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ABSTRACTS OF THE ACCEPTED RESEARCH PAPERS

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1. Differential proteomics approach to identify putative protective antigens of *Mycobacterium tuberculosis* presented during early stages of macrophage infection and their evaluation as DNA vaccines

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There is an urgent need for an effective vaccine against tuberculosis (TB), as the currently available BCG vaccine has not performed satisfactorily, especially against the adult pulmonary disease. In this study we have employed differential proteomics to obtain a list of antigens as potential vaccine candidates. Bacterial epitopes being presented at early stages on MHC class I and class II molecules of macrophages infected with *Mycobacterium tuberculosis* (*M.tb*) were identified using iTRAQ labelling and reverse phase LC-MS/MS. The putative vaccine candidates thus identified were tested as plasmid DNA vaccines in mice to ascertain their protective efficacy against a challenge of aerosolized *M.tb*, based on the ability of the vaccine candidates to reduce the bacterial load in the lungs of infected mice. We report here that four of the seventeen selected antigens imparted significant protection against the challenge of *M.tb*. The four shortlisted antigens were further assessed in the more stringent guinea pig model, where too, they demonstrated significant protection. This proof of concept study shows that combining a proteomics approach with the *in vivo* assessment of vaccine candidates in animal models can be very valuable in identifying new potential candidates to expand the antigenic repertoire for novel vaccines against TB.

2. Lipid profile under vanadium stress in albino rats and its remediation by *Eucalyptus tereticornis* and Liv.52

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Metal concentration in environment has serious repercussions which have been recognized globally and are being tackled strategically. One such strategy includes exploration of biomedical activities of different parts of plants. With this aim, the present study was undertaken to see the effects of vanadium (V_2O_5) on lipid profile in albino rats and the possible role of *Eucalyptus tereticornis* and Liv.52 as protective agents for ill effects under vanadium stress. Administration of vanadium in acute (1d) and subacute studies (7, 14, 21 & 28 ds) was followed after LD₅₀ determination which was registered as 69.6 mg/kg b.wt. Lipid profile was estimated in terms of serum total lipids, cholesterol,

triglycerides and phospholipids in all treatment schedules (vanadium alone, vanadium followed by *Eucalyptus tereticornis* and vanadium followed by Liv.52). Liver being an important metabolic organ performing vital functions of biotransformation and metabolism get affected which is well observed by alteration in the level of lipid profile.

Pretreatment of *Eucalyptus tereticornis* and Liv.52 separate exhibited better performance for restoration of changed value of lipid profile. This could be possible of various chemical ingredients present in Liv.52 and *Eucalyptus tereticornis*.

3. Review on spleen and splenomegaly due to long term feeding of Pan Masala (PM) and its Blend-Tobacco (PMT) in mice

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Spleen is the largest human lymphatic organ found recently vital because of housing stem cells. Spleen filters the blood and maintains healthy red and white blood cells and platelets. Swiss albino mice in 3 groups (control and experimental I and II) of 60 each were fed staple diet (control) composed with 2% pan masala plain (PMP) and its blend (PM-tobacco) were examined by post-mortem at intervals of 16, 56 and 70 weeks observing spleen volume, whether palpable, contour, texture and bleeding points. The PMP and PMT on chronic exposure damages spleen within three weeks shows enlargement of spleen, thus starts dysfunction even its association with other organs exhibiting lung, gastric and hepatic problems resulting in injury due to itching and nasal, corneal, oral bleeding, aphagia non-responsiveness due to defective immune system and in 3 months even abscess and in certain rupture and bleeding. Further PMP and PMT induced proliferation of splenic cells commensurate with cumulative dose/duration exposure parallel with hyperkeratosis, enlargement due to congregation of white blood cells. Thus the splenic trauma (splenomegaly) leads to severe immunological effects sensory and muscle problems, completely damaging all organs and functional systems including defense mechanisms by 70 weeks.

4. Search for antimalarial drugs and Schizontocides: A review

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The resistance of mosquitoes to pesticides and successive more cases of malaria warrants for potential anti-malarial drugs both in temperate and tropical countries. Malaria is a WHO notified disease and prevention is by pesticide spray at the vector breeding sites and also by therapeutically effective anti-malarial and schizontocidal drugs. Primaquine is an antimalarial drug of gametocidal activity with side effects in subjects with glucose-6-phosphodehydrogenase (G-6-PD) and forbidden

during pregnancy. Development of the 8-aminoquinolines was from 1981 when methylene blue was tested against malaria. The first synthetic anti-malarial and schizontocidal drug, pamaquine, a 6-methoxy 3-amino quinoline was announced in 1926. Subsequently, 4 drugs i.e. pentaquine, isopentaquine, 6-methoxy aminobutylamino quinoline and primaquine were found better than pamaquine. 5-phenoxy derivatives of primaquine were more active and less toxic than primaquine. In the blood schizontocidal mouse screen, 5-(4-chloro)-phenoxy primaquine and 5-(4-fluoro)-phenoxy primaquine enabled radical cure in a *Plasmodium cynomolgi/Macaca mulata* model but in mice 5 folds less effective and 20 times less toxic than primaquine. The later was better than primaquine in primates and its activity was abolished by a replacement of lipophilic halogen group by an acetamido group. In continuation, Chinese team synthesized many 5-phenoxy, 6-methoxy-8-(4-phthalimido-1-methyl-butyl-amino) quinolines and 5-phenoxy, 6-methoxy-8-(4-phthalimido amyl amino) quinolines being antimalarial and less potent than primaquine. The 5-anilinoderivatives were found to be less active than 5-phenylthio primaquines. Aromatic substitution in 5th position reduces primaquine toxicity. The microsomal degradation of primaquine and its derivatives was found by deamination in rats and mouse. The yeast *Candida tropicalis* was found to convert Primaquine into N-acetylated derivative and finally a minor dimeric form. *Streptomyces reseoehromogenus* yielded an acetylated metabolite and methylene-linked dimeric product. Currently WR 238605 was found significantly active as gametocytocidal drug than primaquine in *P.berghei* and highly active *P.yoelii*. Originally the drug was designed as a casual prophylactic and radical curative drug to replace primaquine for the prevention of relapsing malaria, it is now in phase I trial in USA. In an *in vitro* study, WR 238605 was extensively metabolized to aminophenolic compounds by air oxidation during the isolation process to a mixture of quinones and quiononeimines. Another primaquine CDRI, India compound is 80/53 is in phase II clinical trial against *P.viavx* infections. Two other compounds, 6-methoxy-5,8 di (4-‘amino-1’-methylbutylamino)Quinoline and 5,5 di-[6-methoxy, 8(4-amino-1’-methylbutylamino)Quinoline] were found to be 3 to 4 times potential gametocidal activity than primaquine.

5. Production, statistical optimization and characterization of multicomponent holocellulase produced by *Streptomyces* sp. ssr-198 isolated from desert soil

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A novel thermotolerant actinomycete *Streptomyces* sp. ssr-198 with capacity to produce multicomponent holocellulolytic enzymes was isolated from the desert soil of Bikaner and identified using 16S rDNA sequencing. Important chemical components of medium were optimized by rotatable central composite design (RCCD) using response surface methodology (RSM) to achieve maximal yield of holocellulolytic (endoglucanase, exoglucanase and xylanase) enzymes. Optimization resulted in 246, 83, and 96% higher yield of endoglucanase, exoglucanase and xylanase respectively as compared to unoptimized conditions. The concentrated crude enzymes were partially characterized in terms of optimum pH (6.0) and temperature (60 °C). Multiple endoglucanase and xylanases with diverse molecular weights were detected in the zymogram which was also confirmed by LC MS/MS analysis. A wide range of hydrolytic enzymes, including eight different endoxylanases (GH 10 and GH 11), four endoglucanases, two each of xylosidase, mycodextrinase, galactosidase, chitinases, arabinosidase, xylanase deacetylase and 20 proteases were detected with high confidence in the

secretome of *Streptomyces* sp. ssr-198. The study demonstrated the ability of this newly isolated *Streptomyces* strain to produce a high titre of holocellulolytic enzymes with potential application in the saccharification of lignocellulosic biomass.

6. Prospects and promises of biomass and biofuel production from marginal and degraded lands of India

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Rapidly increasing worldwide population and changing lifestyle has drastically enhanced the food and energy demands. As a result, the limited fossil fuels have been globally exploited with the subsequent elevation of atmospheric CO₂ by 40% after industrial revolution that leads to global warming and ultimately the climate change. Therefore, the promotion of biofuels and other renewables has been encouraged worldwide. Being an agrarian country, India primarily utilizes its viable land for food production to feed its increasing 1.25 billion people. Thus, the biofuel production should not be at the cost of food production. Therefore, in order to mitigate global warming effects, conflicts food and fuel production; there is a need of sustainable intensification of biofuel production from marginal and degraded land. In this regard, the article explores the prospects and promises of biomass and biofuel production from the marginal and degraded lands of India. Furthermore, it also emphasizes on the sustainable classification strategies of these partially viable lands. Since India has sufficient amount of these lands, therefore the present discussion reveals the sustainable utilization of such land that can provide the multipurpose environmental benefits such as biomass and bioenergy production, soil carbon sequestration and ecosystem revitalization.

7. Micronized Zinc Oxide Foliar Treatment for Boosting Rice Productivity and Zinc Content

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Micronutrient such as zinc is essential for crop growth and productivity. Though its production is low, soil applications are quite large. A field experiment was initiated at the Directorate of Rice Research (D.R.R.) farm, Hyderabad, India on a deep black clay vertisol to compare the performance of mZnO with foliar treatments of Zn sulphate and Zn EDTA.

The field experiment was made on two rice varieties - one is hybrid PA- 6444 - and the other one is Tellahamsa. The dosages of the Zn foliar as mZnO 10 ml/10L, Zn sulphate 9.5 g/10L and Zn

EDTA 16.5 g/10L. There was no significant grain and straw yield response to Zn for PA-6444, whereas in Tellahamsa Zn accumulation in the crops were obtained.

In conclusion wide variations in terms of Zn accumulation were recorded across different stages and at different combination of mZnO doses. The data obtained in this experiment will be reviewed in the context of relative performance of the different Zn sources and their positive contribution to improving rice productivity and micronutrient content.

8. An improved and genetically stable rooting protocol for propagation of *Maerua oblongifolia*, a valuable medicinal liana of arid regions

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Maerua oblongifolia (Capparidaceae) is a pharmaceutically important rare plant species of desertic region. An improved and genetically stable micropropagation system has been developed using nodal segment as explant. Multiple shoots were differentiated on Murashige and Skoog (1962) medium containing BA(2.0 mg l⁻¹) through bud breaking. During subculture, a high rate of shoot multiplication (49.7±0.43 per culture vessel) was attained on Modified MS medium having a combination of (0.1 mg l⁻¹) each of BA, Kn and IAA. Various physical and chemical factors affecting the shoot amplification were studied during subculturing. A lower percentage (58.5 %) of shoots was rooted *in vitro* on half strength MS medium containing IBA (1.0 mg l⁻¹) and activated charcoal (200 mg l⁻¹), while higher percentage (89.4 %) of shoots rooted *ex vitro* on soilrite®, if the base of shoots were pre-treated with IBA (500 mg l⁻¹) for 5 min. Plantlets rooted, were gradually acclimatized in a greenhouse using pad and fan systems. About 85% of *ex vitro* and 55% *in vitro* rooted plantlets were successfully established in the soil. The genetic fidelity of the regenerated plants was assessed using RAPD. No polymorphism was detected in regenerated plants and the mother plant, revealing the genetic stability of the *in vitro* raised plants.

9. MicroRNA regulated T helper cell differentiation and plasticity during visceral leishmaniasis infection

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The protective immune response to leishmania intracellular parasites is mediated by proliferation and differentiation of IFN γ secreting CD4+ T helper (Th1) cells. MicroRNAs are endogenously expressed nonprotein encoding and single stranded RNAs that modulate gene expression and participate in T cell proliferation and differentiation during visceral leishmaniasis (VL) infection. After biting of *Phlebotomous argentipes* to human being it transfers *Leishmania donovani* in the blood stream, later it activates wild type naïve T cell response and modulates Th2 type of response for VL disease development. Subtype lineages of helper T cells are controlled by microRNAs regulated gene expression. Bioinformatics analyses have shown that several microRNAs such as miR-17, miR-19b, miR-340 and Let-7e can activate differentiation of CD4+T helper (Th1) type of immune response and lead to secretion of INF γ and IL-12 to generate leishmania specific protective response. Whereas, seed region present in the microRNAs (miR-29-b, miR-29a, miR-146a) have the putative binding site in the 3'-UTR region of T-bet/TBX21 transcription factor of CD4+ T helper (Th1), which may suppress the Th1 specific protective immune response. Furthermore, we have speculated on the basis of our computational analysis that miR-126 may activate IL-4 dependent CD4+ T helper (Th2) type of immune response and aggravate the VL pathogenesis. Development of Th2 type specific immune response can be suppressed by binding of miR-135b and miR-340 microRNAs over the 3'-UTR region of GATA-3 transcription factor of Th2 specific CD4+ T helper cells. Interestingly, few microRNAs play a role in maintaining the plasticity between Th1 and Th2 immune response. Moreover, miR-21 can inhibit the Th1 immune response and simultaneously activate the Th2 immune response by stimulating T helper cell proliferation and differentiation. We are indicating that miR-27b, miR-155 and miR-128 are important players for gene regulation as they suppress Th2 specific immune response and maintain the plasticity by activating Th1 specific CD4+ T helper cells for generating IFN γ specific protective immune response during VL infection.

10. Development and validation of High Performance Thin-Layer Chromatographic method for quantification of Hecogenin in *Agave sisalana* leaves

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The leaf juices of *A. sisalana* Perrine ex Engelm (Agavaceae) are rich in steroidal saponins, of which hecogenin finds prime importance owing to its application in the synthesis of various cortical hormones (corticoids). However, the exceedingly close relationship of hecogenin with tigogenin, another steroidal saponin, makes the recovery and quantification of hecogenin a cumbersome process that often result in low yield. Therefore, the present study deals with development of a specific, sensitive and accurate high-performance thin-layer chromatographic method for determination of Hecogenin in *Agave sisalana* leaves. Steroidal saponin was isolated from leaves

following standard protocol with appropriate modification. For HPTLC estimation, calibration was performed taking different volumes (1-6 μL) of standard compound and correlation coefficient (r) and % RSD were determined from the calibration curve. Separation was performed on aluminium-backed silica gel 60 F₂₅₄ plates for both the standards and samples using Toluene-Ethylacetate-Methanol 6:1:0.8 (v/v) as mobile phase and anisaldehyde as spraying reagent. Solutions of samples 6 μL along with the standard (1-6 μL) were chromatographed and best resolution was achieved with R_f 0.49 for hecogenin. Detection and quantification were performed by densitometry at $\lambda = 433$ nm for hecogenin. The content of hecogenin in the sample was estimated at 0.4% with the aid of the scanner and software. The method is simple, precise, accurate and reproducible for estimation of hecogenin in *A. sisalana* and other Agave species as well.

11. Strategy for crop production in desert soils under influence of climate change

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Despite the recent great strides in technology and mechanization, agriculture has remained the world's most important primary industry, in which the soils play pivotal role. Desert soils are basically of sandy texture. This type of soil has poor clay content and also lacks in moisture.

Thus in general these soils are saline. Salt content in some desert soils is not high and such cases they support the vegetation in the sufficient availability of water. The desert is actually region or landscape that gets extremely low level rainfall and the level of precipitation is also low to sustain the growth of plants. Whatever its production capacities, whether high in some places of irrigated pockets or low in major areas of Dryland and desert, due to inherent limitations, soil resource of desert areas a medium of crop growing has furnished directly or indirectly a significant share in income of state.

Climate change and agriculture are related issues, both of which takes place at global scale. Global warming is projected to have significant impact on conditions affecting agriculture including temperature, CO₂, glacial runoff precipitation and other elements.

Effect of climate change will be on evaporation, water and soil temperature, soil water, snowing period, cultivable area, the incidence of pest disease, activity of micro organism and decomposition of organic matter and fertilizer, crop yield, cropping pattern insect pest and diseases, management practices.

The various improved techniques and practices recommended for achieving the objective of increased and stable crop production in desert areas will be crop planning, planning for weather, crop substitution, cropping systems, fertilizer use, rainwater management alternate land use, alley cropping, soil and water conservation measures, in-shallow tillage, ridges and furrows, cover cropping, micro catchments and construction of farm ponds, stone and vegetative field bunds, graded line bund, trench cum bund, contour trenching, ground water recharges structure (percolation tanks), recharge through defunct wells, mulching, using antitranspirants, use of wind breaks etc.

12. Effects of graded levels of dietary vitamin-C on gene expression of metabolic enzyme, prolyl-4-hydroxylase in the muscle and swim bladder of suchi fish, *Pangasianodon hypophthalmus* (Sauvage, 1878)

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Commercially produced Food fish suchi fish, *Pangasianodon hypophthalmus* was experimented to assess the impact of dietary vitamin-C on collagen synthesis in edible muscle and waste product swim bladder. Seven iso-nitrogenous and iso-lipidic diets with variable level of vitamin C (T1, 0.0 mg.kg⁻¹; T2, 50.0 mg.kg⁻¹; T3, 100.0 mg.kg⁻¹; T4, 200.0 mg.kg⁻¹; T5, 500.0 mg.kg⁻¹; T6, 1000.0 mg.kg⁻¹ and T7, 2000.0 mg.kg⁻¹ feed) were assigned to treatment groups for 60 days. The body composition of *P. hypophthalmus* does not differ significantly ($P < 0.05$) as the vitamin-C content of the diet increases. The weight gain percentage, SGR, weight gain, survival ranged between 86.20±1.49 % to 122.78±5.61%; 1.036±0.01 to 1.36± 0.04; 3.29±0.32 to 4.23±0.26 g and 76.9±0.7% to 90.9±0.4% respectively. Real time PCR was performed to evaluate the prolyl-4-hydroxylase gene expression responsible for collagen synthesis. The study showed that the highest expression was in T5 in both bladder and livers of *P. hypophthalmus* on 3th and 60th days of analyses. The lyophilized bladder and muscle collagen had a uniform and regular network structure. Therefore, there is a possibility of using the bladder of *P. hypophthalmus* in future as an alternative collagens for industrial purposes. Results of present research work suggests that supplementing with dietary vitamin-C has positive impact on the collagen biosynthesis in this fish and shown the significant increase in gene expression of vitamin-C dependent prolyl-4-hydroxylase enzyme.

13. Hepatic gene expression of FAB regulatory enzyme, Acetyl-CoA Carboxylase and fatty acid profile in *Labeo rohita* fed with graded levels of animal or plant protein

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A 42-days feeding trial was conducted to evaluate the responses of different dietary proteins on the gene expression of Fatty Acid Biosynthesis (FAB) regulatory enzyme, Acetyl-CoA carboxylase and the fatty acid profile of the fish after feeding with plant and/ or animal protein. Casein was used as an animal source and soybean meal was used as a plant source at different levels (24%, 32% and 40%). Six experimental diets used were: three from plant source and three from animal source. The diets were T1(24%), T2(32%), T3(40%) from animal source and T4(24%), T5(32%) and T6(40%) from plant source. One hundred-eighty fish (avg. wt. 50g) were randomly distributed in to six treatments with each of triplicate. The gene expression of acetyl-CoA carboxylase was proportionately increasing with increased protein level and it was maximum at 32% of plant as well as animal protein, then it became constant. In animal protein fed fishes the Saturated fatty acids (SFA) were most abundant in T2 feeding trial(60.92%) and minimum in T1(47.12%). In

case of plant protein feeding trials, the saturated fatty acid decrease with increasing plant protein. T3 (40.51%) was rich in polyunsaturated fatty acids (PUFA) and T4 showed minimum PUFA (18.18%). In case of plant protein PUFA was increasing with increasing plant protein level. The Omega-3 and Omega-6 ratio was ranging from 0.39 to 2.3, the T5 trial with plant protein (PP) @ 32% showed the highest ratio. The most abundant fatty acid in all fishes was C16:0. The other major fatty acids detected were C18:0, C18:1 and C18:3. It is concluded that the gene expression of acetyl-CoA carboxylase is similar in case of plant and animal protein fed fishes. However, the overall fatty acid profile in muscle is better in plant protein. The study suggests that in *Labeo rohita*, the plant protein in the fish feed improves fatty acid synthesis and the gene expression of acetyl-CoA carboxylase to synthesize essential fatty acid at par or better than animal protein fed fishes. More evaluations are required in future studies to pinpoint the exact mechanism of fatty acid synthesis in rohu on feeding with plant origin proteins in culture systems.

14. Down regulation of hepatic catalase gene in PTU-induced hypothyroid rats is due to promoter methylation

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The precise mechanisms by which catalase gene expression is regulated by thyroid hormones is not well known. Catalase is an important antioxidant enzyme that protects cells from reactive oxygen species-induced damage by catalyzing the breakdown of hydrogen peroxide into water and oxygen. The present study investigated the role of neonatal hypothyroidism on the expression of catalase at transcriptional, translational and biochemical level and correlated changes with its promoter methylation. The results showed that expression of catalase is decreased in liver of PTU-induced persistent hypothyroid rats in all the three levels with an elevation in tissue oxidative stress index. The PTU-induced changes in the expression of catalase are partially reversed back when PTU treatment is withdrawn at 30 days of age. Analysis of the methylation levels of catalase promoter by MSP-PCR showed augmentation of methylation level in response to persistent hypothyroidism. The promoter region of the rat hepatic catalase gene was amplified by PCR from -158 to +52 and sequenced directly. The sequencing results showed that all non-CpG cytosines were converted to thymine in control and hypothyroid groups, however, the pattern of methylation of CpG sites in response to persistent or transient hypothyroidism is significantly different from that of control. These results suggest that epigenetic modifications of chromatin might be one of the mechanisms to explain hypothyroid-induced down regulation of catalase in liver.

15. Castor oil-based polyurethane nanocomposites for prosthetic applications

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Prosthesis is the replacement of normal limbs for cosmesis and functionality. The materials that are used for these are generally polypropylene, polyurethane. These petroleum-based industrial polyurethane-resins, when discarded to the environment after their intended use, do not degrade thereby posing a threat to the environment as solid waste.

Castor Bean (*Ricinus communis*) has been widely accepted as an agricultural solution(grows on varying types of climates, high yielding, no maintenance, requires only moderate rainfall and can withstand long periods of drought, but will thrive under higher rainfall, low demand on soil fertility, so ideal to replant marginal lands to prevent desertification and erosion).

Degradable polyurethane (PU), derived from CASTOR OIL is being investigated for use in prosthetic applications; because it is available in plenty and bears polyhydroxyl groups needed to react with isocyanate to form PU. The polyurethanes have been prepared by condensing castor oil with different isocyanates like toluene diisocyanate (TDI) changing the NCO/OH ratio. To enhance the tensile and other dynamic mechanical properties along with processibility, Polyurethane-nanocomposites are prepared using organoclay (MMT) and characterized.

These PU-nanocomposites show excellent morphology, improved thermal properties, chemical resistance, hardness, elongation, tensile properties and higher compatibility similar to the industrial polyurethanes in use. So, prosthetics enriched by biodegradable polyurethane, is a potential tool to empower the ever-growing need of the artificial limbs; hence, enlighten the human race with challenges.

16. Hemeoxygenase-1 in modulating antioxidant defence responses under metal induce stress and its mitochondrial-chloroplast localization in *Glycine max*

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Heme oxygenase (HO) degrades free heme released from heme proteins with the generation of ferrous iron (Fe²⁺), biliverdin-IXa (BV-IXa), and carbon monoxide (CO). The mechanism of heme cleavage has been conserved between plants and other organisms even though the function, subcellular localization, and cofactor requirements of HO differ substantially. Along with heme degradation, HO performs various cellular processes including iron acquisition/mobilization, phytochrome chromophore synthesis, cell protection, and stomatal regulation. Recently the HO-1 has gained more attention due to its physiological cytoprotective role in plants. The study focuses on HO-1 role in plant defence and subcellular localization. HO-1 works against oxidative stress via

detoxifying H₂O₂. Most activity of HO1 appeared to be located within chloroplast due to its role in phytochrome synthesis but mitochondria also share its localization. Mitochondrial location of HO1 might be on its inner membranous space due to its role in the synthesis of electron donor species which facilitates HO1 catalyzed reaction. Study reports the co-localization of HO1 in both chloroplast and mitochondria.

17. DNA isolation from tubers and molecular characterization in *Gloriosa superba* L .

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Gloriosa superba L. is an indigenous medicinal plant. It is available throughout India, however it is in endanger list. In the present study RAPD analysis of 5 domesticated accession of *G. superba* Sikkim (SK), Khammam (KM), Nizamabad (NZM), Vizag (VG) and Mahabubnagar (MBR) from India were included. In this investigation optimization of DNA isolation and amplification of DNA by PCR method for RAPD analysis of *Gloriosa superba* containing high concentration of colchicine. A total of 20 primers generated 102 bands. RAPD analysis yielded 60% polymorphism among the accessions. Colchicine is the main alkaloid component of this plant. Colchicine content analyzed by using HPLC method in seeds and tubers.

18. Role of inflammation and oxidative DNA damage in pathogenesis of prostate cancer

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In aging men, prostate gland becomes hyper-proliferative and displays a propensity toward carcinoma. Due to increase in life expectancy, the proportion of elderly men in India is expected to rise 15% by the year 2050 which might lead to tremendous increase in the incidence of prostate cancer (PCa) cases. In the development of PCa, inflammation of the prostate plays a major risk factor by virtue of oxidative stress and DNA damage. NKX3.1 is a prostate-specific tumor suppressor gene which maintains the differentiated state of normal prostate and its loss represents a predisposing event for prostate carcinogenesis. Recent *in vitro* studies suggested that inflammatory cytokines (IL- β 1 and TNF α) accelerates NKX3.1 protein loss. Following the generation of double strand breaks (DSBs), inactive ataxia telangectasia mutated (ATM) kinase dimers become active which in turn concentrates 53BP1 and Rif1 proteins on DSBs. This mechanism promotes DNA repair mechanism in G1 phase. NKX3.1 and ATM have a functional interaction which accelerates ATM activation. Further studies on inflammatory and DNA damage interface pathways in PCa can improve our knowledge of the pathogenesis of disease and can potentially aid in developing diagnostic and therapeutic strategies for the management of PCa.

19. Transcriptome analysis in seabuckthorn: An overview

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Changing climatic conditions are affecting crop yields every year worldwide. Efforts are underway to develop crop plants with an ability to sustain stress conditions. We have analyzed transcriptome of a non-model plant seabuckthorn, which survives extreme environments, to identify genes involved in cold tolerance. We first standardized a RNA isolation method suitable for plant tissues rich in secondary metabolites. In a pilot study, 3412 seabuckthorn ESTs were generated. Clustering of these ESTs resulted into 1665 unigenes. Later, next generation sequencing (illumina) was used to sequence whole seabuckthorn transcriptome. A *de novo* transcriptome assembly yielded 88,297 putative unigenes from over 94 million short reads. Similarity search of putative unigenes showed maximum homology with *Vitis vinifera*. Microsatellite mining revealed 6787 putative unigenes carrying 8037 microsatellites. Similarly, 7,421 putative seabuckthorn transcription factor genes were found distributed in 80 different families. DeepSAGE, a tag-based expression profiling method, revealed more than 400 genes differentially expressed during cold tolerance. Differential expression of selected genes was subsequently validated through qRT-PCR. Our in depth study of seabuckthorn transcriptome and identification of genetic elements responsive to cold tolerance will aid in understanding abiotic stress management and development of stress tolerant cultivars in future.

20. Development of microsatellite markers in seabuckthorn, a medicinally important plant

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Seabuckthorn (*Hippophae rhamnoides* L.) is a valued source of many bioactive compounds with immense medicinal and nutritional importance. Considering recent interest towards improvement of seabuckthorn as a potential crop, efforts have been initiated for its genome characterization and assessment of genetic diversity. We exploited different strategies to develop microsatellite (Simple Sequence Repeat) markers in seabuckthorn and used these markers in assessing genetic diversity in seabuckthorn collections representing diverse locations in Lahaul-Spiti (Himachal Pradesh). Following our modified strategy of construction and screening of microsatellite enriched library, we identified fifty three microsatellite marker sites. Of these, primers could be designed for forty five loci, of which four were polymorphic in the seabuckthorn collections. Screening of EST database revealed fifty six probable microsatellite marker sites. However, primers could be designed for only thirty microsatellite sites. PCR amplifications using these primers resulted in eight polymorphic markers. Distribution of microsatellites was also studied in the whole transcriptome assembly generated from Illumina NGS platform. Randomly selected fifty five microsatellite sites revealed eighteen polymorphic markers. In all, we have a repertoire of thirty polymorphic microsatellite markers. Current paper presents our efforts towards understanding microsatellite occurrence in seabuckthorn transcriptome and development of microsatellite markers for this important plant species.

21. Studies on feeding of chlorella, an alga on serum cholesterol and protein in *Heteropneustes fossilis* (Bloch.)

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In the present investigation, due to feeding of chlorella an alga, the serum biochemicals i.e. cholesterol and protein were studied. The significant incensements in the serum cholesterol, protein albumin were observed. The increase in the serum cholesterol level with increase of feeding time is non-significant ($P < 0.05$) at 24 hrs while significant ($P < 0.05$) at 48 hours, highly significant ($P < 0.01$) at 76 hours and very highly significant ($P < 0.01$) at 96 hours. In the case of serum protein with the increase of feeding time of chlorella was significant ($P < 0.05$) at 24 hours, 48 hours and 72 hours, while very highly significant ($P < 0.001$) at 96 hours.

The increment of both parameters i.e. serum cholesterol and serum protein after feeding showed that chlorella is a very nutritious alga for the aquatic herbivorous fauna.

22. Green synthesis of silver nanoparticles using floral extract of *Gomphrena globosa* and its antimicrobial activity against multi drug resistant bacteria

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Antibiotic resistance has become a major clinical and public health problem within the lifetime of most people living today. Silver nanoparticles (AgNPs) are well known biocidal substances that can be incorporated as antimicrobial agents in pharmacology, veterinary medicine, implants, wound dressings, and topical ointments. AgNPs were also found to exhibit antimicrobial activities. The present work reports one step ecofriendly method for the synthesis of AgNPs using *Gomphrena globosa* and its antibacterial effects against drug resistant bacteria. AgNPs was characterized by ultraviolet–visible spectroscopy, X-ray diffraction spectroscopy, Transmission electron microscopy and particle size analyzer. The synthesized particles were found to be spherical in shape and sizes ranged between 55–60 nm. Further energy-dispersive X-ray spectroscopy confirmed the presence of silver. Furthermore these green synthesized AgNPs were found to show significant antimicrobial effect against the drug resistant Methicillin resistant *Staphylococcus aureus*, cipro flaxin resistant *Escherichia coli*, and carbapenem resistant *Acetobacter baumannii*. This outcome may pave a way for using floral extract of the AgNPs a drug carrier system to cure bacterial diseases.

