PROCEEDINGS OF THE
INTERNATIONAL CONFERENCE ON
RECENT TRENDS IN ZOOLOGY, BIODIVERSITY, GENETICS &
ENVIRONMENTAL SCIENCES 2018
Govt of India Approved International Conference
MHA Vide F.No42180123/CC-603 ; MEA Vide F. No. AA/162/01/2018-1583

Dec 04-05, 2018


Editors
Dr. Bela Zutshi
Dr. Ratnakar D B

Jointly Organized by
DEPT OF ZOOLOGY, JB CAMPUS, BANGALORE UNIVERSITY, BANGALORE &
INTERNATIONAL MULTIDISCIPLINARY RESEARCH FOUNDATION (IMRF), INDIA
EDITORIAL

Dear Associates

Welcome to each and every one of you congregated for the prestigious IMRF's 93rd International Gathering - International Conference on Recent Trends in Zoology, Biodiversity, Genetics & Environmental Sciences 2018 jointly organized by Department of Zoology, JB Campus, Bangalore University and International Multidisciplinary Research Foundation (IMRF), India which is considered to be one of the premier events for the distinguished academic and research cult.

We know that an academic conference is a symposium for inventive academicians and imaginative researchers to give academics an opportunity to present their academic works, concepts and new discoveries and to exchange their ideas and develop their works and also to share idea in presenting for development in the new research and topics and so forth. Together with academic or scientific journals, conferences plausibly provide a central channel for exchange of information among earnest researchers.

Globalization is a fact, its internalization process integrates multidisciplinary fields to embark on an adventure in the realm of academics and research. We are pleased to unveil the fact that this Copy of Proceedings marked with ISBN No 978-93-86435-61-3 presents an educative network of research with strength of quality, originality and contribution to knowledge of significant fields of multidisciplinary realms duly identified by the solemn research portals and academic destinations in the world.

While presenting you with this sonata of latest academics and research findings, We humbly place on record our loyal acknowledgements of sincere appreciation, due recognition and heart-felt thanks to the Vice Chancellor - Dr. K.R. Venugopal; Registrar - Dr. B.K. Ravi; Administration JB Campus, Bangalore University; and all intellectual paper presenters, article contributors, members on the esteemed Editorial Board, Dept of Zoology, JB Campus, Bangalore University Academic and Supportive Staff, Guest Faculty, Scholars and Students, foreign-national delegates, erudite plenary speakers, scholarly participants and all those who are directly or indirectly in conformity with this conference from home and abroad for their righteous everlasting support in one and all aspects and my sincere thanks to Institutes of Higher Learning, for their ever dynamic support and cooperation. Gratitude is attitude!

With effusive thanks,
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President: Prof. Dr. K.R. Venugopal  
The Vice - chancellor, Bangalore University, Bangalore  
Key Note: Dr. Sandip K. Mishra  
Research Advisor (Cancer Research), Academy of Sciences and International Cooperation Centre, Singapore  
Formerly Faculty in UR MD Anderson Cancer Center, TX, USA.  
Technical Session 1  
Chairperson: Dr. M D Subash Chandran  
Consulting Scientist & In charge, Field Station of Centre for Ecological Sciences (CES), Indian Institute of Science (IISc), Kumta & Bangalore  
Key Talk: Prof. Dr. P.D. Prasada Rao  
Formerly: INSA Senior Scientist, National Environmental Engineering Research Institute, Nagpur & Professor and Head, Nagpur University, Zoology Department, Nagpur.  
Key Talk: Dr. Kaiser Jamil  
Emeritus Research Scientist and Head, Genetics Department, Bhagwan Mahavir Medical Research Centre, Hyderabad |
| 11.45 to 12.00  | High Tea                                                                                                                                              |
| 12.00 to 12.45  | Technical Session 2  
Chairperson: Dr. Kaiser Jamil  
Emeritus Research Scientist and Head, Genetics Department, Bhagwan Mahavir Medical Research Centre, Hyderabad  
Key Talk: Dr. M D Subash Chandran  
Consulting Scientist & In charge, Field Station of Centre for Ecological Sciences (CES), Indian Institute of Science (IISc), Kumta & Bangalore  
Key Talk: Dr. Mohammed Al Saiqali  
Professor of Microbiology, Ministry of Health, Palestine  
Vice Chairman of World Organization of Students &Youth  
Special Presentation: Ms. Sabrine Chelly EP Miladi  
Department of Biology, Faculty of Sciences, University of Sfax, Sfax, Tunisia. |
| 13.30 to 14.15  | Lunch                                                                                                                                               |
| 14.15 to 15.00  | Technical Session 3  
Chairperson: Prof. Dr. P.D. Prasada Rao  
Formerly: INSA Senior Scientist, National Environmental Engineering Research Institute, Nagpur & Professor and Head, Nagpur University, Zoology Department, Nagpur.  
Key Talk: Dr. Vidhyadhara S.  
HOD & Senior Spine Surgeon, Manipal Hospital, Bangalore, Karnataka  
Key Talk: Dr. Jai Prakash, B.S  
Director. Instt. of Environment& Hazardous Management, K.R. Road Bangalore-004 |
| 15.00 to 15.45  | Coffee Break                                                                                                                                         |
| 16.15 to 17.30  | Paper Presentations in 5 Parallel Sessions                                                                                                         |
| 18.00 to 20.00  | Conference Dinner                                                                                                                                  |
| 08.30 to 09.30  | Break Fast & Formal Registrations                                                                                                                  |
| 09.30 to 10.15  | Technical Session 4  
Chairperson: Prof. Dr. P.D. Prasada Rao  
Formerly: INSA Senior Scientist, National Environmental Engineering Research Institute, Nagpur & Professor and Head, Nagpur University, Zoology Department, Nagpur.  
Key Talk: Dr. Vidhyadhara S.  
HOD & Senior Spine Surgeon, Manipal Hospital, Bangalore, Karnataka  
Key Talk: Dr. Jai Prakash, B.S  
Director. Instt. of Environment& Hazardous Management, K.R. Road Bangalore-004 |
| 11.45 to 12.45  | Cultural Evening                                                                                                                                 |
| 12.45 to 13.30  | Special Presentation: Ms. Sabrine Chelly EP Miladi  
Department of Biology, Faculty of Sciences, University of Sfax, Sfax, Tunisia.  
Key Note: Dr. Sandip K. Mishra  
Research Advisor (Cancer Research), Academy of Sciences and International Cooperation Centre, Singapore  
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Technical Session 1  
Chairperson: Dr. M D Subash Chandran  
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<p>| 15.00 to 15.45  | Coffee Break                                                                                                                                         |
| 16.15 to 17.30  | Paper Presentations in 5 Parallel Sessions                                                                                                         |
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Invited Talks
INFLUENCE OF ENVIRONMENTAL ADVERSITIES ON BIODIVERSITY AND HUMAN HEALTH

DR. P.D. PRASADA RAO

Abstract: Most living organisms survive successfully, interact in different ways, reproduce and flourish well so long as the environmental factors such as the aggregate of surrounding things, conditions or influences remain favorable.

India is one among the 17 mega-biodiversity countries and exhibits two biodiversity hotspots i.e., Eastern Himalayas, and Western Ghats. The biodiversity of the Western Ghats has been investigated and the richness of animal prevalence documented; however, there are ongoing studies that bring to light new species.

While adequate environmental conditions existed early, several anomalies have crept into the environment that impacted the biodiversity, animal and human life adversely. These environmental misfortunes include global warming, increase in aquatic and air pollution etc., but most hardships are human-driven. A gradual decline in arctic sea ice area of coverage, due to melting, has been spectacular.

As a result of global warming and other adverse environmental changes such as light and noise pollution, several animal species have become endangered and some are on the verge of extinction. An alarming situation that emanated out of global warming is its impact on human life. Increased temperatures have also resulted in human death toll both in Europe and the U.S. There are strong data that indicate that south Asian population would suffer severely after 2100. Thus it is clear that climate change and global warming does not end with faunal and floral extinction, but is going to cause severe problems including difficulties in human survival on this planet. Recent studies warn that up to 75 percent of people could face deadly heat waves by 2100 unless carbon emissions plummet.

***

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MICRORNAS AS BIOMARKERS AND PREDICTORS OF ORAL CANCER

DR. KAISER JAMIL, DR. RAMAKRISHNA M

Abstract: Background: Oral cancer is defined as uncontrollable growth of cells seen in the oral cavity. It appears as a growth or sore in the mouth that does not cure. Oral cancer can affect the mouth, palate, sinuses, and pharynx. Squamous cell carcinoma is the most common type of oral cancer. MicroRNAs (miRNAs) have been shown to be involved in a wide range of biological processes. A significant role for miRNA in cancers is to target their expression level through their respective signaling pathways. The current study analyzed gene expression profiles of a few microRNAs such as miR-21, miR-137, miR-200c and miR-205 in pathogenesis of oral squamous cell carcinoma (OSCC).

Methods: Biopsy samples were collected from 50 patients recently diagnosed with oral cancer along with corresponding nonmalignant portions, with the approval of Institutional Ethics Committee. Quantitative real time PCR (qRT PCR) was used to quantify the levels of miRNAs expression. The association between miRNA expression levels and clinico-pathological parameters was analyzed using MedCalc software.

Findings and Interpretation: This study found miRNA-21 was up-regulated (in 54% cases) whereas miR-137 (48%), miR-200c (46%), miR-205 (42% of cases) was down-regulated in OSCC. Among these four microRNAs, only miR-137 was not associated with the risk of OSCC, whereas all other microRNAs were found to be associated with OSCC. This study demonstrated an association of miR-21, miR-137, miR-200c and miR-205 in OSCC with altered gene expression, suggesting that in spite of varying expressions in miRNAs' its role in the development of oral cancer was very much evident. It is suggested that these miRNAs could probably serve as biomarkers for oral cancer management.

Keywords: Oral Cancer, microRNAs, Demographics, Biomarkers, Economic Status, miR-21, miR-137, miR-200c, miR-205, Gene Expression, qRTPCR, Reverse Transcription.

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PERSPECTIVES IN CONSERVATION AND DEVELOPMENT OF WESTERN GHATS

DR. M D SUBASH CHANDRAN

Abstract: Despite the phenomenal growth of conservation science and increasing applications of its principles on the Western Ghats, a global biodiversity hotspot along with Sri Lanka, the peak of the South West Monsoon of 2018, witnessed unprecedentedly catastrophic backlash from nature causing heavy losses to humans and to the ecosystems themselves, the dimensions of which are yet to be understood. The situation calls for developing new perspectives, in the applications of conservation science on the Western Ghats, taking into consideration its geological background and ecological complexity. The increased need is felt for understanding the ‘ecological fragility’, an abstract concept in itself. Some parameters for measuring ecological fragility of any given location along especially windward side and crests of the Western Ghats, which hold the bulk of endemic biodiversity and threatened species, are proposed here. The ecological fragility/sensitivity measurement can be used as an appropriate helpful tool for redesigning future developmental plans for such areas. The units for consideration of the application of such integrated approach have to be, for the ease of future administration, a revenue village itself. The elements of landscapes and waterscapes are to be mapped and integrated into a holistic unit. Pooling similar such units in contiguity encompassing ecosystems as a whole within homogenous zones are essential for sustained developmental programs.

The ecological reappraisal of such integrated units will involve:
1. Consideration of latitudinal positions: The lower latitudes towards south-west, especially of Kerala, experiencing 8 to 10 rainy months favor greater species diversity and high degrees of endemism, whereas more northern parts, as in Maharashtra, although might experience rainfall intensities of similar kind or even more, have lesser ecological fragility as the entire rainfall comes in a more shorter period of 4–6 months.
2. The absence or deterioration of appropriate natural climax vegetation in south-west parts of the Western Ghats have created greater vulnerability to landslides, apart from floods, as such areas are basically with high moisture soils due prolonged rainy periods. Such places would need restoration of the natural climax established through the principles of forest succession.
3. The western portions of the Western Ghats capturing maximum rainfall might suffer more landslides and floods whereas the leeward slopes of the rain-shadow region facing the east experience more floods from excessive river flows, than landslides. Catchment area restoration is critical in such areas for sustained flow in rivers and contributory streams and for better recharge of the ground water.
4. Soil fragility assessment is very important in relation to its water holding capacity and perennial flow in streams. Soils with lower bulk density and high porosity, necessarily have to be protected using multi-strata canopy forests and not by monoculture tree plantations. The removal of primary or late successional forests in such areas would cause soil erosion, soil compaction, rising temperature, impoverishment of flora and fauna and even slope failures. More porous soils with lower bulk density are ideal for water holding capacity.
5. Ecosystem evaluation and consideration of the presence of threatened species collectively are critical before developmental interventions such as dams, roads, windmills, townships etc. are contemplated. Threatened species are the indicators of threatened ecosystems.
6. Developmental activities are to be restricted to what are prescribed by law especially in the buffer zones around the Protected Areas like wildlife sanctuaries and National Parks.
7. Human impacts on ecologically fragile zones, including agricultural and horticultural activities should strike harmony with surrounding nature rather than leaving trails of destruction of habitats and causing disruptions of ecosystem functioning; for e.g. promotion and retention of native species as shade trees in coffee, cardamom and pepper growing areas will have greater ecosystem value than their replacement with alien species like silver oak of Erythrina.
8. Trees with buttresses, stilts roots, serpentine roots etc are critical in the upper slopes above human habitations and along water courses as greatest stabilizers against slope failures.
9. Multi-layer canopied vegetation should be re-established for soil regeneration, temperature stabilization, for ground water recharges and perennial stream flow.
10. Higher humidity and soil moisture in such areas are critical for survival of endemic and threatened species.
11. People in ecologically fragile areas also have developmental aspirations. Development should integrate the principles of bio-engineering into site-specific ecology. Soil bio-engineering, involving technological and ecological design goals, are much needed for eroding and unstable areas.

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ANTIMICROBIAL PEPTIDES AS AN EFFECTIVE WEAPON AGAINST SUPERBUGS

DR. MOHAMMED AL SAIQALI

Abstract: Antimicrobial peptides (AMPs) are part of innate immunity, establishing a first line of defense against pathogens. Antimicrobial peptides (AMPs) are oligopeptides with a varying number (from five to over a hundred) of amino acids. AMPs have a broad spectrum of targeted organisms ranging from viruses to parasites. Plant antimicrobial peptides (AMPs) are a component of barrier defense system of plants, they have been isolated from roots, seeds, flowers, stems, and leaves of a wide variety of plant species. All plant organs express AMPs constitutively or in response to microbial attack. Plant AMPs are structurally and functionally diverse. Plant AMPs are grouped into six classes and share general features such as positive charge and the presence of disulfide bonds which stabilize the structure. Plant AMPs are classified into thionins, defensins, lipid transfer proteins (LTPs), snakins, knottins, cyclotides and hevein-like AMPs. Besides targeting fungal, bacterial, and oomycete pathogens, certain AMPs can be directed against other organisms, like insects. They have anticancer and antiviral activities. The biological activity of plant AMPs primarily depends on interactions with membrane lipids, using different mechanisms to kill the targeted pathogens, but other modes of action do exist as in the case of defensins. Plant AMPs are considered as promising natural antibiotic compounds with important pharmaceutical, agricultural and biotechnological applications. Therefore, AMPs have a high potential for therapeutic application in healthcare that can be used as natural antibiotics as alternative for their chemical counterparts, for protection of human being, plants, and animals against microbial infection due to their selectivity and mode of action.

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LOW BACK / NECK PAIN

DR. VIDYADHARA S

Abstract: What is Pain?: Pain is a protective reflex in response to an underlying injury / damage. It is only a symptom and not a disease. Treat it like a friend and not an enemy.

More about Pain: Pain is the psychological expression of underlying actual or potential physical injury / damage. Pain has two components – physical (injury) and psychological (expression). Stress (extreme of any emotion such as anxiety, apprehension, fear etc) – amplifies pain and complicates pain.

How Does Pain Get Better?

Human body heals any injury / damage naturally; but it takes time. In 3-months, 90% of people get pain relief on their own. But, the problem is that we are impatient and are offered with lot of options. We don’t let the body heal injury by itself.

Bed rest > 2 days delays recovery by way of worsening the psychological component of pain. Lumbar Belts / Neck Collars > 7 days are proven to be BAD as they cause wasting of trunk muscles. Physiotherapy / spinal injections / pain killers are NOT effective in changing the natural course of healing. Analgesics such as paracetamol can be taken on-demand basis only.

In patients with >2 years of back & neck pain – incidence of depression is >80% and antidepressants are of proven benefit. Smoking has direct link with back & neck pain because of its role in causation and acceleration of disc degeneration – Hence quit smoking.

Dos and Don’ts: When in pain, be within its limits (listen to your body, not to anybody else) and Stay active. Don’t provoke / increase the pain by any activity, as it means that the injury or damage is being increased before Nature heals it.

MRI: Eugene Carraggee (Stanford University, USA) published a paper in New England Journal of Medicine 2005; 352: 1891-98. He analyzed MRI’s of thousands of normal volunteers between 20-40 years of age who never had back pain. He found Slip Disc (55%), Disc Degeneration (60%), Annular Tears (30%) and High Intensity Zone (25%) in > 80% of study population on MRI.

MRI is oversensitive and non-specific tool. It is very tempting tool to both the doctor and the patient. Once the MRI is done, it is very difficult to stop as findings in the report are usually too exaggerated. MRI findings are not used for indication for surgery. We need to treat the patient and not the MRI. If the patient deserves surgery clinically, then MRI becomes gold standard investigation to direct surgery to the exact pathology.

When do we need Surgery / MRI? (Indications for MRI and Surgery are the same)

Absolute indications (Surgeon sells surgery) – irrespective of duration of symptoms, time is money, delay causes increased damage – cry of the dying nerves
1. Gross weakness of limbs
2. Bowel and / or Bladder involvement

Relative indication (Patient buys surgery) – as pain is subjective
3. Functionally disabling pain > 3 months (functional disability is the gap between the expectations and abilities of a person – very highly individualized)

Natural History of Neglected Back/Neck Pain: Back/Neck pain has episodic occurrence. With increasing age and repeated episodes, natural healing capacity reduces and risk of recurrence and persistence of pain increases.

Prevention of Back/Neck Pain: Spine consists of 33 bones and every two bones are connected with each other by three joints (bearings). For these joints, movement is life. If they don't move for a while, they get jammed and then they break on attempted /forced movement. So, flexible spine resists injury/damage while the stiff spine breaks with the smallest of jerks. The permanent solution is to keep all the joints (bearings) in the spine mobile everyday and get back the flexibility by gradual stretching in the form of Iyengar Yoga. Yoga has been proven scientifically to be the best way to cure chronic back/neck pain (Williams K et al Spine 2009; 34: 2066-76). Iyengar yoga increases the flexibility of the spine as well as reduces the stress. Thus it targets both (physical and psychological) components of back/neck pain. Start on Yoga once pain subsides and continue for the rest of life. It is a way of life and not an exercise.

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E WASTE MANAGEMENT-OVERVIEW

DR. B S JAI PRAKASH

Abstract: It is estimated that, on an average, every person on the earth is using about 7 kg of electrical and electronic material. This has resulted in a huge accumulation of discarded electronic materials. At present, more than 80% of the e-waste that is produced is not properly documented and is going to unorganized sectors in developing countries where precious metals are extracted by burning the electronic materials glued to boards and by acid treatment in a dangerous manner. Many workers are untrained teenagers who are not aware of the dangers of burning and acid treatment of e-waste to get the precious metals. In the process they are exposed to serious health hazards. It is the responsibility of the public also not to handover the e-waste materials to unorganized sectors. Every organization, including schools and colleges, should have e-waste collection centres and hand over the materials collected to the authorized sectors.

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FROM ‘TRAGEDY OF COMMONS’ TO ‘WISDOM OF CONSERVATION’: MANAGEMENT ISSUES CONCERNING COASTAL FISHERY RESOURCES OF KARNATAKA

DR. S. M. SHIVAPRAKASHA

Abstract: India is facing the dual problem of overexpansion of its fishing fleet and overexploitation of marine fishery resources. Though it has made tremendous strides in fish production attaining 11.41 m. t. during 2016-17 (of which 3.64 m. t. are from marine fisheries), of late, it is showing symptoms of overexploitation with fisher folk raising hue and cry complaining of ‘fish famine’. Karnataka has 320 Km coastline and 27,000 km$^2$ of continental shelf area with rich pelagic fishery resources. Karnataka’s share of EEZ is 87,000 km$^2$. Karnataka occupies a preeminent position among the maritime states of the country with excellent infrastructure in fisheries sector.

Marine fishery resource potential of Karnataka is estimated at 4.25 lakh tonnes, of which 2.25 lakh tonnes are from 70 m water depth and the remaining 2.0 lakh tonnes are from offshore/deep sea zone. The present annual marine fish yield being 4.14 lakh tonnes. Realizing the dire necessity to conserve fish resources, the Government of India has taken a decision to impose a uniform fishing ban from 1st June to 31st July (61 days) during monsoon season (consequent to the Hon’ble High Court of Goa’s verdict) along the west coast of India which came into effect in 2003-04. The whole idea is that at least one chance shall be given for each fish to breed during monsoon season so that there will be a natural revival of the stock.

In order to create awareness among fisher folk on the need to observe FAO’s Code of Conduct for Responsible Fisheries, an effort was made to sensitize fishermen through street plays, exhibitions, demonstrations, film shows etc. at selected ten fish landing centres along coastal Karnataka, the results of which are highlighted. Besides, trends in marine fish production, issues facing the fisheries sector and the management issues to solve some of the problems facing the industry are also focused.

