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on

Innovative Techniques in Agricultural and Biological Sciences for Sustainable Development

(ICITABS-2018)

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Organized by

PG Departments of Botany & Zoology

Sri Vidya Mandir Arts and Science College

Affiliated to Periyar University, Salem
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Vignesh Nagar, Katteri – 636 902, H. Eachampadi (Via),
Uthangarai (Tk), Krishnagiri (DT), Tamil Nadu

V. CHANDRASEKARAN
Founder

Date: 18.12.2018

Message

Science always looks explanation for what goes on in the natural world. Modern Science traces its origin from Aristotle to the present. One third ranges from the ancient Greeks to the development of the Renaissance that prepared the way for the scientific revolution.

The ultimate goals of evolution of Agricultural and Biological Sciences are to show their evolution in historical and political content and to demystify Science. We stand at the threshold of moments advancements ranging and human cloning to fusion power on understanding of science is essential to be a modern citizen.

The Departments of Botany and Zoology have planned to conduct one day **International Conference on Innovative Techniques in Agricultural and Biological Sciences for Sustainable Development (ICITABS-2018) on 20th December 2018.** I wish them wholeheartedly for the successful conduct of the conference.

Thiru. V. CHANDRASEKARAN
Chief-Patron, ICITABS-2018

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Uthangarai (Tk), Krishnagiri (DT), Tamil Nadu

R.P. RAJEE
Secretary

Date: 18.12.2018

Message

Science rotates human and animal life. Modern life is fully possible only with the help of Modern Science. We have to be more conscious in the field of newer conventions, recent issues like Environmental Pollution and their significant impact on Agricultural and Biological Sciences. These issues have so high values and we have to rekindle its native scope for the welfare of the country.

I wish the PG Departments of Botany and Zoology for the successful conduct of the one day **International Conference on Innovative Techniques in Agricultural and Biological Sciences for Sustainable Development (ICITABS-2018) on 20th December 2018.**

Thiru. R.P. RAJEE
Patron, ICITABS-2018

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Uthangarai (Tk), Krishnagiri (DT), Tamil Nadu

Dr. K. ARUL, MBA, M.Phil., Ph.D.
Principal

Date: 18.12.2018

Message

As it is rightly said, the current Agricultural and Biological Sciences are still trying to produce a tranquilizer more effective the ancient. These are gaining a new shape in the Universe, as they spread their wings round the clock. Recent advancements in the subject disciplines of Plant Breeding, Microbial Technology, Agricultural Biotechnology, Plant Pathology, Nano Technology, Soil Environment, Bio Fertilizer, Composite Materials, Biochemistry, etc. have a wide scope in the world of Science.

By considering the above facts among thirsty minds of the students and scholars the PG Departments of Botany and Zoology are going to conduct a one day **International Conference on Innovative Techniques in Agricultural and Biological Sciences for Sustainable Development (ICITABS-2018) on 20th December 2018.**

I take immense pleasure to wish the Conference a grand success.

Dr. K. ARUL
Convener, ICITABS-2018

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Dr. A. SELVARAJU
Organizing Secretary

Date: 18.12.2018

Message

It is my immense pleasure and I feel a great honour to be a part of the Organizing Committee of the International Conference on Innovative Techniques in Agricultural and Biological Sciences for Sustainable Development (ICITABS – 2018), organized by the PG Departments of Botany and Zoology of this College on 20th December 2018. This International Conference focuses on diverse areas of agricultural and biological sciences and their applications towards the improvement and growth of ecosystem.

This International Conference will bring together the scientists, agriculturalists, microbiologists, biotechnologists, environmentalists, industrial leaders and decision makers across the nation to share their knowledge, expertise and research findings in their respective fields through excellent presentations. I am indeed pleased to host this International Conference in view of bringing the recent developments in the fields of agricultural and biological sciences and their applications. I hope that the deliberations and recommendations of the Conference will certainly have a significant impact on the exploration of research in agricultural and biological sciences towards their potential applications.

I am sure that the presentations by the eminent scientists and subsequent brain storming technical sessions in different aspects of the themes proposed for this International Conference will enlighten the young brains of the participants. I wish the International Conference a grand success.

A. SELVARAJU
Organizing Secretary

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Dr. M. MURALI
Joint Organizing Secretary

Date: 18.12.2018

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M. MURALI
Joint Organizing Secretary

CONTENTS

Invited Talk – I

Application of biological products for organic crop cultivation in the field

Kasem Soytong
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Abstract

Results showed that the biological product application to produce organic vegetables eg. Kangkong, Kale, Pakchoi and Chinese cabbage in the fields which applied biological fertilizers in powder and liquid formulations, ketomium biofungicide, microbial elicitor, bio-chitosan and bio-inecticide etc.for disease and insect control increased in yield of 45.84, 51.76, 60.73 and 58.57 %, respectively. The organic vegetables are certified by BioAgricert, International Federation of Organic Agriculture Movements (IFOAM) andc delivered to organic markets in Thailand as well as export to Singapore and Hongkong etc. It is clearly demonstrated that the quality and quantity of organic products are equal to the chemical producing vegetables.

