deep) in a year with no grass or cover crop. The basic soil texture was clay loam, pH 6.9, having a high clay content of 40 – 44% and humus 3.4%. Results claimed that some soil nesting bees, which are valuable pollinators and benefit growers in the form of readily available pollination services and thus enhanced fruit yield, were found in large numbers in undisturbed soils (NT). Also the soil moisture conservation and organic carbon content were better under this soil management practice. Moreover, in case of mustard intercropped plots, although the bee abundance was good but fruit yield recorded was low. While as, under conventional tillage systems, bee abundance, soil moisture content and fruit yield were found the least.

IMPACT OF SEASONAL CLIMATIC CHANGE AND GRAZING ON THE PHYTODIVERSITY OF HERBACEOUS VEGETATION AT TWO HIGH ALTITUDE RANGE LANDS OF KASHMIR VALLEY

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The present study was conducted to asses the impact of biotic stress and season climatic changes on phytodiversity of herbacoues vegetation at two high altitude rangnelands of Kashmir valley. Four study sites were selected two each at Pahalgam valley (site I & II) and Heerpora Shaopian (site III & IV) were designated as protected and degraded sites. The number of species recorded during the study period ranged between 5-18 site I & site II; 4-14 at site III & IV. Dominant species based on density (m²) at site I in spring season were *Trifolium pratense* (6.0), *Trifolium repens* (4.2), *Fragaria nubicola* (5.4), *Plantago lanceolata* (2.4) and during summer season (*Capsella bursa-pastoris*, 7.4; *Taraxacum officinale*, 2.6; *Oxalis corniculata*, 1.2; *Fragaria nubicola*, 2.4; *Gernaium wallichium* 1.4). At site II in spring season dominant species



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were (*Cynodon dactylon*, 8.6, *Rumex hastatus*, 4.2, *Erigeron Canadensis*, 1.4; and *Frageria nubicola*, 1.2) and during summer season dominance was shown by (*Cynodon dactylon*, 6.4; *Trifolium pratense* 5.0, *Trifolium repens*, 5.6; *Plantago lanceolata*, 2.2 and *Taraxacum officinale*, 1.6). At site III in spring season species dominated were (*Taraxacum officinale*, 2.4; *Trifolium pratense*, 3.6; *Frageria nubicola*, 3.8; *Achillele millifolium* 1.2; *Digitaria sanguish*, 1.2 and *Poa spp.* 1.4) and during summer season (*Taraxacum officinale* 5.3; *Cynodon dactylon*, 3.0; *Plantago lanceolata*, 5.3 and *Trifolium pratense* 2.0). At site IV during spring season dominant species were *Taraxacum officinale* 18.6; *Trifolium pratense* 10.8; *Frageria nubicola* 34.58; and *Hypericum perforatum*, 3.0). However during summer season at site IV was dominated by *Cynodon dactylon*, 28.0; *Plantago lanceolata* 24.5; *Trifolium pratense*, 10; *Taraxacum officinale* 2.0 and *Rumex sp.* 1.2). Distribution of species recorded at all sites depicted contagious>random>regular pattern of distribution. At site I and site II sites it showed a variation in species distribution like (71.43%-26.66%, contagious; 46.66%-22.22%, random and 27.77%-0%). However at site III and site IV it ranged between 100%-57%, contagious; 28.50-22.22, random and 14.29%-0%), hence predicted a contagious at high and regular at lower side at all sites. The study concludes that sites under degradation require immediate protection from biotic interference at least from two to five years period.

Key Word Index: *Climate, seasonal, species, biotic, protection*

EVALUATION OF SOIL-SITE SUITABILITY IN GANDERBAL DISTRICT OF KASHMIR VALLEY, INDIA

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Assessment of problems and potential of soils using land evaluation techniques give a fair Idea about the suitable land use options for the area. At the same time in depth studies on specific soil related constraints as well as soil properties not only facilitates yield prediction but also enables the assessment of specific causes, which lead to sub-optimal yield or complete failure of the crop. However, optimal requirement of a crop is always region specific where the soil characteristics determine their degree of suitability and help in planning expansion of area under a particular crop. Especially, crop response to a specific soil property may vary widely with respect to individual crop type, which, therefore, requires crop wise Soil site suitability evaluation for suggesting suitable cropping plan for an area. Crop response to a specific soil property may vary widely with respect to individual crop type and therefore requires crop-wise soil-site suitability evaluation, to adjudge suitable cropping options for an area. The present study was undertaken to interpret the soil resource data base in terms of soil - site suitability of major crops in the Ganderbal District. In Sys's parametric approach individual crop requirement were matched with soil parameters to evaluate Soil-site suitability as well as limitations related to specific crop cultivation. The soils of Ganderbal district with high potential for different crop



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production are presently being utilized for large scale maize, apple, paddy cultivation. Majority of the soils (60 percent of the total cultivated area) were classified as good cultivable land; however, the problem of soil drainage proved to be the major restricting factor towards crop cultivation in some soils. Evaluation of Soil – site suitability of different crops revealed that all crops are highly to moderately suitable in more than 60 percent of total cultivated area (TCA).

Key Word Index: *soil, evaluation, crop, suitability, cultivable, moderately*

CLIMATE CHANGE AND HIMALAYAN FLORA AND FAUNA-IMPACT, MONITORING, VULNERABILITIES AND ADAPTATIONS

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Climate change is one of the most important global environmental challenges and the many types of impacts are needed to be understood and assessed, vulnerabilities needed to be addressed, while adaptation strategies have to be developed. The Himalayan ecosystem not only provides mountain goods and services but also biodiversity, community diversity and cultural diversify.

The eastern Himalayan region is considered to be one of the mega hotspots of the world. Due to increase in temperature, change in vegetation, rapid deforestation and scarcity of drinking water, habit destruction and corridor fragmentation may lead to be a great threat to extinction of world flora and fauna. A recent study suggested that a quarter of land animals and plants, altogether 1 million species, could be extinct by the middle of this century.

Huge anthropogenic pressures have led to destruction of mountain forests. In the Himalayan mountain systems, the timberline/tree line and snowline represents two most recognizable biological boundaries. Global warming associated with upward migration of altitudinal boundaries and consequent change in the snowline position and its biota is an important factor for initiating long term monitoring in the Himalayas.

Agriculture is highly dependent on weather and changes in global climate have major effects on crop yield and food supply. Weather also impacts soil and plant growth; and animal growth and development. Horticulture is an important source of income of the Himalayan people. Irregular rainfall and snowfall; change in climatic condition; and rising temperatures affects fruit production. Global warming is a key threat to biodiversity. Global warming represent perhaps the most pervasive of the various threats to the planets biodiversity, given its potential to affect even areas far from human habitation.

The present study is focused on damages caused by global warming on the flora and fauna of Himalayan region of J and K.

Key Word Index: *Flora, fauna, Global warming, threat, environment.*



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CONTRIBUTION OF VEHICULAR TRAFFIC TOWARDS THE PARTICULATE EMISSION AND ITS EFFECTS ON HUMAN HEALTH

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Particulate matter is small and medium solid and liquid particles which are present in the atmosphere. There are two types of particulate matter viz., RSPM and SPM. The increase in particulate matter at alarming rate in Bhopal is a topic of measure concern. Congested roads, road side constructions and burning of fuel wood are contributing at high rates to the particulate matter. Both RSPM and SPM have risen to very high levels. Present study reveals that particulate matter during most of the months crossed the safe limits as per CPCB (2009). Current study was carried out at a busy crossing in old congested area of Bhopal Township where there is close proximity of residential area besides heavy traffic load. People have been found to suffer from coughing, sneezing, phlegm, wheezing, breathlessness, irritation in eyes, heart problems, hypertension, skin allergy, head ache and nausea.

Key Word Index: *Township, atmosphere*

PESTICIDE RESISTANCE- A BANE FOR ENVIRONMENT

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Pesticide resistance describes the decreased susceptibility of a pest population to a pesticide that was previously effective at controlling the pest. Pest species evolve pesticide resistance via natural selection: the most resistant specimens survive and pass on their genetic traits to their offspring. Pesticide resistance has been described as, "The developed ability in a strain of insects to tolerate doses of toxicants which would prove lethal to the majority of individuals in a normal (previously untreated) population of the same species" (WHO). It has also been described as, "A heritable change in the sensitivity of a pest population that is reflected in the repeated failure of a product to achieve the expected level of control when used according to the label recommendation for that pest species. Pesticide resistance is increasing day by day, over 500 species of pests have evolved a resistance to pesticide. Humans often rely almost exclusively on pesticides for pest control. This increases selection pressure towards resistance. Pesticides that fail to break down quickly contribute to selection for resistant strains even after they are no longer being applied. In response to resistance, managers may increase pesticide quantities/frequency, which exacerbates the problem. In addition, some pesticides are toxic toward species that feed on or compete with pests. This can allow the pest population to expand, requiring more pesticides. This is sometimes referred to as *pesticide trap*, or a *pesticide*



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treadmill, since farmers progressively pay more for less benefit. Pests become resistant by evolving physiological changes that protect them from the chemical. Resistance may occur either due to physiological or behavioural mechanisms. Resistance can be managed by reducing use of a pesticide. This allows non-resistant organisms to out-compete resistant strains. They can later be killed by returning to use of the pesticide. IPM approach provides a balanced approach to minimizing insecticide resistance. A complementary approach is to site untreated refuges near treated croplands where susceptible pests can survive. Building partnership by bringing together the people actively engaged in public sector, policy makers, researchers, entomologists, insecticide manufacturers etc can also help in tackling this problem. Above all, these issues need to be addressed on priority basis as any negligence would culminate in increased insect resistance which in near future would definitely result in hampering the agricultural productivity thereby in a longer run eventuate in mass hunger and malnutrition.

RESPONSE OF BABY CORN (*ZEA MAYS*) HYBRIDSTO CROP GEOMETRY AND INORGANIC NUTRIENT SOURCES UNDER TEMPERATE CONDITIONS

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The field experiment to study the response of maize hybrids under altered crop geometry and nutrients was conducted during *kharif* season of 2016 at Dryland (*Karewa*) Agriculture Research Station (DARS), Budgam, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir. The experiment was laid out in a split plot design with four combinations of hybrids ('HM 4' and 'Golden Baby') and crop geometry levels (60cm x 25cm and 60cm x 20cm) in main plots and four nutrient levels (control, $N_{110.5}P_{17.6}K_{37.5}$, $N_{150}P_{24.2}K_{45.5}$ and $N_{187.5}P_{29.75}K_{59.5}$ kg/ha) in sub plots. Significantly taller plants were recorded with 'HM 4' alongwith more leaf area index (LAI), dry matter accumulation (DMA) and SPAD score than 'Golden Baby'. The root volume and dry weight were also more compared with 'HM 4' to 'Golden Baby'. Decrease in spacing from 60cm x 25cm to 60cm x 20cm improved the plant height, whereas dry matter accumulation, leaf area index at all the growth stages and root dry weight and root volume showed the reverse trend with decreasing spacing. Growth parameters *viz.* plant height, dry matter accumulation and leaf area index increased with increasing nutrient levels from control to $N_{187.5}P_{29.75}K_{59.5}$. 'HM 4' recorded earlier coblet initiation, more coblets/plant with higher coblet girth over 'Golden Baby'. Decreased spacing declined the coblet length, coblet girth, coblets/plant and coblet weight. While, application of $N_{187.5}P_{29.75}K_{59.5}$ and $N_{150}P_{24.2}K_{45.5}$ had morecoblet length, coblet girth and coblets/plant compared to control. While, coblet weight improved with increase in each NPK level up to the highest level. 'HM 4' recorded 9.6, 10.8 and 5.2% more baby corn yield with husk, baby corn yield without husk and green fodder yield over 'Golden Baby', respectively and these differences in yields were of significant level. Similarly, the spacing of 60cm x 20cm recorded 8.8, 7.8 and 13.5 % significantly more baby corn yield with husk, baby corn yield without husk and fodder yield



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over 60cm x 25cm spacing, respectively. In general there was improvement in baby corn yield with husk and without husk was 43.3, 59.7 and 73.2; and 45.3, 59.2 and 70.3 % due to application of $N_{110.5}P_{17.6}K_{37.5}$, $N_{150}P_{24.2}K_{45.5}$ and $N_{187.5}P_{29.75}K_{59.5}$ levels over control, respectively and these enhancements were of significance level with higher coblet: corn ratio. However, fodder yield showed increasing trend with increasing nutrient level up to $N_{150}P_{24.2}K_{45.5}$. The uptake of N, P and K by the crop parts enhanced with increasing nutrient and plant population levels. The gross and net returns and B: C ratio remained more with 'HM 4' variety and less spacing of 60cm x 20cm. There was substantial improvement in gross and net returns and benefit: cost ratio with each increase in nutrient levels. On the basis of experiment it may be concluded that for getting more yields and profit, 'HM 4' hybrid should be raised with a spacing of 60cm x 20cm and fertilized with $N_{187.5}P_{29.75}K_{59.5}$

Key Word Index: *maize, geometry*

MINERAL NUTRITION STATUS OF PLUM TREE IN RESPONSE TO VARIOUS NITROGENOUS FERTILIZATION AND BORON CV. SANTA ROSA UNDER RAINFED CONDITIONS OF KASHMIR VALLEY

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The aim of the study was to examine the mineral nutrition status of plum tree in response to various nitrogenous fertilization and boron cv. Santa Rosa under rain fed conditions of Kashmir valley. The experiment was carried out in a 7 year old private plum orchard near SKUAST-Kashmir, Shalimar Campus Srinagar, J&K during 2012 and 2013. Thirty six trees of uniform growth and vigour were selected for experimentation. The effects of four nitrogenous fertilizer treatments at different times of applications were studied on plum cv. Santa Rosa. The treatments were replicated thrice in Factorial Randomized Block Design. The result showed that mineral nutrient content of leaves were significantly influenced by various treatments and recorded highest leaf nitrogen content with urea 500g full dose in spring, maximum phosphorus and potassium was recorded under the treatment of calcium nitrate 1450g full dose in spring, magnesium and copper with urea 500g full dose in spring and zinc, iron and manganese were recorded with calcium nitrate 1450g full dose in spring during both the years. However, mineral nutrient content of fruits were also significantly influenced by various treatments and recorded maximum nitrogen and potassium content under urea 500g full dose in spring, phosphorus and calcium with calcium nitrate 1450g full dose in spring, magnesium under urea 500g + 50g borax full dose in spring. While as fruit micro nutrient content (zinc, manganese, copper and iron) were recorded under the treatment of calcium nitrate 1450g full dose in spring during both the years. Mineral nutrient status of the plum orchard during the present studies was significantly



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influenced by various nitrogenous fertilizer treatments. The maximum nitrogen, potassium, iron, copper, zinc and manganese were recorded under the treatment of urea 500g full dose in spring, while as maximum phosphorus, calcium were recorded under the treatment of calcium nitrate 1450g full dose in spring. Thus, it may be concluded that overall results indicate that among various sources of nitrogenous fertilizer calcium nitrate + boron can be considered as best fertilizer application in plum orchards for improving the mineral nutrient status of leaves, fruits and soil.

Key Word Index: *Plum, source of fertilizers, time of fertilizer application and mineral nutrition status in leaves, fruits and soil.*

SYNTHETIC BIOLOGY: A RAY OF HOPE FOR PROTECTION OF ENVIRONMENT

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Synthetic biology may be best described as an engineering-related approach to rationally design and construct biological compounds, functions and organisms not found in nature, or to redesign existing biological parts and systems to carry out new functions. Its first and foremost challenge was to create 'life in lab'. It includes DNA sequencing, DNA synthesis, genome assembly, transplantation. Through synthetic genomics it is possible to move life into the digital world and back. Its applications are providing new hopes in science.

Hopes in the field of the environment include biosensors for environmental toxins, bioremediation strategies based on genetically engineered microorganisms (GEMs) and biosynthesis of environment- friendly materials like bio plastic. These applications can be efficiently used for cost effective monitoring and removal of pollutants with intact site's material, flora and fauna. In the field of energy, first-generation biofuels have been developed that are based on plant oils (biodiesel) or on cane sugar and crop starch (ethanol). But it has got issues like "fuel-vs. Food". New generations of biofuels based on non-edible, lignocellulose plant parts, special energy grasses or microalgae have thus been envisaged. Some approaches aim to create "drop-in" fuels that can use existing infrastructure and can be mixed with fossil fuels in any ratio. Biofuel could reduce total GHG emission and therefore could mitigate the climate change and could prove a key asset in energy security.

Key Word Index: *DNA sequencing, bio plastic, biofuel, drop-in fuel*



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ECO-FRIENDLY MANAGEMENT OF WASTE: A POTENTIAL FOR ECONOMIC AND SOCIAL VALUE CREATION

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Waste is a global headache for major countries because every year the amount is on a high with varied ingredients. With fast population growth and urbanization, global municipal waste generation is estimated to rise 2.2 billion tonnes by 2025. What is challenging for all the economies of the world is proper and eco-friendly disposal and management of waste. Srinagar city is inhabited by a population of well above 1.2 million souls churning out wastes somewhere around 550 tonnes per day. Quite similar like the other urban areas, this humungous waste is not only a constant headache for the population, but its management is a huge challenge for the local administration. The paper looks at this challenge, as an opportunity from the prism of an eco-friendly disposal of waste.

The paper analysis three broad valuables that can be tapped from the waste-Energy, Recycling, Sustainability and in this process how money can be made. The paper further explains how these three are very critical in the context Srinagar and how current methods of managing the waste are not only problematic in the long-run but also a loss of a resources and opportunity. The different pathways for recovery of energy are discussed, and the most suitable is suggested as per the overall environment in Kashmir. Overall, the paper makes a case for the necessity of adopting the latest waste management techniques to ensure eco-friendliness and the viability of the entrepreneurship opportunities in the area.

Key Word Index: *urbanization, global municipal waste, Srinagar, waste management*

ECO-FRIENDLY USES OF MULBERRY

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Mulberry is a very hardy and fast growing perennial plant belonging to the genus *Morus* of the family *Moraceae*. The leaf of mulberry is used for feeding and rearing of the silkworm, *Bombyx mori* for the production of silk yarn. Mulberry trees can grow in a wide range of climate (from temperate to sub tropical regions of northern hemisphere to the tropics of the southern hemisphere) and soil conditions. In the recent years as people pay more and more attention to the increasingly deteriorated ecological environment, the roles of mulberry trees in the prevention and control of desertification, water and soil conservation, saline-land management etc have received renewed cognition. Moreover multiple usages of mulberry trees as the source of other products other than as silkworm food have also been gradually explored. The present review focuses on the eco – friendly uses of mulberry.

Key Word Index: *Bombyx mori, Mulberry, Moraceae*



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ORNAMENTAL IMPORTANCE OF MULBERRY PLANT

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Mulberry, which belongs to the genus *Morus* of family *Moraceae*, is a fast growing deciduous and perennial plant. It can be grown under various types of climatic conditions ranging from temperate to tropics. Mulberry is an Plant and its wide range of varieties have been very beneficial to man from time to time. Mulberry trees do have redeeming qualities, though, and one of the most outstanding is the minimal care they require. Many people plant contorted mulberry as an ornamental in the home landscape. They bring great interest during all the garden seasons and draw wildlife with their foliage. They make lovely fashion plants and are popular because of their fast growth. This review focuses on the importance of mulberry as an ornamental plant.

Key Word Index: *Moraceae, wildlife*

AWARENESS AND ATTITUDE TOWARDS WILDLIFE CONSERVATION AMONG STUDENTS OF KASHMIR VALLEY

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Wildlife found in all ecosystems conventionally refers to undomesticated animal species, but has come to include all plants, fungi and other organisms that grow or live wild in an area without being introduced by humans. Wildlife in distinct forms is observed in deserts, forests, rain forests, plains, grasslands and other areas including the most developed urban areas. It is believed that the Stone Age people and hunter-gatherers depended on wildlife, both animals and plants, for their food. Today hunting, fishing and gathering is still a significant food source in some countries of the world. Historically, humans have tended to separate civilization from wildlife in a number of ways including the legal, social and moral sense. All major religions of the world viewed animals as a special part of God's creation and worthy of consideration and respect. Mankind is responsible for whatever it has at its disposal, including animals, plants and environment whose rights must be respected. The Holy Qur'an, the Hadith, and the history of Islamic civilization offer many beautiful examples of kindness, mercy and compassion towards animals. According to Islamic principles, animals have their own position in the creation hierarchy and humans are responsible for their well-being and food. According to a report by the World Wildlife Fund, the global wildlife population has decreased since 1970. In recent years the growing concern regarding environmental issues and their impact on general awareness is one of the most noticeable phenomena world wide. To raise environmental literacy level among students, Environmental Education as a subject is taught in Kashmir valley using both interdisciplinary and multi-disciplinary approaches. The aim of the study was to determine the



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level of awareness, attitude and participation of students in environmental activities. The study involved a sample of four hundred students randomly selected from different higher educational institutions of Kashmir valley using a well designed questionnaire. Analysis of the data collected was done using standard statistical tools. The results of the study revealed that students have a positive perception towards the conservation of wild animals. This further meant that the respondents have genuine concern and willingness to conserve the remaining biodiversity in the State. It was concluded from the study that there is an urgent need of giving mass awareness on importance of forests and wildlife to the people of Kashmir valley. Suitable suggestions were given which can definitely help in the conservation of the fast eroding precious wildlife.

Key Word Index: *Attitude, Wildlife, Forests, Kashmir Valley, Statistical Tools*

INFLUENCE OF SIZE REDUCTION AND MICROBIAL CULTURE ON *IN SITU* PADDY STRAW DEGRADATION

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The study deals with the deployment of collector-cum-chopper to reduce the size of paddy straw and applying the recommended dose of fungal inoculum from *Aspergillus awamori*, *Trichoderma viride*, *Aspergillus nidulans* and *Phanerochaete chrysosporium* to ensure rapid *in situ* degradation. The collector-cum-chopper machine consists of straw collection and conveying unit, straw chopping unit and discharging mechanism. It also carries a 300 litre plastic tank to apply the recommended dose of fungal inoculum @1000 g per tonne of the material. The chopped paddy straw was decomposed with/without fungal inoculant above and below the soil. The treated chopped paddy straw incorporated within the soil by rotavator resulted in an increase in NPKC from 110.6 to 182.0 kg ha⁻¹ N, 42.8 to 63.5 kg ha⁻¹ P, 1068.4 to 1862.5 kg ha⁻¹ K and 0.33 to 0.51 % C. Due to uniform mixing, the total biomass content increased from 273.3 to 290.1 µg of biomass / g of soil, resulting in an increase in dehydrogenase activity from 57.51 to 111.04 µg TPF g⁻¹ 24 per hour and emission of CO₂ from 272.8 to 319.1 milli gram. As the degradation progressed, the total biomass content, dehydrogenase activity and emission of CO₂ decreased to 266.4 µg of biomass/ g of soil, 105.04 µg TPF g⁻¹ 24 hour and 307.1 mg after 45 days of degradation.

Key Word Index: *Paddy straw, inoculant, microbial biomass, incorporated, internode*

DEVELOPMENT AND EVALUATION OF PADDY STRAW COLLECTOR-CUM-CHOPPER FOR *IN SITU* PADDY STRAW MANAGEMENT

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An effort was made to find the long lasting solution of paddy straw burning and enrichment of the exhausted soil by designing, developing and evaluating paddy straw collector-cum-chopper for *in situ* paddy straw degradation. Paddy straw collector-cum-chopper comprised of three sub-systems i.e. straw collection and conveying unit, straw chopping unit and



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discharging mechanism. The prototype of paddy straw collector-cum-chopper was fabricated in 2014-15. The machine was evaluated in terms of size of cut, power, energy requirement, fuel consumption and productivity. The independent parameters were moisture content (50, 40 and 30 %), forward speed (4, 3 and 2 kmph) and height of cut (50, 40 and 30 cm). The Duncan multiple range test showed that optimum condition occurred at moisture content of 40 % operating at a forward speed of 3 kmph with 40 cm height of cut. At optimum conditions, the percentage of paddy straw less than 5 cm, 5-10 cm, 10-15 cm and > 15 cm was 63.5 %, 8.12 %, 6.44 % and 17.92 %, with productivity of 2.06 ton.h⁻¹, fuel consumption 5.78 l/h and energy utilization of 7.82 kWh per tonne.

Key Word Index: *Internode, in situ, collector-cum-chopper, stubbles, straw management*

LEGUMES, A PROMISING TOOL FOR PHYTOREMEDIATION OF HEAVY METALS IN SOIL

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An increasingly industrialized global economy over the last century has led to a dramatic increase in production and release of hazardous metals to the environment. Heavy metals has received great attention in soil science and plant nutrition mainly due to (1) its phytotoxic impact ranging from growth reduction, wilting, and chlorosis to cell death (2) their relative high mobility in the soil-plant system, which implies metal dissemination throughout the food chain, even becoming a serious threat to ecosystem and human health. Concerning bioremediation, plant-assisted remediation or phytoremediation has been highlighted for its potential for *in-situ* removal of heavy metals from soils. Although phytoremediation is a promising technology, its feasibility depends on site conditions, soil properties, and plants sensitivity to the toxic metal. In this regard, the exploitation of symbiotic relationship between leguminous plants and rhizobia is presented as an attractive and cost-effective alternative to improve the nitrogen input into the plant-soil system compared with the use of expensive synthetic N-fertilizers. Moreover, this symbiotic relationship has been proposed to be applied in metal contaminated soil to improve soil fertility and extract or stabilize metals simultaneously. The rhizobia can directly enhance phytoremediation through nitrogen fixation and production of the plant growth promoting factors. This would result in increased metal uptake and translocation from soil to plant due to the change in bioavailability. On the other hand, microbial metabolism such as extracellular polymeric substance (EPS) production and enzyme activities can immobilize and/or change the redox state of metals to lessen their toxicity to plants.

Key Word Index: *Legumes, Phytoremediation, Metals Toxicity*



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RAPID BIOASSESSMENT BY USING PHYSICAL HABITAT CONDITION AND FISH OF RIVER SIP, A TRIBUTARY OF RIVER NARMADA

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The perishability and flourishability of any organism depends upon its habitat where it is surviving. The habitat study in terms of species ecology is as important as water quality because habitat defines the type of species inhabiting there. Habitat is considered as one of the most important tool for assessment of the fish survival as it defines their health and abundance. It is important for individual species as well as for the assemblage of fishes. The objective of this study is to assess the impairment of river ecosystem by the anthropogenic activities. For evaluating the aquatic health physical habitat condition and fish status were taken as a tool.

Sip River is a Tributary of River Narmada which is a Central Indian River, joining Narmada at right bank just upstream of Indira Sagar reservoir. Seven sites were selected from the 74km river. In the present study, the physical habitat condition was assessed by using Rapid Bioassessment Protocol (RBP's) in terms of visual assessment. The fish assemblage was assessed by using an attribute (number of tolerant/intolerant fishes) from the Index of Biotic Integrity (IBI) developed for Indian rivers.

In the total assemblage, it is found that the intolerant species were abundant on the sites where the habitat is less destructive or is untouched by human perturbation. Alternatively, the stations where human interference is more, the tolerant fishes were found significant and diverse. The tolerant species signifies the pollution level in the aquatic ecosystem and has been found only on two sites which are facing the most anthropogenic disturbance among all sites. The change in land use pattern with respect to the increasing developmental activities near the banks is affecting the habitat of the organisms residing in the aquatic ecosystem.

Key Word Index: *Biodiversity, Ecology, River, Aquatic Ecosystem, Habitat*

SUSTAINABLE DEVELOPMENT THROUGH REDUCE RECYCLE AND REUSE

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The co-existence of biotic and abiotic objects in the eco system makes the environment invariably healthy. The biotic component includes human beings, animals, birds, flora fauna. The abiotic group includes land, water, air, sky, water along with their energy components; the survival of biotic group on abiotic components is in tune leading to sustainable environment. However, the unhealthy activities of human beings are increased day by day leading to ecological imbalance. The main threat to the rich resource of medicinal plants(CITES) and



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endangered animals in the forest range thereby are ecological imbalance. The golden nature is diminished by the activities hampered and impede by extrinsic influences remarkably. On the other hand the liberal usage of plastics by the tourist leading to soil and water pollution. Eco Tourism geared up in many parts of North Eastern states of India in competence with European countries. The concept of minimizing the pollutants, reuse and recycling should be incorporated by many of the tourist area. The best strategies by the Eco tourism for the sustainable development are highlighted in the present paper with 3R approach.

Key Word Index: *Sustainable development- eco system-reduce- reuse- recycling*

COMPARISON OF PERCOLATION LOSSES OF GUAR GUM AND CARBOXYMETHYLCELLULOSE (CMC) POLYMER TREATED AND UNTREATED SOILS UNDER LABORATORY CONDITIONS

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The present study was carried out to compare percolation losses of soil treated with Guar gum and Carboxymethylcellulose (CMC) polymer at different concentrations with untreated soil under laboratory conditions. These polymers are water soluble, physiologically inert, biodegradable, economical, do not produce any harmful effect when applied to the soil, and easily available materials were applied in four different concentrations i.e., 0.01%, 0.025%, 0.05% and 0.1% separately by weight of water to the soil columns in four mild steel cylinders supported by iron frame. The cylinders have approximately 60 cm depth, 30 cm diameter and 16 gauge thickness having conical bottom with opening. These cylinders were placed vertically on a platform supported with frames made of Engle iron, and measuring conical flasks were kept just below the small hollow rod at bottom of each cylinder to collect the percolated water. The data was collected for control and polymer treated soils in different concentrated solution of polymers applied in the soil column after 24 hours. The readings were noted after every 15 minutes just after pouring the water in each cylinder. The recorded observations indicated in general, that polymer treatment to the soils resulted in reduced percolation loss. The efficacy of polymer treatment to reduce percolation loss in soil were found to be better at higher concentration.

