ANNUAL CONFERENCE ON TOXICOLOGY RESEARCH & DEVELOPMENT

(2nd Online International Conference)

BOOK OF ABSTRACTS

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A compilation of abstracts of all research papers presented in Annual Conference on Toxicology Research & Development organized by Zoology Department & RUSA on 07th-08th December, 2023

SOPHIA COLLEGE FOR WOMEN (EMPOWERED AUTONOMOUS)

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About Sophia College

Sophia College, founded in 1940, is affiliated to the University of Mumbai. The Governing Body of the Society for the Higher Education of Women in India runs the College. The religious sisters of the Society of the Sacred Heart of Jesus that was founded in France in 1800, by St. Madeleine Sophie Barat, and lay staff form the staff of the College. The main goal of Sophia is the relentless search for Wisdom, through an education that is holistic and transformative. The College has achieved an A++ Grade in its third NAAC cycle with CGPA of 3.70 on the scale of 4.0. In the academic year 2018-19, the college has been granted Autonomous status. Sophia College (Autonomous) offers Bachelor Degree programmes in Arts, Science, Mass Media and Information Technology, and Postgraduate M.Sc. programmes in Life Sciences, Microbiology, and Chemistry as well as Postgraduate diploma course in Quality Assurance in Food & Pharmaceutical Industry. The college has a well-equipped Suman Tulsiani Research Centre which is recognized for Ph.D. programme in Applied Biology, Microbiology and Zoology. Sophia has illustrious alumnae from different walks of life as it offers a wide scope for girl students to explore their full potential through an academically rich, value-based education enhanced with many co-curricular and extra-curricular activities.

About Zoology Department

The department of Zoology was started in 1952. Zoology is offered as one of the subjects upto SYBSc level and the students subsequently major in Microbiology or Life Sciences at their TYBSc level. The department encourages students to actively participate in various academic as well as the co-curricular activities under Excellence in Science Program and DBT STAR Status by undertaking mini research projects, literature reviews and seminar presentation. The department also organizes environment related activities in order to sensitize the students towards the conservation of ecosystem and understanding the importance of biodiversity. Innovative pedagogies used by the department faculty members such as collaborative learning, enquiry-based learning, invited guest lectures, experiential learning through field-based studies offer an exciting and an enriched academic experience to the students. The syllabus under autonomy has incorporated a blend of basic as well as applied topics in order to give students a sound foundation knowledge of zoology. The department has spacious UG laboratory and is also a recognized research centre for Ph.D. in Zoology with well-equipped infrastructure facilities.

About The Conference

This is the Second Annual Conference on Toxicology Research & Development. Toxicological research has been of great significance in making the life safe not just for humans but for all the living organisms found in various ecosystems. The field of toxicology research and development has also contributed to the development of selective toxicants that could serve beneficial to humans such as pesticides, anticancer and other clinical drugs. Thus, toxicants can have a dual role to play and scientific interventions are necessary to strike a balance between their excessive usage and mitigation of their harmful effects. This conference therefore, aims at exploring the toxicological studies carried out in various fields which may also be mutually connected. The conference has been planned with an objective to orient the UG and PG students to toxicology as one of the dynamic research fields. It will also offer a platform for the researchers to present their research work in this field whereby an exchange of scientific knowledge could be facilitated.

Plenary Session Speakers:

Plenary Session-I: 07th December 2023
Topic: Applications of Instrumentation in Toxicology
by
Dr. Ajit Datar
Scientific Advisor, Clarity Biosystems India Pvt. Ltd., Mumbai

Plenary Session-II: 07th December 2023
Topic: Forensic Toxicology
by
Ms. Riva Pocha
Founder, FACTS
(Forensic Analysis Consultancy & Training Services)

Plenary Session-III: 08th December 2023
Topic: Zebrafish as Model Animal in Toxicology & Allied Research
by
Dr. Kalidas Kohale
Scientific Officer F, Department of Biological Sciences, TIFR, Mumbai

Plenary Session-IV: 08th December 2023
Topic: Toxicological Studies in Clinical Research
by
Mr. Pratik Kulkarni
Senior Manager (Clinical Data Management),
Amgen Inc., Cambridge, UK

Session Chairs for Oral Presentations:

- **Dr. Subhash Donde**, Associate Professor, Kirti M. Doongursee College of Arts, Science & Commerce (Autonomous), Mumbai
- **Dr. Hitesh Singhadia**, Vice Principal – Research, Consultancy & Collaborations, SVKMs Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce & Economics (Autonomous), Mumbai

CONTENTS

HEPATOTOXICITY OF BETA-CYFLUTHRIN EXPOSURE ON ZEBRAFISH (*DANIO* SP.)