Keywords: Biological products; Organic crop production

Introduction

Application of chemical fungicides has been recognized to cause environmental pollution and leave chemical residues in the soil, water and agricultural products, and it is known that continuous use of chemical fungicides leads to the development of resistance in the pathogen[7]. Biological control of plant pathogens has successful provided a relatively recent strategy for integrating with other control measures. It could reduce the heavy use of chemical fungicides, improving agro-ecosystem and maintain natural balance[8]. There are several reports on the potential use of biological control agents against plant pathogens. *Chaetomium* spp. is one of the strictly saprophytic antagonists against several plant pathogens, e.g. *Phytophthora palmivora*[4, 5] and *Colletotrichum gloeosporioides*[3]. The biological products have been developed as biological fertilizers in powder and liquid formulations, ketomium biofungicide, microbial elicitor, bio-chitosan and bio-inecticide etc. according to research findings as reported by Soytong as the agricultural input for good agricultural practices (GAP), pesticide-free production (PFP) and organic crop production. Soytong (2004) stated that Thailand is the one of the research leader on biological products for agriculture producing good agricultural practices (GAP) of crop, pesticide-free production

and organic crop using biological integrated pest management (Bio IPM). The aim is to decrease or atop the use of toxic chemical pesticides.

Research and development has been performed with the several known outstanding scientists in the field of microbial biotechnology in agriculture to meet the philosophy as follows: high microbial activity, high organic matter, high natural resources, high environmental protection and high yield and safety food. It has been interested in biological control among scientists over 25 years to seek the new strategic for diseases and pest control to decrease the usage toxic chemical pesticides. These are now successfully being applied to promote good agricultural practice (GAP), pesticide-free production (PFP), commercial scale organic farms, and in combined applications for integrated pest management (IPM). Microbial products are now used to reduce damage to several economic plants in Thailand, Vietnam and P.R. China., and to decrease toxic chemicals in agricultural products and surrounding environment for sustainable development. The microbial products used for bio-agriculture are biological fertilizers in powder and liquid formulations, ketomium biofungicide, microbial elicitor, bio-chitosan and bio-inecticide. This research finding proved those microbial products successfully used for organic crop production in the fields. The some organic products are certified agricultural inputs by BioAgricert, IFOAM for organic vegetable production. The sample of organic vegetables were recorded and reported such as kangkong or water convolvulus (*Ipomoea aquatica*), Kale (*Brassica oleracea* var *albograbra*), Pakchoi (*Brassica chinensis* var. *parachinensis*) and Chinese cabbage (*Brassica pekinensis*).

Materials and Methods

The tested plants were used as follows:- kangkong or water convolvulus (*Ipomoea aquatica*), Kale (*Brassica oleracea* var *albograbra*), Pakchoi (*Brassica chinensis* var. *parachinensis*) and Chinese cabbage (*Brassica pekinensis*). The experiments have been conducted using Randomized Completely Block Design (RCBD) with 4 replications and two treatments as follows: T1 was natural control (non-treated one) and T2 was organic method. The Each plot is 1.5 × 1.5 meters that there were 8 plots per experiment. The tested plants were then separately conducted for each plant. T1 was the natural control plot, applying water and remove weeds. And T2 was done by interval apply powder and liquid formulations, ketomium biofungicide, microbial elicitor, bio-chitosan and bio-inecticide at recommedation raste at every 15 days until harvest.

Soil preparation for organic method in the experimental plots was prepared the soil plough for 2 times, mixing with organic amendment for repel insect pest in the soil. Each plot was prepared for the size of 1.5 m × 1.5 m (width:length). Then organic fertilizer in powder formulation was mixed to each plot at the rate of 10 kg. The soil wasthen applied water and incubated 7 days before planting. The control plots were prepared the soil plough for 2 times, and did not use any agricultural inputs until planting. All plots were mulched with dried grass and applying water.

Data collection:-plant height (cm) plant fresh weight (g) and yield/rai. Percent of increased in yield was also calculated as follows: Organic treatment – control treatment /Organic treatment × 100. Mean comparison was computed by Duncan Multiple Range Test (DMRT) at P = 0.05 and P = 0.01.

Results

Kangkong or water convolvulus (*Ipomoea aquatica*)

Plant height: Result showed that plant height at 7 days was not significantly different at P = 0.01 revealing that plant height in organic method was 6.62 cm and in natural control was 5.73 cm, respectively. After planting for 14 days, it was showed highly significantly different in plant height for organic method which was 14.20 cm and higher that natural control (11.16 cm.). Organic method at 21 days was significantly higher in plant height than natural control. The plant height in organic method and in natural control was 31.17 cm and 20.17 cm, respectively. After harvesting at 28 days, it was showed that the organic method gave significantly different in plant height when compared with natural control. Plant height in organic method and natural control were 40.72 cm and 28.32 cm, respectively. Results showed that the tested biological products gave successfully to produce organic vegetable in the field as seen in table 1.

Plant fresh weight (yield): The fresh weight per plant in organic method was significantly different at P = 0.01 when compared with natural control which fresh weight per plant in organic method and natural control were 24.37 g and 14.37 g, respectively. Fresh weight per plot was also observed from the experiment and showed that in organic method had significantly higher fresh weight per plot than the natural control method. With this, in organic method and natural control were 7.20 kg and 3.90 kg, respectively. As the result, it is estimated for the yield per rai (1600 m^2) showing in the organic method was 3,839 kg per rai and in natural control was 2079 kg per rai as seen in table 2. With our result, the yield from organic method which used the agricultural inputs increased to 45.84 %.