Key Word Index: *Carboxymethylcellulose (CMC) polymer, Guar gum polymer, percolation loss, soil column, soil treatment*



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QUANTIFICATION OF DIET OF HIMALAYAN BLACK BEAR (*URSUS THIBETANUS*) IN KASHMIR HIMALAYA

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Food habits of black bear (*Ursus thibetanus*) were documented in Kashmir Himalaya from July 2014 to June 2015. Among 112 scats investigated 22 items of plant origin and 5 items of animal origin were found. The vegetation was dominant component contributing 94.60% to the overall diet followed by animal materials which contributed 7.17%. Food habits also showed seasonal variation with spring food dominated by succulent plants (*Prunus avium*, *Heraculum* spp. and *Lychnis alba*) summer by fleshy fruits (*Prunus armeniaca*, *Zea mays*, *Rosa* spp. and *Rubus niveus*) and autumn by fat rich nuts (*Quercus robur* and *Juglans regia*). This variation in diet is attributed to the seasonal availability of the different food items in the habitat. There was statistically significant variation in the prevalence of food items ($p < 0.05$). Cultivated crops as well as livestock remains were also recovered from the diet.

Key Word Index: Food habits, Black bear, Kashmir Himalaya, Scat.

AN INSIGHT TO THE MEDICINAL PLANTS DIVERSITY IN CENTRAL AYURVEDA RESEARCH INSTITUTE FOR DRUG DEVELOPMENT (CARIDD), KOLKATA, WEST BENGAL INDIA

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Central Ayurveda Research Institute for Drug Development, Kolkata houses medicinal plants garden with rich diversity of genera. These are being used for the preparation of Ayurvedic medicines and formulations. They are utilized in cure of several ailments such as cardiac diseases, hypertension, diabetes, gynecological problems, sexual disorders, dermatology, obesity, digestive disorders, oedema, hepatic disorders, digestion related disorders, fevers and others. In the present context, 37 genera have been studied, along with their respective family(s), Ayurvedic name, vernacular name, part(s) used and medicinal uses have been highlighted. Statistical representation of the data is also presented. Knowledge on medicinal plants is useful for their beneficiary roles, creating awareness on conservation and sustainable development of biodiversity.



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STATUS OF HIMALAYAN GORAL (*NAEMORHEDUS GORAL*) IN KAZINAG NATIONAL PARK, JAMMU AND KASHMIR, INDIA

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Current population and conservation status of Himalayan goral (*Naemorhedus goral*) was assessed in Kazinag National Park (KNP), Jammu and Kashmir (J&K), during August 2017 to June 2018. Line transects of 0.5 - 1.0 km were laid on the field to assess the status of this species. Direct (sighting during dawn and dusk) and indirect (using signs such as footprints, pellets) methods were used to survey two major regions (Limber and Lacchipora) of the KNP and 21 potential areas. A total of 71 individuals with a density of 1.70 goral/km² were recorded with highest density at Methwane Limber (4 goral/Km²). Despite the protected status of goral under J&K Wildlife Act, habitat destruction, illegal hunting, poaching, over-grazing by livestock and human disturbance are the major threats to future conservation of goral.

Key Word Index: Himalayan goral, Kazinag National Park, J&K Wildlife Act, Major threats.

PILGRIMAGE TOURISM AS AN ALTERNATIVE TO ACHIEVE SUSTAINABLE DEVELOPMENT: AN ANALYSIS WITH SPECIAL REFERENCE TO JAMMU AND KASHMIR

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Globally Jammu and Kashmir, also known as the “Paradise on Earth,” is famous for its tourism throughout the world, may it be the case of leisure, adventure or pilgrimage tourism all of these major forms of tourism are very much prominent in the State and witnessed great boom in the last couple of decades. Besides, its enchanting natural beauty, J&K is also famous for ‘Pilgrimage Tourism’ as the state is full of world famous shrines for all religions which attract millions of domestic and overseas pilgrims every year. Consequently, the growth of pilgrimage tourism in J&K has been improved astonishingly.

Unfortunately, J&K is one of the most economically backward regions of country and here, because of the political instability, isolation, inaccessibility, and other geographical consequences the scope of large-scale industrialization is very limited and the potentialities of



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agricultural development are scarce, hence, the role of tourism is immense in the overall development of the economy. Tourism in J&K is considered as backbone of the State's economy. "It is estimated that almost 50-60% of total population of J&K is directly and/or indirectly engaged in tourism related activities. Tourism contributes about 15% to State Gross Domestic Product" (Mir, 2014). If we look at the sectoral composition of the state's income, it has undergone considerable changes over a period of time. Over the last five decades, the share of primary sector has declined steadily from 17.47% in 2011-12 to 16.05% in 2017-18 (Adv. est.). Similarly, the share of secondary sector has also declined from 28.09% in 2011-12 to 27.88% in 2017-18 (advance estimates), while as the contribution of services sector has increased from 54.44% in 2011-12 to 56.07% in 2017-18 (Adv. est). Accordingly, the overall growth is mainly driven by the service sector and in the service sector tourism is the major contributor in the state's economy. (Economic Survey 2017, Govt. of J&K)

The rapid growth in the inflow of pilgrims helps a lot in the sustainable development of the region by generating socio-economic benefits such as promotion of national integration and international understanding, increasing educational facilities, creation of employment opportunities, increasing domestic incomes and effective demand, opening up new growth centers and removal of regional disparities. Further, if managed properly it could also prove beneficial for environmental conservation and protection by financing for the protection and increasing the economic importance of the natural area as well as by raising the awareness of environmental values among visitors and the local population, so that these natural resources could be preserved for the future generations too. On the other hand, being a double edged sword the unchecked and unregulated rapid growth of pilgrimage tourism also costs a huge in the form of ecological and environmental decimation, degradation local resources, and other socio-cultural and economic problems.

This paper is an attempt to study the attempts to study the contribution of pilgrimage tourism in the sustainable development of the J&K. The study also gives some major recommendations for future development of pilgrimage tourism which can prove a major tool for the sustainable development of the region and also provides some suggestions to overcome the problems in the way to achieve this goal. This study also offers some valuable recommendations to reduce the negative impacts of pilgrimage tourism development and also opens some new and interesting avenues for future research. Furthermore, the study will help researchers to enhance knowledge, will help planners in the process of planning and also be useful to incorporate the findings required in future by scholars.

Key Word Index: *Tourism, Environment, Sustainable Development, Economy, Pilgrimage Tourism, Conservation, Growth.*



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A STUDY ON THE PROCEDURES AND ISSUES FOR CONSERVATION OF HERITAGE OF DISTRICT SRINAGAR IN KASHMIR VALLEY

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Heritage refers to processes that have a special meaning in group memory. In the literature, we come across terms National heritage site, Historic site, Cultural heritage, World Heritage Site, List of destroyed heritage, Food heritage, Heritage language, Industrial heritage, Natural heritage, Virtual Heritage, Inheritance, Heritage science and Heritage studies and their importance. Heritage is our past that has been preserved for the present and it will be inherited for the future generations. The architecture of Kashmir represents a traditional knowledge base that has evolved in response to the climatic conditions, the traditional lifestyle of the residents, and various natural threats in the form of earthquake, flood etc., affecting the region. Yet, our advance into the 'modern scientific age' has witnessed an eroding of this rich heritage. District Srinagar is well known for its rich heritage character with more than 1200 years of urban history. To retain its heritage character, the state government has implemented various conservation policies and identified various heritage zones in district Srinagar city in its Master Plan 2035. In this paper, we discuss heritage, procedures, issues and importance of conservation of heritage sites of district Srinagar, Kashmir valley. Finally, we discuss the steps that have been taken to protect heritage of Srinagar, including how to adapt it to contemporary life.

Key Word Index: *Kashmir, Heritage, Culture, Inheritance, Srinagar, Conservation*



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INFLUENCE OF DIFFERENT BIOFERTILIZERS USING DIFFERENT LEVELS OF PHOSPHORUS ON NUTRIENT CONTENT IN DIFFERENT PARTS OF MAIZE (*ZEAMAYS L.*) UNDER INTERCROPPING WITH COMMON BEAN (*PHASEOLUS VULGARIS L.*)

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Phosphorus is the most important key element in the nutrition of plants, next to nitrogen. It plays vital role in virtually all major metabolic processes in plant including photosynthesis, energy transfer, signal transduction, macro molecular biosynthesis and respiration. Microbial mediated phosphorus management is an ecofriendly and cost effective approach for sustainable development of agricultural crop. Maize being an exhaustive crop, it has very high nutrient requirement and its productivity is closely linked with nutrient management. The objective of this study was to evaluate the effect of different biofertilizers (*Rhizobium*, *Azotobacter*, *Vesicular Arbuscular mycorrhizae*) with varying amounts of phosphorus (P) fertilizer on nutrient content in various parts under intercropping system. An experiment was conducted during *kharif* seasons of 2012 and 2013 at the Krishi Vigyan Kendra (KVK) of Shere-e-Kashmir University of Agricultural Sciences and Technology, Budgam, Jammu and Kashmir. The experiment was laid out in randomized complete block design (RCBD). Common bean variety and maize variety included in the experiment were Shalimar Rajmash and C-15. Experimental results showed that *Rhizobium* with VAM @ 20 kg P/ha in the present research showed significant impact on nutrient content in different parts of maize.

Key Word Index: *Maize, nutrient content, biofertilizers, Phosphorus.*

AIR POLLUTION IMPACT ON FOREST HEALTH

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It is estimated that 49% of forests (17 million km²) will be exposed to damaging concentrations of tropospheric O₃ by 2100. Global forest area at risk from S deposition may reach 5.9 million km² by 2050. Outcomes from the 22nd meeting for Specialists in Air Pollution Effects on Forest Ecosystems "Forests under Anthropogenic Pressure – Effects of Air Pollution, Climate Change and Urban Development", September 10–16, 2006, Riverside, CA, are summarized. Tropospheric or ground-level ozone (O₃) is still the phytotoxic air pollutant of



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major interest. Challenging issues are how to make O₃ standards or critical levels more biologically based and at the same time practical for wide use; quantification of plant detoxification processes in flux modeling; inclusion of multiple environmental stresses in critical load determinations; new concept development for nitrogen saturation; interactions between air pollution, climate, and forest pests; effects of forest fire on air quality; the capacity of forests to sequester carbon under changing climatic conditions and coexposure to elevated levels of air pollutants; enhanced linkage between molecular biology, biochemistry, physiology, and morphological traits. Pollution and climate regimes, including the mycorrhizosphere. Interactions between air pollution, climate, and forest pests are still an issue of ongoing debate, as it has become a widespread opinion that pollutants may predispose trees to injury induced by other kinds of stress, eventually leading to decline. Little information is available about environment-dependent impacts of gene regulation on the expression of traits that are important for adaptation and survival. Little is still known about the capacity of forests to sequester carbon under real-world conditions i.e., under changing climatic conditions coupled with coexposure to elevated levels of pollution.

Key Word Index: *Air Pollutants, Forests, Global Change, Forest Health and Impact.*

BLENDING OF NON-WOOD HERBACEOUS SPECIES PULPS FOR ELEVATION OF STRENGTH PAPER PROPERTIES

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Blending of non-wood herbaceous species *Amaranthushybridus* pulp was investigated, which is profusely accessible in Kashmir (India) along road sides, foot paths, wastelands, pastures, hilly areas as unwanted weed. In the opportunity of current study, the element characterization of *Amaranthushybridus* stalk dust, chemical characterization of liquor analysis and paper properties were carried out. The elemental analysis of test species bared that Ash%, Lignin%, Hot water solubility%, 10% NaOH solubility, Alcohol-benzene solubility% and Holocellulose % content were detected in the array of 11.03, 17.55, 20.25, 40.40, 6.64 and 62.41 respectively. Strength properties of standard resultant sheets of 60 gsm with and without blending of beaten pulp at 300 ml csf were assessed in terms of tensile strength (Nm/g), tear index (mN.m²/g), burst index (Kpa m²/g), double fold number. Blending of *Amaranthushybridus* pulp with *Daturastramonium* pulps revealed that blending of stalk pulps to *Amaranthushybridus* pulp improved the physical properties to a greater extent.

Key Word Index: *Amaranthushybridus*, blending, Kashmir valley, paper properties



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HORTICULTURE INNOVATIONS AND ENVIRONMENT CONSERVATION

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Horticultural production basically involves the intensive use of natural and artificial resources, such as land, water, labour and inputs such as fertilisers, pesticides and horticultural implements. The use of these resources in a temporal basis has the potential to negatively impact on the local environment and worker welfare. In addition the transport of horticultural produce over long distances, particularly by air transport, and reported in term of food miles, is known to have a negative contribution to the global environment. The use of technologies that have been used to mitigate the impact of horticultural production on the environment are highlighted including greenhouse technologies, soil protection and conservation, optimal fertiliser use and Integrated Pest Management. The past decade has seen an increasing awareness of man's activities on the planet's environment. The horticultural value chain has affected virtually every aspect of the environment. In addition we have seen greater advances in quantifying the impact of horticultural activity on the environment. By understanding and measuring, then scientists and growers themselves have been able ways to minimise their effect on the environment through the use of technology and management strategies. This is likely to be an on-going scenario. Climate change and variability will affect horticulture system substantially, requiring orchardists to adapt at the same time that they are called on to reduce emissions at the orchard level. Choosing effective adaptation and mitigation strategies will represent a key challenge for farmers over the coming decades. However the climate change we are seeing currently is as a result of practices totally outside horticulture and in future global warming and the environmental impact on horticultural production may be more important than horticulture's impact on the environment.

Key Word Index: *Horticulture, Environment, Management, Conservation, Mitigation*

HORTICULTURE NATURAL RESOURCE MANAGEMENT STRATEGY

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Natural resources, such as soil and water, are a foundation of horticultural production. Growers need access to suitable natural resources, their future operations rely on maintaining the health and productivity of those resources, and communities (and governments) insist that production does not negatively impact on surrounding environments. This Natural Resource Management Strategy enables horticultural industries to deal with environmental matters in the



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economic and social context in which growers operate. It helps ensure that industry approaches are efficient and effective, and that they are understood, and supported, by external stakeholders (e.g. governments). The Strategy enables horticulture to manage the environmental agenda as it affects the industry's future. Growers manage sophisticated enterprises that require science-based measures to optimise production and maintain their productive base (i.e. soil, water and nutrient management), and to manage risks and threats (e.g. pests, diseases and weeds) in environmentally sound and cost effective ways. They also want to contribute to the local environment as good neighbours (e.g. regarding noise, dust, light, odours and greenhouse emissions). Modern horticultural enterprises are significant investments; their operations can't afford to be undermined by a declining resource base or the risk of prosecution for environmental breaches. The Horticulture NRM Strategy shows that the industry is aware of environmental issues, accepts its responsibilities, has been and continues to be active in addressing them, and has a clear and effective plan to continually improve its performance. The plan operates at a whole-of-industry level and provides a framework to support, stimulate and promote activities by individual commodities and regions. It also serves as a vehicle for communication with governments and communities about how they can assist industries and growers. This Strategy is not a start, nor even a new beginning. It is another flagstone in the industry's path to a profitable and sustainable future. It provides an opportunity to reflect on the journey so far, to re-group and to stride confidently way forward.

Key Word Index: *Horticulture, Natural Resource, Management, Conservation, sustainable, environment.*

BIODIVERSITY AND TEXONOMIC STUDIES ON BEETLES (COLEPTERA) IN PIR PANJAL BIODIVERSITY PARK BGSBU RAJOURI, JAMMU, INDIA

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Biodiversity is one of the important cornerstones of sustainable development and represents the biological wealth of a given nation. The term biodiversity has been defined as the variety and variability among living organisms and the ecological complexes in which they occur. The world is currently facing biodiversity crisis mainly due to rapid alteration of the earth's environment leading to loss of stability of ecosystems which will be detrimental for the survival of mankind. The present study was carried in Pir Panjal Park of BGSBU University, district Rajouri, Jammu. This study highlights the richness of the coleoptera fauna which was mainly because of the availability of varieties of plants and microhabitats. The major ecological importance of beetles is due to their effect on green plants, their contribution to breakdown of plant and animal debris and their predatory activities. A total 28 species has been collected during the month from March to June 2016. Altogether these insects belong to 10 families and 27 genera. The results show vast diversity of Coleoptera belonging to the family Cleridae, Elateridae, Lampyridae, Scarabacidae, Coccinellidae, Crabidae, Melolidae, Chrysomelidae,



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Cerambycidae and Buprestidae. Members of the family Scarabeidae were found most dominant with respect to individuals and species richness catch that is 9 species were recorded from this family comprising (32.14%) of the overall catch, followed by Coccinellidae (14.28%) Melolidae, Chrysomelidae and Carabida (10.71%), Elateridae (7.14%) and Cleridae, Lampyridae, Cerambycidae and Buprestidae (3.57%) with 1 species each.

Key Word Index: *Biodiversity, Coleoptera, Ecosystems, Microhabitats, Species*

ASSESSMENT OF BIO CHEMICAL PARAMETERS OF *CERATOPHYLLUM DEMERSUM* AND *HYDRILLA VERTICILLATA* OF DAL LAKE UNDER TEMPERATE CONDITIONS OF KASHMIR

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Fifty four weed samples of each two weeds (*Ceratophyllum demersum* and *Hydrilla verticillata*) were collected from March to August during 2015 from three sites of Dal Lake (Hazratbal, Nishat and Telbal) and analyzed for bio-chemical parameters. Maximum content of chlorophyll 'a' (4.4 ± 0.52 mg/g) was recorded in *C. demersum* in the month of June at Hazratbal site whereas; the *C. demersum* exhibited lowest content of chlorophyll 'a' (2.9 ± 0.79 mg/g) at Telbal site in the month of March. The highest chlorophyll 'b' content was recorded in *C. demersum* (1.6 ± 0.36 mg/g) and *H. verticillata* (1.6 ± 0.34 mg/g) at Nishat and Hazratbal site in the month of April and July, respectively. *H. verticillata* showed lowest level of chlorophyll 'b' (0.7 ± 0.17 mg/g) at Telbal site in the month of June. The total chlorophyll content (5.8 ± 1.22 mg/g) was higher in *H. verticillata* in the month of June at Hazratbal whereas *C. demersum* exhibited the lower content (4.0 ± 0.79 mg/g) of total chlorophyll at Telbal site. Carotenoids and free sugars showed elevated level of 4.3 ± 1.47 mg/g and 4.0 ± 0.20 mg/g respectively in *H. verticillata* in June at Hazratbal, whereas the minimum content of carotenoids and free sugars was recorded 3.0 ± 0.98 mg/g and 3.1 ± 0.81 in *C. demersum* at Telbal site in March, respectively.

Key Word Index: *Dal Lake, C. demersum, Bio-chemical, H. verticillata, Carotenoids, Chlorophyll.*



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BENEFITS AND HAZARDS OF CHEMICAL PESTICIDES-A REVIEW

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Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA-1947) defined Pesticides as “any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any insects, rodents, nematodes, fungi, or weeds or any other form of life declared to be pests”. The greatest challenge of today’s agriculture is to feed the growing population and restore the natural resources. According to FAO, global food production needs to be doubled by 2020. Uncontrolled population growth in developing countries accelerated the imbalance between human needs and sustainable use of land. Though by virtue of chemical pesticides, the crop losses by pests and diseases which is approximately 20-40% of total yield have decreased. In 2016, the estimated global consumption of pesticide is 3.5 billion kilograms (40% herbicides, 17% insecticides, 10% fungicides). Pesticides protect crops by killing pests, eliminating weeds and improving crop quality. Pesticides can save farmer’s money by preventing crop losses to pests. Farmers get an estimated fourfold return on money they spend on pesticides. Each pesticide or pesticide class comes with a specific set of environmental concerns. Over 98% of sprayed insecticides and 95% of herbicides reach a destination other than their target species, because they are sprayed or spread across entire agricultural fields. They can cause growth abnormalities and death of non-target organisms. Such undesirable effects have led many pesticides to be banned, while regulations have limited and/or reduced the use of others.

Key Word Index: *Insecticide, Fungicide, Rodenticide*

OCCURRENCE AND MOLECULAR CHARACTERIZATION OF *CLOSTRIDIUM DIFFICILE* FROM BROILER CHICKEN IN KASHMIR VALLEY

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The present study was undertaken to investigate occurrence and virulence gene profile of *Clostridium difficile* from clinical cases of enteritis in broiler chicken. A total of 474 faecal samples (82 from live birds and 392 from necropsied carcasses) were collected from different organized and unorganized farms of Kashmir valley. The screening of *C. difficile* isolates by



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standard morphological, biochemical and molecular assay revealed that nine samples were positive for *C. difficile*. For confirmation, all the *C. difficile* isolates were confirmed by detection of *C. difficile* specific glutamate dehydrogenase gene (*gluD*) as well as triose phosphate isomerase gene (*tpi*) by PCR. The occurrence of *C. difficile* in enteritis cases was found to be 2.32 % (11) respectively and their occurrence was recorded to be more in unorganized sector than in organized sector. With respect to age group, highest occurrence of *C. perfringens* was found in 3-4 weeks age group while as highest occurrence of *C. difficile* was found in 0-2 weeks age group. The isolates were further characterized by multiplex PCR for detection of toxin genes. Out of eleven *C. difficile* isolates, six isolates possessed *tcdA* gene, while none of the isolates possessed *tcdB* or binary toxin gene. Hence, a close monitoring of broiler farms is necessary to check its spread to humans.

APPLICATION OF LOGIT AND PROBIT MODELS IN FORESTRY

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Regression analysis is expressed in the form of an equation or a model connecting the response or dependent variable and one or more explanatory or predictor variables. The estimates of regression analysis may be robust against errors in some assumptions. Such is the case when the dependent variable is a qualitative measure rather than a continuous, interval measure. When the dependent variable is binary, the model cannot be estimated using ordinary least squares. Instead, maximum likelihood estimation is used, which requires assumptions about the distribution of the errors. Most often, the choice is between normal errors which result in the probit model, and logistic errors which result in the logit. As the simplest logit and probit model, response variable in binary logit and probit models have only two categories. The occurrence and non-occurrence of these events are the categories in the dependent variables. The logistic and normal distributions are both symmetrical around zero and have very similar shapes, except that the logistic distribution has fatter tails. As a result, the conditional probability functions are very similar for both models, except in the extreme tails. Both of these models may be used to analyze same data sets for the same purpose. In forestry parallel use of logit and probit models makes it possible to accurately distinguish the probability of damage caused by the deforestation to the ecosystem.

Key Word Index: *Logit, Probit, Binary, Linear models.*



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A STUDY ON ASIA'S BIGGEST FRESH WATER LAKE (WULAR LAKE), KASHMIR VALLEY

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The valley of Kashmir popularly known as paradise on earth has been tantalizing the lovers of nature and tourists from far and wide. The Lake Wular freshwater ecosystem is located about 35 km North West of Srinagar and also harbours a rich biodiversity. It not only acts as a safety valve for the Kashmir Valley against floods but is also a key factor in maintaining biodiversity, production of food, fodder and other commercially important wetland resources. The recent studies reveal that conversion of Wular Lake peripheral area into agricultural land, construction of houses for human settlement, plantation of some tree species and related developmental activities have endangered the existence of this freshwater body. In this paper, we discuss the importance of lakes in view of the ecology as well as tourism point of view. Finally, we report the present condition of Wular Lake and suggest ways of improving the quality of water and Wular lake environment.

Key Word Index: *Wular lake, Kashmir, Environment, tourism, wetland, biodiversity*

ASSESSING THE IMPACT OF LAND USE CHANGE ON WATERSHED RUNOFF USING SOIL AND WATER ASSESSMENT TOOL (SWAT) MODEL

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Runoff is a very important phenomenon of hydrological cycle and it is relevant for the watershed management programme for conservation and development of natural resources. However, the availability of accurate information on runoff is scarce in India. Soil and Water Assessment Tool (SWAT) is a physically based distributed parameters model which was developed to predict runoff, erosion, sediment and nutrient transport from agricultural watersheds under different management practices. For the present study, physically based Soil and Water Assessment Tool (SWAT) was used to simulate runoff from Bino watershed (300.91 km²) situated in Almora and Pauri Garhwal districts of Uttarakhand, India. The calibration was performed using monthly observed runoff data from the year 1981 to 1998 and then calibrated model was validated using observed runoff data from 1999 to 2007. A good agreement between simulated and observed runoff was observed for the model, which was verified using both graphical technique and quantitative statistics. During calibration, the values of $E_{NS} = 0.83$, $R^2 =$



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0.88, PBIAS = 17.1 and RSR = 0.4; and during validation, the values of $E_{NS} = 0.62$, $R^2 = 0.72$, PBIAS = 26.5 and RSR = 0.61 was found in SWAT model. The sensitivity of SWAT model output to changes in land use has also been analyzed. It was found that on comparison of simulated values for landuse of 1985 and 2015, runoff increased by 22.34% as compared to 1981-1998, by 26.75% as compared to 1999-2007 and by 23.47% compared to 1981-2007. Also, the mean annual runoff in 2015 was $0.711\text{m}^3/\text{s}$ higher.

Key Word Index: *Bino watershed, Hydrological modeling, Land use, Runoff, SWAT*

CONSCIOUSNESS AND ATTITUDE OF COLLEGE STUDENTS TOWARDS BIRD CONSERVATION

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Birds are generally admired for their beauty, songs, and the grace of their near miraculous ability to fly without recognizing their role direct or indirect to the environment (often called “Ecosystem Services”). Bird watching and related eco-tourism is a major economic force in many countries. Birds are excellent indicators of environmental health and on a less quantitative level, they offer humans with pleasure, joy and spiritual inspiration merely by their existence. The changes in bird populations at present tell us a great deal about the impacts of climate change. The most significant reason to study birds is to promote our understanding of the ecosystems that support all life on earth, including humans. To have a healthy planet, we must understand how the natural systems on which we depend function. We should work for the conservation of birds as they are a critical element to nearly every ecosystem on earth, and their fate is intertwined with ours. In this paper, the main aim is to find out the consciousness and attitude of students towards bird conservation. The partial aims of the study were to find out the influence of demographic variables like gender, grade, residence and the ownership of pet on the attitudes toward and awareness about birds. The sample size consisted of 400 (200 boys and 200 girls) college going students from Kashmir valley. The data collected was analyzed by the standard statistical methods such as descriptive (mean score), inferential (analysis of variance) and also multidimensional statistics (factor analysis). It was observed that gender and grade level of students has got significant level on knowledge. All observed variables under study have got significant level on the attitudes toward water birds and the relationship between awareness and attitudes was negative. Finally, conservation and role of birds in nature and human life was discussed in view of their life history.

Key Word Index: *Consciousness, Attitude, Birds, Students, Kashmir, Conservation, Statistics*



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ASSESSING THE ENVIRONMENTAL ECONOMICS OF ECOTOURISM

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Tourism is the major industry of any nation due to its ever increasing share in National Income. Tourism in J&K, despite of disturbances due to one or other reasons, remains the backbone of state's economy. The recent upsurge in tourism however claimed to create environmental stress due to the increased pollution and thus shifts the focus of agencies towards Eco-tourism. Ecotourism refers to tourists travelling to a nature site because of the amenity and recreational value derived from having contact with some aspect of the natural world. Jammu & Kashmir is full of such sites; whether the religious places like Vaishno Devi at Katra in Jammu, Amarnath Cave in Kashmir or naturally aesthetic places like Patnitop in Jammu and Gulmarg in Kashmir, where every year millions of tourists visit to enjoy. In order to ensure the sustainability of natural resources in these places, there is a need to assess the economics of tourism from environmental perspective. There are however many economic and environmental problems in developing ecotourism in the state.

The role of local community is imperative in sustaining the natural resources and therefore, local groups and communities must be strengthened to undertake the work of managing tourism, besides conserving the local resources and environment.

Key Word Index: *Industry, tourism, natural resources, environment.*

SERICULTURE AN ECONOMIC AND ECOFRIENDLY VENTURE

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Sericulture is an ancient agro-based cottage industry that provides ample employment opportunity to rural people of our country, irrespective of gender and age. It involves cultivation of mulberry for rearing of silkworms that in turn produce cocoons which are finally reeled for silk being woven into splendid fabrics. Nothing is waste in sericulture starting from soil to silk. India is the only country in the world to produce all the commercial varieties of silk. Jammu & Kashmir is a rare state in India with salubrious climatic conditions which are quite suitable for the production of bivoltine silk of international standard. Silk is widely used as sustainable ecotextile. It is regarded as the queen of textiles owing to its affinity of dyeing, appeal, sheen, lusture, softness and elegance. Sericulture being an ecofriendly activity needs to be promoted for creation of employment and better Environment.

Key Word Index: *Ecotextile, Employment, Environment, Sericulture, Silk.*



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BIOECOLOGY OF VULTURES IN INDIA: A REVIEW

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Nine species of Vultures have been reported from India and among them four are critically endangered, one endangered, three near threatened and one is least concern. They feed on carcasses of different sizes and hence prevent the spread of disease to other animals and humans. The nest site selection and breeding success of vultures depend on various factors like human interaction and interaction with other animals. In India the population of Vultures declined drastically since 1990s. Usage of diclofenac to treat farm animals was attributed to this decline. The other threats to Vultures include- habitat loss, infectious diseases, environmental contaminants, low food availability and human interference. To provide diclofenac free carcass by implementing ban on diclofenac, to maintain captive breeding centres and to minimize disturbance to Vultures are some of the suggested measures for vulture conservation.

