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Dear Associates

Welcome to each and every one of you congregated for the prestigious IMRF's International Gathering –hosted at IMRF Delhi Chapter organized by IMRF Institute for Education & Research , DRPF Macedonia & IIM Australia is considered to be one of the premier events for the distinguished academic and research cult .

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

IMRF with its Academic Chapters in many Countries, since inception, has a great academic, research and social priorities to promote the spirit of values and orientations in multidisciplinary research functions of education by working out in dexterity required by the integrity of a sophisticated social world order duly transmitting central heritage with scientific bent of mind forming socialization process in respect of reformation of attitudes to confer a serene status for a rational being called man on this civilized planet, of course, from the threshold of Ratna Prasad Multidisciplinary Research and Educational Society.

IMRF has left no stone unturned for the accomplishment of its vision and mission catering its influential services in the academic and research disciplines comprising the streams of Human Rights, Social Sciences, Arts and Education, English Studies, Business Sciences, Engineering Sciences, Mathematical Sciences, Life Sciences, organizing International Conferences humbly witnessing the virtuous presence and innovative presentations of investigating pioneers, potential leaders, promising researchers, intellectual academicians, working faculty, industry magnates, advanced educationists, eminent scientists, rational thinkers, earnest scholars and superior students with their bonafide work of discovery from as many as 50 and more countries in the world (with their recurring presence) including home towards showcasing their professional performance with excellent communication skills based on their accumulated experience in the fields concerned successfully.

Globalization is a fact. Its internalization process integrates multidisciplinary fields to embark on an adventure in the realm of academics and research. As such, this conference by International Multidisciplinary

ResearchFoundation (IMRF). I am pleased to unveil the fact that this Copy of Proceedings marked with ISBN No 978-93-86435-83-5 presents an educative network of research with strength of quality, originality and contribution to knowledge of significant fields of multidisciplinary realms duly identified by the solemn research portals and academic destinations in the world.

While presenting you with this sonata of latest academics and research findings, I humbly place on record my loyal acknowledgement of sincere appreciation, due recognition and heart-felt thanks to all intellectual paper presenters, article contributors, members on the esteemed Editorial Board, centres of higher learning in collaboration with IMRF, foreign-national delegates, erudite plenary speakers, scholarly participants and all those who are directly or indirectly in conformity with this IMRF conferences from home and abroad for their righteous everlasting support in one and all aspects and my sincere thanks to DRPF Maceodina & IIM Australia for their ever dynamic support and cooperation. Gratitude is attitude!

With effusive thanks,

Dr. Ratnakar D. Bala
Conference Chairman

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MULBERRY AND TEMPERATE TASAR SERICULTURE: A SOURCE OF EMPLOYMENT GENERATION FOR RURAL POPULACE OF J&K- A STUDY

DR. SHAMIM AHMED BANDEY

Abstract: Sericulture is one of the important potential agro-based rural industries, which provides immense scope for self-employment. In J&K, sericulture is being practised since time immemorial and this state is one of the traditional state as far as production of silk is concerned and offers a wide range of scope for employment generation both in mulberry and tasar sectors, as nature has endowed J&K with favourable climatic and environmental conditions, suitable for mulberry and temperate tasar silkworms. Present study revealed that there is immense scope in mulberry and non mulberry sericulture to provide self employment.

Keywords: Sericulture, Mulberry, Tasar, Employment.

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**STUDIES ON PHYSICO-CHEMICAL PARAMETER TO ASSESS
THE WATER QUALITY OF KEWAI RIVER FOR DRINKING PURPOSE
IN KOTMA DISTRICT**

DR. SMITA VERMA, NAMRATA PANDEY

Abstract: Anuppur District is an Administrative District in Shahdol Division of Madhya Pradesh State in central India. The District has an Area of 3701Km², and a Population of 667,155. The District has a Longitude of about 23.0729° N and Latitude of about 81.7787° E. The origin of Kewai River belongs to C.G. Jatashankar area, its length is about 45km and width is about 300 ft (100m) approx. The width of the river covers up an area of Khatambar, Barney, Tarabehra, Baherabandh and Bhatadand. The Kewai River has total five bridges which elaborate to Chhattisgarh, Kothi, Pathrardi, Bhalumada and Rapra Bridge. Rapra Bridge is in under construction. I had selected four locations of the Kewai River and collected four samples. Total thirteen physico-chemical parameters done for each of the sample which included pH, Electrical Conductivity, Temperature, TDS, Turbidity, S.S, T.S, Total Hardness, Calcium hardness, Alkalinity, Chloride, COD and BOD. The above mentioned values are normal and balanced as compared to its standard values except Turbidity & Calcium Hardness both are slightly higher than its standard value. And Total Hardness, Alkalinity & Chloride which found to be slightly low than its standard values. By this we can say that the water of Kewai river is not much polluted and the values also shows that the water is of soft nature. There are water pollution act and remedies applicable for the treatment of water pollution also mentioned in this dissertation, which is very useful.

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CASE STUDY ON PHULONG LAKE BY WATER DISTILLATION METHOD USING SOLAR ENERGY

NATARAJ PURAM, SAHITHYA YADAV SEROLLA, PRAVEEN KUMAR GAJULA

Abstract- Distillation is a process that removes dirt and contaminants to produce pure water from the waste water. Such as lakes, pounds which are highly polluted with unwanted dust. As there are so many processes for distillation but, the solar power based process is free energy process. So we adopt this method for distillation process. In this process we prepare a vessel type solar still. A **solar still** evaporates the water with substances dissolved in it causing the heat of the Sun to evaporate water so that it may be cooled and collected, thereby purifying it. They are used in areas where drinking water is not available. So that we are planning to produce clean water from dirty water or from lakes or pounds by exposing them to sunlight. As we know distillation process is a natural process to purify the sea water into fresh water in the form of rain. The rain water is converted into acid due to the pollution in water and air around that area some places like Agra. By this reason we don't want pollute our lake water and we want purify it for drinking purpose this purification process will take place by data collection of pre & post sample tests. This purification method is cost effective so we gone take up this method to purify our lake water as fast as possible.