23. Water quality status of Mahi Bajaj Sagar dam, Banswara district, Rajasthan, India

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This study was aimed to estimate current status of physico-chemical characteristics of Mahi Bajaj Sagar Banswara District, Rajasthan. Seasonal changes in physico-chemical parameters such as Air temperature, water temperature, pH, transparency, total dissolved solids, Electrical conductivity, total hardness, Total Alkalinity, chlorides dissolved oxygen, phosphate, nitrate and productivity were analyzed seasonally for a period of 2009 September to June 2011. The results indicated that physico-chemical characteristics of the water were within the permissible limits and can be used for domestic, irrigation and pisciculture.

24. Proteomic changes in the liver of murrel *Channa striatus* exposed to high temperature stress

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The present study was carried out to investigate the high temperature stress induced changes in liver proteome of murrel *Channa striatus*. Fishes were exposed to 36 °C for 4 days and proteomic changes in the liver were analyzed using gel based proteomics i.e. 2D gel electrophoresis, MALDI-TOF-Mass Spectrometry and the results of proteomics studies were validated by transcript analysis (qRT-PCR). There was significant increase in the expression of anti-oxidative enzymes superoxide dismutase (SOD), ferritin, glutathione-s-transferase (GST); the heat shock protein HSP 60; enzymes involved in energy metabolism glyceraldehyde-3-phosphate dehydrogenase (G3PDH), phosphoglycerate kinase (PK), enolase, malate dehydrogenase (MD), fumaryl aceto acetoatase (FAA), and ATP synthase subunit β (ATP β) and the cytoskeletal protein β -actin and cytoplasmic actin in the heat stressed fish. Transcript analysis also showed the up-regulation of *sod*, *gst*, *hsp60*, *ferritin*, *pdi*, *md*, *atp β* . The simultaneous up-regulation of the cytoskeletal proteins, antioxidative enzymes, heat shock proteins and enzymes of energy metabolism pathways in the heat stressed fish could be the adaptive strategies for survival under the high temperature stress.

25. *In vitro* propagation of *Piper longum* L-DNA and HPTLC fingerprint analysis establishing the identification of quality planting material

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Piper longum L (Piperaceae), a perennial climber, considered as a valuable source of active substances of medicinal value and a spice. An efficient *in vitro* propagation protocol of *P. longum* was established by using shoot tip explants. Multiple shoots were induced from shoot tips on Murashige and Skoog (MS) medium supplemented with 2.0 mg/l 6-benzylaminopurine (BAP), 1.0 mg/l Kinetin and 100 mg/l Adenine sulfate. Inclusion of various concentrations of BAP along with IAA showed multiple shoot proliferation. The maximum number of shoots per explant was varied from 2.0 to 3.4 on medium supplemented with 1.5 - 2.0 mg/l BAP and 0.5 – 1.0 mg/l IAA. The elongated shoots were separated from the original culture and rooted in half strength MS medium supplemented with 0.25 mg/l IBA (indole-3-butyric acid). The *in vitro* raised plantlets were established in the soil. The genetic fidelity analysis of the *in vitro* raised plantlets was carried by using ISSR primers. The result showed that there was no genetic variation among the *in vitro* raised plantlets as compare with doner plant. All the *in vitro* raised plantlets showed monomorphic banding pattern. A high-performance thin layer chromatography (HPTLC) fingerprint analysis protocol was established for analyzing the quality control planting material developed through *in vitro*. During the analysis, the common peaks represent the active principles i.e. Piperine-1 and piperine 2. Based on the chromatographic peaks, the *in vitro* raised plants exhibit a nearly similar piperine profile as standard. The HPTLC and DNA fingerprints analysis established the identification of quality planting materials developed through *in vitro* for production of secondary metabolites.

26. Isolation and characterization of halo-tolerant *Bacillus* sp .with extra cellular α -Amylase production potential from Sambhar salt lake

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Sambhar lake (27° 58 N, 75° 55 E) is a Athalassic and Polymictic haloalkaline lake with water density varying from 3-27 Be (Baume). The lake is a heaven for studying extremophiles and others microbes with unique metabolic potential. This work presents isolation and molecular characterization of two moderate halophilic bacterial strains from brine samples of the lake. The isolates showed a growth range of 3-15% NaCl in alkaline medium and were characterized taxonomically. Both the isolates were gram +ve, rod-shaped and motile. They both tested positive for catalase and oxidase. The isolates were tested for exo-enzyme production and tested positive for α -Amylase and negative for lipase and protease production. The Isolates were not able to utilize citrate as a sole carbon source and failed to produce H₂S in TSI-medium. Carbohydrate fermentation revealed utilization of glucose,

fructose and sucrose by both the isolates. Taxonomic Identification of isolates was confirmed by partial 16s rRNA gene sequence analysis. The phylogenetic study revealed that the isolates fit into evolutionary cluster comprising members of *Bacillus pumilus* (94%) and *Bacillus licheniformis* (98%) respectively.

27. Antioxidative effect of *Withania somnifera* on SO₂ induced osmotic fragility of red blood cells in albino rat

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Present study is designed to evaluate the effect of *Withania somnifera* (Ashwagandha) on SO₂ (80 ppm) induced osmotic fragility of red blood cells, sulphhemoglobin and methemoglobin in albino rat, *Rattus norvegicus* (Berkenhout). Rats were grouped in 6 sets. Control sets (1) and (4) were unexposed for 30 and 60 days, experimental sets (2) and (5) were exposed to SO₂ gas 1h/d for 30 and 60 days and experimental sets (3) and (6) were exposed to SO₂ gas 1h/d with supplementation of aqueous extract of *Withania somnifera* root (5mg/rat/day) for 30 and 60 days respectively. The results show a significant increase in osmotic fragility, sulphhemoglobin and methemoglobin is due to oxidative damage induced by SO₂ gas exposures which were modulated by antioxidative and antistress activity of *Withania somnifera* on SO₂ induced alterations in albino rat.

28. Point mutations in translation initiation context alter the expression of recombinant human α_1 -proteinase inhibitor in transgenic plants

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The functional and biological significance of translation initiation context (TIC) sequence in determining high level expression of recombinant human α_1 -proteinase inhibitor (α_1 -PI) was documented in stable transgenic tomato plants. The α_1 -PI gene was strategically designed, codon-optimized, synthesized and expressed in transgenic tomato under the control of CaMV35S duplicated enhancer promoter. The native signal sequence was substituted with tobacco pathogenesis related PR1a signal peptide, a dicot preferred TIC sequence and 38 bp alfalfa mosaic virus UTR were incorporated at 5' while endoplasmic reticulum retention signal (KDEL) was incorporated at 3' end of the gene. The TIC sequence was identified as taaA(A/C)aATGGCt in highly expressed dicot plant genes. Removal of this context sequence reduced the expression of recombinant protein to four-folds. The mutation at +4 position to a pyrimidine either alone or with substitution at -3 position eliminated most of the α_1 -PI expression, while mutation at -3 alone resulted in about seven-fold reduction. The presence of steady-state levels of α_1 -PI transcript in transgenic plants indicated that the variation in expression is entirely due to the point mutations incorporated in TIC. These results indicated the significance of conserved nucleotide sequence around initiator ATG codon in augmenting expression of heterologous proteins in transgenic plants.

29. A recent approach for acetylation of amine terminated Polyamidoamine (PAMAM) Dendrimer

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Polyamidoamine (PAMAM) dendrimers inherent properties have made it the nanocarrier of choice in the current era of innovation. Dendrimer based products are growing and mushrooming like anything in the current time. Although it suffer from hemolytic toxicity which could be reduced by protecting free amino group. In the present work alternate acetylated method for PAMAM dendrimers was discussed. The acetylated conjugate was evaluated for color reaction, UV, FT-IR, DSC, NMR Spectra studies. The results revealed that this approach for acetylation gives considerable amount of acetylation in less time duration with elimination of organic solvent. This method could be employed for regular acetylation of amine terminated nanocarriers.

30. Cold tolerant microbes from Indian himlayas: diversity and potential applications in biotechnology and agriculture

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Microbial communities in different samples collected from cold deserts of Indian Himalayas, India, were analyzed using 16SrRNA gene sequencing and phospholipid fatty acid (PLFA) analysis. A total of 232 bacterial isolates were characterized employing 16SrDNA-Amplified Ribosomal DNA Restriction Analysis with the three restriction endonucleases *AluI*, *MspI* and *HaeIII*, which led to formation of 29-54 groups for the different sites, adding up to 169 groups. 16SrRNA gene based phylogenetic analysis, revealed that 82 distinct species of 31 different genera, belonged to four phyla Actinobacteria, Bacteroidetes, Firmicutes and Proteobacteria. PLFA profiles were performed for concerned samples which gave an estimate of microbial communities without cultivating the microorganisms. PLFA analysis led to characterisation of diverse group of microbes in different samples such as Gram-ve, Gram+ve bacteria, actinomycetes, cyanobacteria, anaerobic bacteria, sulphate reducing bacteria, fungi, *Pseudomonas*, *Methylobacterium* and *Arthrobacter*. The representative strains were screened for their plant growth promoting attributes, which included production of IAA, gibberellic acid, ammonia, HCN and siderophore; solubilization of phosphorous and activity of ACC deaminase. *In vitro* antifungal activity assays were performed against *Rhizoctonia solani* and *Macrophomina phaseolina*. The representative strains from each cluster were also screened for cold active enzymes like amylase, β -glucosidase, pectinase, protease, cellulase,

xylanase, β -galactosidase, laccase, chitinase and lipase. Cold-adapted micorganisms can be a source of novel biomolecules, genes and alleles which have potential applications in industry, agriculture and medicine.

31. Role of vesicular arbuscular mycorrhizal (VAM) Fungi in Arid Western Rajasthan Crop Plant- Soil System

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Vesicular Arbuscular Mycorrhizal fungi occur in nearly all soils on earth and form a symbiotic relationship with roots of most terrestrial plants and have a wide range of roles. Most mycorrhizas are balance mutualistic associations in which the fungus and plant exchange commodities required from their growth and survival. Myco-heterophic plants have exploitative mycorrhizas where transfer processes apparently benefit only plants. Exploitative associations are symbiotic in the broad sense, but are not mutualistic. A new definition of mycorrhizas that encompasses all types of these associations while excluding other plant-fungus interactions recognizes the importance of nutrient transfer at an interface resulting from synchronized plant-fungus development. Mycorrhizal fungi also function as entophytes, necrotrophs and antagonists of host or non host plants, with roles that vary during the lifespan of their associations. The purpose of this abstract is considered and examines the diversity of mycorrhizal associations and the interactions between mycorrhizal fungi and plants and factors regulating their associations. These plant fungal associations primarily responsible for nutrient transfer are essential to one or both organisms and involve synchronized development. The mycorrhizal morphology is the basis for grouping them into two major groups: ectomycorrhizae and endomycorrhizae. In this relationship, the fungi obtain carbon compounds and other nutritional requirements from the symbiotic plant roots, and in return, supply the plant with most of the immobile mineral elements such as Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), Copper (Cu) and Zinc (Zn) from the soil solution, thus, becoming a significant component in low-input agricultural systems. Vesicular Arbuscular Mycorrhiza (VAM) is the utmost profuse kind of mycorrhiza. Defined as 'a universal plant symbiosis. This symbiosis is a highly progressed mutualistic relationship found between fungi and plants, most prevalent plant symbiosis known, and AM is found in 80% of vascular plant families in existence today. The marvelous advances in research on mycorrhizal physiology and ecology over the past 40 years have led to a larger understanding of the multiple roles of VAMF in the ecosystem. This knowledge is applicable to human endeavors of ecosystem management, ecosystem restoration, and agriculture. The improved nutrient absorption by mycorrhiza plants especially phosphorus under drought conditions have had a direct impact on growth parameters. Although VA mycorrhizal fungi do not show any host specificity, there is increasing evidence that various climatic and edaphic environmental factors influence their occurrence, taxonomic distribution and effectiveness. VAM fungi do have a potential to enhance plant growth but further studies are needed with additional plants, fungi under variable environmental conditions.

32. Economics evaluation of Turmeric (*Curcuma longa* L.,) crop under Drip Irrigation and Plastic Mulch

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Field experiments were conducted on the lateritic sandy loam soils of Kharagpur, West Bengal, India during 2009-2013 to determine the optimum water requirement of Turmeric crop and to evaluate the economic feasibility of drip irrigation with and without plastic mulch. Reference evapotranspiration for Turmeric crop was estimated using FAO-56 Penman Monteith approach. The total water requirement of crop was estimated to be 416 mm. There were eight treatments of three irrigation levels viz. VD, 0.8 VD and 0.6 VD with drip and conventional furrow irrigation in conjunction with mulch (black plastic mulch of 50 μ thickness) and without mulch. The effect of these treatments were studied for biometric and crop yield response. The results of furrow irrigation either alone or in conjunction with black plastic mulch conditions were compared with drip irrigation in terms of growth and yield of the crop. The research trials for the consecutive four years showed that 80% of water requirement met with drip and plastic mulch (T_4) resulted in maximum plant height, stem girth, functional leaves, corm weight, corm size and yield. The highest yield was observed under the treatment 0.8 VDM (16.64 t ha^{-1}) with 85% increase in yield as compared to furrow irrigation (8.99 t ha^{-1}). The gross income (INR 1,66,400) and benefit-cost ratio (2.88) were found to be highest for drip irrigation with black plastic mulch (0.8 VDM) followed by the treatment VDM with net profit of INR 1,00,347 and B.C. ratio of 2.73.

33. Evaluation of antilithiatic potential of red banana rhizome and its preliminary phytochemical characterization

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Kidney stone are formed by the supersaturation of urinary constituents and no suitable drugs available to use in clinical therapy. Traditionally banana juices (true stem/rhizome) were used in the treatment of lithiasis because of its diuretic effect. Red banana rhizome was evaluated for its *in vitro* antilithiatic potential and its phytochemical characterization was done in the present study. The results revealed the presence of major phytochemical constituents in the rhizome and was found to have antilithiatic activity. Calcium oxalate crystals formed under *in vitro* conditions were significantly dissolved by the methanolic extract of Red banana rhizome in all the three critical stages of stone formation.

34. Acute toxicity of Nuvan®, an organophosphate to freshwater fish *Clarias batrachus* and its effect on blood biochemistry

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Indiscriminate use of pesticides has elevated the risk of contamination of environment and aquatic habitat. In the present study, the freshwater fish, *Clarias batrachus* was exposed to sub-lethal concentration of an organophosphorous pesticide, Nuvan on biochemistry of blood serum because blood is a good patho-physiological indicator. The fish exposed to acute toxicity of Nuvan for 24, 48, 72 and 96 hours. Significant changes in various biochemical parameters such as blood glucose, blood urea and serum cholesterol were observed. The toxicity of 0.07ml/L concentration of Nuvan led to the addition in blood glucose and blood urea in blood while reduction in serum cholesterol. This may be due to hepatocellular destruction, renal damage and caused by pesticidal Nuvan, which leads to the liver dysfunction.

35. Correlation between phytoelemental profile & glyceemic activity of *Citrus limonia* leaves

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The efficiency of a diverse range of trace elemental concentrations present in medicinal plants in the treatment of several ailments can be established by means of their quantitative evaluation. Elemental concentrations of aqueous extract of *Citrus limonia* leaves were measured by Laser-induced breakdown spectroscopy (LIBS). LIBS is an immensely powerful and efficient analytical tool for determining elemental composition. The present study deals with the LIBS-based validation of elements responsible for the glyceemic potential of aqueous extract of *C. limonia* leaves in streptozotocin-induced diabetic models. The considerable decrease in blood glucose level and marked improvement in glucose tolerance test of diabetic models is correlated to the concentration of elements present in the extract as revealed by LIBS spectra. Elements like Mg and Ca which are well-known to possess antidiabetic potential, have been detected in the LIBS spectra of *C. limonia*.

36. Medicinal values of the latex of plant *Calotropis procera*

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Calotropis procera, a latex producing plant of family Apocynaceae, grows in the wild in warm and dry places throughout India including desert. The plant is well known for the toxic properties of its latex that occurs in abundance in its aerial parts and oozes out when the plant is injured. Nevertheless, different parts of the plant have been used in the traditional medicinal system for the treatment of various ailments like piles, sores, painful joints, disorders of liver, spleen and abdomen. In a series of experimental studies carried out in rodent models, it has been found to exhibit potent anti-inflammatory, analgesic, weak antipyretic, antidiarrheal, hepatoprotective, antiulcer, antidiabetic, antiarthritic and anticancer properties. The validation of some of the medicinal properties has been carried out following oral administration of the aqueous extract of the dried latex where its non-protein constituents are effective. The latex also contains proteins that have been found effective following parenteral administration in various disease models. Both the aqueous extract and the protein fraction of the latex exhibit potent anti-inflammatory property and these fractions have been found effective in ameliorating arthritic dysfunction in the rat model.

37. Pulmonary effects and general review of Indian Pan Masala, Plain (PMP) and its Blend-Tobacco (PMT) on long term feeding in mice

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Lung is the easily and most affected among all organs by chronic pan masal (PM) and its blend (PMT) consumption. Lungs exposed at 2% PM (PO) to >70 weeks showed disability both in structure and function in mice. The lung parenchyma is eroded and replaced by cellular mass. The cell mass mostly arranged in tubular pattern shows loss of differentiation and also invades the adjacent areas with mesothelial lesions. The breathlessness i.e. chronic obstructive pulmonary disease (COPD), an invalidity that has no cure but only symptomatic inconsistent treatment of the lungs. A growing structural incompatibility goes parallel enabling functional debility resulting deficit oxygen saturation. A general and critical specially pulmonary (lung) damage is presented to focus lung developing carcinoma, adenocarcinoma as a final outcome. The body, behavioural, social, public aspects due to PM and PMT have been discussed. The common and frequent users of PM to combat to work stress (manual or non-manual) out of any occupation, weariness and family issues and thus ensuring addiction need to avoid PM or tobacco or otherwise even chronic PM alone can destroy this vital organ, lung which is a dose-dependent effective and becomes ineffective to deliver oxygen to meet energy of the body demand.

38. A novel herbal formulation with improved antioxidant efficacy

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A novel herbal formulation was prepared with two medicinal plants, viz. *Murraya koenigii* and *Sesamum indicum* and its antioxidant efficacy was compared with the antioxidant efficacy of individual plants. Different assays viz. FRAP, reducing power, nitrosyl radical and metal chelating scavenging were undertaken to assess the antioxidant efficacy of the formulation *in vitro*. Results reveal that its FRAP value was much higher (149.7 $\mu\text{M Fe}^{2+}/\text{g}$) than the individual plants (99.25 $\mu\text{M TE}/\text{g}$ and 0.013 Fe^{2+}/mg , respectively). Similarly, the reducing power was found to increase in terms of increasing absorbance with rising concentration of the formulation as compared to the individual plants. Nitrosyl scavenging ability of the formulation showed highest inhibition of 80.87% at the highest concentration of 400 $\mu\text{g}/\text{ml}$. Whereas, *M. koenigii* and *S. indicum* individually showed nitrosyl scavenging activity by 92 and 91% at 400 and 1000 $\mu\text{g}/\text{ml}$ concentrations, respectively. Metal chelating activity of the formulation showed significant inhibition of 72.11% at the highest concentration of 100 $\mu\text{g}/\text{ml}$. Whereas, *M. koenigii* and *S. indicum* separately showed lower inhibition of 54.88 and 72%, respectively than the formulation. Results suggest that this promising herbal formulation could serve as a source of natural antioxidants with potential applications in pharmaceutical industry.

39. Impact of *Cucurbita maxima* seed extract on Antioxidant defense system

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Antioxidants have the ability to quench free radicals by oxidizing themselves. Since, in the system, overproduction of these ROS (reactive oxygen species) or inadequate antioxidant defense or both, lead to cellular oxidative stress causing several diseases viz., diabetes mellitus, cancer, neurodegenerative disorders and aging as well, therefore the present study deals with the evaluation of impact of *Cucurbita maxima* aqueous seed extract *in vitro* using different assays. The extract was screened for NO and ABTS radical scavenging activity as well as for some other antioxidant assays viz., FRAP (ferric reducing antioxidant power), reducing power and total phenolics. The extract exhibited significant inhibition of 54.54 and 69.67% in case of NO and ABTS radical scavenging activity, respectively. On the other hand, FRAP assay revealed excellent antioxidant capacity of 85.33 $\mu\text{M Fe}^{+2}/\text{g}$. The reducing power of the extract was also found to be significant with increase in concentration showing maximum absorbance of 0.044 at maximum concentration evaluated of 200 $\mu\text{g}/\text{ml}$. Since diabetes is always associated with oxidative stress therefore this extract could be developed as an effective therapeutic agent not only for managing oxidative stress but also for managing diabetes as well.

40. Effectiveness of new insecticides against yellow stem borer, *Scirpophaga incertulas* (Walker) on semi deep water rice

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Field experiments have been conducted on a semi deep water rice variety, *NDGR-201* during *kharif* seasons 2012-13 and 2013-14 to evaluate the effectiveness of certain new insecticides against yellow stem borer. Altogether, 8 treatments including 6 insecticides, viz. triazophos 40 EC @ 1250 ml ha^{-1} , sulfoxaflor 24 SC @ 375 g ha^{-1} , buprofezin 25 SC @ 800 ml ha^{-1} , rynaxypyr 20 EC @ 150 ml ha^{-1} , acephate 75 SP @ 667 g ha^{-1} and dinotefuran 20 SG @ 200 g ha^{-1} besides insecticidal check monocrotophos 36 SL @ 1390 g ha^{-1} and untreated control. The yellow stem borer infestation, i.e. white ears varied from 1.81 to 8.57% over the *kharif* seasons. The results on stem borer infestation and yield indicated that all the insecticidal treatments were significantly superior to untreated control. However, triazophos 40 EC @ 1250 ml ha^{-1} was most effective with 1.84% average stem borer infestation and 32.21 q ha^{-1} average grain yield in comparison to 8.26% average stem borer infestation and 21.06 q ha^{-1} average grain yield in untreated control. It was insignificantly followed by sulfoxaflor 24 SC @ 375 g ha^{-1} and acephate 75 SP @ 667 g ha^{-1} with 1.93 and 2.11% average stem borer infestation; and 31.42 and 29.39 q ha^{-1} average grain yield, respectively. The insecticidal check monocrotophos 36 SL @ 1390 g ha^{-1} was superior to untreated control with 3.24% average stem borer infestation and 24.03 q ha^{-1} average grain yield. It has also been noted that the insecticides, viz. triazophos 40 EC @ 1250 ml ha^{-1} , sulfoxaflor 24 SC @ 375 g ha^{-1} and acephate 75 SP @ 667 g ha^{-1} showed 53.38, 49.62 and 39.95% increase over control, respectively, in comparison to check insecticide, monocrotophos 36 SL @ 1390 g ha^{-1} with only 14.43% increase over control.

41. Screening of flood-prone rice cultures against yellow stem borer, *Scirpophaga incertulas* (Walker)

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Altogether, 35 promising flood-prone rice cultures along with susceptible check variety TN-1, resistant check variety Suraksha and check varieties Madhukar and Barh Avarodhi have been screened against yellow stem borer (YSB), *Scirpophaga incertulas* (Walker) *kharif* seasons 2011-12, 2012-13 and 2013-14 under natural field condition. The scoring for YSB infestation have been conducted on the basis of Standard Evaluation System, i.e. 0-9 scale, where score 0: no infestation, score 1: 1 to 5% infestation, score 3: 5 to 10% infestation, score 5: 10 to 15% infestation, score 7: 15 to 25% infestation and score 9: above 25% infestation. The YSB infestation varied from 5 to 25% during *kharif* seasons 2011-12, 2012-13 and 2013-14. The susceptible check variety TN-1 recorded up to 25% average YSB infestation, whereas resistant check Suraksha recorded up to 5% average YSB infestation during three *kharif* seasons. However, the check varieties Madhukar and Barh Avarodhi recorded up to 15% average YSB infestation during three *kharif* seasons. On the basis of overall performance during three *kharif* seasons, the entries C-23-3, C-6-5, IR-71398-Ci-6 and IPS-42 were most promising and tolerant with 5 to 10% YSB infestation. Further, it has been recorded that the entries, viz. IR-71400-C4-4, IR-71404-C7-4, IR-60543-38-4, IR-6286-C-4, NDGR-123 and IPS-1999-28 were also promising with 10 to 15% average YSB infestation during three *kharif* seasons. Hence, it is concluded that the flood-prone cultures C-23-3, C-6-5, IR-71398-Ci-6 and IPS-42 are moderately resistant/ tolerant to yellow stem borer and may be developed as moderately resistant varieties against yellow stem borer.

42. Nutritional and sensory properties of vegetable oil filled milk beverage prepared with pulp of *Mangifera indica* L.

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Value addition of a beverage was carried out by blending mango juice at three concentrations (5%, 10% and 15%) with skimmed milk and three concentrations (3%, 3.5% and 4.0%) of vegetable oil with 80% rice bran oil and 20% *Carthamustinctorius*L. oil (Saffola gold). Sensory evaluation showed significant differences in flavour and taste, consistency and overall acceptability amongst the various treatment combinations. Beverage prepared from 3.5% vegetable oil and 15% pulp was observed feasible in terms of nutritional quality like fats (2.9%), proteins (2.83%), carbohydrate (12.16%) and total solids (18.73%). It contained maximum overall acceptability (7.55/9) among all tested combinations. Total sugar, ascorbic acid and acidity decreased while total solids and pH increased as the storage period of beverages was increased from 0-30 days, however the changes were observed lesser at low temperature than the room temperature. Addition of vegetable oil $\geq 3.5\%$ produced minimum total plate count (≤ 1.8 cfu/mL) and negative test for coliforms and the beverage products were found microbiologically safe during the one month of storage at low temperature

(around 4 °C). Coliform organisms could not be detected in beverages and total plate counts remained ≤ 3.0 cfu/mL at 0, 7 and 30 days of storage period. The value added filled milk beverage prepared with 80% rice bran oil, 20% safflower seed oil and 15% mango pulp was prescribed for the best use for a week.

43. Soil fertility status of Sant Ravidas Nagar Uttar Pradesh

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The main activity for soil testing in Krishi Vigyan Kendras are Soil test compaign, Soil health camp, Trainings, Apni mitti pahchano programme (state departments), Front line demonstrations (FLDs.) and On farm trials (OFTs). We are collected soil sample from different villages of block Aurai for different crops like Paddy, maize, jowar bajara, arhar, urd, moong, lobia in Kharif and Wheat, mustard, toria, chickpea, pea etc in Rabi. Total sixty two (62) soil sample taken from different twenty (20) villages and given to soil testing laboratory, Department of Agriculture ,Gharaon, Sant Ravidas Nagar,U.P.. All the sample physically clay loam to sandy loam and Chemically (OC %, Available N & P kg. per ha.) are low category but in the case of available K kg per ha. 14 sample in medium range and 48 sample in higher range of potassium kg per ha. For soil reaction (pH) value ranges from 7.40 to 7.90 maximum samples falls in category of slightly alkaline conditions. We are concluded that the soil of Sant Ravidas Nagar is very poor fertility status.

44. Vertical stratification of parasitic fauna in the fishes of Yamuna river at Gau Ghat, Allahabad during the summer season

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The parasitic fauna has been investigated in the four species of fishes in Yamuna river at Gau Ghat, Allahabad during the summer season. Among the observed fishes, only Common Carp and Tilapia have the infections of bacteria (09.1% and 26.7%) and protozoa (49.8% and 44.7%) respectively whereas Eel fish and Cat fish harboured endo-helminthes infections of nematode and cestode (46.4% and 45.7%) respectively despite bacteria and protozoan infections. Simultaneously, the arthropod parasite (*Ergasilus sp.*) was recovered less in common carp (0.06%), moderate in Tilapia (39.2%) and cat fish (35.6%) from their gills as ecto-parasites. The thermal stratification of water was responsible for the establishment of infections in these hosts during the summer Season

The above parasitic infections pattern can be explained on the basis of habitat selection, dietary behavior, immunological status of the fishes and the thermal stratification along water pollution. It can be argued that bacterial, protozoan arthropods and helminthes were vertically stratified from surface to bottom in respect of their host's habitats.

45. Studies on the nesting material of Sarus Crane (*Grus antigone antigone*, Linn. 1758) around Alwara lake, District Kaushambi, (Uttar Pradesh), India

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The nesting material of **Sarus Crane** is specific which totally made by the residing flora of marshy land and confines its distribution and conservation. The nest size, material and buoyancy are appealing toward this threatened, state bird of Uttar Pradesh.

A total number of 46 nests including 89 eggs were encountered during the survey month of July-fore September, 2014. These nests were mainly located inside the marshy wetland surrounded by croplands and non croplands. The nests were mainly fabricated by the twigs of residing aquatics and land plants for the purpose of buoyancy. The nest were a platform of varying size (1.3 to 2.5feet), having broad base and submerged type. The water level was quite and less than its leg. The maximum percentage of the utilized plants were observed- *Oryza sativa* (Dhan), *Typha angustata* (Naraee), *Oryza rufipogon* (Fasahi), stem and roots of *Pennisetum typhoids* , stem and roots of *Sorghum bicolor*, roots of *Typha angustata* whereas minimum percentage were recovered - *Echinocola colonum*, *Hydrilla vericillat*, *Eleocharis*, *Ipomoea aquatica* and others. The percentages of utilized material were varied according to the availability of plants in their habitat. Therefore, selection of nesting sites were depends on the nesting material of landscape flora which varied in different transects of Alwara lake.

46. Screening of Phytochemical Properties and Antibacterial Activity of *Aloe vera* L. “LILY OF THE DESERT”

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The aim of the study was to investigate the preliminary phytochemical and antimicrobial screening of different extracts of *Aloe vera* L. “**Lily Of The Desert**”. The preliminary phytochemical screening of the extracts of leaves of *A. vera* revealed the presence of bioactive compounds such as alkaloids, tannins, flavonoids phenolic compounds, and etc. with absence of cyanogenic glycosides. Five different solvents on the basis of increasing polarity such as ethyl acetate, acetone, ethanol, methanol and distilled water were used to extract the bioactive compounds from the leaves of *Aloe vera*. Antibacterial activity of *Aloe vera* was analyzed against five human clinical pathogens by agar well diffusion method. The maximum antibacterial activities were observed in methanol extract followed by other organic and aqueous extracts. It was also found that remarkable antibacterial activities with methanolic and ethanolic extracts of *A. vera* compared with the standard antibiotic, tetracycline that was not active against *E. coli* and *S. boydii* and supported the view that *A. vera* is a potent antimicrobial agent compared with the conventional antibiotic.