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Objectives: Beta-Cyfluthrin is a widely used pyrethroid insecticide in Indian agriculture and commercial products like Responsar® which contain beta-Cyfluthrin are readily available in the market. A major portion of the agricultural runoff reaches rivers and lakes and could potentially impact aquatic organisms. However, the effect of beta-Cyfluthrin exposure on zebrafish (*Danio* sp.) is currently poorly evaluated.

The purpose of this study was to examine the hepatotoxicity of beta-Cyfluthrin on the adult zebrafish (*Danio* sp.)

Methods: Adult zebrafish were subjected to acute (4 days) and chronic (21 days) exposure of beta-Cyfluthrin at concentrations of 0.25, 0.5, 1.0, 2.0 and 4.0 µg/L. Biochemical oxidative stress studies (SOD, catalase, peroxidase, lipid peroxidation) were measured. Liver enzymes (AST, ALT, ALP, ACP) were also evaluated. Histopathological staining of the liver was also done for the chronic group.

Results: Beta-Cyfluthrin exposure was found to cause severe hepatic damage in zebrafish. Oxidative stress studies show that within and in-between the acute and chronic groups, with increasing concentration, there was a significant reduction in SOD and peroxidase activity, while catalase and lipid peroxidation activity showed an increase. Liver enzymes (AST, ALT, ALP, ACP) were also significantly affected at higher concentrations. This suggests that beta-Cyfluthrin exposure causes severe hepatic damage in both acute and chronic groups. These findings are supported by histopathological studies which showed loss of cytoarchitechture at concentrations of 1.0 µg/L and above.

Conclusion: Our investigations show that exposure to beta-Cyfluthrin has an adverse effect on the hepatic system of zebrafish and demonstrates the importance of restricting the entry of beta-Cyfluthrin into our aquatic ecosystems.

Keywords: Beta-Cyfluthrin, Zebrafish, Hepatotoxicity, Oxidative stress

CLINICAL TOXICOLOGY STUDY OF IMMUNOMODULATORY EFFECT OF *GMELINA ARBOREA* ROXB.

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Objective: To study immunomodulatory activity of hydroalcoholic plant extract of *Gmelina arborea* Roxb.

Methods: The test animals chosen for the present experiment were Wistar albino rats. The tests carried out were haemagglutination inhibition, delayed type hypersensivity test, complete blood counts and histopathology (Liver and Spleen). The dried plant powder extract of *Gmelina arborea* Roxb. was evaluated for immunosuppressive activity using Cyclophosphamide as an immunosuppressive drug and for immunostimulant activity using Septilin as an immunostimulant drug. Humoral immune response was evaluated by withdrawing blood from immunized wistar albino rats for haemagglutination inhibition test. Cell mediated immune response was studied using paw edema test conducted on immunized wistar albino rats. The blood cell counts were evaluated for generalized study of effect of the plant drugs of *Gmelina arborea* Roxb. Histopathological examination of liver and spleen were evaluated for the effect of plant drug of *Gmelina arborea* Roxb. on liver and spleen.

Result: The results obtained indicates that the plant *Gmelina arborea* Roxb. possesses immunostimulant activity in vivo.

Conclusion: The dried whole plant extract of *Gmelina arborea* Roxb. showed an increase in titre values, delayed type hypersensitivity response and complete blood count. The histopathological examinations revealed changes in histology of liver and spleen supporting the above conclusion. Hence, all of the above observations reveal modulating effect of *Gmelina arborea* Roxb. extracts. Thus, the plant *Gmelina arborea* Roxb. is found to possess immunostimulant activity.