Keywords: Coastal Fishery Resources, Overexploitation, Fishing Ban, Conservation, Management.

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ROLE OF LEGAL REGIME FOR THE SUSTENANCE OF SUSTAINABLE DEVELOPMENT IN INDIA

DR S. GANAPATHY VENKATASUBRAMANIAN

Abstract: Though Sustainable Development word has come in to existence from Rio Declaration (1992). But if any one could trace the history of the Indian culture, whatever the practices we were doing from time immemorial were all of towards Sustainable Development. But most unfortunately due to the introduction of western culture in to our system it has slowly changed into consumerist culture. From the repair to remove and replace to use and throw culture. Even though the Sustainable Development principle has come into existence since Rio Declaration (1992), strictly and judicially speaking it was in the form of soft law only, which is judicially non enforceable and non obligatory on the part of signatories. It is needless to say India was also partner for the Declaration. But still the soft law was given hard law status in India by our Hon Supreme Court in its landmark judgement in the Vellore Citizen Welfare Forum vs Union of India case in the year 1996. For the effective Environmental Management three “E”s are essential vide Engineering, Education and Enforcement. In Engineering point of view to attain the sustainable development we have to have a comprehensive look and control of all the sources and types of pollution through technological input and ways and means. It is highly imperative to blend the scientific principles into the engineering and develop technology to control and manage the pollution both at the source and end pipe treatment with clean development mechanism where it is possible. The second “E” is Education –namely creating an awareness and sensitizing the people the importance of pollution control, changing the life style and behaviour of the people and practice more ecofriendly methods. Infact Hon Supreme Court in one of its landmark judgements made Environmental Education as one of the compulsory paper in the college and University curriculum irrespective of the branch of study, with same syllabus throughout the length and breadth of the country. Finally with reference to third “E” namely Enforcement here the laws play good amount of role in managing and controlling the Environmental pollution and Environmental Protection. Laws are the tools in the hands of the enforcement agencies to control and combat the pollution. Again for the purpose of enacting the laws the Constitution has give room for the legislature. In this connection it can be very proudly said that India is one among the few countries in the world where the Environmental Protection is given the Constitutional status. We have enacted a plethora of Environmental Legislations in the last two decades in addition to the Indian Penal Code for the effective environmental management. Apart from this Legislature, Executive, the third arm and pillar of the democracy namely Judiciary also played a very active role and paved the way for the emergence of environmental Jurisprudence. In my paper, I am going to discuss the how far the Sustainable Development has been given a hard law status by the judiciary and more so the higher judiciary innovatively interpreting the Constitution elevated the Environmental Right in to a Constitutional Right from the ordinary simple public nuisance under the IPC. Apart from that the judiciary also ingrained certain principles and doctrines into our Environmental Jurisprudence. Inspite of all these we could not able to achieve the requisite or expected target, why. Finally a blend of technological solution with Economic, ecological and legal regime together with political will, public participation and professional ethics, alone can solve the Environmental problems effectively and for the sustenance of sustainable development.

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IMPACT OF MANGROVE DEGRADATION ON BIODIVERSITY
AND CONSERVATION STRATEGIES BY PARTICIPATORY METHOD

DR. V. N. NAYAK

Abstract: Mangrove conservation has been a global concern on realizing the serious threat faced by the indiscriminate felling, encroachment and changed land use pattern. There is an immediate need for resurrection in view of its importance in holding rich biodiversity, its role in conservation of soil and in combating global warming due to its high carbon arresting potential. Commonly called as coastal wetland that has been limited to the tropical and subtropical region of the globe, mangrove provides a coastal green canopy with diverse flora and fauna that sustains rich fishery. However, with the changed scenario, promotion of tourism, home for every family, urbanization this important ecosystem has been victimized and large-scale destruction has attracted global biologists and environmental analyzers.

Sand mining, shell mining, encroachment for reclamation as agriculture and horticultural area, development of tourist cottages and resorts, aquaculture ponds are some of the prominent activities that have affected the region in addition to destruction for firewood.

A survey of three ranges in the Karwar Forest division of Karnataka was conducted to study the possibility of livelihood potential of the mangroves and the possible involvement of stakeholders in conservation of the mangroves in their respective areas. Interestingly, from the survey it was observed that almost all the people are aware of the role of mangrove in protecting environment and the benefits of mangroves. The fishermen and poor people have been surviving on the resources available in the mangrove region and blame the rich people for encroaching into mangroves - aquaculture farmers, sand miners and agriculture farmers for destruction of mangrove and thus their livelihood support.

Government under the department of Forest has been making efforts to reconstruct the mangroves by replanting the degraded region and providing awareness to the beneficiaries. However, the people who are the real beneficiaries are not very keen and concerned about the conservation activity as there is no immediate return from this activity and they have no patience to wait for a very long time. Also, for them conservation of biodiversity is not a primary activity.

After the investigation it is felt that the stakeholders need to be properly educated about importance of mangroves and the need for conservation. Also these stakeholders need financial and vocational support during conservation period and the forest department must declare mangrove forest as a biodiversity reserve and map as per CRZ Notification 2011, ecologically sensitive region (CRZ I).

Keywords: Mangrove Destruction, Biodiversity, Conservation Strategies, Peoples’ Participation.

***

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Paper Presentations
PTD-DRBD MEDIATED dsRNA DELIVERY IN 
LEPTINOTARSA DECEMLINEATA: APPLICATIONS 
FOR IMPROVING THE EFFICIENCY OF RNAi-BASED BIOPESTICIDES

DIMITRIOS KONTOGIANNATOS, LUC SWEVERS, 
POLYDEFKIS CHATZOPoulos, ANNA KOURTI

Abstract: The development of insecticide formulations with new mechanisms of action (modes of action, MOAs) is a huge priority for pesticide industry. This priority has become apparent during the last few years after (a) the observed increase in insect resistance for the most widely used active substances and (b) the harmful effects of the excessive use of pesticides on human health, environment, beneficial insects and fish. Silencing of genes by RNAi (RNA interference) technology provides an alternative, selective to species level, environmentally friendly strategy to combat insect pests. Double-stranded RNA molecules (double-stranded RNAs, dsRNAs) targeting important developmental genes are taken up by the digestive tract of the targeted insect species and induce RNAi, which results in inhibition of growth, development and reproduction of the targeted insect species. After the rapid development of RNAi technology in the past 10 years, biotech industry is seeking for new applications aimed at producing environmentally friendly genetic insecticides or genetically modified plants (GMPs) that induce environmental RNAi in the targeted insect species. These technologies are expected on the market at the end of this decade. In this work we exploit the use of the chimeric protein PTD-DRBD (peptide transduction domain–dsRNA binding domain) as a delivery agent that improves the effectiveness of the RNAi mechanism in the insect. The ribonucleoprotein particle (RNP) is resistant to nuclease activity increasing the efficiency of insect gene silencing through oral delivery when compared to the naked dsRNA. These data demonstrate that engineered RNPs could be used in new approaches for constructing RNAi based biopesticides with potential industrial interest.

Keywords: Double-Stranded RNA, Genetically Modified Plants, PTD-DRBD, RNA Interference.

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PTD-DRBD AND dsRNAs Transiently Co-Expressed in Potato Plants Enhance Insect Toxicity in Colorado Potato Beetle Larvae

DIMITRIOS KONTOGIANNATOS, LUC SWEVERS, POLYDEFKIS CHATZOPPOULOS, ANNA KOURTI

Abstract: Silencing of genes by RNAi (RNA interference) technology provides an alternative, selective to species level, environmentally friendly strategy to combat insect pests. Double-stranded RNA molecules (double-stranded RNAs, dsRNAs) targeting important developmental genes are taken up by the digestive tract of the targeted insect species and induce RNAi, which results in inhibition of growth, development and reproduction of the targeted insect species. Agrobacterium mediated transient co-expression of the chimeric protein PTD-DRBD (peptide transduction domain-dsRNA binding domain) and insect specific dsRNAs in potato plants increased lethality of Colorado potato beetle larvae after in planta bioassays. Our results showed that PTD-DRBD and dsRNA co-expression in plant tissues could be used as an alternative approach for constructing genetically modified plants resistant to Colorado potato beetle.

Keywords: Double-Stranded RNA, Genetically Modified Plants, PTD-DRBD, RNA Interference.

***

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EVALUATION OF S. NONAGRIOIDES ECR AND USP GENES AS POTENTIAL TARGETS FOR CONSTRUCTING RNAI-BASED PESTICIDES

DIMITRIOS KONTOGIANNATOS, LUC SWEVERS, POLYDEFKIS CHATZOPoulos, ANNA KOURTI

Abstract: The development of insecticide formulations with new mechanisms of action (modes of action, MOAs) is a huge priority for pesticide industry. This priority has become apparent during the last few years after (a) the observed increase in insect resistance for the most widely used active substances and (b) the harmful effects of the excessive use of pesticides on human health, environment, beneficial insects and fish. Silencing of genes by RNAi (RNA interference) technology provides an alternative, selective to species level, environmentally friendly strategy to combat insect pests. In this work we assess the insecticidal impact of silencing of the ecdysone receptor and ultraspiracle genes in the moth Sesamia nonagrioides and we discuss the possibility for an RNAi-based pest control strategy for this insect species.

Keywords: Insecticide, RNAi (RNA Interference), Sesamia Nonagrioides, Gene Silencing.

***

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INVESTIGATIONS ON THE CHEMICAL COMPOSITION, ANTIOXIDANT AND ANTIFUNGAL ACTIVITIES OF TUNISIAN PLANT RANTHERIUM SUAVEOLENS DESF.

SABRINE CHELLY, MERYAM CHELLY, LAVANYA NEHRU SEKAR CHINNATHAMBI, HANEN BOUAZIZ-KETATA

Abstract: Recently, interest in plants extracts increased for their antioxidant potential and their ability to prevent certain diseases. In most plant products, the compounds responsible for the antioxidant effects are phenolic and flavonoid contents. Thus a preliminary assessment would begin with the total phenol assay. Oxidative stress which can be relieved by antioxidants are caused mainly by free radicals. The antioxidants generally scavenge these radicals. Hence, it is important to measure the free radical scavenging activity and other potential medicinal activity of plants. Here, we have chosen Rhanterium suaveolens, a plant rich in natural antioxidant, and is widely used as medicinal plant in Tunisia. The aim of this study was to investigate the phytochemical profile of Rhanterium suaveolens extract using HPLC-MS-MS and to evaluate its in vitro antioxidant, anti-diabetic, anti-obesity and antimicrobial activities.

We report the isolation of nine flavonoids. The total phenolic content was 58.78 ± 2.8 mg gallic acid equivalents/g extract and the total flavonoid content was 48.81 ± 4.5 mg quercetin equivalents/g extract. The antioxidant activity of Rhanterium suaveolens was assayed through the total antioxidant capacity and β-carotene bleaching assay. The radical scavenging activity was analyzed using 2,2-diphenyl-1-picrylhydrazyl and 2, 2’-Azinobis (3-ethyl benzo thiazoline)-6-sulfonic acid. Furthermore, Rhanterium suaveolens exhibited an important anti-diabetic and anti-obesity effects proved by α-amylase and pancreatic lipase inhibition. The antimicrobial activity of Rhanterium suaveolens were evaluated using bacteria strains and fungi. The extract exhibited an interesting antibacterial activity against Bacillus amyloliquefaciens and a potent antifungal activity against Fusarium phyllophilum, Trichoderma harzianum and Aspergillus niger.

In conclusion, the present investigation suggests that Rhanterium suaveolens can be utilized as an effective and safe antioxidant, anti-diabetic, anti-obesity, antibacterial and antifungicidal sources.

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CHEMICAL COMPOSITION, ANTI OXIDANT AND ANTIMICROBIAL PROPERTIES OF THE TUNISIAN THERAPEUTIC PLANT RUMEX ROSEUS.

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Abstract: Traditionally, Rumex genus plants have been used to treat different types of human diseases such as inflammation, microbial infections, genotoxicity and even cancer in Tunisia. In general, phenols and flavonols in plant extracts, are considered to be responsible for the cure of such diseases. Oxidative stress caused mainly by free radicals can be relieved by antioxidants. Objective of the present work is to evaluate the phytochemical profile of the hydro-ethanolic extract Rumex roseus aerial parts using HPLC-MS-MS and to find out the relationship between antioxidant activity, anti-diabetic, anti-obesity and antimicrobial properties. Among others, tangeritin and quercetin isolated from plant extract were found to be the major constituents. Furthermore, the hydro-ethanolic extract exhibited an important antioxidant effect assayed by total antioxidant and radical scavenging activities. Moreover, Rumex roseus exhibited potential health benefits in curing diabetes mellitus and obesity while inhibiting amylase and lipase enzymes. It possessed also a very interesting antimicrobial profile after they were tested against three Gram-negative, four Gram-positive bacteria, and six pathogenic fungi.

To conclude, the present investigation suggests that the Rumex roseus extract can be utilized as an effective anti-diabetic, anti-obesity and antimicrobial sources, in one-word antioxidant origins.

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SPATIOTEMPORAL DISTRIBUTION OF AVIFAUNA IN RELATION TO MAJOR ENVIRONMENTAL VARIABLES ALONG THE MANGROVES MUDFLATS OF KALI ESTUARY, UTTARA KANNADA, WEST COAST OF INDIA

ROSHMON. T., V. N. NAYAK

Abstract: The health of coastal wetlands has become a global concern in recent years. Mangrove mudflats play a key role to the survival of many species of migratory/local birds by acting as feeding, breeding and roosting grounds. The tidal mudflats provide the much needed benthic and planktonic food supply that the birds fly thousands of kilometers to consume. Accomplishing the habitat requirement and food necessities of various water birds is one of the most important functions performed by mangrove ecosystem as it helps to preserve the biodiversity globally. Monitoring of water birds provides valuable information on the status of wetlands, and can be a key tool for increasing awareness of wetlands importance and conservation values.

Hence, the objectives of present study were set to investigate the avifaunal abundance and their correlation with the major environmental factors in the mangrove habitat.

Samplings were carried out at regular interval through point count method at selected mangrove sites from November 2007 to January 2009 for the Avifaunal abundance and the related ecological factors were monitored using appropriate methods. Different statistical methods such as Multiple regression test, principle component analysis (PCA) and canonical correspondence analysis (CCA) were used to find the correlation among the bird species and the environmental variables.

Results showed that a total of 153 species of birds belonging to 52 families that use Kali Mangrove areas either for feeding, nesting, roosting or other activities. The maximum species were represented by the families Scolopacidae (16), Accipitridae (9), Ardeidae (8), Laridae (8), Charadriidae (8) and Anatidae (5).

Results further revealed that habitat features such as vegetation alignment, structure of trees (height and diameter) and ecological factors such as temperature, salinity, precipitation, benthic invertebrate biomass were the key factors that influenced the diversity, distribution and concentration of the bird species. In addition, the study clearly confirms that the abundance of birds at the Kali mangroves are closely associated to the biomass of benthic fauna. Benthic invertebrates found to be the best-favored food for the migrant as well as resident bird species at all the study sites. They act as the first consumer of mangrove debris, breakdown matter and hence play a vital role in regulating food web in this ecosystem.

Overall study suggest that Kali estuary with its rich mangrove mudflats act as a good feeding ground for migratory birds/resident birds although it requires several conservation strategies and regulation from the anthropogenic pressure.

Keywords: Avifauna, Mangroves, Abundance, Benthic Fauna, Conservation.
**BIOACTIVE SUBSTANCES FROM ENTOMOPATHOGENIC FUNGI, OPHIOCORDYCEPS IN DOI INTHANON NATIONAL PARK, THAILAND**

**Rungkiat Kawpet, Kanungrat Kummanee, Samaporn Saengyot**

**Abstract:** Bioactive substances of entomopathogenic fungi Ophiocordyceps (Hypocreales: Ophiocordycipitaceae) found in Doi Inthanon National Park, Chiang Mai (UTM coordinates; 2063808 N, 436635 E at an altitude of 756-2,560 m above mean sea level were investigated. Results showed that the most commonly found substance was cordycepin at 440.65 mg/100 g in *Ophiocordyceps nutans* with 306.41 and 230.86 mg/100 g in *O. sphecocephala* and *O. irangiensis*, respectively. Highest adenosine content was found in *O. irangiensis* at 13.80 mg/100g, followed by *O. nutans* at 5.90 mg/100 g.

**Keywords:** Bioactive substances, entomopathogenic fungi, pharmaceutical substances

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BIODIVERSITY CONSERVATION IN INDIA: LAWS, CHALLENGES
AND A WAY FORWARD

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Abstract: "Failure to conserve and use biological diversity in a sustainable manner would result in degrading environments, new and more rampant illnesses, deepening poverty and a continued pattern of inequitable and untenable growth." --Kofi Annan

The persistent population growth and per capita consumption, as aggravated by climate change and other anthropogenic environmental impacts have led to unsustainable degradation of Earth’s biological diversity. Effective conservation of biodiversity is *sine qua non* for a balanced ecosystem and human endurance. Until 2002, despite of housing a substantial portion of world’s biodiversity; India did not have a comprehensive law to address the issue of conservation of biodiversity. The year 2002 is marked with the positive approach of Parliament of India by adopting Biological Diversity Act (BDA) in *parimateria* with Convention on Biological Diversity (CBD), 1992, the objective being preservation of biological diversity in India and to provide mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge.

In this paper, by applying doctrinal method of research, the researchers have documented the status and major threats to the biodiversity in India in the light of the legislative approach that the country has adopted. Factors like pollution, overexploitation and degradation, coupled with natural causes, pose a threat to biodiversity. Although the Act tries to deal with these problems, there are still loopholes like inadequate access to local communities, non-inclusion of genetic resources and access benefit sharing. By analyzing various loopholes in the present BDA, researchers have concluded that to get the desired result in conservation and protection of biodiversity, networks among farmers, civil society associations, grass root organizations, scientific and academic institutions and governmental organizations is of utmost importance. It is also noted that to integrate biodiversity conservation into public policies and to implement the policies effectively, more radical changes are required that recognize biodiversity as a global public good. Thus, this would lead to better conservation and protection of biodiversity.

Keywords: Biodiversity, Biological Diversity Act, Conservation, India.

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STUDIES ON PHYSICO- CHEMICAL PARAMETERS OF LONAR LAKE BULDHANA DIST INDIA

PROF RATHOD MADHUKAR PADAM

Abstract: The Lonar crater, Dist. Buldhana, Maharashtra, India has been proved to be caused by an Aerolite Meteor (contain mainly rocky material). The aim of the present study was to study the physico-chemical parameters of water of Lonar crater to understand the status of lake water. Primarily water samples were collected from basin of Govt rest house the pH range from pH 7 to 11. pH of lake ranged between 10.5 to 11.3. The temperature showed the decreasing trends from the month of October to January. The maximum temperature was noted in the month of July (30.5°C) and the lowest was in the month of January 22°C. Dissolved oxygen Maximum dissolved oxygen (DO) was recorded in Dec (4.53 mg/lit) and the minimum 0.53 mg/lit in the month of April.

The maximum value of calcium carbonate was observed (1022ppm) in January but again it decreases. The lowest value was shown (735 ppm) in November while The chloride range was between 38.35 to 81.12 mg/lit. The maximum was recorded in the month of September 81.12 mg/lit or (3041.61 ppm) and the minimum was (2056.1 ppm) in October.

Sodium (Na+) maximum was observed in the month of June (318 mg/lit) and the lowest in the month of January (172 mg/lit). Potassium they are fluctuated between 0.14 mEg/lit to 0.38 mEg/lit from August onward, the value increased. The iron value fluctuated between 0.25 mg/lit to 0.5 mg/lit. The maximum was observed in the month of July (0.5 mg/lit) and the minimum was recorded in the month of October 0.25 mg/lit.

Keyword: Physico-Chemical Parameter, Lonar Lake, Sodium, Calcium Carbonate.

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SPIDER DIVERSITY OF SUBURBAN OF SOUTH BANGALORE, KARNAKATA

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Abstract: In the current study the biodiversity of spiders was surveyed and documented from suburban region of Turahalli forest, south Bangalore Karnataka. The samples were collected from August 2015 to December 2015, during monsoon season as the richness of species were encountered. Totally 11 families with 18 different species were documented and identified. The species were collected mainly through visual observation and hand collection method. The samples were stored and preserved in 70% alcohol. The photography was done using digital camera. Some of the common spiders observed were signature spiders, orb web spider, garden spiny spider. Orb weaver spider, decorative silver orb web spider, red house spider, Indian ornamental tarantula, funnel web spider, yellow sac spider black wood spider, gaint wood spider, golden lynx spider, jumping spider, grass crab spider, and white kneed spider. Among the 18 species, Aranidae family had recorded highest species (05) with 27.7%, the families Niphilidae, Oxyopidae, and Salticidae(02each) had recorded with 11.11%. The other seven families had documented with (01 each) 5.55%. The male and female spiders were found and recorded for the most dominant species. The Oxoypes species had documented the highest number of males (15) with 34.09%. whereas the more number of females had found for Argiope anasuja (25) with 18.65%

Keywords: Biodiversity, Turahalli, South Bangalore, Aranidae, Oxyopes Species, Argiope Anasuja.
IMPACT OF FORTIFIED MULBERRY LEAF WITH NIACIN ON DEHYDROGENASE ACTIVITIES AND ECONOMIC TRAITS IN SILKWORM BOMBYX MORI L.

DR. M.N. ANIL KUMAR, JAGADISHA M.C.