Key Word Index: *vulture, critically endangered, habitat loss, diclofenac, captive breeding*

BIOECOLOGY OF HOUSE SPARROW, (PASSER DOMESTICUS): A REVIEW

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Worldover, house sparrow of the genus *Passer* comprises of 25 species, with the species of *Passer domesticus domesticus* as the nominate species across Europe to northern Asia. Although it has an extremely large range and population, and is not seriously threatened by human activities, so it is assessed least concern for conservation on the IUCN Red List. However, British Trust of Ornithology estimated that sparrow population in London declined by 71% between 1994 and 2004. Similar cases of decline have been reported from other areas of globe viz. Hamburg, Berlin, Glasgow, Edinburgh, Dublin, etc. In India decline has also been reported which has been attributed to loss of nesting sites, food sources, increase in predator and pollution. The decline in population of the sub species of house sparrow, *Passer domesticus parkini*, from the valley of Kashmir has been attributed to the shifting of the population from urban to rural areas mainly because of loss of nesting sites due to concretization and denudation of green areas.

Key Word Index: *IUCN, least concern, Passer domesticus, concretization, denudation.*



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A STUDY ON THE AWARENESS OF WATER CONSERVATION AMONG STUDENTS AND THEIR PERCEPTION OF WATER RELATED RISKS IN KASHMIR

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Water being the most vital element of nature, is therefore the very basis for all life on Earth. Water has become a matter of concern for the modern world and its International organizations, such as the UN- officially designating a yearly World Water Day observed on 22 March. Sustainable development will not be achieved without a water secure world. A water secure world integrates a concern for the intrinsic value of water with a concern for its use for human survival and well-being. A water secure world reduces poverty, advances education, and increases living standards. It is a world where there is an improved quality of life for all. In this paper, we discussed the students' awareness and attitude towards water conservation. The quantitative data was collected using a well-designed questionnaire based on the previous literature. In this study, we used stratified sampling technique to collect the data from 400 students studying in various colleges of Kashmir valley. The data collected was analyzed using SPSS statistical package software. Results revealed that while most of the students had a favorable attitude towards water conservation; many of them gave no thought to the amount of water they consumed each day. It was found that the majority of participants did recognize the importance of water conservation but they did not necessarily conserve water themselves. Results showed that significant relations exist between perceived water consumption and actual water consumption. The students who could accurately estimate water consumption were found to have better water conservation consciousness and water conservation practices than those who would underestimate their water consumption. Female students under study had significantly higher levels of awareness of water use than male students. Water related risks including water scarcity were discussed.

Key Word Index: *Water, Water Conservation, Water scarcity, Environment, Awareness, Attitude, Kashmir, Statistics*



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IMPACT OF TOURISM A MAJOR ECOLOGICAL CONCERN IN LADAKH

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Ladakh is a high-altitude desert in the Indian state of Jammu and Kashmir. Ladakh, sometimes referred to as Little Tibet, is popular with tourists because it is home to one of the purest remaining examples of Tibetan Buddhist culture. An ecological, or sustainable, tourism implies that the human and natural ecosystems of an area will be able to adapt to the stresses of tourism in a way that does not threaten their continued functioning. Human ecology research in the high-altitude region of Ladakh (northern India) has tended to focus on the adaptive significance of Ladakhi social institutions given a natural environment characterized by numerous challenges.

Tourism is flourishing and providing livelihood opportunities to the people of Ladakh but is also playing havoc with its fragile eco-system. Traditionally-living Ladakhis are in a state of well-being and harmonious balance with their environment. A large influx of tourists with the money, material, and ideas this implies will inevitably affect a preindustrial culture. The issue of sustainability in tourism, then, seems to come down to whether the culture will adapt and yet retain its fundamental character through a period of change or whether tourists will destroy the qualities that attracted them in the first place and in the process leave the local inhabitants worse off. There has been little research on biological adaptation in Ladakh, and the view from biology presents a very different picture of the relationship between Ladakhis and their environment. The health of women and infants is compromised by both natural and social factors.

Key Word Index: *Tourism, impact, ecology*

ECONOMIC ASSESSMENT OF NATURAL RESOURCES

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Natural Resources Management (NRM) is an approach that aims for the community, industry and three tiers of government to work together to manage the environment in a way that achieves a balance between the needs of people and those of nature. Effective use of natural resources ensures growth of a country. Ineffective use of natural resources can potentially cause serious losses to environment and economics; not always it is possible to substitute natural capital with different forms of capital. Its decrease can affect sustainability and development of economics; if economic growth is faster than use of natural resources, and then state policy of



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resource use is based on sustainability. Prior to economic valuation of natural resources and using them in economics, it is essential to develop a united economic approach. It is necessary because evaluation methods should become a united system. When using natural assets, the aim is to achieve the highest benefit and the least wear and tear. Sustainable development is when there is balance between human social environment and economic environment. Not always nature assets can be substituted by different forms of assets. Decrease in nature assets can affect development and sustainability of economics.

Key Word Index: *Natural Resource Management, Sustainable, Economic valuation, Natural Resources.*

HEAVY METAL BIOTOXICITY AND ITS REMEDIAL MEASURES- A REVIEW

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The term Heavy metal is a general expression used to define elements having atomic no. greater than 20 and atomic density more than 4000 kgm⁻³, which is about 5 times more than the water and are present as natural components of earth's crust, having varied chemical and physical properties. Continuous exposure to heavy metals can have damaging health effects on humans. Heavy metals are importunate in characteristics; helping later to get accumulated in soil, plants and animals to a very high toxic amount leading to undesirable effects past threshold limit. Some heavy metals in trace amounts have significance in living organisms but most heavy metals in their high concentrations have serious ill effects which is a matter of concern. Even some heavy metals are toxic in low levels as well. They have been proven to be mutagenic as well as carcinogenic. According to the literature sources, heavy metals originate in the environment via either naturally or due to various anthropogenic inputs like industrial activities, mining and automobile exhausts. Many conventional methods were previously used to neutralize the environment from adverse effect of these pollutants but still most of these methods used are very expensive and remote from their best possible remedial potential. Biological methods decipher these drawbacks since they are easy to handle, do not produce any additional contamination besides being eco-friendly and cost-effective. This review is an attempt to give extensive details about few heavy metals, their bio-toxicity, and efforts employed to remediate heavy metal pollution.

Key Word Index: *Heavy Metals, Toxicity, Bioaccumulation, Pollution.*



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CLONAL VARIATION IN GROWTH RESPONSE OF *POPULUS DELTOIDES* BARTR. TO NITROGEN FERTILIZATION UNDER NURSERY CONDITIONS

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Populus deltoides by virtue of fast growth is the most extensively planted poplar in Jammu & Kashmir and is one of the ten most prominent tree species grown in the State. A strapping clone \times fertilizer interaction was observed for diameter, height and biomass. Growth response of six clones of this species to three levels of nitrogen (50, 75, 100 kg ha⁻¹) was evaluated in nursery for two years in order to produce healthy and vigorous nursery stock for the purpose of their mass multiplication. The application of N- fertilizer @ 75 kg ha⁻¹ recorded maximum height, diameter, number of branches plant⁻¹, number of leaves plant⁻¹, leaf area plant⁻¹, internodal length and total biomass (fresh and dry) plant⁻¹. The application of 100 kg N ha⁻¹ was observed to exert toxic effects and reduced the growth performance. Further, in terms of efficient utilization of Nitrogen fertilizer (NUE), the application of 50 kg N ha⁻¹ yield maximum biomass per unit of N- used by the plant.

Key Word Index: *Populus deltoides*, clonal variation, nitrogen fertilization, nursery conditions.

ECOTOURISM AND MONETARY BENEFITS: A CASE STUDY FROM COSTA RICA

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Costa Rica has turned to ecotourism as its key to economic development. Since 1984, international tourism receipts have grown from \$117 million to \$136 million in 1987, and \$577 million in 1993. Such phenomenal growth has made tourism the leading source of foreign exchange in Costa Rica. The growth linkage possibilities of ecotourism development have had, consequently, far reaching effects on other sectors of the economy. For example, “a visit to the Carara Biological Reserve entails not only a \$15 entrance fee and possible additional donation, but also a flight into San José's International Airport, a bus ride to the park, a stay in a local hotel, dining in the town's restaurants, and the purchase of souvenirs from street vendors” (TED). To this extent, the ecotourism industry has had a trickle-down effect, bringing added revenues to rural and previously disadvantaged areas. Less obvious growth linkages of ecotourism can affect everything from the communications industry to agriculture. The successes of Costa Rica's ecotourism industry have also helped breathe life into the nation's sagging coffee market. Tourists consume an average of two cups of the nation's gourmet coffee a day adding up to approximately 22 million cups of coffee a year, which, at 75 cents per cup, brings in about \$16.5 million. Therefore, as many Latin American nations are losing jobs and revenue to falling coffee prices caused by an influx of cheaper Asian brands into the market, Costa Rica has managed to stay afloat with this increase in domestic consumption. With a rise in ecotourism and benefits to other industries, locals were relocated and logging industries shut down and Costa



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Ricans were able to turn to the tourism industry for employment. This would not have been possible if Costa Rica had adhered to former protectionist measures that tended to wall off protected areas from the public. Ecotourism in Costa Rica has also helped “diversify the national economy, which previously depended upon the exportation of a few agricultural products, namely coffee, bananas, meat, and sugar, for 65% of its exports.” Like many countries in Central America, Costa Rica's small internal market and scarcity of raw materials make industrialization a slow and difficult process without much room for expansion.

Key Word Index: *ecotourism, economic development, receipts, foreign exchange, revenue, tourism industry.*

ECOTOURISM: SOCIAL AND ECONOMIC ASPECTS

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Global economists forecast continuing international tourism growth, the amount depending on the location. As one of the world's largest and fastest growing industries, this continuous growth will place great stress on remaining biologically diverse habitats and indigenous cultures, which are often used to support mass tourism. Tourists who promote sustainable tourism are sensitive to these dangers and seek to protect tourist destinations, and to protect tourism as an industry. Sustainable tourists can reduce the impact of tourism in many ways: informing themselves of the culture, politics, and economy of the communities visited, anticipating and respecting local cultures, expectations and assumptions, supporting the integrity of local cultures by favouring businesses which conserve cultural heritage and traditional values, supporting local economies by purchasing local goods and participating with small, local businesses, conserving resources by seeking out businesses that are environmentally conscious, and by using the least possible amount of non-renewable resources. Increasingly, destinations and tourism operations are endorsing and following "responsible tourism" as a pathway towards sustainable tourism. Responsible tourism and sustainable tourism have an identical goal, that of sustainable development. The pillars of responsible tourism are therefore the same as those of sustainable tourism – environmental integrity, social justice and economic development. The major difference between the two is that, in responsible tourism, individuals, organizations and businesses are asked to take responsibility for their actions and the impacts of their actions. This shift in emphasis has taken place because some stakeholders feel that insufficient progress towards realizing sustainable tourism has been made since the Earth Summit in Rio. This is partly because everyone has been expecting others to behave in a sustainable manner. The emphasis on responsibility in responsible tourism means that everyone involved in tourism – government, product owners and operators, transport operators, community services, NGOs and Community-based organization (CBOs), tourists, local communities, industry associations – are responsible for achieving the goals of responsible tourism.

Key Word Index: *economists, international tourism, mass tourism, Sustainable tourists, responsible tourism.*



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ROLE OF ECOTOURISM IN GROWTH AND DEVELOPMENT OF KASHMIR ECONOMY

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A green economy is a sustainable economy that results in improved human wellbeing and social by equity by reducing environmental risks and ecological scarcities. Ecotourism as a component of green economy is one of the fastest growing segments of tourism industry which focuses on wildlife conservation, environmental protection, poverty alleviation and capitalist development. Ecotourism is one of the sustainable green economy sectors recognised by the United Nations Environmental Programme (UNEP) as one of the success stories of sustainable and green economy in the world. It is a strategy to create sustainable economic development with conservation objectives by balancing the conflicting goals of economic development and bio diversity conservation. Ecotourism neo-liberalise nature by maintaining the relationship among state policy, local market, communities and the private sector for environmental management. Kashmir having a large potential of eco-tourism can benefit from the ecotourism through employment opportunities to the people and by providing unique and natural environments, cultures and opportunities for adventures.

Key Word Index: Green economy, Environment, Ecotourism, Kashmir.

ECOTOURISM: WASTE MANAGEMENT A HINDRANCE TO IT

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Ecotourism is more focused on ecological conservation and educating travelers on local environments and natural surroundings, ecotourism is a form of tourism, or a category of vacation similar to beach, adventure, health, or cultural, while the concept of sustainability can be applied to all types of tourism. As established by The International Ecotourism Society (TIES) in 1990, ecotourism is “Responsible travel to natural areas that conserves the environment and improves the well-being of local people.” Another widely cited definition of ecotourism is “purposeful travel to natural areas to understand the culture and natural history of the environment; taking care not to alter the integrity of the ecosystem; producing economic opportunities that make the conservation of natural resources beneficial to local people.” The fundamental differences between ecotourism and mass tourism lie in the emphasis of the prior one on the nature of tourism activities, on enhancing public awareness of environmental protection, reducing the negative impacts on the environment and increasing local residents’



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living standards. Waste handling has been a major concern, especially since improper waste treatment causes increased environmental deterioration and has led to the drastic downfall in ecotourism worldwide. Laboratory, industries and factories may disposed of in recycling, trash, laboratory glassware disposal boxes, sharps containers, or waste are usually dumped to natural ecosystems that not only degrade ecosystem but also has impeded the ecotourism. Time has come when ecotourism related community should take a note on waste management, else it will have grave consequences on it.

BIODIVERSITY CONSERVATION AND SUSTAINABLE ECO TOURISM

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Biodiversity Conservation emerges more important due to the globalize process of the world economy and also for survival of the world as a balance habitat. Biodiversity of an ecosystem is a vital issue of an economy. Soil, water, climatic condition, forest cover and biodiversity are crucial in determining the renewable resource flow of an economy. Sustainable development stresses on economic development alone with the object of conservation of environment. India is one of the twelve mega diversity country in the world. The country possesses about 8 percent of global biodiversity occupying the 10th position in terms of plant species, out of the 25 hot spots of biodiversity in the world. North- Eastern region is one of the hottest hot spots ranking 6th position among the 25 biodiversity hot spots. Ecotourism stresses on significance of conservation and welfare activities along with recreation. Many tourists assume that merely travelling to natural areas is eco-tourism. But the true meaning of eco-tourism is uniting conservation, communities and sustainable travel. Ecotourism is a form of tourism involving visiting fragile, pristine and relatively undisturbed natural areas, intended as a low impact and often small scale alternative to standard commercial tourism. Its purpose may be to generate funds for conservation of environment, to provide environmental education to the traveler to enable economic empowerment of the local dependent communities and to foster respect for various cultures.

Key Word Index: Eco-tourism, Sustainable, Biodiversity, Conservation, Commercial Tourism..

EFFICIENT RATIO ESTIMATORS FOR FINITE POPULATION MEAN IN SRSWOR USING LTS, LMS ROBUST REGRESSION TECHNIQUES

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The present study was encountered with the problem of extreme values present in the data. In that case population estimates obtained by using traditional method such as OLS (ordinary least square method) does not give precise results as this method is very sensitive to



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extreme values. Keeping in view the sensitiveness problem of OLS method, we propose some new ratio type estimators for population mean using different auxiliary information, obtain estimates through OLS and also adapted the LTS (Least trimmed squares method) and LMS (Least median of squares method) to the above proposed estimators and obtain estimates. Theoretically, we obtain the mean square error (MSE) expressions for these estimators. We compared MSE values of the proposed estimators using OLS with MSE values of same proposed estimators based on LT and LMS methods. From this comparison we observe that our proposed estimators give more efficient results by using LTS and LMS than OLS approach in case of outliers. These theoretical results are supported with the aid of a numerical example.

Key Word Index: Ratio type estimators, LTS, LMS, Ancillary information, simple random sampling, Efficiency.

ULTRASTRUCTURAL STUDY OF MAGNUM REGION IN THE OVIDUCT OF HILL FOWL OF UTTARAKHAND

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The samples were obtained from active laying hens, 6-7 months of age birds consisting of 12 hens. The mucosal folds of the magnum were broad and more voluminous as compared to other parts of the oviduct. There was no evidence of secondary folding in the magnum of local Hill fowl. The magnum was the chief albumen secreting region of oviduct and its luminal surface consisted of longitudinal mucosal folds having long ciliated cells intermingled with small non-ciliated patchy areas containing glandular crypts (pits). The glandular crypt upon magnification showed many openings of glands filled with globular secretory material. The cells encircling the glandular openings were non-ciliated but contained microvilli on their surface. The glands were elliptical in outline and varied in size. The length varied from $29.63 \pm 0.94 \mu\text{m}$ (large glands) to $5.21 \pm 0.85 \mu\text{m}$ (small glands) and width as $18.44 \pm 0.52 \mu\text{m}$ (large glands) to $3.55 \pm 0.72 \mu\text{m}$ (small glands). The glands were richly filled with globular albumen proteins. The diameter of protein molecules varied from 1.1-2.95 μm . The exocytosed glandular cells gave honey comb like appearance with tightly placed empty ghost cells.

Key Word Index: *oviduct, fowl*



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A STUDY ON ENVIRONMENTAL CONSERVATION IN ISLAMIC TEACHINGS

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The growing concern with environmental issues and their impact on general awareness is one of the most noticeable phenomena world wide. The word for religion (Deen) is found in the holy Qur'an in 90 different places, often in contexts that place it outside the purely ritual. Deen in essence describes an integrated code of behavior which deals with personal hygiene, at one end of the spectrum, to our relationships with the natural order at the other. "The creation of the heavens and the earth is far greater than the creation of mankind. But most of mankind do not know it" (Qur'an 40:56). In Islam, the earth is mentioned more than four hundred times in the Qur'an, whereas the sky and beyond are mentioned only about three hundred times. In this paper, we examine the role of religion in the environment empirically. Using data from the Kashmir valley Social Survey 2017-18, we examined the effects of religious beliefs on environmental behaviors in Kashmir. The estimation revealed that a majority of the people under study showed positive attitude towards environmental conservation but their attitude was negative. We intend to explore and share that Islam does understand the earth to be subservient to humankind. Therefore, the earth should not be administered and exploited irresponsibly. Based on the teachings and principles of Islam, one leads to a strong sense of goodness and purity of the earth. In Islam, human and environment interaction is guided by the notion of the person as a vicegerent or steward of the earth. The extensive evidence provided by the Holy Quran is indicative that the earth is an important protected element for future sustenance of the next generation and is to be a safe place to keep. It is noticed that rapid industrialization, unplanned development and unprecedented growth in population with its accompanying poverty and deprivation are recognized as being the main causes of environmental degradation, a major threat to the existence of humanity today. The rapid worsening of human environment is nothing but a disaster of values. Muslims and mankind at large are being instructed to look after the environment and not to damage it. Therefore, an Islamic way of a sustainable environmental life entails living in "peace and harmony (salam)" at individual, social as well as ecological levels. All human activities have some impact on the environment. And for that this paper will display the reconciliation of Islam and environmental sustainability through the perennial reference of the Holy Quran and the Words of holy Prophet Muhammad (pbuh). The world can no longer pay for the cost of our failures. It is time that people of all faiths unite and stand for a common cause for humanity. The Holy Qur'an and Sunnah offers a clear guidance for our future, applicable not only to the Muslims, but to every one of us, in a simple yet divine revelation penned ages ago.

Key Word Index: *Environment, Islam, Quran, Hadith, Allah, Nature, Statistics*



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ECO-TOURISM: AN OPPORTUNITY FOR WILD LIFE CONSERVATION AND LIVELIHOOD

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Eco-tourism is a form of tourism that involves visiting natural areas in the remote wilderness or rural environments, According to the definition and principles of ecotourism established by The International Ecotourism Society (TIES) in 1990, ecotourism is “Responsible travel to natural areas that conserves the environment and improves the well-being of local people.” Nature Education is also a new name for eco-tourism, which varies in accordance with the ecological setting and seasonal attribute of the site. The potential of ecotourism involving local indigenous communities for their economic up-liftment has now been recognized. Essentially it aims at the enjoyment of nature and an understanding of the ecology, without causing the least destruction to its support system, leading to economic benefits for the indigenous masses.

Eco-tourism is distinct from mass tourism. It is multi-faceted, having various intricate linkages with different forms of human activity, with domestic, regional and international characters. Eco-tourism plays an important role in the shaping of national economy. The socio-economic and ecological impact of eco-tourism is relevant to a developing country like India, and it is evolving new concepts and ideas with the time.

Key Word Index: *Ecology, Environment, Tourism, Local people, Conservation, Economy*

IMPORTANCE OF UNDERUTILIZED FRUIT CROPS IN KASHMIR

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India is the second most populous country next to china. To supply a balanced diet to its huge population is becoming a stupendous task to the scientists and planners of India. Large number of fruits, 647 species belonging to 357 genera remain as underutilized or minor fruits in India. Attempts to increase global food security face a number of complex and interlinking challenges. The need to provide food for (and also actually to feed) nine billion people will require an intensification of farming at one end of the scale, but local issues, such as nutritional and dietary diversity and the loss of traditional diets, will increasingly demand attention if any long-term form of food security is to be achieved. In addition, simply producing enough food is



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not in itself enough, but that food must be harvested, processed, and distributed and the poor must be in a position to have the purchasing power in order to access that food resource. Underutilized plant species have local or regional importance, but generally lack national recognition and appreciation. The under-utilized crops are the plant species that are traditionally used for their food, fiber, fodder, oil or medicinal properties. However, those species have under-exploited potential to ensure food security, nutrition, health, income generation and environmental services. According to the great philosopher Hippocrates. “Your Food is Your Medicine” the present food basket carries a limited number of crops, though there are many potential crops, presently underutilized. There is an urgent need to highlight the importance of these underutilized crops which have high nutritional and medicinal values. The cultivation of such crops will not only add to the food basket, but also enhance the income of the farmers; at the same time the species will be saved from becoming extinct. In the state of J and K crops like pomegranate, kiwi, quince, grapes, hazelnut, chestnut, pistachionut, Olive, pecanut, persimmon, fig and loquat are underutilized because of poor management and market interventions. Minor crop species play a very important role for allowing the rural community by reducing poverty. It is not only poor people who benefit from underutilized species. All people benefit in terms of diet, income, better maintenance of agro ecosystems, and greater use of marginal lands along with enhanced preservation of cultural identity can be shared by all the humankind.

Key Word Index: *population, genera, food security, nutrition, health, income generation environmental services*

ROLE OF MULBERRY IN KASHMIR

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Mulberry sericulture is the good source of income for majority of population of Kashmir, where plantation is available only for a restricted period of time due to its temperate belt. The dormant buds become active in March due to rise in temperature, where the final leaf plucking from the shoots for chawkie rearing starts from the first week of May at the fifth stage of rearing. The farmers cut the shoots in the first half of June making the buds active and ready for sprout within a week to grow fast during hygrothermic conditions. The onset of September decline the growth rate of both the leaves and shoots, where the defoliation starts from October and prolongs up to November depending upon the severity of cold and rainfall. The sericulture industry in the region needs to follow some measures so as to enhance the cocoon production and to meet the demands of the market.



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ROLE OF INTERNET AND SOCIAL NETWORKING IN PROMOTING TOURISM IN KASHMIR

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This research paper seeks to study the role of tourism promotion in Kashmir, in particular via the Internet and social networking. The aim of this research paper is to draw conclusions that help to know and understand this type of tourism promotion. In today's world, the internet is one of the most powerful tools throughout the world. In today's society, the internet is a major part of everyone's life, whether it is school, business, or entertainment, it has influenced us immensely. Tourism is particularly adapted to highlight the nature of the upheavals implied by the development of internet in service activities and it was one of the primal industries applying internet and electronic commerce. Internet has enabled tourism industry to broadcast tourism and travel related information to customers all around the world, in a direct, cost minimizing, and time effective way. Social media also plays a significant role in tourism promotion and helps the tourism service providers in focusing on best practices through the feedback they get from tourists and public through social media. Social media is considered to be an important strategy in order to market tourism products in Kashmir. In the tourism industry social media and internet has altered the landscape of marketing. Today most of the travelers determine their travel plans based on social media shares and reviews, thus making online customer service a crucial part of building a positive brand reputation. Emergence of social media has disrupted the traditional customer service models – for hotels and travel agencies alike.

EFFECT OF DIFFERENT PRE-TREATMENTS ON DRYING CHARACTERISTICS OF APRICOTS

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Experiments were conducted to characterize the drying behaviour of Apricots at various concentrations, soaking time and chemical treatments. The various drying models were evaluated for their suitability in characterizing the drying behaviour of Apricots. Page's model was found to be best describing the drying characteristics of Apricots. A full second order model was developed for all the response variables, and it was found that the models are significant at 1%



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level of significance. The effect of process variables was investigated at individual, linear, interactive and quadratic levels for each response. The rehydration ratio was significantly affected by all the process variables at each level except their interactions at 5% level of significance. The shrinkage percentage is found to be significantly affected at 1% level of significance with linear and individual levels of process variables, quadratic and interactive levels have non-significant effect on shrinkage percentage. The linear, quadratic and interactive levels of process variables have significant effect on mean sensory score of Overall Acceptability at 5% level of significance. The data was optimized by 'Design Expert 7.0' for all the responses. Compromise optimum levels of process variables for the responses were KMS (1), 3% (1) and 18.95 mins (-0.19). The corresponding values of the responses were 4.64, 7.00 and 15.0 respectively.

Key Word Index: *Apricots, Rehydration ratio, Shrinkage Percentage, Overall Acceptability, Optimization.*

SCAB MANAGEMENT OF “APPLE” ROSACEOUS PLANT THROUGH NON-FUNGICIDAL APPROACH: AN ALTERNATIVE STRATEGY TO FOLLOW

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Scab caused by *Venturia inaequalis* on apple host under humid and cool weather conditions is the most widespread disease, if not managed can cause extensive losses. Floral buds are first exposed to ascosporous infection and then conidia causing secondary infections are produced on all succulent plant parts throughout the season. In Kashmir scab is currently managed by fungicidal sprays from pink bud to harvest. Indiscriminate use of fungicides has increased health concerns for both farmers and consumers. In genetic method, *Vf* gene have been most frequently used in commercial cultivars for resistance sources and other genes such as *Vm*, *Vr*, *Vbj*, *Vb* and *Va*. In India, particularly Kashmir valley, cultivars such as LalAmbri, Gulshan, Shreen, Firdous, Akbar, Shalimar 1 and Shalimar 2 have been bred in the J&K state. Effects of different cultivar combinations or planting patterns on the reduction of spore lesions, have shown 79 percent reduction with three cultivar mixes within the row (Blaise and Gessler 1994) than the solid blocks or homogenous rows. We have taken three cultivars Lal Ambri, Golden Delicious, and Starkrimson from mixed orchard having parallel row pattern for evaluating the diversity of *Venturia inaequalis* in order to find the suitability of cultivar combination for management of



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scab. We have found there is high gene flow between Golden Delicious and Starkrimson ($N_m=11.55$) and less gene flow between Lal Ambri and golden delicious with high genetic differentiation ($F_{st}=0.035$), thereby mixed orchard with Golden Delicious and Lal Ambri cultivar combination is suitable for scab management and there is further need of evaluation of different cultivar combination to see the diversity of pathogen, in order to give suitable combination of cultivars for scab management. Therefore, management of apple scab may prove more sustainable and will depend on the cost effectiveness of integrated approaches as compared use of a single method.

Key Word Index: *Apple scab, diversity, mixed orchard, non fungicidal approach*

ECOTOURISM AS EMERGING FACET OF TOURISM SECTOR WITH SPECIAL REFERENCE TO J & K

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Nature has bestowed this region with natural scenic beauty and breath-taking places so we are at advantage to be benefitted by this sector, tourism is already added a lot to the domestic product of state ecotourism will add on it. Ecotourism can be defined as the travel of natural areas, which can conserve the environment and can also improve the wellbeing of the local people. People are today more conscious about undertaking ecotourism and their main aim is to ensure environmental safety. This type of tourism involves different forms of visiting natural areas, located in a rural environment or remote wilderness. Day by day people are getting acquainted with the importance and contribution of natural environment in our daily life hence attention towards it is also increasing. Natural resource management can be utilized as a specialized tool for the development of ecotourism. There are several places throughout the world where a number of natural resources are abundant. But, with human encroachment and habitats, these resources are depleting. Without the sustainable use of certain resources, they are destroyed, and floral and faunal species are becoming extinct. Ecotourism programs can be introduced for the conservation of these resources. Several plans and proper management programs can be introduced so that these resources remain untouched. Several organizations, NGO's, and scientists are working on this field. Ecotourism is sensitive to local culture; it empowers local communities, minimizes environmental impact, and preserves endangered animals.