Keywords: Clinical toxicology, *Gmelina arborea* Roxb., Immunomodulatory Activity

TOXICOLOGICAL EFFECTS OF CAFFEINE, CAPSAICIN, AND NICOTINE ON THE DEVELOPMENT OF CHICK EMBRYOS

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Objective: The environment contains a wide variety of harmful compounds that can have varied degrees of impact on the resident species. One thing to keep in mind is the possibility that some chemicals that people use casually can cause a toxicological response in other organisms. The poisons may be a byproduct of evolution or a defence against predators. Caffeine, nicotine, and capsaicin are a few examples of these substances.

Methods: The purpose of the subsequent paper is to investigate the toxicity and teratogenicity of the substances on a 72-hour-old chick embryo. Three concentrations (5%, 10%, and 100%) of the isolated toxins were examined.

Results: Results demonstrate that treated embryos significantly limit their ability to develop. Embryos had decreased sizes and undergone morphological changes as a result of caffeine and capsaicin. The negative effects of nicotine on eggs totally cemented thereby killing the embryo.

Conclusion: Capsaicin seemed to affect neural development as well as internal development concerning various organs. The effects of caffeine showed a growth was significantly hampered. The results of nicotine were inconclusive as the higher concentrations showed no growth at all.

Keywords: Toxicity, chick embryo development, nicotine, caffeine, capsaicin

EFFECTIVENESS OF NATURAL HERBS ON SEWAGE AND TREATED MUNICIPAL WASTE WATER: A COMPARATIVE STUDY

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Objective: Improperly handled sewage is the main cause of water pollution. Nearly 62% of wastewater in urban India remains untreated or partially treated, which further gets disposed of in the natural water bodies. The usual treatment methods include the activated sludge process, oxidation ponds, aerated lagoons, and trickling filters. These methods need spacious areas, a lot of energy and time, which drives up the cost of the treatment. The expense of the treatment process can be decreased by using natural coagulants. The indigenous medical system uses plants, which are abundant in secondary metabolites, to treat a variety of illnesses. The purpose of this study was to comprehend how these indigenous plants can be utilized for treating sewage water, as a low-cost accessible method that can be used by citizens to get access to clean drinking water.

Methods: A quick and low-cost method was created to investigate the efficacy of *Moringa Oleifera* (Moringa), *Ocimum Sanctum* (Tulsi), and *Azadirachta Indica* (Neem) in the treatment of sewage water. This herb treated water was then compared to municipal treated water from the Ghatkopar Wastewater treatment facility, managed by the Municipal Corporation of Greater Mumbai (MCGM). All the herb-based components were bought from regional markets, and water samples from a lagoon found in the nearby Ghatkopar lagoon in Mumbai.

Results: When compared to the lagoon-treated water, the efficacy of the sewage water treated with herbs was higher or comparable. Coliform and copper levels decreased considerably in the treated sample. Herb-treated samples showed a reduction in the COD levels as compared to the treated water.

Conclusion: When combined, the herbs had a significant impact on lowering the COD, Copper, and coliform levels, making the native plants a valuable source for the treatment of sewage water.

ANTI - OBESITY EFFECTS OF *LAGERSTROEMIA SPECIOSA* ETHANOLIC GREEN LEAF EXTRACT AGAINST A KETOGENIC DIET IN FEMALE ALBINO RATS

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Objective: Obesity, a long-term health issue causing a 2-20-year decline in life expectancy, is a significant concern. *Lagerstroemia speciosa*, an ornamental and medicinal plant, offers numerous benefits, including antibacterial, antidiabetic, and anti-obesity properties.The main objective of the study is to find out the anti-obesity effects of *L. speciosa* ethanolic green leaf extract against a ketogenic diet in female albino rats.