Kales (*Brassica oleracea* var *albograbra*)

Plant height: It showed that the plant height at 14 days gave not significantly different at P = 0.01 revealing that plant height in organic method was 2.05 cm and in natural control was 2.02 cm, respectively. After planting for 21 days, it was showed highly significantly different in plant height for organic method which was 3.53 cm and higher that natural control which was 2.38 cm. Organic method at 28 days was significantly higher in plant height than natural control. The plant height in organic and natural control methods were 4.25 cm and 2.59 cm, respectively. After harvesting at 35 days, it was showed that the organic method was also significantly different in plant height when compared with natural control. Plant height in organic method and natural control were 5.92 cm and 3.47 cm, respectively. It is

demonstrated that the biological products gave the highest response for growth of organic vegetable production as seen in table 3.

Plant fresh weight (yield): The fresh weight per plot was observed and showed that in organic method had significantly higher fresh weight per plot than the natural control method. With this, in organic method and natural control were 2.47 kg and 1.19 kg respectively. The estimated yield per rai (1600 m^2) showed that in the organic method was 1,754 kg per rai and in natural control was 846 kg per rai as seen in table 4. Yield from organic method which used the agricultural inputs increased to 51.76 %.

Pakchoi (*Brassica chinensis* var. *parachinensis*)

Plant height: It showed that the plant height at 7 days gave not significantly different at P = 0.01 revealing that plant height in organic method was 3.65 cm and in natural control was 2.40 cm, respectively. After planting for 14 days, it was showed highly significantly different in plant height for organic method which was 7.84 cm and higher that natural control which was 4.52 cm. Organic method at 21 days was significantly higher in plant height than natural control. The plant height in organic and natural control methods were 15.07 cm and 8.62 cm, respectively. After harvesting at 28 days, it was showed that the organic method was also significantly different in plant height when compared with natural control. Plant height in organic method and natural control were 24.00 cm and 16.22 cm, respectively. At the harvesting day of 35 days, plant height in organic method was 33.55 cm. which significantly differ from the natural control (22.62 cm) as seen in table 5.

Plant fresh weight (yield): The fresh weight per plot in organic method was significantly different at P = 0.01 when compared with natural control which fresh weight per plot in organic method and natural control were 8.10 kg and 3.27 kg, respectively. The estimated yield per rai (1600 m^2) showed that in organic method was 5,298 kg per rai and in natural control was 2,080 kg per rai as seen in table 6. The yield from organic method which used the agricultural inputs increased in yield of 60.73 %.

Chinese cabbage (*Brassica pekinensis*)

Plant height: It showed that the plant height at 21 days gave significantly different at P = 0.01 which the plant height in organic method was 6.17 cm and in natural control was 4.51 cm, respectively. After planting for 28 days, it was showed highly significantly different in plant height for organic method which was 12.06 cm and higher that natural control which was 8.08 cm. Organic method at 35 days was significantly higher in plant height than natural control. The plant height in organic and natural control methods were 20.09 cm and 14.62 cm, respectively. After harvesting at 40 days, it was showed that the organic method was also significantly different in plant height when compared with natural control. Plant height in organic method and natural control were 22.84 cm and 17.16 cm, respectively as seen in table 7.

Plant fresh weight (yield): The fresh weight per plant in organic method was significantly different at P = 0.01 when compared with natural control which fresh weight per plant in organic method and natural control were 330 g and 142 g, respectively. The fresh weight per plot in organic method was significantly different at P = 0.01 when compared with natural control which fresh weight per plot in organic method and natural control were 63.68 kg and 26.42 kg, respectively as seen in table 8. The yield from organic method which used the agricultural inputs increased in yield of 58.51 % (table 8).

Table 1. Plant height of kangkong in the field after planting for 28 days.

Methods	Plant height (cm)			
	7 days	14 days	21 days	28 days
Natural control	5.73a	11.16b	20.17b	28.32b
Organic method	6.62a[1]	14.20a	31.17a	40.72a
CV (%)	7.04	2.35	5.70	5.43

[1]Average of four replications. Mean follows by a common letter in the same column are not significantly different at P = 0.01.

Table 2. Plant fresh weight or yield of kang kong in the field after planting for 28 days.

Methods	Per plant (g)	Per plot (kg)	Estimated yield/Rai (kg)	Increased in yield (%)
Natural control	14.37a	3.90a	2079a	
Organic method	24.37b	7.20b	3839b	45.84
CV (%)	11.54	10.50	10.51	

[1]Average of four replications. Mean follows by a common letter in the same column are not significantly different at P = 0.01.

Table 3. Plant height of kale in the field after planting for 35 days.

Methods	Plant height (cm)			
	14 days	21 days	28 days	35 days
Natural control	2.02a[1]	2.38a	2.59a	3.47a
Organic Agriculture	2.05a	3.53b	4.25b	5.92b
CV (%)	5.00	8.81	8.54	12.33

[1]Average of four replications. Mean follows by a common letter in the same column are not significantly different at P = 0.01.

Table 4. Plant fresh weight or yield of kale in the field after planting for 35 days.