47. Seasonal variation in the neurons of lateral hippocampus of koel (*Eudynamys scolopaceus*)

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Golgi-Colonnier method, a neurohistological technique to analyze the seasonal variation in the neurons of Lateral hippocampus (HCl) of koel (*Eudynamys scolopaceus*) has been applied. The region ventral to the APH and running along the mediodorsal wall of the lateral ventricle is lateral hippocampal (HCl). On the basis of soma size, shape and dendritic tree pattern the neuronal classes observed in HCl region during B and NB time could be differentiated into two types- Multipolar neurons and Pyramidal neurons . Multipolar neurons of HCl tended to have medium to large sized soma and sent 4-6 dendrites in all directions whereas pyramidal neurons possessed medium to large size triangular soma with thick apical dendrite running towards pia whereas a skirt of fine basal dendrites running towards ventricle. Thickness of apical and basal dendrites, spine density, of both pyramidal and multipolar neurons were found to be significantly higher (at $P < 0.05$) during breeding phase. Present study supports the view that during the breeding period birds are more active, the neurons tend to increase in dendritic thickness and spine morphology to cope with changing conditions.

48. Variation in neuronal spacing within dorsomedial forebrain during breeding and non-breeding phase of male *Psittacula krameri*

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Dorsomedial forebrain (Hippocampus), a narrow strip of tissue lying on the dorsomedial surface of avian telencephalon is known to play crucial role in varied functions such as learning, memory formation, food storing behavior and spatial navigation. Seasonal variation exhibits its pronounced effect on dorsomedial forebrain of birds in terms of: changes in volume within parasitic, food storing and navigating birds; spine density and morphology of spines in parahippocampal region of Indian ring parrot and Asian koel; neuronal size and spacing in adult male song sparrows and neuronal spacing within hippocampus of female Indian ringneck parrot, being greater during breeding time of bird.

Using Cresyl-violet staining technique, the present study was aimed at studying variation in neuronal spacing across breeding (Oct-Feb) and non-breeding (Mar-Sep) phase of male *Psittacula krameri* in all the fields of dorsomedial forebrain. The spaces between neurons in all the fields of dorsomedial forebrain were observed to be significantly greater (at $P < 0.05$) during breeding phase of male parrot in comparison to non-breeding parrot. Our observations are in consonance with previous findings and hence indicate that seasonal variation effect neuronal spacing and this increase in neuronal spacing can be correlated with increase in dendritic field observed in birds during breeding phase.

49. Neuronal types in Parahippocampal area of Indian roller (*Coracias benghalensis*)

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Hippocampus is situated dorsomedially at the forebrain which covers the peripheral region of telencephalon in strip tissue form, rest of hemisphere is separated from it by a ventricle. Hippocampal region of aves is divided into five subfields namely: Lateral hippocampus (HCl), Parahippocampal area (APH), Central field of Parahippocampus (PHc), medial hippocampus (HCm) and crescent field (CF). An attempt had been made to find out various type of neuron in the APH area. Experiments were performed in *Coracias benghalensis* birds using Golgi-colonnier method to observe neuronal types. The result demonstrate that Multipolar (43.50%) were the bulk of neuron rather than the Unipolar (10.50%), Bipolar (4.50%) and Pyramidal (41.50%). Pyramidal type of neurons had greater dendritic field (193-232 μ m) than the other subtypes. The results have been compared with the neurons of other previously reported avian species.

50. Spine morphology in hippocampal complex of *Corvus splendens*

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Spines are neuronal surface outgrowth and function for neuronal communication through synapse formation. Spines play important role in memory formation and both spine morphology and number change with learning and memory processing. Four types of the spine morphology have been observed that are thin, stubby, mushroom and filopodium based on relative size spine head and spine shaft. All these spine morphology have been observed in all the neuronal types of the hippocampal complex, although filopodium type has been observed mainly in middle or terminal part of a dendrite. Golgi impregnation method has been followed to trace spine morphology. On axon collaterals only filopodium type has been observed. In multipolar and pyramidal/pyramidal like neurons Gaussian, curve type of spine arrangement has been observed that is along a dendrite, spine density is low at the base, maximum at the middle and again goes down at terminal part. ANOVA test analysis shows that differences in spine density among neuronal types are apparent and each neuronal type has almost equal contribution towards neuronal interlocking.

51. Cyto-architecture and neuronal classes of the dorsal cerebral cortex of the Indian Sand Boa, *Eryx johnii* (Russel, 1801)

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The cyto-architecture and morphology of the neuronal classes of the dorsal cerebral cortex of the Indian Sand Boa, *Eryx johnii* has been studied with the help of Cresyl violet staining and Golgi impregnation method. The dorsal cerebral cortex displayed three neuronal layers. Layer-I contains only few neuronal somas and also the dendrites ascending from the subjacent layers. Layer-II is

characterized by two to three cell thick densely packed neuronal somas. Layer-III contains loosely packed neuronal somas and the dendrites and axon descending from layer-I and II. Below the layer-III an ependymal layer is observed just above the ventricle. Seven classes of neurons were distinguished in the cellular layer of dorsal cortex of *Eryx johnii*: aspinous monotufted monopolar neurons, aspinous monotufted bipolar neurons, spinous monotufted monopolar neurons, spinous monotufted bipolar neuron, pyramidal neurons, multipolar neurons and candelabra-like neurons. The multipolar cells were large showing more or less single type present in the cellular layer and have mostly intracortical dendritic branching and connections. The pyramidal neurons have mostly dendritic branching and connections. The candelabra-like neurons have very high dendritic branching. Neuronal classes of the cerebral cortex of ophidian will be compared with other lacertilians species already reported.

52. Topology and types of Neurons in the Cerebral Cortex of Indian Magur, *Clarias batrachus* (Linnaeus, 1758)

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Scaleless fishes are the siluriformis of the family claridae and genus *Clarias* is representative of the family. The topological organization and types of neurons have not been investigated of any fish. The purpose of this study is to identify and classify the neuronal types presents in the cortex of the *Clarias batrachus*. The neuronal classes have been studied with the help of cresyl violet staining and Golgi-Colonnier method. Total 244 neurons were studied in 10 fishes and major groups of neurons were- unipolar (23.77 %), bipolar (20.49 %), pyramidal (14.75%) and multipolar (40.98 %). The results will be compared with the observations made by previous investigations in tetrapods.

53. Food and feeding attributes of *Labeo bata* from lower stretch of the river Yamuna, India

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Labeo bata (Hamilton, 1822) commonly known as 'Bata' is a freshwater medium sized Indian minor carp. The fish forms lucrative pond fishery in West Bengal, Assam, Orissa states in India and also in Bangladesh. It is widely cultured in West Bengal, Assam and Tripura due to its high market demand and consumer preference. Although some preliminary investigation have been undertaken on the biology of this economically important fish species, no information is on record about its food and feeding habits. The present study was carried out to determine food and feeding attributes of *L. bata* from the lower stretch of river Yamuna at Allahabad, India. Samples were collected from Sadiapur landing site in Allahabad during May 2013 to April 2014. The body size of the samples varied from 13.4 to 32.6 cm. The gut content analysis revealed that *L. bata* is a herbivorous fish. Green algae constitute maximum proportion (46.26%) of the gut contents, followed by diatoms (36.86 %), blue-green algae (6.77 %) and protozoans (5.11 %). Sand particles were also recorded in sizeable proportion (5.11%). Contribution of the higher aquatic animals in the gut of the fish was minimal

(0.50%). Diatom group was recorded maximum diversity, while green algae shared highest percentage in the gut of fishes. Significant seasonal variability in food and feeding was observed from the gut of the fishes. Green algae comprised maximum share in monsoon and summer seasons while diatoms in winter season. The details on food, feeding and seasonal variations will be discussed in the paper.

54. Ecological assessment of alien fishes in the Ganga river system, India with special reference to *Cyprinus carpio* and *Oreochromis niloticus*

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Indian rivers are facing severe alterations in hydrology, water chemistry and biological parameters due to massive anthropogenic activities. River Ganga is also an example of mass-scale variations. As a result, the fish diversity and composition in the rivers have registered tremendous changes including invasion of exotic fishes. The present study was conducted during January 2008 to December 2009 in the river Ganga and Yamuna at Allahabad, to assess influence of exotic fishes. *Cyprinus carpio* and *Oreochromis niloticus* were dominating fish species in both the rivers. *C. carpio* and *O. niloticus* contributed 13.44%, 14.20% during 2008 and 10.96% and 12.54% in 2009 from Ganga river while, the composition required tremendous increase in Yamuna river comprising 25.18% and 32.99% in 2008 and 19.07% and 17.87% in 2009, respectively. Both the species indicate poor state of sensitive, native species like IMC and catfishes. After invasion of both species, miscellaneous groups shared decline in the rivers but total landing (annual production) of fishes slightly increased at Allahabad due to presence of exotic species. On comparison of both the rivers, IMC in river Ganga were in better state (6.97% and 12.62%) than Yamuna (4.56% and 7.53%). The altered habitats were congenial for *C. carpio* and *O. niloticus* but adverse for IMC, which was considered to be a backbone of Indian culture fishery.

55. Enhanced antibacterial and anti-inflammatory activities of a biherbal formulation

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The current study was undertaken to evaluate the synergistic effects of two medicinal plants viz. *Murraya koenigii* and *Sesamum indicum* on their antibacterial and anti-inflammatory activities based on Minimum Inhibitory Concentration and Albumin Denaturation Inhibitory action, respectively. Activities were assessed for a range of various concentrations of biherbal formulation. Antibacterial activity of biherbal formulation was found to have significant antibacterial efficacy against *Klebsiella pneumoniae* and *Staphylococcus aureus* strains as that of standard drug, ampicillin. Whereas, its efficacy against *Escherichia coli* and *Pseudomonas aeruginosa* strains was almost at par with ampicillin. However, *Enterococcus faecalis* was slightly resistant towards the formulation in comparison of standard drug. In albumin denaturation inhibitory activity maximum inhibition of 94.70 and 96.02% was observed with this novel formulation and the standard, ascorbic acid,

respectively at the lowest concentration of 50 µg/ml. The comparative study of the data obtained of formulation and of the pre-existing data of individual plants, clearly indicates that the antibacterial efficacy as well as antiinflammatory activity of the formulation were much higher than the each individual plant. Hence, this formulation could be developed as a potent antibacterial as well as antiinflammatory agent.

56. Differential expression of nitric oxide synthase in dorsomedial cerebral cortex of *Amandava amandava*

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The cerebral cortex is a thin sheet of nervous tissue in the roof of cerebrum of amniotes. Dorsomedial forebrain of birds comprises hippocampal complex, separated from rest of cerebral hemisphere by lateral ventricle. The boundaries of avian hippocampus have not been well established which is very important for understanding the functions of avian hippocampus. Histochemical markers are useful tools for delineating different fields of brain. NADPH-d histochemistry is indirect method to express enzyme nitric oxide synthase (NOS). Distribution of NO-synthase in brain of *Amandava amandava*, reveal a weakly stained region of neuropil in the hippocampal area. The possible reason for this may be non food-storer nature of the bird.

57. Effect of crop species on CO₂ efflux from soil

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Soil respiration is an essential process in the cycling of the carbon and an influential factor affecting the soil-atmospheric carbon exchange. The present study was aimed to test the hypothesis that apart from the soil microbial communities, the soil respiration rate is also regulated by the plant species. For this, we have compared the spatiotemporal variation of the CO₂ efflux from selected agrosystem having crops like *Cicer arietinum*, *Pisum sativum*, *Zea mays* and *Vigna mungo*. The diurnal variation in CO₂ efflux rate was monitored periodically at the regular interval of 10 days over the entire crop period. The results found that CO₂ efflux rate from the field of *C. arietinum*, *P. sativum*, *Z. mays* and *V. mungo* were found in the range of 75-144, 65-117, 65-111 and 114-173 mg/m²/hrs. This was again supported by the correspondent values of the microbial count, microbial biomass carbon and soil enzymes in the respective field. However, more studies are essential to underpin the detailed plant specific microbial interactions responsible for the CO₂ efflux from soil.

58. Applications of nanotechnology for soil remediation

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Soil is an important supporting system and the most basic of all natural resources for human survival on earth. However, in the recent years soil pollution and degradation has become a major challenge for the world. Adding to this crisis, is a growing demand for food production for a burgeoning human population. It is estimated that approximately 30% of land is degraded or contaminated by various anthropogenic activities and this level continues to rise. The major sources of soil contamination includes heavy metals, pesticides, hydrocarbons and the persistent organic pollutants (POPs) released as a result of various anthropogenic activities. Nanotechnology deals with the study of phenomena and the manipulation of materials at the atomic, molecular or macromolecular levels, in the length scale of approximately 1-100 nanometer range. Nanotechnology is being anticipated as a novel technology for soil remediation and management. The applications of nanotechnology for soil remediation include: nano-based sensors for detection of pesticide residue in soil, nanoparticles for degradation of pesticides and persistent organic pollutants in soil and nanoparticles for remediation of heavy metal by their conversion to less toxic forms.

59. Ecological characterization of a pesticide contaminated site for remediation and management

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The present study was aimed to validate simple, adequate and consistent inventorying methods for the ecological characterization of a pesticide contaminated soil site in Lucknow for remediation and management. The abundance and diversity of plant species, microbial biomass, total organic carbon, soil dehydrogenase activity, pesticide concentration in soil and plant species as well as the occurrence of ecologically sensitive species such as earthworms, honey bees and butterflies in contaminated and non-contaminated soil sites were studied. FTIR analysis was done for assessing the variation of functional groups present in soil. Furthermore, the germination assays of selected seeds were conducted in both HCH-contaminated and non-contaminated soils. Twenty five plant species were reported from the control site; whereas in the case of HCH-contaminated site, it was reduced to seven species. The presence of α -, β -, γ - and δ -HCH isomers in the soil samples of contaminated sites were varied from 5.18–12.45, 30.15–68.77, 6.93–16.55 and 0.75–7.54 mg kg⁻¹, respectively, whereas the concentrations of Σ HCH in plant samples were varied from 2.78 to 12.47 mg kg⁻¹. The germination percentages of all the test plants were significantly low in contaminated soil. Interestingly, sensitive species were not spotted in the contaminated sites. The study indicates that proposed way of ecological characterization is appropriate for adopting suitable methodical frame works for the *in situ* restoration of contaminated soil sites.

60. Influence of organic and inorganic plant nutrient sources on soil quality/health

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A field experiment was carried out to know Influence of organic and inorganic plant nutrient sources on soil quality/health during Kharif 2011 to *Rabi* 2013-14 with twelve treatments replicated three times in randomized block design (RBD) in the department of Soil Science & Agricultural Chemistry, N. D. University of Agriculture & Technology, Kumarganj, Faizabad- 224 229 (U.P.) India. The results indicated significant improvement in bulk density, soil reaction, electrical conductivity, organic carbon per cent, available N, P, and K in kg per ha. In all the years of experimentations over control and initial soil parameters after harvesting of the rice and wheat.

61. Influence of organic and inorganic plant nutrient sources on yield and yield attributing characteristics of paddy and wheat

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A field experiment was carried out to know influence of organic and inorganic plant nutrient sources on yield and yield attributing characteristics of paddy and wheat during Kharif 2011 to *Rabi* 2013-14 with twelve treatments replicated three times in randomized block design (RBD) in the department of Soil Science & Agricultural Chemistry, N. D. University of Agriculture & Technology, Kumarganj, Faizabad- 224 229 (U.P.) India. The results indicated significant improvement in plant height (cm), number of tillers /m², number of grains/panicle, grain and straw yield q. per ha. over control. Treatment six and ten given better response over other treatments during the period of experimentations.

62. Cross-domain drivers of dissolved organic carbon in Ganga river

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Despite the fact that the human alteration of carbon (C) cycle is in part linked with other major biogeochemical cycles, particularly that of nitrogen (N) and phosphorus (P), most of the geosphere- biosphere models do not explicitly consider the changing state of C/N/P coupling and the associated shifts in ecosystem structure and functioning. On global scale, atmospheric deposition

(AD) has become the dominant vector of N and P inputs. Further, despite rising atmospheric deposition, the atmosphere- land- water connectivity of dissolved organic carbon (DOC) is not altogether accounted in major rivers of India. The study was an effort to investigate the effects of atmospheric deposition (AD) and surface runoff on DOC build-up in Ganga River for three consecutive years. The Atmospheric deposition of organic carbon increased consistently over time and river DOC was positively associated with AD-OC and runoff DOC. Our study, suggests that future climate models should consider region specific time series data on changing state of atmosphere- land- water transfer and associated shift in carbon capture and storage in major rivers for predicting future climate change drivers.

63. Radiation and cadmium induced testicular injury and its amelioration by *Aloe vera* extract

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Extract of *Aloe vera* leaves has been used for treatment of various diseases and disorders in Ayurveda and Unani medicine. Many types of DNA lesions are produced in cells by Ionizing Radiation and chemicals, which results in enhanced production of ROS. *Aloe vera* protect DNA against damage induced by the Reactive Oxygen Species.. It is well known that Aloe is an essential component of oxidant defence system with participation at multiple cellular levels. Due to a variety of bioactive constituents with antioxidative and free radical scavenging properties, present study has been undertaken the radioprotective potential of *Aloe vera* against testicular injury in Swiss Albino Mice. For this purpose, six to eight weeks old male mice were selected and divided into seven groups.

Group I sham irradiated, Group II treated with cadmium chloride (20 ppm.) Group III irradiated with 3.0 Gy Gamma rays, Group IV both irradiated and treated with cadmium chloride solution. Group V animals treated with cadmium chloride and *Aloe vera*. Group VI treated with radiation and *Aloe vera*. Group VII radiation, cadmium and *Aloe vera*. The animals were sacrificed at each post treatment intervals of 1, 2, 4, 7, 14 and 28th days. The testies were taken out and fixed in bouin's fluid for histological observations by routine procedure. The changes observed in the testis were picnosis, karyolysis, karyorrhesis, intertubular oedema, hyperamia, cytoplasmic degranulation, vacuolation, loosening of germinal epithelium and shrinkage of tubules. But these changes become more severe in the testis of combined treated animals as compared to individual one (radiation, cadmium). The damage and recovery pattern showed a dose dependant and synergistic action.

64. Amelioration of metal induced hepatotoxicity and Antibacterial effects of *Bauhinia variegata* leaf extract

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This study aims to investigate the protective effect of *Bauhinia variegata* leaf extracts on aluminium induced hepatotoxicity in Wistar rats. Toxicity was induced by administration of $AlCl_3$ for three weeks. Serum levels of hepatic markers glutamic oxaloacetic transaminase (GOT), glutamic pyruvic transaminase (GPT), alkaline phosphatase (ALP), creatinine and bilirubin were determined. $AlCl_3$ treated rats exhibited augmentation of SGOT, SGPT, ALP, creatinine and bilirubin levels while co-administration of Liv-52 and test extract revealed protective response as indicated by decline in these biochemical hepatic markers. The antibacterial activities of the extracts derived from leaves of *B. variegata* were evaluated against four Gram negative bacteria viz., *Proteus vulgaris* (MTCC 7299), *Salmonella typhi* (MTCC 3917), and *Bordetella bronchiseptica* (MTCC 6838) and Gram positive bacteria viz., *Bacillus cereus* (MTCC 6840), *Streptococcus mutant* (MTCC 497). Hexane, benzene and aqueous extracts exhibited significant antibacterial activity. The study revealed noticeable therapeutic efficacy and antibacterial activity of *B. variegata* extracts.

65. In vitro evaluation of cinnamaldehyde ((E)-3-Phenyl-2-propenal) and eugenol (2 Methoxy-4-(2-propenyl) phenol) for their antioxidant and anticancer activities

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Free radicals generated in various metabolic pathways are regulated by several endogenous as well as exogenous antioxidant systems in the living organisms. They are highly reactive species and attack biomolecules leading to many degenerative diseases. Present study reports free radical scavenging, reducing power and anticancer activities of trans-cinnamaldehyde and eugenol. Anticancer activity was performed against different cell lines T47D (breast cancer cell lines) and NCI-H322 (Lung cancer cell line). Both compounds showed appreciable antioxidant and anticancer properties. Eugenol exhibited comparatively better radical scavenging and reducing potentials in comparison with cinnamaldehyde. Eugenol accounted for about 70% free radical scavenging activity while at the same concentration cinnamaldehyde displayed up to 45% activity. Similar trend was observed in the assessment of reducing power by both the compounds. Moderate cytotoxic activity was observed with cinnamaldehyde against T47D and NCI-H322 cell lines at tested concentration while eugenol showed comparatively lower activity. The study demonstrated antioxidant and cytotoxic potential in cinnamaldehyde and eugenol.

66. Hepatoprotective efficacy of *C. procera* root extract in anti-tubercular drug induced rats

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Most of the synthetic hepatoprotective drugs are well known for their adverse reactions including abnormal liver function tests, hepatitis, sideroblastic anemia etc. *Calotropis procera* (Asclepiadaceae) a xerophytic weed has been widely used in Indian traditional medicinal system. The root bark and leaves of *C. procera* are used by various tribes of central India as a curative agent for jaundice. Therefore present study was designed to validate the hepatoprotective efficacy of *C. procera* root extract. The rats were divided into four groups viz., Group I (normal rats); Group II (hepatotoxicity induced rats); Group III (Liv52 treated rats); and Group IV (extract treated rats). After the experimental period, all animals were sacrificed and the blood was collected for evaluation of serum hepatic markers (ALP, SGOT, SGPT, creatinine, bilirubin). Results showed that oral administration of anti-tubercular drug caused liver damage as indicated by a significant increase in activities of serum enzymes (ALP, SGOT and SGPT) and creatinine and bilirubin contents as compared with control rats. Co-administration of *C. procera* extract with drug restored the hepatic marker levels in serum towards normal. The study demonstrated the hepato-protective nature of *C. procera* root extract.

67. Serum biochemical alterations in *Rattus norvegicus* under stress of a synthetic pyrethroid, Decis

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LD₅₀ of Decis (2.8% E.C. Deltamethrin) for albino rats has been estimated as 950mg/kg body weight. The albino rats were given 630mg/kg body weight and 30mg/kg body weight for acute (1das) and sub-acute (7, 14 and 21 days) treatment respectively. Serum revealed significant decrease/increase in the levels of protein profile and cholesterol, while significant increase in alkaline phosphates (ALP). Peroxisomal proliferation in liver has been considered responsible for reduced serum cholesterol and hepatocytes destruction increase in alkaline phosphatase has been correlated with bile inhibition.

68. Consequence of environmental pollutant (HgCl₂) on serum marker enzymes of albino rat

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Environmental pollution increased day by day hence the load of toxicant become more and more in environment. Environmental pollution is due to deforestation, industries, mines, coal, burning of fuel in houses. Out of these the chemical pollutants are on top. These chemical pollutants are called toxicant and mostly released from industries. They enter in the faunal body by various ways such as air, water and inhalation and disturb the metabolic activity. Considering this fact present investigation has been taken. Twenty four adult albino rats have taken and divided into 4 groups. Group one for acute study, while three for sub-acute studies with 3 rats in each. Control was also taken with similar references. Mercuric chloride given orally administered (LD₅₀=9.26 mg/kg b.w.) by gavage tube with distilled water. Rats were autopsized at pre-determined time interval to assess serum marker enzymes. Phosphatases include alkaline phosphatase and acid phosphatase while, transaminases include alanine transaminase and aspartate aminotransferase. Results revealed that ALP and ACP were significantly increased after acute and sub-acute treatment due to destruction of cell membrane of lysosomes. However, AST and ALT were also increased significantly due to toxic effect of mercuric chloride on hepatic cells. Hence, from the above investigation it is clear that the mercuric chloride is an environmental pollutant and disturbs the serum marker enzyme which leads to improper metabolic activity.

69. Pyrethroid induced morphological and biochemical abnormalities in *Drosophila melanogaster*

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A great biodiversity is available on our planet. Many species of vertebrates and invertebrates are there. Among them insects are very important for us. Insects prove their worth for human beings by many ways like help in pollination, production of useful substances etc. However, there are a considerable number of insects which negatively affect humans directly or indirectly. They destroy our crops and other material. Organophosphate, organochlorine and carbamate are common pesticides for outside use to control this destruction. Insects also interfere with our daily life in houses but it is not wise and practical to use these pesticides inside house. Hence it is necessary to test a pyrethroid for indoor use. In the present study, a pyrethroid lambda-cyhalothrin is tested on *Drosophila melanogaster*, a dipteran. There is a remarkable change in morphology viz. shrinkage in larvae and blackening in pupae alongwith morphometrical changes viz. decrease in larval length, larval weight and adult weight of *Drosophila melanogaster*. All the data were analyzed statistically which proves significance of study. The abnormalities in morphology and morphometry are due to the effect of lambda-cyhalothrin on biochemistry and physiology of *Drosophila* mutant. The results are encouraging and can be applied to other dipterans like mosquito and allied insect species.

70. Analysis of Yamuna water near tannery outlet

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The present study is a effort to know the water quality of river Yamuna. The water of river Yamuna is collected and treated before supplying to the city. As the Yamuna river comes to Agra passing through several cities, some of them are industrial which dump their waste into the river. Besides this city waste or sewage is also dumped. As the river Yamuna passes through Ghats due to which various organic as well as inorganic waste are also added into Yamuna river which increase the pollution load. "During our study at Water Works, Agra, It was observed that the pH, Hardness, Chloride and Alkalinity is always higher then the IS Standards. In river Yamuna's water due to dumping problem many problem arises which increases the colour, pH as well as other physio-chemical parameters. Due to which the colour becomes higher then the normal standard as by IS standards. Due to such an increased pollution in Yamuna river water, the water treatment at Water Works, Agra become difficult and the chlorine dosing (Which is used for disinfection) and Alum dosing (For sedimentation) becomes higher and dosing quantity changes according to the seasonal variation in Yamuna river water.

71. Impact of particle size on toxicity of calcite particles

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Increases in nanotechnological applications for industrial, consumer and medical uses promise many benefits, yet at the same time they have generated serious concerns about potential health and environmental risks from exposure to engineered nanoscale materials. Such concerns stimulated research in the emerging field of nanotoxicology, suggesting that nanominerals because of their specific physico-chemical properties can induce significant toxic responses. Although most of the nanotoxicological studies were performed using unrealistic exposure conditions. Knowledge about potential human and environmental exposure combined with dose response toxicity information will be necessary to determine real or perceived risks of nanomaterials following inhalation, oral or dermal routes of exposure. Because the respiratory tract is the major portal of entry for airborne nanoparticles, this exposure route can be used as an example to discuss some key concepts of nanotoxicology, including the significance of dose, dose rate, dose-metric and biokinetics.

72. Pesticide residues in food commodities and water

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The low level of organochlorines, organophosphates and synthetic pyrethroids residues in fruits, vegetables and grains of the present study is an indicative change in uses pattern of pesticides, where shift has taken place from persistent organochlorines to the easily degradable groups like organophosphates and synthetic pyrethroids. All the water samples were safe in terms of pesticide residues. Since last decade, it has been observed that analysed pesticide residues were either BDL or <MRL in majority of samples. In this study vegetables, fruits and grains are an important food item and proper care should be taken for use very safe pesticide for avoiding potential risk to human. It is therefore, suggested that the food item collected from in and around Lucknow city, India are comparatively safe from pesticide residues. A periodical monitoring of pesticide residues in other food commodities are the recent need for the consumers as well as authorities of food quality control.

73. Toxicity of an organophosphate on biochemical constituents of *Channa punctatus*

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Incidents of fish mortality have been reported from different parts of world due to insecticidal treatment of the agricultural crops. Now days, due to advancement of technologies and requirement of huge amount of grains, the use of pesticides increased on large scale. Both types of pesticides are used by the farmers, natural as well as chemical. Famfos chemical also used in the agricultural field for control of pests. Oxidative stress and role of reactive oxygen species (ROS) in disease and toxicity have been studied on two major issues in biomedical science in recently times. *Channa punctatus* (Bloch.) is selected for present study due to easily availability and handling. To assess the effect of famfos the fishes were grouped into five sets- four treatment (100ppm) and one control set. The liver total protein activity shows decreasing trend on exposure to famfos at different time intervals (24 hrs, 48 hrs, 72 hrs and 96 hrs) at 100ppm. The decrement in total protein may be due to total protein treatment in attribute to abnormalities in fat deposit cell of liver and this disturbing the protein metabolism. The liver glycogen activity showed decreasing trend on exposure to famfos at different time intervals (24 hrs, 48 hrs, 72 hrs and 96 hrs) at 100ppm. This fall in glycogen content in the tissue indicates its rapid utilization in the respective tissue to counteract the effect of pesticide toxic stress. The liver total lipid content showed marked decreasing trend on exposure to famfos at different time intervals (24 hrs, 48 hrs, 72 hrs and 96 hrs) at 100ppm. This decreasing in liver total lipid may be due to abnormalities in fat deposit cell of liver and also changes in lipid content may be due to action uptake of lipid compound by the tissue for utilization of cellular level in increased lipolysis or mitochondrial injury which impaired the function of citric acid cycle and affect fatty acid oxidation mechanism.

74. Haematotoxicity assessment of pesticide nuvan in experimental albino rats

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Pesticides are used from ancient times in agriculture and in repelling insects from houses. There are many categories of insecticides such as pyrethroids, organochlorine, organophosphate, carbamate and natural compounds. Natural compounds are very costly and not used in general. Pyrethroids are used in house (In all mosquito repellents- coils, mats and liquids) and organophosphates mainly used in agriculture. All these categories affect humans by direct or indirect mechanisms. To assess this damage, nuvan (organophosphate) has been selected to observe their effects in albino rats and the primary effects have been observed on haematology.

The observations showed significant alterations in haematology. Nuvan is more effective in early treatments (7 and 15days) and almost equally effective in 30days. However, both insecticide showed a recovery effect in 45days.

The findings of the present study showed that the organophosphate nuvan is highly toxic to vertebrates and its replacement with some other effective but with low mammalian toxicity pesticide is necessary.

75. Acetylcholinesterase from human erythrocytes as a screen to evaluate activity of aqueous extracts of *Argemone mexicana* fruit and seeds *in vitro*

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Ethnopharmacological approach and bioassay-guided isolation have provided a lead in identifying potential AChE inhibitors from many plant sources, which are employed to repair /cure memory disorders (Alzheimer's disease, senile dementia, ataxia, myasthenia gravis, Parkinson's disease). AChE isolated from human erythrocytes treated with aqueous extracts from *Argemone mexicana* fruits strongly inhibited AChE activity. The results obtained led to evaluate impact of these extracts on AChE isolated from erythrocytes present in whole blood treated with different concentrations of extracts. Under this experimental condition, activity of AChE was recorded to be inhibited by the plant extracts; the extent of enzyme inhibition being concentration dependent. The fruit extract at highest concentration tested (7.80 µg), displayed about 90% of AChE activity inhibition. The aqueous seed extract caused inhibition of enzyme activity by 23.02 % at highest concentration (200µg/ml) tested. The results from above experiments indicated presence of strong neurotoxic substances in aqueous extracts from seeds and fruits of the plant, *A. mexicana*. The results suggested that these herbal ingredients may be exploited as potential sources for development of effective chemotherapeutics against different neurodegenerative disorders. AChE from healthy human erythrocytes can be exploited as a screen to evaluate neurotoxic potential of different plant products.