Methods: The leaves of *L. speciosa* were collected from the PG Girls Hostel, Government Arts College (Autonomous), Coimbatore, Tamil Nadu, India. The identification and authentication of *L. speciosa* are done by the Botanical Survey of India, (BSI/SRC/5/23/2020/Tech/50) in Coimbatore. The Institutional Animal Ethics Committee at KMCH College of Pharmacy (Approval No. KMCRET/RERE/PhD/23/2021) conducted an animal protocol in which the animals were divided into three major groups: control, standard, and experimental groups. The standard and experimental groups received a KGD containing 55% to 60% fat, 30% to 35% protein, and 5% to 10% carbohydrates for 3 weeks. The animals were treated orally daily for 21 days. Groups III and IV are the experimental groups, orally fed with LEGLE Low Dose and High Dose (250 and 500 mg/kg body weight), and group II is the standard group treated with only KGD.

Results and Conclusion: The findings indicate that the KGD group had a greater normal fat content (715 ± 57.3), while the experimental group had a lower normal fat content (279 ± 20.7). Higher animals mostly include cholesterol, which is present in animal fats, oils, and bodily structures like the brain and spinal cord. There are significant differences in the triglyceride content between the experimental group (216±23.9) and the negative group (582±88.1). High TC counts are one kind of lipid condition. The experimental group has a higher level of good cholesterol (42.7±3.53). The experimental group had higher good cholesterol levels, while HDL levels should be at least 60 mg/dL. The study suggests lagerstroemin and corosolic acid can decrease lipid profiles.

Keywords: Obesity, *Lagerstroemia speciosa*, *Lagerstroemia speciosa* ethanolic leaf extract (LEGLE), Corosolic acid, and Ketogenic diet (KGD).

GREEN POWER FROM POLLUTED WATERS: MICROBIAL FUEL CELL TECHNOLOGY FOR ENHANCED DYE EFFLUENT BIOREMEDIATION AND ELECTRICITY GENERATION

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Objective: Highly toxic substances found in dye effluents have the potential to impair human health, soil quality, and aquatic ecosystems. These compounds have a likelihood to cause long-term environmental harm, disturb ecological equilibrium, and bioaccumulate in living things. To preserve our ecosystem, it is crucial to investigate and minimize the harmful consequences of dye effluent.

Methods: For the purpose of this investigation, dye wastewater from the dyeing industry was treated using a microbial fuel cell (MFC). Biological oxygen demand (BOD) levels were compared before and after the treatment to assess the effectiveness of the MFC in bioremediating the dye effluent sample. Moreover, the isolated bacteria from the enhanced dye effluent sample were further purified and subjected to gram staining, an evaluation of biofilm development, and an electron-based dye reduction activity to track their electrogenic characteristics. Providing information about the isolates' electrogenic characteristics and potential for bioremediation of dye effluents was the goal of this study.

Results: There was a noticeable 33% decrease in biological oxygen demand (BOD) and a peak voltage of 1.3V for the dye effluent. After being treated with a microbial fuel cell, ten isolates were obtained from the dye effluent sample and evaluated using different techniques, such as gram staining, biofilm forming capability, and dye reduction electron-based activity monitoring. The enrichment and isolation of dye effluent sample resulted in total 10 isolates out of which 5 were gram positive and 5 were gram negative organisms There were four isolates that showed remarkable capacity for forming biofilms. The gram-negative organisms demonstrated higher electron transfer activity than the gram-positive organisms, according to the dye reduction electron-based activity monitoring (DREAM) analysis, which also shed light on the isolates' electrogenic characteristics.

Keywords: Microbial fuel cell, biological oxygen demand, biofilm, DREAM assay.

INVESTIGATING THE TOXICITY OF SEVERAL FACIAL CLEANSERS USING *MOINA* SP.

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Objective: To compare the toxicity of paraben based, non-paraben based and herbal based facial cleaners on *Moina Sps*.

Methods: A monoculture of *Moina Sps*. was prepared with yeast granules used as their feed. LC50 was determined by performing an acute mortality test wherein 5 juvenile *Moina Sps* were used per dilution of the 1% stock of each face wash. A concentration of zero ppm was the lowest dilution and 600 ppm was the highest dilution used per face wash. The rate of mortality and the number of heart beats per minute after 24 hrs of exposure was recorded.