Methods	Per plot (kg)	Estimated yield/Rai (kg)	Increased in yield (%)
Natural control	1.19 a	846	-
Organic method	2.47 b	1754	51.76
CV (%)	13.20	-	-

[1]Average of four replications. Mean follows by a common letter in the same column are not significantly different at P = 0.01.

Table 5. Plant height of Pakchoi in the field after planting for 35 days.

Methods	Plant height (cm)				
	7 days	14 days	21 days	28 days	35 days
Natural control	2.40a[1]	4.52a	8.62a	16.22a	22.62a
Organic method	3.65a	7.82b	15.07b	24.00b	33.55a
CV (%)	6.18	5.59	6.03	14.18	16.22

[1]Average of four replications. Mean follows by a common letter in the same column are not significantly different at P = 0.01.

Table 6. Plant fresh weight or yield of Pakchoi in the field after planting for 35 days.

Methods	Per plot (kg)	Estimated yield/Rai (kg)	Increased in yield (%)
Natural control	3.27a	2080	-
Organic method	8.10b	5298	60.73
CV (%)	17.83	-	-

[1] Average of four replications. Mean follows by a common letter in the same column are not significantly different at P=0.01.

Table 7. Plant height of Chinese cabbage in the field.

Methods	Plant height (cm)			
	21 days	28 days	35 days	40 days
Natural control	4.51a[1]	8.08a	14.62a	17.16a
Organic Agriculture	6.17b	12.06b	20.09b	22.84b
CV (%)	11.57	13.69	5.28	5.70

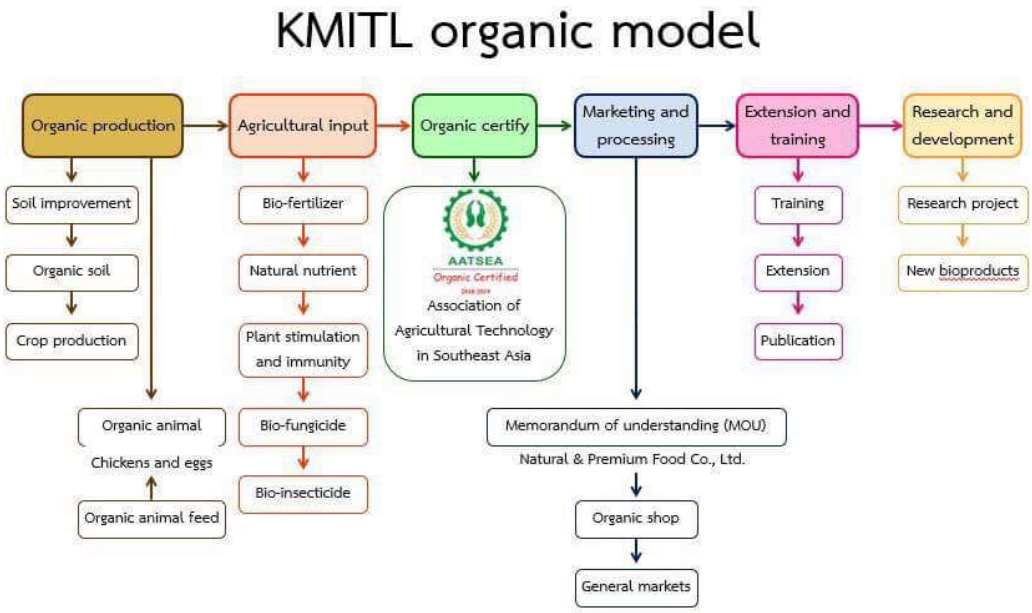
[1]Average of four replications. Mean follows by a common letter in the same column are not significantly different at P = 0.01.

Table 8. Plant fresh weight or yield of Chinese cabbage in the field after planting for 40 days.

Methods	Per plant (g)	Per plot (kg)	Increased in yield (%)
Natural control	142a	26.42a	-
Organic method	330b	63.68b	58.51
CV (%)	18.4	11.23	-

[1] Average of four replications. Mean follows by a common letter in the same column are not significantly different at P = 0.01.

As result, KMITL organic agriculture model is established by supporting from King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand to contribute the research findings of biological products as agricultural inputs to be used for organic agricultutre in practice. It is located at Dan Chang district, Suphanburi province, Thailand. It is to promote the farmers to gain the based knowledge of organic agriculture. KMITL organic model are divided into six parts as follows:- production, agricultural inputs, organic certification, marketing, extension and training as well as research and development. The model is a processes from production to marketing including research findings which necessary to serve the model.



Discussion

As the results from all experiments, it revealed that the certified agricultural inputs to produce organic crop production have been successfully applied to organic vegetables of kangkong or water convolvulus (*Ipomoea aquatica*), Kale (*Brassica oleracea* var *albograbra*), Pakchoi (*Brassica chinensis* var. *parachinensis*) and Chinese cabbage (*Brassica pekinensis*).

It explained that the organic method gave significantly higher plant height than the natural control method. This research finding is similar results with the work of Charee (2005) who stated that the organic method resulted to higher plant height than the non-treated ones.

Results explained that the biological products such powder and liquid formulations, ketomium biofungicide, microbial elicitor, bio-chitosan and bio-insecticide gave successfully organic production in the fields which finding of Soytong (2004) stated that liquid microbial fertilizer which consists of *Actinomyces* K, *Bacillus subtilis* WC-1, *Saccharomyces cerevisiae* RT, *Bacillus subtilis* BSP, *Bacillus subtilis* BA-1, *Bacillus subtilis* WP, *Bacillus subtilis* HB2 have been proven to stimulate root growth, increasing plant growth and yield.