Key Word Index: *Ecotourism, sustainable, conservation.*



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PERIPHYTONIC DIVERSITY IN RELATION TO WATER QUALITY OF RIVER SONG IN DOON VALLEY

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During the last few decades there has been an increasing demand for monitoring water quality of many rivers by regular measurement of various water quality variables. River Song in Uttarakhand requires the same qualitative and quantitative approach of monitoring for predicting the steady state water quality condition. The present study was carried out for a period of six month on monthly basis from December 2011 to May 2012 for physico-chemical and biological parameters of river Song at S1, S2, S3 and S4 in Doon valley (Dehradun) Uttarakhand India. The influence of physico-chemical parameter of song river and its biological diversity revealed that the quality of water has been slightly deteriorated showing of fairly good diversity with phytoplankton followed by zooplankton and macro benthos (Phytoplankton > Zooplankton > Macro benthos) in the result I found that in phytoplankton Chlorophyceae was dominated followed by Bacillariophyceae, Diptophyceae, Myxophyceae and then Xanthophyceae. Correlations between hydrological attribute and biological diversity was good to some extent; however the condition of hydrological attributes had a great effect on biotic diversity of River Song. In the present study biological diversity was found highest at S1 and lowest at S3 showing a general and irregular trend from S1 to S4 as (S1>S4>S2>S3). Other parameter used for the analysis of water quality in relation to periphytonic diversity were BOD, COD, PH, Turbidity, Softness and hardness. The result shows that as the S1 is steep that mean water flow is high so BOD is low and rich in periphytonic diversity as compare to S3 and S4 which is plain and water flow is slow so BOD is high and periphytonic diversity is low BOD and COD is high due to anthropogenic activities. The current prevailing condition of physico-chemical parameter of River Song and aquatic diversity besides acting as potential bio indicators of trophic status require the management strategies for the conservation of River Song in Doon valley.

Key Word Index: *Periphytonic diversity, Water quality, Doon Valley, river Song*

PESTICIDES: LOVE TO HATE AND BIOREMEDIATION POSSIBILITIES – A REVIEW

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Pesticides, the chemical compounds manufactured for the pest control has offered significant economic benefits by improving the production and yield of crops and the prevention of vector borne diseases. The earliest use of chemicals for the pest control can be traced back to the 14th century when elemental sulphur was used. Later a number of natural chemical



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derivatives were used as pesticides. At present about 2.5 billion tons of pesticides are manufactured and used annually. India, the second largest producer of pesticides in Asia, accounts for approximately 3% of total pesticide consumption in the world figuring 41822 MT in 2009 – 2010. The use of pesticides in Agriculture and Horticulture accounts about 67% of the total Indian pesticide consumption. Pesticide consumption pattern in India is quite different from that of the rest of the world with Insecticides accounting for the largest consumption rate at app.76%, followed by Herbicides (10%) and Fungicides (13%). The use-intensity of pesticides application is highest in the state of Jammu & Kashmir with an average level of 2.337 kg/ha, followed by Punjab (1.377kg/ha) and Haryana (1.151 kg/ha). Although pesticides are generally profitable in agriculture but the unchecked use of these chemicals under the notion, “if little is good, a lot more will be better” has played havoc by adversely affecting human and other life forms and the environment (air, water and soil). According to the US data 18% of all the insecticides and 90% of all the fungicides are carcinogenic. Various studies have shown that the farm workers and pesticide applicators, which are often exposed to pesticides, are at higher risks of certain types of cancers. Studies have also linked pesticides with reproductive effects like testicular dysfunction or sterility. According to the report of WHO and UNEP around 200,000 people die and around three million people are poisoned each year by the use of pesticides all over the world. The conventional techniques in the treatment of pesticide polluted sites prove to be effective but their negative effects nullify their overall positive effects. In this regard, bioremediation is an effective, eco- friendly and innovative solution for the pesticide pollution abatement.

Key word Index: *Pesticide, Agriculture, Environment, Carcinogen, Sterility, Poisoned, Bioremediation.*

NEED FOR CONSERVATION OF MULBERRY GENETICS

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Mulberry is a highly heterozygous perennial tree with high biomass production and its protein rich foliage is used extensively for sericultural, pharmaceutical, agroforestry and horticulture programmes. In India, rich *Morus* diversity exists both under natural and managed habitats, which flourish well in on-farm conservation procedures promoting more than 0.6 million families of farmer/tribal livelihood development while conserving *Morus* biodiversity. In recent times, seri-biodiversity is greatly threatened because of unlawful habitat destruction, natural calamities, fragmentation of forests, global climatic changes and social disruption and this large scale genetic wipeout disturbs the coexistence of sericigenous flora and fauna. With the



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great deal of diversity in mulberry, it becomes difficult to carry studies on spot regarding effect of different edaphic factors on the expression of genotypic characters for adjusting the variation. The conservation of mulberry genetics is a priority area for ensuring sustainable development and strengthening of sericulture industry. A wide spectrum of activities ranging from acquisition, characterization, conservation and evaluation for useful traits deals with mulberry germplasm conservation. Better information on the genetic make up of germplasm accessions enables better management and utilization of mulberry genetic resources.

AGGREGATE ASSOCIATED AND MINERALIZABLE CARBON UNDER DIFFERENT AGRICULTURAL LAND USE SYSTEMS OF CENTRAL KASHMIR, INDIA

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The investigation was carried during 2016-17 in soils of central Kashmir; two districts (Ganderbal and Srinagar) and four land-use systems (crop land, agro-forestry, grassland and forestry) were selected to study the effect of land-use on soil carbon sequestration. Under different land-use systems, macro-aggregate associated C in the soils of Ganderbal and Srinagar varied from 173.0 to 7378.2 and 706.3 to 10203 mg kg⁻¹, respectively, and micro-aggregate associated C ranged from 986.9 to 2123.6 and 2549.7 to 5065.0 mg kg⁻¹, respectively. Macro-aggregates were richer in aggregate associated carbon at both the locations as compared to micro-aggregates. The proportion of macroaggregates (0.25 to 2 mm) and associated C was higher in grassland and proportion of microaggregates (0.1-0.25 mm) and associated C was higher in agro-forestry, in soils of Ganderbal, and in Srinagar, among the different land-uses, the macro-aggregate (0.25 to 2mm) proportion and associated C was higher in grassland, and the proportion of micro-aggregates (<0.25 mm), and associated C was higher in agro-forestry followed by forestry, cropland and grassland. The cumulative carbon mineralized (C_{min}) in 43 days of incubation under different land-use systems of Ganderbal and Srinagar, respectively, ranged from 133.4 to 548.6 and 142.8 to 885.8 mg kg⁻¹ of soil. Amount of C was mineralized was highest in the grassland followed by forestry at Ganderbal, and the agro-forestry followed by forestry at Srinagar. Therefore land-use change has great potential to sequester carbon and thus change from cropland to forest or grassland has a high global C sequestration rate.

Key word Index: *land use, Aggregation, Carbon sequestration, Soil organic carbon, Mineralizable carbon.*



DETERMINATION OF SIZE OF SAMPLE FOR STATISTICAL ANALYSIS

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The aim of sample size determination is to determine an adequate sample size which can estimate results for the whole population with a good precision. The inference to be drawn is related to some parameters of the population such as the mean, standard deviation or some other features like the proportion of an attribute occurring in the population. Parameter is a descriptive measure of some characteristics of the population whereas if the descriptive measure is computed from the observations in the sample it is called a statistic. Parameter is constant for a population, but the corresponding statistic may vary from sample to sample. Statistical inference generally adopts one of the two techniques, namely, the estimation of population parameters or testing of a hypothesis. The process of obtaining an estimate of the unknown value of a parameter by a statistic is known as estimation. There are two types of estimations viz. point estimation and interval estimation. If the inference about the population is to be drawn on the basis of the sample, the sample must conform to certain criteria: the sample must be representative of the whole population. The computation of the appropriate sample size is generally considered to be one of the most important steps in statistical study. The sample size computation must be done appropriately because if the sample size is not appropriate for a particular study then the inference drawn from the sample will not be authentic and it might lead to some wrong conclusions.

Key word Index: *Sample Size, Computation, Inference, Sample and Population.*

USE OF NON PARAMETRIC TESTS IN MEDICAL SCIENCES

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Conventional statistical tests are usually called parametric tests. Parametric tests are used more frequently than nonparametric tests in many medical articles, because most of the medical researchers are familiar with and the statistical software packages strongly support parametric tests. Parametric tests require important assumption; assumption of normality which means that distribution of sample means is normally distributed. However, parametric test can be misleading when this assumption is not satisfied. In this circumstance, nonparametric tests are the alternative methods available, because they do not required the normality assumption. Nonparametric tests are the statistical methods based on signs and ranks. Many researcher's had discussed about the basic concepts and practical use of nonparametric tests for the guide to the proper use.



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Nonparametric statistical analysis greatly differs from parametric statistical analysis in that it only uses + or – signs or the rank of data sizes instead of the original values of the data. In other words, nonparametric analysis focuses on the order of the data size rather than on the value of the data percentage.

Key Word Index: *Data interpretation, Investigative technique, Non-parametric statistics, Statistical data analysis.*

PHENOLOGICAL PROPERTIES OF SOME EUROPEAN AND JAPANESE PLUM CULTIVARS GROWN UNDER TEMPERATE CONDITIONS OF KASHMIR

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Plums are by far the most diverse of all the *Prunus* species and could be the most diverse of all deciduous fruit crop species which belongs to genus *Prunus* of sub family Prunoideae (Amygdaloideae) and family Rosaceae. It ranks next to peaches in economic importance. Jammu & Kashmir, with the yearly production of 10,112 MT of plums is one of the most important plum producers in the world. This study was carried out to evaluate the phenological traits of different plum cultivars under Kashmir conditions. The purpose of this study was to determine the phenological characteristics of some plum cultivars that have economic importance in Kashmir and also to enable proper selection of cultivars for commercial cultivation in this area. The experiment was conducted in SKUAST-K from 2016-17 to determine the phenological characteristics of seven plum cultivars viz. Burbank, Stanley, Friar, Wickson, New Plum, Santa Rosa and Satsuma. In the experimental years, swollen bud, bud burst, green cluster, white bud, bloom, petal fall and fruit set were determined. The data recorded revealed that the swollen bud and bud burst stage was recorded first in cultivars Friar and Satsuma on 23rd Feb and 29th Feb and late in cultivar Stanley on 5th March and 25th March, respectively. The early date of green cluster was observed in cultivar Friar (13th March), while the early date (25th March) of white bud was recorded in cultivar Friar and Satsuma. The early date of initial bloom, final bloom and petal fall was recorded in cultivars Friar and Satsuma on 27th March, 31st March and 8th April and late in cultivar Stanley on 12, 17 and 21st April, respectively. The study concluded on the note that cultivars Friar and Satsuma were earliest to bloom and Stanley was late to bloom.

Key Word Index: *Plum, cultivars, phenological characteristics, Jammu & Kashmir*



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AROMATIC LANDRACE OF JAPONICA RICE *MUSHK BUDJI* POSSESSES AN 8 BP DELETION IN EXON 7 OF *BADH2*, A GENE VITAL FOR AROMA DEVELOPMENT

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Aroma trait imparts speciality to the rice and increases its demand in market. Genotypes of aromatic rice have been reported to possess a truncated version of betaine aldehyde dehydrogenase gene (*badh2*) located on chromosome no 8, which causes the production of aroma. Kashmir varieties need to be screened for the presence of variants of this fragrance imparting gene *badh2* for use in crop improvement programmes. In present study 10 genotypes of rice grown locally in Kashmir including special rice of Kashmir i.e Mushk Budji were assessed for allelic variants of exon 7 of *badh2* gene. Based on previous studies, primers were designed that targeted 8 bp deletion in exon 7 of *badh2* gene and amplified a fragment of 95 bp in aromatic rice varieties and 103 bp fragment in non-aromatic varieties. To validate the results 463 bp region covering the target deletion was amplified by another set of primers (*OsBadh2*) and subsequently the bands were eluted and got sequenced by Sanger method. Software program Clustal W was used for creating multiple sequence alignment in the region of interest. The analysis showed presence of a deletion of 8 bps “GATTATGG” and three SNPs were in exon 7 of aromatic rice genotypes which could be the possible reason of truncated betaine aldehyde dehydrogenase enzyme and subsequently aroma. No such deletion was found in non-aromatic rice varieties. Hence functional markers for *badh2* allele were validated in all accessions of Mushk-budji, Pusa sugandh-3 and Basmati 1509 (aromatic varieties) which can facilitate development of fragrant rice varieties through MAS. Surprisingly aroma was not detected in a so-called accession claimed to be Kamad which had been collected from a farmer’s field in year 2009. This so called Kamad didn’t show any aroma in the fragrance test of Berner and Hoff and same was corroborated by evidence from PCR results and sequencing. It doesn’t possess the 8 bp deletion! The reason could be that the concerned farmer was growing a mixture of aromatic and non aromatic genotypes in his field, and his claim was wrong.

Key Word Index: *Oryza sativa L., Mushk budji, Aroma, Sequencing , Functional markers*

ETHNOGRAPHIC ART FOR DISPLAY OF MULBERRY PLANTATION FOR RENEWING TOURISM IN KASHMIR

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In present politico-economic conditions of Kashmir there is a retrogressive state of tourism, instilling a need of re-formulating and re-modeling the percept of tourism as a natural way of touring for recreation to contextualized display of natural art in ethnographic way of exhibition. The philosophy of manifestation of nature via art inherits an ideological dimension to



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aesthetics, making it comprehensible, attractive and representable in forms liked by different individuals or tourists. In present study, this new way of 'exhibited tourism' is applied on mulberry plantation, modeling a scientific, philosophically driven systematic and integrated way for tourism in an ethnographic way, connecting fragments of culture, value, ethnicity and traditional history of Kashmir. The multi-stages evolution of mulberry tree along with life cycle of silkworm reflects their well suitability for initiating the new hybrid way for renewing tourism via mulberry plantation. It is a way of representing artistic cultivation in a well scientific and systematic manner. The excessive mulberry plantation on roadsides, bunds, uncultivated areas and other leftover patches will not only increase the magnitude of silkworm rearing resulting in augmenting the income of stakeholders associated with the industry but at the same time it will eventuate in adding more glamour to the splendor and scenic beauty of our valley. The improvement in forest cover besides cleaning the air we breathe will be an added advantage and thus the exercise will serve the purpose of individuals in multifarious ways and serve as a prelude for boosting ecotourism.

Key Word Index: *Ethnography, Mulberry Plantation, Tourism.*

ON BREEDING BIOLOGY OF BLACK CROWNED NIGHT HERON (*NYCTICORAX NYCTICORAX*) IN HAIGAM WETLAND, KASHMIR

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Nesting biology of black crowned night heron (*Nycticorax nycticorax*), a resident bird in the wetlands and other water bodies of the valley was observed in the breeding season of 2015 in Haigam Wetland, Kashmir. Detailed investigations on nesting sites, nesting materials, clutch size, egg dimensions, incubation period, hatching success, fledging success and nesting success were carried out through direct observations in the field. Nest site selection was initiated in April in willow plantations. Nests were bowl shaped made of dried willow twigs. Average inner and outer diameter of nests was 17.25 and 15.04 cm respectively with average depth of 7.31 cm (N=15). Average clutch size of black crowned night heron was 3.85 ± 0.59 eggs per nest and mean egg dimensions were 48.59mm x 31.71mm (N=37). Average volume of the eggs was $27.80 \pm 1.92 \text{ cm}^3$ and shape index of 65.57 ± 5.02 . Both sexes incubated eggs and the mean incubation period was 23.18 ± 1.12 days. Hatching was asynchronous. The hatching, nesting and fledging success were 67.56 %, 80.08 % and 76.92 % respectively and using Mayfield method it was calculated as 49.06%, 57.95% and 60.50% for Hatching, fledging and nesting success respectively.

Key Word Index: *clutch size, Haigam, incubation, hatching, fledging, nests.*



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ECO TOURISM IN INDIA

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Ecotourism is defined as "Responsible travel to natural areas that conserves environment and improves well-being of local people." (The International Ecotourism Society, 2015). Ecotourism is entirely a new approach in tourism. Ecotourism is a preserving travel to natural areas to appreciate the cultural and natural history of the environment, taking care not to disturb the integrity of the ecosystem, while creating economic opportunities that make conservation and protection of natural resources advantageous to the local people. In short, ecotourism can be categorised as a tourism programme that is - "Nature based, ecologically sustainable, Where education and interpretation is a major constituent and Where local people are benefited." All this together can be called ecotourism. If a travel does not satisfy any one of these constituents, then it is not called a real ecotourism venture.

The Concern for Ecotourism: Since ages, nature worship and the conservation ethics have been an inseparable part of Indian thought and traditions. Traces go back to ancient civilisations of India, when people used to nurture the philosophy of the oneness of life. The Indian tradition has always taught that, humankind is a part of nature and one should look upon all creation with the eyes of a love and respect. It is tragic that since last few decades, the mad quest for the material end and economical progress in India and abroad has become identical with the exploitation of nature in all its appearances. Today, the entire world is facing a deep crisis and is in the danger of being doomed. The rich forest areas and biological diversities have been relentlessly divested to erect concrete walls. The continuous denuding of forest reserves has led to Global Warming and Greenhouse Effects. Fortunately, this has led to some realisation, and now the world has awoken for new beginnings about human responsibility towards nature.

India, the land of varied geography offers several tourist destinations that not just de-stress but also rejuvenate you. There are several ways to enjoy Mother Nature in most pristine way. The few places like the Himalayan Region, Kerala, the northeast India, Andaman & Nicobar Islands and the Lakshadweep islands are some of the places where you can enjoy the treasured wealth of the Mother Nature. Thenmala in Kerala is the first planned ecotourism destination in India created to cater to the Eco-tourists and nature lovers. The India topography boasts an abundant source of flora & fauna. India has numerous rare and endangered species in its surroundings. The declaration of several wildlife areas and national parks has encouraged the growth of the wildlife resource, which reduced due to the wildlife hunt by several kings in the past. Today, India has many wildlife sanctuaries and protection laws. Currently, there are about 80 national parks and 441 sanctuaries in India, which works for the protection and conservation of wildlife resource in India. There are numerous Botanical and Zoological Gardens in India, which are working towards the enhancement of the Ecosystem. Poaching has stopped to large extent. There are severe punishments for poachers, hunters and illegal traders of animals and trees. Tree plantation is taking place in several places. There are



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several animal & plant rights organisation, who fight for the rights of the animals and plants. Numerous organisations and NGOs are coming forward to provide environmental education to the common people at the grass root level.

Key Word Index: *Ecosystem, Eco Tourism, Environment, India, Nature*

BIODIVERSITY OF VEGETABLE CROPS AND THEIR CONSERVATION

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The biodiversity in vegetable crops is composed by the genetic diversity, as species diversity (interspecific diversity) and as diversity of genes within a species (intraspecific diversity) referring to the vegetable grown varieties and by the diversity of agro-ecosystems (agro-biodiversity). Intraspecific diversity is very ample in vegetable crops and is not reflected, at least not to the same extent, in other group of crops. Today this biodiversity meets and stimulates the various requirements of the market (in terms of new types of product, quality standards and rediscovery of traditions), of the production sector (in terms of plants more adaptable to climate change, new cultivation methods and cultivation environments or biotic stresses) as well as needs of the processing industry and of modern distribution. Biodiversity, conservation and genetic resources are triple buzzwords that have come to assume significant position in most biological and environmental science fora of recent times. Diversity rich ecosystems possess greater resilience and are able to recover and adapt more readily from natural calamities and or human-induced habitat degradation. Horticultural biodiversity can be conserved through seed storage, in field, gene banks, through cryopreservation and other methods like collection of DNAs in DNA libraries.

MATURATION AND SPAWNING OF THE RAINBOW TROUT *ONCORHYNCHUS MYKISS* WALBAUM, 1792 (SALMONIFORMES: SALMONIDAE) FROM KASHMIR

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In present study, maturation and spawning season of rainbow trout *O. mykiss* was studied between August 2015 to January 2016 from three trout rearing farms namely Dachigam Trout Farm, Mammam Trout Farm and Achabal Trout Farm. The data collected was analysed statistically using standard statistical techniques. The maximum ova diameter was observed during spawning phase (6.01mm) and minimum ova diameter was obtained during resting phase



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(1.19mm). The ova diameter analysis of *O. mykiss* (pooled and site-wise) revealed a significant difference with a p value <0.05 , with the considerable increase in ova diameter frequency (pooled and site-wise). The results of GSI for the pooled data revealed maximum value of 15.05% in December and minimum value of 1.60% in August. The gonadosomatic index (site-wise) revealed maximum value of 21.39% at Dachigam in January.

Key Word Index: *Maturation, Trout Farms, Oncorhynchus mykiss, Statistics*

ENCOURAGING EXISTENTIAL TOURISM VIA ETHNOGRAPHIC DISPLAY OF MULBERRY PLANTATION IN KASHMIR

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Existential Tourism is concerned with the search of absolute that model beauty in the forms of truth, transcendence and freedom. It's an attempt of understanding the ideal interpretation of any form. The interchange between natural plantation to a contextualized display of culture or heritage can be well actualized via mulberry plantation in an ethnographic manner, where beauty realizes an artistic way of manifestation of heritage. There is an artistic way of increasing the Diaspora of Jewish heritage via ethnographic contexts. Based on this formalism we can model mulberry plantation along with silkworm rearing as a tool to encourage existential tourism in Kashmir. This hierarchical methodology can be implemented in a stepwise manner on an isolated land at different places in a manner resembling a conserved area for wildlife. Pertinently has a direct effect on the population of the area in terms on recognition of heritage and cultural life in a natural way. Though it seems very abstract but with the introduction of postmodern values in population the trend to attract tourism needs to be improvised towards existentialistic tourism utilizing ethnography.

Key Word Index: *Ethnography, Existential Tourism, Mulberry Plantation, Tourism.*

EFFECT OF PRIMING TREATMENTS ON SEED STORABILITY OF PARSLEY

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A lab experiment was conducted at the division of Basic Sciences and Humanities, Faculty of Horticulture, SKUAST-K, Shalimar to determine the storage potential of parsley seeds following various priming treatments. Freshly harvest and uniform seeds of parsley (Curly type) were subjected to various priming treatments viz. i. Hydropriming, ii. vermicpriming and osmopriming. Unprimed seeds from the same lot was taken as control. Sufficient quantity of seeds were soaked in distilled water (24 hours), 2x diluted vermin wash (24 hours) and -1.5 MPa



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solution of PEG6000 (36 hours) and kept at 25°C in a incubator. After the given period of time seed were removed from the solution and kept for drying under shade to achieve the original moisture content (9.0 percent). The primed seeds were wrapped in aluminum foil and stored in a incubator at 25°C and 70% RH for six months. Various germination attributes like germination percent, germination index, germination energy, shoot/root ration, seedling vigour index were recorded in seed germinator at 25°C and 70% RH at monthly intervals. Data indicated that various priming treatments improved the germination potential of parsley seeds compared to control and osmoprimed seeds showed better results followed by vermicpriming and hydropriming. There was decrease in the germinability of seeds with passage of time but primed seeds still showed better germination potential over control even after six month.

HIRPORA WILD LIFE SANCTUARY UNDER CONSTANT THREAT OF CATTLE GRAZING

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Excessive overgrazing by cattle and sheep is constantly being observed in the premises of Hirpora wildlife sanctuary in Shopian district of south Kashmir. Thousands of domestic animals have been found grazing in the sanctuary which disturbs the food and shelter of some wild animals like Himalayan brown bear, Himalayan black bear, the musk deer and endangered pir panjal markhor. Besides disturbing their habitat, the domestic animals have also been found to spread some infectious disease to the wild animals within the wildlife sanctuary. Some of the GIT parasites get transmitted by grazing in the same habitat which affect the wellbeing of these animals by making them weak and susceptible to other diseases as well. This has posed a great threat to these endangered animals which are present in the wildlife sanctuary. The grazing has disturbed the habitat to the extent that the wild animals have shifted towards the higher reaches of the wild life sanctuary and are difficult to sight them in the low lying areas which they used earlier as there feeding and breeding grounds.

Key Word Index: *Parasites, wild animals, markhor, endangered, brown bear.*

EFFECT OF SUCROSE AND SILVERTHIOSULPHATE PULSING ON THE VASE LIFE AND POSTHARVEST QUALITY OF CUT FLOWERS OF *SALVIA SPLENDANS*

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Salvia splendans (Scarlet sage) is one of the most commonly grown ornamental *Salvia* species. It is commonly cultivated as a bedding and container plant, because of its profuse flowering with beautiful terminal racemes that last from early summer to late fall. When used as cut flower, flowers wither and abscise quickly after harvest. It is in this context that the present



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study was conducted to enhance the vase life and improve the postharvest quality of its cut flowers. A series of experiments were conducted to study the effect of various chemical treatments, given either as vase or pulsing solutions, on the post-harvest life and quality of its cut stalks. Stalks were harvested at 0900 hrs. in the morning; the cut ends were immediately dipped in distilled water; transferred to laboratory where they were recut to a uniform length and held in following vase solutions: Distilled water (Controls); Sucrose (0.01M, 0.025M, 0.03M, 0.05M, 0.10M and 0.20M); 8-Hydroxyquinoline Sulphate (8-HQS) (0.5mM); Sucrose+8-HQS and Ethanol (5% and 10%). Pulsing with Sucrose and Silverthiosulphate (STS) separately or in combination was also given. In control, average vase life was only 4.3 days. Sucrose (at lower concentrations) alone or in combination with 8-HQS and STS pulse significantly prolonged vase life and improved quality of cut stalks as compared to control. STS-pulsed stalks held in Sucrose+8-HQS lasted longest (12 days). The present study suggests that Sucrose+8-HQS after STS pulsing can serve as an effective treatment for the enhancement of vase life and postharvest quality of cut flowers of *Salvia splendans*.

Key Word Index: Abscission; Cut flowers; 8-Hydroxyquinoline Sulphate; Postharvest, *Salvia splendans*; Silverthiosulphate; Stalks; Sucrose; Vase Life.

IMPACT OF ECO TOURISM ON TOURISM INDUSTRY OF KASHMIR

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Ecotourism an important branch of the tourism industry is vulnerable to the consequences of global climate change. Kashmir, known as 'paradise on earth', attracts hundreds and thousands of tourists every year but lot of environmental problems have arisen mainly because of over influx of tourists at certain places like Pahalgam, Gulmarg and Dal Lake. Tourism on other hand is one of the world's fastest growing industries as well as the major source of foreign exchange earnings and employment for many developing countries, and it is increasingly focusing on natural environments. However, tourism is a double-edged activity. It has the potential to contribute in a positive manner to socio-economic achievements but, at the same time, its fast and sometimes uncontrolled growth can be the major cause of degradation of the environment and loss of local identity and traditional cultures. Biological and physical resources are in fact the assets that attract tourists. However, the stress imposed by tourism activities on fragile ecosystems accelerates and aggravates their depletion. Tourism industry in Kashmir is growing and it has vast potential for generating employment and earning large amount of foreign exchange besides giving a flip to the State's overall economic and social development. Eco-tourism needs to be promoted so that tourism in Kashmir helps in preserving and sustaining the diversity of the Kashmir's natural and cultural environments.

Key Word Index: *Eco-tourism, Environment, Tourism, Ecosystem, Kashmir.*



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THE STUDY DURING THE THREE SEASONS (PRE-SPAWNING, SPAWNING AND POST-SPAWNING PERIODS) ON HAEMATOLOGICAL PARAMETERS AND GSI OF *SCHIZOTHORAX NIGER* HECKEL IN DAL LAKE, KASHMIR

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The present study was conducted to investigate changes in haematological parameters and GSI of *Schizothorax niger* Heckel during pre-spawning, spawning and post-spawning period in Dal Lake, Kashmir from November, 2014 to July, 2015. Fishes ranging in length from 75-374mm and in weight from 56-557g were taken during the study. The mean values of haemoglobin, RBC, WBC, PCV, MCV, MCH, ESR, and GSI were recorded as 6.45 g/dl, $2.34 \times 10^6/\text{mm}^3$, $4.36 \times 10^4/\text{mm}^3$, 29.86%, $130.68 \mu\text{m}^3$, 27.78 μg , 3.49 mm/hr and 2.02 respectively of the fish during pre-spawning period. During spawning period the mean value of haemoglobin, RBC, WBC, PCV, MCV, MCH, ESR, GSI, Absolute fecundity and Relative fecundity were recorded as 4.57 g/dl, $2.35 \times 10^6/\text{mm}^3$, $7.44 \times 10^4/\text{mm}^3$, 23.66%, $107.06 \mu\text{m}^3$, 20.26 μg , 1.58 mm/hr, 20.37, 21981 and 109 respectively. During post-spawning period the mean value of haemoglobin, RBC, WBC, PCV, MCV, MCH, ESR and GSI were recorded as 6.19 g/dl, $2.56 \times 10^6/\text{mm}^3$, $5.26 \times 10^4/\text{mm}^3$, 26.86%, $107.60 \mu\text{m}^3$, 23.6 μg , 4.06 mm/hr and 1.43 respectively.

Hb, PCV, ESR and MCH, MCV were found low in fish during spawning period as compared to pre-spawning and post-spawning periods and other parameter such as TLC, Lymphocyte and Neutrophil were found significantly higher in fish during spawning period as compared to pre-spawning and post-spawning periods. Maximum Gonadosomatic Index (GSI) in *Schizothorax niger* Heckel were recorded in March, i.e. during spawning period (mean value of 20.37 in females). The GSI then started decreasing gradually and was recorded minimum in July (mean value of 1.43 in females). Thus the peak breeding season of the fish during the present study was found in March. Absolute Fecundity and Relative Fecundity of *S. niger* were recorded with mean values of 21981 and 109 respectively.