76. Novel triterpenoids from *Cassia siamea*

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Cassia siamea, a member of leguminosae family is found abundantly in Northern India, It is a large tree bearing yellow flowers. The stem bark of *C. siamea* is used as a mild pleasant and safe purgative. A decoction is given in diabetes and a paste can be used as dressing for ring worm and chilbalins. Investigation of this plant revealed the presence of anthraquinones, terpenoids and alkaloids. 2-oxo-1 β , 3 β , 19 α -trihydroxyurs-12-ene-28-oic acid- β -D-glucopyranoside and 1 β , 2 α , 3 β , 19 α tetrahydroxy urs-12-ene-28-oate-3-0- β -D-glucopyranoside are two new triterpenoids isolated from stem bark of *C. siamea*. Complete structural determination of both the compounds was achieved using chemical and spectral evidences.

77. Evaluation of effect of factors affecting *in vitro* multiplication in *Alhagi maurorum*

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Alhagi maurorum belongs to family 'fabaceae', is a halophytic medicinal plant species. Plant is favoured food of camels and is therefore called as Camelthorn. The plant is known for its antiulcerogenic, antiangiogenic, antioxidative and anti-inflammatory properties. The present study describes the effect of various factors such as nature of explants on bud break, plant growth regulators, concentration of nitrates, types of culture vessels, different gelling agents, and different concentration of salt (NaCl) affecting on MS+ BAP (2.0 mg l⁻¹) + additives from fresh nodal shoot segments used as explants while juvenile segments produced lesser shoots.

Differentiated shoots multiplied the best on 0.8% agar gelled MMS medium + BAP (0.5 mg l⁻¹) + IAA (0.1 mg l⁻¹) + additives. Leaf formation was observed on 51 mM NaCl in the multiplication medium. The *in vitro* regenerated shoots were rooted under both *in vitro* (on half strength MS salts with 1.0 mg l⁻¹ IBA + 100 mg activated charcoal) as well as *ex vitro* rooted plantlets were hardened under green house conditions.

78. Propagation of female Date Palm (*Phoenix dactylifera*) through somatic embryogenesis: an important horticultural plant of arid and semi arid regions

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Date-Palm (*Phoenix dactylifera* L.) is an important horticultural plant of arid/semi-arid regions. We have developed an *in vitro* regeneration method for selected mature female plants of Date-Palm suited for climatic conditions of Rajasthan. The axillary shoot buds (measuring 0.5-2.0 cm) were used as explants for culture initiation. After 5-6 months the cultured buds produced creamy white, slow growing callus on MMS medium augmented with 10.0 mg l⁻¹ of 2,4-D and additives. The

cultures were transferred to MMS medium containing 3.0 mg^l⁻¹ of 2,4-D, 0.5 mg^l⁻¹ each of iP and kinetin, 4.0% sucrose, 1.0% glucose and 2.0% maltose and additives for the proliferation of callus. The granular embryogenic cell cultures differentiated on hormone-free full strength of MMS salts containing 4.0% sucrose, 1.0% glucose and 2.0% maltose and additives. The *in vitro* raised plantlets were hardened in the green house and then transferred to soil in polybags.

79. Effect of variation in dietary incorporation of *Trogoderma granarium* on the egg laying capacity of *Paederus fuscipes*

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Paederus fuscipes is a poisonous insect, commonly found around the agriculture field. The study of oviposition of *P. fuscipes* with the various treatment of *Trogoderma granarium* under laboratory condition is observed. The *Paederus fuscipes* is given treatment of partially treated and fully dietary incorporated *T. granarium* with neem powder. The observations are, daily egg laying production in untreated adult of *P. fuscipes* start on the 4th day (4.66 eggs per female) after emergence as adult. The mean total no of eggs laid per female in 16th day were 51.97 i.e., 100% where as in partially treated *T. granarium* given to *P. fuscipes* is 33.97 i.e., 65% and fully neem dietary incorporated *T. granarium* to *P. fuscipes* is 15.64 i.e., 30%. This shows that the *Trogoderma granarium* has given neem leaf powder as dietary component reduces significantly egg laying capacity of *Paederus fuscipes*.

80. Effect of hypoxia and energy conservation strategies in non air-breathing Indian carpfish, *Cyprinus carpio*

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Hypoxia is a frequently occurring environmental phenomenon in many freshwater and coastal systems, and can be caused by either anthropogenic input, or naturally occurring biological and physical factors. Aquatic organisms which are frequently exposed to hypoxia show adaptations at behavioural, morphological and physiological levels. To assess the effect of hypoxia at physiological level, change in LDH and MDH enzyme activity in selected tissues of non-air-breathing carpfish *Cyprinus carpio* was undertaken. Fish were exposed to experimentally provoked hypoxia for different duration and were sacrificed to study the effect on LDH and MDH enzyme activity in heart, liver, brain and muscle. Significant changes were recorded. The observations indicate that different tissues respond differently to the stress of hypoxia and the enzyme activity respond in a tissue specific manner.

81. Synergistic effect of AM Fungi and PGPR on the growth and nutrient status of *Capsicum annuum* growing in semi-arid region

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Capsicum annuum is an important spice crop of Western Rajasthan. Although it is known to be widely cultivated throughout the warm, temperate, tropical and subtropical countries but the taste, appealing scent, pungency and flavor of this crop is peculiar in Rajasthan varieties. Its fruits are a rich source of Vitamin C, A & E, beta carotene and capsaicin, adding medicinal properties to diet of the region. The present study was directed to assess the effects of arbuscular mycorrhizal fungi (AMF) (a plant-growth promoting fungus through higher nutrient intake), *Azospirillum brasilense* (a plant-growth promoting bacterium), on the growth and nutrient acquisition of *C. annuum*. A dual interaction of AMF and *A. brasilense* showed improved plant growth response in *C. annuum* compared to uninoculated plants. Inoculation of AMF showed significant increase in growth and nutrients compared to control but when supplemented with *A. brasilense* even better was observed, suggesting that enhanced plant growth and nutrient uptake was dependent on the bacteria-AMF combination used. We propose that, in the case of *Capsicum* choice and testing of the combination of beneficial organisms is necessary to obtain a desired plant growth promotion.

82. Arbuscular mycorrhizal fungus, *Glomus* spp. associated with drought tolerant plants of the Indian Thar desert

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Arbuscular mycorrhizae are well known for its beneficial stimulation to the plants surviving under harsh environmental conditions. To understand better about their interaction with arid region plants various arbuscular mycorrhizal species are to be explored and studied in greater detail. The objective was to investigate the species diversity of the mycorrhizal genus *Glomus* associated with some important plants of the Indian Thar Desert. Identification and characterization were made on observed spore morphology. The present study concludes *G. aggregatum* to be the most frequent and abundant *Glomus* species in arid regions of Indian Thar Desert.

83. Oviposition deterrent power of some arid zone plants against stored grains insect pests, *Callosobruchus spp.*

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In present study leaves of some arid zone plants were used in the form of powders to detect their oviposition deterrent power against the insect pests of stored moong beans, *Callosobruchus spp.* All powders were applied @0.5, 1 and 2 gm. per 100 gm. seeds of moong beans. It was observed that all the treatment caused significant reduction in egg laying by test insects in comparison to the control and their effect were varied in different plant species as well as different doses of same plant species. Minimum numbers of eggs were laid in the case of *Azadirachta indica* at all three doses. *Eucalyptus globules*., *Fagonia critca*, *Balanites aegyptiaca*, *Ocimum sanctum*, *Commiphora weightii*, and *Barleria* were also found effective to deterrent the oviposition by test insect. Maximum numbers of eggs were laid in seeds treated with *Salvadora* powder @ 0.5gm/100gm seeds.

84. Hair characteristics and development of hair database of mammals from Rajasthan (India)

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Hair morphological characteristics like scale patterns, medulla structure and pigmentations have been studied in many mammalian species across the world. These features are helpful for species identification as well as interspecies comparisons. This is pertinent in cases where no other samples except hairs are available for detection. Analysis of hair characteristics can also help in identification of prey from scat samples of predators. Monitoring hair diversity in scat samples of carnivores can also throw light on alterations (if any) in predator habits.

Here we present comparative analysis of characteristics of cuticle scale patterns, medulla and pigmentation in dorsal guard hairs some mammalian species (including some chiropterans) from Rajasthan with emphasis on hairs of Hanuman langur during different stages of development. We propose building of database of hair characteristics using database servers like MySQL server. In the first stage it would be a standalone database available to interested scientists on request. However, on availability of websites willing to host such database, either a static or dynamic database could be made available to the scientific community.

85. Effect of varying concentration of herbal extract of *Nyctanthes arbor-tristis* leaf on synthesis of silver nanoparticles and its evaluation

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The synthesis of silver nanoparticles (AgNPs) using crude aqueous extract of medicinal plant like *N.arobor-tristis* leaves on reacting with the aqueous solution of silver nitrate has been explored with the aid of microwave. The plant is known for its used as antibacterial, anthelmintic and anti-inflammatory. Nanoparticles formed were characterized using UV-visible spectrophotometer, dynamic light scattering (DLS), atomic force (AFM) and transmission electron microscopic (TEM) analyses. Synthesis of silver nanoparticles is due to the presence of biomolecules in leaves. The antioxidant properties of AgNPs were evaluated using DPPH assay. The synthesized silver nanoparticles exhibited good antibacterial potential against both formed within 120 sec of reaction time and found to be mostly spherical in shape. Antibacterial activity of nanoparticle was confirmed by Gram positive and Gram negative bacterial strain as measured using well diffusion assay.

86. Identification of Phytoplasma infected host and their interaction within plant and insect in adjoining areas of Gorakhpur

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Phytoplasma are specialized prokaryotes originated from bacteria via genomic reduction and fusion which are obligate parasite present in some plant and insects. They cannot culture in –vitro in cell free media. Phytoplasma affected many plants and causes a variety of symptoms .The identification and classification of phytoplasma originally based on biological properties such as symptoms produced in infected plant , plant host range and relationship with insect vector. Phytoplasma have been associated with several hundred plant species belonging to many families associated with numerous homopteran insect belonging primarily to the family Cicadillidae (leaf hoppers). Geographically, occurrence of phytoplasma are world –wide having divers distribution not uniformly distributed. Surveys of different places of Gorakhpur were found a incidence of Phytoplasma disease. Typically little leaf, chlorosis, witches' broom, yellowing, phyllody and verisence symptoms were observed in *Ranunculs scleratus*, *Oldenlandia dichotoma*, *Croton trifolium*, *Datura stramonium*, and *Phyllanthus niruri*. These symptoms are identifying with help of Electron microscopy the shape of phytoplasma is pleomorphic nature after identification the symptomatic plants were further processed for phytoplasma detection and characterization. Universal primer pair of P1/P7 amplified the DNA fragment of phytoplasma 16S-23S rRNA from nucleic acid extracted from symptomatic plants. In nested PCR assay with R16F2n/R16R2 a specific DNA fragment was obtained .The PCR product of phytoplasma were either sequenced directly or cloned prior sequencing and generated phylogenetic tree using for relationship between different groups of phytoplasma.

87. Population dynamics of non-commercial fish (*Gudusia chapra*) in riverine habitat and possibility of their sustainable yield for commercialization

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Based on the length frequency data growth, mortality, and population parameters of *Gudusia chapra* from the scoop net (mesh size 0.5-2 cm) catches from middle stretch of Ganga at Allahabad were estimated. The length-weight relationship for pooled data was $\text{Log } W = -12.913 + 3.0822 \log L$. The asymptotic length (L_{∞}) and growth coefficient (K) were estimated to be 158 mm, and 0.448 year⁻¹ respectively. The total, fishing and natural mortality coefficients were estimated as 3.07, 1.85 and 1.22 respectively while the 'E' 0.603 year⁻¹. The recruitment was continuous with one peak per year. The LC₅₀ was obtained at 69 mm. The estimation of its biochemical value suggested that the meat could be fortified with other phyto-nutrients to enhance the nutrition value, thus making of functional food is possible. Therefore, this non-commercial fish could be utilized with eco-sustainability by fishing for product development to eradicate malnutrition and poverty.

88. A geo-bio-anthropogenic study of underground water of trans Yamuna and trans Ganga regions of Allahabad

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The Shankargarh area is situated trans to river Yamuna, Phulpur area is situated trans to river Ganga. As a case study the hundred percent sources of drinking water of 8 villages of Shankargarh region and 6 villages of Phulpur region were analysed for their physico-chemical and biological qualities/parameters. The presence of chemical contamination was almost geogenic in nature. The main cause of concern was the presence of microbial contamination in the water of hand pumps. Approximately 74% of water samples from Shankargarh region whereas 52% of water samples from Phulpur region were found to contain microbial contamination which was almost due to the anthropogenic activity in the region. However, the quality of water of Phulpur region was found to be better than Shankargarh region as far as their potability was concerned.

89. Water quality status of river Ganga

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On the basis of CPCB report since 2007 to 2011 regarding the water quality status of river Ganga starting from Gangotri to Ganga Sagar and reports from other research works indicate that in general the value of DO and BOD is well within the limit throughout the 2525 km long stretch of Ganga starting from Uttarakhand segment to West Bengal segment except at those places where heavy amount of treated and untreated sewage is released in the river Ganga. The river water in

Uttarakhand upto Rishikesh is pristine or almost pristine. On moving down from Haridwar the water gets polluted, the level of COD, EC and Faecal Coliform become very high because of mass bathing, release of untreated sewage and industrial effluents containing poisonous chemicals and due to other human activities. In Jajmau (Kanpur) the release of effluents from tanneries has not only poisoned the Ganga water but the colour at some sites has also changed. The stretch of Ganga from Kannauj to Varanasi is highly polluted and there after the pollution level decreases due to dilution. The river Ganga may again acquire its pristine nature with judicious policy and efficient planning for preserving its ecology and restraining the people to pollute the river Ganga.

90. Isolation, identification and characterization of cadmium resistant bacteria from soil of Electroplating Industry

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The study was undertaken to isolate and identify cadmium resistant bacteria in soil around electroplating industries of Delhi (India). Five isolates were selected on the basis of tolerating Cadmium and antibiotic resistance in the secondary screening. Out of five, one of the strains was authentically identified as *Sporosarcina luteola* (EP3) on the basis of morphological, biochemical, 16S rDNA gene sequencing and phylogeny analysis. The identified bacteria showed optimum growth at 37°C, 7.0 pH and at NaCl concentration of 1% (w/v). The minimal inhibitory concentration (MIC) of Cd was also determined in solid media which was 5mM. The identified heavy metal resistant bacteria could be useful for the bioremediation process of Cadmium contaminated soil and industrial effluent.

91. Bignoniaceae of Nimar eco-region of Madhya Pradesh

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The present investigation deals with the taxonomic enumeration of the various taxa belonging to the family Bignoniaceae that are met with in Nimar eco-region of Madhya Pradesh. Nimar ecoregion is situated in the West of M.P. and it is a small part of main Satpuda eco-region. It includes four districts namely Barwani, Khargone, Khandwa and Burhanpur districts.

On account of large geographical area, variable climate and habitat conditions, this region is rich in all aspects of biodiversity. But urbanization, industrialization and other destructive agents have threatened the biodiversity of this tract and now it has become a challenge to save the valuable taxa of this area.

The present survey was done during the year 2012--'13 and in this connection various places of Nimar eco-region were surveyed namely Bijagarh, Jamnyapani, Mohana, Sejla, Sirwel and Timarni. Khardwa, Pati, Burhanpur and Pandhana.

Bignoniaceae is one of the dicotyledonous family of angiosperms. Its distribution is mainly in the tropical areas but some taxa of this family occur in temperate regions. It is represented by 750 species belonging to 110 genera. In India, this family is represented by 25 species i.e about 25% of total taxa of the world. In our study in all 8 species belonging to 7 genera have been reported and all are cultivated. The various taxa with their local or common names are shown in parenthesis: *Bignonia venusta*, *B. unguis-cati*, *Dolichodendrone falcate* (Madsingh), *Jacaranda acutifolia* (Trumpet flower) *Millingtonia hortensis* (Akashneem), *Spathodea campanulata* (Fountain tree), *Stereospermum swavelens* (Padar) and *Tecoma stans* (Pilikaner). Thus about 30% of the Indian species are represented in Nimar eco-region of M.P. Out of these 8 taxa, *S.campanulata* and *D.falcata* are very rare in this tract and need protection. Further investigation in this direction is in progress.

92. Biochemical studies and traditional uses of some species of Ceasalpiniaceae

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In the present paper an attempt has been made to report the biochemical analysis and traditional uses of some species belonging to the angiospermic family Caesalpiniaceae of Dicotyledonous group. *Cassia* is an important genus of the family Caesalpiniaceae which is one of the sub-family of Leguminosae. This genus includes at least 340 species which are distributed throughout the tropics. A few species are also extra-tropical. Some of the valuable species of ethnomedicinal importance are *C.occidentalis* Linn. (the Negro coffee), *C.tora* Linn. (foetid plant or ringworm plant), *C.angustifolia* Vahl (Indian senna), *C.fistula* L (= *C.rhombifolia*) (Indian laburnum or Pudding pipe tree), *C.absus* (four leaved Cassia) ,*C.obtusifolia* Linn. (fragrant Cassia)and *C.auriculata* Linn. (Avlya). Whole plant, roots, stem, leaves, fruits and seeds of various species of this genus are used by the tribal people of Nimar eco-region of Madhya Pradesh. Plants are laxative, expectorant, anti-leprotic, stomachic, diuretic, anti-pyretic, appetizer, aphrodisiac, digestive, anti-dot, anti-cough, anti-inflammatory, analgesic, astringent, blood purifier and styptic. Some of the phytochemicals reported are glycosides like emodin, steroids, triterpenes and flavonoids. Seeds of *C.tora* are applied externally on skin diseases (leprosy, leucoderma), leaf juice is used in rheumatism, facial paralysis and also used as laxative. Senna is used in cough and abdominal troubles. Leaves of *C.auriculata* are used in leucorrhoea while while leaf paste of *C. obtusifolia* is used as plaster in case of bone fracture. Further research work in this direction is in progress.

93. Soil solarisation: A unique technique for management of soil borne plant pathogens

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Soil borne pests cause heavy losses to all agricultural crops, affecting both yield and quality, and create severe economic, environmental and social consequences. Frequent cropping of the same crop i.e. monoculture taken to the extreme is common in both highly developed and less developed agricultural system. This practice causes the rapid buildup of pest populations in the soil to levels that

force the farmer to either abandon the land or shift to less profitable crops when effective control measures are not available. Thus, an increased frequency of harmful soilborne organisms is one of the negative consequences (including social consequences) of agricultural practices that disturb the biological equilibrium in the plant ecosystem. Many methods of managing soilborne pathogens have been developed, with different levels of success, including chemical, physical biological, and cultural methods. Most management tools prevent the introduction or establishment of pathogens in the soil, suppressing or eradicating them or at least reducing the size of the existing. Soil disinfestation is one of the most effective means of controlling soilborne pests and improving soil and plant health. It is a drastic means, applied to the soil before planting, to reduce or eliminate a variety of harmful biotic agents in the soil. If the biological equilibrium in the soil is not harmed, it may be also delay pathogens population build-up. Soil solarisation, like other soil disinfestations measures, adapts these principles. Soil solarisation or polyethylene mulching is a technique used primarily for the disinfestations of soil. It was described over 3 decades ago by a team of Israeli scientists. This technique quickly became of intense interest because it was non chemical, eco-friendly and an effective approach for integrated pest management.

94. Gum polysaccharide structure from *Moringa oleifera* Lam. plant by methylation studies

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Moringa oleifera Lam. plant belongs to Moringaceae family and commonly known as *Sainjna*. It occurs in Northern to Southern India, Thailand, Pakistan, Sri Lanka, Africa, Nepal, Indonesia, Mexico, America, etc. Plant has many important medicinal values for the treatment of cardio vascular, gastrointestinal, haematological, etc. Gum used for dental carries, astringent and blood pressure. The water soluble gum polysaccharide has been extracted as L-arabinose and D-galactose in the molar ratio 1:4 with traces of L-fucose. The present investigation mainly deals with the methylation studies of gum polysaccharide alongwith proposed polysaccharide structure. The purified gum polysaccharide was completely methylated by Hakomari and Purdie's method. Methylated polysaccharide was hydrolysed with methanolic and hydrolysate after saponification were separated in ether soluble (A) and ether insoluble (B). The ether soluble methylated sugar fraction (A) were fractionated by paper chromatographic on Whatman No. 3 MM filter paper sheet to revealed the presence of methyl sugars were identified as: 2,3,4,6-tetra-O-methyl-D-galactose; 2,3,4-tri-O-methyl-D-galactose; 2,4-di-O-methyl-D-galactose and 2,3-di-O-methyl-L-arabinose were found in 1:1:2:1 molar ratio. The ether insoluble methylated uronic acid fraction (B) was characterized as: 2,3,4-tri-O-methyl-D-glucuronic acid (1 mole). On the basis of above methylation results a tentative gum polysaccharide structure of *Moringa oleifera* Lam. clearly indicates that the gum is highly branched in nature and contains (1→6)-β-type, (1→3)-β-type and (1→5)-α-type linkages in the gum polysaccharide structure.

95. Periodate oxidation studies of *Acacia auriculiformis* gum polysaccharide

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Acacia auriculiformis plant (Mimoseae) occurs in Tropical America and Northern India. Water soluble gum polysaccharide was yielded sugars as L-arabinose, D-galactose in 1:4 molar ratio with traces of L-fucose. Present investigation mainly deals with the periodate oxidation studies of gum polysaccharide for the confirmation of gum polysaccharide structure which was obtained by methylation studies. Periodate oxidation reaction is the most important in the structural determination of polysaccharide. Gum polysaccharide was oxidized with sodium metaperiodate by Fluery & Lange's method for more extensive use of periodic acid for oxidation of glycol. It liberated 1.24 moles of formic acid per equivalent of gum polysaccharide with simultaneous consumption of 6.05 moles of periodate. Presence of (1→6)-β; (1→3)-β and (1→5)-α-type linkages are also confirmed by periodate oxidation results. The glycol groups undergo cyclic ester formation with oxidant and reaction is considered to be dialdehyde type of oxidation.

96. Effect of applied nitrogen on *Acacia nilotica* and *Prosopis cineraria* under sodic soil environment

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A field experiment was conducted to investigate the effect of different levels of nitrogen on *Acacia nilotica* and *Prosopis cineraria* under sodic soil environment. The treatments comprised of control (N₀), 90 (N₁), 180(N₂), 270(N₃) and 360(N₄) mg/kg urea in randomized block design with three replications. The soil had pH-8, organic carbon 2.5 g/kg and total nitrogen 10 mg/kg. The result indicated that the total seedling dry weight increased with increasing nitrogen availability and it was increased continuously in *Prosopis cineraria* upto N₃ level and in *Acacia nilotica* it increased upto N₂ level but at the end of experiment highest dry mass was observed in *Acacia nilotica* (59 g at N₂ level). The growth parameters i.e. height growth, root: shoot ratio, leaf area produced highest value in *Acacia nilotica* at medium level and high levels of soil nitrogen in *Prosopis cineraria*. Highest organic carbon being in *Acacia nilotica* and low in *Prosopis cineraria*, whereas at the end of the experiment the pH of soil declined with increasing soil nitrogen under all the species and the maximum soil pH being under *Prosopis cineraria*. Thus high level of nitrogen application in *Prosopis cineraria* was found to be most effective followed by medium level to *Acacia nilotica*.

97. Anthelmintic activity of Green Synthesized Silver Nanoparticles using aqueous and methanolic extract of Kalijiri Seeds

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The present study reports microwave-assisted rapid green synthetic method for synthesis of silver nanoparticles using *Kalijiri* seed extract (both methanolic and aqueous) and evaluation of their anthelmintic activity and antibacterial activity. The green synthesized nanoparticles were characterized using UV-visible (UV-vis) spectrophotometer, scanning electron microscopy (SEM) and DLS (Dynamic light scattering). The nanoparticles were found to be spherical in shape and nanometer in range. It was found that anthelmintic activity of synthesized silver nanoparticles using methanolic extract was more than the synthesized silver nanoparticles using aqueous extract. Different concentration of aqueous, methanolic extracts and silver nanoparticles were tested against adult Indian earthworms (*Pheretima posthuma*) as test worms. The bioassay involved determination of the time of paralysis and time of death control. Albendazole (40mg/ml) was used as a standard reference drug. Normal saline was used as a control. The synthesized silver nanoparticles using methanolic extract exhibited more antibacterial potential than synthesized silver nanoparticles using agar well diffusion assay.

98. Phenology studies in *Populus deltoides* Bartr.

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All of the eleven males clones and females clones studied were planed from the forest department, Uttarakhand. The average maximum length and breadth of male catkin clone in PIP-220 and L-17/92 respectively. The average minimum length and breadth of male catkin clone in S₇C₄ and 82-42-5 respectively. The average maximum length and breadth of female catkin clone in PIP-204 and PIP-201 respectively. The average minimum length and breadth of female catkin clone in PIP-221. The pollen maturation and leaf initiation in 82-42-5 clone was earliest. The data collected from progeny revealed that the maximum length and breadth of capsule/ cross in 82-33-2 X L-17/92 and 82-33-2 X S₇C₁₁ respectively. The minimum length and breadth of capsule/ cross in S₇C₈ X PIP-209 and G-48 X G-3 respectively. The cross of PIP-208 with G-3 and PIP-208 with PIP-S₇C₄ has high number of capsules/ plant. The maximum seed/ capsule found in progeny PIP 208 with PIP-220 and minimum in progeny S₇C₈ with PIP-209, S₇C₈ with S₇C₁ & G-48 with L-124/86. The maximum length and breadth of pollen was recorded in G-3 and respectively while minimum in 82-42-5 and breadth of pollen in L-124/86 was recorded respectively.

99. Spirulina role in mitigation of haematological disorders in swiss albino mice exposed to aluminum and aluminum fluoride

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Toxic effects of aluminum (sub-acute: @78.4 mg / kg body weight for 7 days, sub-chronic: @7.8 mg / kg body weight for 90 days) and aluminum fluoride (sub-acute: @103 mg / kg body weight, sub-chronic: @21mg / kg body weight) are reported on the hematology of male Swiss albino mice along with alleviating effects of diet supplement Spirulina (@230 mg / kg body weight). The recovery of treated mice (sub-chronic groups) was also studied for another 90 days. Blood samples were analysed using a Sysmex KX 21 cell counter. Blood smears were prepared for differential leucocyte counts and to quantify morphological abnormality in erythrocytes. There were significant alterations in values of RBC (↓ 5-18%), Hb (↓15-17%), PCV (↓8-14%), WBC (↑54-124%) and platelets (↓26-36%), more particularly after sub-acute exposure. Morphology of RBC was also distorted. Aluminum fluoride was comparatively more toxic than aluminum. Spirulina supplement alleviated chemicals toxicity.

100. Production of gallic acid from *Penicillium crustosum* AN3 and its detection by various techniques

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Gallic acid (3,4,5- trihydrobenzoic acid) is an organic substance occurring in many plants and has wide range of applications. It serves as precursor for the commercial production of antimicrobial drug trimethoprim. Gallic acid has enormous applications in many fields, including dye-making, pharmaceutical, leather industry, food industry and chemical industries. Conventionally gallic acid is produced by acid hydrolysis of tannic acid but it has high cost and low purity disadvantages. Alternatively it has been found that microorganisms also has the capability to break down tannic acid into gallic acid by secreting the enzyme tannase. The present study deals with production of gallic acid in solid state fermentation by the use of pine needles as a solid substrate and action of *Penicillium crustosum* AN3 for the conversion of tannin into gallic acid. Gallic acid production was detected in the cultures through enzymatic assay and absorbance was observed on UV-VIS Spectrophotometer which was found to be 4.8umole/gm/min. Techniques like thin layer chromatography (TLC), Fourier Transformation Infra-red Resonance (FTIR) and High Performance Liquid Chromatography HPLC techniques were used for the confirmation of gallic acid in the cultures using gallic acid as a standard.

101. Bioaccumulation and translocation efficiency of heavy metals in *Pistia stratiotes*

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A field study was conducted to investigate the accumulation and translocation of heavy metals in *Pistia stratiotes* grown on Sulem sarai wetland near Mahila gram, Allahabad. *Pistia stratiotes* grown in the sampling sites, the maximum concentration of the heavy metals was found in the roots of *Pistia stratiotes* Mg(566.18±67.07), Fe (572.48±61.40), Cu (90.54±6.22) Cr (9.14±4.25) and Mn (98.49±6.24). The translocation factor of metals in *Pistia stratiotes* from soils was higher for Cu (0.919) Cr (0.537), Mn (0.272), Fe (0.231) and Mg (0.155). Significant positive correlation was recorded with metals concentration in plants and wetland water. The enrichment factor calculated for sampling sites was in the order Cr (1.129)>Fe (0.833)>Cu (0.559)>Mn (0.210)>Mg (0.129). Estimation of bio concentration factor is very much important. It indicates that the species is more favorable to tolerate higher concentrations of heavy metals and also helps a lot in decontamination of the land, water etc. *Pistia stratiotes* have great potential to accumulate heavy metals and can be effectively used in phytoremediation. The present study also reveals that *Pistia stratiotes* can be effectively used to cleanup aquatic ecosystems.

102. Rapid *In vitro* plant regeneration of *Asteracantha longifolia* (L.), an important medicinal plant

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Asteracantha longifolia L. Nees (Family: Acanthaceae) is commonly known as 'Koilkreka' in Odia, 'Talmakhana' in Unani and 'Kokilasha' in Ayurveda system of medicine. The plant contains alkaloids, flavonoids, terpenoids, essential oil and phytosterols and has been used in traditional systems of medicine since centuries for the treatment of diseases like low libido, premature ejaculation, ascites, jaundice and diseases of urogenital tract etc. An efficient and reproducible procedure for clonal multiplication through *in vitro* culture of *Asteracantha longifolia* is standardized. The leaf disk explants were used for callus induction and regeneration of the complete plantlets. Organogenic calli were developed from leaf disk tissue on MS medium supplemented with 2.0 mg/l 6-benzylaminopurine (BAP) along with 0.5 mg/l 1-naphthaleneacetic acid (NAA). Shoot bud regeneration was achieved on MS medium supplemented with 3.0 mg/l BAP along with 0.2 mg/l NAA within 3 to 4 weeks of subculture. The number of shoots per callus varied from 1.12 to 10.8. The MS medium containing 2.5 mg/l BAP along with 0.5 mg/l NAA exhibited higher number of shoots per callus and also regeneration percentage. The culture incubated to 16 hour photoperiod for 2 to 3 weeks showed higher number of shoot bud regeneration. The proliferated shoots were further sub-cultured on similar medium for higher rate of shoot bud regeneration. The elongated shoots were rooted on ½ strength MS medium fortified with 0.1- 0.5 mg/l NAA or indole-3-acetic acid (IAA) or indole-3-butyric acid (IBA). The higher percentage of rooting was obtained on 0.1-0.25 mg/l NAA as compared to IAA and IBA. The rooted plantlets were transferred to soil mixture (soil: sand:

vermicompost, 1:1:1) and kept in greenhouse with 85% humidity. After one month of hardening, the regenerated plantlets were successfully transplanted in the field and 75% survival rate was recorded. This protocol can be used for mass propagation and pharmaceutical extraction of secondary metabolites.