Results: The lethal concentration at which the population of test organisms shows 50% mortality is calculated for each of the facial cleansers. LC_{50} was observed at 555.69 ppm, 140.283 ppm and 229.193 ppm for non-paraben based, herbal based and paraben-based face wash respectively. The heart rate and motility of *Moina* sps was observed to decrease on increasing concentration of paraben based and non-paraben based face washes.

Conclusion: The experiment reports that the LC_{50} for all the samples was found to be more than 100 ppm which is classified as non-toxic according to the literature. Although the formulation as a whole may be non-toxic, a detailed test on its properties may be performed. One of the interesting findings from the experiment is that the LC_{50} for the ayurvedic face wash was found to be less than either of the face washes. Research suggests that prolonged usage of herbal remedies may result in health issues overtime due to potential adulteration and some inherent toxicity of the herbs used in the products. (Paudyal, B., et al., 2019). We conclude that there has been an effect of paraben, non-paraben and herbal based face wash on the mortality and heart rate of *Moina Sps* with the most adverse by paraben and the least by herbal based. But herbal facial cleanser cannot be ruled out as non-toxic as there could be effects due to the degradation of its constituents over time.

Keywords: toxicity, *Moina sps*, paraben, non paraben and herbal facial cleansers

EFFECT OF CLOTHIANIDIN ON DEVELOPMENTAL EXPOSURE TO ZEBRAFISH (*DANIO* SP.)

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Objective: In India, about 40% of the cultivated area is treated with pesticides. Pesticides are extensively used to protect crops as well as to prevent vector-borne diseases. These pesticides contaminate the environment and their residues may enter the food chain. 'Neonicotinoids' are systemic insecticides which are structurally similar to nicotine. Clothianidin is one of the most commonly used neonicotinoids. Several studies indicate lethal effects of clothianidin on invertebrate non-target organisms. Data regarding toxic effects of Clothianidin on vertebrates is limited to a few studies, which report comparatively higher LC50 values. Therefore, the objective of the present study was to determine the effect of sublethal concentrations of Clothianidin in fresh water systems on the developmental stages of zebrafish (*Danio* sp.) as a model organism.

Methods: The OECD Test Guideline 236, Fish Embryo Acute Toxicity (FET) test with the zebrafish was carried out by exposing the zebrafish embryos to the five concentrations ranging between 30 mg/L to 110 mg/L of 96% technical grade Clothianidin from 4 hpf to 96 hpf in a 24-well plate for each concentration along with 4 embryos as respective internal control. Besides this, a separate plate for control group was maintained. All the procedures were carried out at the CCSEA registered zebrafish housing facility of Sophia College for Women (Autonomous). Apical observations for lethality were recorded under the microscope after 24, 48, 72 and 96 hrs on each tested embryo. Other morphological abnormalities of all treatment group compared to their control groups were recorded from 48 hrs onwards.

Results: No significant toxic effects were seen at the lowest concentration till 24 hpf. Negative effects on survival rate and morphological alterations such as defective body curvature, yolk sac edema, pericardial edema, were observed at all concentrations from 48 hpf in a dose dependent manner. The highest concentration (110mg/L) resulted approximately 75% larval death at 72 hpf and 95% at 96 hpf.

Conclusion: This study showed that the developmental exposure of Clothianidin may affect the survival rate and cause developmental abnormalities in zebrafish embryos. Further investigations through other biochemical, histopathological and behavioural assays would help to understand the overall effect of Clothianidin on the development of zebrafish embryos.

Keywords: Clothianidin, Pesticide toxicity, Zebrafish embryo, developmental toxicity.