Abstract: The silkworm Bombyx mori L. has been regarded as one of most striking example of monophagy as its food selection is restricted to mulberry leaves alone. B. mori obtained nutrients from the mulberry leaf which includes carbohydrates, vitamins, sterols, minerals and phagostimulants. These nutrients play pivotal role in growth and development of silkworm larvae in turn reflects on cocoon yield. The vitamins are indispensable organic compounds required by insects in little quantity which regulates various metabolic functions.

An attempt has been made in the current investigation to record the effect of mulberry leaf fortified with niacin at varied concentrations viz., 0.2, 0.4 and 0.6 % on succinate dehydrogenase (SDH) and lactate dehydrogenase (LDH) enzymes as well as economic traits in bivoltine silkworm hybrids FC1 and FC2. The results of study inferred that, both the hybrids recorded higher level of enzyme activities (SDH and LDH) at 0.6 % of niacin supplementation over remaining concentrations. The maximum enzyme activities were observed in fifth instar 6th day followed by 3rd day and 1st day old larvae. Further, both hybrids (FC1 and FC2) performed better in respect of economic traits such as larval weight, cocoon weight, shell weight, shell percentage, filament length, filament weight and renditta at 0.6 % concentration when compared to remaining concentrations and control batches.

Keywords: Bombyx Mori, Dehydrogenase, Economic Traits, Fortification, Niacin.
LIPIDEMIC EFFECT OF KOMBUCHA (BIO-TEA) IN ISOPROTERENOL INDUCED MYOCARDIAL INFARCTION

REEMA ORISON LOBO, CHANDRAKALA SHENOY K.

Abstract: Kombucha is a beverage which is produced by the aerobic fermentation of tea and sugar by the symbiotic association of bacteria and yeasts which forms a “tea fungus”. During the production of Bio-tea, the black tea ingredients and sucrose undergo progressive modification by the action of the tea fungus. Bio-tea is a good source of flavonoids and catechins as the levels of gallic acid, quercetin, Epicatechin (EC), Epigallocatechin gallate (EGCG), and Gallo catechin gallate (GCG) increase upon fermentation from tea to Bio-tea. Further tea does not contain Gallo catechin (GC) while the same has been found in Bio-tea. In the present study, the lipidemic activity of Bio-tea was studied during Isoproterenol induced myocardial infarction. A study of the Protein-Ligand interactions between intestinal fatty acid binding protein and three ligands (EGCG, Gallic acid, and Quercetin) was also carried out using Schrödinger Suite. The study revealed that Bio-tea exhibits antihyperlipidemic activity which was confirmed by the in silico study.

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IN VITRO GLUCOSE UPTAKE ACTIVITY OF A TRADITIONAL BEVERAGE KOMBUCHA IN NORMAL AND DIABETIC RATS

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Abstract: Kombucha, a fermented beverage is a rich source of bioactive components and has great medicinal potential. The antihyperglycaemic effect of Kombucha is well documented. The present study investigates the effect of Kombucha on glucose uptake in normal and diabetic rats using rat hemidiaphragm and everted gut sac model. Albino Wistar rats weighing 200–240g were randomly divided into experimental sets with three rats in each group. Diabetes was induced by 50 mg/kg of streptozotocin to one experimental set of animals and maintained diabetic for 14 days. The animals were starved for 18 hours but allowed for tap water ad libitum use, before each experiment. Rats after mild anaesthesia were sacrificed by cervical dislocation. The abdomen was cut open by midline incision to obtain the diaphragm and the small intestine for in vitro glucose uptake using the standard protocol. The results obtained from the present study shows that Kombucha shows a higher glucose uptake activity in diabetic diaphragms when compared to the normal rat diaphragm. Also, Kombucha in diabetic everted gut sacs showed significant inhibitory effect on the transport of glucose than across the normal everted gut sacs. However, at varying glucose concentrations the inhibition of glucose uptake by Kombucha is higher in diabetic everted gut sacs when compared to normal everted gut sac group. Thus, it was concluded that Kombucha has a significant role in peripheral glucose consumption as well as in inhibition of intestinal glucose absorption in diabetic rats and thereby it facilitates its antihyperglycaemic action and proves to be a strong antidiabetic agent.

Keywords: Kombucha, Streptozotocin, Hemidiaphragm, Everted Gut Sac.
MEDICINAL PROPERTIES OF WEED PLANTS OF KALAMBOLI AREA

KAMALINEE AVINASH DEODHAR

Abstract: Plant Diversity study is important aspect of botany. It is directly and indirectly related to the formation of environmental conditions. It also indicates the presence of dominant flora of particular area when data is analyzed. In this paper plant diversity of Kalamboli area is included. The present data includes plants of different families mostly Malvaceae, Tiliaceae, Cucurbitaceae, Asteraceae, Amaranthaceae, Solanaceae, Acanthaceae, Cruciferae, Portulaceae, Scrophulariaceae etc. The plants mentioned in the data are considered as roadside or weed plants but all of them are having some medicinal properties or useful properties and hence data collection for biodiversity should be done. It will help to make awareness among people for the conservation of such plants.

Keywords: Plant Diversity, Conservation, Dominant Flora, Awareness.

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IMPACT OF FUEL-WOOD COLLECTION ON TREE SPECIES DIVERSITY IN TWO WATERSHEDS OF SIRSI TALUKA

PALLAVI P. BANAVASI, A.G KOPPAD

Abstract: The present study was conducted in Sirsi taluk, Uttar Kannada district, Karnataka. The objective of the study was to determine the biodiversity indices (Shannon’s index, Simpson diversity index and Evenness) and thus know the impact of fuel-wood collection on tree species diversity in the two selected watersheds (5BiA5 and 4D4F5) of Sirsi taluk. Five villages were selected in each watershed. In each village, transects with size 100 m × 10 m were laid in the forest both near and away from the village. In each transect, tree species existed and their degradations were recorded. The household survey was done to assess the species preferred for fuel-wood collection through questionnaire. The data was analysed and the result indicated that Shannon’s index in watershed 5BiA5 was found to be 1.25 in transect nearer to villages and 1.12 in away from the villages. In watershed 4D4F5, it was 1.03 in nearer transect and 1.08 in away. The Simpson diversity index in 5BiA5 was 0.16 in nearer transect and 0.15 in transect away from village, whereas it was 0.12 and 0.14 in 4D4F5 respectively. Evenness of tree species in the forest was 0.94 in nearer transect and 0.79 in transect away in 5BiA5 whereas it was 0.8 in both nearer and farther plots in watershed 4D4F5.

Keywords: Diversity, Forest, Indices, Species, Fuel-Wood, Watershed.

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ASSESSING AND MAPPING OF THE VEGETATION HEALTH AND CHANGE DETECTION OF THE FOREST IN JOIDA TALUKA OF UK DISTRICT USING GEOSPATIAL TECHNOLOGY

ARJUN.G. KOPPAD, MALINI P.J

Abstract: Vegetation plays a key role in reducing ambient temperature, moisture and pollutant capture. In recent years vegetation mapping has become increasingly important, especially with advancements in environmental economic valuation. The spatial information from the remote sensing satellites enables researchers to quantify and qualify the amount and health of vegetation of the forest. The study was taken up in Joida Taluka of Uttara Kannada district to assess the vegetation pattern using geospatial technology. The study highlights significance of remote sensing in the vegetation mapping and assessing the vegetation health of forest in Joida Taluka. With help of satellite imagery the vegetation map was done using ArcGIS and ERDAS IMAGINE software. The change detection of the vegetation over the period of more than 20 years through NDVI map. So there is the shift in the forest vegetation from dense forest to moderate dense and sparse forest due to the anthropogenic pressures. In this study the other vegetation indices such as EVI, ARVI, NDWVI and VCI etc ... are also assessed the change in the forest Health.

Keywords: Vegetation, Remote Sensing, Vegetation Indices, Forest and Imagery.
ASSESSMENT OF HYDROCHEMISTRY OF KSHIPRA RIVER BY USING WATER QUALITY INDEX (WQI) AS TOOL

DEEPEndRA SINGH RAGHVANSHI, REDDY, P.B

Abstract: In the present experiment rigorous efforts have been made to calculate water quality index (WQI), using fifteen water quality parameters at three different stations along the Kshipra River basin at Ujjain, Madhya Pradesh, India during summer months of 2017. A total of 12 water samples were collected from three different study stations and analyzed. Furthermore, along with baseline information, data was normalized and integrated by applying the Water Quality Index (WQI). A Rating scale is established based on the acceptance limits of BIS/ICMR/WHO standards. Water quality index (WQI) rating was calculated to quantify overall water quality for human consumption. The usual surface water quality surrounding Triveni Sangam (Station 1) was found to be moderate in terms of its potability after conventional treatment and disinfection. However, water samples from Mangalnath ghat and Ramghat display poor and bad quality in a greater amount when compared with Triveni Sangam (Station 1) possibly due to efficient leaching of ions, misuse, direct discharge of textile effluents and agricultural impact. The overview of WQI with chloride and EC match to the same locations indicating the poor quality of water in the study area. It was witnessed from the study that the impact of anthropogenic activities (textile) like printing, dyeing and bleaching at station 3 and sewage disposal in the river was severe on most of the parameters. It was detected that the central cause of a decline in water quality was due to the high anthropogenic activities, illegal discharge of sewage and industrial effluent, lack of proper sanitation, unprotected river sites and municipal runoff. The appliance of WQI as a tool to evaluate chronological variations in surface water quality was thus found to be acceptable.

Keywords: Anthropogenic Activities, Kshipra River, Water Quality Index, Water Chemistry.

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Abstract: Since many industrial microbiological products result from secondary metabolism, researchers have sought to explain the role of secondary metabolites in the survival of the organism. *Fusarium chlamydosporum* normally a saprophyte is known to produce a red pigment which still remains unidentified. The intracellular pigment was extracted from the fungus by the mycelial homogenisation method using ice cold solvent, chloroform and sterile sand.

Proteomics, the global analysis of proteins will contribute to our understanding the gene function and metabolic pathways of complex organisms. The mechanism and functional pathway for production of secondary metabolites can be known by profiling the fungal proteome at the time of pigment production, i.e. during the late idiophase or early trophophase period of the growth curve.

The intracellular proteins from the fungus was subjected to extraction at the time of its maximum pigment production. In this study, a relatively new approach of quantitative proteome profiling was performed. After successful extraction of the proteins from the protoplast (cell wall of the fungus was removed with suitable solvents inorder to reduce the complexity of proteins), protein extracts were identified and sequenced by Liquid Chromatography coupled with Mass Spectrometry and Triple-Time of Flight (LC-MS/MS-Triple TOF). Homologous fungal sequences were derived by searching the available data bases with the help of Sequential Window Acquisition of all Theoretical fragment ion spectra mass spectrometry (SWATH MS). Our analysis identified a total of 5241 proteins with 99% confidence. A stringent analysis led to the identification of 139 proteins and 775 distinct peptides with 99% confidence. Out of the identified 139 proteins, 45 proteins were found to be significantly regulated wherein 24 were up regulated and 21 were down regulated. The classification of the biological process of the identified proteins and the pathways were analyzed by the UniProt KB search and the KEGG pathway. The regulated proteins were grouped mainly based on their functional analysis into six main domains- such as- (1) metabolic proteins (2) proteins involved in transcription and translation (3) membrane associated proteins (4) proteins responsible for virulence (5) proteins involved in catalytic activity and (6) stress induced proteins.

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COMPARATIVE STUDY ON ECOLOGY AND ICHTHYOF AnaL DIVERSITY OF MYDALA AND DURGADAHALLI LAKES OF TUMAKURU, KARNATAKA STATE, INDIA

SHIVARAJU, M. VENKATESHWARLU

Abstract: The ichthyofaunal diversity is a good indicator of health of aquatic ecosystem and represents the balanced ecosystem. The Mydala and Durgadahalli Lakes are situated 20km and 15km from centre of Tumakuru city towards north east. They lies at 13°18’46”N latitude, 77°11’37”E longitude and 13° 13’ 56” N latitude, 77° 25’ 30” E longitude. Water spread area is 370 hectares and 15.60 hectares, the average depth is 3.0 to 4.4 meters and 1.8 to 2.0 meters respectively along the bund. These lakes are rain fed during monsoon period. The total catchment area of the lakes is 62.96sq.km and 17.25sq.km, height is about 13 to 14.8m and 10.4 to 10.6m, average rain fall is 640.27mm and 620mm respectively. This water is mainly used for cultivation in and around the lakes area and Mydala lake is comparatively larger with limited catchments. At present the fish productivity is considerably low. No much reports available on fish productivity of these lakes. Keeping all these views, we have selected Mydala and Durgadahalli lakes to study on ecology and fish diversity. During the study from the period of October-2016 to October-2018, in Mydala lake observations reveled that there are 15 different fish species are present, among them, Oreochromis nilotica, Oreochromis mossambica, Ctenopharyngodontidae are the major contributory species and family Cyprinidae is most dominant group. In Durgadahalli lake have 10 different species of fishes among them, Ctenopharyngodontidae, Oreochromis mossambicus are major contributory species and family Cyprinidae is most dominant group. Hence the protection of these lakes is mandatory for sustainable fishery. Along with ichthyofaunal diversity, the physiochemical water parameter is carried out but there is no unpredictable change in these two lakes of water.

Keywords: Fish Diversity, Habitat, Physiochemical Water Parameters, Mydala Lake, Durgadahalli Lake.

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MEIOTIC ABNORMALITIES IN *BRACHIARIA MUTICA* (FORSSK.) STAPF

**SHRINGALA THIMAPPA GIRISHA**

**Abstract:** *Brachiaria mutica* is a major fodder grass in urban area which grows at out skirts of the city by using raw sewage water, meiosis in *Brachiaria mutica* grow in sewage water appears to be regular in majority of the pollen mother cell. Diakinesis revealed the presence of 18 bivalents in about 80% of the cell. In about 10% of cell tetravalent were constantly present in diakinesis and metaphase – I. Very rarely cells showed precocious movement of chromosomes during metaphase – I and some shows mutagenecity i.e., chromosome clumping. As metaphase - I proceeded to anaphase - I normal segregation of chromosomes were seen and in few cells lagging of chromosomes were also observed. Telophase – I was found to be normal. Second division leads to irregular distribution of chromosomes and formation of isobilateral tetrads of microspores. The pollen fertility as assessed by staining ability in acetocarmine was 80%; however 1 to 2% seed set was recorded which was very low.

**Keywords:** Brachiaria, Pollen Mother Cell, Lagging Chromosome, Tetrads, Seed Set.

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EVALUATION OF ANTIMICROBIAL EFFICACY OF THE PIGMENT
BY FUSARIUM CHLAMYDOSPORUM AGAINST EMERGING
NOSOCOMIAL AND OPPORTUNISTIC PATHOGENS

TESSY ANU THOMAS, SHARMILA TIRUMALE

Abstract: The treatment of infectious diseases have become now an immediate requirement in the current scenario due to the emergence of multi-drug resistant bugs which are prone to cause Nosocomial and Opportunistic infections. An opportunistic infection is an infection caused by bacterial, viral or fungal pathogens that take advantage of a host with a weak immune system. Mostly these pathogens do not cause disease in a healthy individual that has a normal immune system but in immunocompromised patients. A hospital-acquired infection (HAI), also known as a nosocomial infection, is an infection that is acquired in a hospital or other health care facility. Fungi produce a large number of secondary metabolites, which have roles in a range of cellular processes such as transcription, development and intercellular communication. In addition, many of these compounds have been found to have important applications, as antibiotics or immunosuppressant, anti-rejection drugs, enzyme activity blocking agent, cholesterol lowering agent, prebiotics, food additives replacing sugar, toxins, antineoplastic drugs, anti-cancer antimicrobials, production of organic acids, proteins, vitamins, biofuels, dye effluent treatment and in pigment production. The present study was carried out to evaluate the antimicrobial efficacy of the pigment produced by the fungus, *Fusarium chlamydosporum* against the emerging nosocomial and opportunistic pathogens which were procured from the American Type Culture Collection; Staphylococcus aureus ATCC®1708TM (Methicillin Resistant) {MRSA}, Escherichia coli ATCC®2326TM(Extended Spectrum BetaLactamase) {ESBL}, Pseudomonas aeruginosa ATCC®27853TM, and Acinetobacter baumanii ATCC®19606TM, Serratia marcescens ATCC®14756TM, and Candida albicans ATCC®10231TM. The fungus was cultivated in an optimised medium for its pigment production. The intracellular pigment produced by *F. chlamydosporum* was subjected for partial purification via Thin Layer Chromatographic (TLC) technique. The purified extracts of the fungus were assessed for the antimicrobial activity and Minimum Inhibitory Concentration (MIC) using the Kirby Bauer method. Appropriate positive and negative controls were used in the analysis as per the CLSI standards. The pigment exhibited excellent antimicrobial activity against MRSA (MIC at 39 μg/ml), ESBL E. coli (MIC at 625 μg/ml), A. baumanii (MIC at 312.5 μg/ml), S. marcescens (MIC at 39 μg/ml), and C. albicans (MIC at 312.5 μg/ml) whereas the pigment showed a negative response against *P. aeruginosa*. These results suggest that the pigment produced by *F. chlamydosporum* is a potent metabolite which can be used for various applications in the medical field against the emerging drug resistant and nosocomial pathogens.

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WATER SCARCITY- CHALLENGING THE FUTURE

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Abstract: The latest world water development reports (UN-Water, 2009) observe how the various global crisis reported recently- in climate change, energy, food security, economic recession and financial turbulence-are related to each other and have impacts on water. Water Scarcity is growing threat to our global economy, society and even to the survival of human beings. The crisis that we face today is mainly due to water pollution especially in the field of agriculture. Pollution can be anything from oil, to carcasses, to chemicals and to fecal matter, whatever the cause it majorly affects global population. The world is moving towards a direction where water is becoming costly hence not affordable by majority of people. As far as India is concerned it is gifted with many water bodies but due to improper management and unscientific industrial development. We are staring at the increase in the death of rivers. Erratic development plans means our future generation is in major threat, sustainable development plans means our future generation is saved from such major threat, sustainable development is the hour of need. Apart from government policies the change needs to come from grass root level. This paper deals with water use and savings for the future. It also highlights the importance and threats on water scarcity and the challenges that will be faced by the future generations.

Keywords: Water Scarcity, Pollution, Sustainability, Food Security, Global Population.
MUDSKIPPER RETAINS WATER IN MUDFLATS, SOUTHEAST COAST OF INDIA- A CASE STUDY

V.RAVI

Abstract: Mudskippers (Gobiiformes: Oxudercidae) inhabit the intertidal mudflats and mangrove swamps of the Indo-West Pacific region and they are important group of fishes as potential bio-indicator for biodiversity assessment in intertidal systems. Mudskippers depend for their survival uniquely on huge mudflat region, which should be ever inundated with tidal waters for the reason of wet condition and food availability. Report on mudskipper diversity in India is meager and at the same time, the present study has made considerable attention on these fishes in the study areas like Vellar estuary, Pichavaram and Muthupettai mangrove forests of Southeast coast of India. The aim of the present study was concentrated as follows: (i) to assess the biodiversity of mudskipper distribution in Tamil Nadu, southeast coast of India; (2) to understand the structure and shape of burrow of mudskipper (Boleophthalmus boddarti); and (3) to find out the water holding or retaining ability of mudskipper’s burrow in the mudflat environment in station 1(Pichavaram) and station 2 (Muthupettai). Regarding the method of molding the burrow, the plaster of paris was used to understand the structure and shape of the burrow mainly for quick-setting of casting molds. In the present study, the functions of the mudskipper (Boleophthalmus boddarti) were concentrated through their water holding capacity in the mudflats of the study areas during low tide. The components of the burrow were performed like burrow width (cm), burrow depth (cm), total volume of water in the burrows (ml) and distance between burrows. Totally 7 species of mudskippers of the genus Periophthalmus, Periophthalmodon and Boleophthalmus were found distributed in the study areas. Among them, the population of Boleophthalmus boddarti dominated considerably followed by other species. Biodiversity indices of mudskippers were calculated and presented. The structure and shape of the burrows is described in the present study. Additionally, classification of the burrow was confirmed only after the burrow cast using plaster of Paris.

Based on the number of apertures formed in one common burrow (burrow formed originally – wherein branches may be extended), it can be classified as follows: Single aperture burrow, double aperture burrow and multi-aperture burrow. Furthermore, based on the construction and survival of the burrow, it can be classified as follows: Newly constructed burrow, existing burrow and collapsed burrow. The details are discussed in the present study. The mean burrow width was ranged from 6.7cm (station 1) to 7.1cm (station 2); mean burrow depth was varied from 7.7cm (station 1) to 8.4cm (station 2); the mean total volume of water (ml) was higher (140.5ml) in station 2 and lower (110.2ml) in station 1 and the distance between burrows (cm) was maximum (7.3cm) in station 2 but minimum (6.11cm) in station 1. It could be noticed that the burrows support evidently the wet condition of the mudflat through retaining the water during the low tide and most importantly burrows help the other burrowing organisms with sufficient water during low tide. Thus, for the existence of mudskippers, mudflats act not only as sheltering area, but also they are also breeding and nursery grounds. Therefore conservation of mudflats helps protecting the dependent fauna in the future.