103. Identification and molecular characterization of the virus causing mosaic and enation disease on *Withania somnifera* L.

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A very few viral disease are reported on *Withania somnifera*. It was found as a host of Tobacco Leaf Curl Virus. In Jordon, a natural reservoir of eggplant mottled dwarf virus in the absence of brinjal. The winter cherry harbours the Cucumber Mosaic Cucumovirus. Recently Ashwagandha has been found to be infected by viral infection and using molecular techniques association of Begmovirus has been confirmed. Begmovirus belongs to the family geminiviridae is an emerging threat to many economically important-crop plants. Like other pathogens that affect value of plant. Viruses are of significant important due to absence of therapeutic control means against them in plants.

104. Micropropagation of *Tinospora cordifolia*

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Tissue cultures of *T. cordifolia* were established from nodal shoot explants harvested from mature plants. The nodal shoots treated with antioxidants produced multiple shoots on MS medium supplemented with 2.0 mg⁻¹ BAP of the explants 80 – 85% responded in the culture. BAP was found to better cytokinin than kinetin for bud breaking and multiple shoot production. Shoots were further multiplied by culture or repeated transfer of original explants. Six to seven shoots generated in each vessel on MS + 0.5 mg⁻¹ BAP. On a medium with combination of 10 – 12 shoots were produced. On sustained culturing the shoots generated in cultured exhibited tip burning and defoliation. Therefore the culture medium was amended. Half-strength MS salts and 100 mg⁻¹ of Ammonium sulphate with 0.5 mg⁻¹ BAP promoted shoot amplification without deterioration and decline in growth. Defoliation, drying and dying of cultures was checked. In wood plants for sustained growth and development, supply of balanced nutrients is important. It has been observed that after establishment of cultures, for further growth and multiplication of shoots salts of MS medium cause difficulty. Reduction of levels of NH₄ NO₃ and/or KNO₃ and addition of Ammonium sulphate remove the constraints culture multiplication. Once the cultural conditions were defined the shoot multiplication was consistent for *T. cordifolia*. More than 80% of the shoot rooted on one fourth MS salts + 2.0 mg⁻¹ IBA and activated charcoal. About 85% of the shoots produced roots *ex vitro* if pulse-treated with 200 mg⁻¹ IBA. Micropropagated plants of *T. cordifolia* were hardened and acclimatized. These survived on transfer to soil. The micropropagation method defined for *T. cordifolia* can be used for large-scale plant production and also for conservation of germplasm. Tissue culture methods described in this

thesis are important contributions. There is need for applying liquid culture methods over conventional micropropagation. It has been possible to establish cultures and regenerate multiple shoots. Sustained growth and amplification of shoots of all the species was achieved. The micropropagated cloned shoots were rooted *in vitro* or *ex vitro*. The rooted plantlets were hardened and transferred to soil.

105. Gender based markers in Betel Vine - a dioecious plant

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Betel vine (*Piper betle* L., family Piperaceae) is an important cash crop of India and is widely cultivated in many parts for its leaves. It's a dioecious crop having medicinal and ceremonial value and is also considered as a holy plant. Sex determination in early stages is not readily possible in this crop. Early identification of sex is of immense importance to breeders in advanced generation breeding programmes. Many studies have been conducted to report gender based difference with respect to many traits. Effective markers available have been listed which can differentiate between male and female plants in Betel vine. The effective marker will be useful in molecular breeding and MAS.

106. Biological rhythms in Hanuman Langur, *Semnopithecus entellus*

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All living organism exhibit rhythmic activities in a wide variety of behavioural parameters. These biological rhythms are endogenously generated by a circadian clock, and they are entrained by cyclic variations of environment factors called synchronizers. This ecobehavioural study describes how langur has been used to elaborate the structure and function of the circadian timing system. The variations of the timing and duration of biological activity in langur occur for many essential biological processes. These occur in langur (eating, sleeping, mating, dozing, grooming etc.) Circadian timing in daily ranging pattern in langurs troop in Jodhpur (Rajasthan) were observed in urban habitats in Jodhpur (western Rajasthan), where habitat structure is most important while food distribution in only two daily feeding peaks and the location of roosting / sleeping sites hardly influential at all. The movement and its direction decided by old females of the troop. The bisexual troops are more active in the morning (7 to 10.30 Am hrs.) and evening (17 to 19.00 pm) and less so at mid and at the afternoon. Their daily ranging schedule may differ from season to season and even day to day. Roosting site of bisexual troops is permanent. In night there is no move and no other activity except some shift in the position. The control of rhythm is related to intrinsic (endogenous) factors (formally referred to as 'biological clocks'), as well as extrinsic (exogenous) factors.

107. Hanuman Langur (*Semnopithecus entellus*) became aggressive due to habitat encroachment and regular provisioning by local people around Jodhpur India

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Current study focus on different patterns of agonistic behaviour and aggressiveness in langur population depending on the intensity of provisioning. Human population growth and activities like deforestation, agriculture and urbanization lead to an ever-increasing encroachment on langur wildlife habitats. Although many groups live on the outskirts and within city areas of Jodhpur. Simultaneously with the development of human urban settlements, langur species has live in/or around human habitation and also become urbanized and more aggressive. Studies on the nature of changing the natural response with the intensity of provisioning and or human interaction are essential for a basic understanding of the behavioral strategies that individual displays. Provisioning by local people to free-living primate groups usually leads to a significant increase in competition among individuals for the newly available resources. The behaviours that have been considered in the present analysis include foraging, scavenging, allogrooming, affiliation, total aggression, non-contact aggression, contact aggression, aggressive approach, retreat and feeding supplant. If provisioning continues, interactions between Hanuman langur and peoples may become more frequent, and the probability of aggression may become higher. This already happens in city troops where monkeys are in close contact with humans where they constantly harass or bite peoples, occasionally with serious consequences.

108. Sex differential maternal care in Hanuman langur, *Semnopithecus entellus*

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This study focuses the relationship in sex-biased maternal investment in Hanuman langur *Semnopithecus entellus*. High-ranking mothers in langur showed a significantly male-biased maternity and spent more time in contact with and carried male infants for longer than female infants. But low-ranking mothers show no bias in sex and nor in the time spent in contact and carrying with male and female infants. A growing body of evidence shows that in langur mothers do invest more heavily in sons. This study also suggests that parent-offspring conflict is expected to vary according to offspring sex when fitness returns per unit of investment are different for male and female offspring. The vast majority of maternal behaviour is simply cradling newborn infants, providing the support they need to remain in physical contact with mothers. Male viability and growth during the period of maternal investment is more sensitive to variations in food supply than those of females. Sex-biased maternal investment in Hanuman langur may not have adaptive value of its own, but rather may have evolved as part of a total behavioural complex.

109. Sex differential life span of Hanuman Langur (*Semnopithecus entellus entellus*)

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The general biodemographic principle to emerge from recent studies on male–female differences in life span is not that the female life span advantage is a universal “law” of nature. Rather the deeper principle is that the mortality response and, in turn, the life spans of the two sexes will always be different in similar environments. This is because the physiology, morphology, and behavior of males and females are different. Females consistently survived better than males, they are also expected to have a longer life span. Calculations based on the adult survival rates indicate that once a female has reached adulthood, she has a 50% chance to live to age 25; the equivalent age for males is 21 years. Present study focus on data from all classes was combined to calculate sex-specific adult mortality. It imply to human being in which also women live longer than men.

110. Ecobehaviour study of Golden Jackal (*Canis aureus*) in South Western Rajasthan (India)

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The study cover two districts viz Jodhpur and Pali of South-Western Rajasthan which is suitable site for study the species in details of ecology and behaviour. The golden Jackal is one of the common carnivores in India. No accurate number of the Jackal population in this region is available. However, they are estimated 8-10 animals per km within this isolated habitat. Golden jackals are omnivorous and opportunistic foragers, and their diet varies according to season and habitat. Jackal prey on sheep, goats and calves. It also eats vegetables and fruits. There has been an intense human pressure on the jackal in recent years. The wildlife in general and the carnivores in particular have suffered greatly with the introduction of motor vehicles and firearms in the last century as well as from habitat destruction. Some jackals in the primary study area were followed for study. For each individual the location was recorded for every hour of the day according to a randomized (by time and individual) schedule with no more than one daytime and one nighttime location recorded for each individual. Golden jackal is regarded rare and kept under schedule III of the Wildlife (Protection) Act-1972. The jackals are not persistent hunters, they like easy human-produced food on garbage and human waste.

111. Environmental management by renewable resource-based degradable plastics

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New environmental regulations, societal concerns and growing environmental awareness throughout the world have triggered the search for new products and processes that are compatible with the environment. Soybean proteins, by-products of soybean-oil industry, are recently considered as petroleum-polymer alternatives in the manufacture of biodegradable molded products and films because; material life-cycle-analysis (LCA) has become imperative in choosing the right polymer/plastic for any given application. The present research program investigated the spectral, thermal, morphological properties and biodegradability of the semicarbazide-modified soyprotein isolate (SPI).

Water absorption increases with increase in percentage of semicarbazide concentration. FTIR studies ascertained that there is no bonding reaction between SPI and semicarbazide and it act as modifier. Thermogravimetric analysis of the modified material was followed using a computer analysis method, LOTUS package, for assigning the degradation mechanism. Mechanism of the degradation of the biopolymer is explained on the basis of kinetic parameters. The scanning electron microscopy indicates the nature of surface morphology of the plastic. The crystallinity, calculated by computerized package method, exhibited that mostly it represents an amorphous stage. The biodegradability of the modified-SPI indicates that they degrade within reasonable time period. It is expected that this semicarbazide-modified SPI resin could be commercially used for making molded products.

112. Novel tools in diagnosis, treatment and prevention of tuberculosis: A hope for future

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Tuberculosis (TB) in humans has been described since ancient times and its causative agent, *Mycobacterium tuberculosis* (MTB) is widely disseminated. The WHO estimates that approximately one-third of the global community is infected with *M. tuberculosis*. In 2006, an estimated 9.2 million incident cases and approximately 1.7 million deaths due to TB occurred worldwide making it the worlds leading causes of mortality. Despite mass *Mycobacterium bovis* BCG vaccination and the development of antitubercular drugs, tuberculosis still remains a major global public health problem.

Nanotechnology offers new ways to address residual scientific concerns for tuberculosis. Nanoparticle-based systems have significant prospective for diagnosis, treatment and prevention of tuberculosis. Nanoparticle-based tuberculosis diagnostic kits are under trial and fascinating in sense

that it is not required to have skilled-hand and also of low cost. Another significant advancement of this technology is that nano particles as drug carriers possess high stability and carrier capacity. The possibility of drug administration by oral and inhalation route make it more advantageous. Properties of nanoparticles, like the controlled drug release from the matrix, enable improvement of drug bioavailability and reduction of the dosing frequency, and may resolve the problem of non-adherence to prescribed therapy. The development of aerosol-vaccine is undergoing extensive progress; which could provide a great potential in prevention of tuberculosis infection.

113. Screening the protective role of lycopene on Sodium Fluoride exposed Swiss albino mice

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This study was conducted to evaluate the potential efficacy of lycopene on sodium fluoride (NaF) exposed Swiss albino mice. Exposure of sub-acute dose of NaF through gavage elicited organ specific toxicological response in Swiss albino mice. No significant changes were found in body and liver weights of standard feed groups while levels of SGOT and SGPT decreased. Glycogen content of liver decreased significantly in fluoride treated mice. Fluoride exposed mice of Standard feed groups showed severe alteration in liver architecture such as vacuolar degeneration, necrotic nuclei and dilation of portal vein and sinusoids. The number of Kupffer cells increased resulting inflammation showing the signs of damage in liver histo-structure. Lycopene supplementation to fluoride treated mice resulted recovery in changes which were either absent or less pronounced in this group when compared with standard feed groups and also levels of SGOT and SGPT found decreased in lycopene treated mice in comparison to standard feed group. However, our finding pointed out the protective role of lycopene in fluoride exposed Swiss albino mice.

114. Assessment of Bacteriological quality of raw milk of camel

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Quality of milk is assessed not only by its protein fraction, fatty acid chains, and biomolecules but more importantly by its microbial flora. Microorganisms occurring in milk may be indigenous owing to the health of the animal and the specific environmental conditions conducive for the concerned pathogens. Camel milk, a good nutritional source for nomads is consumed mostly in its raw state. This study was planned to detect the prevalence of *Escherichia coli*, *Salmonella* and *Staphylococcus* in raw milk samples. Selective enrichment method was followed by physico-chemical confirmation. 88.5% of milk samples collected in winter season can be regarded as safe for consumption whereas, 60% of the samples collected in the monsoon season were contaminated. *E. coli* emerged as the most prevalent bacteria with 21.56% overall rate of incidence followed by *Salmonella* with 17.65% and *Staphylococcus* with 13.73% occurrence of which 9% were coagulase

positive. To study their control, antibiotic sensitivity profile was observed and an alternative strategy was investigated employing probiotic control of the isolates. The results suggest that healthy handling protocols must be followed for milking and consumption of raw milk should be avoided by the immuno-compromised individuals.

115. Characterization of planktonic, agar-surface associated and biofilm forms of *Cronobacter sakazakii*

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The present study was conducted in the semi-arid region of Agra to characterize the planktonic, agar-surface associated and biofilm forms of *C. sakazakii* isolated from milk and milk products. A total of 12 isolates of *C. sakazakii* were obtained and confirmed from 80 samples using biochemical tests. Biochemically confirmed isolates were confirmed as *C. sakazakii* using a species specific PCR by amplification of 469 bp fragment of *ompA* gene unique to *C. sakazakii*. The proteomes of planktonic, agar-surface associated and biofilm forms were compared using 2-D gel electrophoresis. Nine proteins, which exhibited higher levels of expression in biofilm-grown cells, were identified from the 2-D gels using MALDI-TOF/TOF mass spectrometry. Proteins that were found to be more highly expressed in biofilm-grown cells were involved in cell envelope, energy generation, amino acid biosynthesis and membrane function. Isolates were further characterized using FTIR and Raman spectroscopy. The study using these techniques demonstrated that *C. sakazakii* biofilm grown cells are chemically different from planktonic cells. Gaining knowledge about the biofilm proteome of *C. sakazakii* will help to design strategies that cause its degradation, and will thus help to prevent the contamination of food by biofilm formation on food contact surfaces.

116. Effects of fish (*Gambusia affinis*) stocking on plankton community

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The effects of stocking of *Gambusia affinis* (mosquito fish) @ 5, 10 and 20 fish/microcosm were studied on plankton community after their 30 and 45 days of introduction. Microcosms without fish served as control. The microcosms were raised in 30L plastic bucket using sediment and water of an eutrophic Mansagar Lake. Compared with control, fish introduction suppressed populations (7- 98 % ↓) of large sized arthropods i.e., *Alona*, *Heterocypris*, *Nauplius* and *Ostrocod* whereas an opposite trends (↑ 2-653 times) were observed for rotifers, being pronounced for protozoans especially *Euglena* (↑ 4761–5868 times). In addition, there was build of phytoplankton populations (Chlorophyta = 3-10 times; Bacilairophyta = 17-44 times, Cryptophyta = 6% - 68 times) but that of *Microcystis* (Cyanobacteria) decreased (28-91% ↓). Fish introduction therefore, favored build in the phytoplankton because reduction in grazing pressure of large crustaceans.

117. Hypoglycemic and antioxidant effect of *Spirulina maxima* extracts in fructose induced diabetes mellitus

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The micro alga *Spirulina maxima* being rich in proteins and other essential nutrients is widely used as a food supplement. The present study explored the antidiabetic, anti-lipidemic and antioxidant functions of *Spirulina maxima* in a rat model. Excessive feeding of fructose to Wistar rats for 30 days generated hyperglycemia associated with hyperlipidemia and oxidative stress as evident from significant elevations in plasma blood glucose, triglyceride and thiobarbituric acid reactive substances and significant reduction in activities of blood catalase, superoxide dismutase and reduced glutathione. Oral administration of 250mg/kg/body weight, aqueous and ethanolic extracts of *S. maxima* along with the allopathic drug (metformin, 250mg/kg/body weight) for 30 days restored not only of blood glucose and triglyceride levels but also markers of oxidative stress. These biochemical observations were supplemented by histopathological examinations of pancreatic section. The antidiabetic, anti-lipidemic and antioxidant effect of ethanolic *S. maxima* extract was more pronounced than aqueous extract. Results of the present study indicated that *S. maxima* showed antidiabetic and antilipidemic effects in addition to its antioxidant effect in type 2 diabetic rats.

118. *In silico* analysis of tumor suppressor genes as potential sites of microsatellite instability

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Microsatellites or simple sequence repeats represent tandem iterations of 1-6 nucleotides. Many structural and functional roles have been assigned to these so-called simple sequences in recent years. Many studies on gastric and colorectal cancers have suggested that microsatellite instability (MSI) in various tumor suppressor and mismatch repair genes can be exploited as potential markers for prognosis and diagnosis of cancer. We studied microsatellite distribution in all the reported tumor suppressor genes in humans and their corresponding cDNA sequences to detect association between MSI occurrences with positive selection during the evolution of homologous sequences in related organisms. Microsatellite containing cDNA sequences were extracted for 716 tumor suppressor genes and annotated to assign associated biological processes. The homologous sequences of protein coding genes involved in multiple biological pathways were subjected to Omega test and Z-test to assess the selection pressure operating during evolution. We identified eight genes having higher non-synonymous substitution to synonymous substitution ratio, which indicates positive selection in their protein coding sequences. The changes in the number of microsatellite repeats at the same locus in all homologs observed through multiple sequence alignment, were accompanied by positive selection. We conclude that these genes could be the potential targets of microsatellite instability during carcinogenesis.

119. Protective role of triadimefon on *Citrullus colocynthis* (Linn.) Schrad seedlings under salinity

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Citrullus colocynthis (Linn.) Schrad locally known as “Tumba” is an unexploited perennial creeper growing in Thar Desert of Rajasthan, and has gained importance in recent past because of its medicinal and multifarious uses. The interactive effect of triadimefon (0.25 mM TDM) and sodium Chloride (50 and 100 mM NaCl) was investigated on *in vitro* grown seedlings of *C.colocynthis*. After 7 days of treatment, NaCl decreased the percentage of seed germination, vigor index, pigment content and chlorophyll stability index (CSI) while increased the activities of antioxidative enzymes such as superoxide dismutase (SOD), peroxidase (POX) and catalase (CAT), and the malondialdehyde (MDA) content. Treatment of TDM reduced the adverse effect of salinity by increasing seed germination, other growth parameters, activities of SOD, POX and CAT. The experiments also showed that TDM treated seedlings had lower lipid peroxidation in term of MDA content than that of both salt stressed and non stressed seedlings. In conclusion, pretreatments of seeds with TDM may be useful for minimizing the toxic effect of NaCl during early seedling growth.

120. Community analysis of helminth fauna in *Rattus rattus rufescens*, Jodhpur

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Helminthological survey of 50 house rats in Jodhpur during the year 2011 revealed infection with 7 helminthes species: 3 cestodes, *Vampirolepis fraternal*, *Hymenolepisdi minuta*, and *Taenia taeniaeformis* (larva stage); 3 nematodes, *Aspiculuris pakistanica*, *Rictulariaratti* and *Syphacia sp.* and one acanthocephalan, *Vampirolepis fraternal*, *Hymenolepisdi minuta* and *A.pakistanica* most common, *R. rattiless* frequent, and *T.taeniaeformis*, *Syphacia sp.* of occasional occurrence. Multiple infections were more frequent among male than female hosts.

121. Pharmacological studies in some plants of Allahabad district

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The medicinal uses of Plants are well known to man since ages. Indians were also familiar with it, since Vedic Times (see Jeevak 6th Cen.BC, Shushruta 4th CenBC, Charak 1st Cen AD). In the present study nearly 14 plants have been subjected to their pharmacological studies. These include *Abutilon indicum* (L.) Sweet, *Abrus precatorious* L., *Aloe vera*(L.)Burm.F., *Ammania buccifera* L., *Argemone mexicana* L., *Asteracantha longifolia* Nees., *Barleria prionitis* L., *Cissus quadrangularis*L., *Cleome viscosa*L. *Pedaliium murex*L., *Phyla nodiflora* (L.) Greene, *Sarcostemma secamone* (L.) Bennet.,

Terminalia arjuna (Roxb) Wight & Arn., *Tribulus terrestris* L. and others. These plants were collected from diverse localities of Allahabad district e.g. Jhansi, Phaphamau, Tharwai and Phoolpur. The Plants were growing in diverse ecological conditions e.g. alluvial, clayish, loamy and sandy soils. Their different parts like stem, leaf and reproductive organs have been studied by using GCMS, LCMS, WDXRF & FTIR and from them different new chemical have been extracted.

122. Micropropagation of *Anogeissus sericea* var. *Nummularia*

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A reliable and reproducible protocol for in vitro regeneration has been developed for *Anogeissus sericea* var. *nummularia*. Nodal shoot segments harvested from mature looped plants were used as explants. About 55% of explants exhibited bud break after 18-20 days of inoculation. Two to three shoots (1-2 cm long) from each node were differentiated on MMS medium containing BAP (3.0 mg l⁻¹), NAA (0.1 mg l⁻¹) and additives. The cultures were multiplied by repeated transfer as well as subculture of shoot clumps. Ammonium sulphate (200mg/l) and coconut water (10% v/v) were added in culture media to overcome the problems of shoot tip burning and leaf abscission. The regenerated shoots were subcultured for multiplication on MMS medium containing BAP (0.5 mg l⁻¹), TDZ (0.005 mg l⁻¹), IAA (0.1 mg l⁻¹) and additives. About 55% of the shoots were rooted ex vitro after treatment of IBA (250 mg l⁻¹) and NAA (100mg l⁻¹) for 5 minutes. The *ex vitro* rooted plantlets were hardened under green house conditions and transferred to soil in polybags. RAPD markers were used to validate the genetic homogeneity of tissue cultured plantlets. The monomorphic banding pattern confirms the genetic homogeneity of the in vitro raised plants and demonstrates the reliability of our in vitro propagation system for *Anogeissus sericea* var. *nummularia*.

123. Antibacterial potential of some selected plants of Thar Desert against MRSA

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In developing countries, a great bulk of population utilizes medicinal plants for the treatment of various diseases. The emergence of constant antimicrobial resistant bacteria is the major cause of numerous clinical problems worldwide. Medicinal plants contain physiologically active principles which over the years have been exploited in traditional medicine for treatment of various ailments as they possess antimicrobial properties. Plants and plant derived agents are being used from ancient times and has proved to be a great source of potential chemotherapeutic agent. The purpose of the present study was to investigate the antibacterial potential of some desert plants such as *Achyranthes aspera*, *Asparagus racemosus*, *Barleria prionitis*, *Cleome viscosa* and *Maytenus emarginatus*, against Multi Drug Resistant *Staphylococcus aureus* (MRSA). Disc diffusion method was used to determine the antimicrobial activity of different plant parts (root, stem, leaves). All the plants exhibited

significant antibacterial activity and highest activity was observed in petroleum ether extract of roots of *Asparagus racemosus* followed by alcoholic extract of its leaves. Phytochemical screening was also done. The study emphasizes that these plants can be included in the list of herbal medicines in reference to their high antimicrobial potential and lesser side effects and can be recommended as an alternative medicine.

124. Probiotics and desert challenges

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Hot and dry climate combined with lack of life sustaining water are miserable for life. The survival of life in desert is like a miracle. As the temperature increases bacteria become more virulent due to their enhanced transmission and reduced resistance. Indiscriminate use of antibiotics is harmful for humans, animal and environment. So there is a urgent need of some alternative therapeutic agent. Probiotics may be the answer, these are live microorganisms, when administered in adequate amount confers health benefits to the host. The most commonly used organisms belong to genera *Lactobacilli*, *Bifidobacterium*, *Saccharomyces*, *Bacillus*, *Streptococcus*, *Clostridium*, *Bacteroids*, *Enterococcus*, *Propionibacterium*, and *Faecalibacterium* etc. The main health benefits of Probiotics are – regulation of intestinal tract microbiota by reducing the number of pathogenic bacteria, maintenance of the epithelial cell integrity and barrier function as well as induction of immunoregulatory mechanisms that control adaptive immune functions. In brief probiotic action involves pathogen exclusion, immunomodulation and production of bacteriocins. Bacteriocins are the proteins which are heat resistance and have antimicrobial activity these are produced by probiotic strains. Also, some desert foxes have been found to produce the bacteriocins. Bacteriocins from probiotics have been significantly used as therapeutic agents. So, the probiotics not only effect the animals beneficially but also inhibits the pathogens putting its strong candidature as future medicine.

125. Thar desert medicinal herb: *Arabic acacia* unique proteins unveils drug targets in cardiovascular (Atherosclerosis) disease

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Chymase is a chymotrypsin-like enzyme expressed in the secretory granule of mast cells, catalyzes the production of angiotensin I to angiotensin II in vascular tissues. In the entanglement risk factors illustrated by chymase and their link with cardiovascular diseases has been ascribed, and there is an interest to develop a novel herbal chymase inhibitor as a new therapeutic regimen for the atherosclerosis disease. Indian Thar Desert *Arabic acacia* is one of the indigenous trees which have

many medicinal properties and unique proteins. The present Insilco study was conducted to assess and trace the effects of Indian Gum Arabic phytochemical inhibitors act as drug targets for atherosclerosis chymase enzyme. This can be achieved through a comprehensive approach such as bioinformatics and computational approaches allows in investigation of protein structure features, simulation of ligand binding and properties of binding site, and finally the virtual screening and simulation of the protein-ligand docking and validation by clinical studies on mice to verify how individual mutation on the protein, as variant related to pathologies. The results of this study will suggest that the inclusion of *Arabic acacia* pods powder in the diet of people with atherosclerosis disease will reduce risk factors associated with atherosclerosis and other cardiovascular diseases.

126. Threats to survival of wild ungulate population in the Thar landscape of Western Rajasthan, India

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Thar Landscape is located in west of Aravalli ranges, lies between 22°30'N to 32°05'N and 68°05' E to 75°45'E in Rajasthan state of India. It is part of the "The Great Indian Thar Desert", which is seventh largest desert of the world. This region, with all climatic vagaries, is endowed with diversities of wild fauna, including free ranging wild ungulates, like Indian gazelle (*Gazella bennetti*), Blackbuck (*Antelope cervicapra*) and Nilgai or Bluebull (*Boselaphus tragocamelus*). Present study comprised of about 2100 km road survey in the region. We surveyed 05 closed areas (19 transects) in Jodhpur and Nagaur districts of Rajasthan. It was found that feral dogs are major factor of the mortality in the blackbuck (about 45%) and the chinkara (35%) population in the study areas. The feral dogs caused as high as 62% mortality in antilopes' fawn population. Another hazard to ungulate population is found to be over speeding of vehicles on the roads, which passes through antelope inhabited areas, caused 24% mortality in the chinkara and about 15% in the blackbuck population. There are other numerous factors, which are responsible for mortality and health hazard to wild ungulate population in arid region of western Rajasthan.

127. Comparable specialized pallial regions in vocal learner birds and humans

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Birds are able to carry out higher order cognitive functions without a laminated cerebral cortex, However, birds are able to do so as major part of avian telencephalon contributes to pallium and is comparable to mammalian cortex, not only anatomically but also in possession of similar cell types as mammalian cortex do, Only vocal learners, songbirds, parrots, hummingbirds, and humans, have brain regions in their cerebrums (or telencephalon) that control vocal behavior. This hypothesis states that an excellent vocal learning bird like parrot may share anatomical and histological analog with humans and have comparable specialized pallial regions. Present study was designed to identify

the possible shared neural features of avian pallium that may generate such higher levels of consciousness. Anatomical boundaries in subpallial regions were identified by Cresyl violet staining and morphologically distinct neuronal classes were studied by Golgi Colonnier technique. Avian nuclear subdivisions bear marked similarities to different layers of the mammalian neocortex, which suggest that some birds also have similar specialized neuronal components or homologous regions of brain with mammals which forms the neural circuitry responsible for cognition and vocal learning.

128. Present status and economic importance of Desert *Vulpes vulpes pusilla* in the Thar desert of Rajasthan

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Desert fox *Vulpes vulpes pusilla* is endemic to the Thar desert, inhabits in sandy areas with open scrubs. Up to the last decade its presence was very common in Barmer district but at present they are seen very fewer in numbers in each areas. The study was carried out in the year 2010-2012 and during this time period, various intensive surveys were conducted in Barmer district, covering all the eight panchayat samities; for knowing its recent status. In this study, its dietary composition was also detected for knowing economic benefits of this medium sized canid. In this study it was found that Desert fox is a friend for economy of our country and also a nature saver. Its population is seemed to be very lesser as found during the study period in the road surveys; the mean population density in Barmer district was found to be 0.04 individuals/km².

129. Study on chemical parameter of Lonar crater India

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Lonar Crater (19°58'N and 76°31'E) Lake is the third largest natural salt-water lake in the world. Lonar Crater is a wet land which is important biodiversity sector. The lake brine supports typical microbial flora and fauna need to be investigated to access its value of wet-land to be recognized as Ramsar Site of India.

During the study period Seven different chemical Parameter were studied, Total Iron, Soluble Iron, Ferric Iron, Ammonia, Nitrite, Nitrates, Total Organic Nitrogen, Total Phosphate, Sulphates and Silicates. The crater physical setup, its relative Geographical and Ecological isolation evolve Limnological status in a unique way. Its unusual and climatic isolation highlights the ecosystem as an ecological wonder. Present work deals with analysis of chemical parameters that aims to investigate the pollution level to know Eutrophication status of Lonar Crater Lake. The study of hydrological status reveals variation of Phosphate and Nitrates during rainy season and summer while the lake is leading towards Eutrophication.