Key Word Index: *Schizothorax niger*, Dal Lake, Haematological parameters, GSI, Kashmir Valley.



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ECOLOGY AND ECOTOURISM IN KASHMIR

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In present era of development and globalisation, ecotourism has emerged as one of the fastest-growing sectors of the tourism industry throughout the globe. Ecotourism can integrate conservation of biodiversity with socio-economic development of local communities in Kashmir valley. Due to the introduction of ecotourism ecology of Kashmir has been saved and conserved up to a great extent. The people with active consciousness can play a lead role in preserving ecology by providing certain knowledge and capacity building orientation to them. Due to unregistered inflow of tourists every year to various pilgrimage sites and other tourist destinations, number of environmental problems have arisen. Thus, it is high time to understand the tourism of Kashmir through the prism of ecotourism and sustainable development, and also how ecotourism can be used for the protection of ecological diversity of Kashmir.

Key Word Index: *Conservation, Ecological Diversity, Ecotourism, Biodiversity, Sustainable Development.*

ORGANIC FARMING AS AN ALTERNATIVE TO CHEMICAL FERTILIZERS

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Due to haphazard and increased use of pesticides and other chemical fertilizers every component of an environment got affected. Application of chemical fertilizers and pesticides in agricultural or horticultural sector has tremendously degraded soil health and crop quality. In environmentally conscious world use of food products produced through application of different chemical fertilizers are considered as problem, while as foods produced through organic farming are gaining much preference. Different life-threatening diseases are caused by consumption of food products produced by the use of herbicides, pesticides and other chemical fertilizers. It is evident that use of dangerous and persistent chemicals has spoiled fertility of soil and have affected directly microbial flora of soil. Presently multiple inorganic fertilizers are being ruthlessly applied in different crops. To get rid from such health and soil spoiling agents, adaptation of organic farming and application of different bio-fertilizers is the best alternative. In the world of microorganisms, number of microbes possesses high potential to produce different bio-products and act as eco-friendly agent in agriculture and horticulture sector. Bio-control



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agents (e.g, *Trichoderma* sp., *Pseudomonas* sp.), bio-solubilizers (Potassium, Zinc, Phosphorus Solubilizing Bacteria etc.), VesicularArbuscularMycorrhizal fungi (VAM) are efficiently used in disease management and nutrient management. Several bacterial and fungal genera have shown their potential as bio-control for different soil borne diseases. To avoid use of harsh chemicals for disease and nutrient management an alternative and effective farmer friendly technology must be adapted.Organic farming is known asfarmer-friendly technology and can be implemented in farmer's field. These procedures will provide quality food products and keep soil health and nutrient rich.

Key Word Index: *Chemical fertilizers, Organic farming, Bio-control agents, Microorganisms.*

PROTECTIVE EFFECT OF ZINGERONE IN LEAD-INDUCED HEPATO AND NEPHRO TOXICITIES IN WISTAR RATS

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Lead (Pb) toxicity affects both humans and animals mainly by derangement of antioxidant enzyme system and ALAD. Zingerone is a bioactive compound present in dried ginger and possesses numerous pharmacological properties. In this study, our aim was to find that how zingerone treatment can help to alleviate toxic effects of lead on liver and kidney in wistar rats. Five groups of animals were made with each group comprising of 6 animals namely, control group, lead alone group (Pb @ 25 mg/kg b.wt. i.p., on day 7, 14 and 21 of the study period) and Zin + Pb group. In Zin + Pb groups, three doses of treatment with Zin were given: 50, 100 and 150 mg/kg b.w from day 1 to 28. ALAD activity was determined in liver and kidneys homogenate. Liver and kidney function parameters were analyzed in serum along with lipid profile. Oxidative stress was analyzed by estimating lipid peroxidation and antioxidant enzyme activities in liver and kidney homogenates. Zingerone pretreatment of 150mg/kg b.w. significantly restores ALAD activity in liver and kidney tissue. Liver and kidney specific parameters were also normalized by zingerone pretreatment significantly. Furthermore, zingerone significantly restored antioxidative profile preventing oxidative damage in liver and kidneys. Our results suggest that there is protective role of zingerone especially at 150mg/kg b.w. against lead- induced toxicity in liver and kidneys. The findings revealed that zingerone pretreatment increased ALAD activity, normalized the increased liver and kidneys function parameters, reduced lipid peroxidation and increased activity of antioxidant enzymes. The histological observations support with the biochemical findings. The results suggest that zingerone may be a potential drug for prevention of lead intoxication in animals.

Key Word Index: Zingerone, Lead, Oxidative stress, Hepatotoxicity, Nephrotoxicity



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MISTLETOE-A PARASITIC PLANT FOR DECORATION AND MEDICINAL PURPOSES.

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Mistletoe is partially parasitic, growing on several woody hosts (trees and shrubs) in a variety of wooded habitats, extending from the tropics to temperate regions. Mistletoe is well-known for its waxy white berries and in Europe is strongly associated with Christmas. It is highly sought after for use as a winter decoration and there is a long held tradition of kissing underneath bunches of Mistletoe. Many workers have reported that Mistletoe has physiological, anti-cancer, anti-viral and immuno-stimulatory properties. The most thoroughly investigated compounds are the mistletoe lectins (ML I, II, and III), low-molecular- weight proteins, oligosaccharides, flavonoids, vesicles and triterpene acids. In silkworm, Mistletoe has been found to extend the life span. The efficacy of Mistletoe extract was checked by applying three different concentrations of Mistletoe viz., 1.0%, 1.5% and 2.0% on mulberry leaf and given once daily as first feed @60 ml/200g for 100 larvae. Before feeding the silkworm with Mistletoe extract, the worms were inoculated with *BmNPV* @ 1×10^6 Polyhedra/ml. The maximum larval weight of 44.64 g, cocoon yield by number of 9080, cocoon yield by weight of 15.65 kg, pupation rate of 95.37%, single cocoon weight of 1.724g, single shell weight of 0.330 g and shell ratio of 19.20% were recorded when silkworms were given mulberry leaf containing 1.5% concentration of Mistletoe. Further, at this concentration, Mistletoe reduced larval mortality by 92% and Pupal mortality by 77.89% with respect to inoculated control.

Key Word Index: *Mistletoe, Decoration, Flavonoids, Parasitic.*

ROLE OF ECOTOURISM IN SUSTAINABLE DEVELOPMENT

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Ecotourism is a sub-component of the field of sustainable tourism. Ecotourism's perceived potential as an effective tool for sustainable development is the main reason why developing countries are now embracing it and including it in their economic development and conservation strategies. Ecotourism, as an alternative tourism, involves visiting natural areas in order to learn, to study, or to carry out activities environmentally friendly, that is, a tourism based on the nature



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experience, which enables the economic and social development of local communities. It focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artifacts from the locality. Ecotourism, natural resources, cultural heritage, rural lifestyle and an integrated tourism is a type of local economic activities. Its aim is to conserve resources, especially biological diversity, and maintain sustainable use of resources, which brings ecological experience to travelers, conserve the ecological environment and gain economic benefit. It contributes to conservation of biodiversity, sustains the well-being of local people, involves responsible action on the part of tourist and the tourism industry, promotes small and medium tourism enterprises, requires lowest possible consumption of natural resources, stresses local participation, ownership, and business opportunities, particularly for rural people. Therefore, ecotourism guarantees the sustainable use of environmental resources, while generating economic opportunities for the local people.

Key Word Index: *Ecotourism, Sustainable, Conservation, Environment, Communities, Cultural, Ecological, Biodiversity*

EFFECT OF NITROGEN APPLICATION ON QUALITY OF CORIANDER

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An investigation was conducted at Experimental Field of the Division of Vegetable Science, SKUAST-Kashmir during *rabi* season 2016 to study the effect of different levels of urea and their integration with FYM and vermicompost on coriander. The experiment was laid out in randomized complete block design (RCBD) with three replications. The experiment comprised of ten treatments viz., T₁ (40 kg nitrogen ha⁻¹ through urea), T₂ (70 kg nitrogen ha⁻¹ through urea), T₃ (100 kg nitrogen ha⁻¹ through urea), T₄ (50% nitrogen of T₁ through urea + 50% nitrogen of T₁ through FYM), T₅ (50% nitrogen of T₂ through urea + 50% nitrogen of T₂ through FYM), T₆ (50% nitrogen of T₃ through urea + 50% nitrogen of T₃ through FYM), T₇ (50% nitrogen of T₁ through urea + 50% nitrogen of T₁ through vermicompost), T₈ (50% nitrogen of T₂ through urea + 50% nitrogen of T₂ through vermicompost), T₉ (50% nitrogen of T₃ through urea + 50% nitrogen of T₃ through vermicompost), T₁₀ (Control-no chemical fertilizer/organic manure). Enhancement in quality attributes was observed with the application of integrated (INM) treatments. Maximum dry matter (30.25%) was observed in treatment T₉ while as maximum moisture was observed in treatment T₁ (40 kg nitrogen ha⁻¹ through urea). Maximum values for TSS (11.65 °Brix), vitamin C (149.65 mg 100g⁻¹), chlorophyll a (5.10 mg 100g⁻¹), chlorophyll b (6.75 mg 100g⁻¹) and phenols (97.63 mg 100g⁻¹) were recorded in treatment T₉ (50% nitrogen of T₃ through urea + 50% nitrogen of T₃ through vermicompost). Minimum nitrate content of 401.31 mg kg⁻¹ was recorded in Treatment T₇ (50% nitrogen of T₁ through urea + 50% nitrogen of T₁ through vermicompost). In terms of soil properties, treatment T₉ (50% nitrogen of T₃ through urea + 50% nitrogen of T₃ through vermicompost) resulted in highest available nitrogen (272.35 kg ha⁻¹), available phosphorus (16.89 kg ha⁻¹), available potassium (186.21 kg ha⁻¹) and organic carbon (0.99%). Maximum reduction in soil pH (6.41) was



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observed in treatment T₉ and highest EC (0.201 dSm⁻¹) was also recorded under the same treatment.

Key Word Index: *Nitrogen, Coriander, Quality, Vermicompost, Drymatter, FYM*

ECOTOURISM: AN EFFECTIVE TOOL TO REDUCE POVERTY

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Unsustainable development worldwide, is leading to a variety of environmental, social and economic issues. Economic growth which impacts these three pillars of sustainability, affects the current populations ability to meet their needs or those of future generations. For many developing countries, tourism is an economic developmental tool that can contribute to their economy. However, unsustainable tourism, such as mass tourism, exacerbates socio-environmental issues and can be contributory factors to poverty and environmental degradation. Additionally, strategies to alleviate poverty and conserve the environment may conflict with each other, reducing their efficacy. These issues can be most pronounced in popular tourist destinations and highlight the need for a win-win solution. Ecotourism has immense potential to help the global fight against poverty. A WTO initiated study concluded that in developing countries, particularly in the least developed countries, tourism is almost universally the leading source of economic growth, foreign exchange, investment and job creation. Tourism can increase opportunities for the rural poor in their own communities. It also has the potential to help reduce rural outmigration to urban areas, increase employment opportunities for the urban poor, and give them additional income to provide for their families in the rural areas. Also, tourism related skills gained by the urban poor can be applied in rural areas, helping to reverse the migration process. Tourism provides employment opportunities by diversifying and increasing incomes that help reduce the vulnerability of the poor. Through increased national income (foreign exchange earnings and taxation), additional funds can be diverted to poverty reduction programs.

Key Word Index: *Ecotourism, poverty, economic, employment*

INTEGRATION OF RS AND GIS IN GROUND WATER POTENTIAL MAPPING OF PAMPORE WATERSHED

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A systematic planning of groundwater exploitation using modern techniques is essential for proper utilization and management of this precious but shrinking natural resource. Assessing the potential zone of groundwater recharge is extremely important for the protection of water quality and the management of groundwater systems. In the present study, an attempt has been made to delineate possible groundwater potential zones in Pampore watershed of Pulwama District using Geoinformatics technology. The thematic layers considered in this study are geology, geomorphology, lineament, slope, land use/land cover, soil, rainfall, lineament density,



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altitude and drainage density which were prepared using satellite imagery LISS IV and other conventional data. All these themes and their individual features were assigned weights according to their relative importance in groundwater occurrence and the corresponding normalized weights were obtained based on the Multi-Criteria Evaluation (MCE) technique. The thematic layers were finally integrated using Arc GIS10.2 software to yield a groundwater potential zone map of the study area. Thus, four different groundwater potential zones were identified, namely 'high', 'moderate' 'poor' and 'very poor' covering an area of (15.404%), (33.402%), (39.161%), and (12.030%) respectively. The study revealed that the area is dominated by low groundwater potential zone followed by medium, high and very low. The GIS output results were validated with the well yield data generated from the sample wells and a high coefficient of determination was found between well yield and ground water potential with $R^2 = 0.97$ which justifies the accuracy of the procedure used in this study.

Key Word Index: *Groundwater; Remote sensing; Geographic Information System; Multi-Criteria Evaluation; Slope; Weighted overlay; Well data*

ECOTOURISM- AN OPPORTUNITY FOR CONSERVATION AND LOCAL COMMUNITY EXPECTATION

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Ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy, study and appreciate nature that promotes conservation, has low visitor impact and provides for beneficially active socio-economic involvement of local populations. Eco-tourism is distinct from mass tourism. It is multi-faceted, having various intricate linkages with different forms of human activity, with domestic, regional and international characters. Eco-tourism plays an important role in the shaping of national economy. It integrates economic, social, and environmental considerations within a sustainable system. A sustainable system is one that survives and continues to function over a long period of time. Being sustainable means using only enough of the earth's resources (air, water, soil, minerals, animals and plants) to meet our needs and conserving enough of these resources to meet the needs of our children and so on. Local Communities have the following legitimate expectations from ecotourism: Local communities must be equity partners and their share of ecotourism revenue must be contractually guaranteed over and above the creation of jobs. They should be clearly identified. The communities should receive priority in terms of jobs. Their legal access to the resource through their legal tenure should be recognised and acknowledged. The distribution of revenues to local people should be fair, transparent and accountable. Capacity building for local people should be part of the scheme.

Key Word Index: *Ecotourism, conservation, sustainable, community*



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IMPACT OF DIFFERENT SEWAGE SLUDGE APPLICATIONS ON HEAVY METAL ACCUMULATION AND YIELD OF KALE (*BRASSICA OLERACEA* VAR. *ACEPHALA* L.)

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In this study, we present the response of Kale (*Brassica oleraceavar. acephala* L.) to different amendment rates of sewage sludge (T₁=20% Sewage Sludge + 80% Recommended fertilizer dose), (T₂=40% Sewage sludge +60% Recommended fertilizer dose), (T₄=100% Sewage sludge) and (T₅ absolute control) in a field experiment, where plant growth and heavy metal uptake were measured. Results indicated that sewage sludge amendment increased soil EC, organic matter, cadmium, lead and zinc concentrations and decreased soil pH. All heavy metal concentrations of the sewage sludge were beneath the permissible limits in soil. Yield and biomass of Kale showed a positive response to sewage sludge application (T₂) compared to the control plants. Increasing the sewage sludge amendment rate caused an increase in all heavy metal concentrations in Kale. Heavy metal contents were found under the critical levels in plant also. So, sewage sludge application as organic fertilizer used in applicable doses did not pollute the soil, but increases the plant growth. In conclusion, this study provides evidence for a positive effect of sewage sludge application for Kale.

Key Word Index: Amendments, Sewage sludge, Organic fertilizer, Soil fertility, Kale.

POTENTIAL MEDICINAL USES AND PHARMACOLOGICAL PROPERTIES OF *CROCUS SATIVUS* L. (SAFFRON)

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Saffron is a spice derived from flower (*Crocus sativus* L.), is an herbaceous perennial-cormous plant which is believed to show many pharmacological actions. There are varieties of chemical components present in the stigma of the saffron plant. The plant contains important constituents like crocetin, picrocrocin, safranal (main component for characteristic aroma). It is well known for its diverse uses such as a food additive and a palliative agent for many human diseases. Medicinally, Saffron is regarded as tonic and antidepressant and has been used in strengthening digestion, relieving coughs, smoothing menstruation, relaxing muscle spasms,



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calming anxiety improving mood, helps digestion, strengthens the stomach and is anti-tympanites, activates the sexual desire, is analgesic, fights tumors and collection of free radicals (thus reacting against cancerous cells), is euphoriant and alleviates neuralgia, fights depression, the Alzheimer's and Parkinson's diseases, controls blood pressure disorders, lowers high cholesterol levels, reduces chances of such heart diseases as arteriosclerosis, and helps improve heart conditions (due to the presence of thiamin, riboflavin and mineral components), cures respiratory disorders such as asthma, cough, influenza and cold.

Key Word Index: *Saffron, Crocin, Picrocrocin, Saffranal, Alzheimer's, Parkinson's, Arteriosclerosis.*

SOCIO-ECONOMIC, POLITICAL AND ECOLOGICAL ASPECTS OF ECOTOURISM IN KASHMIR

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The International Ecotourism Society defines Ecotourism as: "responsible travel to natural areas that conserves the environment and improves the welfare of local people". Tourism plays an important role in economies of almost every nation vis-a-vis GDP. In the recent times few economies in the world which are regarded as purely tourism based economies have emerged. Similarly, the economy of the state of Jammu and Kashmir can also be referred as tourism economy i.e. tourism based economy. No doubt, there is a vital role of tourism in overall development of any nation or region. However, this economic development which can be called as green side of the tourism is also linked with some dark patches which exist in its shadow. Usually, we cheer the economic gains of the tourism and ignore its impact on the environment and the mankind which appears at its later stage as, many in vogue tourism ventures destroys the very ecosystems they claim to protect. With poor planning, ecotourism ends up in environmental degradation. So it is better to plan tourism well in advance by keeping the plight of future generations in view. Ecotourism appeals to socially and ecologically conscious individuals. Kashmir, known as 'paradise on earth', attracts hundreds and thousands of tourists every year but lots of socio-economic and environmental problems have arisen mainly because of over influx of tourists at specific locations like Pahalgam, Gulmarg and Dal Lake etc with no proper understanding and application of ecotourism. On the other hand, Kashmir provides a great potential for tourism industry. Thus, it is important to understand the tourism of Kashmir through the prism of political ecology, ecotourism and sustainable development, how ecotourism can be used for the protection of the cultural heritage and ecological diversity and to foster the culture and human rights of Kashmir and also contribution in the socioeconomic development and political empowerment of local communities.

Key Word Index: *ecotourism, environment, economy, tourism, Kashmir.*



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ECO-TOURISM IN JAMMU AND KASHMIR: WITH REFERENCE TO ITS NATURAL BEAUTY

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Tourism plays an important source of earning for the Jammu and Kashmir economy. This industry is considered the back bone of Jammu and Kashmir Economy after horticulture sector. The Year 2011 has made history in terms of surpassing all previous records of tourists and pilgrim arrivals in the state. Our analysis shows that except in 2008-09 when there was greater political instability in the state, the revenue earned from Director Tourism Kashmir/Jammu has shown a continuous increasing trend and has increased around three fold from 2006-07 (Rs 32.25 Lakh) to 2011-12 (Rs 93.3 lakh). Further the analysis of current data shows that there is a positive impact of tourist inflow on employment i.e. with the increase in tourist inflow, total employment also rises. In fact, tourism is a basic and most desirable human activity deserving encouragement of people and government. Although Tourism industry does not require huge investment and sophisticated technology but it provides benefit to millions. Simultaneously nature has bestowed the state with natural beauty of highest order which is the main driving force as far as eco-tourism is concerned. . The abstract highlights the benefits of tourism with special reference to its natural beauty. Tourism is the oldest and the largest industry in the J & K State. The tourist sites here attract lakhs of tourists every year. It offers a good source of recreation. It satisfies them and leaves a scar of memory to visit this place again and again.

Key Word Index: *J&K Tourism, Employment, Tourism industry, Benefits, Scar*

MICROBIAL BIOTECHNOLOGY AND ITS APPLICATIONS IN AGRICULTURE

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Microbial biotechnology is an important area that promotes for advances in food safety, food security, value-added products, human nutrition and functional foods, plant and animal protection, and overall fundamental research in the agricultural sciences. Microbial biotechnology, enabled by genome studies, will lead to breakthroughs such as improved vaccines and better disease-diagnostic tools, improved microbial agents for biological control of plant and animal pests, modifications of plant and animal pathogens for reduced virulence, development of new industrial catalysts and fermentation organisms, and development of new microbial agents for bioremediation of soil and water contaminated by agricultural runoff. Micro-organisms found in the soil improve agricultural productivity. Micro-organisms that live in the soil actually help plants to absorb more nutrients and these friendly microbes are involved in “nutrient recycling”. The microbes help the plant to “take up” essential energy sources. In return, plants donate their waste by-products for the microbes to use for food. Scientists use these friendly micro-organisms



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to develop biofertilizers. Phosphate and nitrogen are important for the growth of plants. These compounds exist naturally in the environment but plants have a limited ability to extract them. A fungus, *Penicillium bilaii* helps to unlock phosphate from the soil. It makes an organic acid, which dissolves the phosphate in the soil so that the roots can use it. Biofertilizer made from this organism is applied by either coating seeds with the fungus as inoculation, or putting it directly into the ground.. Biofertilizers help plants use all of the food available in the soil and air, thus allowing farmers to reduce the amount of chemical fertilizers they use. This helps preserve the environment for the generations to come.

Key Word Index: *Biotechnology, Environment, Microbes, Sustainable.*

LAVENDER: ECONOMIC AND TOURISM SCOPE IN KASHMIR VALLEY

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Lavender is one of the most prestigious cash crops the of world, grown for it's essential oil with utility in medicine, cosmetics, perfumery and in aroma-therapy Kashmiri Lavender yields the most versatile essential oil known to mankind; one which blends harmoniously with extracts of cedarwood, pine, clary sage, geranium and nutmeg to make the spa therapist's dreams come alive. Lavender processing gives multiple end products that has various commercial applications, thus increasing the market value of this crop and the wealth that can be generated through its cultivation and processing. Lavender grows best in agro-climatic conditions of Kashmir it is cultivated worldwide for oil and agri-tourism as lavender tours and festivals conducted in lavender parks are becoming popular. Lavender blossoms in Kashmir in the last week of June and continues till end of July which coincides with the peak tourist season in Kashmir. In addition, land that is rocky or barren and not previously used for any extensive agricultural practice can be suitably taken under lavender cultivation for higheconomical output. Rural empowerment through cultivation, processing, value addition and marketing of lavender provide farmers and other aspiring entrepreneurs with incentives for its cultivation and processing and has already local entrepreneurs for lavender oil by providing technical knowhow and quality planting material. Proper training, financial assistance and technical expertise during plantation, cultivation, distillation and more in marketing of lavender and other culinary herb oils growing best in agro-climatic conditions of Kashmir can become a potential and prospective crop for agribusiness in Kashmir for both the unemployed and progressive farmers of the valley, besides a hot destination for ecotourism forestablishing lavender parks and lavender festivals.

Key Word Index: *Lavender, agritourism, Lavender parks, Essential oil*



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STUDY ON THE KNOWLEDGE AND ADOPTION OF FLOWER GROWERS OF DISTRICT SRINAGAR OF KASHMIR VALLEY

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The study was conducted in Srinagar district of Kashmir valley owing to the majority of registered flower growers. 100 registered flower growers were selected through proportional allocation method. Different personal and socio-economic characteristics of the registered flower growers were studied and their relation with knowledge and adoption was also found out. Educational qualification, land holding, income, extension contacts and risk orientation were found to be significantly correlated with knowledge and adoption of registered flower growers. Inadequacy of capital for purchase of seeds and fertilizers, high rates of interest on loans, high cost of fertilizers, non-availability of planting material at the time of sowing, incidence of pests and diseases, lack of cold storage facilities and local market demand, demand fluctuation were the major constraints faced by the registered flower growers in the commercial production of flowers.

Key Word Index: *Adoption, Knowledge, Constraints, Registered flower growers, Marketing, and Socio-economic characteristics.*

AN ECONOMIC BIO-PLASTIC MULCH LAYING MACHINE, A REVIEW

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Bio-Plasticfilm mulch is widely used to increase the productivity of vegetables, fruit trees and crops in cold and arid or semiarid regions. Bio-Plastic mulch practice in Agriculture fields is increasing in folds as this system is not only expected to increase profits in certain rain fed and irrigation situations, but it is also expected to results in environmental and social benefit by reducing the load of herbicides on Agro-eco system as it gets decomposed within four months in bare environment. The bio-plastic mulch has an important application in boosting the supply of staple crops especially in water hunger areas and weed predominant areas. Most of the present available techniques are efficient for performing a particular task like laying mulch or for laying Drip line. There are integrated machines but they are either expensive or too big to be operated in small scale farms. Thus, there is a need of the project that extends to building a small size portable machine which integrates all the above-mentioned tasks like laying mulch as well as drilling holes and laying drip line performs them efficiently. Such a machine reduces the efforts and saves time taken by different operations.

Key Word Index: *Bio-Plastic, Mulch, Agro-eco system, Dripline, Portable.*



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AGRITOURISM: PROSPECTS AND PROBLEMS

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Agritourism provides a number of economic, educational, and social benefits to producers, consumers/tourists, and communities. Furthermore, agritourism provides incentives for producers to remain in agriculture. The agriculture industry is facing a growing number of challenges, such as market competition, rising land and input costs, encroachment from sprawl, and a complex regulatory environment. Agritourism enterprises provide numerous economic benefits to the surrounding community. Operations create jobs and support the local economy through their purchases of goods and services. Other “spillover” economic development opportunities occur when agricultural tourists shop, eat and lodge in the surrounding community. Agritourism also provides rural communities with the potential to increase their local tax bases because farmland and forestland generally require fewer community services and generate more local tax revenue than they cost in services. More importantly, agritourism operations are unique, local businesses, which cannot later be “outsourced” to other communities.

Key Word Index: *Agritourism, producers, market competition, farmland, forestland and outsourced*

FISH GEAR RECYCLING: A STEP TOWARDS HEALTHY ENVIRONMENT

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All the fishes are caught with nylon nets-seine nets and gillnets that can reach hundreds of feet in length. Many such nets are slowly but surely colonizing every spare inch of storage in fishing harbours because many have deteriorated to such an extent that they can no longer be used for commercial fishing. As the traditional disposal options of burying or incinerating the nets are limited and costly, fishermen simply store their nets or dispose them into the water bodies. In many fisheries around the world, lack of disposal options means old fishing gear finds its way back into the marine environment, where it haunts our oceans as “ghost gear” with devastating impacts. The cumulative long term effects are likely to be extremely damaging to marine flora and fauna, as well as to the people and industries who depend on healthy seas. Most fishing nets are made from nylon, a valuable engineering-grade plastic which can be regenerated and used in textile products. Recovered fishing nets are still all too often dumped into landfills or burned, they can also be transformed and regenerated into yarn, a high-quality raw material used to create new products, such as socks, swimwear, carpets, etc. Effectively tackling the problem of derelict fishing gear and marine litter more generally will clearly require long term, coordinated action at the local, regional and global level.



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EGG ALBUMEN -AS A PROTEIN SUPPLEMENT FOR SILKWORM GROWTH AND DEVELOPMENT

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Egg albumen is an important water soluble globular protein present largely in the poultry eggs. Egg albumen contains 18 amino acids including all essential amino acids. It has been reported that egg contains about 4 grams of protein, 55mg of sodium and besides some calories which makes it potential source for use as protein supplement for insect growth and development. The egg albumen is important as it contains the ingredients which are needed for the synthesis of silk in *B. mori* which is easily available to the silkworm rearers. The efficacy of Egg albumen was checked by applying 5 different concentrations viz. 5, 10, 15 and 20% with mulberry leaf and then fed to silkworm larvae daily once during fourth and fifth instar. 20% egg albumen significantly improved all the larval and cocoon parameters of *B. mori* registering 25.33 days of larval duration, 57.96 g of weight of ten mature larvae, 2.32 g of cocoon weight, 52.65 cg of shell weight, 22.52% of shell ratio, 1252.36m of average filament length, 20.90 kg of cocoon yield by weight and 19.92% of raw silk percentage against control.

Key Word Index: *Egg albumen, protein supplement, Silkworm, Growth and development*

ENVIRONMENTAL EDUCATION: AN IMPORTANT TOOL FOR PUBLIC AWARENESS

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Environment is everything that is around us. The environmental education becomes an indispensable tool of the strategy for ecological development, environmental improvement and protection as well as prevention of environmental degradation. Such an approach to education becomes a medium and process of creating public awareness about man's relationship with his natural as well as social and manmade environment. It should aim at enabling individuals and communities at par to understand the complex formation of environment that results from mutual interaction of their biological, physical, social, economic and cultural aspects along with knowledge, values, attitudes and skills acquired over the years. There is also a growing awareness of the need and importance of involving people actively in the protection and



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conservation of environment and management of the natural resources of their locality. The environmental conservation and restoration of ecological balance must include not just rivers, forests, and soil but also the humans. Women can be good educator for their children and family shaping up the mind-set of the children and family members who is very much a part of the eco-system. Environmental education becomes an integral part of the strategy of eco development, environmental improvement and protection as well as prevention of environmental degradation. The environmental education, thus defined, becomes a medium and process of arousing awareness about man's relationship with his natural as well as social and man-made environment. Environmental education is the principal means of enhancing awareness, both among the public at large, and among focused groups. Such education may rely on educational institutions at different levels; the print electronic or live media; and various other formal and informal settings. Secondary sources of data like reports, journals, books and other related material are utilized for the preparation of this research paper.