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MANAGEMENT OF GRAPE STEM BORER
CELOSTERTNA SCABRATOR (CERAMBYCIDAE: COLEOPTERA)

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Abstract: India is the 13th largest producer of grape appropriating 2.00 per cent of the global production. The major grape growing states in India are Maharashtra (75.79%), Karnataka (17.23%), Tamil Nadu (2.39%), Telangana (1.03%), Mizoram (2.06%), Andhra Pradesh (0.36%) and Punjab (0.35%) amounting to nearly 90 per cent of the total production. During 2016-17, in Vijayapura district grape was cultivated in an area of 10,652.00 ha with a production of 2,11,640.00 tonnes. More than 100 pests are known to attack grape in India. Stem borer *C. scabrator* is a serious pest on grape and causes 50% reduction in fruit yield. Female lay eggs below loose bark of stem and inside the old tunnels. Both adults and grubs cause damage to the plant. Adult beetles gnaw the shoots of girth size between 1.4 to 2.0 cm leading to drying from the injury point where as, shoots with girth size more than 2.0 cm tolerated the injury and recouped. Grubs of *C. scabrator* bore into the main stem and branches. Initially reddish sap oozes from the wound and chewed material of wood and excreta are seen below the damaged plants. Sap translocation is affected and plants and branches wither and die. Looking into the severity, studies were conducted on the management of stem borer *C. scabrator* in the grape orchards of Vijayapura district (Karnataka: India). The experiment was laid out in Randomized Complete Block Design (RCBD) with 9 treatments replicated thrice with 25 grape vines with live tunnels for each treatment. Live tunnels were identified by adopting frossing index method. All the treatments were imposed in the last week of December and observations were recorded on number of live tunnels at 7, 15, 30, 45 and 60 days after the application of treatments and finally percent reduction in live tunnels is worked out by applying formula by Henderson and Tilton (1955).

Stem injection with DDVP 76%EC @ 8.00% was found very effective and recorded 100.00 percent reduction in live tunnels at 45 days after treatment. Soil application of Chlorantraniliprole 0.4%G and Fipronil 85% WG@20.00gm/vine were found effective treatments next to DDVP 76% EC. Highest cost benefit ratio was recorded in soil application of Chlorantraniliprole 0.4% G @ 20.00 g (1:2.83), followed by stem injection of DDVP 76% EC (1:2.77), Fipronil 80% WG @ 20.00 g (1:2.74), Fipronil 80% W @ 15.00 g (1:2.67) and Chlorantraniliprole 0.4% G @ 15.00 g (1:2.55).

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ISOLATION, IDENTIFICATION AND CHARACTERIZATION OF CELLULOSE DEGRADING MICROORGANISMS FROM THREE DIFFERENT TERMITE SPECIES

TIFFY MARIAM JOHN, JOBIN MATHEW

Abstract: The present study was carried out to isolate cellulose degrading microorganisms (bacteria) from the gut of three different termite species, *Odontotermes redemanni*, *Microcerotermes cameroni* and *Odontotermes anamensis* followed by their characterization and identification. Termites are aided by the presence of trichonympha, bacteria for the digestion of cellulose. They secrete certain cellulase enzyme which is able to degrade cellulose. Several bacterial strains were isolated in Carboxy Methyl Cellulose media. The enzyme efficiency on CMC media was noted down based on the zone of inhibition produced by the bacteria with the help of Congo red assay. They were identified through various biochemical tests. About 12 different bacterial species were identified. The identified bacterial species are *Brevibacillus brevis*, *Bacillus licheniformes*, *Enterobacter cloacae*, *Bacillus lentus*, *Micrococcus luteus*, *Bacillus cereus*, *Clostridium bifermentans*, *Pseudomonas corrugata*, *Clostridium septicum*, *Bacillus subtilis*, *Pseudomonas putida* and *Bacillus circulans*. They were subjected to varying conditions of pH, incubation times, supplementing their carbon and nitrogen sources. Cellulase enzyme produced was analysed through DNS assay.

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EVALUATION OF ANTITUMOR ACTIVITIES OF DIFFERENT PLANTS ON AGROBACTERIUM TUMEFACIENS, ITS ISOLATION AND CHARACTERIZATION.

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Abstract: Crown gall is a neoplastic disease caused by Agrobacterium tumefaciens. Agrobacterium tumefaciens is a gram negative, non sporing, motile, rod shaped bacterium, closely related to to Rhizobium. It causes crown gall disease of a wide range of dicotyledonous plants. Crown gall manifests itself initially as small swelling on the root or stem near the soil line and occasionally on aerial portions of the plant. The purpose of this study is to investigate the antitumor activities of different plants against A. tumefaciens and to propose an alternative model of green technology and ensure sustainability. The extracts from the leaves of 11 different plants viz. Tagetes erecta, Wedelia trilobata, Gomphrena globosa, Euphorbia cotinifolia, Citrus limon, Achyranthes aspera, Adiantum trapeziforme, Selaginella ciliaris, Codiaeum variegatum, Vitex negundo and Catharanthus roseus were investigated for antitumor properties.

Keywords: Crown Gall, Antitumor Activity, A. Tumefaciens.

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GREEN SYNTHESIS OF SILVER NANOPARTICLES AND ITS ANTIMICROBIAL ACTIVITY

HARITHA PRASAD, NISHA P ARAVIND

Abstract: In recent years, biosynthesis of silver nanoparticles (AgNPs) has gained much interest from researchers. Indian flora provides us with innumerable sources of cost-effective non-hazardous reducing and stabilizing compounds which can be utilized in preparing AgNPs. This study investigates an efficient and sustainable route of AgNP preparation from 1 mM aqueous AgNO₃, fresh leaves of Azadirachta indica (Neem), Centella asiatica (Indian Pennywort), Aloe vera and peels of Citrus sinensis (Orange), Punica granatum (Pomegranate), Musa paradisiaca (Banana). The AgNPs were characterized by UV-visible (vis) spectrophotometer and tested for their antibacterial activity. AgNPs obtained showed significantly higher antimicrobial activities against Escherichia coli (E. coli), Pseudomonas aeruginosa and Bacillus subtilis. This study can be considered as a green route for the synthesis of silver nanoparticles which also focuses on upcycling of agricultural waste.

Keywords: Silver Nanoparticle, Green Synthesis, Antibacterial Activity.

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GREEN SYNTHESIS AND ANTIBACTERIAL STUDY OF SILVER NANO PARTICLES FROM THE PLANT *BIOPHYTUM SENSITIVUM* (MUKUTTI)

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**Abstract:** Nanoparticles (NPs) are spearheads of the rapidly expanding field of nanotechnology. The use of NPs continues to increase in microbial applications due to the potential of NPs to circumvent microbial resistance. Among the metallic NPs, for microbial resistance, silver NPs (AgNPs) have been extensively used. AgNPs possess excellent antibacterial, antiviral and antifungal activities. The chemical synthesis of AgNPs employs the undesired use of hazardous chemicals. Therefore, the use of eco-friendly, nontoxic, biocompatible method of synthesis is required.

In this study AgNPs have been prepared by bio reduction of silver nitrate solution using leaf extracts of *Biophytum sensitivum* (mukutti). The synthesised silver nanoparticles were confirmed with UV visible spectroscopy. Characteristic maximum peak was obtained at 423.05 nm.

Antibacterial activity of AgNPs obtained by green synthesis method were analysed against five strains of bacteria which includes one gram positive bacteria (*Staphylococcus aureus*) & four gram negative bacteria (*Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, Salmonella typhi*). The antibacterial effect of the synthesised AgNPs were determined by Kirby Bauer disc diffusion method. The maximum bactericidal activity with AgNPs was observed in *Pseudomonas aeruginosa*. The zone of inhibition formed was observed to be highest in *Pseudomonas aeruginosa & Salmonella typhi* (9mm) & lowest in *Klebsiella pneumoniae* (3mm).

**Keywords:** Silver Nanoparticles, Antibacterial Effect, *Biophytum Sensitivum*, Kirby Bauer Disc Diffusion.

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EFFECT OF DIFFERENT FEEDING SYSTEMS ON GROWTH PERFORMANCE IN SALEM BLACK GOATS

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Abstract: The experiment was conducted to find out the effect of seven feeding systems on growth performance of Salem Black goat. Seventy seven Salem Black goats of five months of age were randomly selected for 7 treatment (Feeding Systems) groups having 11 animals in each. Treatments were Full day grazing (Group I), Grazing plus maize grain supplementation@ 1% body weight (Group II), Grazing plus maize grain supplementation @ 1.5% of body weight (Group III), Grazing plus concentrate supplementation @ 1% body weight (Group IV), Grazing plus concentrate supplementation @ 1% body weight (Group IV and Group V), Grazing plus concentrate supplementation @ 1.5% body weight (Group VI) and stall feeding plus concentrate supplementation @ 1.5% body weight (Group VII). The average daily gain was among groups with values of 17.46, 40.18, 34.13, 40.48, 41.43, 39.17 and 50.58g for group I, II, III, IV, V, VI and VII respectively. Among the groups, V and group VII goats gain higher body weight in compare with other groups. The ADG was significantly (P<0.05) higher in stall fed goats followed by protein supplemented goats others. In conclusion, it may be stated that among these feeding groups the ADG was higher stall fed goats in compare with other goats. Though the ADG was higher in stall fed grazing plus protein supplementation system can be an economical feeding optimizing live weight gain in Salem Black goat at farmer’s level.

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Abstract: Spiders belong to Order Araneae, Class Arachnida of Phylum Arthropoda. Spiders constitute the largest order. They being good hunters play vital role as predators, help maintaining ecological balance in nature. Many spiders are important as biological control agents to control several agricultural pests, especially in paddy fields. Spider fauna and statistical estimates of the diversity in three different habitats of Mangalore University campus was done. In the present study, we report 32 species of Spiders of 16 different genera of 9 families in different habitats. Spiders were found in abundance in the months of September and October during the study period which is probably due to greater availability of food. Spiders' families like Oxyopidae, Araneidae and Tetragnathidae were found mainly on trees, flowering plants, shrubs and small herbs in our study. Most of the Salticidae members were found on artificial constructions except for Phintella vittata, Carrhotus viduus, Carrhotus sp. which were seen on vegetation. Sparassidae and Pholcidae family members were found indoor with Salticidae. Hippasa agelenoides of Lycosidae was found exclusively in grassland along with some of families Tetragnathidae, Araneidae. Spiders on trees and vegetation were abundant owing to their predatory habitat and self-defence. This type of survey of spiders and their documentation would be useful in the future assessment of environmental conditions as well to create awareness for their conservation. The bio indicative value of spiders is presented successively to family level in natural populations and their increased numbers in September and October months which can be correlated with the amount of prey ingested in the field. Thus, these parameters give an indirect estimation of the habitat quality. Due to the close correspondence between the vegetation architecture and the composition of the associated spider community, it is argued that fluctuations in the spider community structure allows the bio evaluation of human disturbances. This is supported by our study in which species richness was observed in arboreal habitats and highlights the importance of maintenance of natural ecosystems for spiders amidst current, elevated human activities.
INFLUENCE OF PHOTOPERIOD ON GROWTH AND BODY COLOR IN MICKEY-MOUSE PLATY (XIPHOPHORUS MACULATUS)

ARADHANA SINGH, BELA ZUTSHI

Abstract: In ornamental fish industry, healthy growth and attractive dark color are important factors which increase economic value of fish. The aim of the present study was to investigate the effect of long and short photoperiod regime on somatic growth and body color of a live-bearer ornamental fish, Mickey-Mouse Platy (Xiphophorus maculatus). The fish was exposed to two different long and short photoperiods (18L:6D & 10L:14D) using closed wooden chambers at constant light intensity for a period of 60 days was investigated while the control fish were kept under the laboratory lighting condition. At the end of the experiment, result of this study showed that weight gain and specific growth rate were significantly higher in long photoperiod than those exposed to short photoperiod and control (P<0.05). Condition factor differed significantly between long and short photoperiod regime. After visual analysis and carotenoid content estimation of the skin, dark orange fish body color was observed under long day photoperiod followed by short photoperiod than control. Thus present study confirms that long day-photoperiod may be applied for healthy growth and enhancement of the skin color of live-bearer ornamental fishes.

Keywords: Photoperiodic Regime, Somatic Growth, Body Color, Xiphophorus Maculatus.
IMPACT OF TRANSIENT TEMPERATURE DISTURBANCE ON
THE LIPID PEROXIDATION, CATALASE AND GLUCOSE LEVELS IN
GILL AND MUSCLE TISSUES OF CYPRINUS CARPIO VAR KOI

PROTEEK Dasgupta, ARADHANA SINGH, BELA ZUTSHI

Abstract: The present work investigates a transient impact of sudden temperature change on the lipid peroxidation (LPO), catalase (CAT) and glucose levels (GLU) in the muscles and gills of Cyprinus carpio var koi, an ornamental strain of the common carp. The fishes were exposed to different grades of temperature, both cold (10°C, 15°C and 20°C) and warm (30°C, 35°C and 40°C), for 3 hours each. The wide range of temperatures were selected, depending on their occurrence in various geographic regions of the world in which these fishes inhabit. Throughout the study in the fish tissues exposed to both the temperature variants, CAT showed a decreasing trend, the lowest being at 10°C and 15°C. LPO activity was elevated with the increase in temperatures, the maximum being recorded at 40°C, indicating immoderate cellular disturbance and surplus oxidative stress. At lower temperatures, tissues were found to be hyperglycaemic. The current study showed the disturbing and alarming impacts of temperature on the survivability of the fish.

Keywords: Koi Carps, Low Temperature, High Temperature, Muscle, Gill, LPO, CAT, Glucose.

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A HERBAL BASED REMEDIAL INSIGHT INTO
THE SIGNIFICANCE OF NATURAL PRODUCTS AGAINST DANDRUFF -
PERSPECTIVES ON BIODIVERSITY

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Abstract: The threat to biodiversity through the destruction of terrestrial and marine ecosystems coupled with the urgent need to find novel, new chemotherapeutic agents as well as active chemotypes as leads for effective drug development, make natural products research in drug discovery and development a top priority. This study therefore highlights the research of selected natural products aiming at the discovery of therapeutic agents against Malassezia furfur, causative agent of Dandruff. The antifungal activity of nine selected plant extracts of Nelumbo nucifera, Averrhoa carambola, Datura stramonium, Salvia officinalis Tagetes erecta, Psidium guajava, and Tamarindus indica, Butea monosperma, and Sida cordifolia were evaluated by the Kirby Bauer disc diffusion method from which potent plants were further selected for advanced research trials. The aqueous extract of Salvia officinalis and Sida cordifolia; and methanol extracts of Butea monosperma, exhibited potent antifungal activity against M. furfur followed by which they were further processed for characterization of the compounds. Further the Minimum Inhibitory Concentration (MIC) of the plant extracts were determined by agar diffusion technique. The phytochemical analysis of Salvia officinalis, Butea monosperma and Sida cordifolia revealed the presence of terpenoids, steroids, tannins, and polyphenols of which the concentration of polyphenols and flavonoids were significantly higher in Salvia and Butea monosperma respectively. These selected plants when studied, are shown to be naturalized throughout the world. To summarize, the conservation of biodiversity and stabilizing the natural resources of the motherland is very much important not only for the ecological balance but also for the discovery of herbal products against the upcoming infectious threats across the globe.

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PROTECTIVE AND THERAPEUTIC EFFECTS OF GARLIC AND TOMATO ON CADMIUM INDUCED ACHE ACTIVITY IN ALBINO MICE

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Abstract: Heavy metals are natural components of the earth's crust and are considered as constant environmental pollutants since they cannot be degraded or destroyed easily. Cd is present primarily in the ores of zinc, copper or lead, the extraction and processing of which releases large quantities of cadmium into the atmosphere, hydrosphere and soil thereby contaminating the human environment. The aim of the study was to study the protective and therapeutic effects of garlic and tomato on cadmium induced AChE activity in mice. Animals were divided into different groups i.e. Protective and Therapeutic groups. Then they were subdivided into Group I- control, II- Cd treated group, III- Cd+GE group, Cd+TE group and V- Cd+GE+TE treated group. Results showed that there was significant reduction in AChE activity in Cd treated group as compared to control. But the antioxidant treated groups showed significant increment in AChE level in the protective study and this was also confirmed by the histological study. Both tomato and garlic administration showed more attenuation in the Brain AChE activity and it may be due to the strong antioxidant potential of their constituents.

Keywords: Cadmium (Cd), Garlic Extract (GE), Tomato Extract (TE) and Acetylcholinesterase (AChE)

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SAFETY EVALUATION OF WATER AND FISH FROM SELECTED LAKES OF BANGALORE, KARNATAKA.

NAZIMA NOOR, BELA ZUTSHI

Abstract: In the present study, the two lakes, Vengaiah lake (Lake A - Sewage polluted receiving discharge from storm water drain) and Yellamallappa Chetty lake (Lake B - Industrially polluted) situated near Krishnarajapuram-Hoskote taluk, Bangalore, Karnataka were selected for analysis of trace metals viz., arsenic, aluminium, cadmium, lead, mercury, iron, copper and zinc in water samples. Muscle and gill tissues of freshwater fish Labeo rohita reared in these water bodies were also analysed for bioaccumulation of trace metals. Hebbal fish farm was considered as a reference site (Control site) for water and fish samples. Trace metals analyses was carried out by atomic absorption spectroscopy and values were compared with those recommended by FAO/WHO in water and fish samples. Trace metals such as Al, As and Hg were detected in the water sampled from lake B which is attributed to the differences in the sources of pollutants. Muscle and gill tissue sampled from Lake B exhibited high concentration of Al, Pb and Cd content showing a positive correlation with their concentration in water samples. Metals as Cu, Zn and Fe were detected in water sampled from all water bodies and also in the fish tissues. Gills exhibited higher concentration of metals in fish from lake B. Bioaccumulation of these trace metals in fish tissues may cause potential danger to human health when consumed on regular basis. Thus necessary remedial measures are required to combat water contamination and its management keeping in view the aquatic ecosystem and public health. Values were statistically significant at P < 0.0001.

Keywords: Lake, Metals, Labeo Rohita, Bioaccumulation.

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STUDIES ON THE EFFECT OF CAROTENOID PIGMENT FROM PLANT SOURCE ON COLOR CHANGE OF MANGO PLATY XIPHOPHOROUS MACULATUS

REKHA M, BELA ZUTSHI

Abstract: Color is one of the major factors which determine the price of the ornamental fish in the world market. Carotenoids are responsible for colour of muscle and skin in ornamental fish. Like all other animal's fishes are unable to synthesize carotenoids and rely on diet for fulfillment of their body colour. Formulated feed is responsible for improved growth and colour of ornamental fish in confined environment. Thus the present experiment was conducted to evaluate the effect of dietary supplementation of carotenoid (Lantana camara) on growth and coloration of Mango platy (Xiphophorous maculatus). Two concentrations of carotenoid supplement (50mg/100g and 100mg/100g), were made and a diet without Lantana supplement served as control. The experiment was carried out for a period of 60 days. Weight gain (WG) and specific growth rate (SGR) were significantly (P<0.05) higher in fish fed with diet containing 100mg/100gm lantana meal than control diet. Body carotenoid showed significant increase (P<0.01) by the dietary supplements. Results indicated that carotenoid source in diet is beneficial for enhanced growth and pigmentation of the ornamental fish.

Keywords: Xiphophorous Maculatus, Lantana Camara, WG, SGR, Body Carotenoid

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LAND SNAIL DIVERSITY IN PLANTATIONS OF UDUPI DISTRICT, KARNATAKA

SANDHYA LEEDA D’SOUZA, K. BHASKER SHENOY

Abstract: Land snails form an important group of soil invertebrates serving as the indicators of ecological conditions and environmental degradation. They contribute significantly to decomposition process, soil transformation, nutrient cycling and food chain. Due to their sedentary mode of life, they are susceptible to alterations in their habitats. Present study is aimed to investigate the diversity and abundance of land snails in different plantations of Udupi district of Karnataka. The coconut plantations (Sastan and Ucchila), arecanut plantation (Kudi) and cashew plantation (Bantakal) of Udupi district were selected for the study. Coconut and arecanut plantations were visited in monthly intervals from May-October, 2018 whereas cashew plantation was visited in July. The land snails were collected using direct search, placing quadrates and litter sieving techniques. They were identified with the standard identification keys of Raheem et al., (2006 and 2014). A total of 7 species of molluscs belonging to 3 families and 7 genera were recorded from selected plantations. They were Mariaella dussumieri, Machrochlamys indica, Euplecta indica, Laevicaulis alte, Allopeas gracile, Subulina octona, Gessula sp. The family Subulinidae dominated among the land snails in number of individuals (89%) and in number of species (43%). Abundance and richness of species was observed during early monsoon (May-July) whereas no snails were found during late monsoon (August to October). The arecanut plantation of Kudi was rich and dominant with land snails. Population density and richness per quadrate was highest in the month of June in the study area. Shannon –Wiener index was maximum for the selected arecanut plantation of Udupi district and uneven distribution of species was observed. Mariaella dussumieri, Euplecta indica were seen in all the plantations whereas Glessula sp was confined to cashew plantation. Ecological conditions of arecanut plantation have favoured the diversity of land snails. The canopy cover and thick leaf litter provided suitable habitats for Glessula sp in the cashew plantation. Hence, it could be concluded that the plantations of Udupi district provide microhabitats for the land snails.