WHY VESEEL TYPE SOLAR STILL? We had a thought to take up this process by observing the water boiling in the vessel using heat. As we know in that process the water get heated and convert into vapor after cooling they form into water. So with this observation we want purify our "PHULONG LAKE WATER" in 'Nizamabad district Telangana state', with the help of solar energy. So we adopted 'VESEEL TYPE SOLAR STILL' to purify more water at a time. This is our main motto to do this research on water purification.

Keywords: Solar Distillation, Vessel Type Still, Solar Isolation, Funnel Shaped Collector.

**"GENERATION TO GENERATION IS MAN POLLUTION,
BE A PART OF SOLUTION NOT IN THE POLLUTION"**

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MOLECULAR CHARACTERIZATION OF BASAL STEM ROT PATHOGEN OF SUGARCANE AND ITS MANAGEMENT THROUGH BACTERIAL BIOAGENTS

P. KISHORE VARMA, V. CHANDRA SEKHAR

Abstract: Basal stem rot is a sporadic disease of sugarcane and is associated with the plants growing poorly due to abiotic or other biotic stresses. Basal stem rot incidence was observed in the sugarcane clone 2006A 102 infected with yellow leaf disease during November, 2017 in Lakavaram village of Chodavaram mandal, Visakhapatnam district of Andhra Pradesh. The pathogen was isolated in pure culture and identified by ITS-PCR as *Marsamiellus* sp. Sixteen endophytic bacterial cultures were isolated from the roots, shoots and leaves of rooted tissue culture plantlets of sugarcane cultivars, 87A 298 and 2009A 107 and were identified using 16S rRNA sequence based homology. The endophytes isolated from tissue culture plantlets were of the genera, *Bacillus* and *Paenibacillus*. These bacterial isolates were tested for their growth promoting traits, prevalence of antimicrobial peptides and antagonistic activity against *Marasmiellus* sp. The biochemical assays showed that some of these strains could produce IAA, HCN, cellulases and proteases. There were three antimicrobial peptides producing genes of bacilysin, bacillomycin, and fengycin in *B. amyloliquefaciens* (SE1, SE7); *B. siamensis* (SE4, SE16); *B. subtilis* (SE2, SE3) and *B. velezensis* SE15. *Bacillus* species, viz., *B. amyloliquefaciens*, *B. subtilis*, *B. safensis* and *B. velezensis* were found highly antagonistic to *Marasmiellus* sp. under *in vitro* conditions. Overall, our results suggested the scope and potentiality of endophytic bacteria isolated from tissue culture plantlets of sugarcane in suppressing stem rot pathogen and promoting sugarcane growth.

Keywords: *Bacillus*, *Marasmiellus*, *Paenibacillus*, Stem Rot, Sugarcane.

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SURVEY FOR RICE DISEASES IN NORTH COASTAL DISTRICTS OF ANDHRA PRADESH

KISHORE VARMA, P., SURESH, M., SRILATHA VANI, CH.

Abstract: A roving survey was conducted during *Kharif* 2016-17 and 2017-18 to study the prevalence of rice diseases in some rice growing areas of North Coastal districts (Visakhapatnam, Vizianagaram and Srikakulam) of Andhra Pradesh. Disease incidence was recorded on hill basis and severity was recorded as per the standard disease rating scale. Sheath blight and blast were the most prevalent diseases in the zone followed by brown spot, false smut, sheath rot, narrow brown leaf spot and bacterial leaf blight. Sheath blight was most pronounced in North coastal districts of Andhra Pradesh in the rice cultures, viz., BPT 3291, BPT 5204, MTU 1121, MTU 1124, MTU 1156, MTU 1229 and RGL 2537, from tillering to grain maturity stage. The overall incidence of sheath blight ranged from 5 to 70 per cent in different fields surveyed. Maximum sheath blight severity (8 scale) was observed in the rice culture, MTU 1124 in Tangedu village of Kotauratla mandal of Vizianagaram district. Blast incidence was recorded in the rice cultures, BPT 5204, 2571, BPT 3291 and RGL 2537 in Anakapalli, Ananadapuram, Butchayyapeta, Chodavaram, Kasimkota and Munagapaka mandals of Visakhapatnam district. The differential prevalence of diseases in various farmer's fields may be attributed to the fertility status of the soil, cropping system followed, rice varieties cultivated, time of transplantation, adoption of timely management practices for various biotic and abiotic stresses and most importantly, the climatic conditions prevailed during the cropping period.

Keywords: Rice Survey, Disease Incidence, Sheath Blight, Blast, North Coastal.