UPSHOT OF MAKARDHWAJA ON SPERMATOGENESIS OF YOUNG MALE MICE

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Objective: To study the efficacy of Makardhwaja on spermatogenesis and other relevant parameters of reproductive health of young male mice. Human health has been severely harmed as a result of civilization, urbanisation, lifestyle deviations, in addition the health of adolescents, is becoming increasingly jeopardized. World Health Organisation signifies, that the physiological, psychological, and social changes occur in adolescence. According to world health organisation 2011, the foundations of sexual and reproductive health are best established during developmental years. Since adolescents are typically seen as having better health, their health issues have received considerable attention. As, male infertility has become common and males are responsible for 50% of all infertility cases among 15-20% of infertile couples. The sperm quality and quantity in semen has significantly declined over the past 50 years. To overcome this, Makardhwaja being a formulated drug, well known for its aphrodisiac, immuno-modulator, antidiabetic effect and act as a rejuvenator according to Ayurveda used. To approximately 5000 years B.C Ayurvedic materia medica includes resources of plants, animal, metal, and mineral origin for the treatment of ailments.

Methods: young parkes strain albino male mice were orally administered Makardhwaja (10 mg/Kg, 25 mg/Kg and 50 mg/Kg BW) and control (D/W) were examined for 35 days (n=6/group). Mice were sacrificed; Motility, viability, Morphology and number of spermatozoa in the cauda epididymus, as well as serum testosterone level were evaluated.

Results: A significant increase were noted in serum testosterone level and epididymal sperm concentration as well as a comparable change observed in sperm motility and sperm viability as compared to control. Moreover, sperm abnormal morphology was significantly increase with increasing dose as compared to control.

Conclusion: Makardhwaja showed an optimistic response towards spermatogenesis and the effects are dose dependent.

Keywords: Makardhwaja, Testosterone, Spermatogenesis, Sperm parameter.

TOXICOLOGICAL ANALYSIS OF ANTI-OVULATORY COMPOUND (TRIQUILAR) BY ASSESSMENT OF VASCULARIZATION USING THE CHICKEN'S CHORIOALLANTOIC MEMBRANE (CAM ASSAY)

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Objective: Concerns about the ethical viability of using animals in research arise, even though animal models enable the measurement and assessment of toxicity. Due to a growing societal awareness of animal care, animal research is highly controversial nowadays. Nowadays, scientific research uses the "3R principle"—reduce, refine, replace—as a standard. Animal models should therefore be used with caution. Models made of hen eggs have grown in popularity recently for toxicological testing due to these considerations. A hen's egg is used as the experimental organism in the chorioallantoic membrane (CAM) assay, a technique which is growing progressively more prevalent. Fertilized eggs were a substitute platform for experiments on animals could prove to be an appealing alternative. The CAM assay is used for the toxicological evaluation of the anti-ovulatory chemical (Triquilar) by assessing CAM vascularization. The most prevalent method of pharmacological contraception, a pill used by women that contains a synthetic hormone dose (oestrogen and progesterone). The effectiveness is assessed and evaluate the efficacy of Triquilar, therapeutic agents with control PBS after loading. The present research evaluation of vascularization.

Methods: For test sample the experiment carried out with 10% aqueous solution of Anti-ovulatory compound (Triquilar). These 10% aqueous solutions of Anti-ovulatory compound (Triquilar) prepared while crashing all 28 tablets into fine powder then from this 10 gram dissolve in 90 ml of PBS (pH 7.4) and mix it well. From this solution, 200µl of Anti-ovulatory compound (Triquilar) solution loaded on to the CAM. For control: PBS (pH 7.4).

Results: Triquilar treated CAM showed anti-angiogenesis response.

Conclusion: Histological study showed the effect of Triquillar on capillary plexus. Stereomicroscopic image studies showed its effect on development of capillary plexus with disruption of normal branching. The treatment of Triquillar. suggest its antiangiogenesis effect. In in vitro angiogenesis study showed the effect of tranquiller by trypan blue. These research study conclude that the CAM injury after the treatment.

Keywords: Chorioallantoic membrane, Angiogenesis, Triquilar, Phoshate buffer saline

ALLELOPATHIC EFFECT OF *CROTON BONPLANDIANUM* ON *PARTHENIUM HYSTEROPHORUS*

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Objectives: The chemical exudates from allelopathic plants are proposed to play a major role in the allelopathy mode of action. Evidence showed that plants release a diversity of allelochemicals into the environment which includes phenolics, alkaloids, long-chain fatty acids, terpenoids and flavanoids. The present research was therefore undertaken to study the ecology and biology of *Parthenium hysterophorus* L. for better understanding of factors helpful in its survival and to assess the magnitude of interactive reaction and suppressing capabilities of *Croton bonplandianum* growing in its vicinity (plant to plant competition).