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**DISTRIBUTION AND DIVERSITY OF THE MARINE MACRO ALGAE FROM SELECTED COASTS OF KERALA, TAMIL NADU AND LAKSHADWEEP ISLANDS**

LIZZY MATHEW, HEMA VIJAYYAN P.U., GEENA GEORGE

**Abstract:** The diversity and distribution of algae in the aquatic ecosystems is a topic of great significance. Marine and freshwater systems provide several important ecological and economic services. The marine macro algae or seaweeds are simple photosynthetic plants and one of the important living resources that contribute greatly to the economy of coastal regions. The distribution and density vary according to geological characters of the substrata and the quantity and quality of light and temperature. Benthic forms grow on rocks, sand, mud, corals and other hard substrata, provide a three dimensional structural habitat for other marine organisms and are consumed by an array of animals. They also stabilize the marine environment by absorbing nutrients, producing metabolites, serving as bio-indicators and showing signs of degrading water quality. Along with ecological relevance, seaweeds possess great economic importance, as human and animal food, fertilizers, stabilizers and stiffeners in food and cosmetic industry and medicine. Utilization of seaweed biomass for making value added products are very much limited in our country. Seaweed resources in the coastal regions are inadequate to meet the growing demands for agar, carrageenan and alginate production. It is highly essential to cultivate the commercially important seaweeds to support and to meet the demand of raw materials for the seaweed industries and also adopt adequate measures to conserve them. Hence the seasonal studies on distribution and diversity of this group of primary producers is of great relevance. The seasonal changes in the distribution of seaweeds can be due to the variation in rainfall, salinity, nutrients and light intensity. The present study was conducted to understand the diversity and distribution of marine algae in selected coasts of Kerala, Tamil Nadu and Lakshadweep islands. The maximum diversity and species richness was observed during the post-monsoon seasons from all the sites selected for the study. A total of 69 species belonging to Chlorophyceae, Phaeophyceae and Rhodophyceae were identified. The most abundant group was Rhodophyceae dominated by 33 species, followed by Chlorophyceae with 22 and Phaeophyceae of 14 species. In Kerala the highest macroalgal diversity was observed in Thirumullavaram of Quilon district and maximum representation was from Rhodophyceae followed by Chlorophyceae and Phaeophyceae. Among the coasts selected in Tamil Nadu maximum diversity was seen in Chlorophyceae compared to the other two groups. Sites selected from Kavaratii possessed maximum diversity compared to those of Agatti, Kilton and Kadamath islands of Lakshadweep and the group Rhodophyceae showed highest macroalgal diversity followed by Chlorophyceae and Phaeophyceae.

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ASSESSMENT OF PHOSPHATASES ACTIVITY IN TISSUES OF LABEO ROHITA FROM SELECTED LAKES IN BANGALORE CITY.

SREEKALA.G., BELA ZUTSHI

Abstract: The present investigation was carried out to assess the levels of activities of acid phosphatase (ACP) and alkaline phosphatase (ALP) in kidney, liver and brain tissues of a fresh water fish, *Labeo rohita* sampled from two lakes, viz., Vengaiah lake (lake A) and Yellamallappa Chetty lake (lake B) within Bangalore city limits having different type of water quality. The results were compared with the tissues of fish collected from a control site. ACP and ALP activities showed a marked percentage decrease in all the fish tissues from lake B which is an industrially polluted lake when compared to lake A which receives sewage and other domestic waste and with Hebbal fish farm (control site). ACP showed decreasing trend in percentage in the following order: brain < kidney < liver and the trend followed by ALP was brain = liver < kidney. The change in the level of these phosphatases showed stressful condition of fish - a biological unit, indicating change in biochemical constituents, metabolic pathways, dysfunctioning and cellular damage in various tissues. ACP and ALP were positively correlated with each other in general. The results were statistically significant at p<0.05.

Keywords: Acid Phosphatase, Alkaline Phosphatase, Polluted Lakes, *L.Rohita*.

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PROTECTIVE ROLE OF VITAMINS C ON ACID ORANGE 7 INDUCED SUBLETHAL TOXICITY IN ANABAS TESTUDINEUS (BLOCH, 1792)

C.V. PRIYATHA, K.C. CHITRA

Abstract: The sublethal toxic effects of acid orange 7 on antioxidant status of liver, kidney and muscle tissues, and the protective role of vitamins C were examined in Anabas testudineus. Sublethal concentration of acid orange 7 i.e., 0.27 g/ L was exposed for 24, 72 and 96 h followed by vitamin C treatment at 0.55 g/ L concentration for 7 days. The activities of superoxide dismutase, catalase, glutathione reductase, and the levels of hydrogen peroxide (H₂O₂) generation and lipid peroxidation (LPO) were evaluated in the liver, kidney and muscle tissues. The results observed showed significant (P<0.05) reduction in the activities of antioxidant enzymes in time-dependent manner with concomitant increase in the levels of H₂O₂ and LPO thereby indicating the induction of oxidative stress. Similarly, the activities of alanine and aspartate aminotransferases in liver and kidney, and acid and alkaline phosphatase enzymes in muscle tissue also decreased significantly (P<0.05) in the treatment groups when compared to the corresponding control tissues indicating sublethal toxicity of acid orange 7. Interestingly, vitamin C exposure neutralized the toxic effects of acid orange 7 as evident by normalizing the activities of all antioxidant enzymes and the tissue biomarker enzymes thereby proved protection of tissues against oxidative stress.

Keywords: Acid Orange 7, Vitamin C, Anabas Testudineus, Oxidative Stress, Sublethal Toxicity.
COMBITORIAL STUDY OF BACTERIOCIN FROM ACINETOBACTER VARIABILIS WITH ESSENTIAL OILS AGAINST FOOD BORNE PATHOGENS

RASHMI. D, SUGUNA. S R, TESSY ANU TOMAS, SHARMILA.T

Abstract: Bacteriocins are a kind of ribosomal synthesized antimicrobial peptides produced by bacteria, which can kill or inhibit bacterial strains closely-related or non-related to the producing bacteria, but will not harm the bacteria themselves by specific immunity proteins. The application of combined preservative factors is very effective in controlling the growth of food spoilage and foodborne pathogenic bacteria. Antimicrobial activity of the bacteriocin extract from Acinetobacter variabilis and in combination with some natural organic essential oils (carvacrol, eugenol and thymol) on the growth of pathogenic bacteria Escherichia coli, Listeria monocytogenes and Salmonella typhi were investigated. All the organic compounds tested did not exhibit any antimicrobial activity against the microorganisms by Kirby-Bauer disc diffusion. Investigation of the interaction between the organic compounds and nisin against the test organisms revealed different patterns, varying from synergistic to antagonistic. Combinations of nisin with carvacrol, eugenol, or thymol resulted in synergistic action against the indicator organisms. The activity of bacteriocin with eugenol showed highest activity at lowed acidic pH against the indicator organisms wherein synergistic activity was not observed with carvacrol and thymol. This study highlights the potential of the combination of these organic compounds with bacteriocin to inhibit pathogen growth in food.

Keywords: Antimicrobial Activity, Bacteriocins, Essential Oils, Kirby-Bauer Disc Diffusion, Synergistic Action.

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HYDROGELS (CARBOXY METHYL CELLULOSE – STARCH) AS A DYE- ADSORBENT FROM INDUSTRIAL WASTE WATER

NAVYA K N, SUJATHA C H

Abstract: Water is the most important natural resource and its quality and quantity are very crucial for every sphere of our life and also for the industrial activities. The presence of color in wastewater may be due to industrial wastes from pulp, paper, dyestuffs, textiles, paint and varnishes, ink plastics, rubber, cosmetics and leather using various coloring agents including some organic substances. Discharging even a small amount of dye into the water can affect the survival of aquatic life. Therefore the removal of dyes from effluent is a major environmental problem and has been widely focused. Among these various dyes, methylene blue (MB) is a thiazine cationic dye, which is most commonly used dye for various purpose. Although not strongly hazardous, it can have various harmful effects. Adsorption is a technique that has been employed widely for the removal of colors from aqueous phase. The hydrogel has been used for the absorption studies of methylene blue dyes from industrial wastewater. Hydrogel has been synthesized using carboxymethyl cellulose (CMC) and starch using polyethylene glycol (PEG) as a cross linker. The chemical structure of the hydrogel (CMCS) has been characterized by FTIR spectroscopy. Morphological studies were also carried by SEM images. The swelling and the diffusion study of the hydrogels in dyes were analyzed. A notable inference was observed and show the effectiveness of performed activities of hydrogel. The results suggest that the hydrogel can be used as an effective sorbent for the removal of dye effluent discharged from various industries and could solve the issue facing today.

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ANALYZING GENETIC DIVERSITY-A FUTURE PROMISE TO FOOD SECURITY

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ANN MARY MATHEW, A MANICKAVELU

Abstract: The rice landrace varieties cultivated by traditional farmers possess a substantial genetic diversity and played a very important role in the local food security. But the wide diversity present in the germplasm was not utilized completely in breeding programs. Diversity analysis among rice varieties by using SSR markers is a resourceful implement of gene profiling and diversity analysis. Genetic diversity among 96 rice landrace accessions, including 3 improved varieties were investigated by using 12 SSR markers distributed across the chromosomes. RM 242 showed highest PIC value of 0.80 where as the lowest PIC value (0.45) showed by RM 232. The number of alleles per locus varied from 4 to 9 with a mean of 6.41 allele per locus. RM 232 had shown major allelic frequency with 0.68. Gene specific markers were also included in the marker set which helped to identify the diversity in gene level. RM 3 and RM 232 were flanked to drought tolerance trait. PCoA analysis of the 96 varieties showed 54% of variance. The cluster analysis resulting from N-J method revealed allelic richness of clusters for various sizes. Cluster based analysis on microsatellite allelic frequency clearly delineated the rice landrace varieties into 4 clusters. The Genetic dissimilarity coefficient between landraces Chennellu Vella and White Jasmine (> 0.5) clearly indicates that they are with high genetic differences. The results demonstrated that rice landrace germplasm show evidence of higher genetic diversity and can be utilized for sustainable development in crop breeding.

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EXPRESSION AND PURIFICATION OF GLUK1 AND GLUK5 ATD HETERODIMERS

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Abstract: Ionotropic glutamate receptors (iGluRs) are ligand-gated ion channels that mediate the majority of excitatory neurotransmission in the central nervous system. The iGluR family includes four subtypes in vertebrates: α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA), kainate (KA), N-methyl-d-aspartate (NMDA), and δ-receptors. Kainate receptors are further classified into low-affinity (GluK1-3) and high-affinity (GluK4-5) receptor families based on their affinity for the neurotoxin kainic acid. GluK1-3 can form homomers and heteromers, however, GluK4 and GluK5 can only form functional receptors by combining with one of the GluK1-3 subunits. They can be arranged in different ways to form a tetramer, a four subunit receptor. They are integral membrane proteins that form a central ion channel pore. Glutamate receptor subunits contain four discrete semiautonomous domains: the extracellular amino-terminal domain (ATD), the extracellular ligand-binding domain (LBD), the transmembrane domain (TMD), and an intracellular carboxyl-terminal domain (CTD). The ATD of iGluR facilitates subunit assembly, accommodates allosteric modulator compounds, and controls gating properties. The project aims at expression and purification of ATD of GluK1 and GluK5 in order to understand the guiding principles for heteromeric assembly. This was done by transforming TOP10 competent cells with pRK5 vectors carrying the gene of interest to amplify the plasmid DNA. The cells that grew in the media containing ampicillin were cultured and grown, and the plasmid was isolated using maxi prep kit (Macherey Nagel). HEK-293 suspension cells were transiently co-transfected at a ratio of 1:3 using polyethylenimine (PEI) as transfecting reagent. The GluK1 and GluK5 heterodimer secreted by the cells were purified by Ni-NTA affinity chromatography. The eluted sample was concentrated using centrifugal filters and, the polyhistidine-tag and N-linked glycosylations were digested using thrombin and endoglycosidase H. The sample was loaded onto a size exclusion chromatography column for final purification and the fractions were collected. The expression of the target proteins was confirmed via SDS PAGE.

Keywords: Ionotropic Glutamate Receptors, Ion Channels, Kainate Receptor.

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STUDY ON SPATIOTEMPORAL EXPRESSION PATTERN OF TRANSCRIPTION FACTORS IN TRITICUM AESTIVUM

ANN MARY MATHEW, LAKSHMI PRIYA P, MINU M NAIR, A. MANICKAVELU

Abstract: Transcription factors (TFs) are important gene regulatory elements having pivotal role in development, reproduction, metabolism, stress response, cell division cycle, intercellular signaling etc. Identification and characterization of TFs in crop plants like *Triticum aestivum* (bread wheat), one of the major food crops in the world, has primary importance as it can be utilized to engineer improvement strategies for agriculturally important traits. This study aimed to identify differential expression of TFs in various tissues at different developmental stages of bread wheat using Expressed Sequence Tags (ESTs). Similarity search of TFs was conducted with 427 TFs from 42 TF families against the ESTs and resulted in the identification of members from 11 TF families specific to various tissues at different developmental stages. We found that members of bHLH family of TFs were expressed in all the tissues belonging to different developmental stages and their members were reported to have roles in epidermal cell type specification, brassino-steroid and abscisic acid signaling, etc. Some of the TFs showed specificity in their expression and are need to be validated. Among these, members of NFX1-type zinc finger proteins were specifically found in pistil at heading stage and Calmodulin binding transcription activator (CAMTA) family were expressed in spike at flowering stage. Moreover, TFs from LSD, GeBP and TALE transcription factor families were exclusively identified in spikelet at late flowering stage and BBR-BPC TF members were found only in seed DPA 20 stage. The outcome of this work can act as a source for development of new improvement strategies inbread wheat.

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A CHECK LIST OF HETEROPTERAN BUGS FROM DIFFERENT REGIONS OF NORTH KERALA, INDIA

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Abstract: The hemipteran suborder Heteroptera consists of true bugs. They have very distinctive forewings, called hemelytra, in which the basal half is leathery and the apical half is membranous. At rest, these wings cross over one another to lie flat along the insect’s back. These insects also have elongate, piercing-sucking mouthparts which arise from the ventral (hypognathous) or anterior (prognathous) part of the head capsule. The mandibles and maxillae are long and thread-like, interlocking with one another to form a flexible feeding tube (proboscis) that is no more than 0.1 mm in diameter. This group of insects is adapted to a wide range of habitats – terrestrial, aquatic and semi-aquatic. Heteropterans comprise economically important species like pests, predators, scavengers etc. Plant feeding bugs are important pests of many crop plants. They may cause localized injury to plant tissues, they may weaken plants by removing sap, and they may also transmit plant pathogens. Predatory species of Heteroptera are generally regarded as beneficial insects, but those that feed on blood may transmit human diseases.

The present study mainly deals with the checklist of heteropteran fauna found in different regions of northern Kerala, where the currently available data is very scanty. This checklist includes 25 different species of bugs which comes under eight families and 21 genera. The family Pentatomidae that consists of shield bugs were found to be predominant among them. This check list of true bugs will throw light in the identification of the heteropteran studies and unveil their puzzling distribution pattern in Kerala.

Keywords: Kerala, Heteroptera, Checklist.

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LINDANE DEGRADING BACTERIA ISOLATED FROM AGRARIAN SOILS AS A POTENTIAL CANDIDATE FOR WETLAND BIOREMEDIATION.

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Abstract: This comprehensive study aims to isolate and identify lindane degrading bacteria from agricultural sites and to study its viability as bioaugments in wetland system to enhance the abatement of pesticides. Kole wetlands, a part of Ramsar site, are unique in nature and major producer of rice granaries. The term kole comes from malayalam language which means bumper yield. The presence of persistent contaminants in the form of different pesticide residues, heavy metals etc. reaching as a result of runoff or along the flow of river from various industries is a threat to the kole wetlands and thereby to its biodiversity. Organochlorine pesticides are a group of chlorinated hydrocarbon derivatives having vast application as agricultural insecticides. Lindane is an organochlorine insecticide, with a broad spectrum, and used to control pests and thereby improve crop yield. Besides its fatal threat, lindane is also persistent in nature and often accumulating through the food chains and leaching out to non-target sites. Lindane and its isomers are known to cause short term as well as long term damage to human health. First part of our study focuses on the isolation of indigenous potent lindane degraders to reduce the lindane toxicity. The soil samples were collected from three different agricultural sites of Palakkad district, Kerala which has a long history of farming. Soil samples incorporated with 10 ppm of lindane was used for the screening of potent lindane degraders by using serial dilution techniques followed by pouring in nutrient agar plates. Out of 38 isolates, four species with prominent lindane utilization capacity were selected and subjected to molecular identification. Following the DNA isolation, PCR amplification and 16SrRNA sequencing the species were identified as Bacillus drentensis COD NIS-24, Bacillus subtilis COD NIS-25, Bacillus cereus COD NIS-26 and Lysinibacillus sphaericus COD NIS-26. As a second part of our study, the isolated bacteria’s will be applied on selected soil samples from kole wetlands to check their potential as bioaugments to enhance the degradation of lindane and also that of other pollutants.

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ROLE OF COLD STRESS ON THE FUNCTIONAL ABILITY OF FEMALE REPRODUCTIVE TRACT IN STZ INDUCED DIABETIC RATS

RAKESH H, AFREEN MAHABOOB, MAHABOOB BASHA P

Abstract: Reproductive failure is a significant health concern in diabetic subjects and reactive oxygen species (ROS) are involved in the modulation of an entire spectrum of physiological reproductive functions. Relatively, little is known about factors affecting fertility while there is lacuna to hypothesize that cold stress exacerbate in modulating diabetic complications. Hence attempts are made to unravel the synergistic actions of both stressors on the functional ability of female reproductive tract in diabetic model.

STZ (40mg/kgbw) induced female diabetic rats were exposed to cold stress (15°C) for 72h by in cold chamber and later they were euthanized by pentobarbital (1%) anesthesia to excise accessory reproductive tissues to measure biochemical indices of oxidative stress. Markers of oxidative stress such as superoxide dismutase, glutathione peroxidase, glutathione transferase, reduced glutathione and lipid peroxides were assessed in discrete reproductive tract and results indicate variation in their activity levels in rat reproductive accessory tissues upon induction of diabetes, while 72hr cold exposure to STZ induced diabetic rats exhibited exacerbation in hyperglycemic levels and impairments in the levels of antioxidant enzymes.

Results of this study infer that synergistic effects witnessed in the functional tissues of female reproductive tract could be due to failure of antioxidant system in quenching free radicals generated as a result of co-exposure of cold stress to diabetic animals. These changes may exacerbate the female reproductive functions such as gonadotropin regulation and bring disruption in the estrous cyclicity by inhibiting estrogen and progesterone secretion and impairment of reproductive functions. Despite ovulation, the reproductive functions may vary and bring serious complications in diabetic subjects residing in colder regions.

Keywords: STZ Induced Diabetes, Cold Stress, Markers of Oxidative Stress, Female Reproductive Tract.

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GESTATIONAL DIABETES AND COLD-STRESS IMPAIR ANTIOXIDANT DEFENCES IN DEVELOPING CENTRAL NERVOUS SYSTEM

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Abstract: Prevailing conditions of intrauterine life play a major role in shaping fetal development and health outcome of the offsprings. A single or dual stressors of environmental and maternal origin may influence the physiological system(s) in critical phases of fetal development that will have impact in later life. Relatively, little is known about factors affecting neurodevelopment while there is a lacuna to hypothesize that cold stress exacerbate in modulating diabetic complications, hence attempts are made to unravel the synergistic actions of dual stressors namely, maternal diabetes and cold-stress on the functional ability of developing nervous system.

STZ (35mg/kgbw) induced diabetic female rats were allowed for conception, entire gestation they were exposed to cold stress (15°C) for 3hrs/day and litters born were further allowed to cold stress along with dam during lactation. In post-weaning period they were euthanized by pentobarbital (1%) anaesthesia to excise discrete brain regions and biochemical indices concerned to oxidative stress were measured. Oxidative markers viz., superoxide dismutase, glutathion.e peroxidase, glutathione transferase, reduced glutathione and lipid peroxides found varied in discrete brain regions confirming the existence imbalanced antioxidant defences in both diabetic and cold stressed rats however higher exacerbation was evident upon co-exposure of both stressors.

Results of this study infer that discrete brain regions are susceptible to prenatal stress and synergistic effects witnessed could be due to failure of antioxidant system in quenching free radicals generated as a result of co-exposure of cold stress to diabetic animals. These changes may exacerbate the neuronal functions and damage to neurites. Thus, environmental influences may permanently modify the function of physiological system in critical stages of fetal development. Specifically, prenatal stress during gestation, may trigger long-lasting modifications on the epigenome of the differentiating cell resulting in changes in organ structure and adaptation of its metabolism, allowing optimal adaptation of the organism to its environment in order to ensure the immediate survival of the fetus.

Keywords: STZ Induced Diabetes, Cold Stress, Markers of Oxidative Stress, Developing CNS.

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THE ROLE OF SELECTED SACRED GROVES IN THE BIODIVERSITY CONSERVATION OF KOTTAYAM DISTRICT, KERALA

HARITHA R. NAIR

Abstract: Selected Sacred groves of Kottayam district, Kerala revealed that the importance of conserving the biodiversity of that area. The vegetation analysis revealed that a total of 161 taxa belonging to 142 genera in 65 families were distributed in these groves. The vegetation in the groves comprised of different life forms. The economic analysis explores the medicinal, edible and miscellaneous potentiality of plants in such groves. So the studies indicate the importance of conserving such species. The distribution analysis enumerate the diversity and status of plant species in the groves. It preserves the characteristic vegetation of the region and a house to some Rare, Endangered, Vulnerable and Low risk species, along with this many Endemic plants are also present. Sacred groves render valuable ecological services such as soil and water conservation, nutrient cycling and temperature regulation. The religious and socio-cultural aspects associated with these groves express a rich cultural heritage. Many unique rituals, offerings and festivals are found associated with deities of such groves helps there conservation and even today it exists as integral part of the traditional system.