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CLIMATE RESILIENT PRODUCTION SYSTEMS IN RICE ECOSYSTEM

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Abstract: Climate change pertains to increase in atmospheric concentration of green house gases and global warming. The consequences of climate change are high annual temperatures, erratic rainfall and water stress which can have serious implications for crop production. According to the FAO, agriculture accounts for 14% of global greenhouse gas emissions and climate change and could increase by an additional 30 percent by 2050, without greater efforts to reduce them. The major contributors from agriculture are the synthesis and application of synthetic nitrogen fertilizers, rice production, and landscape change. Conventionally rice is grown under puddled transplanted conditions, which makes soil anoxic, depleted of dissolved oxygen leading to the breakdown of plant matter by microbes producing methane. Further, conventional rice cultivation takes a heavy toll on water, which is a precious resource. Rice farmers need to adapt quickly to technologies which foster stability in production besides enhancing efficiency in resource use and environmental safety. To popularize climate resilient approaches in rice cultivation, direct sowing through drum seeder and system of rice intensification (SRI) technologies were demonstrated by the District Agro Advisory and Transfer of Technology Centre, Visakhapatnam, ANGRAU. The studies revealed lesser consumption of water in drum seeder (20-25%) and SRI technology (25-30%). The benefit cost ratio for drum seeder was 2.1-2.3 and for SRI was 2.2-2.5, which manifested these technologies to be more productive and cost effective. As improving resilience of agriculture to climate change is of utmost importance, direct seeding through drum seeder and SRI technology ensure yield gains, resource use efficiency and possible reduction in emission of green house gases.

Keywords: Climate Resilient, Rice, SRI, Drum Seeder.

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CONSTRAINTS ANALYSIS OF CULTIVATION OF RICE FALLOW PULSES IN NORTH COASTAL ZONE OF ANDHRA PRADESH

DR. CH.SRILATHA VANI

Abstract: Rice is the important crop grown in North Coastal Zone of A.P and majority of the area is left as uncultivated due to several reasons. Rice-fallow areas can be better utilized in establishing pulse crop utilizing the residual soil moisture through conservation agricultural practices. To exploit these rice fallow areas with pulses, location specific and economically viable technology for better performances of pulses are required to be standardized through proper understanding of the system ecology and constraints.

This constraint study was carried out in North Coastal zone of Andhra Pradesh state, to record the constraints responsible for the non adoption of Rice fallow production technology. The proposed study was conducted in 12 villages of Visakhapatnam, Vizianagaram and Srikakulam districts with the total respondents of 120. The constraints were recorded under two broad categories namely socio-economic and biophysical constraints. Majority farmers expressed that Lack of availability of inputs at proper time (42.5%) and less remunerative prices to the pulses (48.3%) due to sales in local markets were the main constraints which limit the practice of rice fallow pulses in the NC Zone. Low volume of produce and lack of markets may deprive the small and marginal producers to get the market price. Lack of skill and knowledge about improved practices of pulses was expressed by 40% of farmers as one of the important constraints by the farmers. High incidence of pests and diseases(72.5%) , Unpredictable yields(54.2%) and Lack of resistant varieties against pests and diseases(50%).For effective and better adoption of new technologies these barriers should be taken care of by the researchers, state departments and the other extension agencies. The strategies suggested improving the area under rice fallow pulses cultivation are making available high yielding and pest and disease resistant varieties and providing timely extension services.

Keywords: SHC, Constraints, Adoption.

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EFFECT OF ANTIDEPRESSANT CITALOPRAM ON THE GROWTH RATE OF THE CHLOROPHYTE *PSEUDOKIRCHNERIELLA SUBCAPITATA*

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Abstract: This research paper reports the effect of the most commonly used and prescribed antidepressant Citalopram which comes under the class of Selective Serotonin Reuptake Inhibitors on non-target organisms especially algae that survive in the effluent receiving lakes situated close to bulk drug producing industries. The effect of most of these metabolites to the environment is unknown. For further understanding of their effects on these non-target organisms, this study was done. The chlorophyte algae *Pseudokirchneriella subcapitata* which is known to be highly sensitive to toxins was selected for analysis. The analysis was done using the Acute Single Species Growth Inhibition Assays. The concentration of the cells was opted as the criteria for measurement of growth rate and the organism was exposed to different quantities of Citalopram ranging from 0.001 mg/l, 0.01 mg/l, and 0.1 mg/l maintaining optimum temperatures of $21 \pm 2^\circ\text{C}$. The effective concentration EC_{50} for 72 hrs was 4.9 mg/l. The efficacy of the results showed the growth rate at the end of the exposure for 72 hrs to be 190-fold (where the efficacy criterion is growth rate > 16 fold). The observed results, keeping the end point to be complete growth inhibition showed that the algae was highly sensitive to the antidepressant and the growth was inhibited at the lowest level of Citalopram i.e., 0.001 mg/l. The metabolites of Citalopram Didemethylcitalopram [DDCT] and Desmethylcitalopram [DCT] have also been observed to inhibit the growth of the species at exposure levels of 0.01mg/l. The results obtained thus suggest that minute quantities of the drug can induce effect on the growth and physiological functioning of the chlorophyte *Pseudokirchneriella subcapitata*. The results obtained suggest that there is an immediate requirement to efficiently remove the compound as well as its metabolites from the effluents of the industries before they are released into the fresh waters to prevent their effects on non-target organisms.

Keywords: *Pseudokirchneriella Subcapitata*, Citalopram, Algal Toxicity, Lake Ecosystem, Growth Rate, SSRIs.