Methods: The upper parts of shoot tips were collected from the *Croton bonplandianum*. 100 grams of shoot tips were soaked in 500ml of double distilled water each under aseptic conditions for 9 days and placed in conical flasks in a refrigerator at 8 ± 1°C. The aqueous leachates were filtered through three layers of muslin cloth/cheese cloth to remove debris. The filtrate was then re-filtered through one layer of Whatmann no. 1 filter paper. Leachates of 100% concentration were prepared with sterilized distilled water and used for bioassay. Chlorophyll content of *Parthenium hysterophorus* was estimated according to Arnon's, 1949. Nitrogen was estimated by following the method of Snell and Snell, 1955. The protein content in plant sample was calculated by multiplying percentage nitrogen content of plant sample by the factor of 6.25.

Result: The effect of botanic agent *Croton bonplandianum* had a significant effect on chlorophyll content, nitrogen percentage and protein content of *Parthenium hysterophorus*. It has been observed that at 100% concentration of 9th day leachates reduces the chlorophyll content by16.56 as compared to the control in which 25.68 chlorophyll content has been observed. At different concentration like 75%, 50% and 25% the total chlorophyll observed was 17.49, 19.03 and 20.31, respectively and was found to be significant. At 100% concentration the nitrogen percentage was found to be 6.10 as compared to the control in which 6.85 nitrogen percentage has been observed. At 100 % concentration the protein content has also shown depletion that is 38.12 as compared to the control in which 42.87 protein content was observed and was found to be significant.

Conclusion: The plant botanical agents (BA's) could exert allelopathic impact and hinder germination and growth of *Parthenium* both in green house and in its natural habitat. Promoting growth of BA's in abandoned and non-agricultural lands and in *Parthenium* infested orchards would be rewarding and should be preferred for the following seasons. The BA's have in their system allelopathic compounds suppressing germination and growth of only *Parthenium* and not other waste land plants or agricultural crops.

Keywords: Allelochemicals, Biochemical interaction, Congress grass, Competitive weeds, Ecosystem

CURATIVE ROLE OF CAFFEINE AND L-ASCORBIC ACID ON LEAD INDUCED ALKALINE PHOSPHATASE ENZYME ACTIVITY IN VARIOUS TISSUES OF *LEMELLIDENS CORRIANUS* (LEA)

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Objective: Heavy metals disrupt a vast array of metabolic processes. Bivalves are aquatic molluscs, which represents benthic fauna of fresh and marine water ecosystems. Free radicals such as reactive oxygen species are formed during a variety of biochemical and cellular functions. The stresses caused by toxic contaminants on ecosystems are best indicated by the direct effects of the stresses on the biological components of those ecosystems. The present communication deals with individual and synergistic effectiveness of caffeine and L-ascorbic acid on alkaline phosphatase activity profile in lead induced toxicity in an experimental model, freshwater bivalve, *Lamellidens corrianus.*

Methods: Alkaline phosphatase activity was assayed by the method of King (1951). The reaction mixture consisted of 1ml (0.01M) Disodium phenyl phosphate, 2ml carbonate-bicarbonate buffer of pH 10 and 0.5 ml tissue homogenate. It was incubated at 37 ^{0}C for 1 hr. The reaction was terminated by the addition of 1ml of Folin ciocaltaeu phenol reagent and centrifuged at 2000 rpm for 10 min. To the supernatant, 2ml of 15% sodium carbonate was added. The blue colour complex developed was read at 660 nm. The activity of alkaline phosphatase enzyme was expressed as KA units/100gm/hr at 37 at pH 10. The effect on bivalve was studied under nine groups. From each treated and recovery groups, some bivalves were removed and enzyme activity in selected tissues of bivalves were estimated. Result: The result profiles indicate the protective and curative role of caffeine and ascorbic acid, individually and in synergistic way on heavy metal induced alterations. The increase in the levels of acid and alkaline activities suggests the damage of the tissue and rapid loss of the acid and alkaline activity in caffeine and ascorbic acid during the recovery indicates rapid recovery of the damaged tissue.