Keywords: Sacred Groves, Kottayam District, Diversity, Conservation, Socio-Cultural.

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TAXONOMIC RELATIONSHIP ON GARCINIA SPECIES BASED ON ANATOMICAL CHARACTERISTICS.

PRIYA C., KIRAN GEORGE KOSHY., HARI N.

Abstract: The genus *Garcinia mangostana* L., *G. indica* Choisy. and *G. livingstonei* T. Anderson which belongs to the family Clusiaceae. The family occupies 6 genera and up to 26 species in Kerala. The transverse sections of the leaf blade and petiole of three species were studied to establish an anatomical and taxonomic relationship among them. Observation of the transection of the leaf blade showed thick cuticle and uniseriate epidermis, the ground tissue consists of chlorenchyma and round thin-walled parenchyma cells. The examination of midrib exhibits varied nature of arrangement of vascular bundles in these species. The microanatomy of the leaf showed the presence of rubiaceous stomata on the abaxial side only in all the members. The leaves are petiolate in the three taxa. The petiole vasculature of *G. mangostana* and *G. livingstonei* shows incurved open vasculature with a narrow distinct gap and large distinct gap respectively. But as in *G. indica*, the vasculature shows curved vascular strand with a narrow gap. The anatomical characteristics of the three species strengthened the systematic interspecific relationship among them.

Keywords: Anatomy, Garcinia, Leaf and Petiole, Relationship.

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IMPACT OF SYNTHETIC VITAMIN ‘C’ SUPPLEMENTATION ON GROWTH AND FOOD UTILIZATION IN PURE MYSORE RACE OF THE SILKWORM BOMBYX MORI L.

OHILA M.S., ASIYA NUZHAT F.B

**Abstract:** Nutrition plays an important role in biological characteristics of silkworms. Ascorbic acid is an active form of vitamin ‘C’ soluble in water, being found in different insect tissues and organs. The present study was carried out to know the impact of synthetic vitamin ‘C’ on Pure Mysore race of silkworm *Bombyx mori* L. fed *ad libitum* mulberry leaves *Morus alba* at different concentrations of synthetic vitamin ‘C’. The study was conducted from hatching to pupation at ±6±2°C with 80±10% relative humidity. The food utilization parameters like food intake, faeces defecation, assimilation, food conversion, oxidation, feeding rate, assimilation rate, conversion rate, metabolic rate, assimilation efficiency, conversion efficiency (K1 and K2) were studied. It has been observed that the 0.5% vitamin ‘C’ treated group plays a significant role with an increase in growth and better food intake compared to control group and other vitamin ‘C’ treated groups i.e. 1.0%, 1.5% and 2.0% concentrations. Hence it is indicated that administration of vitamin ‘C’ stimulate metabolic activity which is used to increase the Growth and feeding efficiency with reference to Silkworm rearing.

**Keywords:** Ascorbic Acid, *Bombyx Mori* L. Growth, Micronutrient, Mulberry Leaves.
DENSITY DEPENDENT INTERRELATIONSHIP BETWEEN TROPICAL FRUGIVOROUS BIRDS AND POLLINATED PLANTS WITH IMPLICATION FOR THE CONSERVATION OF FRUIT-BIRD INTERACTIONS

SILVY MATHEW

Abstract: The present study focuses on the patterns of fruit-bird interactions and to identify species with significant roles and classification of this plant species according to traits relating to frugivory by birds, and analyzed the relationships between plant types and frugivorous birds in the Western Ghats especially in Kerala Forest research institute (KFRI) campus. At the 28 ha Reserve Forest area study site, many plant species were bird-dispersed and 14 common bird species were frugivorous. The observations showed that feeding time of the birds vary, some feed in morning time while others are active whole day, some are in mid noon and others are in evening times. The study includes the morphological characters of the fruits (length, breadth, weight of the fruit, dispersed by the birds, colour and size of the fruits preferred by birds, Fruiting season of the plant, Number of the seeds, Color of the seed). Fruits were classified in terms of size, as small, a size widely eaten by bird, and large, a size that is difficult for small birds to eat. Seven types of plants were identified in the study site, which were classified according to growth form, phonological pattern, and fruit size. Of these fruits, bright red coloured fruits with 0.72gm weight and 1.5cm length are preferred by almost all species of birds. Of the observed birds, eight species were considered as major dispersal agents. The patterns of relationship between fruits and birds overlapped in various ways. Strong relations in which species of fruits and birds are dependent almost entirely on each other were found. The results of this study suggest that conservation of the overall composition of fruit types improves the stability of food resources for birds and facilitates dispersal success for the plants themselves. In particular, a decrease in key plant species might seriously affect fruit-bird interactions, causing a food scarcity for birds, and preventing adequate seed dispersal for plants. Therefore, monitoring the population of key species is essential for conserving fruit bird interactions in tropical forests.

Keywords: Birds, Forest Conservation, Frugivory, Fruit-Bird Interaction, Forest, Seed Dispersal.

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INTERACTION OF MEALYBUS ATTENDANT ANT SPECIES SOLENOPSIS GEMINATA (FABRICIUS) (HYMENOPTERA: FORMICIDAE) IN PRESENCE OF MEALYBUG PREDATOR CRYPTOLAEMUS MONTROUZIERI (MULSTANT) (COLEOPTERA:COCCINELLIDAE)

PRASHANTH G P, M G VENKATESHA

Abstract: Several different species of mealybugs (Hemiptera: Pseudococcidae) are the most serious pest of economically important crops worldwide. Ants shows mutualistic relationship with honeydew producing hemipterans. Ants receive large amount of honeydew as nutritional resources from hemipterans which are essential for colony growth. In return they provide a various benefits, mainly they protect mealybugs from predators and parasitoids and also maintain colony hygiene by reducing the fungal growth. In our study we investigated to know predation rate in presence of mealybug attendant ants and also the behaviour of ant when predators were introduced in to the mealybug culture. Cryptolaemus montrouzieri (Mulstant) (Coleoptera:Coccinellidae) is native to Australia and has been used in the control of various mealybug species around the world. Ant species observed in our study was the fire ant Solenopsis geminata(Fabricius) (Hymmenoptera: Formicidae). Solenopsis geminata was foraging mealybug colonies throughout the day. S.geminata easily recognise the mealybug predator Cryptolaemus montrouzieri and aggressively attack the predator stages (1st,2nd and 3rd larval instars) including adults. Aggressiveness of S.geminata was found more towards adults of C.montrouzieri than larval instars. Impact of ant species attending the mealybug infested pumpkins resulted in enhanced mealybug growth.

Keywords: Mutualistic Relationship, Parasitoids, Ants, Predation.

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A REVIEW TO NECESSITATE CONSERVATION OF INDIAN TERRESTRIAL AND FRESHWATER GASTROPODS

SILPI SARKAR, DR.S.KRUPANIDHI

Abstract: The Phylum Mollusca, an important assemblage of unique species of the ecosystem, is the second largest phylum among invertebrates. The molluscan species are considered to exhibit phylogenetically dispartate lineages and species-rich lineages which represent in two of the molluscan classes namely Bivalvia and Gastropoda. Gastropods are diverse, yet remain as less-studied and critically imperiled fauna. In this review, we emphasize the diversity of terrestrial and freshwater Indian gastropods, challenges critical for gastropod species loss, conservation status of gastropod species and the management required to conserve gastropods in general. Thus, in conclusion, this article reviews to understand the areas of concern that can be prioritized for the conservation of species of terrestrial and freshwater gastropods in the perspectives of sustainability of ecosystem in India.

Keywords: Challenges, Conservation, Diversity, Gastropods, Management.

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DIETARY SUPPLEMENTATION OF *HEMIDESMUS INDICUS* AND SWIM EXERCISE AMELIORATES BRAIN OXIDATIVE STRESS AND IMPROVES COGNITION IN MIDDLE AGED RATS

BHAGYALAKSHMI D, RAVIKIRAN T

**Abstract:** Numerous studies have shown that exercise and diet has a positive effect on brain function. The present study was aimed to investigate the effect of swim exercise and supplementation of *Hemidesmus indicus* (HI) extract on antioxidant status and synaptic plasticity in discrete regions of the rat brain. Male *wistar* albino rats of 12 months old were received oral supplementation of HI extract at a dose of 50 and 100mg/kg body weight and swim trained at 3% intensity for 30min/day, 6 days/week for a period of 60 days. Spatial performance were evaluated using T-maze task and western blotting assay was performed to assess brain derived neurotrophic factor (BDNF) expression. Swim trainee and supplementation of HI extract at 100mg/kg body weight upregulated antioxidant enzymes in all the regions of the brain. The synergistic effect of both the treatment significantly improved cognitive performance in terms of acquisition and retention of memory and promote synaptic plasticity by enhancing the expression of BDNF. Our results suggest that the exercise and diet have a profound effect on brain function by enhanced antioxidant activity and improved cognitive and synaptic performance.

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APPEARANCES OF ORGANOCHLORINE PESTICIDES RESIDUE
IN WATER AND SOIL OF WESTERN GATH COFFEE
PLANTATION (CHIKKAMAGALUR DIST.); KARNATAKA, INDIA.

RAGHAVENDRA, M. G. VENKATESHA

Abstract: This study investigated levels of organochlorine pesticide (OCP) residues in water and soil samples from perennial crop coffee (Coffee arabica) plantation areas of Chikkamagalur western gaths stretch. Drinking and domestic water resources sample were collected from the plantation areas. Total 66 number of samples were collected which included surface as well as ground water, receiving runoff/leaching from nearby coffee plantations. Two hundred twenty four samples of soil (0–15 cm depth) were collected randomly using grab technique. Water samples were processed using a liquid-liquid extraction technique by using mechanical shaker and condensed in rotatory evaporator. Soil sample were processed with solid liquid extraction followed by condensation. For both water and soil, detection was done by gas chromatography micro electron capture detector (GC-μECD) with capillary column and nitrogen as carrier gas. Presence of organochlorine pesticide residue in water and soil were estimated for 16 OCP (Alpha HCH, Beta-HCH, Gama-HCH, Delta-HCH, Heptachlor, Aldrin, Heptachlorepoxide, Endosulfan, 44 DDE, Dieldrin, Endrin, Endosulfan-II, 44 DDD, Endrin aldehyde, 44 DDT & Methoxychlor) were in appearances of β-HCH, Endrin, endosulfan-II and 4-DDD are in LOQ(Limit of quantification) level. Reaming 12 targeted were detected in more than detectable level. About 60% of sample was not detected by any residue of interest. OCPs by gas chromatography with electron capture detection gave higher concentrations for soil compared to water samples. The efficiency of the analysis was evaluated with percentage analyte recoveries in their matrix, evidences confirms 70.17 ± 0.03 to 130.72 ± 0.02 ranges of recoveries. The study resolved that most of the Coffee growing areas were still evidences the presence of residues OCPs was associated with agricultural activities in the past. In general sources of contamination are closely related to human activities in agricultural pesticides usage as well as atmospheric transport of the same. Farmers having small farm holdings (less than 25 acres holdings) showed predominant appearance of pesticides residues in their water and soil.

Keywords: Organochlorine Pesticides, Water, Soil, Coffee Plantation, GC-ECD.

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A COMPARATIVE ACCOUNT OF POTENT ANTIMICROBIAL EFFECTS OF NATIVE BAMBOO SPECIES

SMRUTI PIMPLIKAR, UCHIT BHASKAR, SUMATHRA MANOKARAN, A.H. MANJUNATHA REDDY

Abstract: Traditional medicine lists bamboo as an important component, especially in the regions of Southeast Asia, India and other parts of the Orient. It is one of the most abundantly grown members of the grass family, used for a variety of purposes ranging from construction materials to paper industry. However, Bamboo shoots have not been exploited in their entirety for their potent bactericidal and fungicidal properties. Literature survey reveals the presence of a 20 kD thaumatin-like protein called Dendrocin in some species of Bamboo, responsible for antifungal activity. Nonetheless, it is not known if all forms of indigenous Bamboo have this protein. In this study, we have utilized three natively available bamboo species belonging to Dendrocalamus, Bambusa and Phyllostachys genera. Crude proteins were extracted from each of the species by homogenization and protein precipitation techniques, and the total proteins were estimated by conventional Bradford assay. To assess the presence of Dendrocin-like protein, the samples were run on an SDS-PAGE, to identify the relative molecular weight of proteins in the extract. Further, all samples were checked for their antifungal and antibacterial activity by standard disk diffusion method against commonly available laboratory microbes. In lieu of its use as bactericidal or fungicidal agent, two of the species taken were found to be effective. Further tests are required to assess the exact mode of action and to evaluate the activity of the purified protein.

Keywords: Bamboo Shoots, Dendrocin, Antimicrobial.

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PRIMARY PRODUCTIVITY STUDIES
IN KUNIGAL TANK, TUMKUR DIST, INDIA

LALITHA H M, RAMAKRISHNA S

Abstract: Primary productivity is the most important biological parameter. It is the rate at which the sun’s radiant energy is stored by plants and other photosynthetic organisms in the form of organic compounds in the aquatic ecosystem. It gives the valuable information on the productive nature of the water body and responsible for the fish yield. The present study was carried out at five stations of Kunigal tank for a period of one year from February-2014 to January-2015 using Gaarder and Gran (1927) ‘Light and dark bottle method. ’The Gross primary productivity, Net primary productivity and Community respiration were calculated using standard formula. The gross primary productivity was found high during summer and less during monsoon and winter. The similar trend of variations was observed in the values of net primary productivity and community respiration.

Keywords: Primary Productivity, Radiant Energy, Organic Compounds, Light and Dark Bottle Method, Gross Primary Productivity.

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IDENTIFICATION OF ACCIDENT BLACKSPOT LOCATION AND ANALYSIS

ALKA SINHA, ASHWINI M, HARITHA N C, SWATHI S

Abstract: From last few years "Road Accident" has become a big challenging issue to overcome. They occur mostly due to behavior of driver, traffic distribution, climatic control, speed than the capacity of vehicle, improper or premature roads. To control all these we need some high technology solution. The accident data from police record can’t be used effectively for any solution to lower the range of “Road Accident”. In the field of proper identification and analysis, the Machine Learning technique should be introduced. It focus on the development of algorithms and enhancing the performance of applications to the field of identifying the exact locations and its analysis. So that it can be used to reduce the range of “Road Accident” in future.

Keywords: Accident Locations, Black Spots, GIS.

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STUDIES ON PCV, GCV, HERITABILITY AND GENETIC ADVANCE IN SESAME GENOTYPES FOR YIELD AND YIELD COMPONENTS

GOKULAKRISHNAN, J., B. PRIYA, R. NIRMALRAJ

Abstract: The present experiment was carried out. Thirty genotypes of sesame to study genetic variability, heritability and potential for screening suitable genotypes for future improvement programmes. The genotypes exhibited significant differences for all traits under study. A wide range of variability along with high estimates of PCV and GCV observed for seed yield per plant, number of capsules per plant and number of branches per plant, indicating high variability available in the germplasm for these characters for further improvement. High heritability coupled with high genetic advances as per cent of mean was observed for days to 50% flowering, number of capsules per plant, plant height at maturity, seed yield per plant, number of branches per plant, 1000 seed weight and number of seeds per capsule which indicates the predominance of additive gene effect and therefore, these are more reliable for effective selection.

Keywords: Sesame, Genetic Variability, Phenotypic Coefficient of Variation (PCV), Genotypic Coefficient of Variation (GCV), Heritability, Genetic Advance and Selection.
QUALITATIVE AND QUANTITATIVE EVALUATION OF
ZOOPLANKTON COMMUNITY IN
BORANAKANIVE RESERVOIR, KARNATAKA.

R SHRUTHI, S RAMAKRISHNA

Abstract: Freshwater ecosystems accommodate much faunal diversity, among which the zooplankton community is attributed with a vital role of interlinking the lower trophic level to that of the higher ones in the process of energy conservation. Since, zooplanktons are major bioindicators to the ecological status of any aquatic environment, the present study deals with their qualitative and quantitative evaluation at the Boranakanive reservoir in the state of Karnataka. Water samples were collected once in every month from November 2017 to October 2018 and were observed for the presence of various zooplanktons species. Throughout the study period a total of 22 species were identified belonging to three different groups of zooplanktons, listed as Rotifera, Cladocera and Copepoda. The highest value of the total zooplankton abundance was recorded in the pre-monsoon season followed by the monsoons and the least abundance was observed during the post-monsoon season. The Rotiferans accounted for 59% of the zooplankton diversity, followed by 28% and 13% of Cladocerans and Copepods respectively. Our study, revealed the presence of substantial amount of Rotiferan species which signifies alkalinization of the water body.

Keywords: Zooplankton Abundance, Boranakanive Reservoir, Rotifera, Cladocera, Copepoda.

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ENUMERATION OF MICROBIAL LOAD
IN LIQUID ORGANIC FERTILIZERS
(PANCHAGAVYA, BEEJAMRUTHA AND JEEVAMRUTHA)

SORNALATHA.S, ESAKKIAMMAL.B

Abstract: Microorganisms play a vital role in the organic agriculture practices. It enrich the soil fertility and solubilize the nutrients present in the environment. Cow products work at grass root level in the environment. Cow dung and cow urine are the base products of the organic liquid fertilizers. Some of the cow products based organic fertilizers are Panchagavya, Beejamrutha, Jeevamrutha, Sanjibani, Kunapajala. Microorganisms are identified from the liquid fertilizers like Panchagavya, Beejamrutha and Jeevamrutha using serial dilution and plate count method. The present study investigated to know the microbial count of the liquid fertilizer. In Panchagavya, the bacterial load was identified is 10.6±0.24, fungi 75.0±0.22 and actinomycetes 30.1±0.24. There was a significant increase in the variation with respect to the microbial flora of the liquid fertilizers.

Keywords: Panchagavya, Beejamrutha, Jeevamrutha, Bacteria.
EFFECTS OF COGNITIVE ENRICHMENT ON WELFARE MEASURES OF ASIATIC LIONS AT SAKKARBAUG ZOO

SITENDU GOSWAMI, P.C. TYAGI, P.K. MALIK, SHIV PATEL, SAMRAT MONDOL

Abstract: Modern zoos rely heavily on behavioural welfare indices without accounting for intra-specific variations. To understand the impact of individuality and cognitive enrichments on welfare indices, we studied 35 Asiatic lions, *Panthera leo persica* housed at Sakkarbaug zoo, Gujarat. This study was conducted in collaboration with Zoological Society of London, Gujarat Forest Department, and Wildlife Institute of India.

We used rating, and coding to categorize Asiatic lions based on bold and shy traits. From 15,311 scans we calculated species-typical behaviour diversity, spread of participation index (SPI), and proportion of aberrant repetitive behaviours (ARB) for each subject. We introduced enrichment interventions at six enclosures (test) housing 18 subjects, remaining nine enclosures housing 17 individuals were control. Alongside behavioural measures, we measured faecal corticosterone metabolites. We used paired and unpaired t-tests to compare welfare indices.

Timid/shy subjects (n=14) showed higher latency to novel objects (158.35±26.04s) compared to curious subjects (n=21) (14.96±4.38s). At baseline, Bold subjects showed higher behaviour diversity (1.23±0.26) and lower ARB compared to shy subjects (behaviour diversity = 0.73±0.1, ARB = 17.23±5.87, p<0.001). Subjects displayed significant increase in behaviour diversity (baseline = 1.03±0.4, treatment = 1.32±0.3, p < 0.001), reduction in stereotypy (baseline = 11±7, treatment = 3.44±3.13, p < 0.001), and decrease in SPI (baseline = 0.8±0.07, treatment = 0.6±0.1, p < 0.01). Faecal corticosterone levels decreased significantly after enrichment interventions (baseline = 1.6±0.17, treatment = 1.12±0.24, p < 0.01).

Our findings indicate that welfare evaluations should account for intraspecific variations and pave the way for tailored husbandry at conservation breeding centres. Contrary to existing practices, animal welfare evaluation should be multi-dimensional in nature to capture the biopsychosocial health of an individual. Enrichment devices are effective in bringing functional complexity to sterile enclosures and lead to significant improvement in affective states of Asiatic lions.

Keywords: Animal Welfare, Personality, Asiatic Lions, Corticosterone, Conservation Breeding.
Abstract: Reintroduction of tiger (Panthera tigris) in Sariska Tiger Reserve (STR) and subsequently in Panna Tiger Reserve (PTR) in India, are one of the first successful tiger reintroduction programs anywhere in the world. However, the first reintroduced tiger fell prey to human-animal conflict when it was poisoned by villagers in STR. Therefore, management of human-tiger conflict (HTC) is pivotal for the long-term establishment of the reintroduced tiger populations in these protected areas. Efficient mitigation strategies can be developed only when the patterns associated with human-animal conflict are exposed. In this study, we attempted to discern the spatial and temporal patterns of HTC in these two reserves. We were also interested in understanding if these patterns were similar in both the reserves, to test if there were certain universal patterns associated with HTC. For this purpose, we employed a two-pronged strategy. Firstly, we carried out questionnaire survey in 25 villages in PTR and 32 villages in STR. Questions were designed to estimate the frequency of conflict in the two reserves and the livestock species, place, season, and time associated with each reported conflict incident. Secondly, we mapped hotspots of conflict using livestock compensation data for Sariska and tiger kill data for Panna. There was no significant difference between the number of households facing conflict in Sariska and Panna (χ²=0.46; p=0.49), even though we expected the conflict to be comparatively severe in Sariska. A total of 141 livestock were reported to be lost by households facing conflict in PTR and 223 in STR. Domestic cow (n=69) was the most common livestock lost to conflict in PTR, while in case of STR it was domestic buffalo (n=65). The highest number of cattle depredation incidents took place inside reserve forest in case of both PTR (n=58) and STR (n=90). The season in which the greatest number of depredation events occurred was monsoon (n=29) in case of PTR, while in case of STR, it was winter (n=45). Most depredation events occurred in the morning hours (n=13) in PTR, while in STR, they occurred mostly at night (n=34). Our results suggest that different tiger habitats have dissimilar patterns associated with conflict most likely owing to the differences in husbandry practices of the communities involved. The hotspot maps revealed high and low risk zones within these reserves and can be deployed by management for effectively addressing HTC at these key reserves.