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**SEX SORTED SEMEN –CURRENT STATUS IN INDIA AND JHARKHAND,
ADVANTAGES, DISADVANTAGES AND LONG TERM EFFECT ON POPULATION
DYNAMICS OF THE BREED CONCERNED-A REVIEW**

DR. NANDANI KUMARI, DR. SUSHANT DASH, DR. ALOK K. PANDEY

Abstract: Current study is a review on the status of sex sorted semen in dairy animals in India with special emphasis to Jharkhand along with advantages, disadvantages and long term genetic effect of sex sorted semen. India has 56 semen stations which collectively produce 70 million doses covering 25 percent of breedable cows. Currently, SSS production facilities are being developed at 10 technically most advanced bovine semen stations across the country. There are several methods of SSS out of which Flow cytometry is the most widely used method of Sex Sorted Semen based on the difference in content of DNA in X and Y. SSS with 90 percent accuracy is the need of the hour to increase milk production, to increase the profitability of dairy farming, to control the problem of cattle vigilantism. It has few limitations like decreased conception rate, increased cost, requirement of skilled manpower. Other than these limitations, this paper focuses on the long term detrimental effect of SSS on population dynamics of the concerned breed based on the concept of effective population size. This paper focuses on the application of SSS to not only do the segregation of X chromosomes to produce female calves in large numbers but also on its hitherto unexplored application of SSS to segregate and sort out Y chromosomes to produce quality bulls via this technique. This application could be used for upgradation of breeds and to increase milk production. Further study is requested via this paper to find the actual long term effect of SSS before adopting it on large scale in all the states in India and proper policy devised accordingly.

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COMPARITIVE STUDY OF HEMATOLOGICAL PARAMETERS IN FARMED PRODUCED MALE AND FEMALE SCHIZOTHORAX RICHARDSONII

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Abstract: An attempt has been made to explore the hematological variation in male and female *Schizothorax richardsonii* under farmed condition. Hematological parameters i.e total erythrocyte count (TEC), total leukocyte count (TLC), hemoglobin (Hb), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC) were examined in male and female *Schizothorax richardsonii*. The purpose of study is to investigate the variation in hematological parameters of the fish with sex and to obtain baseline data on blood cell size, morphology as there is limited published literature. Total erythrocyte count show highly significant difference($p<0.05$) between male and female *S. richardsonii* and also showed significant difference ($p<0.01$) in case of MCV and MCH sexwise, other parameters do not show significant difference with respect to sex in captive condition. Though WBCs were in higher side in females as compared to males, might be due to egg carriage stage, infection, or adverse condition in female but the difference was not significant. The present study is helpful to understand the health state of farmed produce male and female in fish.

Keywords: *Schizothorax Richardsonii*, Hematological Variation, WBC, RBC, Hemoglobin, Hematocrit.

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SEED QUALITY ENHANCEMENT THROUGH OSMO-PRIMING IN CHICKPEA CROP UNDER NORMAL AND WATER DEFICIT CONDITIONS

T.N.TIWARI, SHIVAM K. PATEL

Abstract: An experiment was conducted under laboratory as well as in plastic pots of 10 kg capacity with 05 seed osmo-priming level, two varieties of chickpea (Ujjawal and JG-14) and two moisture level (Normal at field capacity and water deficit at half of the field capacity) during *rabi* season 2017-18 at the Research farm of IIPR main campus Kanpur to study the influence of seed osmo-priming with inorganic salts on seed quality parameters, germination enzyme activity, growth, crop efficiency, and grain yield under normal and water deficit conditions. The observations were recorded on seed quality parameters including germination %, speed of germination, seedling length, seedling dry weight, field emergence, vigour index I & II just after start of germination and up to 7th days as per ISTA procedure. Growth parameters including leaf area, plant height and crop efficiency parameters viz: Photosynthetic rate, Stomatal conductance, transpiration rate, chlorophyll, NBI, flavonoides and anthocyanin ratios were measured at pod formation stage using Photosynthesis meter and chlorophyll meter in between 11.00AM to 2.00PM during clear sky. On the basis of observations recorded, it may be concluded that osmo-priming of one year old chickpea seeds with KNO_3 , MgSO_4 , $\text{Ca}(\text{NO}_3)_2$ in 0.2% solution and tap water for 06 hours significantly enhanced the germination %, speed of germination, seedling length, seedling dry weight, field emergence and vigour index I & II in both the varieties evaluated under normal as well as under water deficit conditions over their respective control. Amongst, the priming agents used KNO_3 performed better than MgSO_4 , $\text{Ca}(\text{NO}_3)_2$ and tap water in respect of most of the seed quality parameters studied. Percent improvement due to osmo-priming over their respective control was higher in water deficit condition than normal moisture in all the seed quality parameters studied indicating thereby the role of osmo-priming under limiting environment. Variety ujjawal responded better the priming treatments than JG-14 under both normal and water deficit conditions. Osmo-priming treatments with different in-organic salts and tap water also showed the positive response in improvement of Stomatal conductance, photosynthetic rate and transpiration rate in both the varieties evaluated under normal as well as water deficit condition. Amongst the in organic salts used KNO_3 and $\text{Ca}(\text{NO}_3)_2$ were found more effective in enhancing the above parameters over rest of the priming treatment and un primed control. Varieties did not show any definite trend for these characters. Nitrogen balance index (NBI) was increased with osmo-priming treatments under normal and water deficit conditions but the magnitude of increase was relatively more with KNO_3 followed by MgSO_4 , $\text{Ca}(\text{NO}_3)_2$ and tap water and variety ujjawal showed higher NBI over JG-14. Similarly chlorophyll and flavonoides ratio, s are also showed enhancement with KNO_3 , MgSO_4 , $\text{Ca}(\text{NO}_3)_2$ and tap water priming in normal as well as water deficit conditions but priming with MgSO_4 under drought showed highest chlorophyll and flavonoides ratio in both the varieties evaluated might be due to role of Mg ions in chlorophyll & flavonoides synthesis. Anthocyanin was accumulated in leaves of chickpea plants primed with KNO_3 , MgSO_4 and $\text{Ca}(\text{NO}_3)_2$ salts and it was higher under water deficit conditions than normal.