It was observed that in organic method was significantly higher fresh weight per plant or yield when compared with natural control either yield per plot and estimated yield per rai (1600 m^2) as similar result to the work Chaiwat (2004). And this work is proved that the organic treatment which applied interval apply liquid organic fertilizer at the rate of 50 cc, ketomium 10 g, Bot-f 50 cc, Neem's extract 100 cc, bioinsecticide 10 cc and bio-humus 10g/20L of water) proved to be fast growing and early harvest. This finding has confirmed the research bio products resulted in the highest response for organic vegetable production in commercial scale.

Acknowledgements

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Invited Talk – II

Studies on production technology of Biofertilizers

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Abstract

Biofertilizers are becoming increasingly popular in many countries and for many crops. Biofertilizers are fertilizers containing living microorganisms, which increase microbial activity in the soil. Biofertilizers are low cost renewable source of nutrient that supplements the chemical fertilizer. Biofertilizers gained importance due to its low cost amongst small and marginal farmer**.** Inoculation of nitrogen fixing bacteria with bifertilizer increases the phosphorus level. The application of biofertilizer containing beneficial microbes showed a promoting effect on the growth.In conclusion, efficient plant nutrition management should ensure both enhanced and sustainable agricultural production and safeguard the environment.

Keywords: Biofertilizer; Mass multiplication; Plant growth promoting rhizobacteria (PGPR)

Introduction

The term biofertilizer, represent everything from manures to plant extracts. "Biofertilizers" are those substances that contain living microoragnisms and they colonize the rhizosphere of the plant and increase the supply or availability of primary nutrient and/or growth stimulus to the target crop (Bhattacharjee and Dey, 2014). Biofertilizers are applied in the agricultural field as a replacement to our conventional fertilizers. Conventional fertilizers contain compost; household wastes and green manure. Those are not as effective as chemical fertilizers. So, farmers often try to use chemical fertilizers in the field for crop development. But obviously the chemical fertilizers are not environment friendly (Mishra *et al*., 2013). Rhizobacteria can promote plant growth through a broad variety of mechanisms, which can be grouped according to their mode of actionsare; (i) the synthesis of substances that can be assimilated directly by plants, (ii) the mobilization of nutrients, (iii) the induction of plant stress resistance and (iv) the prevention of plant diseases (García-Fraile *et al*., 2015). Biofertilizers are usually prepared as carrier-based inoculants containing effective microorganisms. Incorporation of microorganisms in carrier material enables easy-handling,

long-term storage and high effectiveness of biofertilizers. Among various types of biofertilizers, bacterial inoculant is one major group which includes rhizobia, nitrogen-fixing rhizobacteria, plant growth-promoting rhizobacteria, phosphate-solubilizing bacteria, and so on. Basically, the carrier-based inoculant of these bacteria can be prepared by a common procedure. Liquid biofertilizers are an alternative solution to carrier based biofertilizers. Screening of *Rhizobial* strains and growing them on large scale on shake culture using standard media has started in other countries in recent years. These liquid inoculants supplied to cultivators by impregnating them in nutrient enriched soil. The liquid formulation should contain not only the desired micro-organism and their nutrients, but also special cell protectants or substances that encourage longer shelf life and tolerance to adverse conditions (Chandra *et al.,* 2005). Bacteria and fungi, especially growth-promoting bacteria and materials derived from their activity, are the most important bio-fertilizers. The fertilizers, according to growth and development of plants, are commonly called yield-promoting bacteria (Nadeem *et al*., 2014). Some of these bacteria species are widely used in agriculture so as to increase seeds' production as well as yield, and in disease control. There are numerous species of soil bacteria that colonize mainly in the rhizosphere of plants. These bacteria are collectively known as plant growth promoting rhizobacteria (PGPR). Some PGPR promote the growth by acting as biofertilizer. Microorganisms mainly nitrogen fixer, phosphate solubilizer and mycorrhizae are the main sources of biofertilizer. The microorganisms used for the biofertilizer are bacteria of *Bacillus*, *Pseudomonas*, *Lactobacillus*, photosynthetic bacteria, nitrogen fixing bacteria, fungi of *Trichoderma* and yeast (Bhattacharjee and Dey, 2014).

Biofertilizers

In recent years, biofertilizers have emerged as an important component for biological nitrogen fixation. Biofertilizers gained importance due to its low cost amongst small and marginal farmer (Bhattacharjee and Dey, 2014). Biofertilizer is a substance which contains living microorganisms and they have no toxic effect on the soil. The use of biofertilizer is low cost when compared to chemical fertilizer. The optimization of various parameters for mass production of phosphate solubilizing bacteria isolated from rhizosphere soil samples of maizeand tomato plants. They were identified as *Bacillus megaterium* and *Pseudomonas aeruginosa*. Mass production was carried out at the optimized condition in submerged batch fermentation. These mass cultures can be used further as potential biofertilizer by packing insuitable carrier materials and added to rhizosphere soils directly or through application with the seeds (Prasad, 2014).