Keywords: Human-Tiger Conflict, Reintroduction, Spatial, Temporal, Hotspot Mapping.
CYTOGENETIC CHARACTERISTICS OF PSEUDOCOCCIDS-MEALYBUGS
(HEMIPTERA: COCCOIDEA: PSEUDOCOCCIDAE)

KOKILAMANI A. L., RAMAKRISHNA S., VENKATACHALAIAH G.

Abstract: Scale insects (Coccoids) are sap-sucking polyphagous pests of many agriculturally important plants. Cytogenetic characteristics of some of the pseudococcid species like Phenacoccus solenopsis (Tinsely), Maconellicoccus hirsutus (Green) and Paracoccus marginatus (Williams and Granara de Willink) and Ferrisia virgata were investigated. The chromosomes were prepared by modified air-drying technique with conventional Giemsa staining. The species exhibited 'Lecanoid genetic system' with 2n = 10 chromosomal complement in both the male and the female individuals without any identifiable sex chromosomes. The Nucleolar Organizer Regions (NORs) were detected in one of the termini of the longest chromosomal pair in the complement. Classical C-banded staining exhibited telomeric specific constitutive heterochromatic sites in all the chromosomes. The karyotypic differentiation between the species analysed was hypothesised due to a simple paracentric inversion that occurred during the course of chromosomal rearrangements.

Keywords: Differential Chromosome Staining, Telomeric C-Banding Sequences, NOR Localization, Scale Insects.

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INFLUENCE OF CONTAINERS ON GERMINATION DURING STORAGE
OF BLACK GRAM CV. VBN 1 (VIGNA MUNGO L.)

SRIMATHI . S, GOKULAKRISHNAN. J

Abstract: The storage experiment was carried out in the laboratory to examine the influence of various storage containers on germination percentage of black gram seed in the laboratory of the Department of Genetics and Plant Breeding, Annamalai University, Annamalainagar. In this research, two seed containers, viz. 700 gauge polythene bags, cloth bags were used to store the seeds. Polythene bags maintained the seed quality up to 8 months. The result revealed that storage and storage periods considerably influenced the germination percentage of black gram seed. In this polythene bags maintained the seed quality up to 8 months with 84.3% during storability.

Keywords: Storage, Seed Quality, Storage Containers, Germinability.

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ANTIOXIDANT PROPERTIES AND QUANTIFICATION OF BIOACTIVE COMPOUND IN NIGELLA SATIVA L. SEED EXTRACT

SALIYA. S. BAWANI, D. USHA ANANDHI.

Abstract: Herbal drugs have been believed to be advantageous remedy for various diseases, as they have less side effects compared to modern medicines. *Nigella sativa* L. (Black cumin), an annual herbaceous plant, belonging to family Ranunculaceae due to its notable pharmacological efficacies like neuroprotective and antioxidative properties. The present study aims to analyze the anti-oxidant properties and quantification of Thymoquinone (TQ) from *N.sativa* seeds. Ethanolic seed extract was screened for possible antioxidant activity against 1, 1-diphenyl-2-picrylhydrazyl (DPPH), Hydroxyl radical scavenging assay, Superoxide anion radical scavenging assay, Reducing power assay (FRAP) and Hydrogen peroxide scavenging assay. Further, it was analysed by HPLC for quantification of Thymoquinone. The results showed that *N.sativa* extract possess antioxidant properties which can be attributed to the presence of bioactive compound and it may be considered as an effective agent with high therapeutic value in preventing cellular damage.

Keywords: *Nigella Sativa*, Antioxidant Activity, Thymoquinone, HPLC, Ethanolic Extract.

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COUROUPITA GUIANENSIS (AUBLET, 1775): AN INTRIGUING CASE STUDY OF INSECT POLLINATION

SRUTHY S NAIR, MARTIN J BABU

Abstract: Couroupita guianensis (Aublet)–known as Cannon ball tree is a plant native to central and South America. But, today the plant is present throughout India. Certain parts of the plant have proven high medicinal and pharmacological potential. Plant parts like flower, leaf and fruit has antifungal and anti cancerous properties. Pollination studies on the plant are few. Stamens and staminodes on the flowers raises curious questions about the plant pollination. Tetragonula irridipennis, Apis florea and Apis indica and Xylocopa latipes are the visitors of the flowers. We noticed differences in these insects preference to the pollens of the ring stamen and hood staminodes. SEM of the staminode reveals that the pollens are present within the long filaments, and are not visible outside. Only specialist insects can gather the staminode pollen from the filament. The staminode pollen has more nutrient value. Staminode pollens though sterile have more nutritive value, and act as a lure to attract insects like Xylocopa which are capable of extacting it from there aiding pollination in the process. Xylocopa is the only insect capable of extracting the staminode pollen through buzz pollination or nototribic pollination.

Keywords: Staminodes, Ring Stamen, Pollen, Pollination.
PROTEOLYTIC PATTERN OF SOME LACTIC FERMENTED LYSATES

JINSU VARGHESE, M. HARIDAS

Abstract: Lactic fermentation is well known for human health benefits owing to the release of a number of bioactive peptides. Microbial fermentation results in the release of various peptides which is said to be encrypted in the native milk protein in inactive form. Ingredient supplementation in milk left for fermentation has proved to change the proteolytic pattern and the yield of intermediary and or products. Lysates obtained by lactic fermentation with and without fruits were carried out to investigate the change in their proteolytic pattern and yield of biopeptides. To investigate the degree of milk protein breakdown SDS-PAGE and RP-HPLC chromatograms were done and compared. The peptide patterns and turnover of lysates are seen to change drastically on addition of the fruits to milk before fermentation. The fruits selected in the study were fruit pulp of ripe, uncooked edible part of banana, jackfruit and pineapple. Addition of fruits was seen to accelerate proteolysis of milk proteins by lactic acid bacteria and increased the peptide contents showing better utilization of milk proteins. This can be further exploited in the preparation of food and pharmaceutical preparations.

Keywords: Lactic Fermentation, Proteolysis, RP-HPLC, SDS-PAGE.

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EXPRESSION AND PURIFICATION OF COPZ ISOFORMS

UDAY JAYARAMAIAH, DEEKSHITH KUMAR N, DEEPAK K J., OMKAR GOWDA D, DR H.P.PUTTARAJU.

Abstract: Recent research has revealed a new potential target for anti-cancer therapy. In function-based genomic screening the coatomer protein complex Z1 (COPZ1) was identified as essential for different types of tumor cells. Normal, healthy cells can rely on the isoform COPZ2. These subunits are part of the COPI which has its function in intracellular traffic and autophagy. The cancer cells where COPZ1 is silenced with micro RNA 152 die through apoptosis without mitotic catastrophe, which is the common cause of death in healthy cells that are targeted with anticancer drugs. This indicates that cancer cells are dependent on COPZ1, whereas healthy cells can rely on both COPZ1 and its functional isomer COPZ2. This would offer a novel therapeutic opportunity with a better prospect for achieving cure. The specific aims of this research are to provide novel and highly specific tools to validate inhibition of the COPZ1: COPG interaction as a treatment for both metastatic and non-metastatic cancer. We observed high expression levels in BL21 (DE3) RiL and Rosetta 2(DE3) pLysS cell lines for both COPZ1 and COPZ2 respectively with pETM11 vector. The elution fraction indicates that the protein is HIS-tagged, which is strong evidence that the plasmid DNA has been expressed and the protein COPZ1 and COPZ2 has been produced.

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ACUTE TOXICITY OF FULLERENE C$_{60}$ AND THE HAEMATOLOGICAL PROFILE OF THE FRESHWATER FISH, ANABAS TESTUDINEUS (BLOCH, 1972)

N. SUMI, K.C. CHITRA

Abstract: The acute toxicity of fullerene C$_{60}$ determined by Probit analysis on the freshwater fish, *Anabas testudineus* was found as 50 mg/L. One-tenth and one-fifth of the median lethal concentration (LC$_{50}$-96 h) was selected as the sublethal concentrations to evaluate the haematological changes in the fish. The toxicant was exposed for short-term i.e., 24, 48, 72 and 96 h, and long-term i.e., 7, 15, 30 and 60 days, durations maintaining negative and solvent-control (1% DMSO) groups. Fullerene C$_{60}$ exposure showed significant ($P<0.05$) reduction in the erythrocyte and leukocyte counts, haemoglobin concentration, and percent of packed cell volume in concentration- and time-dependent manner. Similarly, the concentrations of serum albumin, globulin and total protein decreased significantly ($P<0.05$) in concentration- and time-dependent manner. However, there was a significant ($P<0.05$) increase in the concentration of serum glucose and in the activities of alanine and aspartate aminotransferases in the blood serum of exposed fish when compared to the controls. The present findings illustrated the sublethal toxicity of fullerene C$_{60}$ in the freshwater fish, *Anabas testudineus*, and on chronic exposure may lead to changes in normal physiology of the fish.

Keywords: Fullerene C$_{60}$, Anabas Testudineus, Median Lethal Concentration (LC$_{50}$), Haematology, Serum Biochemistry.
BIOGENIC SYNTHESIS OF SELENIUM NANOPARTICLES MEDIATING A PLANT, CHARACTERIZATION AND THEIR ANTICANCER SPECIFICITY.

NEETA RAGHUVEER, BELA ZUTSHI

Abstract: Biogenic Selenium nanoparticles (SeNPs) gaining importance in the field of nano-medicine exhibit low cytotoxicity compared to selenium (Se) compounds. They possess excellent anticancer and therapeutic activities making them apt for medicinal applications. They can be synthesized by physical, chemical, and biological methods and have distinct bright orange-red color. In the present study selenium nanoparticles were synthesized by mediating a plant, *Amaranthus spinosus* and optimize the synthesis by studying the influence of physiological and physicochemical parameters. The leaves reduced sodium selenite and synthesized SeNP within 5 days, which was indicated by the colour change from colourless to brick red colour. This synthesis of SeNP was analyzed through X-ray diffraction depicting peaks reflecting pure hexagonal Se crystals. The functional groups were detected by FTIR, morphology by TEM & SEM images. Synthesized SeNPs were spherical with diameters ranging between 60 and 120 nm which were stable in the solution phase for at least 3 months. Their anticancer activity resulted at low concentration and showed efficiency in inducing apoptosis to human prostate cells (PC3). Cell viability was determined by XTT assay. Cells were acquired in Flow Cytometer. The data analysed by FlowJo software.

The significance of this study was to fulfill the growing demand for non-hazardous nanoparticle synthesis methods and anticancer efficacy of nanomaterials, providing an appropriate approach to Cancer nanotechnology.

Key words: Selenium, XRD, FTIR, UV, PC3, Nanoparticles.

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DIFFERED IMPACT OF HUMAN AND WILD LIFE CONFLICT REPORTING: CASE STUDY OF HUNTING TIGRESS AVNI

DR. RAJESHWARI R., DR. VAHINI

Abstract: Eco system requires every species to coexist. Greater diversity leads to healthy sustainability of all living species. The conflict among human society and other living species is continuously the bothering factor for establishing biodiversity. Each species in the nature has its own role to play. However the population density and human greed has lead to encroachment of living space of other species. Media plays important role in information dissemination and awareness creations among society. Media is reporting the wildlife in various manners leaving differed impact on society and wildlife as well. Media reports create positive and negative effect on society and wild life. Certain reports on media had created the perception that wildlife is threat to human life and both cannot coexist. It is the trend that media sensationalize every issue wildlife is not exceptional. One such recent case is killing of tigress Avni in Maharashtra. International, national and regional media extensively reported this issue in different light. The regional media titled it as “Man eater Avni”. This kind of reports and act of killing has received variety of feedback and gave rise to different kinds of discussion.

Present study proposed to evaluate the media activism in reporting and raising concerns over wildlife and human conflict. The specific objectives are to know the approach of journalistic writing on human-wildlife conflict, to understand perceived impact of media reporting on society, to evaluate the content of reports on Avni killing, and to investigate the social media activism in Avni killing.

It is a qualitative study used qualitative analysis of print, electronic and social media content. The literatures will be referred to understand the perceived impact. Thus collected primary and secondary data will be compared and correlated to arrive at conclusion.

The study is deemed important as the human-animal conflict is worldwide trend. The handling such issue has lasting impact on human society because of active media. Present study will evaluate the nature of reporting and its impact thus educating the media professionals to approach the content in different way to keep up rich biodiversity.

Keywords: Biodiversity, Media Content, Human-Animal Conflict, Social Media Activism.

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STUDY OF PROTEOLYTIC ENZYME ACTIVITY FROM NON-LACTIC ACID BACTERIA

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Abstract: Proteases are very essential for living organisms, they are found in diverse biological resources. Proteases have a broad range of applications in industrial processes and products and are representative of most worldwide enzyme. Microbial proteases have become very important in recent past years due to it, cost effective production and have found its ways in a variety of biotechnology applications. The present work emphasis on the study of the production of proteolytic enzymes from a Probiotic, non-lactic acid bacteria isolated from milk. Optimal enzyme activity was reached at pH9 and temperature of 50 degrees C. Proteolytic activity was enhanced by Ca(2+) and Mn(2+) ions. A total of 9 isolates were isolated and screened for proteolytic activity on skimmed milk agar by diffusion method. Among that 4 isolates show efficient proteolytic activity and the organisms were selected for the biochemical and probiotic studies.

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IN VITRO INDUCTION OF CALLUS AND REGENERATION OF PLANTLETS FROM LEAF EXPLANT OF ICHNOCARPUS FRUTESCENCE (L.)W.T.AITON - A MEDICINAL PLANT

RAJANNA. L, ASHWINI

Abstract: Ichnocarpus frutescens (L.)W.T.Aiton - a medicinal herb commonly known as black creeper belonging to the family Apocyanaceae. A protocol for the in vitro induction of callus from leaf explant was developed using Murashige and Skoog (MS) medium supplemented with various hormones like 2,4-D, BAP, KN, IAA, GA3 and NAA alone and in combinations. Proliferation of green compact callus was obtained from leaf explant on MS medium fortified with 2mg/L BAP + 3mg/L NAA. Multiple shoots were regenerated from leaf explant on MS media suplimented with 0.5 mg/L IAA + 3 mg/L BAP. This protocol could be used to regenerate Ichnocarpus frutescens for conservation and to evaluate the secondary metabolites from callus.

Keywords: Ichnocarpus Frutescens, MS Media, Callus, Multiple Shoots.

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GROWTH KINETICS OF A TRANSFORMED CELL LINE DERIVED FROM COBIA, RACHYCENTRON CANADUM (LINNAEUS, 1766)

SREELAKSHMI ANAND, SHEETHAL MARY SUNNY, GITHA ANN GEORGE, PRIYANKA POULOSE, NEETHU, K. P., K. S. SOBHANA, K.K. JOSHI

Abstract: Tissues of the fishes are as amenable to the techniques of in vitro cell culture as mammalian tissues and organs, nevertheless this vast resource, comprising thousands of vertebrate species, remains largely unexplored. In aquatic toxicology, cytotoxicity tests using continuous fish cell lines have been suggested as a tool for (1) screening or toxicity ranking of anthropogenic chemicals, compound mixtures and environmental samples, (2) establishment of structure-activity relationships, and for (3) replacement or supplementation of in vivo animal tests. The present study evaluated the growth kinetics of a continuous cell line designated as RC,H,Tr developed from the heart tissue of cobia Rachycentron canadum, by trypsinisation method. The cells were cultured in Leibovitz L-15 medium supplemented with foetal bovine serum (FBS). The cells were subcultured at an interval of every 5-7 days during routine maintenance and cryostored in liquid N2 for long term preservation. The growth kinetics of the cells at passage 157 were studied at varying levels of foetal bovine serum (FBS) supplementation as well as at different temperatures and pH. The plating efficiency and seeding efficiency of the cells were also evaluated and the results are discussed in the present paper.

Keywords: Cobia Cell Line, Growth Kinetics, Plating Efficiency, Rachycentron Canadum, Seeding Efficiency.

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CYTOGENETIC STUDY OF CROSSOPRIZA LYONI (BLACK WALL 1867) AND ARTEMA ATLANTA (WALCKENAER 1837) OF FAMILY PHOLCIDAE IN SPIDERS

SHIVA SHARMA, DR. S RAMAKRISHNA

Abstract: Pholcidae (Haplogynae) encompasses 967 described species of which only 14 have been cytogenetically being analyzed. Our aim in this work was to perform analysis of meiosis in Crossopriza lyoni (Black wall 1867) and Artema atlanta (Walckenaer 1837) which are of some family Pholcidae. Several chromosome features have already been described including presence of meta and sub meta centric chromosomes for both the genera. Cytogenetic preparation were made using conventional air drying technique. Crossopriza lyoni exhibited 2n=23=22+X in males and 2n=24=22+XX in females and the sex determination chromosome system (SDCS) is of X0/XX type. While Artema atlanta showed a diploid number of 2n=32 in males and sex determination system was found to be X1X2 in males. For both the genera cell impregnated with silver nitrate shows the presence of many heterochromatic blocks. The remarkable karyotype and sex chromosomes system diversity allows us to distinguish different evolutionary lineages of basal araneomorphs and to study different types of sex determination system. Diversity in diploid chromosomes number in spiders is attributed to centric fusion (Hackman 1948) or tandem fusion (Bole-Gowda 1950) or via reduction of chromosomes number (Suzuki 1954). Crossopriza lyoni and Atrema Atlanta represent the chromosomal races or cytotypes. Presence of many heterochromatic blocks reveal different gene expression during the course of development.

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Abstract: Dr. Yellapragada Subbarao’s elder brother Purushotham and another brother Krishna Murthy both were died of a fatal disease “Tropical Sprue”. He was deeply affected and moved by these untimely deaths. Hence, he decided to invent a medicine to treat and cure “Sprue”. “His quest for life saving drugs took him to Harvard”. In 1930 he got his Ph.D. from Harvard University, U.S.A. He worked at Harvard till 1940. In recognizing his great discoveries “Lederle” Pharmaceutical Company appointed him as their Director in 1940. He continued “Lederle’s Director” till his last breath. The Director of Lederle Dr. Yellapragada Subbarao discovered the isolation, chemical synthesis, pure crystalline synthetic form and chemical structure of “Folic acid” in 1945. Further, Dr. Yellapragada Subbarow has discovered a “Chemical Method for Chemical Synthesis of Folic acid”. The structure of Folic acid contains 3 parts: (1). pteridine ring , (2). para-aminobenzoic acid and (3). Glutamic acid. Dr. Yellapragada Subbarow’s “Miracle Drug Folic acid is a medicine to treat “Tropical Sprue” and also useful for a wide range of treatment to many diseases are applied to life saving of millions of people in past, at present and in future. The function of folic acid is to help in the transfer of one-carbon units in biochemical reactions useful to the metabolism of DNA, RNA and amino acids. So, the synthesis of DNA from its precursors is dependent on the presence of folic acid. Folic acid is necessary to prevent the changes to DNA molecules which inhibits the formation of cancers. Folic acid is necessary for the formation of methionine. This helps in preventing a buildup of homocysteine, and a risk factor for heart disease. Folic acid is necessary for pregnant women because without folic acid the embryo may develop neural tube defects (NTD’s). In the late 1990s, US scientists realized the importance of Folic acid in health grounds, hence the US government implemented the folic acid fortification programme especially to avoid Neural Tube Defects (NTD’s), deaths of pregnant women, Cancer, Rheumatoid Arthritis (RA), Sprue, Heart attacks, Anaemias and other health complications. Folic acid is essential for growth, DNA synthesis, cell division and erythropoiesis. The Uniqueness of Dr. Yellapragada Subbarow’s Folic acid, 73 Years after the discovery the drug Folic acid is still high potential to new benefits to the health of human being. Hence, “Folic acid is an essential medication to protect health and life of human being. Dr. Yellapragada Subbarow (9-8-1948) died of a massive heart attack during sleep. On his death: (1). I wish to honor him as a great man who was responsible more than other person from developing the broad Spectrum antibiotics which still are the most useful antibiotics today - Dr. CW. Hesseltine of USDA’s Fermentation Laboratories at PEORIA, ILLINOIS. (2). Famous American Journal “Science” praised him “Merits the attention of Historians of American Science - SCIENCE, USA Journal.

Keywords: Dr. Yellapragada Subbarao, Miracle Drug, Folic Acid, Sprue, NTD’s.
MURINE MODELS OF COLON CANCER RESEARCH: PRESENT SCENARIO

YAMINI MESHRAM, SUMAN K RAY

Abstract: Cancer is an uncontrolled growth of abnormal cells in a body. The normal cell is damaged or altered, the cell usually dies but when cells do not die it becomes mass of cells and show uncontrolled division and growth forming into a mass of cancer cells which later form a tumour. Colon cancer is the third most common cancer in the world and fourth in India. The growth of colon cancer allows precancerous cells to form into an adenomatous polyp and grow into an intrusive tumour. The causes for colon cancer are basically alterations in the gene or inheritance of gene from previous generations or even traits, habits, diet is also responsible. To study the mechanism, early diagnosis and newly synthesised drugs of colon cancer mouse models are used. Since the mouse is the mimic of the mammalian model thus normal as well as transgenic mice is the choice for a lot of therapeutic research in recent times.