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**EFFICACY OF VARIOUS PRIMING AGENTS ON SEED QUALITY, ENZYME
ACTIVATION, GROWTH AND YIELD OF MOONG BEAN CULTIVARS UNDER
NORMAL AND MOISTURE DEFICIT CONDITIONS**

SHIVAM K. PATEL, T.N.TIWARI

Abstract: A pot experiment with four priming level (control, tap water, KNO_3 (0.2%) and GA_3 100ppm) three moong bean varieties(Virat, Samrat and Meha) and two moisture level(normal and drought) during *zaid* season 2017-18 at the Research farm of IIPR main campus Kanpur. The seed quality parameters have been recorded in lab as well as in pots. Seed quality parameters including germination%, root length, shoot length, Seedling length, seedling dry weight, field emergence and vigour I & II were significantly increased with the priming treatments in all the varieties evaluated under normal and drought conditions. Amongst the treatments of priming, GA_3 @100 ppm showed maximum germination, root, shoot and seedling length and there by higher vigour-I where as KNO_3 (0.2%) showed maximum seedling dry weight and thereby higher Vigour-II. All the seed quality parameters showed deterioration under drought condition in comparison to normal moisture condition. The improvement in seedling vigour I&II due to treatment over their respective control was higher in drought condition in variety Virat followed by Meha but variety Samrat showed relatively less improvement under drought thereby indicating relatively poor response of priming agents against water deficit condition. Crop efficiency parameters including Nitrogen Balance Index, Chlorophyll, Flavonoids ratio s, stomatal conductance, Photosynthetic rate and transpiration rate showed the positive response towards priming treatment, and maximum values were recorded with KNO_3 Priming followed by GA_3 and tap water in all the varieties evaluated. The yield attributes and, yields also showed improvement in total biomass production, pod number, grain no./pod, 100 seed weight and final grain weight. Priming treatments responded well under both normal moisture and moisture deficit condition. Among the treatments applied priming with KNO_3 @0.2% showed highest values in almost all the yield attributes followed by GA_3 @100ppm and were significantly superior over tap water priming and un primed control under normal and water deficit conditions. Varieties showed differential response to different attributes under normal and moisture deficit conditions. Germination enzymes including alpha amylase and protease also showed improvement in their activities and maximum activity was recorded with GA_3 priming under both normal and drought conditions. Overall the enzyme activities were decreased under drought conditions.

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AN OVERVIEW OF THE EFFECTS OF ENDOCRINE DISRUPTERS (EDCS) IN FISH

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Abstract: The present review attempts to explore a critical assessment on the effects of EDCs on physiology and health status in fish. Most of the earlier assessments were mainly engaged on defining peripheral adverse effects as endpoints rather than discovering the mechanism(s) responsible for observed effects. For the present investigation, an online search was conducted from various scientific databases to obtain the relevant data.

Results of the published literature reveal that EDCs have the capability to mimic endogenous hormones, and may inversely affect male or female reproductive physiology. Reduction in the gametes number, development of intersex gonads, changes in the gonadosomatic index, gamete viability and reduced fertility rate has been frequently acknowledged. Variations in sperm density, motility, and fertility in males and inhibition of oocyte growth and maturation and the incidence of apoptotic/autophagic processes in female species have been reported. Certain EDCs can act also at gene level producing DNA mutations and changes in epigenetic pathways. In conclusion, the present review sum up that EDC exposure affects reproduction, disruption of steroidogenesis, feminization effects, distorted behavior patterns, response to stress, and incidence of epigenetic process, impact on thyroid and immune system focusing on mainly reproductive impairment in fish species. Therefore, for effective regulation, a set of global standardized and sensitive toxicity tests are to be established to ensure further description of EDCs properties.

Keywords: Aquatic Pollution, EDCs, Endocrine Disruption, Fish Reproduction.

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ASSEMENT OF PRIMARY PRODUCTIVITY IN RELATION TO WATER QUALITY OF SHIVNA RIVER AT MANDSAUR, M.P., INDIA

DR. PRERNA MITRA

Abstract: The physico-chemical parameters of fresh water are the major factors, which regulate the dynamics and structure of the productivity of aquatic ecosystem. The present research was carried out to study the limnological aspects of three different zones of Shivna River at Mandsaur (M.P, India) in response to water quality. Investigations were also made to find out the relationships if any, between productivity and abundance plankton with various physico-chemical parameters. Sub surface water samples were collected from three different study stations during winter months of 2018 and assessed for analysis of various water quality parameters. Most of the surface water samples of ponds were largely found within the permissible limits of BIS and WHO standards. The Gross Primary Productivity (GPP), Net Primary Productivity (NPE) and Community Respiration (CR) were estimated by using standard formulae. The gross primary productivity (GPP) was ranged from 0.061 gC/m² /day to 0.29 gC/m² /day. The lowest values for gross primary productivity were recorded as 0.061 gC/m² /day at station 1 (Ramghat) and highest values for gross primary productivity (GPP) were recorded as 0.29 gC/m² /day at station 3 (Railway bridge). Statistical analysis also revealed that gross primary productivity (GPP) exhibited a positive significant correlation with net primary productivity (NPP) ($r^2 = 0.4041$) and insignificant correlation with community respiration ($r = 0.185615$). The NPP of surface-water in the Shivna River was very low at all the three stations. The net primary production (NPP) values were ranged between 0.077 and 0.035 gC/m²/day. The community respiration values ranged from 0.032 gC/m² /day to 0.044 gC/m²/day.