Key Word Index: *environmental awareness, environmental education, conservation, management, development.*

IMPACT OF FARMED AND WILD ENVIRONMENT ON THE MILT QUALITY OF THE SEMINAL PLASMA IN COMMON CARP, *CYPRINUS CARPIO* VAR. *COMMUNIS* IN KASHMIR

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Keeping the inbreeding depression in view, the present study was conducted to compare the physical and biochemical parameters of seminal plasma and also the female reproductive parameters between the cultured and wild stocks of Scale carp (*Cyprinus carpio* var. *communis*) during the year 2015-16. A total of 120 fish samples were taken for the present study. In wild conditions, the seminal plasma was having 70.64 ± 10.75 mg/dl glucose, 1.99 ± 1.15 g/dl total protein, 12.99 ± 5.6 mg/dl triglyceride, 5.98 ± 0.629 mg/dl cholesterol and 25.22 ± 4.047 mg/dl urea, whereas in farmed conditions, the seminal plasma contained 85.06 ± 9.29 mg/dl glucose, 0.917 ± 0.62 g/dl total protein, 12.3 ± 5.22 mg/dl triglyceride, 5.53 ± 1.61 mg/dl cholesterol and 28.4 ± 5.57 mg/dl urea. The physical parameters like mean sperm volume, mean sperm motility, mean movement duration, mean sperm density and mean pH in the wild and farmed fishes were recorded as 2.393 ± 1.64 ml, 1.486 ± 0.88 ml; $75.038 \pm 10.162\%$, $68.9 \pm 12.46\%$; 50.367 ± 13.92 sec, 44.66 ± 13.48 sec; $3.534 \pm .272 \times 10^9$ /ml, $3.84 \pm 0.181 \times 10^9$ /ml and $8.29 \pm .494$, 8.5 ± 0.311 respectively. The result revealed that total protein concentration were significantly higher in wild males than cultured counterparts ($p < 0.01$). Triglyceride and cholesterol were also found higher in wild



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environs than farmed conditions but difference of these parameters was found to be non-significant ($p>0.05$). The results showed that cultured brooders produced more dense milt than wild individuals. In contrast, the milt volume, percentage and duration of spermatozoa motility were higher in wild brooders than in cultured individuals. However, concentration of glucose and urea were found higher in cultured males than wild ones ($p<0.01$; $p<0.05$ respectively). The high level of glucose and urea in farmed males may be related to stress condition (confinement, holding or handling) in captivity and higher concentration of urea due to the presence of ammonia in the ponds respectively. The present study showed the significant effect of environment on the physical and biochemical parameters of milt in cultured and wild fishes.

Key Word Index: *Cyprinus carpio var. communis*; seminal plasma; milt quality; cultured and wild; biochemical parameters; extenders

BIODYNAMIC FARMING; A TOOL FOR SUSTAINABLE AGRICULTURE

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Biodynamic Farming is a form of alternative agriculture very similar to organic farming, but it includes various esoteric concepts drawn from the ideas of Rudolf Steiner. It treats soil fertility, plant growth, and livestock care as ecologically interrelated tasks, emphasizing spiritual and mystical perspectives. Bio dynamics has much in common with other organic approaches, it emphasizes the use of manures and composts and excludes the use of artificial chemicals on soil and plants. Methods unique to the biodynamic approach include its treatment of animals, crops, and soil as a single system, an emphasis from its beginnings on local production and distribution systems, its use of traditional and development of new local breeds and varieties. Biodynamic agriculture uses various herbal and mineral additives for compost additives and field sprays; these are sometimes prepared by controversial methods. In common with other forms of organic agriculture, biodynamic agriculture uses management practices that are intended to "restore, maintain and enhance ecological harmony." Central features include crop diversification, the avoidance of chemical soil treatments and off-farm inputs generally, decentralized production and distribution, and the consideration of celestial and terrestrial influences on biological organisms. The prime objective is always to encourage healthy conditions for life": soil fertility, plant and animal health, and product quality. "The farmer seeks to enhance and support the forces of nature that lead to healthy crops, and rejects farm management practices that damage the environment, soil plant, animal or human health.

Key Word Index: Agriculture, Biodynamics, Ecology, Farming, Organic.



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EFFECT OF ENVIRONMENTAL CHANGES IN GONADO-SOMATIC INDEX AND FECUNDITY OF *CARASSIUS CARASSIUS* LINNEAUS IN DAL LAKE KASHMIR

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Study on fecundity forms an important part of fishery science as it has direct bearing on fish production and exploitation. Fecundity and gonado-somatic index (GSI) of *Carassius carassius Linnaeus* were estimated from December 2016 to May 2017 in Dal Lake Kashmir. GSI was found to be highest in the month of April (6.64) in case of females which indicated that the fish spawns in the month of May. The estimated absolute fecundity ranged from 1699 to 7174 whereas relative fecundity per gram of body weight varied from 38 to 120 ova. The average absolute fecundity recorded was 4759 where as the average relative fecundity was 84. Changes in the environment such as temperature, salinity and oxygen from certain years in turn have brought remarkable changes in absolute fecundity when compared with earlier reports also food resources available in a given habitat have direct affect on the egg production and thereby the fecundity

Key Word Index: *GSI, Fecundity, Carassius carassius, Dal Lake.*

ECO-TOURISM AND ENVIRONMENT CONSERVATION

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One class of tourism that make an effort to minimise the negative impacts of traditional tourism is ecotourism which educates travellers on sustainable living with the desire to enjoy serenity and pristine natural beauty of the environment. Eco-tourism is a purposeful travel to natural areas to understand the culture and history of the environment, taking care not to alter the integrity of the eco-system, while producing economic opportunities that make conservation of natural resources beneficial to local people. Fundamentally, ecotourism identified as a backbone of the green economy is one of the fastest- growing segment of the tourism industry which focusses on environmental conservation, socio-economic betterment, social and cultural heritage preservation, capitalist development and enhancement of livelihoods. It is envisaged as an integral part of the natural resource management while maintaining cultural integrity, essential ecological processes, biological diversity and enhancing opportunities for the future. It has also a potential to stimulate employment generation, entrepreneurship and poverty elimination for sustainable human development. Aiming to provide a framework for the improvement of ecotourism and to protect environment it is imperative to hold community meetings and discussions to check whether sustainable tourism issues have been addressed, capacity building and ecotourism awareness has to be carried out for all the stakeholders with seminars,



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workshops, field visits, orientation programs etc., production and product planning, implementation of new technological procedures in the production, investing in the environmental protection, and forming of special services for the environmental protection. So awareness, educational programmes related to tourism and principles of ecotourism if properly understood and implemented can transform the way of travelling and increase the length of stay of visitors.

Key Word Index: *Ecotourism, Environmental Conservation, Ecosystem, Economical Impacts*

GUMMOSIS IN HORTICULTURAL CROP

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The gum production is a natural phenomenon and it seems to be a symptom expression caused by a variety of factors including abiotic and chemical stimuli. Gum is formed from disintegrated unlignified cells and usually collects in lacunae in wood tissues, but can occur in all tissues from blossoms to roots (Leroux, 2007). The production of fruit crops is hampered by the problem of gummosis. Earlier literature on some of the possible causes of the gummosis in stone fruit trees and their fruits was received by Boothby (1983). The production of ethylene is also increased with the aggravation of gummosis. The exudates gums are complex branched heteropolysaccharides comprising of galactose, arabinose and glucouronic acid residues with other sugars also present in trace quantities. Application of growth retardants like NAA, 2,4,5-triphenoxy acetic acid and gibberillic acid for suppressing undesired growth of water shoots after pruning induced gummosis in peach and nectarine. High concentration of ethephon produces large amount of gum in stone fruit trees (Buchanan and Briggs 1969). Control of gummosis in orchards of stone fruits are not easy because of its varied, diverse and elusive etiology. However, integration of cultural, chemical and biological approaches may be employed.

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IMPACT OF TOURISM ON ENVIRONMENT

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Ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas in order to enjoy and appreciate nature that promotes conservation. Tourism is one of the world's fastest growing industries as well as the major source of foreign exchange earnings and employment for many developing countries and its main focus is on natural environments. The presence of ecotourism in the era of sustainable and tourism development mission should be minimum negative impacts, both on the environment resources and on socio-cultural local values. Ecotourism activities were more oriented on the utilization of natural resources, the natural ecosystems and have not been polluted yet. However, when all of tourism development cannot be separated from the negative impacts, such as ecosystem distress in ecotourism object when visited by large number of tourists, there are many conflicts of interest between the ecotourism management with local communities, especially regarding the benefits sharing and its accessibilities. It has a great potential to contribute positively to socio-economic development but sometimes its fast and uncontrolled growth can be the major cause of degradation to the environment and loss of local identity and traditional cultures. Natural resources are the most important assets that are responsible for attraction to the tourists. However, the stress imposed by tourism activities on ecosystems accelerates their depletion. Tourism may lead to the degradation of the natural environment and environmental laws that occurs when the level of visitor use is greater than the environment's ability to cope with this issue within the acceptable limits of change. Carrying capacity of ecotourism is not just limited to the number of visits, but also covers other aspects, such as: ecological capacity that is ability of natural environment in providing the needs of tourists, physical capacity, that is ability of facilities and infrastructure in providing the needs of tourists, social capacity, that is ability to absorb tourism activities without the negative impacts on the local communities, the economic capacity, that is ability to absorb destination commercial efforts and accommodate any interests of the local economy. Uncontrolled conventional tourism poses potential threats to many natural areas around the world. It put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, discharges into the sea, natural habitat loss, increased pressure on endangered species and heightened vulnerability to forest fires, diminish the aesthetic appeal of a destination through the construction of buildings that clash with the surrounding environment, creating "architectural" or "visual" pollution. It often puts a strain on water resources, and it can force local populations to compete for the use of critical resources.

Key Word Index: *Ecotourism, environmental impacts, carrying capacity, aesthetics, endangered, Traditional cultures.*



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COCCINELLIDS AS BIOAGENTS

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Ladybird beetles (Coleoptera: Coccinellidae) are a species-rich, ecologically diverse group of substantial agricultural significance, inhabit in all types of terrestrial ecosystems. The family Coccinellidae comprises 6,000 described species worldwide, of which 90% are considered beneficial predators and is divided into six subfamilies: Sticholotidinae, Chilocorinae, Scymninae, Coccidulinae, Coccinellinae and Epilachninae although a recent phylogeny suggests a seventh subfamily, Ortaliinae. They have great economic importance as natural enemies, exhibit a predatory nature against many soft bodied insect pests such as aphids (Aphididae: Homoptera), scale insects and mealy bugs (Coccoidea: Homoptera), whiteflies (Aleyrodidae: Homoptera), Thrips (Thripidae: Thysanoptera), jassids (Cicadellidae: Homoptera), psyllids (Psyllidae; Homoptera), small larvae, insect eggs, and phytophagous mites. These have been used in both classical and augmentative biological control programmes and are also considered important in conservation biological control programmes. They are of high priority in organic cropping and integrated pest management systems.

Key Word Index: *Coccinellidae, Biological Control, Economic importance, Insect pests, Ladybird beetles, Natural enemies, Predators.*

STUDIES ON THE EFFECT OF TIME AND TECHNIQUE OF GRAFTING ON SUCCESS AND GROWTH OF AMRAPALI MANGO

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The present investigation was conducted at Horticultural Research Centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, during 2013-14 under subtropical climatic conditions of western Uttar Pradesh with a view to find out the response of Amrapali mango to time and techniques of grafting. The experiment was carried out in factorial RCBD with five replications in each treatment. There were four grafts in each replication of all 9 treatment combinations. The treatment combinations were comprised of three time of grafting i.e. (25th July, 10th August and 25th August) with three techniques of grafting viz, veneer grafting, softwood grafting and epicotyl grafting. Studies revealed that maximum success



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85.64 was recorded after one month of grafting when veneer grafting was performed on 10th August. Veneer grafting performed on 10th August was also found to be the best technique in terms of rootstock diameter (0.95 cm), Scion diameter (0.46 cm) graft height (15.96 cm) and number of leaves per graft (16.12) after one month of grafting in Amrapali. Softwood grafting was found better than epicotyl grafting when performed on 10th August in Amrapali mango in respect of survival, growth and root parameters.

Therefore, veneer grafting should be preferred over softwood and epicotyl grafting in order to get better survival and over all sprout growth for commercial propagation of quality plants of Amrapali mango in polybags under climatic conditions of western Uttar Pradesh.

Key Word Index: Mango, Grafting, Amrapali, softwood grafting, stone grafting.

EFFECT OF ORGANIC MANURE AND INORGANIC FERTILIZER ON THE BIOCHEMICAL PARAMETERS OF SOYBEAN (*GLYCINE MAX* L.)

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In order to estimate the comparative impact of organic manure (Vermicompost, Farmyard manure), chemical fertilizers (NPK, Urea) and combination of both on the chlorophyll, carotenoid, protein and carbohydrate content of Soybean during different growth stages, the experiment was conducted by using Randomized block design (RBD) with three replications. The experimental results revealed that at 15 days after sowing chlorophyll 'a' was found maximum in 200 gm urea (1.21 mg/gm) followed by 10% vermicompost (VC) + 100 gm NPK (1.19 mg/gm) and minimum in control (0.63 mg/gm). However at 60 days after sowing chlorophyll a was observed maximum in 10% VC + 100 gm NPK (2.28 mg/gm) and minimum in control (1.32 mg/gm). At 15 days after sowing protein content of plant leaves was recorded maximum (37.52 mg/gm) in 10% VC + 100 gm NPK fertilizer followed by 10% VC + 100 gm urea (35.61 mg/gm) and minimum (19.35 mg/gm) was observed in control. At 30 days after sowing it was observed maximum (38.31 mg/gm) in 10% VC + 100 gm NPK and minimum (19.96 mg/gm) in control. At 60 days after sowing protein content was found maximum (39.74 mg/gm) in 10% VC + 100 gm NPK and minimum ((20.91 mg/gm) was recorded in control. Moreover carbohydrate content was maximum (25.86 mg/gm) in 10% vermicompost (VC) + 100 gm urea and minimum (10.42 mg/gm) was observed in control at 15 days after sowing. At 60 days after sowing it was observed highest (28.73 mg/gm) in 10% VC + 100 gm NPK and lowest (20.94 mg/gm) in control. The study concluded that the combined application of organic manure (vermicompost, farmyard manure) and chemical fertilizers (NPK, urea) significantly improved the protein and carbohydrate content of Soybean. Among all the fertilizer combinations application of vermicompost (VC) along with NPK fertilizer is the most efficient combination for the enhancement of chlorophyll, carotenoid, protein and carbohydrate content of Soybean.

Key Word Index: Vermicompost, NPK, Urea, Chlorophyll, Protein, Carbohydrate



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APPLICATION OF GIS IN ECOTOURISM DEVELOPMENT: A CASE STUDY OF TOSAMAIDAN, BUDGAM

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GIS can be used in tourism as a decision supporting tool for sustainable tourism planning, impact assessment, visitor flow management, and tourism site selection. Therefore, the potential for GIS applications in tourism is significant. The purpose of this study was fixed to explore the potential of using GIS for planning resources pertinent to ecotourism development. The study investigated a case study of Tosamaidan situated about 70 miles west of Kashmir's summer capital Srinagar, had become deadly for shepherds and their animals since it was turned into an artillery training ground thus negating its potential of a sought-after tourist destination like that of Gulmarg which is in the vicinity of it. Moreover, the meadow has been facing some problems due to unplanned development which resulted in land use change, increased deforestation, biodiversity losses and contamination of streams. Therefore, the study considered this beautiful pasture for ecotourism planning and development with GIS used as decision supporting tools. For ecotourism planning this study quantifies land use in Tosamaidan using LISS-IV (2013-14) data and prepared maps based on Various GIS layers. For ecosystem protection in Tosamaidan the study proposed a 3 km buffer zone around the area. Finally, the study proposed an outline for ecotourism planning in the Tosamaidan area of Budgam region where GIS assists in the planning process. The study found that, the land use/ land cover consisted of 10 classes which include Agriculture Fields 2.5% mainly maize, Alpine Meadows 18.9%, Dense Forest 13.3%, Horticulture 0.3%, Mixed Plantation 0.2%, Open Forest 6.5%, Scrub's 27.4%, Snow Cover/Glacial Area 29.6%, Wasteland 0.2%, Waterbody 0.9%. The research proposes to develop Tosamaidan as an ecotourist destination based on nine chosen criteria including visibility, land use/cover, reservation/protection, elevation, slope, distance from roads and settlement size using GIS in various stages of planning, so as to develop this area efficiently and on a scientific basis with regard to the ecology of the area. The research will also be fruitful for community development and involvement of local people as a part of hospitality services in ecotourism industries in this region because they can assist tourists according to their experience as guides in the forest. Moreover, they can be employed in the service industries accompanying tourists on wilderness trails and assisting in transport operation.

Key Word Index: *Ecotourism, GIS, Land use change, Planning Tosamaidan, Budgam.*



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REMEDIATE SOIL AND WATER POLLUTION BY THE USE OF *TRICHODERMA* SPP.

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Trichoderma spp. has been widely used as antagonistic fungal agents against several pathogens as well as plant growth enhancers. Antagonistic effect of *Trichoderma* spp. against several pathogens is due to their faster metabolic rates, anti-microbial metabolites, and physiological conformation. Mycoparasitism, spatial and nutrient competition, antibiosis by enzymes and secondary metabolites, and induction of plant defence system are typical biocontrol actions of these fungi. On the other hand, *Trichoderma* spp. have also been used in a wide range of commercial enzyme productions, namely, cellulases, hemicellulases, proteases, and β -1,3-glucanase. They also have been shown to be plant symbionts and are capable of increasing plant biomass and root growth and simultaneously protecting plants from disease by a number of different mechanisms. Some strains are strongly rhizosphere competent—which permits them to colonize roots, grow, and persist on roots and to provide long-term benefits in terms of plant health and productivity. Moreover, some enzymes may be highly useful in degradation of toxic soil pollutants.

Key Word Index: *Biocontrol, Enzymes, Mycoparasitism. Rhizosphere, Symbiont, Trichoderma.*

TROPHIC STATUS OF A RURAL LAKE IN DISTRICT GANDERBAL OF KASHMIR VALLEY

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The present study was conducted to assess the limnological parameters of Ahansar Lake, a rural lake situated about 30 kms from city centre Srinagar in district Ganderbal. Water samples from five different locations viz., inlet, outlet, littoral zones and centre were collected for a period of 9 months covering three different seasons viz., winter, spring and summer. The overall minimum and maximum values obtained for various physico-chemical parameters were: air temperature (2.8°C-33°C), water temperature (2.9°C -33.1°C), depth(0.8m-4.8m), transparency(0.3m-2.51m), dissolved oxygen (7mg/l-12.5mg/l), pH(7.1-8.8), free carbon-dioxide



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(4mg/l-20mg/l), chloride (7.6mg/l-22mg/l), total alkalinity (120mg/l-385mg/l), total hardness (250mg/l-395.5mg/l), calcium hardness (53.9mg/l-117mg/l), magnesium hardness (46mg/l-79mg/l), ammonical nitrogen (76.2 µg/l -140µg/l), nitrate nitrogen (284 µg/l -683 µg/l), total phosphorous (183 µg/l -288 µg/l) and orthophosphate (17 µg/l -42.1 µg/l). Higher values of parameters viz., ammonical nitrogen, nitrate nitrogen, total phosphorous and orthophosphate indicate that the lake waters have become eutrophic when compared with earlier records. Therefore it becomes imperative for government to develop policies for management and preventing the lake from further deterioration.

Key Word Index: *Ahansar, water chemistry.*

STOCK DIFFERENTIATION BETWEEN RIVERINE AND LACUSTRINE POPULATIONS OF SNOW TROUT *SCHIZOTHORAX NIGER* HECKEL, 1838 FROM KASHMIR VALLEY

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Landmark-based morphometrics were examined to evaluate the population status of *Schizothorax niger* collected from Dal lake and river Jhelum. A total of 180 samples were collected from the two locations and a truss network was constructed by interconnecting 12 landmarks to yield 30 distance variables that were extracted from digital images of specimens using tpsDig2 and PAST software. Transformed truss measurements were subjected to Principal Component Analysis, where the first component explained 78.43% while the second and third components explained 4.62% and 2.91% respectively. The high component loadings were from the characters which mostly contributed to anterior half of body depth, middle portion of body depth and head region. The bivariate plots explained that the principal component 1 clearly separates the two populations on the X-axis. The cross validation of this analysis revealed that the percentage of correctly classified fishes was 100% both in Dal Lake as well as river Jhelum. These morphological divergences in the inhabitant fishes were due to the differences in the water velocities between the lake and the river system

Key Word Index: *Schizothorax niger, Truss network, Dal lake, river Jhelum, PCA*



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ROLE OF BIODIVERSITY IN ECOTOURISM

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Biodiversity is under threat by anthropogenic pressures activities such as urbanization, monoculture, poaching, and infrastructure development activities. Tourism is not except for it. The threat imposed by unmanaged tourism to the biodiversity is unavoidable for which major steps in the form of sustainable tourism is needed. To maintain the ecological balance of environment, conservation of biodiversity is a vital step which is possible by means of Ecotourism or ecological tourism. As the name suggests ecotourism is conscientious travel to natural areas which conserves the environment and improves the well-being of the local people. This therefore means that ecotourism is primarily about bringing together environmental conservation, communities and sustainable travel. It also helps in increasing employment and entrepreneurship at a local level. Income and expenditure of local people increase because of ecotourism. Participation in ecotourism, the education level, an increase in productive human capital and an increase in income enhance people's livelihoods. Ecotourism is also regarded as a sub-component of sustainable tourism which is also one of the fastest growing segments of the tourism industry. However, awareness and education programmes related to tourism, and strategies to increase the length of stay of visitors are recommended since inadequacy of information is one of the issues plaguing ecotourism. Moreover, meeting the requirements for ecotourism is extremely difficult. The need of hour is to encouraged ecotourism and design it appropriately to benefit the tourist, the host population and the environment.

Key Word Index: *Ecotourism, biodiversity, conservation, environment*

IMPACT OF ECO TOURISM ON ENVIRONMENT OF KASHMIR VALLEY AND ITS REMIDIES

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Environmental education is a key driver for sustainable development and there is an urgent need of a greater coordination of Forest (including wildlife) and Tourism departments in J&K so that we can maintain the ability of our natural systems which further provide the natural resources ,ecosystem and tourism services. According to World Tourism Organization, "Tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes." The growing diversification of the tourism has turned it into an indispensable factor for socio-economic progress. As tourism is a major tool for economic development and if not



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handled properly it can have negative impacts on biodiversity and virgin environment and can result in the destruction of natural resources. As tourism is a service based industry it involves both tangible and intangible elements of the environment. The growth of mass tourism has led to a range of problems, which have become more obvious over the recent years. It includes environmental, social and cultural poverty. The magnitude of these impacts depends on the intensity of tourism development and use, resilience of the ecosystem, long-term versus short-term tourism planning and the extent of modification of the tourism site. The Valley with its ideal setting will surely capture the hearts and the minds of all visitors to the region. For an overall sustainable development of the Valley as a variable tourist destination, an integrated approach to tourism planning and conserving of the rich, natural eco-system is required. Over the past few decades, Kashmir has sacrificed its lakes and rivers to its booming tourism industry. The absence of proper governance owing to simmering conflict in the region has facilitated the destruction of water bodies and threatens the alpine charm of Kashmir's scenic spots. Today, these environmentally fragile areas have become concrete jungles without proper sewerage systems. Thus, there is an urgent need to discover and setup new ways and means through which negative impacts can be minimized and positive impacts can be strengthened keeping the basic concept of ecotourism in mind. If ecotourism practices are implemented in a proper way, it can contribute significantly to the growth and sustainability of tourism in Kashmir.

POST-HARVEST PHYSIOLOGY OF FRUITS AND VEGETABLES

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Postharvest Physiology is the scientific study of the physiology of living plant tissues after they are denied further nutrition by picking from the parent plant. About one-third of the fruits produced worldwide are never consumed by humans due to loss at various stages and the losses are generally more in developing countries in comparison with developed countries especially when compared between production and retail sites (Kader 2005). Fruits, in general, show two distinctive respiratory patterns during ripening and on this basis fruits are categorized into climacteric and non climacteric groups (Kader and Barrett 2003). Post harvest physiology has direct applications to postharvest handling in establishing the storage and transport conditions that best prolong shelf life, for example 1-Methylcyclopropene (1-MCP) is an inhibitor of ethylene perception that can delay or prevent ripening and senescence processes in plant tissues (Sisler and Serek, 2003). Pre-harvest factors also effect the post harvest life of fruits and vegetables. Controlled atmosphere storage has been shown to be effective in reducing the post harvest losses and prolonging the life of the produce by proper management of respiration via alteration in the gaseous composition and storage temperature. Proper understanding of the biochemistry and the underlying physiological factors will go a long way in minimising the post harvest losses and thereby improving the socio-economic condition of the farmers particularly in the developing countries.

Reference:



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ELEVATED ATMOSPHERIC CO₂ AND ITS IMPACT ON C₃ AND C₄ PLANTS

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Climate change and global warming are the two environmental phenomena that are greatly affecting our planet. The climatic factors like light, temperature, rainfall, gaseous composition are undergoing rapid change. Of these, elevated levels of carbon-dioxide (CO₂) due to human activity has been a major concern affecting plants. Photosynthetic assimilation of CO₂ is central to the metabolism of plants. The concentration of CO₂ in 1959 was 315 ppm and it is estimated to be around 500-1000 ppm by 2100. Every year atmospheric CO₂ is increasing at the rate of 0.5%. High level of CO₂ affects growth, physiology and chemistry of plants. C₃ plants and C₄ plants are two of the plant photosynthetic types in nature. They have different mechanisms of assimilating CO₂. Increasing levels of CO₂ cause certain changes in these plants. The changes that include are reduction in dry matter production, photosynthetic rate, stomatal conductance, plant water use efficiency, leaf nitrogen and protein concentration among others. Apart from yield, carbon-dioxide also affects the nutrition of the plants. The water use efficiency is another important aspect that is to be taken into consideration while studying the increasing CO₂ levels. Other environmental factors like temperature and moisture interact with CO₂ to influence the yield of the crops. The knowledge of the factors concerned help us to prepare for the changing climate and its impact on agricultural production and productivity.

EFFECT OF CLIMATE CHANGE ON AGRICULTURE

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Agriculture is under significant pressure to meet the demands of rising populations using finite, often degraded, soil and water resources that are predicted to be further stressed by the impact of climate change. The impact of climate change on production and opportunities for emissions reductions should be reviewed with a focus on developing countries, including the implications for food security and livelihoods for the poor. Many studies of climate change have



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focused on the next 100 years. Climate change-induced increases in temperatures, rainfall variation and the frequency and intensity of extreme weather events are adding to pressure on the global agriculture system – which is already struggling to respond to rising demands for food and renewable energy. The changing climate is also contributing to resource problems beyond food security, such as water scarcity, pollution and soil degradation. As resource scarcity and environmental quality problems emerge, so does the urgency of addressing these challenges. Climate change is expected to negatively affect both crop and livestock production systems in most regions, although some countries may actually benefit from the changing conditions. Overall, productivity levels are expected to be lower than without climate change – due to changes in temperatures, crop water requirements and water availability and quality.

Key Word Index: *Agriculture, Climate change, production, livestock.*

FOLIAR APPLICATION OF MINERAL NUTRIENTS: PHYSIOLOGICAL ASPECTS & CURRENT STATUS

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Foliar fertilization is nutrition through leaves, a very efficient technique of supplementary fertilization. Foliar nutrients facilitate easy and quick consumption of nutrients by penetrating the stomata or leaf cuticle and enters the cells. Foliar fertilization is used as a means of supplying supplemental doses of macro and micro-nutrients, plant hormones, stimulants, and other beneficial substances. It is determined that during crop growth, supplementary foliar fertilization increase plants mineral status and improve crop yields. Foliar application of nano-fertilizers are new generation of the synthetic fertilizers which contain readily available nutrients in nano scale range. Nano fertilizers are preferred largely due to their efficiency and environment friendly nature compared to conventional chemical fertilizers. Nano formulated fertilizers can be easily absorbed by plants and they may exhibit prolonged effective duration of nutrient supply in soil or on plant. Nano fertilizers can be effectively applied to plants through foliar application. In addition, environmental factors, aspects of plant biology and spray solution properties have a crucial effect on the efficiency of foliar fertilization.