130. Feeding ecology of Chinkara (*Gazella bennetti* Sykes) in desert National Park, Rajasthan, India

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Chinkara (*Gazella bennetti*) is the state animal of Rajasthan and protected under the schedule-I of Wildlife (Protection) Act, 1972. This is herbivore and mainly found in arid and semi-arid regions. Survival of the chinkara is depended on the natural vegetations which are found in its surrounding habitats. Chinkara feeds mainly on twigs, leaves, flowers and fruits of small trees, bushes, grasses and herbs etc. The study was conducted on the feeding ecology of chinkara in Desert National Park. Direct observation technique was used for taking observations. Seasonal variations were found in its feeding preference. During monsoon season chinkara mostly likes grasses and herbs whereas in summer it feeds upon leaves, twigs, flowers, fallen pods and fruits of bushes and trees. Maximum grazing activities were recorded in monsoon season whereas maximum browsing activities were recorded in summer season.

131. Monitoring aquatic resources in India in the new millennium

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Water is a precious natural resource. India is rich in water resources being endowed with rivers and blessed with snow cover in the Himalayan range which can meet a variety of water requirements of the country. But due to population explosion, rapid industrialization and modern life styles, the demand of water for drinking purposes, irrigation, domestic and industrial works is increasing tremendously. Now-a-days India is facing the problem of scarcity of water because of insufficient rains, management of water resources and their pollution. It has been observed that Indian rivers are polluted due to discharging of untreated sewage and industrial effluents. The Central Pollution Control Board (CPCB) has established a network of monitoring stations on rivers across the country. At present there are 870 stations in 26 States and 5 Union territories in India. The monitoring is done on monthly or quarterly basis in surface waters and on yearly basis in case of ground waters. At present there are 189 rivers, 53 lakes, 4 tanks, 2 ponds, 3 creeks, 3 canals, 9 drains, and 218 wells under this scheme.

At present the inland water quality monitoring network is operated under a three-tier programme i.e. Global Environmental Monitoring System (GEMS), Monitoring of Indian National Aquatic System and Yamuna Action Plan. The water quality data are reported in Water Quality Statistics year books. The water quality monitoring indicates that organic pollution is predominant and almost all the surface water resources are contaminated to some extent by Coliform group of bacteria that make them unfit for human consumption unless disinfected. It is surprising that Ganga, Yamuna, Cauvery, Satluj, Krishna, Godavari, Sabarmati, Tapi and Mahanadi are grades as much

polluted while Mahi, Narmada, Brahmaputra and Beas are comparatively possess clean water with respect to bacterial and organic pollution.

In order to control water pollution, sewage should not be mixed directly into the rivers, industrial wastes should not be mixed in rivers and factories should not be installed on river banks. Potassium permanganate should be added in well water. Man and animal fasces should not be thrown in ponds. The domestic wastes should be buried in deep pits outside the habitations and sewage should be purified before it enters the rivers.

132. Eco-morphological studies on some bryophytes of Allahabad

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The article embodies eco-morphological feature of some bryophytes occurring in the Allahabad region. Among liverworts four species of *Riccia*: *R.billardieri*, *R.discolor*, *R.cavernosa* and *R.frostii* were observed and among mosses the taxon *Physcomitrium* were studied. *R.billardieri* and *R.discolor* grow mainly in summer season. Thalli of *R.billardieri*, collected from exposed habitat show prominent antheridial papillae compared to those collected from shady unexposed habitats. Even the shape of spore and ornamentation on the exine shows variation. *R.discolor* was collected from only one site and all thalli exhibited a single row of antheridial papillae. Antheridial papillae are reportedly arranged in 2-3 rows in thalli collected from other places. *R.cavernosa* and *R.frostii* are winter species having smaller thalli with *Ricciella* type of anatomy. *R.cavernosa* was collected from three different localities but those collected from the banks of river Gange showed rosette of compactly arranged large thalli, while those collected from two localities other than river bank showed loosely arranged rosettes of smaller thalli, having small sized sporophytes.

Two species of the moss *Physcomitrium*: *P.eurystomum* and *P. indicum* were collected from two different localities and in both the cases the species were found growing intermixed but in one of the localities population of *P.indicum* was sometimes found to grow in isolation. In one instance *P.indicum* growing in association with *R.cavernosa* exhibited rhizoidal gemmae. Gemmae have not been observed in *P.eurystomum*. Plants of *P.eurystomum* growing under direct sunlight are smaller in size, have narrower leaves and smaller capsule while those collected from unexposed shady sites are large sized, have broad leaves and capsule. However, no structural variation in spore morphology was found in thalli from exposed and unexposed habitats.

133. Preparation, evaluation and characterization of ultrasonication assisted andrographolide-loaded nanoemulsion stabilized with alginate and chitosan for galactosamine induced hepatotoxicity

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Andrographolide (AP), known for its potent hepatoprotective activity worldwide. Owing to its poor bioavailability and less stability, its clinical application is circumscribed. Present investigation is aimed to target the above problem together by formulating triple layer nanoemulsion (NE) of AP via layer by layer (LbL) technology. A ternary nanoemulsion (TNE) of AP was formulated via layer-by-layer (Lb-L) electrostatic deposition of alginate and chitosan using ultrasonication to abate its poor bioavailability and less stability simultaneously. The TNE was formulated successfully which was confirmed via transmission electron microscopy. The particle size of the TNE ranges from 90.8-167.8 nm and the most stable was obtained in 20 min sonication having the mean droplet diameter of 92.02 nm. The transparency and stability of emulsion was enhanced when the sonication time was increased. Moreover, the hepatoprotective activity on mice was also assessed against galactosamine/lipopolysaccharides induced hepatotoxicity. The TNE treated group showed significant improvement in serum liver parameters (SGOT, SGPT, ALKP, SBLN) as compared to AP. The results indicate an excellent potential of the TNE formulation for the reversal of liver toxicity in mice. Thus, it could be inferred that the fabricated TNE exhibit improved bioavailability, pharmacological activity and stability for the period of three months.

134. Induced instability in microsporogenesis in Linseed (*Linum usitatissimum* L.)

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Irregular microsporogenesis and mode of reproduction are described in *Linum usitatissimum* L. of family-Linaceae due to hazardous effect of different doses of gamma-rays i.e. 100Gy, 200Gy, 300Gy, 400Gy and 500Gy. Cytological analysis revealed that the elimination of micronuclei, microcytes formation and cytotoxic microsporogenesis was revealed almost at the each stage of meiosis and the further meiotic behaviors were highly irregular as well. Most meiotic anomalies were related to irregular chromosome segregation commonly found due to cytomixis and microcyte formation. Some micronuclei remained as terad, whereas other released as microcyte from spore wall. Other meiotic abnormalities, such as Dyads, tetrads and hexads with micronuclei and microcyte formation due to cell fusion and the absence of cytokinesis were also recorded. Restitution nucleus leads to the formation of binucleate microspore or 2n microspores were also recorded. This is first time reported that meiotic instability and pollen sterility caused at different doses of gamma rays in *Linum usitatissimum* L.

135. Food habits of *Agama agilis* Olivier in Thar desert, Rajasthan, India

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The Thar lizard *Agama agilis*, a syntype of *Trapelus agilis* and commonly known as 'Brilliant Ground Agama' is found to be distributed in central and southern Asia. Food habits of *Agama agilis* in Thar desert was measured in a period of two years, from 2008 to 2009. The site chosen for study, was near the village Amar Sagar, located at a distance of 12 km from the city of Jaisalmer and adjoining Desert National Park. Behaviour was observed carefully with the help of binoculars without disturbing animals. Road trampled animals were dissected to analyze the stomach contents. It was observed that lizards feed between 800 to 1500 hr. In early morning, lizard feeds upon small apterygote insects such as ants, termites and caterpillars, but during the noon session, feeding preference is turned upon large sized insects, such as beetles, locusts, butterflies and moths. Food preference also changes with seasons. Dissection of trampled animals showed that intestinal content was invaded by numerous helminthic endoparasites. Food items of stomach contents were of seven insect species, leaves of *Indigofera hochstetter* plant, some plant seeds and stones.

136. Sexual dimorphism in *Trapelus agilis*

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The present piece of work was carried out on *Trapelus agilis* [Thar Lizard] belonging to order Squamata and suborder Lacertilia. *Trapelus agilis* is distributed in Iran, Pakistan, Afghanistan, India, Russia, Turkmenistan, Tadjikistan, Uzbekistan, Kazakhstan and China. It inhabits the Thar Desert in the Western part of the India. The area of study is village Amar Sagar near Jaisalmer district of Rajasthan. There is a distinct sexual dimorphism between the male and female lizards and it can be easily observed through its body colour, scale patterns and their arrangement and also in the sizes of head and limbs.

137. Studies on the cellular changes in intestine of magur, *Clariasbatrachus* (Linnaeus, 1758) fingerlings on partial, and/or major replacement of animal protein by plant protein in the diets

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A feeding experiment was conducted for 12 weeks with 10 feeds (F₁ to F₃ contains 100% Animal protein (A), F₄ to F₆ contains 25% Plant protein (P) and F₇ to F₉ contains 75% plant protein (P) and all the diets were mixed with glucosamine (G) @ 0.5% (F₁, F₄, F₇), 5.0% (F₂, F₅, F₈) and 10% (F₃, F₆, F₉) and control (F₁₀) as natural food with *Clariasbatrachus* grow-outs. Fishes fed with F₁₀ showing normal architecture of intestine with circular muscles, longitudinal muscles, serosa and villi. Fishes fed with P:A:G :: 0:100:0.5 feed (F₁), P:A:G :: 0:100:5.0 feed (F₂) and P:A:G :: 0:100:10.0 feed (F₃) depicting normal appearance of circular muscles, longitudinal muscles, serosa and villi. In F₃ fed fishes the fusion of few villi seen. *C. batrachus* reared with P:A:G :: 25:75:0.5 feed (F₄), P:A:G :: 25:75:5.0 feed (F₅) and P:A:G :: 25:75:10.0 feed (F₆) showing normal appearance of circular muscles, longitudinal muscles, serosa and villi. However, some goblet cells and spaces in villi observed. Fishes fed with P:A:G :: 75:25:0.5 feed (F₇) showing elongation of lumen in villi. Normal Circular muscles, longitudinal muscles and serosa are seen except few spaces and fishes fed with P:A:G :: 75:25:5.0 feed (F₈) appearances of spaces between circular muscles and base of villi. Circular muscles, longitudinal muscles and serosa were normal. Fishes fed with P:A:G :: 75:25:10.0 feed (F₉) showing normal circular muscles, longitudinal muscles and serosa however, the fusion of villi and spaces around villi were observed. The results suggest that the partial or major replacement of dietary plant protein has no major effects on the cellular structures of intestinal tissues in this fish and the dietary glucosamine has no direct effect on the modification of cellular changes.

138. Effect of halophilic bacteria on two important chemical properties of saline soil

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Halophilic bacteria are those which thrive in environments with high salts concentrations and are categorized into slight, moderate and extreme halophilic based on their salt tolerance. These are generally prevalent in sea water/marine salty soils/saline soils of different ecological regions including desert soils.

Sixty six halophilic bacterial isolates were isolated from different ecological environments like sea water at two different locations of Arabian sea, salty water of Lonar lake, salty marine soils/lake soils and saline soils in eastern and western region in Maharashtra. These halophilic bacterial isolates were categorized for their salt tolerance.

The effects of these halophilic bacterial isolates were studied on two important chemical properties of saline soil i.e. pH and electrical conductivity. Generally the good and cultivable soils have pH range of 6.5 to 7.5 and EC less than 2. On the contrary the saline soils have pH range of 7.5 to 8.5 and EC above 4.0. To lower down these two important parameters of saline conditions the efficacy of salinity thriving (halophilic) bacteria was studied on these parameter and are presented in this paper.

139. In vitro flowering and fruiting in *Alysicarpus monilifer*: a source of herbal hepatoprotective drug

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Alysicarpus monilifer (L.) DC., family Fabaceae and sub family Papilionoideae, is an important source of hepatoprotective herbal drugs. It grows during monsoon season and is grazed extensively by the wild and domesticated animals. Therefore, there is a need for its conservation and propagation. Various environmental and nutritional conditions were optimized to obtain flowering and fruiting under *in vitro* conditions. Healthy individual shoots maintained under *in vitro* conditions on MS medium without PGRs were used for flowering and fruiting under *in vitro* conditions. Various factors affecting *in vitro* flowering and fruiting such as PGRs, carbohydrate concentration, Strength of MS salts, Age of cultures etc were studied. On half strength MS medium with 0.5 mg l⁻¹ BA + 0.25 mg l⁻¹ Kin + 0.1 mg l⁻¹ IBA + 60 g l⁻¹ sucrose + additives, 85.4 ± 0.51% flowering shoots and 78.8 ± 0.52% fruiting shoots were obtained. The seeds collected from fully mature pods showed 75% viability under *in vitro* conditions on MS medium without PGRs. The above mentioned protocol can thus be used for controlling life cycle of this important medicinal plant of the Indian Thar desert under *in vitro* conditions without any seasonal effect.

140. On some new dispersed megaspores from the Triassic of Nidpur, Madhya Pradesh, India

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The article reports four new species of dispersed megaspore morphogenera, from the Middle Triassic of Nidpur, Madhya Pradesh, India. The megaspores are structurally preserved as compressions and reveal the presence of two lycopsid species, though macrofossil evidence of source plants is almost lacking. The megaspores are assigned to two existing genera, *Biharisporites* Potonie, 1956 and *Lagenicula* Zerndt, 1934 and in each case the megaspores represents new species. *Biharisporites gopali* sp. nov. and *B. bosei* sp. nov. are rare, non-lageniculate, trilete megaspores having spinae or coni on both proximal and distal surfaces. *Lagenicula marhwasensis* sp. nov. and *L. triassica* sp. nov. are gulate, more abundantly represented megaspores in the assemblage having densely ornamented branched or unbranched pointed processes and almost smooth contact faces. Triassic is predicted as semi-arid, but overwhelming recovery of carbonaceous debris from the non-coal forming Nidpur beds suggest a favourable climate. There is preponderance of gymnospermous elements in the litter but megaspore producing plants of lycopsid origin also formed a minor component of the rich vegetation surrounding the Nidpur basin.

141. Agro-biodiversity for the livelihood security in the cold desert of North-Western Himalayan Region

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The cold desert region in 'trans-Himalayan region' lies above the tree line in the Western edge of Himalayas at 30°64' - 37°20'N latitude and 72°30' - 80°15' E longitude in the States of Himachal Pradesh, Jammu & Kashmir and Utrakhand. The region is characterized by extreme climatic conditions, scanty rainfall, strong afternoon winds, heavy influx of infrared and ultraviolet radiations, reduced oxygen levels, low concentration of atmospheric carbon dioxide and relative humidity. The agro-biodiversity is diverse, unique and highly endemic, which got evolved due to ecological differentiation, natural selection, nutritional value and preferential use. The landraces of crops, fruits, medicinal plants, spices, nuts etc are contributing towards people's livelihood. Domestic animal and fish diversity is also an integrated component of agro-biodiversity in the region. The conservation and use of agro-biodiversity will remain essential for the long term sustainability of the people of cold deserts. Therefore, complementarities and synergy between agro- biodiversity conservation vis-à-vis developmental activities is needed to be looked holistically.

142. Phytoremediation potential and nutrient status of *Holoptelea integrifolia* Planch. tree seedlings grown under different arsenic (As) treatments

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Hydroponic experiments were conducted to investigate the effects of different arsenic (As) treatments on *Holoptelea integrifolia* seedlings. Results revealed that *H. integrifolia* could tolerate much higher arsenic concentration, accumulating about 1129-3322 mg kg⁻¹ dry weight in roots, and 345-3662 mg kg⁻¹ dry weight in shoots under 0.2, 0.5, 1.0 and 1.5 mM arsenic treatments. Arsenic treatments at 0.2-1.0 mM do not exhibit toxicity signs however, up to 1.5 mM causes significant decline in growth parameters. Further it shows that increase in nutrient distributions of Ca, Mg, and S content both in roots and shoots compared to control. Potassium content increased in roots while decreased significantly in the shoots. Phosphorous contents drastically decreased in roots as compared to shoots. Micronutrients (B, Cu, Fe, Mn, Zn and Na) increased being higher in roots compared to shoots. Bioaccumulation factor (BF) and translocation factor (TF) shows the value of >1 without observing arsenic toxicity symptoms. This study demonstrates that *H. integrifolia* could tolerate arsenic concentrations up to 0.2-1.0 mM which may be useful in arsenic phytoremediation programmes.

143. Health effects on the populations exposed to open dumping of the municipal wates: An epidemiological study

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The investigation assess the disease-environment association, measure of the expose and related health on the population living around the open waste dumps as compared to populations far away from these dumps. It consists a descriptive cross sectional design of questionnaire survey of 150 individuals of exposed group, 100 individuals of the unexposed group and analysis of water quality of the residing areas of the populations. The statistical Odd ratio, logistic regression analysis and ANOVA validate the comparative evidences of route of exposure, relation with distance of contamination and relative risks. Acidic pH (5.7-5.83), higher TDS (up to 1150 mg/l), higher BOD (up to 44 mg/l) and presence of heavy metals in drinking water samples of the exposed area was alarming (Fe>Pb>Zn>Cr). The most common illness was diarrhea and vomiting having a prevalence rate of 32.67% followed by skin problems (19%), and diseases was quite low. The results indicate the exposure of contamination and threat of different air and water born diseases related with the open dumping of wastes. This signifies that the impact of solid waste exposure in the disease occurrence cannot be neglected.

144. Application of LIBS and ICAP-AES to detect the elemental profile of cultivated and wild *Ocimum L.* species

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Present study was aimed to investigate the micro and macro nutrient distribution in the leaves of different *Ocimum* species i.e. *Ocimum basilicum*, *Ocimum sanctum*, *Ocimum gratissimum* and *Ocimum americanum* by Laser Induced Breakdown Spectroscopy (LIBS) and ICAP-AES. LIBS spectra of different *Ocimum* leaves were recorded in the spectral range 200-900nm which shows the atomic lines of Potassium (K), Sodium (Na), Calcium (Ca), Magnesium (Mg) and Silicon (Si) along with lighter elements like Carbon (C), Hydrogen (H), Oxygen (O) and Nitrogen (N). ICAP-AES also confirmed the presence of above mentioned elements except the lighter ones in the *Ocimum* species due to its identification limits. Observations from both the techniques clearly reveal that Calcium (Ca) is most abundant element in all the species followed by the Potassium (K), Magnesium (Mg) and Sodium (Na). Further results suggest that *O. sanctum* is highly mineral rich species followed by the *O. basilicum*, *O. gratissimum* and *O. americanum*. PCA on LIBS data was also studied and classification of these samples was demonstrated. The pattern of mineral profile in different *Ocimum* species obtained using LIBS is in good agreement with results of ICAP-AES. The present work demonstrates the suitability of LIBS technique due to its rapid, nondestructive and eco-friendly approach.

145. Quality of water in river 'Yamuna' at Allahabad

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It has been experienced that river Yamuna is being polluted day by day in Allahabad also. It is true that rivers provide is understood and appreciated based on sound knowledge, information base and applied science the fate and future of rivers would remain at best uncertain. Presently there is no broad best technique or tool available with planners to assess the health of river which having on the health of its dependent humans, cattle, other flora and fauna, local land and allied resources present in it. The water quality in rivers in terms of BOD (Biochemical Oxygen Demand), DO (Dissolved Oxygen) and faecal coliform number etc.

The project derives its origin to a felt need as experienced by the project executants during an 'awareness' and advocacy campaign called 'Run for Yamuna' during Mahakumbh' to aware common people. We have collected some sample of water (River Yamuna) at New Naini Bridge, Karela Bagh, Arailghat, and Gaughat and tested for chloride, nitrate, alkalinity, *E. coli*, hardness, DO, BOD,

Presence of Pb and Cu in it. It was observed that the quality of water in river Yamuna is not good for aquatic animal as well as human beings due to presence of *E. coli* (<23/100ml), copper (2.3mg/L), Lead (0.19 mg/L). The reason for failure water sample due to lack of awareness among common people. The Excess quantity of copper and Lead may damaged the lungs, Kidney and liver and tendency develop the diseases related heart and circulatory system. River water must not contain *E. coli* in excess of 0/100 ml, or Copper and Lead in excess of 0.1 mg. IASc is trying to ensure the good quality of river already through organizing awareness campaign programmed which may change the quality of river water in future, due to awareness in common people.

146. Hydrological scenario of river Ganga (Gangotri to Haridwar)

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In recent times, several studies around the globe show that climate is likely to impact significantly upon freshwater resources availability. In India, demand for water has already increased manifold over the years due to urbanization, agricultural expansion, increasing population, rapid industrialization and economic development. At present water pattern change modifying the hydrological cycle in many climate regions and river basins of India. The present study deals with the hydro-chemicals assessment of river Ganga (Gangotri to Haridwar), in view of their ecological sequestration. Planktonic and bloom forming cyanobacteria have many implications in river Ganga by their allelopathic behavior as well as in forming toxic substances.

The limno-chemical features and extent with references to hydrological parameters of the running water were monitored during study period. Hydrological factors along with nutrient/ nutrient transport & their interaction with aquatic phytoplankton population were also great influx. The hydrological scale i.e. solids (TDS, TS, TSS), hardness, negative oxygen value, BOD, COD, chloride, residual chlorine, ammonia, N, P and N/P ratio and bacterial load were higher in all selected site. The critical deficits water supply and improper sewage system/ treatment infrastructure have increased the risk of exposure to more acute level in water quality of Ganga. The dendrogram confirms chlorine, pH, hardness, nitrate, ammonia, total solids and sulphates are the key factors of the change in the chemistry of the water body.

147. Assessment of heavy metal accumulation in wastewater flooded soil of Allahabad, Uttar Pradesh, India

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Assessment of heavy metal accumulation (Cr, Cu, Fe, Mn, Zn and Ni) was conducted in the wastewater irrigated soil in Allahabad district of Uttar Pradesh, India, using contamination factor (CF) and pollution load index (PLI). Samples from each of the grid area taken at the depth 0-5, 5-10, 10-20, 20-25 cm and were analyzed using Atomic Absorption Spectroscopy (AAS). The concentrations of all the metals were found to increase to a maximum concentration at a depth of 10-20 cm then decreased. The study area observed to be contaminated with Cr (maximum 2.63), Cu (maximum 1.24), Fe (maximum 2.04), Mn (maximum 2.75) and Ni (maximum 2.10) in all the sampled points and depth except 20-25 cm depth. The pollution load indices (PLI) were found to be high but decrease (1.44-0.85) with increase in depth (0-25 cm) indicating that the study area was polluted by all the observed heavy metals (PLI>1). These results support both the managed utilization of wastewater for irrigating field and regulate the discharge of wastewater into the water from households and runoff that are located upstream.

148. Desertification- Causes and Impacts

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Desertification is a long process through which land degradation occurs. Desertification is a result of various human and climate activities. This is emerging as a serious problem which every country of the world is facing and is a threat for both human beings and ecological system. Various causes of desertification are deforestation which further leading to soil erosion and decreasing the quality of the soil. On the other hand overgrazing, over cultivation and salinization in irrigated croplands are also affecting desertification rates. Farming of an average land is causing desertification worldwide. Farmers are clearing average land, and using it which takes away the richness in the soil. Increase in the number of industries have also effected the present situation and further increased the rate of desertification process. Rajasthan state of India also gets affected to a great extent by industrialization as Rajasthan has a rich source of limestone and gypsum. The impacts produced by various causes are serious. There are drastic climate changes. The land is becoming infertile. Ecological system is destroyed by these factors. Desertification is causing loss of biodiversity. The developing countries are facing large problem due to land degradation and ultimately desertification of useful land. The demands of the increasing population are unable to meet. Each person is responsible for this and need to take strict step to prevent desertification especially in developing country like India.

149. Bioremediation of oil on shoreline environments: Development of techniques and guidelines

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In march 1990 the office of technology assessment (OTA) published copying with an ailed sea, an analysis of oil spill response technologies. The study was prompted in part by the alarm and concern that followed ht nation's largest oil spill to date, the n-million-gallon spill in prince william sound, Alaska, caused by the grounding of the *Exxon Valdez*. OTA evaluate that the state of the art and the potential for improvement of the most widespread technologies mechanical containment and cleanup methods and assessed what appeared to be the most a promising alternatives to mechanical methods in particular the use of chemical dispersant and in situ burning. Over the last 30 years, the development of operational procedures to accelerate the natural biodegradation rates of oil spilled on shoreline environments has been the focus of numerous research programs. As a result, bioremediation has been demonstrated to be an effective oil spill countermeasure for use in cobble, sand beach, salt marsh, and mudflat environments. Today, studies are directed towards improving the efficacy and evaluating the ecological impacts of available bioremediation agents and/or procedures. This review describes the latest developments in bioremediation strategies and their key success factors.

150. Study of oviposition of *Sitophilus oryzae* in with effect of some medicinal plants

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The daily egg production of female *Sitophilus oryzae* (Linn.) reared on refined wheat flour and flour mixed with leaf powders of different plants. The *S. oryzae* reared on untreated wheat flour their egg laying started on the 4th day (6.66 eggs per female) after emergence of adults. The mean total number of eggs laid per female in 20 days was 206.6 (100%). At 1 and 2% treatment with neem leaf powder, the egg laying was significantly lower (38.00 and 13.2% respectively). The dietary incorporation of menthol mint leaf powder also significantly reduces (77.22 and 54.02%) the mean number of eggs at 1 and 2% treatment respectively. The *S. oryzae* reared at 2% treatment of tulsi leaf powder lay only 61.60% egg in 20 days.

151. In vivo diabetic activity of petroleum ether and methanol extracts of *Psoralea corylifolia*, *Solanum nigrum* and *Eclipta alba* on rat model using glibenclamide as control

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The petroleum ether and methanol extracts of *Psoralea corylifolia* (seeds), *Solanum nigrum* (whole plant) and *Eclipta alba* (whole plant) is being observed for hypoglycemic and hyperglycemic effect in normal rats using 18 hr fasted Wistar rat model. The petroleum ether and methanol extracts of above selected plants at the dose of 250 mg/Kg were given to the overnight fasted rats and blood glucose determination was done at 0h (prior to any treatment) and after 3h (post drug administration). The p value ($p < 0.001$) compared to 0h blood glucose level was obtained. Petroleum ether extracts of *Psoralea corylifolia* were showing hyperglycemic activity while methanol extracts does not showing hypoglycemic activity. Both the extracts of *Solanum nigrum* were showing almost hypoglycemic activity.

152. Transverse thin cell layer induced micropropagation of *Caralluma edulis* (Edgew.) Benth. & Hook. f., a rare and nutraceutically important plant of extreme arid regions

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Caralluma edulis (family Asclepiadaceae) is an edible and nutraceutically important plant of the extreme arid regions of the Thar Desert. We explored transverse thin cell layer (tTCL) technique for micropropagation of *C. edulis*. Nodal and internodal portions of shoot segments were transversely sliced in to pieces of about 1–4 mm (thickness) and were used as tTCL explants for shoot regeneration. Of the concentrations of cytokinins tested, MS medium containing BAP (1.0 mg l⁻¹) proved the best in terms of percentage response and produced the maximum number of shoot buds (4.2 ± 0.78 per tTCL nodal explant). For further multiplication of shoots, different combinations of PGRs tested, out of which MS medium having a combination of BAP and Kin (0.25 mg l⁻¹ each) + IAA (0.1 mg l⁻¹) was found the best and produced the highest number of shoots (23.6 ± 1.34). The internodal tTCL explants were also studied for shoot differentiation, but only callus was induced from tTCL internodal explants and failed to differentiate shoots. The nodal tTCL raised shoots were rooted ex vitro on pulse treatments with freshly prepared IBA and NOA (50 and 100 mg l⁻¹) for 4 min. The rooted plantlets were acclimatized and hardened successfully in the green house.

153. Nematode diseases of crops under influence of air pollution

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In the developing countries like India, fossil fuels are a major source of energy. Several phytotoxic air pollutants such as CO_x, SO₂, NO_x, O₃ etc. are generated during the combustion of these fuels, and has resulted in the environmental contamination and subsequently the climatic change. Development of plant diseases depends largely on the environment prevailing around the host and pathogen, and a change in the constituents may influence host susceptibility and consequently host-parasite relationship. Air pollutants such as SO₂, O₃ and acid rain injure the plant tissue directly. However, phytonematodes being mostly soil inhabitants may also be influenced by air pollutants indirectly, but foliar nematodes may be exposed to the pollutants directly. Hence, air pollutants may affect the severity of plant diseases depending on the kind of nematode parasite involved. SO₂ and O₃ at concentrations ranging 50-100 ppb enhanced the infection and reproduction of foliar nematodes like *Aphelenchoides fragariae*, *A. ritzemabosi* and *Anguina tritici*, but higher concentrations proved inhibitory to these nematodes. Air pollutants can also influence the infection of ecto and endoparasitic nematodes attacking underground parts. Higher concentration of SO₂ and O₃ (>250 ppb) inhibited the reproduction and development of ectoparasitic nematodes, but stimulated the infection of *Pratylenchus penetrans* on tomato. Root-knot severity (galling) and reproduction (egg mass and fecundity) of *Meloidogyne* spp. have been found significantly greater on tomato, tobacco and celery plants exposed to SO₂ and O₃ at concentrations below 100 ppb, but higher concentration suppressed the nematode. Other pollutants, especially acid rains have also been found to influence the pathogenicity of phytonematode. Infection of plants with endoparasitic nematodes may also enhance the sensitivity of plants to low concentrations of gaseous pollutants which are considered relatively safer to green plants.

154. Effect of biocontrol bacteria and fungi on the root-knot nematode disease of rice

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Effectiveness of different mode of application of *Trichoderma harzianum*, *Aspergillus niger*, *Pochonia chlamydosporia*, *Bacillus subtilis* and *Pseudomonas fluorescens* against root-knot of rice cv. PS-5 caused by *Meloidogyne graminicola* was evaluated in a pot trial. The biocontrol agents were applied as a root-dip (RD) and soil application (SA, 2 ml pure culture/kg soil) in both nematode infested (1000 juveniles/kg soil) and non-infested soil with five treatments viz., RD, SA 15 days after planting (DAP), SA 15 + 30 DAP, RD + SA 15 and RD + SA 15 + 30 DAP. The length and dry weight of root and shoot of the plants grown in non-infested soil and applied with biocontrol agents were improved, the growth promoting effect was greater with *P. fluorescens* applied through root dip + 1 or 2 soil applications. The roots of the plants grown in the nematode infested soil, showed

terminal and spiral galls, and the plant growth decreased by 19-31%. Treatments with the biocontrol agents controlled the root-knot disease to a varying extent. The RD + SA 15 of *P. chlamydosporia* or *A. niger* was found highly effective and suppressed the gall formation (22-25%), egg mass production (21-24%) and soil population (16-60%) of *M. graminicola*, that led to 15-21% enhancement in the plant growth variables.