From the above account, it is clear that pollutants present in urban and industrial effluents considerably reduced primary productivity in the downstream. This investigation provides a base line evidence to find out influence of water quality on primary productivity. Periodic observation on the water quality is suggested to prevent the water pollution.

Keywords: Productivity, Water quality, Shivna River.

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PROSPECTS OF SNOW TROUT (*SCHIZOTHORAX RICHARDSONII*) TO BE A NEW CANDIDATE SPECIES FOR COLDWATER AQUACULTURE IN HILLS

SHEETAL SHARMA, BIPIN VISHWAKARMA, H. C. S. BISHT, N. N. PANDEY

Abstract: Major occupation in the mountain region of the country is agriculture based activities. The agriculture in the hills is having limitations with a number of factors such as small land holdings, short period of cultivation, and temperate climate. These factors force the human resource to divert their occupation for meeting livelihood. The farmers in the hill region have integrated type of farming pattern. Fish can serve as an additional source of income if integrated with the water conservation and agriculture practices. Locally farm produced fish is suggested to be the best substitute of the animal protein to the dwellers. Moreover, fish culture in hills encourage conserving the water as well as indigenous biodiversity. Among other important food and game fishes one of the specialised and specific group of economic significance are the snow-trout belonging to the family Cyprinidae and subfamily Schizothoracinae. They form an important natural fishery inhabiting torrential streams. Their distribution is mainly restricted to mountain regions of Asia-mainly the highlands (above an altitude of 670 m asl) of Himalaya and central Asian. The growth of this fish is not very encouraging, so that its culture in captivity has not attracted the attention of the aqua culturists. As this is an important fish for hill biodiversity and is a preferable fish of fish eaters, it is desirable to develop a complete culture technique of this fish. Though, this is slow growing fish and grows at slow rate during first and second years of the life. However, the growth of fish is comparatively better after the age of 2 years. Hence, its culture is feasible with stocking of 2 years old stock in the pond in high density (40-60 fish per m³). Basically, fish is periphytonphagus and prefer attached algae to eat. However, supplementary feeding may be provided with the protein level of 30% for better growth and survival. 2-3 kg/m³ fish can be achieved in 12 months culture cycle. Polyculture of this species with grass carp is also feasible having 3-4% stock of grass carp. This diversified culture practice would be helpful for the further development of rural hill aquaculture and for livelihood security to the people dwelling in hills.

Keywords: Snow Trout, Periphyton, Highlands, Livelihood Security, Polyculture.

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**IN VITRO MUTAGENICITY EVALUATION OF AL₂O₃NPS, FE₃O₄NPS, SIO₂NPS
AND TIO₂NPS USING AMES TEST.**

PV VIDYA

Abstract: There is an ever-growing concern about the genotoxic and mutagenic potential of nanoparticles. Present study designed to evaluate the mutagenic potential of four nanoparticles using Ames test. Three mutant test strains of *Salmonella typhimurium*, TA97a, TA98 and TA100 were used for measuring the ability of nanoparticles to reverse the mutations. Eight different concentrations for four nanoparticles were selected and incubated with test strains, plated and revertant colonies were counted for mutagenicity. All the four nanoparticles resulted negative with all concentrations nanoparticles, suggesting that Ames test is not a suitable method for nanotoxicity testing.

Keywords: Nanoparticles, Ames Test, *Salmonella Typhimurium*, Revertant Mutation.

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**ASYNCHRONIZATION SITUATION IN
THE GONADAL MATURITY OF RAINBOW TROUT (*ONCORHYNCHUS MYKISS*)
IN BALKHILA RIVER OF UTTARAKHAND**

VISHAL DATTA, BIPIN KUMAR VISHWAKARMA, H. C. S. BISHT, N. N. PANDEY

Abstract: Being a low volume high value commodity, rainbow trout has good potential for domestic consumptions as well as foreign export. Presently the bulk of trout production is contributed by the Jammu & Kashmir and Himachal Pradesh, while the other hill states like Uttarakhand, Sikkim and Arunachal Pradesh have also initiated rainbow trout farming. This species has been transplanted in many of the streams of Indian Himalayan region including Uttarakhand for the promotion of trout angling and enhancement of wild stock to support the livelihood. Study was conducted in Balkhila stream (30° 23'N, 79° 10'E), which is originated from Tungnath hills in Uttarakhand. This is a snow-fed tributary of river Alaknand having thermal regime of 6.0-15°C throughout the year. Gonadal maturity and breeding season was observed in the self recruited mature stock of rainbow trout in this stream. The GSI values of female Rainbow trout were ranging from 0.42 to 22.84 with a peak in January and reached its lowest level in March. The value of GSI for male was observed as 0.27 - 3.44 with peak in the month of December. The absolute fecundity was ranging from 1109 to 1896 ova with an average of 1775 ± 238 ova per kg fish. However, variation was observed in absolute fecundity from November to February. There was a positive relationship between absolute fecundity and body weight. Thus, results showed asynchronization situation in the gonadal maturity of males and females, which affects the range of breeding season, breeding performance and natural population of this desirable fish species might be due to the climate changing having erratic precipitation pattern and increasing water temperature.

Keywords: Rainbow Trout, Balkhila Stream, Gonadal Maturity, Asynchronisation, Fecundity and GSI.

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VARIOUS TECHNIQUES OF TRIPLOIDY INDUCTION IN GOLDEN MAHSEER (*TOR PUTITORA*) FOR IT'S AQUACULTURE ENHANCEMENT: A REVIEW.