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IMPACT OF FARMED AND WILD ENVIRONMENT ON THE MILT QUALITY OF THE SEMINAL PLASMA IN COMMON CARP, *CYPRINUS CARPIO* VAR. *COMMUNIS* IN KASHMIR

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Keeping the inbreeding depression in view, the present study was conducted to compare the physical and biochemical parameters of seminal plasma and also the female reproductive parameters between the cultured and wild stocks of Scale carp (*Cyprinus carpio* var. *communis*) during the year 2015-16. A total of 120 fish samples were taken for the present study. In wild conditions, the seminal plasma was having 70.64 ± 10.75 mg/dl glucose, 1.99 ± 1.15 g/dl total protein, 12.99 ± 5.6 mg/dl triglyceride, 5.98 ± 0.629 mg/dl cholesterol and 25.22 ± 4.047 mg/dl urea, whereas in farmed conditions, the seminal plasma contained 85.06 ± 9.29 mg/dl glucose, 0.917 ± 0.62 g/dl total protein, 12.3 ± 5.22 mg/dl triglyceride, 5.53 ± 1.61 mg/dl cholesterol and 28.4 ± 5.57 mg/dl urea. The physical parameters like mean sperm volume, mean sperm motility, mean movement duration, mean sperm density and mean pH in the wild and farmed fishes were recorded as 2.393 ± 1.64 ml, 1.486 ± 0.88 ml; $75.038 \pm 10.162\%$, $68.9 \pm 12.46\%$; 50.367 ± 13.92 sec, 44.66 ± 13.48 sec; $3.534 \pm .272$ 10^9 /ml, 3.84 ± 0.181 10^9 /ml and $8.29 \pm .494$, 8.5 ± 0.311 respectively. The result revealed that total protein concentration were significantly higher in wild males than cultured counterparts ($p < 0.01$). Triglyceride and cholesterol were also found higher in wild environs than farmed conditions but difference of these parameters was found to be non-significant ($p > 0.05$). The results showed that cultured brooders produced more dense milt than wild individuals. In contrast, the milt volume, percentage and duration of spermatozoa motility were higher in wild brooders than in cultured individuals. However, concentration of glucose and urea were found higher in cultured males than wild ones ($p < 0.01$; $p < 0.05$ respectively). The high level of glucose and urea in farmed males may be related to stress condition (confinement, holding or handling) in captivity and higher concentration of urea due to the presence of ammonia in the ponds respectively. The present study showed the significant effect of environment on the physical and biochemical parameters of milt in cultured and wild fishes.

Key Word Index: *Cyprinus carpio* var. *communis*; seminal plasma; milt quality; cultured and wild; biochemical parameters; extenders



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DIVERSITY OF BACTERIAL ENDOPHYTES OF BROWN SARSON (*BRASSICA RAPAL.*) ROOTS AND THEIR EFFICACY AS POTENTIAL BIOINOCULANTS IN ORGANIC AGRICULTURE UNDER KASHMIR CONDITIONS

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The present study was aimed to assess the diversity of bacterial endophytes of brown sarson (*Brassica rapa* L.) as well as their efficacy as potential bioinoculants in organic agriculture under temperate conditions of Kashmir. The root samples of brown sarson were collected from three districts of the valley viz., Anantnag, Srinagar and Baramulla. The survey revealed that bacterial population was highest (4.4×10^5 cfu/g of fresh weight) at site Hugam (Anantnag) and lowest (7.0×10^3 cfu/g of fresh weight) at site Nowgam (Srinagar). Eighty one morphologically dissimilar isolates were selected and characterized on the basis of Gram's staining and cell and colony morphology. Gram negative bacteria were most predominant. The colony characterization revealed that circular forms dominated. Likewise the colonies with entire margins and convex elevation were pre-dominated amongst the isolates. The isolates were screened for temperature and drought tolerance and various metabolic properties, optimization and plant growth promoting attributes. The metabolic properties of isolated bacterial root endophytes revealed that all the isolates metabolized glucose and galactose but some isolates did not metabolize maltose and sucrose. Drought tolerance studies revealed that all the bacterial isolates grew at all the PEG concentrations tested. Amongst the isolates only 28 isolates produced ammonia with average production of 31.76 µg/ml. The isolates with > 25 µg ammonia/ml were optimized using yeast extract as a nitrogen source in place of peptone. All the isolates were screened for indole acetic acid (IAA) production and it was observed that forty four isolates produced IAA with average production of 8.15 µg/ml. The isolates with the IAA production of > 9 µg/ml were optimized using L-tryptophan supplementation. The screening for chitinase activity revealed that only 22 isolates produced chitinase enzyme with average production of 15.83 units/ml. The isolates with chitinase activity >15 units/ml were optimized using various carbon source (1%) under varied incubation periods. Experiment on phosphate solubilization revealed that 31 isolates released free phosphate from tri-calcium phosphate with average release of 95.88 mg/l. The isolates with activity > 90 mg/l were optimized using different nitrogen source (1%) supplementations at varied incubation periods. The screening for siderophore activity revealed that only 22 isolates had siderophore producing ability with average siderophore production of 12.81 (% siderophore unit). The antifungal behaviour of isolates revealed that only 25, 21, 17 and 18 isolates inhibited *Dematophora necatrix*, *Pythium aphanidermatum*, *Fusarium oxysporum* and *F. solani*, respectively. The assay on hydrogen cyanic acid in terms of absorbance revealed that only 15 isolates produced HCN. The overall performance of all the isolates was quantified by giving the weightage to each attribute of plant growth promotion and 12 isolates most promising ones were selected for pot house studies. The inoculation of effective isolates showed insignificant impact on soil pH but significant on EC against control. The soil enzymatic activities viz., dehydrogenase, protease, phosphatase,



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cellulase, xylanase, urease and amidase in endophyte inoculated soils showed significant change. The plant macro- and micro-nutrient and leaf pigments also increased in inoculated treatments. The yield attributes of brown sarson showed significant increase in inoculated treatments as compared to uninoculated control. All the twelve isolates were identified on morpho-biochemical and physiological basis as per the *Bergey's Manual of Determinative Bacteriology*. Based on phylogeny all the isolated strains were identified using 16s rRNA gene sequencing and were submitted to GenBank NCBI, USA and accession numbers were obtained.

Key Word Index: *Bacterial diversity, brown sarson, endophytes, optimization, ammonia production, IAA, chitinase, carbon sources, nitrogen sources*

OPTIMIZATION FOR CHITINASE PRODUCTION BY ENDOPHYTIC ROOT BACTERIA ASSOCIATED WITH BROWN SARSON GROWN (*BRASSICA RAPAL.*) UNDER DIFFERENT CROPPING SYSTEMS OF NORTH WESTERN HIMALAYAS.

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Root samples of brown sarson (*Brassica rapa*L.) were collected from 22 villages of three districts of Kashmir valley viz. Anantnag, Srinagar and Baramulla. All the root samples collected from various locations harbored bacteria capable of growth on TSA media. The highest bacterial population of Log₁₀ 8.386 (cfu/g of FW) was observed at site Hugam in the district Anantnag while, Nowgam in the district Srinagar had lowest bacterial population of Log₁₀ 4.227 (cfu/g of FW). A total of 81 morphologically dissimilar isolates were selected and characterized on the basis of Gram's staining, cell, colony morphology and 16S rRNA sequencing. The study revealed that Gram negative bacteria formed dominant group. Similarly colonies with circular forms, entire margins and convex elevation were most dominated among all the isolates. Screening isolates for metabolic properties revealed that all the isolates (81) metabolized glucose and galactose while only but a total of 65 and 60 isolates metabolized maltose and sucrose, respectively. The screening of isolates for chitinase activity revealed that only 22 isolates produced chitinase enzyme with average production of 15.83 units/mL. The isolates with chitinase activity of ≥ 15 units/mL were optimized under different set of conditions. The chitinase activity was observed to be highest at 1.5% colloidal chitin concentration, likewise pH 6 favoured chitinase production in almost all the isolates. The experiment on effect of temperature revealed that chitinase production increased linearly from 15 to 30 °C and then decreased beyond this temperature, maximum chitinase activity was observed at 30 °C in almost all the isolates. The nitrogen sources also had great impact on chitinase activity, inorganic nitrogen sources proved less favourable for enzyme production. Casein yielded the highest enzyme activity in all the isolates reaching as high as 5.56 u/ml. Presence of glucose, sucrose, galactose, maltose, arabinose and raffinose in the culture media in addition to colloidal chitin predominantly influenced chitinase activity.



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ENVIRONMENTAL ECOTOURISM PLANNING FOR SUSTAINABLE DEVELOPMENT

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Ecotourism creates an impact on natural ecosystems but more importantly, it offers a way to promote conservation in ecologically fragile regions; benefit the economies of local communities; provide the public with a nature-based education experience. Sustainable development is an important aspect of ecotourism development that involves harvesting our natural resources without depleting or permanently harming them. The eco tourist practices a non-consumptive use of wildlife and natural resources and contributes to the visited area through labour or financial means aimed at directly benefiting the conservation of the site and the economic well-being of the local residents. The visit should strengthen the eco tourist's appreciation and dedication to conservation issues in general, and to the specific needs of the local. Ecotourism encompasses many aspects and faces many challenges. It is not only about safeguarding the environment, but employing and informing the locals, as well as educating the tourist. Ecotourism is a softer, gentler version than the tourism we have come to know. It might not bring in as many people as other forms of tourism, but the true recipients of the benefits of ecotourism are the traveler, the host population, the tourism industry and, of course, the environment. Sustainable development not only ensures that consumption of tourism does not exceed the ability of the host destination to prosper, but also provides for the freedom, education and welfare of the host community. It has become common knowledge that it is unethical to save nature at the expense of the local people. The host community should be given the opportunity to act as partner in the sustainable development of its land, not as enemy of it.

Key Word Index: *Environmental Eco-Tourism, Planning, Sustainable Development*

IMPACT OF ECOTOURISM ON ANIMAL POPULATION

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Ecotourism has immense potential for negatively impacting different animal species. Ecotourism-induced stresses on animals may result in changes in their population densities, species composition, and community structure. National Parks in our country are visited extensively by tourists. The potential impacts of tourism can be evaluated by comparing the



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population densities of selected species of animals in different regions of these affected National parks, with and without tourist traffic. Densities can be estimated using visual line transects and distance sampling methods. Trends show the impact of ecotourism is species specific, with some species increasing in density, some decreasing, and others unaffected. An evaluation of the limitations and assumptions of the methods used provides a framework for consideration of the results. Given the potential negative impact of tourists on animals, national parks should develop management strategies to minimize these impacts, such as concentrating tourists in already disturbed areas.

Key Word Index: *Ecotourism, National Parks, Tourists, Impact, Animals.*

NUTRIENT STATUS OF *SOLANUMLYCOPERSICUM* IRRIGATED WITH SURFACE AND GROUND WATER IN SRINAGAR, JAMMU AND KASHMIR

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The study was aimed to assess the nutrient status of tomato (*Solanumlycopersicum*) irrigated with surface and ground water in Srinagar district of Jammu and Kashmir, India. Fifteen samples of tomato were collected at the time of maturity from each surface and ground water irrigated areas and were analyzed for total N, P and K. The results revealed that the total N, P and K were found higher in ground water irrigated tomato compared to surface water irrigated one. The mean concentration of nutrients for groundwater irrigated crop were $3.97 \pm 0.13\%$, $0.21 \pm 0.03\%$ and $3.40 \pm 0.14\%$ for N, P and K respectively and for surface water irrigated crop the concentration of these nutrients were $3.28 \pm 0.11\%$, $0.17 \pm 0.02\%$ and $2.81 \pm 0.11\%$ for N, P and K respectively.

Key Word Index: *Surface water, Ground water, Macronutrients, Tomato*

ANALYSIS OF HISTORICAL RAINFALL DATA FOR DROUGHT INVESTIGATION IN KASHMIR VALLEY

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Droughts are generally identified and characterized using drought indices. The present study deals with the potential of using precipitation-based Standardized Precipitation Index to duplicate observed meteorological droughts in the Jhelum river Basin of Kashmir valley. Historical droughts that occurred from 1980 to 2017 have been examined in the study. The SPI



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analysis shows a good agreement with the recorded historical drought events. SPI was also used to study the time-based pattern of drought occurrence and its severity. The droughts in the Jhelum basin occurred during the years 1999, 2000, 2001, 2007 and 2016. The intensity of these droughts was found to be severe to extreme. The most prolonged droughts in the basin occurred during three successive years during 1999, 2000 and 2001. The SPI Values were less than -1 for these years on 6-month, 9-month and 12-month time scales. The 12-month SPI values for these years were -2.37, -2.39 and -2.46 respectively.

Key Word Index: *Drought, Drought Intensity Jhelum, Multi-Scale, Normal, Standardized*

USE OF BACTERIOPHAGES FOR THE CONTROL OF BACTERIAL PATHOGENS IN FOOD PROCESSING ENVIRONMENT

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Bacteriophage (phage) are obligate intracellular parasites that multiply inside bacteria by making use of some or all of the host biosynthetic machinery. Phages have the ability to eliminate bacterial pathogens from food of plant origin and to control plant diseases such as fire blight, bacterial blotch and bacterial spot in cultivated mushrooms, tomato, and apple, respectively. *Xanthomonas campestris* pv. *vesicatoria* and *Pseudomonas syringae* pv. *tomato* have been used commercially to control bacterial spot/ speck on tomatoes. phages have also been applied to control the growth of pathogens such as *Listeria monocytogenes*, *Salmonella*, and *Campylobacter jejuni* in a variety of refrigerated foods such as fruit, dairy products, poultry, and red meats. Phage control of spoilage bacteria (e.g., *Pseudomonas* spp. and *Brochothrix thermosphacta*) in raw chilled meats can result in a significant extension of storage life. Phage biocontrol strategies for food preservation have the advantages of being self-perpetuating, highly discriminatory, natural, and cost-effective.

Key Word Index: *Bacteriophage, Biocontrol, Brochothrix, Campylobacter, Pseudomonas, Spoilage, Xanthomonas.*

AN EMPIRICAL STUDY OF TOURIST SATISFACTION OF THE TOURIST SPOT GANGABAL IN DISTRICT GANDERBAL: A CASE STUDY

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The various tourism services offered by tourist destination Gangabal were examined, to measure satisfaction of tourists by identifying the impact of quality tourism product on overall satisfaction of tourists visiting Gangabal. To compute the significance of service quality destination dimensions on the satisfaction of tourists, four hypotheses were developed and on the basis of these defined hypotheses a study model was developed. A data of 105 tourists including



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domestic and international visiting the place was collected through self-constructed structured questionnaire. To find out the relationship between service quality and tourist satisfaction, the data were analyzed using a series of multiple regressions. The Results confirmed that service quality have a strong influence on tourist satisfaction throughout destination facilities, destination accessibility, destination attraction and safety at destination. It was noticed that there is a strong relationship between the service quality dimensions at destination like facilities at destination, accessibility of destination, attractions at destination, and safety at destination. For further research, in order to confirm the study's survey another study can be conducted among other tourist groups in other destinations.

Key Word Index: *Service Quality, Tourist Satisfaction, Gangabal, hypothesis*

EXTRUSION AND PHYSICAL PROPERTIES OF EXTRUDED PRODUCT FROM RICE: CARROT BLEND

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A study was undertaken to investigate the effect of carrot powder as functional ingredients in broken rice based extruded products at *Division of Food Science and Technology SKUAST-K, Shalimar during the year 2016-2017*. Response Surface Methodology (RSM) was used to investigate the effects of processing conditions on product characteristics. Central composite rotatable design (CCRD) with composition (0-40%), moisture content (11-23%), screw speed (200-400 rpm) and barrel temperature (100-180°C) as independent variables produced 30 different combinations which were used to study the effect on Specific mechanical energy(SME), Bulk density, Water Absorption Index (WAI), Water Solubility Index (WSI), Expansion ratio (ER), Breaking strength For rice carrot blend, composition (Broken rice: carrot) had significant effect on all response variables of extrudates where screw speed had no effect on all response variables except specific mechanical energy(SME) and Moisture had significant effect on water absorption index(WAI) where barrel temperature had significant effect on water solubility index(WSI).The broken rice: carrot extruded product was optimized based on observed responses (SME, WAI, WSI, ER, BS). The optimum conditions for development of rice: apricot and carrot extrudates were - Composition – 10%, moisture content – 14%, screw speed – 350 rpm and Barrel temperature – 120°C.

Key Word Index: *Carrot, Broken rice, Extrudate, Optimization*

ROLE OF BIOTECHNOLOGY FOR SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT

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Agricultural biotechnologies have major potential for facilitating and promoting sustainable agriculture and rural development. They could also generate environmental benefits, especially where renewable genetic inputs can be effectively used to substitute for dependency on externally provided agrochemical inputs. The fact that genes or genotypes (e.g., varieties,



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breeds) can constitute locally renewable resources is of profound significance to the further development of sustainable agriculture and rural development. However, the power of modern biotechnologies to generate useful genotypes has not yet been harnessed for poorer farmers. Science alone is unlikely to provide a complete solution to the problems of rural development. Agricultural (or indeed plant biotechnology) research is one factor which could impact on rural poverty; it is not a panacea for sustainable agriculture and rural development. Over the longer term, there is much promising agricultural biotechnological research that in theory might be harnessed for sustainable agriculture and rural development objectives, such as increasing yields and sustainable utilization of plant genetic resources for food including: Apomixis, an asexual technology of plant reproduction that can provide economic incentives to replant harvested seeds, Micro-propagation and plant tissue culture technology (e.g., to generate disease-free plantlets of vegetatively propagated staple crops, such as cassava, potato, sweet potato, taro, bananas and plantains), Improved fermentation technologies, Marker-assisted-selection strategies for improving agronomic traits in animal and plant varieties/breeds, including yield potential and Development of genotypes with abiotic stress tolerance.

Key Word Index: *Biotechnology, Agriculture, Rural, Sustainable*

Advances in Seed Invigoration through Priming – An overview

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Seed is botanically defined as a matured ovule containing an embryo in an arrested state of development with food reserved in endosperm/ cotyledons surrounded by seed coat which is protective layer. In due respect to all agricultural inputs, seed is the most significant for two reasons. First, it is the propagule carrying unique genetics that culminate in optimum crop response to varying environments. Second, seed is the reproductive unit responsible for ensuring successful stand establishment for most agricultural crops. There are many factors that can narrow down the gap between potential and farm level yield. Among them, use of quality seed is the most important one, as quality seeds ensure better germination as well as better yield. But if the seed is inferior quality crop failure is unavoidable. To the farmers for satisfactory crop production, a high quality seed is not only desirable but also satisfactory required. Although seed quality is governed by genetic make-up, commonly the quality of seeds may deteriorate in subsequent stages like harvesting, threshing, processing and storage period. Retention of seed germination always forms the important consideration in agricultural practices. Poor seed handling condition gives rise to deterioration of seed quality and the resultant loss of viability. Also this greatly affects seed vigor, as a result the quality of the seed becomes bad and the seed is unusable for crop production. Hence, some physical and chemical operations are performed



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with the seeds between the processing to storage time to overcome these problems. Seed enhancement or Seed Treatment technically described as the range of practical beneficial treatment techniques performed on seeds (after harvesting and conditioning) to improve their physical or physiological performance. Seed treatments and enhancements include physical, physiological and biological treatments to overcome germination constraints by uniform stands, earlier crop development and better yields. Improved germination rates and seedling vigour are due to reduced emergence time by earlier start of metabolic activities of hydrolytic enzymes and resource mobilization. Nutrient homeostasis, ion uptake, hormonal regulation, activation of antioxidant defence system, reduced lipid peroxidation and accumulation of compatible solutes are some mechanisms conferring biotic and abiotic stress tolerance. Several transcription factors for aquaporins, imbibitions, osmotic adjustment, antioxidant defence and phenylpropanoid pathway have been identified. One of the important technique used for seed enhancement is the priming of seeds using various priming agents. Present paper will discuss the various priming techniques, their mechanism of action and benefits achieved in terms of seed germination potential and establishment of crop stand.

ASSESSMENT OF LAND USE AND LAND COVER IN SELECTED COMPARTMENTS OF PIR PANJAL RANGE IN KASHMIR: A CASE STUDY

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The generation of thematic maps, for example, those delineating land cover, using an image classification is a standout amongst the most widely recognized utilizations of remote sensing. The following study was conducted in selected compartments(S-9, S-16, and S-17) of PirPanjal forest division using LISS IV data of 2012-2013. We feature the multifaceted nature of land-use/cover change in the study area with recent estimates in land degradation, land use and Land cover classes. The total area was 7.34 sq. km out of which S-9, S-16 and S-17 composed of 46.01%, 40.42%, and 13.55% respectively. The study describes the area under 5 classes out of which scrub forest covers the maximum area (65.29%), followed by Alpine Meadows (20.01%), Closed Forest (8.64%), Snow covered/Glacial area (4.64%), Open Forest (1.44%). The degraded area was found to be 75.74% of the total study area. During the study period we observed an extremely serious land cover change has occurred as a result of encroachments by local people, deforestation and presence of Military firing range in close proximity. These changes in land cover led to land and forest degradation of the study area.



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CHERRY BLOSSOMS: A BLOOM TO TOURISM AND THE PHENOMENA BEHIND THE LATEST TREND IN TRAVEL

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The arrival of spring brings a splash of color as the iconic cherry trees of Kashmir valley burst into bloom. Although cherries can be found in Himachal, UP and Uttarakhand but Kashmir remains home to quality cherries produced in the country. Cultivation of cherries in Kashmir is confined generally to hilly areas on sloppy lands of Tangmarag, shopian, Ganderbal, Kangan, Harwan, Dara, Nishat and Budgam areas. This fruit is known as “GILAAS” in Kashmir. Besides the fact that some of the world’s best cherries still come from Kashmir, the cherry trees which are laden with white flowers during early spring days present a spectacular view. Visitors hoping for solitary contemplation among the pink velvety clouds of blossoms are in the right city especially during this time of the year. Nowadays travelers look for further dimensions to their travel, those who are interested in nature, flora and botanical tourism like to travel in certain seasons to extend the experiences their travels bring to a destination and seasonal travel means one can return to a destination and have a totally new experience. Cherry blossoms can bring new dimensions to the eco-tourism of the valley at this time of the year, not only can one perceive the beauty of the landscapes but also attend the Cherry Blossom fiesta in the valley during the second fortnight in March. With proper intervention by the state this can mark the beginning of the celebration of this spectacular event of the earlier blooms which could affect tourism and the local economy to a great extent. This can include the Cherry Blossom Festival, which can be extended to several weeks with its popularity. Anticipation of the peak bloom captivates meteorologists, city planners, the National Park Service, residents, and tourists each year. Such is the pleasure derived from floral events that an upsurge has been reported in the number of travellers seeking to deepen their experience of the world's natural phenomena.

Key Word Index: *Cherry, blossom, tourism, economy*

BIOMAGNIFICATION- A REVIEW

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The process of transfer of xenobiotic substances from food to an organism resulting in the higher concentration compared with the source. It is regarded as a general phenomenon for marine food webs. It has been reported that biotransference of Selenium, copper, Cadmium, Zinc, Arsenic and lead was measured in contaminated sea grass. If biomagnification of these trace elements is occurring and if they reach concentration that pose threat to the organisms or human



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consumers. Many hydrophobic chemicals such as polychlorinated biphenyls accumulate in organisms. Bioaccumulation factor or bioconcentration factor is the most common way of expressing the degree to which chemicals accumulate in individual species. Biomagnification is also called as Bioamplification or biological magnification. It is the increasing concentration of any substance such as a toxic chemical in the tissues of organisms at successively higher levels in food chain. The result of biomagnification is that an organism at the top of food chain generally suffers greater harm from a persistent toxin or pollutant than those at lower levels. It is caused due to accumulation of toxic chemical and pollutants such as heavy metals, pesticides etc.

Key Word Index: *Xenobiotic, marine food webs, biotransference, bioaccumulation and bioconcentration.*

GENOTOXIC EFFECT OF A COMMONLY USED FOOD ADDITIVE (FOOD DYE) SUDAN DYE I IN ROOT MERISTEMS OF *Allium cepa*.

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Food additives are the substances that are intentionally added to modify visual appearance, taste, texture or the storage life of food. There has been significant controversy associated with the risks and benefits of food additives. The effect of different concentrations of food dye sudan I on the chromosomes of *Allium cepa* was investigated. Four concentrations of the food dye sudan dye I (0.25, 0.50, 0.75, and 1 %) were used for 3 hours. All concentrations of this dye showed mitoinhibitory effect in root tips of *Allium cepa* and increase in chromosomal aberrations. Various types of metaphasic and anaphasic aberrations were scored and it was found that metaphasic aberrations were more prominent than the anaphasic aberrations. The most observed aberrations induced by sudan dye I were stickiness at metaphase, bridges at anaphase, stickiness at anaphase, scattering at metaphase, unorientation at anaphase and metaphase. The present study clearly establishes the genotoxic behavior of food dye sudan I.

Key Word Index: *Allium cepa, chemicals sudan I, chromosomal aberrations.*

STATISTICAL MODELS FOR YIELD ESTIMATION OF 'FUJI ZEHN AZTEC' APPLES BEFORE BLOOM

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To solve the problems of damage in crops due to natural disasters like frosts, hail storm, it is common to insure crops against the damage. After damage, crop loss must be evaluated, by comparing what crop is left with the amount that would have been obtained under normal



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conditions. Potential crop must be evaluated quickly through the use of measurements obtainable at the beginning of the cycle of tree's growth. The objective of the study was to develop the best fitted model for estimating yield in 'Fuji Zehn Aztec'. The data used for this research were primary data collected from high density apple block SKUAST-Kashmir (HDP, Plate-1). The study was undertaken at experimental field of Division of Fruit Science, SKUAST-Kashmir, Srinagar, J&K during the years 2015 and 2016. The measurements of various tree/fruit characteristics of 'Fuji Zehn Aztec' were recorded. Model was developed for estimating yield of Fuji Zehn Aztec before bloom. The model developed was validated using k-fold cross validation and bootstrap validation technique.

Key Word Index: *Yield Estimation, Regression Models, Validation.*

BIOCHEMICAL BASIS OF *BACTROCERA* SPP. (DIPTERA: TEPHRITIDAE) RESISTANCE IN SOME GENOTYPES AND IMPROVED VARIETIES OF *CUCUMIS SATIVUS* L.

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Studies were conducted at farmer's field, Marhun, Bara (Hamirpur) in Himachal Pradesh to evaluate the potential of biochemical basis of host plant resistance in the management of melon fruit flies of cucumber (*Cucumis sativus* L.). None of the improved varieties tested showed significant and consistent resistance to this devastating pest. The genotype IC-430026 however, supported relatively less maggot population and thus suffered significantly lower damage (infested fruits) under no insecticide protection than the improved varieties. The different levels of biochemical constituents namely total sugars, total free amino acids and total phenols were observed in genotypes and improved varieties. The higher levels of total sugars and total free amino acids were observed in improved varieties KCU-006 and Mohani-5300. There was a clear significantly positive correlation between total sugars and melon fruit flies incidence.

TREND ANALYSIS OF AREA, PRODUCTION AND PRODUCTIVITY OF CHERRY IN JAMMU AND KASHMIR

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Cherry (*Prunus Avium*) is one of the important horticultural crops grown in Jammu and Kashmir and is packed with healthy nutrients and excellent antioxidants. Basically, cherries are native to Europe and Asia regions. Cherries are cultivated all over the world and the top 3



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producers of cherry are Turkey, USA and Iran. India occupies as 26th producer in the list. In India, cherry commercial cultivation is carried in the states of Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh due to suitable climate. The present study is an attempt to find past trends of cherry in Jammu and Kashmir using parametric, nonparametric and semi-parametric regression methods. The performance of each method is compared using higher values of R^2 and lower values of residual criteria. It is found that the nonparametric/semi-parametric regression comes out to be good fit for trends in cherry production in comparison to the parametric regression. Even semi-parametric spline regression is selected as the best fitted model for trend analysis. It is inferred that the area under cherry cultivation in Jammu and Kashmir is increasing from 1974-2017 and the productivity has also shown an increasing trend except for some recent years where the trend is found declining. The study advocates for researchers technological breakthrough in cherry production in Jammu and Kashmir.

Key Word Index: Cherry, Trend analysis, Parametric regression, Nonparametric regression

PHYTOSOCIOLOGICAL STATUS OF THE SELECTED SITES (PROTECTED SITE) FOR ASSESSING THE EFFECT OF GRAZING IN KASHMIR VALLEY, INDIA

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Kashmir Valley located in the north-western folds of the Indian Himalayas, has vast land area (16%) under grasslands which play an important role in providing economic goods and ecosystem services to the society. Livestock, particularly the migratory flocks, are entirely dependent on these grasslands. They serve as bedrock for sustaining the core economic activity of livestock rearing in the region. Apart from sustaining this pivotal economic activity, grasslands harbor a rich and endemic biodiversity, and regulate the regional carbon, nutrient and hydrological cycles (Masood, 2003; Anonymous, 2014). The present investigation was conducted at protected site of Yousmarag area of Budgam district in Jammu and Kashmir, India during 2014-2015 with the aim to study the effect of grazing on floristic composition of selected site. The data pertaining to protected area (Kanidajan) revealed the presence of thirty six herb species in spring season, the highest density was shown by *Cynodondactylon*(363300 ha⁻¹), maximum frequency was observed by *Achilleamillefolium*, and highest abundance was reported in *Cynodondactylon*(363300 ha⁻¹). It is evident from the data that out of the thirty six herbaceous species a total of thirty four were recorded in summer season, the highest density was shown by *Cynodondactylon*, the maximum frequency (100%) was observed in *Achilleamillefolium*, and maximum abundance was reported in *Cynodondactylon*(448300 ha⁻¹). A total of twenty species were found in autumn season amongst the thirty six species reported at this site. Maximum density was again recorded in *Cynodondactylon*(215800 ha⁻¹), maximum frequency (100%) was recorded in *Cynodondactylon* and highest abundance was reported in *Cynodondactylon*. In all three seasons, it was observed that *Cynodondactylon*(37.43ha⁻¹) had maximum importance value index (IVI).