Self-life of liquid biofertilizer

Chandra et al. (2005) showed that in the case of *Azospirillium* the population came down up to 105 at six month duration at room temperature where as in liquid, survived up to 2 years and population maintained up to 108/ml. Similarly, *Azotobacter,* KMB, *Rhizobium* inoculant in powder form maintained the shelf life up to 6 months expects PSM which serviced up to 8 months. But in case of liquid 16 formulations, *Azatobacter*, PSM, and KMB

survived up to two years followed by *Rhizobium*, only for 14 months. Chain (2010) reported that by applying appropriate liquid biofertilizers, the overall cost of production would be much lower and would improve the soil quality and yield as compared to traditional biofertilizers.

Plant growth-promoting rhizobacteria (PGPR)

PGPR have been used worldwide for many years as biofertilizers, contributing to increasing crop yields and soil fertility and hence having the potential to contribute to more sustainable agriculture and forestry. The technologies for the production and application of bacterial inoculum are under constant development and improvement and the bacterial-based biofertilizer market is growing steadily. Nevertheless, the production and application of these products is heterogeneous among the different countries in the world. The main bacterial mechanism for improving crop yields, reviews the existing technologies for the manufacture and application of beneficial bacteria in the field, and recapitulates the status of the microbe-based inoculants in World Markets (García-Fraile *et al*., 2015).

***Pseudomonas* spp.**

Prasad and Babu (2017) *P. fluorescens* strain PF1 also developed a bioformulation which is talc powder based, for individual bacteria and mixed culture. This formulation was used as seed treatment, soil application, seedling root dip and foliar spray in ground nut crop *in vitro* germination conditions. *P. fluorescens*, the lateral root growth. The other growth parameters like shoot growth, number of leaves were enhanced by the combination of both of the bacteria than their individual formulations. Among the method of application tested in our study, soil application was found to be the best in yielding better results of plant growth promotion.

***Bacillus* spp.**

Rhizobacteria such as *Pseudomonas* spp. and *Bacillus* sp. can serve as fertilizer by means of biological control of plant pathogens and can increase plant resistance. This study aimed to determine the activity of *Pseudomonas* spp. and *Bacillus* spp. in promoting germination and seedling growth of tomato plants (Widnyana and Javandira, 2016). *Bacillus pumilis* strains were used as PGPR. The PGPR strains were applied as seed and/or drench treatments. Results showed that PGPR treatments as seed and drench significantly affected the seedling height, stem diameter, leaf number, cotyledon diameter, leaf area, shoot and root weight when compared with control. As a result, based on the results of the experiment reported herein, the use of rhizobacteria treatments may provide a means of improving seedling growth and quality in cucumber (Yildirim*et al*., 2015).

***Trichoderma* spp.**

Biofertilizer plays a significant role in crop cultivation with reduced the chemical fertilizer use. Three *Trichoderma*-enriched biofertilizers were evaluated in mustard and

tomato cultivation at field condition. Sole application of biofertilizers didn't show remarkable contribution but all *Trichoderma*-enriched biofertilizers when supplemented with N fertilizer significantly boosted up the growth and yield of mustard and tomato. Application of 50% N fertilizer along with 50% *Trichoderma*-enriched biofertilizers augmented 108 and 203% yields over control both in mustard and tomato, respectively which were 81.90 and 61.82% in mustard and tomato at standard doses of nitrogen, phosphorus and potassium fertilizers. The present results suggest that *Trichoderma*-enriched biofertilizer could save atleast 50% N fertilizer uses for mustard and tomato and could reduce excessive uses of NPK for crop cultivation (Haque *et al*., 2012).

***Rhizobium* spp.**

The effect of co-inoculation of *Rhizobium* and PGPR, on nodulation and growth of common bean (*Phaseolus vulgaris* L.) was also investigated using a low phosphorous soil under greenhouse conditions. Gram-positive nodule endophytic PGPR belonging to the genus *Bacillus* were successfully isolated and characterized. Contrast analysis confirmed the difference between the co-inoculation of rhizobia strains and PGPR compared to single rhizobia inoculation on the root dry weight. These results show that co-inoculation of PGPR and Rhizobia has a synergistic effect on bean growth. Use of PGPR may improve effectiveness of *Rhizobium* biofertilizers for common bean production. Testing of PGPR under field conditions will further elucidate their effectiveness on grain yields of common bean (Korir *et al*., 2017).

***Arbuscular Mycorrhizal* fungi (AMF)**

AM-Fungi are ubiquitous and form a mutuality relationship with roots of most plant species. Generally, the distribution of AM spores in rhizosphere soil is governed by edaphic and certain climatic factors. Soilbased pot culture is applied as a common method for production of AM Fungal inoculum. The importance of these fungi to agricultural and forestry resides in their role in plant growth and nutrition. Dual inoculation of such fungi with a Rhizobium and other bacterium on plant enhanced the growth and other beneficial effects viz., resistance to disease and tolerance to adverse soil and climatic conditions (Giri, Nishita and Joshi, 2010). The main sources of AM fertilizers interact with fungi soil fertility and yield production. Among this mycorrhiza is an important one in agriculture field for the cultivation of many crops.