BIPIN KUMAR VISHWAKARMA, H. C. S. BISHT, N. N. PANDEY

Abstract: Golden Mahseer (*Tor putitora*) is known as the king of rivers and considered to be the most promising coldwater fish species for sport fishing and aquaculture. It's high nutritive value, delicacy, sporty nature and last but not the least the large size makes it supreme among other fish species of coldwater. Mahseer being a high prized food fish, a sport fish and even in commercial fisheries need to be well managed and perpetuated. Now a day, production of sterile fish by ploidy manipulation is a feasible technology to achieve better growth and to reduce environmental risk. Induction of triploidy can be achieved by applying sub-lethal treatments to newly fertilized eggs with the help of thermal shock (heat shock or cold shock), pressure shock and chemical exposure. There are no reports from India concerning induction of triploid in Golden Mahseer (*Tor putitora*). However, there are some studies on triploidy and tetraploidy induction in Indian major carps *Labeo rohita* and *Catla catla* by using thermal shocks and colchicines. Several production related differences have been observed between triploid and diploid salmonids with respect to survival and hatchery performance, growth and harvest quality, feeding behavior, disease resistance, environmental tolerance and stress response. The above, findings may be consistently in favor of triploid production of mahseer for it's better aquaculture enhancement.

Keywords: Triploid Induction, Golden Mahseer (*Tor Putitora*), Thermal Shock, Pressure Shock, Chemical Exposure, Sport Fish, Coldwater.

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**POLYCULTURE OF STUNTED FINGERLINGS OF
GRASS CARP (*CTENOPHARYNGODONIDELLA*) AND
COMMON CARP (*CYPRINUS CARPIO*) IN MID HILLS OF
UTTARAKHAND IN POLYLINE POND**

**DINESH MOHAN, PREETAM KALA, SANTOSH KUMAR,
BIPIN KUMAR VISHWAKARMA, SHEETAL SHARMA, N. N. PANDEY**

Abstract: Fish culture is a temperature base practice and the growth of fish is inversely proportional to water temperature. A fish that has not fully grown due to high stocking density is called as stunted fish. Stunted fish grows faster if stocked in favourable size pond and attained marketable size within 6 months. An experiment was carried out in polylined pond of size 100 m³ for six months at Vill. Jurkafun of Almora district in Uttarakhand. Stunted fingerlings of grass carp and common carp were stocked @ 3 fish/m³ in 1:1 species ratio respectively. Stunted fingerlings were stocked during April and harvested after in October. The length and weight at the time of stocking was 12.84 ± 1.32 cm and 39.29±6.13g for grass carp and 12.74 ± 1.51 cm and 38.57±4.99g for common carp respectively. The supplementary feed was provided at the rate of 3% body weight of fishes. Survival rates of grass carp and common carp were observed 92% and 94%. The size of the fish at time of harvest was 25.31 ±2.49 cm and 371.07 ±131.97g for grass carp and 25.02 ± 2.45 cm and 335.71 ± 110.85g for common carp. Average production of fishes after six month of culture period was 0.74 kg/m³. The study indicated that the stunted fingerling culture in polylined pond exerts a positive impact on growth and production of grass and common carp. High density polyethylene was used for polylined pond and that causes increase in the temperature. Polylined pond with stunted fingerlings polyculture may become an alternative to increase production and income of farmers of mid Himalayan region.

Keywords: Stunted fish, Grass carp, common carp, High density polyethylene, coldwater.

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PRESENT STATUS AND FUTURE PROSPECTS OF RAINBOW TROUT FARMING IN INDIA

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Abstract: Among the freshwater salmonids, *Oncorhynchus mykiss* popularly known as rainbow trout is one of the promising cultivable fish species in coldwater and has considerable scope for its expansion in uplands region. Being a low volume high value commodity, the rainbow trout has good potential for domestic consumptions as well as foreign export. In spite of having excellent positive traits, the development and expansion of rainbow trout farming has yet to be done on large scale. It was introduced in early 20th century during the British colonial rule primarily for the recreational purpose. However, over the years, this species has become a major candidate species for coldwater aquaculture in Indian uplands and supports the employment generation and food security. The northwestern Himalayan region of Jammu and Kashmir and Himachal Pradesh, central Himalaya region of Uttarakhand state, northeastern region of Sikkim & Arunachal Pradesh and Nilgiris & Munnar hills in Peninsular India are potential areas for rainbow trout farming. With research and development efforts, trout production in the country got elevated from 147 tons during 2004 to 1098 tons during 2018 which counts over six fold in comparison. However, Potential success in trout production requires better governance and significant improvement in the management practices.

Keywords: Rainbow Trout, Coldwater, Candidate Species, Uplands, Technical Support

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**WOMEN AND THEIR ROLE IN INTEGRATED FISH FARMING:
A STUDY IN UTTARAKHAND AND SIKKIM STATE**

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Abstract: Major occupation in the mountain region of the country is agriculture based activities. The agriculture in the hills is having limitations with a number of factors such as small land holdings, short period of cultivation, and temperate climate. These factors force the human resource to divert their occupation for meeting livelihood. Due to limited resources and complex climatic conditions, there is integrated type of farming pattern in hills. Fish farming is an additional source of income, which is integrated with if integrated with horticulture and Animal husbandry. This is difficult and need patience, which is performed mainly by women. Though fish farming is a subsidiary profession with agriculture in mountain region of the country, but has important role for food as well as nutritional security of the million households. Integrated fish farming is the major rural activity in hills. Women play a vital role involving directly in fish feeding, retail marketing, seed rearing, fish processing and value addition and indirectly participate for net making, boat rowing, pond construction etc. Survey was conducted in two hill states of Indian Himalayan region, Uttarakhand and Sikkim through interview and a questionnaire. In Sikkim, women are fully engaged in traditional fish farming and cardamom cultivation as well as in retail marketing of fresh fish in their petty shops. Sikkim state is leaping forward for trout farming due to the active participation of women. Therefore, women are a largest workforce behind the fish production in Uttarakhand and Sikkim state. Lack of technical skill, non-availability of Institutional credit and lack of organized fish markets in the hills are the major constraints. In order to ensure better participation of women, it is desirable to create awareness, to impart training and organization of women self-help groups. There is a potential of women participation in fish culture, fish based eco-tourism and ornamental fish trading in hills.