155. Effect of intermittent exposure of CO₂ on the root-knot disease and plant growth of bottle guard and cucumber

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An experiment was carried out to examine the effect of 400, 500 and 600 ppb carbon dioxide on plant growth, physiology, biomass production and root-knot disease development on bottle guard and cucumber. The plants at seedling stage were inoculated with the root-knot nematode, *Meloidogyne incognita* (2000 J₂/kg soil). Two days after inoculation the bottle gourd and cucumber plants were exposed to 400, 500 and 600 ppb CO₂ for 6 hrs on alternate day during day time for months. The uninoculated plants and exposed to the ambient air served as a control (360-380 ppb CO₂). The cucurbit plants exposed to CO₂ had a relatively higher photosynthetic rate, and lower stomatal conductance, trichome length, number of leaves per plant, plant growth, biomass production and yield as compared to the ambient plants exposed to air (380 ppb CO₂). Both the cucurbits were found susceptible to the root-knot nematode and developed characteristic galls on the roots. The nematode disease became severe on the plants exposed to 500-600 ppb CO₂. The elevated level of CO₂ (500 ppb) significantly enhanced the fecundity and egg mass production of *M. incognita*. The soil population of root-knot nematode was also higher in the root zone of plants exposed to CO₂.

156. Effects of heavy metals on leaf micro morphology of *Leucaena glauca*

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These days various kinds of pollution are alarming the environment especially heavy metals. Heavy metals are harmful to the environment as well as plants also. The significance of *Leucaena glauca* leaf micro morphological parameters are in indication and mitigation of industrial pollution. A study was undertaken to determine the effects of industrial pollution on leaf cuticle and stomatal structure of *Leucaena glauca* from Allahabad, India. This work was designed as a comparative study between plant present at polluted site and control site. The study includes various epidermal parameters in plant species viz. Stomatal density and Stomatal indices. Leaf clearing and slides were studied with light microscopy. It was observed that stomatal density and stomatal index of lower surface of leaf is changed in the plant present at polluted site. At polluted site, the concentrations of heavy metals in the soils were in determined which are Copper, Iron, Zinc, Nickel, Lead and Cadmium. The present work may show capacity of the plant against heavy metal pollution which can be used in reduction of pollution with the help of *Leucaena glauca*.

157. Assessing the ecological integrity of running waters in relation to limno-chemical feature

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The term ecological integrity reflects the necessity of considering water bodies as ecological system. Ecological integrity investigating a numbers of key components: hydro-morphological aspects (particulary habitat structures, flow regime, connectivity), hydrological status, micro/macroinvertebrate and fish assemblages, biological water quality assessment and ecotoxicological evaluations. This approach, which has been assessing the ecological integrity of running water at and around Allahabad city has untapped potentiality. Phytoplanktons have many implications in running water by their allelopathic behavior as well as in forming toxic substances in complicated matrices. They are primary producer in aquatic ecosystem often result into large amount of biomass. Screening, cleanup, identification and qualitative analysis of phytoplankton/microcystin, nutrient/nutrient transport, and their interaction were described. The hydrological scale i.e. solids/hardness, DO, BOD, COD, chloride, residual chlorine, ammonia, N, P and N/P ratio and bacterial load were higher in the all selected site and also influenced with water availability/flow and time periods. The study was also performed to measure primary productivity, chl-a and biomass of phytoplankton/toxin producing algal species. The maximum chl-a concentration, toxin producing algal species were found to be 515.00 and 615.00 in water sample of Ganga, while 551 mg/l and 641.22 mg/l in Yamuna water sample, respectively in the case of *Microcystis aeruginosa*. Ecological parameters to evaluate GPP, NPP and CR were found to be 397.00, 234.00 and 282.00 mgCm³/h in Yamuna river, respectively which is higher than Ganga river. A poor association existed between chl-a and GPP. The close relationship between applied limnological importance research and the needs of river management is clear, and it is also helpful for conservation oriented research.

158. Inhibitory effect of SAC on proinflammatory cytokine-induced skeletal muscle wasting in C2C12 myotubes

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Muscle wasting/loss (cachexia) is a major problem in various diseases including AIDS, cancer, diabetes, etc. Up to one-third of all cancer patients die from consequences of cachexia and not from cancer itself. While in AIDS, 5% weight loss over a 4-month period is associated with an increased risk of death and opportunistic infections. Beyond a reduced survival rate, wasting is also related to poor functional status and quality of life. The association of TNF α in impairment of differentiation and muscle loss has been reported very well in these diseases. S-allyl cysteine (SAC), an active compound derived from *Allium sativum*, exhibits its anti-inflammatory properties in human T-cells but its effect in skeletal muscle pathology is unknown. The present study aimed to investigate the role of SAC supplements on pro-inflammatory cytokines (TNF α) induced atrophy in C2C12 myotubes. C2C12 cells were treated with TNF α in the presence or absence of SAC. Our preliminary

data suggest that SAC has tremendous potential to revert the TNF α induced protein loss even at 10 μ M concentration. Data shows that myotube treatment with cytokines (100ng/ml) contributes to reduction in the mean myotube diameter and enhanced the degradation of specific muscle proteins i.e. MyHC (fast-type) and creatine kinase while SAC supplementation counteracts TNF α induced protein loss and protects the myotube diameter. Collectively, our finding suggests that SAC could represent a possible compound to ameliorate the muscle mass.

159. Mechanisms of action of cantharidin, a bioactive component of *Epicauta hirticornis* in murine tumor model: cellular antioxidant system and apoptotic cell death

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In the present work cantharidin, a bioactive insect toxin was isolated from red-headed blister beetles, *Epicauta hirticornis* and its possible mode of action was studied involving apoptosis and cellular stress in murine ascites Dalton's Lymphoma (DL). The structure of isolated compound was confirmed as cantharidin by standard instrumental techniques. Cantharidin treatment showed potent antitumor activity with an increase in life span (~87%) of DL-bearing mice. Cantharidin treatment induced apoptosis in DL cells and also caused an oxidative stress and mitochondrial damage due to generation of reactive oxygen species (ROS) and an increase in lipid peroxidation level. The observed cantharidin-mediated decrease in glutathione and glutathione related enzymes activities in the tumor cells may weaken the cellular antioxidant system. Molecular docking study also confirmed the strong interactions of cantharidin with glutathione related enzymes. Moreover, cantharidin treatment also caused a significant decrease in mitochondrial cytochrome c and simultaneous increase in cytosolic cytochrome c which ultimately facilitates the activation of caspase 9 and 3 to augment mitochondrial apoptotic pathway causing cell death.

160. Palynology and Palaeoenvironment of the Hapjan oil field (Upper Assam Basin, India) of upper paleocene period

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Rock samples of Prang formation of Tinsukya area, Upper Assam Basin have been collected to isolate microfossils. The palynoflora of the Prang Formation are of terrestrial origin. They are dominated by angiosperms pollen grains (mainly Longapertites and Proxapertites), pteridophytic spores are abundant, amongst which the Cyathidites, Lygodiumsporites, Todisporites, and Triplanosporites are the most frequent. Dinoflagellate cysts like Glaphyrocysta, and Achomosphaera, have also been found along with fungal spores, cuticle pieces with stomata and xylem tracheids in appreciable amounts. The association is indicative of a fluvio-lacustrine environment characterized by widespread moist and aquatic habitats under a warm-humid (tropical) palaeoclimate. This study may be helpful in reconstruction of paleoclimate and vegetation and also exploring oil yielding zones of the studied area.

161. *Nidpuria falcatum* sp. nov. and associated vegetative shoots from the Triassic of Nidpur, Madhya Pradesh, India

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A new species of *Nidpuria* Pant and Basu, *N. falcatum* sp. nov. associated with vegetative shoots is described from the Triassic of Nidpur, M.P., India. The lax fructification of unknown length is unbranched and has a dorsiventrally flattened striated axis bearing whorls of sessile decurrent opposite decussately arranged microsporophylls arranged at nodes. All parts of the fructification bear profuse multicellular, uniseriate falcate hairs. Each ovate to boat shaped microsporophyll is univeined and subtending two stalked axillary microsporangia adaxially. The microsporangia is concave adaxially and convex to plano-convex abaxially. Individual microsporangium is ovate to subulate with a mucronated tip, tapering base and a lateral line of dehiscence. It is bitegmic, yielding two cuticles on maceration. The outer cuticle is hairy and stomatiferous while the inner is smooth and non-stomatiferous. Inside the sporangia are bisaccate pollen-grains. The cone axis also yields two non-stomatiferous, hairy cuticles of varying thickness. The adaxial cuticle is thick showing longitudinally aligned rectangularly elongated thin walled cells. Upper and lower cuticles of the microsporophyll are amphistomatic and structurally distinct.

Associated with the fructification are vegetative shoots with flattened winged unbranched to branched axes bearing spirally arranged univeined leaves having decurrent bases and mucronate tips. The leaves are linear-lanceolate to ovate, bifacial, amphistomatic with hairy margins. Maceration of such axes also yields two structurally distinct non-stomatiferous cuticles of varying thickness. Structural features of leaves apparently similar to microsporophylls of the fructification.

162. Quadrate Studies of *Isoetes panchananii* Pant & Srivastava at Pachmarhi, Madhya Pradesh

Sita

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The plants of genus *Isoetes* L. have been collected from Pachmarhi Biosphere reserve, Madhya Pradesh in different localities of *I. panchananii* var. *panchananii* Pant & Srivastava and *I. panchananii* var. *pachmarhiensis*. The detail investigation of ecological parameters of environment like temperature, pH, light intensity atmospheric pressure altitude latitude, longitude and humidity are recorded on the spots. The quadrate analysis and prolonged observation of plants in natural habitats have revealed considerable variation in size, length of plants and number of leaves etc. Relative frequency and important value index are dependent on environmental conditions.

On the basis of prolonged studies 80 quadrates at 16 localities viz. Amba Mai Ki Beed, Bhaisa Talaiya, Dhoopgarh Eco Point, Dhoopgarh Sunrise point, Foot Hill, Gurriam Almond Road, Gwal Baba, Helipad, Little Fall, Madadev Route, Pachmarhi Lake, Polo Garden, Polo Garden Back side, Reechgarh, Shilanjali Pond and Vanshri Vihar. Both varieties are most dominating at

Pachmarhi Lake. The highest numbers of plants frequency, which are uncountable. They form thick mat-like structure in the lake, and in other localities mat-like structure are formed but the number of plants is less than Pachmarhi Lake. The maximum numbers of plants were found at Pachmarhi Lake and the minimum number at Little Fall (2-7 in number of plants per quadrat). The rest of localities exhibit comparatively less frequency and moderate in quadrates.

Quadrat study shows that *I. panchananii* var. *panchananii* and *I. panchananii* var. *pachmarhiensis* dominate and form mat-like structure at Pachmarhi lake and other localities occur in similar and small patches of habitats in Pachmarhi Biosphere Reserve which requires lifelong conservation all of them.

163. Malnutrition among women: Causes and Consequences

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Malnutrition results from imbalance between the requirement and actual intake of nutrients. Malnutrition especially iron-deficiency anaemia has increased among women from disadvantaged social and economic groups. In India, gender inequality in nutrition is there from infancy to adulthood thus women never reach their full growth potential due to nutritional deprivation resulting in malnutrition. Prevalence of anemia among women of age group 15 to 49 years is much higher in our country. Poverty, unawareness, illiteracy, malaria, poor immunity, infection proneness, worm infestation, iron deficiency and poor eating habits are established major causes of anemia and malnutrition. These problems arising from cultural, political and economic realities must be addressed in tandem. Malnutrition among women has long been recognized as a serious problem in India, but data on levels and causes of malnutrition is still lacking. A wide variety of development actions are needed to improve the food security and nutritional status of women in their productive years.

164. Characterization of novel pigment producing psychrotolerant potassium solubilizing bacteria

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Potassium is an essential macronutrient for plant growth. The practice of intensive agriculture since last few decades have drastically reduced that K availability in soils due to shifting cropping patterns, leaching, runoff and erosion. Most of the K in soil is present in insoluble forms like aluminium silicates, mica and feldspar. To increase the availability of soluble K for improving its availability to plants, microorganism can play an important role. However, in cold deserts of the country where the temperatures are subzero at certain time of the year, and nutrient concentration are low in the soil; it is required to isolate and identify psychrotolerant or psychrophilic bacteria that can solubilize K at low temperatures. Among 54 bacterial isolates that showed K-solubilization at 5°C, ten were found to be novel as they produced pigment on various culture media. The colour of the pigment

varied from yellow to pink to red. Production of pigment, most likely carotenoids, could be an adaptation to low temperature. Pigments extracted from isolates were also examined for absorption maxima at different wave length by UV-visible spectrophotometer. Isolates IARI-R-50, IARI-R-72 and IARI-R-81 have three absorption maxima 470nm, 495nm, and 535nm. The zone of solubilization at Aleksandrov medium, with potassium aluminosilicate as insoluble source, ranged from 0.50 to 9.33 mm. However, these isolates showed reduction in the solubilization potential at temperature more than 15°C. Pigment producing potassium solubilizing isolates were identified by 16SrRNA gene sequencing and phylogenetic tree was drawn to decipher the phylogenetic relationship among isolates. The isolates were identified as *Exiguobacterium marinum* (IARI-R-40), *Arthrobacter psychrolactophilus* (IARI-R-47), *Janthinobacterium lividum* (IARI-R-50 and IARI-R-71), *Janthinobacterium* sp. (IARI-R-70, IARI-R-72, IARI-R-81), *Providencia* sp. (IARI-R-83), *Pseudomonas psychrophila* (IARI-R-134), and *Pseudomonas extremaustralis* (IARI-R-135).

165. Microbial inoculants for nutrient management and alleviating moisture stress in direct seeded rice

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Excessive use of groundwater for transplanted rice in North West Indo Gangetic Plains (IGP) has resulted in decline of groundwater table. In these areas, direct seeded rice (DSR) or aerobic rice in non-puddle soil is becoming popular. DSR not only save 30-40% water but also conserve soil nutrients, prevents soil degradation and reduce labour cost. In the present study, microbial inoculants were evaluated in pot and field trial for better establishment of DSR under aerobic and dry conditions by alleviating moisture stress and supplementing macro (N, P, K) and micro nutrients. Bacterial isolates capable of growing, exhibiting plant growth promoting traits and producing copious amount of exopolysaccharide at low water potential and wide temperature range (>30-45°C) were evaluated in a pot experiment for 45 days with recommended rice *var. 1509* for DSR. Based on seed germination assay and initial establishment vegetative 3 best isolates capable of alleviating moisture stress and having PGP traits were further evaluated in field conditions in different combination with mycorrhiza fungi with rice *var.1509* under DSR. Observations such as Proline, NPK content, chlorophyll, membrane stability index, enzymes assay, growth parameters and physiological parameter such as net photosynthesis, stomatal conductance, water use efficiency, transpiration rate and leaf surface temperature were recorded at 30 and 60 days after germination. At harvesting observations such as N, P, K uptake, grain yield, harvest index and grain quality were recorded. Microbial inoculation in consortium along with mycorrhiza significantly improved plant vigour, growth and yield over un-inoculated.

166. Bacterial diversity in the air of an educational building

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Indoor air quality is an increasingly important issue in concern with public health. Microbial contaminants contribute at a greater extent in indoor air pollution. Bacteria comprises the major group among microorganisms present in the air.

This study was conducted to investigate the bacterial diversity in the air of different selected sites of an educational building. Samples of air were taken into winter season. Sampling of air was made by open plate technique on to nutrient agar and further identified. The mean CFU count for bacteria was ranged from 89.48 to 271.04 CFU/m³. Gram positive cocci were the most common among isolated bacteria. Gram positive bacilli (*Bacillus* sp.) were also abundant whereas Gram negative bacilli were relatively less.

Numerous studies have shown that increase in the number of bioaerosols in different indoor environment is associated with various adverse effects which cost the health, motivation, mental and physical development of the people related to these environments. Therefore, there is a need to develop standards to minimize the microbial loads in such an environment.

167. Assessment of genetic bacterial diversity and plant growth promoting attributes of drought tolerant K-solubilizing bacteria allied with wheat (*Triticum aestivum*)

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Drought is one of the major abiotic stresses affecting yield of dry land crops. Potassium (K) is the major essential macronutrients for plant growth and development. Plant growth promoting K-solubilizing bacteria was investigated from wheat growing in central zone of India. A total of 348 bacteria, isolated from epiphytic, endophytic and rhizospheric samples, were screened for potassium solubilization on Aleksandrov agar medium containing potassium aluminosilicates as insoluble source of K-minerals. Of 348 isolates, 65 K-solubilizing isolates were further characterized for plant growth promoting attributes of siderophore production, IAA production, ACC deaminase activity and antifungal activity against fungal pathogens like *Fusarium gramineum*, *Rhizoctonia solani* and *Macrophomina phaseolina*. Forty seven strains could solubilise phosphorous along with potassium under water stress condition. Organic acid profiling during solubilization using HPLC analysis detected six different kinds of organic acids, namely gluconic acid, citric acid, formic acid, fumaric acid, succinic acid and propionic acid from the cultures of these isolates. Phylogenetic analysis based on 16SrRNA gene sequencing led to the identification of K-solubilizing bacteria of eight genera namely *Arthrobacter*, *Providencia*, *Bacillus*, *Duganella*, *Paenibacillus*, *Pseudomonas*, *Psychrobacter*,

and *Stentrophomonas*. *Pseudomonas monteilli* strain IARI-IIWP-27 was identified as the most efficient K-solubilizer (68.6 mg L⁻¹). *Pseudomonas thivalensis* strain IARI-IHD-3 exhibited highest (88.5 mg mL⁻¹) phosphorous solubilization followed by *Pseudomonas lini* strain IARI-IIWP-33 (58.5 mg mL⁻¹). Drought adapted K-solubilizing bacteria may have application as inoculants and biocontrol agents in crops growing in drought stress condition.

168. Silver-nanoparticles could be an alternative for antimicrobial bio-formulations

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It is an established fact that silver is an effective antibacterial agent and possesses a strong antimicrobial activity. It has been known for a long time that in nature a variety of nano-materials are synthesized by biological processes eg. in diatoms and magnetotactic bacteria.

We have shown bio-synthesis and antibacterial activity of silver-nanoparticles by a cell free culture filtrate of bacterium. Extracellular biosynthesis of silver nanoparticles by the culture supernatant of thermophilic isolate LCHUR14 was studied. Culture filtrate turned brownish yellow from yellow, indicating the synthesis of Ag-nanoparticles. A strong peak was observed between 400-430 nm of UV-visual range when screened spectrophotometrically. Ag-nanoparticles were further analysed by Scanning electron microscopy for structural analysis and found to be in the range of 350-390 nm. Purified Ag-nanoparticles were found positive for antagonistic activity against phytopathogenic fungi, *Fusarium udum* and *Macrophomina phaseolina* and human pathogenic bacteria (*Pseudomonas aeruginosa* and *Serratia marcescens*) and human pathogens. The bacterial isolate LCHUR14 can be used to synthesize bioactive Ag-nanoparticles efficiently and in non-toxic manner.

169. Characterization of halotolerant bacterial strains for plant growth promoting attributes

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Primary characterization of soil samples collected from the Rann of Kutch with reference to water holding capacity, pH and EC was done. Bacteria isolated from the soil samples with the aim to screen extremophiles which could play an important role in sustaining vegetation. Due to the hypersaline nature of the soil and the temperature fluctuations of the region, the investigated microflora showed a dominating population of halophiles possessing thermophilic attributes which helped the microorganisms survive at a temperature >60°C. The isolates were further screened for plant growth promoting traits as a possible biotechnological implication to sustain the vegetation. Out of the total isolates, restriction analysis of 16S rDNA with three endonucleases *AluI*, *HaeIII* and *MspI* was carried out for isolates having stimulatory effect on percent seed germination. Genetic diversity

was investigated using restriction patterns produced by NTYSIS and isolates were placed into 68 clusters. The identified bacteria belonged to eight genera such as *Arthrobacter*, *Bacillus*, *Delfia*, *Enterobacter*, *Pseudomonas*, *Serratia*, *Staphylococcus* and *Stentrophomonas*. Respective strains from each cluster were characterized for the PGPR traits like indole acetic acid (IAA) production, siderophore production, phosphorous solubilisation, ammonia production and HCN production. Of 68 strains, 47 were IAA producing with a range of 2.18-58.03 µg/ml; 11 were found to be efficient phosphate solubilizers, 12 showed siderophore production, 35 showed ammonia production and 4 showed HCN production. One isolate showed all the above stated properties, while 4 isolates were to be promising in IAA production, phosphate solubilisation and siderophore activity.

170. Sisal fibre biocomposites of renewable resource-based polyurethane for biomedical applications

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The worldwide trend towards using cheap, atoxic and durable materials from renewable resources contributes to sustainable development. Thus, the investigation of the potential use of vegetal fibers as reinforcing agent in polymeric composites has gained new significance. Sisal (*Agave sisalana*), a xerophytic monocotyledonous plant with luxuriant growth even in areas of scanty rainfall (desert) which yields a stiff hard fibre, has emerged as a reinforcing material for polymers used in automobile, footwear and civil industries. Plastic materials reinforced with sisal fibers have been used as substitute for wood plates and in mortar formulation.

Biocomposites of sisal fibre of varying length and weight percentage were prepared with polyurethane (synthesised from castor oil as the natural polyol and Toluene Diisocyanate) to reduce the cost of traditional fibre-(like carbon, glass and aramid)-reinforced petroleum-based composites and characterized by standard procedures.

The purpose of this study is to investigate the influence of different fibre loadings; their dispersion in the PU matrix on various physico-chemical and the mechanical properties of the nanocomposites and their possible use for biomedical applications and the results are encouraging.

They would degrade in natural environment by microbial action within reasonable time period on disposal after their intended use in various applications.

171. Protective effect of Spirulina and tamarind on histology of kidney of Swiss albino mice treated with fluoride

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Fluoride is a ubiquitous non-metallic element exists abundantly in the earth's crust. In India, 177 districts have been confirmed as fluoride prone areas. Among 31 districts of Rajasthan, excess of fluoride in the drinking water has become a serious health issue in 23 districts. F⁻ is small in radius and passes easily through cell membranes and enters in to soft tissues like kidney, liver, muscle, endocrine glands, testis and brain. We report toxic effects of fluoride after sub-acute and sub-chronic exposure on Swiss albino mice reared on standard diet and diet supplements viz. Spirulina and tamarind fruit pulp separately and also in combination. There were markedly mononuclear cell infiltration, interstitial bleeding and lysigenous cavity formation at some areas of the interstitial of kidney, specially in standard feed groups. Other changes were; dilation of bowman's capsule and thickening of its parietal and visceral layer, alterations in glomeruli size and their sclerotization, increase in bowman's space, proliferation of mesangial cells, reduction in podocyte counts and epithelial cells of tubules along with tubular dilation. These abnormalities were severely present in standard feed groups, moderately in Spirulina and tamarind groups and almost absent in those mice received Spirulina and tamarind in combination. Sub-acute exposure was found more toxic. The diet modulation not only reduced fluoride toxicity but also led to better recovery of treated mice after with drawl, especially in combination.

172. Expression Profile of Heat Shock Protein 70 gene in Indian goats under different environmental conditions

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In desert and tropical environment, feed resources are restricted both in quantity and quality leading to differences in energy requirements and digestive efficiency of ruminants. Goats are well adapted to extreme climatic conditions and serve as an ideal species for studying the effect of heat and cold stress. Thermal stresses trigger a complex program of gene expression and biological adaptive responses. The former can be studied through stress proteins such as Heat Shock Proteins which are highly conserved and are key factors of anti-stress mechanism. Heat Shock Protein 70 (Hsp70) plays a variety of functions including cytoprotection under stress conditions. A direct comparison of HSP genes and their expression profile with some of the unknown genes affected by heat and cold stresses shows both important similarities as well as critical differences. The present work employs the Hsp70 gene expression in different tissues including liver, heart, spleen and kidney of Barbari goat breed in the summer and winter seasons by using relative quantification by Real-time PCR. The results show that the expression level increases in summer in the liver, kidney and heart as compared to the winter.

173. GIS based assessment of a Sandy Terrain in Western Rajasthan for understanding distributional pattern of agricultural land use: A case study from Jodhpur district

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Jodhpur is a transitional region within Arid Western Plain agro-climatic zone of Rajasthan. Rainfall wise, it's oscillated between extreme arid terrain of Barmer & Jaisalmer in the west to alluvial plains of Luni river basin in Pali and Jalore districts. The district also forms a part of Thar Desert, a major geomorphic province in this region. Sandy plains and alluvial plains constitute about 75% and 11% respectively. In the last decade, this region has also received rainfall ~ 350 – 370 mm which indicates a wetter environment. Canal water has also reached the district area to meet its drinking and irrigation demand. Above changes in the water scenario is expected to influence the agricultural landuse and overall bearing on the sandy terrain. Therefore, in this present study, we tried to assess the possible changes with few questions in mind (1) is there any change in the distribution pattern of sand dunes between 1960 and 2011, (2) if there is a change in contours of rainfall during the same period, (3) and what impact have these changes on the trend in agricultural landuse. We used GIS to analyze thematic datasets to answer queries related to spatial dimension. SOI Toposheets and IRS-P6 LISS-III satellite images were used to extract information on sandy terrain and landuse/landcover. Normalized Difference Vegetation Index (NDVI) was used to see changes in vegetation cover in this desert terrain. The study came out identifying areas having changes in terrain and landuse that has a bearing on the rural livelihood.

174. Effect of plant growth regulators on plantlet regeneration of *Paederia foetida* L.

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A novel protocol for *in vitro* propagation of *Paederia foetida* L. (Rubiaceae) has been established. Callus and shoot formation from the nodal explants with axillary buds of *Paederia foetida* L. was initiated on Murashige and Skoog's (1962) basal media supplemented with combinations of auxin (IAA 0.5 mg/l) with cytokinin (BA 1.0 mg/l) induced an organogenic and chlorophyllus callus with an average of 5 shoots per node. Subsequent culture for rapid multiplication of shoots on MS medium with combinations of BA (1 mg/l), Kinetin (0.5 mg/l) and GA₃ (0.2 mg/l) enhanced the number of shoots. Callus initiated from the basal cut end explants differentiated into more than 28 shoots. Shoots regenerated from *in vitro*, rooted on half strength MS medium supplemented with IBA (1.4 mg/l) showed thick and stout roots. Eighty percent of the rooted shoots survived when transferred to the Greenhouse and subsequently to the natural environment.

175. Comparative study of nickel induced stress impacts in black gram cultivars for assessing phytoremediation potential

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Release of nickel (Ni) into the soil through various anthropogenic activities such as smelting, burning of fossil fuel, vehicle emissions, disposal of house hold, municipal and industrial wastes, metal mining, fertilizer application, and organic manures pose significant threats to environment. The current investigation on Ni induced various stress impacts in two black gram (*Vigna mungo* L.) cultivars (PU31C and Shekhar1) under hydroponics reveals various phytotoxic effects. Comparative data on various growth parameters and chlorophyll content of two black gram cultivars under varying concentrations of Ni showed that Shekhar1 is more sensitive than PU31C. Gradual decline in total chlorophyll and growth was observed with increased treatment concentration of Ni²⁺. Total free amino acid and proline accumulation was found maximum at 50 µM and 100 µM Ni²⁺ treatments among toxic doses. Reducing sugar and total sugar content was recorded maximum with increased treatment of Ni²⁺ (200 µM). Protein content of Shekhar1 cultivar was found more than PU31C. The study gives and insight about the tolerance and sensitive nature of cultivars which could be helpful for cultivating the crop variety in contaminated soil by local farmers.

176. Hexavalent Chromium induced physiological and biochemical stress impacts in *in vivo* grown *Helianthus annuus* L. - a preliminary phytoremediation approach

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Present pot culture experiment assess the impact (physiological and biochemical response) of increased doses of hexavalent chromium (Cr⁶⁺) in sunflower (*Helianthus annuus* L.) at different stages of plant growth. Seedling survival % was reduced to 30% at 200 mg Cr⁶⁺/kg dry soil treatments. Root and shoot length of seedlings after 15, 30 and 45 days treatment up to Cr⁶⁺ at 100 mg/kg dry soil showed negligible difference. Seedlings showed significant reduction in fresh and dry biomass, chlorophyll and carotenoid content of seedlings with increased supply of Cr⁶⁺ up to 200 mg/kg after 45 days. Gradual reduction in total sugar content with increased Cr supply was observed in 45 days treated seedlings whereas it was vice versa in 30 days treated seedling. Total free amino acid (α -Leucine) accumulation showed significant linear increase (5.6 mg/g fr. wt. at treatment of 200 mg Cr⁶⁺/kg dry soil) after 30 days treatment but after 45 days it showed linear decline at treatment of 100 mg Cr⁶⁺/kg dry soil. The study indicates a preliminary report on the tolerance potential of *H. annuus* towards environmentally toxic doses of hexavalent chromium which leads to evolved phytoremediation techniques after *in situ* application.

177. Occurance of albino peacock in Ootamber village of Jodhpur (Thar desert of Rajasthan) India

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The study carried out at the Ootamber village of the Jodhpur district. Study is completely based on the observation basis on occurrence of albino Peacock at the study site. The Indian Peafowl (*Pavo cristatus*) was one of the all species which described by Linnaeus. The Indian Peafowl is listed in Red List of International Union for Conservation of Nature (Bird Life International 2008). In this Paper We describe the occurrence of Indian peafowl in this region (Ootamber Village of Jodhpur). This area is located west site of the Jodhpur. General ecobehaviour of this animal is noted which are similar to the normal Idian Peafowl.

178. In vitro conservation of *Ceropegia bulbosa* Roxb. - A threatened asclepiad

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Ceropegia bulbosa Roxb. (Family - Asclepiadaceae), an important medicinal plant, is a threatened species. An improved shoot regeneration protocol has been developed using nodal shoot explants. The explants were cultured on MS medium with BAP or Kin for bud breaking. About 80% of the explants responded within 15 days of inoculation on MS medium with 2.0 mg l⁻¹ of BAP. Shoot amplification was achieved on MS medium with various concentrations of BAP or Kin with IAA. Maximum number of shoots (25-30) on MS medium + 1.0 mg l⁻¹ of BAP or 0.1 mg l⁻¹ of IAA. The cloned shoots rooted on MS medium with 0.2 mg l⁻¹ IBA and 100 mg l⁻¹ AC. Cent percent shoots rooted ex vitro when treated with IBA (300 mg l⁻¹) for 2 min. Rooted plantlets were hardened successfully and transferred to the polybags.

179. Role of malnutrition in cognitive development in undernutrition children

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In developing countries such as India, millions of young children suffer from nutritional deficiencies (ND). Literature indicates that nutrition and health affect children's cognitive development both pre and postnatal. The impact of ND depends on the stage of a child's development, as well as the severity and duration of the deficiency. The situation is complicated in that children who suffer from nutritional deficiencies and infections usually come from poor socio-cultural environments such as tribal communities. Several studies showed a direct causal link between poor nutrition and poor development is difficult and requires a randomized controlled trial in which nutrition supplementation is given to undernourished children. Despite this precise mechanism linking under-nutrition to poor mental development is poorly known. It is possible that the mechanism varies according to which nutrients are deficient, or that several hypothesized mechanisms could act separately or together.