Conclusion: Present study concludes *protective and curative role of caffeine and ascorbic acid, individually and in synergistic way on heavy metal induced alterations in relation to alkaline phosphatase enzyme activity*

Key words: caffeine, L-ascorbic acid, lead, alkaline phosphatase , *Lamellidens corrianus*

THE CLIMATE CRISIS IS A HUMAN HEALTH CRISIS

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Objectives:

1. Understanding the effects of the climate change crisis and related human health crises.
2. Preventive measures and new declarations on the toxic organic chemicals to the environment.

Methods: Three surveys were conducted on more than 200 students and nearby communities and the results were discussed and analyzed based on the questionnaire reports.

i. Data collection with students about the direct impacts of climate shocks on human health.
ii. Health Day survey on public-private partnerships for healthcare climate action.
iii. Environmental contaminants released in the local water bodies and their toxicology.

Results: The results showed that the students and communities are aware of the climate change crisis and related health issues. Over 75% of students identified the actual reasons and effects of climate change and how new health challenges are emerging in the world. Over 60-70% of local communities are well aware of the environmental impacts due to toxic chemicals released as pollutants, leading to an increase in carbon dioxide levels and temperatures rising. A collection of FAQs was prepared based on the surveys for further discussion and to develop innovative climate action plans to reduce the human health crises.

Conclusion: The goal of these studies is to determine and assess the relationship between the climate change crisis and the human health crisis, especially in Oman, the students will plan in the future for effective assessment and monitoring modes to prevent destroying major mechanisms of ecosystems and other local water bodies. The students along with the support of local communities will plan to visit the industrial sectors to monitor and measure the toxic chemical effluents that may be released to nearby water bodies which could be prevented with government aid.

Keywords: Climate shocks, Human health, Public-private partnerships, Climate action.

PLASTICIZERS AND PLASTIC ORGANISMS: EFFECT OF DIETHYL PHTHALATE ON FRESHWATER PLANARIAN BEHAVIOUR, REGENERATION, AND ANTIOXIDANT DEFENCE

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Objective: Phthalic acid esters (PAEs) are intricately related to plastics, and thus are recognized as one of the most pervasive chemical contaminants in the environment. Given the non-covalent bonding that binds PAEs to plastic polymers, these compounds often enter aquatic ecosystems and consequently pose a major ecological and toxicological risk to both wildlife and humans. The purpose of this study was to determine the effect of diethyl phthalate (DEP) on freshwater planaria *Dugesia tigrina*, a common type of PAE in the Indian aquatic environment.

Methods: Planarians were subjected to a variety of DEP concentrations to assess the lethal concentration (LC_{50}) as well as the effect of DEP treatment on ethological and regenerative parameters. Planarian behavior was examined by assessing locomotory velocity and feeding rate, whereas regeneration was quantified by evaluating blastema development, photoreceptor regeneration, and auricles formation. DEP induced alteration in the levels of oxidative stress (LPO, SOD, CAT, POX, GST) and neurotoxicological markers (acetylcholinesterase; AChE) were also measured.

Results: The 24 h LC_{50} of DEP (acute exposure) for the *D. tigrina* was 357.24 µM. Reduced locomotory activity, feeding, and significantly delayed regeneration were observed after either short-term (STE) or long-term (LTE) exposure. There was a significant rise in stress markers such as lipid peroxidation levels and other antioxidant enzymes, indicating that DEP exposure causes oxidative damage in planarians. Furthermore, a significant decrease in AChE activity in exposed planarians suggests that DEP has a neurotoxic effect on planarians.

Conclusion: Our findings reveal that DEP exposure has a deleterious influence on planarian behavior, motility, regeneration, and oxidative and neural damage. This clearly underlines the severity of PAEs as a toxicant in aquatic environments and advocates for their restricted use to improve aquatic ecosystem health.

Keywords: Acetylcholinesterase, diethyl phthalate, oxidative damage, planaria, regeneration

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