Keywords: Integrated Fish Farming, Value Addition, Petty Shops, Trout Farming, Self Help Group.

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SEASONAL VARIATION IN ALGAL DIVERSITY IN THE GORAI CREEK OF MUMBAI COASTLINE, MAHARASHTRA

SHINE P J, VIDYA PADMAKUMAR

Abstract: A research work carried out during June 2017 to May 2018 on the diversity of algae and their seasonal variations in the Gorai Creek of Mumbai coast, is reported here. Air and surface water temperatures varied from 27 to 34°C and 26 to 33°C respectively. The salinity values in ‰ varied between 5 and 35 with pH between 7.9 and 9.1. The dissolved oxygen content measured ranged 3.08 to 6.14 mg/l. The quantities of organic nutrients in µM viz., nitrate, nitrite, phosphate, silicate and ammonia were noted as 0.3-11.7; 0.03-1.9; 0.04-3.97; 20.01-199.74 and 0.001-0.8 respectively. In this study, presently 5 species of macro-algae were identified- Gracilaria, Ulva, Sargassum, Enteromorpha and Chaetomorpha. 82 species of micro algae were recorded from the families- Bacillariophyceae (55), Dinophyceae (15), Cyanophyceae (8) and Chlorophyceae (4). The maximum density of algae during stable hydrological conditions was during summer as well as pre monsoon seasons due to direct correlation to salinity. Comparatively less density of algae was found during the winter as well as monsoon seasons also with significant lower salinity during monsoon. The occurrence and density is hence directly dependent on seasonal patterns and species-specific environmental factors in estuarine areas.

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**OCCURRENCE OF NITRATE AND FLUORIDE IN GROUNDWATER
AND THEIR IN PARTS OF GOVINDARAOPET MANDAL
WARANGAL DISTRICT, TELANGANA, INDIA**

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Abstract: A detailed study was carried out to assess the groundwater quality in Parts of Govindaraopet Mandal, Warangal district, Telangana, India. The study area lies between latitudes 18°0'10" to 18°15'0" North and Longitudes 80°0'0" and 80°15'0" East with an areal extent of 98 sq. kms. Samples were collected from 28 wells used for domestic, agricultural and industrial purposes. Groundwater samples were collected from these wells during the month of December, 2013 and analyzed for all the major constituents. The samples were collected from the wells located in both phreatic and deeper fractured zones.

The analytical results revealed that the groundwater in the major part of the area is highly mineralized with high concentrations of Nitrate and Fluoride. Out of 28 ground water samples analyzed, 16 samples were found to have nitrate concentration more than 45mg/l. The maximum concentration of nitrate in the area is 379 mg/l. The concentration of nitrate in excess of the permissible limit i.e., 45 mg/l in drinking water causes methaemoglobinemia, particularly in infants. The concentration of fluoride also exceeded the permissible limit of 1.50 mg/l in 7.14 percent of the total samples analyzed. Fluoride concentration in excess of 1.5 mg/l in drinking water causes dental and skeletal fluorosis. The highest value of fluoride concentrated in the area is 2.56 mg/l. These two constituents, at very high concentrations, constitute a potential risk for the inhabitants that consume these waters. The occurrence of nitrate and fluoride in the study area, their genesis, and role in metabolism, health effects and the factors controlling the chemistry of these constituents in groundwater are discussed in this paper.

Keywords: Nitrate, Fluoride, Pollution, Fuorosis, Geochemical Characteristics.

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**MAJOR ION GEOCHEMISTRY OF
GROUNDWATER IN PARTS OF GOVINDARAOPET MANDAL,
WARANGAL DISTRICT, TELANGANA STATE, INDIA**

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Abstract: Groundwater forms the major source of drinking water in the rural areas of most of the developing nations of the world. This study was carried out to assess the major ion concentrations in groundwater of **Govindaraopet Mandal** area, Warangal District, where groundwater is the main source of drinking water. Fifty six representative groundwater samples were collected from bore wells and dug wells were analyzed and analyzed for pH, EC, Ca^{+2} , Mg^{+2} , Na^+ , K^+ , CO_3^- , HCO_3^- , Cl^- , TH, TDS, SO_4^- , NO_3^- and F. As per the desirable and maximum permissible limit for Fluoride (1.5 mg/l) and Nitrate (45 mg/l) in drinking water and prescribed by WHO (2004) and Bureau of Indian Standards (2009), 46% groundwater sources in the study area is unfit for drinking purposes. Due to the higher fluoride levels in drinking water several cases of dental and skeletal fluorosis have appeared at alarming rate in the investigated area. The study revealed that 43% of the samples were found to be unsuitable for drinking purposes due to excess nitrate (>45 mg/l) content in the groundwater. High Nitrate concentration may cause blue baby syndrome or methemoglobinemia. The wells in the investigated area have been demarcated into safe and unsafe wells for consumption of water with respect to fluoride and nitrate.

Keywords: Geochemistry, Major Ions, **Govindaraopet Mandal** area, Warangal District, Telangana State, India

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