PGPR as a phytoremediation

PGPR assist phytoremediation directly or indirectly through several mechanisms, such as increased nutrient uptake, suppressing pathogens by producing antibiotics and siderophores or bacterial and fungal antagonistic substances (hydrogen cyanide, HCN), phytohormone production (indoleacetic acid, IAA) and nitrogen fixation. PGPR are helpful for plant growth enhancement and bioremediation of contaminated soil through sequestering or degrading

heavy metals and other toxicants. PGPRs and rhizobium have the potential to play important roles in improving plant growth and enhancing metal uptake by plants in different ways under conditions of heavy-metal stress (Fatnassi *et al.,* 2015).

Bacteria that colonize plant roots and promote plant growth are referred to as PGPR. PGPR are highly diverse and in this review we focus on rhizobacteria as biocontrol agents. Their effects can occur via local antagonism to soil-borne pathogens or by induction of systemic resistance against pathogens throughout the entire plant. Several substances produced by antagonistic rhizobacteria have been related to pathogen control and indirect promotion of growth in many plants, such as siderophores and antibiotics. Rhizobacteria belonging to the genera *Pseudomonas* and *Bacillus* are well known for their antagonistic effectsand their ability. Resistance-inducing and antagonistic rhizobacteria might be useful in formulating new inoculants with combinations of different mechanisms of action, leading to a more efficient use for biocontrol strategies to improve cropping systems (Beneduzi*et al*., 2012).

Conclusion

Microbial revitalization using plant growth promoters had been achieved through direct and indirect approaches like bio-fertilization, invigorating root growth, rhizoremediation, disease resistance, etc. Although, there are a wide variety of PGPR and its allies, their role and usages for sustainable agriculture remains controversial and restricted. There is also variability in the performance of PGPR that may be due to various environmental factors that might affect their growth and proliferation in the plants. The efficient plant nutrition management should ensure both enhanced and sustainable agricultural production and safeguard the environment. Microbial fertilizer has its advantages and disadvantages in terms of nutrient supply, soil quality and crop growth. Developing a suitable nutrient management system that integrates use of these kinds of microbial biofertilizers may be a challenge to reach the goal of sustainable agriculture; however much research is still needed.

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Invited Talk – III

Biosynthesis and characterization of silver nanoparticles from *Ziziphus glabrata* (Heyne ex Roth) leaf extract

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Abstract

Plants provide a better platform for nanoparticle synthesis. Silver has a greater affinity towards sulfur or phosphorus containing biomolecules present in the cells of plant leaves. Hence sulfur or phosphorous-containing proteins in the membrane or inside the cells are considered to be the preferential sites for silver nanoparticle binding. The use of biomaterials in the synthesis of nanoparticles also emerges as an eco-friendly and exciting approach. In the present study, *Ziziphus glabrata* leaf extract was used to synthesize silver nanoparticles. The objective of the study is to synthesis the silver nanoparticles from *Ziziphus glabrata* (Heyne ex Roth) by green synthesis method.

Keywords: *Ziziphus glabrata*; Nanoparticles; Cancer therapy; Green synthesis

Introduction

Nanotechnology is a field of science which deals with production, manipulation and use of materials ranging in nanometers (Salam *et al*., 2012). Synthesis of nanoparticles has gained great significance during the last few years due to their unique properties and application (Prabhu and Poulose, 2012). Today synthesis of nanoparticles is carried out mainly on biological systems such as bacteria for ecofriendly nanoparticle synthesis (Rajashree and Suman, 2012), fungi (Mishraa *et al*., 2012), yeast (Sathish *et al*., 2011), algae (Rajeshkumar *et al*., 2013) and plant extracts (Krishnaraj *et al*., 2010). The naturally synthesized products have greater medicinal values and are better alternatives to these chemically synthesized drugs as they have lesser side effects and lead to long term cure for the illness (Prakash *et al*., 2013). The biocides activity of AgNPs is dependent upon various factors such as size, shape, surface coatings, ionized form of final product and overall nanoparticles charge (Wei *et al*., 2015). Manipulations of Ag NPs specifically from plant extracts were entailed by the global commerce due to their substantial pertinence in health and industrial sphere (Kholoud *et al*., 2010). Synthesized silver nanoparticles enhance the

therapeutic efficacy and strengthen the medical values of herbal plants (Savithramma *et al.,* 2011).

Materials and Methods

Study Area

The present study area is confined to a major range in Yercaud hills station Eastern Ghats that is rich in Biodiversity. The area of investigation approximately at 1515 meters (4970 feet). The mean annual temperature in the study area ranges from 12°C to 24°C. The area receives an average rainfall of 1500-2000 mm annually.

Collection of plant sample

The matured leaves of *Ziziphus glabrata* (Heyne ex Roth) were collected from the study area. The collected plant material was assigned field book number and the field characters such as habit, habitat, colour and odour of flowers, period of flowering and fruiting, occurrence and other relevant ecological features were also observed and are noted in the field book. All the collected plant species were dried and the herbarium specimens were prepared by using standard methods as suggested by (Jain and Rao, 1976). Plant was identified by Flora of the Presidency of Madras by J.S Gamble book from Department of Botany, Periyar University, Salem. The herbarium was submitted in Department of Botany, Periyar University, Salem.

Preparation of leaf extract

Fresh leaves were surface cleaned with running tap water, followed by distilled water. Biosynthesis of silver nanoparticles was carried out by microwave irradiation method. Fresh leaf samples (10 grams) were finely chopped and mixed with 50 ml of deionized water. The mixture was boiled in microwave oven for 10 min. After boiling, the samples were allowed to cool at room temperature and the extracts filtered with Whatman No.1 filter paper.