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AVIFAUNAL DIVERSITY IN RELATION TO THEIR HABITAT
IN THE LANDSCAPE OF MYSURU CITY, KARNATAKA, INDIA

POOJA JHA, RAGHUNANDAN, K. S, PADMANABHA, B.

Abstract: The objective of this paper is to analyze the avian diversity in relation to their habitats in and around Mysore city. This study was carried out by selecting few aquatic and terrestrial habitats during November 2017 to April 2018. The data documented by Point counts, Counting of individual species (Direct count), Counting colonial nesting and flocking bird standard methodologies for avifaunal diversity study. Various bird species were photographed using Olympus binocular (10x40X) and Nikon D750 digital camera (24 megapixels with AF 70-200mm lens). Identification of birds was based on field guides and with an aid of ornithologists. According to the data total 117 bird species belonging to 52 families and 20 different orders were present. The analysis of the result revealed main four habitats such as Trees, Rocks, Land surfaces and Waterbodies. These further subdivided in to 14 sub- habitats such as Tree Canopy (6 species), tree Sub Canopy (11 species), tree base (4 species), tree holes (9 species), axis of small branches (34 species), dry branches (11 species), tree bushes (14 species), Rock cracks and Crevices, Rock Cliff (1 species), Land surface gathering (6 species), River wall holes (3 species), Agricultural Land (2 species), Water bodies like Marshes (8 species), Wetland and Paddy field (5 species), Water edges (4 species), and Backwaters (6 species) and Agricultural Land (2 species). Thus, Mysuru city is a congenial urban landscape for the existence of avifaunal diversity (Shannon Weiner diversity index $H = 3.20$) and there is a dire need for the conservation of these habitats which serve for the existence of biodiversity.

Keywords: Avian Diversity, Urban Landscape, Land Surface, Water Bodies, Mysuru.

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COMPARATIVE PROTEIN PROFILE IN SIX STRAINS OF *CULEX QUINQUEFASCIATUS* IN DIFFERENT LIFE STAGES COLLECTED FROM MANDYA DISTRICT (KARNATAKA).

T P N HARI PRASAD, D.V. PURUSHOTHAMA, N.J. SHETTY

**Abstract:** About 20% of the world population is infected with filariasis. In India, about 20 states/UTs are endemic to infection. *Culex quinquefasciatus* (Diptera; Culicidae) is the major vector of Filariasis. Six strains of *Cx. quinquefasciatus* were collected from Mandya district. Total proteins were quantified spectrophotometrically and qualitative assay by native polyacrylamide gel electrophoresis among larval, pupal and adult stages. Zymograms for larvae samples showed 21 bands, pupae 26 bands, adult males 22 and adult females 23 bands. Among these few bands were exclusive to certain geographical strains. The specific bands present in different stains and also in different life stages could be important enzymes which would aid them in their survival in different life stages and in different geographical areas.

**Keywords:** *Culex Quinquefasciatus*, Filariasis, Lowry’s Method, Polyacrylamide Gel Electrophoresis.

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COMPARATIVE TERATOGENIC EFFECT OF VALPROIC ACID ON DEVELOPMENT AND VIABILITY OF INTRASPECIES OF DROSOPHILA

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Abstract: Valproic acid (VPA) is a first line antiepileptic drug and a known teratogen. Drosophila is an invertebrate model used to assess toxicity and teratogenicity. The present study showed that three Drosophila species exposed to different doses of VPA led to reduction in viability with increased doses, increased mortality and phenotypic variations. Interestingly, the flies reared continuously on media supplemented with VPA showed that a dose-dependent reduction in hatchability, pupation and adult eclosion in all three species of Drosophila. The mean pupation has not shown the significant difference among the species. Adult eclosion in D.nasuta nasuta was significantly decreased for all the doses assessed followed by D.ananassae and D. melanogaster. Reduction in viability showed diverse results where it was significant in D.nasuta nasuta than other two species. The larval and adult mortality was increased with increased doses of VPA in all the three species compared to pupal mortality. Phenotypic variations were observed on exposure to different doses of VPA like wing deformations, deformed abdominal tergites, kinking bristles, abdominal pigment variations, defective haltere, while the frequency of wing deformations were high compare to other malformations. Frequency of wing structural variations were significantly increased and lead to significant mortality rate in Drosophila species. Also wing deformations were significantly high in D.ananassae and D.nasuta nasuta than D.melanogaster. The study shows different results in three different Drosophila species and D.nasuta nasuta is highly sensitive than D.ananassae and D.melanogaster for all the traits. Drosophila bioassay is sensitive enough to detect developmental toxicity of VPA on Drosophila species. The intraspecies study of Drosophila can be useful for determining the correlation between genetic variants in human populations.

Keywords: Valproic Acid, Drosophila, Viability, Mortality, Phenotypic Variations.

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IN VITRO MICROPROPAGATION STUDIES
IN PSEDERANTHEMUM BICOLOR

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Abstract: Psederanthemum bicolor belonging to the family acanthaceae, commonly called Limang-sugat is an erect, branched, half woody plant. Leaves are thin, elliptic-ovate. Corolla is white, lower portion has purple spot. It is widely distributed in Karnataka. The leaves, stem, and root of the plant used as medicine. Decoction of leaves, stem and root used for aphthae and also used as a cicatrizant of wounds and ulcers. In the present study, the explants were inoculated on MS media with or without phytohormones. MS media without phytohormone was control one. Shoot tip, leaf and nodal explants were inoculated on MS media containing varying concentrations of phytohormones viz 2,4-D, GA3, Benzylaminopurine (BAP), Naphthalene acetic acid (NAA) alone. Direct shoot development from nodal explant was seen in presence of 2,4-D at 1.0 micro gram/ml. Callus induction was seen in leaf and nodal explants in presence of NAA at 1.0 and 2.0 micro gram/ml and BAP at varying concentrations. 2,4-D influenced on development of direct shoot and callus. NAA and BAP influenced on development of callus, but GA3 has not showed any positive result.

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SAPROLEGNIA INFECTION ON INDIAN CATFISH CLARIAS BATRACHUS

SHASHI BHUSHAN SHASHI

Abstract: Fungi are group of organisms that are responsible for mortality and several economic loses in fish farming. This can become a problem if fishes are stressed by disease due to poor environmental conditions and poor nutrition or injury. Fish, being master of aquatic environment are more prone to fungal infection in natural as well as in artificial aquarium of lab. Saprolegniasis is a fungal disease of fish caused by saprolegnea species called water moulds. Pathological examination revealed a fungal growth resembling a tuft of cotton seen on localized area of skin and gills of Clarias batrachus. Microscopically the fungal hyphae were seen deep in skin and under lined muscles with mark degenerative and inflammatory reactions. The role of water bodies and saprolegina species infection induced marked tissue alteration as well as haematological changes during the present investigation.

Keywords: Clarias batrachus, Haematology, Skin, Gills, Saprolegniasis.

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A STUDY ON THE EFFECTIVENESS OF INSTRUCTIONAL PACKAGE ON CLIMATE CHANGE (IPCC) WITH REFERENCE TO THE AWARENESS ABOUT GREEN SOLUTIONS FOR CLIMATE CHANGE AMONG B.ED. STUDENT-TEACHERS

DR. A. SRINIVASACHARLU

Abstract: Climate change calls for implementation of green solutions both at macro and micro levels for the wellbeing of planet earth. Green solutions are the procedures, technologies, methods and practices used by governments, businesses and organizations at macro level and individuals at micro levels to adapt and mitigate climate change. India is now faced with the challenge of sustaining its economic growth while dealing with climate change. B.Ed. student-teachers as future teachers in India, have a vital role in developing the awareness among adolescent students (who are future citizens) about role of both macro and micro players in India in adapting and mitigating climate change. This awareness can help them now and in future to take up green solutions either at macro or micro level or both to address climate change. The present study intended to study the effectiveness of a validated Instructional Package on Climate Change (IPCC) in developing and sustaining the awareness about green solutions for climate change among B.Ed. student-teachers studying in Bangalore city. Pre-test, post-test parallel group design was followed. Climate Change Awareness Test (CCAT), which includes ‘Green Solutions for Climate Change’ as its 7th dimension was used to collect data which was statistically analyzed and interpreted.

Keywords: Climate Change, IPCC, Awareness about Green Solutions for Climate Change, B.Ed. Student-Teachers and IPCC.

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HABITAT AND BEHAVIOR OF ENDEMIC ORNAMENTAL FISH IN WESTERN GHATS OF KARNATAKA STATE.

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Abstract: The Western Ghats of the Indian sub-continent, one of the 25 biodiversity hotspots of the world, is peculiar to high endemism. This illustrates that the concerned species have a strong affinity and association with their habitats viz terrestrial, land and water. Numerous hills serve as watershed for the entire region of Western Ghats which give rise to streams of different size and length that combine to form tributaries of a larger water body. 289 species of freshwater fishes have been identified in Western Ghats, of which 41% are endemic. The present study aims to understand the relativity of ecosystem to the endemism and its influence on the Addaholay River, which is one of the tributaries of river Kumaradhara in Subramanya region. An assessment of the habitat and behavior pattern of the genus Carinotetraodon was investigated in different locations in congruence with various environmental factors. The concern lies with the conservation of such endemic and endangered species that are radically being subjected to the anthropological and engineering conglomerations.

Keywords: Western Ghats, Habitat, Endemism, Addaholay, Ecosystem, Behavior, Conservation Factors.

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STRUCTURE BASED IDENTIFICATION OF POTENTIAL ANTIFILARIAL DRUGS AGAINST ASPARTOKINASE (WBm0441) THROUGH COMPUTATIONAL STUDIES

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Abstract: Brugia malayi is an endoparasite and the main causative agent of Brugian and Lymphatic Filariasis. Treatment options are limited for filariasis infection and available drugs are effective in larval stage only and completely ineffective against the adult worm of the parasite. Resistance has also been reported for the available drugs; therefore, it is imperative to identify new potential antifilarial drug that have better prognostic features and short period of the usage of drug is currently needed for effective drug therapy. Therefore, the targeted enzyme of Aspartokinase (ASK) from Wolbachia endosymbiont Brugia malayi encoded by Wbm0441 gene which mediate the synthesis of Lysine and Lipid-II moiety, are considered as vital drug target. Due to the absence of Lysine and Peptidoglycan biosynthesis pathways in the mammalian system, serves as a unique vital target to develop inhibitors with good selectivity and less toxicity for helminthic treatment. The present study involves finding of novel inhibitor against Aspartokinase by applying structure based drug discovery process. However, three-dimensional (3D) structure of ASK is unavailable hence, the structure was modeled using Crystal Structure of Aspartate Kinase from Synechocystis (PDB: 3L76) as a template. Subsequently the predicted structure used as target for virtual screening and molecular docking against ChemBridge, Binding, Asinex, Life Chemical and Zinc databases. Five best hits were selected based on the docking score, binding affinity and pharmacokinetic properties. Further molecular dynamics simulation was carried out in order to study dynamic behavior of the best hit molecules. The finding of this study suggested that these five compounds could potentially be inhibitors for Lymphatic Filariasis prevention.

Key words: Filariasis, Brugia Malayi, Lysine Biosynthesis and Aspartokinase

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A STUDY ON HUMAN-WILDLIFE CONFLICT
AROUND BANDIPUR NATIONAL PARK, KARNATAKA, INDIA

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Abstract: The objective of this study is to make an assessment on Human Wildlife Conflict (HWC) in the ten ranges of Bandipur National Park, Karnataka. Three years data i.e., from 2015-16, 2016-17 and 2017-18 is collected from the Forest Department, Government of Karnataka, prepared questionnaires and by interacting with the villagers and local farmers. The highest conflict cases were reported in the year 2015-16 (3117 cases) followed by 2016-17 (2742 cases) and lowest in 2017-18 (1735 cases). These results suggested that in the succeeding years the human wildlife cases reduced significantly due to effective implementation of mitigation strategies such as Electric fences, Elephant proof trenches, Drum beating, Shouting, etc. During 2015-16, the incidence of HWC was highest in Omkar range (1,327) followed by Hediyala (803), Moleyur (270), Nugu (224), Kundukere (211), GS Betta (115), Maddur (56), N. Begur (55), Gundulpet (52) and lowest in Gundre (4) ranges.

Keywords: Human Wildlife Conflict, Bandipur National Park, Karnataka, Livestock.

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EXTRCTIONS AND PHYTOCHEMICAL SCREENING OF EXTRACTS OF CASSIA FISTULA DRIED LEAVES AND THEIR IN VITRO CYTOTOXIC EFFECT OF ON MCF – 7 AND HEla CELL LINES

SURAPPAJ J. PREMALATHA, GOPAL M. ADVIRAO

Abstract: Cassia fistula is a very common Indian plant. Its different parts are used in ayurvedic medicine as well as in home remedies for common ailments. This plant has been reported to possess antipyretic, analgesic, hepatoprotective, anti-inflammatory activities. To explore the phytochemical constituents, three different extracts of methanol, chloroform and aqueous were prepared by soxhlet extraction procedure. Preliminary phytochemical screening of the extracts by the standard procedures shows the presence of alkaloids, flavonoids, steroids and triterpenoids. These extracts were further evaluated for their cytotoxic effects on MCF-7 and HeLa cell lines using MTT assay. Of the three extracts tested, chloroform extract shows highest cytotoxicity on both the cell lines and has the least IC\textsubscript{50} value of 696 \(\mu\text{g/ml}\) and 554 \(\mu\text{g/ml}\) on MCF-7 and HeLa cell lines respectively. Increase in cytotoxicity was in a dose dependent manner. The cytotoxicity might be attributed to the presence of secondary metabolites. To evaluate this, we performed the TLC on silica gel and partially purified the alkaloids which are under study for further investigations.

Keywords: Cassia Fistula, Cytotoxicity, MCF-7, HeLa, Cell Viability, IC\textsubscript{50} Value.

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A STUDY ON BIOLOGICAL CONSTRAINTS OF ASIAN GIANT HONEYBEE, 
APIS DORSATA FABRICIUS IN SOUTHERN KARNATAKA, INDIA 

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Abstract: All living organisms are subjected to infestation or attack by natural enemies or predators. Wild honeybees, Apis dorsata of the genus Apis are not an exception to it. It nests in open arboreal conditions and on human built structures become easily victim to predators, birds and mammals facing problem from these at its nesting niche. During the present field investigation, an attempt was made to record the impact of pests, predators and man-made activities on its population. Observations were carried out by employing direct visual count method, Variable width line transect (VWLT) method and All Out Search Method (AOSM). Percent pest infestation, animal predators interferences and man-made activities occurred at A. dorsata nested sites are calculated by using standard formulae. Predatory birds, mammals were identified with the help of information standard key books and monographs. These were photographed with the help of Canon-power Shot S2iS Digital Camera for further analysis. Recorded the greater wax moth, Galleria mellonella infestation on solitary colonies, colony aggregates and abandoned combs of A. dorsata. The collected data was compiled and analyzed by using ANOVA and Pearson’s correlations with the help of digital images and SPSS software. The results revealed total 616 colonies were infested by G. mellonella and showed no significant variation (F=0.438; P<0.05). The predator interference was more in the study area. Interestingly, Man being one of the natural enemies to A. dorsata colonies, the various activities such as trimming of tree limbs, colony hunting and burning, uprooting of A. dorsata nested trees at/in the garden or croplands and clearing of normal colonies during different seasons have interfered with the normal survival of A. dorsata population at south-western Karnataka were recorded. Thus, all these activities might have affected the colony integrity, altered the colony strength and encouraged the process of colony desertification that finally leads to colony abandonment in this part of Karnataka.

Keywords: Apis Dorsata, Predators, Galleria Mellonella, Anthropogenic Interferences, Southern Karnataka.

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CURCUMA AROMATICA SALISB. ESSENTIAL OIL:
A NOVEL THERAPEUTIC AND CHEMO-PREVENTIVE BIO RESOURCE

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Abstract: Curcuma genus of family Zingiberaceae comprises about 80-110 species which are spread throughout Southeast Asia, China, India, New Guinea and Northern Australia. Curcuma aromatica is one of the species related to Curcuma longa (common turmeric), also known as wild turmeric, vanaharidra, kasturi arisina or kasturi manjal. Curcuma aromatica, the traditional aromatic and medicinal cosmetic is the second most commonly cultivated and utilized species next to Curcuma longa. Its rhizomes are light yellow in colour with a pleasant, camphoraceous aroma. The crop grows wild throughout India and is commonly cultivated in Kerala and West Bengal. It is considered as an endangered wild turmeric, though popular regionally, due to non-availability of planting material for large scale cultivation. It is a promising drug for therapeutic purpose due to its wound healing, anti-inflammatory, anti-oxidant anti-tumour and immunomodulatory properties. The rhizome is considered as an antidote and a blood purifier. It is also used for treating bruises, worm infestations, fever, skin infections and as tonic for women after child birth. The fresh leaves are aromatic and are extensively used in culinary preparations. Compared to C.longa, which is rich in curcuminoids content, C.aromatica has higher essential oil content (4-8%) with unique chemical composition. Oxygenated monoterpenes (50.9%) and sesquiterpenes (17.6%), monoterpane hydrocarbons (23.9%) and sesquiterpene hydrocarbons (3.6%) are the predominant constituents of both rhizome and leaf essential oil. The major volatile oil components of rhizome oil are 1,8-cineole, d-camphor, d-camphene, Germacrone, Curzerenone, Curdione, Xanthorrhizol and p-methoxycinnamic acid. While the leaf oil, is rich in α and β-pinene, Myrcene, camphor, borneol, camphene etc. Curdione, Germacrone and Xanthorrhizol present exclusively in this species are considered as a promising source for natural anti-carcinogenic and anti-Inflammatory properties. The present review, highlights the importance of C.aromatica essential oil as a source with a wide range of biological activities in treating several disorders. These pharmacological potentials are proven to revalidate the traditional and ayurvedic concept of wild turmeric as a potent herb which has not been explored much as compared to its utility.

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SEASONAL OCCURRENCE AND DISTRIBUTION OF SEMI-AQUATIC EARTHWORMS OF THE GENUS GLYPHIDRILUS HORST, 1889 (OLIGOCHAETA; ALMIDAE) IN THE BACK WATER REGIONS OF RIVER SHARAVATHI, SHIMO GA DISTRICT, KARNATAKA.

VIVEK HASYAGAR, HARISH KUMAR T. S., SREEPADA K. S.

Abstract: Earthworms belong to the Phylum: Annelida and class: Oligochaeta, are an important soil invertebrate, occupy a unique position in the animal kingdom. They influence various soil processes by contributing substantially in the soil fertility and ecosystem functions. They account for the highest biomass among the soil macro fauna. There are two groups of oligochaetes i.e. megadriles (terrestrial and aquatic worms) and microdriles (aquatic worms). Of the 36 families in the oligochaetes, two-third families are aquatic oligochaetes and rest are terrestrial earthworms. The semi-aquatic earthworms of the genus Glyphidrilus Horst, 1889 (Oligochaeta; Almidae) have been reported from Asia and Africa. They are mud dwellers, hydrophilous and found in aquatic margins of submerged habitats, like rivers, streams, canals, ponds, swamps or even in rice fields. These semi-aquatic earthworm species are characterized by a pair of specialized wings, genital organs and their openings. The three species of the genus Glyphidrilus Horst, 1889 (viz. Glyphidrilus elegans Rao, 1922; Glyphidrilus flaviatilis Rao, 1922; Glyphidrilus annandalei Rao, 1922) were studied during March-2017 - February 2018, in the backwater river margins of Sharavathi river in Shivamoga district, Karnataka. The details on the taxonomy, seasonal occurrence and distribution of these three species are presented in the paper.

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SYNERGISTIC ANTICANCER EFFECT OF PIPER BETLE WITH RADIATION

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In the present investigation, the radioprotective properties of *Piper betle* extract was studied using mouse *in vivo* system. Use of betel leaf is known for centuries for its curative properties and in Chinese medicine betel leaves are used for treatment of various disorders and claimed to have detoxification, antioxidant and antimutational properties. Hardly any study is done on the radioprotective effects of these plant extracts. For genoprotective studies bone marrow chromosomal aberration test, bone marrow micronucleus assay and peripheral blood micronucleus assay were done. Haematological parameters including TEC, TLC and Hb content and intestinal histology were analysed to assess the protective effect of *Piper* extract. The animals were pretreated with the extracts prepared in the solvent through oral gavage and were subjected to irradiation. Compared to the sham control, E- beam radiation induced highly significant aberrations and *Piper* extract decreased the frequency of radiation induced chromosomal aberrations in a dose–dependent manner and an increase in mitotic index was observed. The micronucleus yield decreased with extract treatment in the radiation exposed animals at early time intervals. The plant extracts also enhanced the P/N ratio in the radiation treated animals. There was an increase in the TEC, TLC and Hb content in radiation exposed animals when treated with the plant extracts in a dose- dependent manner. The extract treated groups showed histoprotective effects which was evident by the finding that there was a significant increase in the number of surviving crypts compared to the radiation alone group. The villus height, crypt depth and mucosal length in the combined treatment group were found to be greater than those of the radiation alone group.

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