180. Clonal propagation and quality assessment of adventitious rooting through aeroponics in *Commiphora wightii* (Arnott) Bhandari- an endangered medicinal plant

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Commiphora wightii (fam: Burseraceae) commonly known as guggal/Indian Myrrh/Indian bedellium is a highly valuable source of guggal gum resin. It has been included in the Red Data Book of IUCN (IUCN 2011). The aim of this study was to develop an efficient method for propagation of *Commiphora wightii* via adventitious rooting of stem cuttings under soilless conditions. The nodal cuttings bearing 4-5 leaves were pretreated with different concentrations (0.0, 0.5, 1, 2, 3, 4 or 5 gl^{-1}) of IAA, NAA and IBA before insertion in an aeroponic chamber (28 ± 2 °C, 16 h photoperiod and 65% relative humidity). Among the three auxins used for pretreatment, maximum percentage of rooting, number of roots and root length was observed on 3 gl^{-1} IBA within 10 days. Therefore, IBA was used further for comparison with rooting in soil. The number of adventitious roots per cutting and the percentage of cuttings rooted aeroponically were significantly higher than the soil grown stem cuttings. All the plantlets sprouted and rooted aeroponically survived successfully on transfer to soil. This study suggests aeroponics as a method for rapid root induction and clonal propagation of this endangered and medicinally important plant which require focused efforts on conservation and sustainable utilization.

181. Role of *Trichoderma harzianum* as biocontrol agent for the management of *Meloidogyne javanica* attacking bottle gourd

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Plant parasitic nematodes are major pathogens which cause worldwide losses to agriculture \$100 billion /annum. *Meloidogyne* spp. play a major role in crop losses. Nematicides are often use but they are withdrawn from the market because they pose pollution threats and hazardous in nature. Hence, the present investigation was conducted to evaluate biocontrol potential of *Trichoderma harzianum* alone and in combination with oil seed cakes viz., cotton, mustard and neem against root knot nematode, *Meloidogyne javanica* attacking bottle guard under glasshouse conditions .The soil treated with different oil seed cakes applied @ 50g/pot and *T. harzianum* @ 2g/pot. All the treatments brought about significant reduction in the root knot development and improved the growth parameters of bottle guard. Soil treated with neem cake + *T. harzianum* was found most effective in reducing disease intensity and enhance yield and other growth parameters. So the use of *T. harzianum* as a biocontrol agent is advisable for nematode control because they are non toxic, pollution free and promising for bottle guard cultivation grown under sandy loam soil and even in Rajasthan agroclimatic conditions.

182. Antispermatic effect of a herbal preparation in male albino rats

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The 50% alcoholic extracts of flowers of cassia fistula + *Hibiscus rosa sinensis* + *Malva viscus Conzattii* as herbal preparation (mixed in equal amounts) was studied in adult male albino rats (*Rattus rattus norvegicus*). The doses of herbal preparation 50,100 and 200 mg/kg/ day body weight were orally fed to two set of each with three groups including five rats, (dose wise) alongwith a separate control group (vehicle treated) for 60 days. The treated rats with different doses of first set were mated with normal female rats on day 61st. The treated rats showed normal mating. After mating test done, all the treated rats were killed and their genital organs - testes, epididymes and vasa differentia were taken out and processed for histopathological examination.

The genital organs weight was significantly reduced. The spermatogenesis was arrested. The seminiferous tubules were disfigured, reduced in size and their lumen filled with cellular debris. The Leydig's cells were atrophied. The epididymes and vasa deferentia were also devoid of spermatozoa. The second set of treated rats showed revival of spermatogenesis and return of fertility after withdrawal of treatment for 30 days. These rats were able to make pregnant the normal female rats. The effect appears to be reversible. Thus, this herbal preparation may be good herbal contraceptive for male.

183. A preliminary pharmacological screening of certain botanical drugs- for its anti-depressant effects

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Depression is a chronic mood disorder involving thought and behavior of affected person. Altered thought process, loss of libido, disturbed sleep pattern with low self esteem and loss of interest in life affairs are the major presenting clinical symptoms of depressed patients. A high prevalence rate of depression is reported in India and females are more affected compare to males. Biochemical defects like decreased brain monoamine neurotransmitters are noticed in depressed condition. A variety of conventional anti-depressant agents are being used for the management of different degree of depression. Due to risk profile of these drugs an opportunity has been taken for screening of certain medicinal plants targeting its activity on various bio-markers associated with the development of depression. In the present study four plants namely *Nyctanthes arbortristis*, *Ocimum tenuiflorum*, *Hippophae salicifolia* and *Withania somnifera* were screened and the pharmacological therapeutic action of extracts of these plants have been validated on various monoamines including melatonin secretion. These drugs have shown a dose dependent MAO inhibitory activity, melatonergic agonist activity, serotonic antagonist effects revealing the anti-depressant effects.

It is included that above four botanical substances have beneficial effects in the treatment of various dimensions of depression mainly the involvement of emotional, cognitive and social aspects of depressed patients.

Results shall be presented and discussed.

184. Exploration of cytomorphological diversity in members of gamopetalae from Rajasthan

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Rajasthan situated in north-west part of India and is blessed with diverse landscapes and vegetation. The area covered by the state has four major physiogeographic regions with diverse physical features. (a) The great Indian Thar desert located in North-Western part of the state famous for its surface unevenness which are caused due to shifting sand-dunes, barren hills, rocky plains and sandy plains (b) The central Aravalli mountain range which runs across the state stretching from Gujarat to Delhi covering a distance of about 692 Km (c) The Eastern Plains enriched by rich alluvial soil and drained by seasonal rivers and (d) The South-Eastern Hadoti Plateau with intrusions of black volcanic rocks. The floral diversity is explored well but cytological investigation of the plant species from this region is completely neglected.

To make contribution to the cytology of the plant species in this region, this research project has been undertaken. At present, 40 species belonging to 33 genera of 16 families have been cytomorphologically worked out from different localities of districts Sri Ganganagar, Hanumangarh, Churu, Sirohi, Udaipur, Jodhpur and Jhalawar. Of these *Adhatodavasic*(n=17), *Carissa carandas* (n=11), *Cyathocline* sp. (n=9), *Eclipta alba* (n=11), *Echinopusechinatus* (n=14), *Galinsogaparviflora* (n=16), *Lagasceamollis* (n=17), *Parthenium hysterophorus* (n=17), *Pulicariacrispa* (n=9), *Sonchusoleraceus* (n=16), *Xanthium strumarium* (n=18), *Tricodesmaampelxicaule* (n=11, 22), *Ipomeapes-tigrides* (n=30), *I. carnea*(n=15), *Heliotropium* spp. (n=32), *Clerodendrumphlomidis* (n=24), *Plectranthus rugosus*(n=12), *Martyniaannua*(n=16), *Dyerophytum indicum* (n=7), *Plantago ovate* (n=18), *Anagalisarvensis*(n=20), *Nicotianaplum baginifolia*(n=10), *Physalisangulata* (n=12, 24), *Solanumsurattense* (n=12), *S. seaforthianum* (n=12, 24), *Withaniasomnifera*(n=24), *Phyla nodiflora* (n=18) and *Verbena tenuisecta* (n=5) shows normal meiotic course while *Ageratum conyzoides*(n=10, 20), *Blumea* sp. (n=10), *Erigeron bonariensis* (n=27), *Launeanudicaulis* (n=9), *Verbesinaencelioides* (n=17), *Daturastramonium* (n=12), *Solanumseaforthianum* (n= 24), *Veronica anagallis aquatic* (n=26), *Majus japonicas* (n=20), *Lyciumedge worthii* (n=12), *Orobanche ramosa* (n=12) and *Cuscutareflexa* (n=16) shows various meiotic irregularities such as cytomixis, univalents, chromatin stickiness, early and late disjunctions, unoriented bivalents, laggards and bridges. Of these, four species *Ipomeapes-tigridis* (n=30), *Dyerophytum indicum* (n=7), *Orobanche ramosa* (n=12) and *Solanumseaforthianum* (n=24), make varied chromosomal counts for the first time.

185. Road map for prevention of food borne zoonotic parasitic diseases in India

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Zoonoses are the diseases which are naturally transmissible between vertebrate animals and man. Parasitic zoonoses directly affect human, livestock health and production. Transmission of parasitic zoonoses through food has public health as well as socioeconomic importance. The environmental route of transmission is significant for many protozoan and helminthic parasites, with water, soil and food being particularly significant. Food borne parasitic zoonoses occur through consumption of infected meat, fish, contaminated vegetables/plant and water.

186. Poverty & malnutrition – India’s biggest problem: A counter scheme

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India is among the poorest countries of the world, with one of the richest biodiversity, vast human resources and huge land mass of fertile soil. The poverty is then directly associated with lesser income, low awareness level and under nutrition; consequently more diseased condition. All these finally affect the GDP and National Growth & Development. But, there are other severe problems which are unattended; one of these is the hidden hunger (HH), unlike the hunger that comes from lack of food. It is a chronic lack of vitamins and minerals (micronutrients) that often has no visible warning signs, so that people who suffer from it may not even be aware of it. Its consequences are nevertheless disastrous: hidden hunger can lead to mental impairment, poor health and productivity, or even death. One in three people in the world suffer from hidden hunger. Women and children from the lower income groups in developing countries, like India are often the most affected. The crude fact is –

- Vitamin and mineral deficiencies account for 10% of the global health burden.
- 2 million children may die unnecessarily each year because they lack vitamin A, zinc, iron & other micronutrients.
- 18 million babies are born mentally impaired due to iodine deficiency each year.
- Iron deficiency undermines the health and energy of 40% of women in the developing world. Severe anemia kills more than 50,000 women a year during childbirth.

In order to combat widespread deficiencies in iron, India is taking steps to promote iron-rich crops such as pearl millet, which is high in vitamin B, calcium, iron, potassium, magnesium and zinc as well as being well adapted to drought, poor soils and high temperatures. The Indian government is aiming to reverse the trend of declining millet production by incorporating the crop into school feeding programmes, thereby improving school children’s nutrition and creating market demand. A nutritional survey & analysis has been made to assess the impact of such programmes in and around Allahabad, as a case study; and the findings have been correlated with the prevalent HHI viz a viz government initiative in last three years. Not only that, a three-pronged approach has also been suggested to combat hidden hunger.

187. Observation on adaptations in some liverworts growing under xeric conditions in Kumaun Himalaya

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Liverworts, as a rule, prefer moist and shady places. In a tropical country like India, they remain largely distributed in hills and mountains where the moisture content is high. However, these tiny plants have to face the drier summer months, from March to June, every year. As such, they have evolved life strategies in multiple ways to overcome the shortage of water. In Kumaun region (28°44' to 30°49'N; 78°45' to 81°05'E) of Western Himalaya we have frequently observed that the bare and exposed surfaces of rocks and boulders, which otherwise do not support any vegetation, have some xerophytic liverworts growing on them. Some such thalloid liverworts include *Plagiochasma appendiculatum* L. et L., *Targionia hypophylla* L., *Asterella pathankotensis* (Kash.) Kachroo and *Riccia pathanlotensis* Kash. These forms have also been observed growing on rocks located in dense oak forests at higher altitudes where a greater degree of moisture persists throughout the year. As such, in order to understand the life strategies adopted by these plants in xeric conditions, a comparison between the two kinds of forms growing in the drier and moist habitats was made.

The study reveals that the liverworts species growing on exposed rocks under drier conditions have a greater frequency of producing tuberculated rhizoids, a higher concentration of flavinoid pigments in their scales, rather faster upward rolling thereby protecting the dorsal chlorophyllous cells and having more thick-walled cells in the region of midrib than those forms growing under moist conditions.

188. Exposure to Eslicarbazine acetate: Impact on maternal toxicity and behavioural responses in pregnant rats

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Among CNS disorders, epilepsy is one of the most common disorders ranking second to stroke within estimated prevalence of 50 million people worldwide and affects about 0.5-1.0 % of all the world population. A number of antiepileptic drugs (AEDs) are available for the treatment of epilepsy, bipolar disorder, migraine, mania, neuropathic pain and anxiety. However, some AEDs are endowed with unfavourable safety profiles, such as hepatotoxicity, toxicity to central nervous system (CNS) and show complex drug to drug interactions. In recent years, pharmaceutical companies have developed new AEDs with improved safety profiles than the previously available ones. Our experiment includes three exposed group (experimental) to an AED and one unexposed group (control). Therefore, present study is an attempt to evaluate the effect of maternal exposure of Eslicarbazine acetate (ESL) on food intake and body weight change and behavioural changes in pregnant mother rat.

All the control and experimental subjects were exposed from gestation day 0 to 20 (GD 0-20) either with the drug or without the drug. In this study selected doses of ESL (125, 250 and 500mg/kg body weight) were administered orally to sperm positive dams daily from Gestation day 0-20 (GD 0-

20) through cannula. Records of daily food consumption and body weight gain by each individual rat (treated and untreated) were maintained throughout the experiments. According to protocol on GD15 pregnant rats were subjected to neurobehavioral tests of anxiety and locomotor activity for both drug treated and control groups under different mazes. For anxiety Open Field Arena and for locomotor activity photoactometer were used. Exposed pregnant rats showed significantly decreased state of anxiety in open-field arena. In photoactometer, exposed rat showed significant enhanced number of mobility phase than control subjects. These findings suggest that exposure of ESL during gestation period showed behavioral alterations in adult pregnant rat.

189. Risperidone influence on gestational and fetal development in albino rats

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There is limited data about atypical antipsychotic prescription in pregnancy because due to obvious reasons of ethical issues no randomized controlled studies can be made. Keeping this view in consideration, present study has been undertaken to evaluate the effect of prenatal exposure to Risperidone on neocortical region of fetal brain; and related functional sequelae in adult rat offspring. In this study pregnant, wistar rats were exposed to Risperidone at 0.8mg/kg, 1mg/kg and 2 mg/kg BW orally from GD 6 to 21. About 50% of the pregnant rats were sacrificed and their brains were collected, and their brains were dissected out, and processed for neurohistological evaluation. The remaining dams were allowed to deliver naturally and reared up to 8 weeks of age for neurobehavioural study.

Prenatal exposure to Risperidone doses significant produced stunting body and brain weight in rat fetuses. Histopathological observations of exposed fetal brain showed disturbed cytoarchitectural pattern of neocortex substantial reduction in the thickness of six cortical layers were found as compared to control. However, neurobehavioural study revealed that were found altered in prenatally exposed offspring as compared to control. Therefore, it is concluded that different doses of prenatal Risperidone during brain growth spurt induces not only stunting of the body and brain weight but also loss of neocortical architecture and neuron which may cause long-lasting behavioral impairment in rat's offspring.

190. In-utero exposure of anticonvulsant Gabapentin induced neurodevelopmental delay and neurobehavioural alterations

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For the management of epileptic seizures several second-generation antiepileptic drugs (AEDs) are in practice; but neurobehavioural safety of these anticonvulsant drugs, both clinical and experimental, have not been well documented so far. The basic mechanism of action of these drugs are same as of classical AEDs but exert distinct induced effect on developing fetuses. Reports on potential behavioural teratogenicity of newer AEDs like Gabapentin (GBP) are limited, sketchy and

inconclusive. Therefore, present study is an attempt to evaluate the long-lasting effect of prenatal exposure of Gabapentin (GBP) on neurodevelopmental delay and neurobehavioral disturbances in young-adult rat offspring. The pregnant rats (Charles-Foster) were exposed to GBP@ 300 and 400mg/kg body weight from gestation day 0-20. Both drug treated and control dams were allowed to deliver naturally. The offspring of both groups were weighed at birth and reared with their biological mothers' upto PND21. At 8 weeks of age, offspring were subjected to neurobehavioral tests of anxiety and depression under different mazes. GBP exposed rat offspring showed significantly increased state of anxiety in open-field arena and on elevated plus-maze. In behavioral despair maze, exposed rat offspring showed significant enhanced number of immobility phase (a depression sign). These findings suggest that prenatal exposure of GBP during organogenesis showed not only neurodevelopmental delay but also long-lasting effect on neurobehavioral alterations in young-adult offspring. The neurobehavioral alterations in exposed rat offspring may be due to adverse effect of the drug on early development and maturation of different brain regions; and possibly on the level of neurotransmitters (NTs) in GABAergic enriched centers of the fetal brain. The trophic role of neurotransmitters during CNS development may not be ruled out, and needs further investigations.

191. Studies on effects of some biochemical parameters in *Channa punctatus* (Bloch.) after intoxication of Talstar (Bifenthrin)

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Pesticides, insecticides, heavy metals and detergents are major cause of concern to aquatic environment because of their toxicity and tendency to accumulate in the living organisms. Pesticides and insecticides have wide variety of chemicals with great difference in their mode of action, uptake by the body, metabolism and elimination from the body, and toxicity targeted and non-targeted organisms (David *et al.*, 2003). Their continuous use and flow of water bodies may cause alteration in various aquatic organisms, particularly to fishes (Tripathi *et al.*, 2002).

Talstar (Active substance is bifenthrin) is an insecticide, used for the effective control of the pest of cotton, vegetables and public health for the control of mosquitoes. It affects the central and peripheral nervous system and cause synaptic discharge, depolarization and ultimately death like most pyrethroids is also an ATPase inhibitor. Fishes are best indicator of water quality and are meant for ornamental and food value. Sub lethal concentration of Talstar on Serum total protein, serum cholesterol and serum glycogen have been studied. Talstar's LC₅₀ has been calculated by the log-dose/probit regression line method. Sublethal concentration of Talstar given to *Channa punctatus* showed that to serum total protein concentration increased significantly and serum cholesterol and serum glycogen decreased significantly after 1, 7, 15 and 30 days treatment respectively.

192. Cyto-morphological diversity in some monocots from Rajasthan

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Rajasthan is a large arid region known as Thar desert. There are very few reports on cytology of monocots from Rajasthan. Presently, intraspecific variabilities and meiotic anomalies have been noticed through detailed morphological as well as cytological study. Meiosis has been worked out for 70 monocot species. Some species show various meiotic abnormalities. These abnormalities are cytotoxicity (*Arthraxon prionodes*, *Chrysopogon serrulatus*), multivalents and secondary associations of bivalents (*Cenchrus setigerus*, *Eriochloa procera*, *Paspalum paspaloides*, *Polypogon monspeliensis* and *Sorghum bicolor*), Chromatin stickiness (*Arthraxon prionodes*, *Cynodon dactylon*, *Paspalum flavidum* and *Commelina* sp.), unoriented bivalents (*Cynodon dactylon*, *Cenchrus pennisetiformis* and *Cymbopogon martinii*), multiple chromatin bridges (*Arthraxon prionodes*, *Cenchrus ciliaris*, *Cynodon dactylon* and *Commelina* sp.), non-synchronous (*Aloe vera*, *Brachiaria mutica*, *Cymbopogon martinii*, *Cenchrus ciliaris* and *Gloriosa superba*), multipolarity of bivalents (*Paspalum paspaloides*) and laggards (*Aloe vera*, *Brachiaria mutica*, *Cenchrus biflorus*, *C. ciliaris*, *Paspalum paspaloides* and *Sorghum bicolor*). Bimodal karyotype has been reported in some species of *Poa annua* 4S+5M+5L and *Aloe vera* 3S+4L. The presence of B-chromosomes has been observed in *Hemarthria compressa*. Due to these irregularities during meiosis, microsporogenesis is found to be abnormal. Chromosome number and meiotic abnormalities in these monocots will be discussed.

193. Studies on photosynthetic pigments in Blue Green Algae

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Cyanobacteria are diverse group of prokaryotes with many characteristic features. The photosynthetic pigments are one of the most important among them. They are classified into chlorophyll-a, carotenoids and phycobilins. These pigments are involved in the energy transfer to photosynthetic reaction centre. Analysis of chlorophyll-a can provide biomass of microbial diversity whereas measurement of pigments and protein concentration will demonstrate the effects of environmental growth conditions and stresses. In this work, we have selected ten genera from different groups of cyanobacteria like unicellular (*Merismopedia*-1401, *Microcystis*-1502 and *Gloeothoece*-1305), non-heterocystous (*Pseudanabaena*-2210 and *Phormidium*-2006) and heterocystous (*Scytonema*-5232, *Anabaena*-3208, *Nostoc*-3107, *Haplosiphon*-502 and *Calothrix*-4504) for pigments and protein analysis.

194. Progress in computational studies regarding host pathogen protein-protein interactions

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Host-pathogen relationships can be best understood at the level of protein-protein interaction between host and pathogen proteins. Such interactions are instrumental for the understanding entry of the pathogens into the host. It is therefore of great significance to comprehend the physical interplay between receptor and target proteins involved during pathogenesis. Further, they are crucial for effective understanding of the mechanism that underlies infectious diseases. Experimental structure determination of the complexes involved at atomic resolution can be a prolonged and expensive procedure to study the detailed pathogenesis mechanism. Hence computational approaches towards understanding host-pathogen interactions, prediction and analysis of host pathogen protein-protein interactions; database and other software tools for host pathogen interaction data collection have altogether caused a radical leap into the knowledge of this field. The approaches developed for predicting host pathogen PPIs can be largely characterized into homology-based, structure-based, domain motif interaction-based, as well as machine-learning based approaches. The host-pathogen systems that have been studied in detail include *Homo sapiens-Plasmodium falciparum*, *H.sapiens-Heliobacter pylori*, *phage T4- Escherichia coli*, *phage lambda- E. coli*, *H. sapiens- E. coli*, *H. sapiens- Salmonella enterica*, *H. sapiens- Yersinia pestis* etc. In the present paper, we focus on various aspects including advantages and disadvantages of host pathogen protein-protein interactions (PPIs).

195. Role of NTFPs in tribal economy of Sirohi district in Rajasthan

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Rajasthan tribals constitute around twelve percent of the total population of the state. The tribes of Sirohi district constitutes mainly Garasia, Gameti (Bhil) and Meena living in 24 villages in Mount Abu Block (Bhakhari area) which provides a good example of NTFP collection and selling. The socio-economic survey of this area reveals that economically tribal people are very poor and most of them have been listed as BPL families. These tribes are mostly backward residing in the interior parts of the forest and depend on it as their main source of livelihood. The forestland consists of 65% of the total area with only 6 % land being under cultivation. The literacy rate is very low i.e. 13.17% for men and 0.85 % for women. The average income of households ranges from Rs.7,000-8,000/- per annum to Rs. 15,000-16,000/- per annum. Those having agricultural lands are at higher end with almost similar contribution of NTFPs for all the households. To assess the role of NTFPs in the tribal livelihood, 10% of families each in six tribal dominated villages were selected randomly for detailed baseline socio-economic survey. The identified key NTFPs playing significant role in tribal livelihood with their (mean± S.D.) collection /annum in Kg. are: *Tamarindus indica* : fruits (49.25±46.04) prevailing cost Rs.30-40/kg, *Pithecellobium dulce* : fruits (36.12±18.36) Rs.10-15/kg, *Momordica*

dioica : fruits (29.31± 15.68) Rs.40-60/kg , *Annona squamosa*: fruits (14.20±12.77), Rs.15-30/kg
Diospyrose melanoxylon : fruits (14.08±11.81) Rs.15-30/kg, *Syzygium cummuni* : fruits
 (13.48±11.32) Rs.30-40/kg, *Pongamia pinnata* : seeds (13.18±11.53) Rs.7-10/kg *Phoenix sp.* : fruits :
 (12.37±11.38) Rs.10-20/kg, *Jatropha curcus* : seeds (10.14 ± 8.84) Rs.10-15/kg.

196. Throughfall, stemflow and rainfall interception in important tree species of Indian Thar Desert

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Thar desert of India, being a water-scarce area, partitioning of gross rainfall (GR) into throughfall (TF), stemflow (SF) and interception loss (I) has important role in predicting the hydrological effects. Experiments conducted in the farm of Regional Research Station, Central Arid Zone Research Institute, Jaisalmer on rainfall event basis during July to September, 2012 by installing throughfall collectors at the rate of two per tree, placed randomly beneath the canopies while stem flow was collected from same trees using specially designed rubber tube stem flow collection collars. The study conducted in 22 years old *Acacia senegal* and *A. tortilis* trees consists of difference DBH classes. Gross rainfall (GR) was measured in an open area close to the study plot. The amount of cumulative GR transformed into TF, SF and I for *A. senegal* and *A. tortilis* were (107.57mm, 10.81mm and 26.72mm) and (89.31mm, 7.85mm and 47.94mm), respectively. On the event scale, average ratios of TF:GR, SF:GR, and I:GR for *A. senegal* and *A. tortilis* were (74.14%, 7.45% and 18.41%) and (61.55%, 5.41% and 33.04%), respectively. A fairly strong positive correlation was observed between TF:GR and GR for both *A. senegal* and *A. tortilis* (R^2 value = 0.5182; 0.673). Negative correlation was observed between SF:GR & GR (R^2 value – 0.32); I:GR and GR (R^2 value – 0.44) for *A. tortilis*. As the intensity of the rainfall events increased, the interception loss in *A. senegal* (18.41%) was comparatively lesser than *A. tortilis* (33.04%). The study concludes that interception in *A. tortilis* represents a remarkable percentage of gross rainfall than *A. senegal* and it was strongly affected by GR. The higher TF:GR ratio of *A. senegal* is an useful observation having relation with runoff.

197. Developmental neurotoxicity of deltamethrin

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The developing nervous system is highly vulnerable to the exposure to toxic agents, infections, nutritional stress or other environmental factors because of the lack of blood brain barrier and an extensive and complex events involved in it. Thus any structural and functional anomalies may lead to the impairment in learning, memory and the ability to regulate certain responses. Many of the commonly occurring neurodevelopmental disorders are well correlated with the toxic exposures to the environmental agents and interactions with the environmental factors and genetics, because of their prevalent use even without assessing minimal potential toxicity. We have studied the impact of a very low dose (1/200th of LD50) of deltamethrin, a type II pyrethroid insecticide on the cerebellar

development of rat brain. Results indicated a restricted proliferation, delayed migration, increased apoptosis of both progenitors and the differentiated cells, and stunted neurite growth leading to the deficits in motor activity and motor coordination as well as cognitive ability. The results mimics the symptoms associated with some neurodevelopmental disorders in humans, thus becoming alarming for the use of these so considered “safe to human beings” pesticides in the environment of pregnant women or young children.

198. Diabetes, glial activation and impaired cognition

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Role of glial cells in cognition and behaviour disorders in diabetes is poorly understood. Glial activation following experimental infection has been recorded to cause impairment of cognitive ability in rats. In this study, in the STZ-induced diabetes model (45mg/ kg body weight; intraperitoneally), we have observed increased GFAP expression, phenotypic changes and S100 beta expression confirming hyperplasia and hypertrophy of astrocytes. Enhanced Iba1 and MHC II expression corroborated microglial activation following diabetes. Apoptotic cells were profoundly present in the brain regions studied. Reduced co-labelling of GLT-1 and GFAP revealed the altered glutamate transportation. A decline in spatial cognition, motor coordination and muscle activity was recorded in diabetic rats with Barnes maze, rotarod and grip strength studies, respectively. This study provides first insight on the role of glial activation following diabetes in behavioral alterations.

199. Effect of *Paenibacillus polymyxa* on *Stevia rebaudiana*, Bertoni

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The human civilization has revealed a conspicuous preference towards the sweet stuffs since primordial times. For that purpose sucrose is extensively used which provides good quality of sweet savour. Later on, several researchers have reported diverse medicinal and nutritional disorders caused by sucrose. These disorders can be reduced by substituting sucrose by herbal plants such as *Stevia rebaudiana*, Bertoni. *S. rebaudiana* Bertoni is a unique medicinal plant used basically as an alternate of sugar as well as having very good anti-oxidants along with anti-carcinogenic properties. These antioxidants are more useful in the free-radical reduction. But escalating population requires more plantations with huge amount of leaf residues that contains abundant sweetness, approximately 300 times more than sugar. The use of plant growth promoting rhizobacteria (PGPRs) in the form of bio-fertilizers could be better option for the effective cultivation of *S. rebaudiana*. In the present study 15 days old seedbeds were used with three replicates of each. The treatment of these plant parts such as root, shoot and leaves compared to the control plant. The measurement was done on the basis of 5 growth parameters which were root length, shoot length, total length, number and size of leaves. The readings were taken three times i.e. on the same day, after 10 days and finally after 20 days. The result clearly reflects the positive growth promotion in experimented plant as compared to the control. The antioxidant assay of aforesaid plant was also done by using DPPH method which shows very exciting result.

200. Antibacterial activity of gold nanoparticles (GNPs) against *E. coli*

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Therapeutically gold are being used since the 2500 BC in Chinese medical history. Red colloidal gold is still used in the Indian Ayurvedic medicine for rejuvenation and revitalization during old age under the name of Swarna Bhasma. In the present research we describe a more reliable method for growth inhibition of *E.coli*. The gold nanoparticiles were synthesized by chemical method using auric chloride as a precursor salt and sodium citrate as a reducing as well as stabilizing agent. Characterization of GNPs were performed by using UV-Vis, SEM (Scanning Electron Microscope) and TEM (Transmission Electron Microscope). Futher, these nanoparticles were tested against well explored bacterium *E. coli* using globally accepted Broth Microdilution Method, recommended by CLSI, exhibited a good antibacterial activity in form of IC-50 and MIC. In future GNPs can be used in making water purifier system or kit.

201. *Stereocaulon alpinum* Laur. Ex Funck: A potential source of herbal cosmeceuticals

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Trichophyton, *Epidermophyton* and *Microsporum* are a class of dermatophyte which serves as the primary etiological agent inducing cosmetic embarrassment, such as *Tinea capitis*, *Tinea corporis*, *Tinea inguinalis*, *Tinea manus*, *Tinea unguium* and *Tinea pedis*. The infections are widespread globally and have an increasing prevalence in the present changing environment. Indeed, in some geographic regions, dermatophytic infection is now considered a major public health concern. For the past several millions of years in different civilization, herbals are in practice for the traditional medicinal and household purposes. In the plant kingdom, lichens enjoy a very special position. Besides, being a pioneer in ecological succession, a natural biomonitoring agent and a pollution indicator, nature has synthesized in lichens some unique types of chemicals in the form of secondary metabolites which have an excellent antimicrobial potential. Our study leads in the same path, with initial investigation of the antimicrobial potential of the lichens. In the present study, we have worked upon the anti-dermatophytic activity of 50 % ethanolic extract of lichen *Stereocaulon alpinum* Laur. Ex Funck. Thus, *Stereocaulon alpinum* was subjected to antifungal assay against the two dermatophytic strains *Trichophyton rubrum*, *T. mentagrophytes*, *Microsporum gypseum* and *M. canis*. It was found active against *Microsporum gypseum* and *Trichophyton rubrum*. It has shown promising results for the development of novel cosmaceuticals formulation against dermatophytes.

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