Key Word Index: grasslands, grazing, density, frequency and importance value index (IVI)



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BIOTECHNOLOGICAL APPLICATIONS IN ENVIRONMENTAL MANAGEMENT

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Biotechnology has shown a great promise in solving a plethora of environmental problems. Mainly the topics covered are waste management, SBR technology, sludge management, UASB reactor, microbes for heavy metal uptake, specialist microbial culture for wastewater treatment, aero biodegradation of organic compounds, enzymatic cotton delinting, removal and reuse of several environmental contaminants, biogas technology, bio-aerosols in environmental perspectives. The contents of Biotechnological Applications in Environmental Management are Phytoremediation of Heavy Metal Contaminated Soils : Role of Natural and Synthetic chelatins, Removal of Heavy Metals by Wetlands, Phytoremediation of Metals by Azolla Rubra, Removal of Chromium, Plants For Bioremediation of Contaminated Land, Micro-Organisms and Their Role in phosphate solubilization, Waste Management by Vermiculture At Global Level using Earthworms, Use of phosphate solubilizing Bacteria for Supplementing. Phosphorus in Transplanted Rice, biosorption of Heavy Metals by Microbes, Phytoremediation Technology: A Quest for Clean and Green Environment, Enzymatic Cotton Delinting: An Attempt to Utilize Linters as a byproduct, Enrichment of Lignocellulosic Materials with Microbial Proteins By Solid State Fermentation - An Inexpensive Method of Preparing Cattle Feed, Eco-friendly Utilization of Biocolours as a Redeemer to Curb Artificial Dye Pollution and Phytoremediation of Soil Contaminated with Nitro Compounds. The Biofertilizer biotechnology encompassing blue-green algae and phosphate solubilizing microorganisms. The above reasons certify that Environmental Biotechnology has emerged as a very important and promising discipline in the last two decades.

Key Word Index: *Biotechnology, Phytoremediation, bioremidation, Environment*

POTENTIAL BENEFITS AND APPLICATION OF SEWAGE SLUDGE IN SOIL IMPROVED LEAFY VEGETABLE GROWTH

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Sewage sludge is a common by-product of municipal wastewater treatment. Sewage sludge, if appropriately managed, can be used to improve organic fertility in intensively cropped degraded soils. Land application of sewage sludge is one of the important disposal alternatives. Being rich in nitrogen, phosphorus, and other plant nutrients like boron, manganese, copper, molybdenum and zinc depending on the specific nature of the sludge material, sewage sludge



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may substitute for inorganic fertilizers. The advantages of reusing waste are providing a convenient disposal of waste products and having the beneficial aspects of adding valuable plant nutrients and organic matters to soil. Crop yield in adequately sludge-amended soil is generally more than that of well-fertilized and control. The application of organic-rich waste material such as sludge to agricultural soils can have a beneficial effect on soil biological, chemical and physical properties and plant growth. Further, it also increases the biochemical composition of vegetables such as chlorophyll content, T.S.S, lycopene, carbohydrate, vitamin-C, acidity and carotenoid content. Therefore, there is an increasing interest in the agricultural use of treatment plant with sludge.

Key Word Index: *Sewage sludge, Biochemical constituents, Vitamin-C, Inorganic fertilizers and Organic manures*

DETERMINATION OF ACUTE TOXICITY OF BIS (2-ETHYLHEXYL) PHTHALATE AND RELATED BEHAVIOURAL CHANGES IN *CARASSIUS CARASSIUS* (CRUCIAN CARP)

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Phthalates (esters of phthalic acid) especially di (ethylhexyl) phthalate mainly used as plasticizers have attracted special attention of the scientific community, regulatory agencies and the general public as a consequence of their high production volume and widespread use. In this study 96h LC₅₀ value of Bis (2-ethylhexyl) phthalate was determined in Crucian carp (*Carassius carassius* L.) The experiments were planned with total of thirteen doses of DEHP employing the semi-static test method of acute toxicity. 10 fishes were placed in each replicate of each dose. The study was carried out using 60L aquaria. The aquaria were aerated with a central system for a period of 48h and the fish were exposed to period of 96h. Acclimatized fishes were not fed 24h before the start of the tests. Care was taken in order to keep the mortality rate of fish not more than 5% in the last four days before the experiment was started. Behavioural changes in the Crucian carp were determined for each DEHP concentration. The data obtained were statistically evaluated by the use Behren and Kerber's method and a 96h LC₅₀ value for *Carrassius carassius* was determined in a semi-static bioassay system. The water temperature was kept between 21 and 23⁰C. The behavioral changes observed in fish were, swimming in imbalanced manner, capsizing, attaching to the surface, difficulty in breathing and gathering around the ventilation filter.

Key Word Index: *di (ethylhexyl) Phthalate, acute toxicity, Lc₅₀, crucian carp, Semi-static test system.*



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FLORISTIC COMPOSITION CHANGE REPORTED AS A RESULT OF GRAZING AT SELECTED SITE (GRAZED SITE- YOUSMARAG) IN KASHMIR VALLEY, INDIA

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In the Indian Himalaya, the grasslands occupy about 35% of the geographical area. The different types of the Himalayan grasslands include the warm temperate grasslands, cold temperate and subalpine grasslands, alpine meadows, the steppes of cold-arid regions, and the alpine scrub. Although, they differ from one another in terms of origin, structure and composition; nevertheless they all support a large number of wild herbivores, domestic livestock, and agro-pastoral activities. Kashmir Valley has vast land area (16%) under grasslands which play an important role in providing economic goods and ecosystem services to the society. Livestock, particularly the migratory flocks, are entirely dependent on these grasslands. They serve as bedrock for sustaining the core economic activity of livestock rearing in the region. Apart from sustaining this pivotal economic activity, grasslands harbor a rich and endemic biodiversity, and regulate the regional carbon, nutrient and hydrological cycles. The data pertaining to Grazed site (Yousmarag) revealed the presence of twenty four herb species in spring season, the highest density was shown by *Cynodondactylon* (415800 ha^{-1}), maximum frequency (100%) was observed by *Achillea mill folium* and highest abundance was reported in *Cynodondactylon* (554200 ha^{-1}). It is evident from the data that out of the twenty four herbaceous species a total of nineteen were recorded in summer season, the highest density was shown by *Cynodondactylon* (554200 ha^{-1}), the maximum frequency (100%) was observed in *Cynodondactylon* while maximum abundance was reported in *Cynodondactylon* (554200 ha^{-1}). A total of nineteen herbs species were found in autumn season amongst the twenty four species reported at this site. Maximum density was recorded in *Cynodondactylon* (284100 ha^{-1}), maximum frequency (100%) were recorded in *Cynodondactylon*, while highest abundance was reported in *Cynodondactylon* (284100 ha^{-1}). In all three seasons, it was observed that *Cynodondactylon* had maximum importance value index (IVI). IVI for *Cynodondactylon* was maximum in autumn (64.20 ha^{-1}) season followed by summer (58.42 ha^{-1}) and minimum was in spring (39.39 ha^{-1}).

Key Word Index: *grasslands, grazing, density, frequency and importance value index (IVI).*

GENOTOXICITY AND MUTAGENICITY OF SHRI MAHARAJA HARI SINGH (SMHS) HOSPITAL WASTE WATER EFFLUENT USING *ALLIUM CEPA* AS A MODEL PLANT

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Allium cepa assay was used for assessing the genotoxicity of biomedical waste effluents of SKIMS hospital. Samples of untreated wastewaters from outlet pipes were collected twice daily. Physico-chemical parameters of the wastewaters were determined in accordance with standard methods. The toxic status of the waste water was assessed by onion root inhibition test, while genotoxicity was measured by microscopic investigation of the chromosomal aberrations. Before measuring the root lengths, the onion bulbs were exposed to 25%, 50%, 75% and 100% concentrations of the effluent samples in the dark for 72 hours. The mean root lengths of onions exposed to different concentrations of the effluent were measured every day for 5 days and EC50 values were determined from the growth curve. There was a significant decrease in root length of the experiment. Also the mitotic index decreased as concentration increased. Results of BOD, COD, TSS and pH showed levels above the maximum permissible limits for discharge of hospital effluent into the environment. Compared to control, *Allium cepa* shows root growth inhibition in a concentration dependent pattern. Cytological analysis of root tips after 48 hrs exposure to the different concentrations showed reduction in frequency of mitosis in the meristematic zones of the root tips. In the treated cells, various types of structural chromosomal aberrations were induced. The SMHS hospital wastewaters should be treated before discharge into the environment as samples are believed to contain potent toxic substances that provoked the genotoxic responses and should be treated before discharge into the environment.

Key Word Index: *Microscopic, waste water, outlet pipes, effluent*

BIOCONTROL AGENTS AS ECOFRIENDLY ALTERNATIVES FOR DISEASE MANAGEMENT OF TULIP

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Kashmir valley with its ideal climatic conditions and soil fertility has a tremendous potential for floriculture, the evidence of which is the establishment of Asia's one of the biggest tulip gardens in Srinagar. Kashmir valley is the global tourist destination and tulip garden which was established in 2008 is yet another feather in the cap of Kashmir tourism industry. The main purpose of establishing tulip garden was to pre pone the tourist season in the valley. This not only boosts tourism but also helps in the employment generation in the fields of agriculture and floriculture. However, there are a number of constraints in tulip cultivation among which diseases occupy a prominent place. The various diseases affecting tulip are Tulip break, Tobacco necrosis, spot anthracnose, bulb rot, tulip fire, gray mold and root rot. Bio-control agents are emerging as a effective alternatives to fungicides which are detrimental to crop, humans as well as environment. Some of the bio-control agents which have shown promise in disease management are *Trichoderma harzianum*, *Pseudomonas fluorescens* and *Bacillus subtilis*. These bio-control agents not only manage various soil borne diseases of tulip but also significantly increase sprouting, size and weight of bulbs with an added advantage of being cost effective and environment friendly, thus resulting in reduced pressure on agrochemicals and conservation of soil microflora.



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Key Word Index: *tulip, bio-control agents*

FORCASTING OF PRODUCTION AND PRODUCTIVITY OF RICE IN JAMMU AND KASHMIR, INDIA USING ARIMA MODEL

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Early prediction can be very helpful to the policy makers, planners, research workers and farmers in particular for making the future plans of important crops grown in the state, especially rice which is the staple food of Jammu and Kashmir, and can thus be helpful for comparing the past performances with the present accomplishments and therefore forecast the crop area, production and productivity in advance and hence helping in improving the economy of the state. The present study attempts to forecast the area, production and productivity of rice in the state of Jammu and Kashmir. Data for the period of 1990-91 to 2016-17 was analyzed by time series methods. Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) were calculated for the data. Appropriate Box Jenkins Auto Regressive Integrated Moving Average (ARIMA) model was fitted. Validity of the model was tested using standard statistical techniques. For forecasting area, production and productivity ARIMA (0, 1, 2), (0, 1, 1) and (0, 1, 1) model respectively were used to forecast five leading years.

Key Word Index: *Prediction, Rice, ARIMA, Production and Productivity.*

ECOTOURISM AND ENVIRONMENT

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Eco-tourism is a form of tourism that involves visiting natural areas in the remote wilderness or rural environments, according to the definition and principles of ecotourism established by The International Ecotourism Society (TIES) in 1990, ecotourism is “Responsible travel to natural areas that conserves the environment and improves the well-being of local people.” Nature Education is also a new name for eco-tourism, which varies in accordance with the ecological setting and seasonal attribute of the site. The potential of eco-tourism involving local indigenous communities for their economic up-liftmen has now been recognized. Essentially it aims at the enjoyment of nature and an understanding of the ecology, without causing the least destruction to its support system, leading to economic benefits for the indigenous masses.

Eco-tourism is distinct from mass tourism. It is multifaceted, having various intricate linkages with different forms of human activity, with domestic, regional, and international characters. Eco-tourism plays an important role in the shaping of national economy. The socio-



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economic and ecological impact of eco-tourism is relevant to a developing country like India, and it is evolving new concepts and ideas with the time.

Ecotourism affects local environments in many ways. Although some of the most dramatic environmental changes result from development of the infrastructure to support tourism, more widespread impacts result from the recreational activities that tourists engage in. For ecotourists engaged in adventurous pursuits, hiking and camping are perhaps the most common activities that can have profound ecological impacts. This is particularly true in more remote places, protected as parks or wilderness. Of the many environmental effects of hiking and camping, impacts on soil and vegetation have been most thoroughly explored. Consequently, the literature on this subject is voluminous and is a challenge to review thoroughly.

Key Word Index: *Ecology, Environment, Tourism, Local people, Conservation, Economy, effects.*

SIGNIFICANCE, PRODUCTION, PHYSIOCHEMICAL CHARACTERIZATION, MODE OF ACTION AND APPLICATIONS OF MICROBIAL LACCASE

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Laccase (Benzenediol: Oxygen oxidoreductase, EC 1.10.3.2) is a multi-copper-bearing lignolytic enzyme, which catalyzes the one-electron oxidation of many phenolic compounds with concomitant reduction of oxygen to water. The laccase catalysis occurs due to the reduction of one oxygen molecule to water accompanied with the oxidation of one electron with a wide range of aromatic compounds which includes polyphenol, methoxy-substituted monophenols and aromatic amines. It is widely distributed in the higher plants, some insects, a few bacteria and fungi. Most of the known laccases are of fungal origin, in particular from the white rot fungi. These fungi secrete lignolytic enzymes which generate radical species that cause the complete biodegradation of lignin polymers. Because of the complex structure of lignin the biodegradation system is highly non-specific; therefore lignolytic enzymes can be used in the degradation of environmental pollutants that differ structurally. The ability to oxidize priority pollutants with somewhat low substrate specificity has attracted interests in its possible use in wastewater treatment and bioremediation. The laccases have been found in Ascomycetes, Deuteromycetes and Basidiomycetes; being particularly abundant in many white-rot fungi that are involved in lignin metabolism. Fungal laccases have higher redox potential than bacterial or plant laccases (up to +800 mV) and their action seems to be relevant in nature. Recently a novel polyphenol oxidase with laccase like activity was mined from a metagenome expression library from bovine rumen microflora. The fungal laccases are involved in the degradation of lignin or in the removal of potentially toxic phenols arising during lignin degradation. Concerning their use in the biotechnology area, fungal laccases have widespread applications, ranging from effluent decolouration and detoxification to pulp bleaching, removal of phenolics from wines, organic



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synthesis, biosensors, synthesis of complex medical compounds and dye transfer blocking functions in detergents and washing powders, many of which have been patented. The biotechnological use of laccase has been expanded by the introduction of laccase-mediator systems, which are able to oxidize non-phenolic compounds that are otherwise hardly or not oxidized by the enzyme alone. The ability to oxidize priority pollutants with somewhat low substrate specificity has attracted interests in its possible use in wastewater treatment and bioremediation.

Key Word Index: *Laccases, Lignolytic Enzyme, Degradation of Aromatic Compounds*

POST-HARVEST PHYSIOLOGY OF FRUITS AND VEGETABLES

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Postharvest Physiology is the scientific study of the physiology of living plant tissues after they are denied further nutrition by picking from the parent plant. About one-third of the fruits produced worldwide are never consumed by humans due to loss at various stages and the losses are generally more in developing countries in comparison with developed countries especially when compared between production and retail sites (Kader 2005). Fruits, in general, show two distinctive respiratory patterns during ripening and on this basis fruits are categorized into climacteric and non climacteric groups (Kader and Barrett 2003). Post harvest physiology has direct applications to postharvest handling in establishing the storage and transport conditions that best prolong shelf life, for example 1-Methylcyclopropene (1-MCP) is an inhibitor of ethylene perception that can delay or prevent ripening and senescence processes in plant tissues (Sisler and Serek, 2003). Pre-harvest factors also effect the post harvest life of fruits and vegetables. Controlled atmosphere storage has been shown to be effective in reducing the post harvest losses and prolonging the life of the produce by proper management of respiration via alteration in the gaseous composition and storage temperature. Proper understanding of the biochemistry and the underlying physiological factors will go a long way in minimising the post harvest losses and thereby improving the socio-economic condition of the farmers particularly in the developing countries.

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WOMEN'S ROLE IN AGRO-BIODIVERSITY CONSERVATION

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Biodiversity may be the basis of human well-being but human habits threaten to deplete it. Its definition is broad, spanning diversity between ecosystems and species & also within species (genetic diversity). Agro-biodiversity encompasses all relevance to food, agriculture & the sustainability of agro-ecosystems. Agro-biodiversity is the source of genetic material that is vital to future generations. The convention on Biological Diversity in its preamble recognizes "the vital role that women play in the conservation & sustainable use of biological diversity and affirms the need for full participation of women at all levels of policy making & implementation for biological diversity conservation". Women play an important role in conserving agro-biodiversity, due to their important role in household activities, and the influence they have on their children, by teaching them about the importance of nature and conserving biodiversity. Across the globe, women predominate as wild plant gatherers, home gardeners & plant domesticators, herbalists & seed custodians. Women provide close to 80% of the total wild vegetable food collected in 135 different subsistence based societies. Women often have specialized knowledge about the neglected species. The challenge for the next generation is the safeguarding of agro-biodiversity by paying greater attention to diverse & integrated agricultural systems especially those managed by women that provide food and livelihood security. The maintenance of plant and animal diversity will protect the ability of men and women farmers to respond to changing conditions, to alleviate risk and to maintain and enhance crop and livestock production, productivity and sustainable agriculture.

Key Word Index: *Women, agro-biodiversity, conservation*

IN VITRO FLOWERING IN AMMI MAJUS L.

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Ammi majus L (Apiaceae/umbelliferae) is well known for its horticultural significance. The seeds contain drugs used in Unani system of medicine. Since, *Ammi majus* L. is a seasonal plant it is hard to get the material in the entire year for the purpose of drugs. Keeping in view the medicinal value of this plant it has been tried to study *in vitro* for its callusing and morphogenic potentials. MS medium fortified with IAA (2mg l⁻¹) + Kn (1.5 mg l⁻¹) results in complete direct



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regeneration of the whole plant. So that the raw material can be made readily available as and when needed.

Abbreviations MS - Murashige and Skoogs medium, BAP- 6 Benzyl amino purine, KN-Kinetin, IAA- Indole 3 acetic acid, IBA Indole 3 butyric acid, *in vitro*

Key Word Index: *Ammi majus*; *callus*; *leaf explants*; *nodal*; *regeneration*; *tissue culture*.

TRICHODERMA: AN EFFECTIVE AND ECOFRIENDLY BIOCONTROL AGENT

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Due to increase in disease emergence various strategies including the use of fungicides and utilization of biological control agents are being used to manage the plant diseases. The excessive use of fungicides lead to contamination of soil and water. Moreover, many components of fungicides are recalcitrant and persist in environment for long period of time. The non- judicious use of chemicals in agriculture has been a subject of public concern due to harmful effects on environment, non-target organisms and their possible carcinogenic effects. Secondly, manufacturing of these chemical fungicides results in production of greenhouse gases viz., CO₂ and NO₂, thereby contributing to the global warming. Application of biological control agents for managing the plant diseases gained popularity as a way to reduce or eliminate the use of synthetic fungicides. Under the changing agricultural scenario, the only technology that seems promising to manage the plant diseases without disturbing the equilibrium of harmful and useful composition of environment and ecosystem is the use of more and more biocontrol agents. Among the various biological control agent of fungal and bacterial origin, *Trichoderma* species is the most intensively studied species. The biocontrol activity of *Trichoderma* is of immense importance to agriculture as well as to environment as it does not accumulate in the food chain and thus does no harm to plants, animals and humans. They possess several control mechanisms to combat against phytopathogenic organisms. These biocontrol mechanisms include competition with plant pathogens, mycoparasitism, antibiosis, production of lytic enzymes and secretion of secondary metabolites. Various isolates of *Trichoderma* isolated from different fields viz., *Trichoderma viride*, *T. harzianum*, *T. longibrachiatum*, *T. hamatum* and *T. koningii* are efficient biocontrol agents which have the ability to inhibit the growth of soil borne pathogens, hence improve the overall health of the plant and were found to reduce significant diseases caused by fungal pathogens including: *Phytophthora palmivora*, *Rhizoctonia solani*, *Fusarium* spp., *Sclerotium rolfsii* and *Pythium* spp.



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PERMACULTURE AS AN ECOLOGICAL APPROACH TO DEVELOP URBAN GREEN AREAS

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Ecological design requires solutions which adopts the nature as a model in designing the area, which are also compliant with the natural processes and the structural and ecological features of the area. Intensive use of areas in order to make the highest benefit from the area gives damages to the natural structure. Permaculture, considered as an ecological approach in urban areas, is defined as conscious design and maintenance of the agriculturally fruitful ecosystems which have the variety, stability and flexibility of the natural ecosystems. These are harmonized integrations which satisfy the needs of people living on them with sustainable food, energy, shelter and other tangible and intangible needs. The main objective of sustainable landscape design is to develop a self-sufficient and sustainable system which can be a part of the urban ecosystem. In this regard, approaches taking the nature as a model and bringing systematic solutions to the structural and ecological features of the area should be adopted. One of these approaches is permaculture design within the ecological design. Appropriate areas inside the city should be converted to application areas called permaculture based on the functioning of the ecosystem. The contributions of the ecological design in urban green areas to the environmental, economic and social sustainability targets in an urban structure are clear. Urbans are the places where the area usage and the people's effect are utmost. Continuously decreasing green areas in urbans disrupt the relationships between humans and the environment and this accordingly causes growing ecological problem in urban areas. These issues signify in today's cities that the urban development is left to an uncontrolled development and change and is deprived of an ecological basis.

Key Word Index: *Permaculture, sustainable, ecosystem, landscape, urban green areas*

THE CURRENT INDIGENOUS TOURISM INDUSTRY

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Internationally the term 'indigenous' is used most broadly to refer to the first peoples of a given region but regional terms may vary. Indigenous tourism can be defined as a tourism



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activity in which indigenous people are directly involved either through control and/or having their culture serve as the essence of the attraction. Globally indigenous tourism is commonly viewed as a means of facilitating socio-economic benefits to indigenous individuals, communities and host region. A tourist visiting an aboriginal cultural tourism site may experience cultural tourism by looking at museums, eating at restaurants that serve indigenous food, by staying at hotels and resorts owned by indigenous people etc. indigenous tourism provides an opportunity to promote greater cultural understanding while providing economic benefits to indigenous community. The decision making power regarding indigenous tourism must lie with the indigenous community of the region. For example, what to share with tourists and how that is to be done, these decisions must be made by the indigenous community. It is an increasingly central part of tourism economy. Today's travelers are attracted to many global destinations because of the opportunity to interact with and learn from other cultures. It is important for the tourists visiting indigenous regions to be informed about and knowledgeable about indigenous tourism. Tourists should be respectful of the customs and traditions of indigenous community they are visiting and they should not do anything to deteriorate environment of the indigenous region.

INTEGRATED MICRO-WATERSHED MANAGEMENT USING REMOTE SENSING AND GIS

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Kangan is a town at distance of 30 kms from Ganderbal district, of Jammu and Kashmir, India. It is situated across the Nallah Sindh and spread over a 50 km long gorge valley. It lies between 34°10' N 74°33' E / 34.16°N 74.55°E. . The study area consists of one micro-watershed, Gojjar-pathi (3-1), covers a geographical area of 33.99 km². The present study was undertaken for estimating the availability and condition of natural resources and to provide effective and efficient management techniques by using land use/land cover, drainage map, ground water map, geology map to assess soil erosion susceptibility and ground water recharge. Geographic information system (GIS) an essential tool for integrated watershed management and planning tasks. For the GIS mapping drainage network, topography, flow path of water are to be easily located. The analysis of different maps has revealed that the micro-watershed Gojjar-pathi (3-1) needs immediate management of natural resources. In the micro-watersheds, Gojjar-pathi (3-1) some engineering measures have been adopted to recharge the ground water resources, but it has been found that these measures don't work with full capacity in some cases. In the Gojjar-pathi (3-1) micro-watershed area, demand of water for agriculture and drinking purpose is increasing rapidly depleting water resources coupled with overpopulation. The level of ground water in an area more than 80% is under moderate to poor and efficient measures should be taken to increase level of ground water in area of micro-watersheds.

Key Word Index: Engineering measures, Watershed management techniques, ground water storage, Geographic information system



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MORPHOLOGICAL CHARACTERIZATION AND VARIABILITY STUDIES IN VEGETABLE AMARANTH (*AMARANTHUS* SPP.)

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The present investigation entitled “Morphological Characterization and Variability Studies in Vegetable Amaranth (*Amaranthus* spp.)” was undertaken to establish morphological characterization, estimate the coefficients of variability, heritability, genetic gain, in twenty seven genotypes of vegetable amaranth. Observations were recorded on various morphological, quantitative and quality traits. Characterization indicated wide variability with respect to leaf colour, inflorescence colour and stem colour. Other traits also exhibited considerable variability. Analysis of variance revealed significant differences among genotypes for all the traits studied. The maximum range was recorded for plant height (59.66-302.99cm) followed by number of leaves plant⁻¹ (50.20-170.33), vitamin C content (39.37-130.70 mg/100g), leaf yield (10.73-89.68q ha⁻¹) and leaf area (4.51-68.42cm²). The highest phenotypic and genotypic coefficients of variability were observed for lateral spikelet length followed by anthocyanin content, inflorescence length, leaf area, stem thickness and petiole length leaf, yield per hectare, leaf yield plant⁻¹, plant height, number of branches plant⁻¹, leaf length, number of leaves plant⁻¹. In general the phenotypic coefficients of variation were slightly higher than the corresponding genotypic coefficients of variation, which indicates the minor role of environment in the expression of traits. The estimates of heritability in broad sense were high for all the characters.

Key Word Index: *Characterization, variability, heritability.*

DETERMINATION OF ACUTE TOXICITY OF BIS (2-ETHYLHEXYL) PHTHALATE AND RELATED BEHAVIOURAL CHANGES IN *CARASSIUS CARASSIUS* (CRUCIAN CARP)

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Phthalates (esters of phthalic acid) especially di (ethylhexyl) phthalate mainly used as plasticizers have attracted special attention of the scientific community, regulatory agencies and the general public as a consequence of their high production volume and widespread use. In this study 96h LC₅₀ value of Bis (2-ethylhexyl) phthalate was determined in Crucian carp (*Carassius carassius* L.) The experiments were planned with total of thirteen doses of DEHP employing the semi-static test method of acute toxicity. 10 fishes were placed in each replicate of each dose. The study was carried out using 60L aquaria. The aquaria were aerated with a central system for a period of 48h and the fish were exposed to period of 96h. Acclimatized fishes were not fed 24h



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before the start of the tests. Care was taken in order to keep the mortality rate of fish not more than 5% in the last four days before the experiment was started. Behavioural changes in the Crucian carp were determined for each DEHP concentration. The data obtained were statistically evaluated by the use Behren and Kerber's method and a 96h LC₅₀ value for *Carrassius carassius* was determined in a semi-static bioassay system. The water temperature was kept between 21 and 23⁰C. The behavioral changes observed in fish were, swimming in imbalanced manner, capsizing, attaching to the surface, difficulty in breathing and gathering around the ventilation filter.

Key Word Index: *di (ethylhexyl) Phthalate, acute toxicity, Lc₅₀, crucian carp, Semi-static test system.*

BIOCHEMICAL STUDIES ON THE EFFECT OF RADIATION AND CHEMICAL TREATMENTS ON QUALITY AND SHELF-LIFE OF STRAWBERRY

SabahatMushtaq, Sajad Ahmad Bhat, ImtiyazMurtaza, Irtiza Siddiqui

A study was conducted at division of Basic Sciences and Humanities, SKUAST-Kashmir, Shalimar in summer season of 2017 to improve the post-harvest life of strawberry (*fragaria* × *anannasa* Cv. Chandler) fruits using various treatment and storage temperature combinations. The different treatment and storage temperature combinations used were ambient storage (T₁, control), simple refrigeration at 4⁰C (T₂), simple refrigeration at 2⁰C (T₃), hot water treatment and storage at 2⁰C (T₄), calcium lactate (2.0%) treatment and storage at 2⁰C (T₅), chitosan (0.5%) treatment and storage at 2⁰C (T₆), UV-C irradiation treatment and storage at 2⁰C (T₇) and gamma (1.5kGys) irradiation treatment and storage at 2⁰C (T₈). The effect of these chemical and irradiation treatments was studied on various physiological and biochemical parameters and shelf life of fruits. The various parameters recorded included physiological weight (g), total soluble solids (TSS), total sugars (%), anthocyanin content (mg/100g), titratable acidity (%), total phenols (mg/100g), β-Carotene content (μg/100g), ascorbic acid content (mg/100g), membrane stability index (%), water activity, visible decay (%), *L*a*b** values and overall acceptability for at least fifteen days of storage. All the treatments proved effective in retaining the quality and appearance of the fruit as compared to control (T₁) however, the fruits treated with calcium lactate (2%) and stored at 2⁰C (T₅) performed better in terms of titratable acidity (%), membrane stability index (%), total phenolic content (mg/100g), total sugars (%), *L*a*b** values, β-carotene (μg/100g), total soluble solids (°Brix), ascorbic acid content (mg/100g), physiological weight loss (g), colour and flavour. The fruits treated with gamma irradiation (1.5 kGys) stored at 2⁰C (T₈) performed better in terms of texture, flavour and overall acceptability followed by treatment T₅ which was statistically at par with T₈. Overall, fruits treated with 2.0% calcium lactate and stored at 2⁰C (T₅) were able to slow down the deterioration of the nutritional aspects and appearance till at least fifteen days of storage and performed comparatively better in improving the postharvest life of strawberry (*fragaria* × *anannasa* Cv. Chandler).



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ouLifr 'kkl= foHkkx] 'kkl- Lukrd egkfo|ky;] flouh $\frac{1}{4}e-iz-\frac{1}{2}$

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