Biosynthesis of silver nanoparticles

Ten milliliter of 25% *Ziziphus glabrata* aqueous extract was gradually added into 90 ml of 1 mM silver nitrate ($AgNO_3$) in a 250 ml Erlenmeyer flask and incubated at room temperature with shacking under dark conditions. The reaction solution was checked for 30 minutes and monitoring the change in colour of $AgNO_3$ solution from colourless to brown. The AgNPs solution was centrifuged at 15,000 g for at least 30 min. The supernatant was discarded and obtained pellets were redispersed in deionizer water. The centrifugation for pellet was repeated two to three times to wash off any substances on the surface of silver nanoparticles. This change in colour is carried out due to the excitation of surface Plasmon vibrations with the silver nanoparticles (Kumar and Yadav, 2009).

Characterization of silver nanoparticles

UV-Visible spectra analysis

UV-Vis absorption spectroscopy is the measurement of the attenuation of a beam of light after it passes through samples surfaces. Absorption measurements can be at a single wavelength. UV-Vis light is energetic enough to promote outer electrons to higher energy levels and it is usually applied to molecules in solutions. The nanoparticle solutions are analyzed using a UV-Vis spectrophotometer (Shimadzu, UV-Vis range 3600) the absorbance of solutions is measured in the wavelength spectra range 200-800 nm, which included the maximum of absorbance of silver nanoparticles.

Fourier transform infraread spectroscopy analysis

To find out the functional group of synthesized nanomaterial's using FTIR analysis. The characterization involved Fourier transform infrared spectroscopy (FTIR) spectrum (Bruker tensor 27) was recorded in mid IR region in the range of 400-4,000 wave number (cm^{-1}). A drop of the sample solution was carefully added to the potassium bromide crystals using 1ml micropipette and the spectrum was recorded in transmittance (%) mode. The biological component interacts with metal salts via these functional groups and undergoes bio-reduction into nanoparticles (Mital *et al*., 2013).

X-Ray diffraction analysis

X-ray diffraction analysis was carried out to examine the crystallographic structure of the purified AgNPs (Moharram *et al*., 2014).

Scanning electron microscopy analysis

The SEM analysis was used to determine the structure of the reaction products that were formed. Thin films of the sample were prepared on a carbon coated copper grid by just dropping a very small amount of the sample on the grid, extra solution was removed using a blotting paper and then the film on the SEM grid were allowed to dry by putting it under a mercury lamp for 5 min. SEM image has showed individual silver particles as well as a number of aggregates.

Results and Discussion

Biosynthesis of silver nanoparticles from *Ziziphus glabrata* (Heyne ex Roth)

The biosynthesis of silver nanoparticles (AgNPs) synthesis was elucidated using the medicinal plant *Ziziphus glabrata* (Heyne ex Roth) (Plate 1) were collected from Yercaud hills, Eastern Ghats. Aqueous extract of the medicinal plant was used. The gradual change in colour of reaction mixture from dark brown to dark yellow within 48 h indicated the silver nanoparticles formation (Plate 2). During the preparation of the nano silver particles using the mixture of silver nitrate as metal source and *Ziziphus glabrata* leaves extract as reducing and capping agent, there was change in colour from yellow to brown in the synthesized sample.

Plate 1. Collection of plant sample of *Ziziphus glabrata* (Heyne Ex Roth)

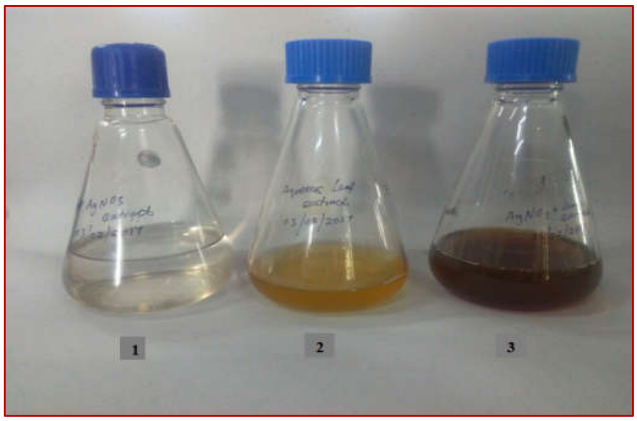

Plate 2. The aqueous extract of *Ziziphus glabrata* (Heyne Ex Roth). 1.$AgNO_3$, 2. Aqueous leaf extract, 3. Synthesis $AgNO_3$

Characterization of silver nanoparticles by UV-Visible spectroscopy

UV spectra were measured at room temperature in a quartz cuvette with the path length of 1 cm. Size and shape of produced nanoparticles in aqueous solutions are deducted using UV-Vis spectroscopy at 452 nm wavelength. High absorbance value UV-Vis spectrum range 224.50 nm (Fig. 1). The similar studied carried out *Azadirachta indica* showed rapid conversion of silver nitrate into silver nanoparticles indicated by distinct colour changes from yellowish to dark brownish yellow with few minutes of neem extract addition in $AgNO_3$ (1Mm). There was maximum absorption between 438 nm to 445 nm with average maximum absorption at 442 nm.

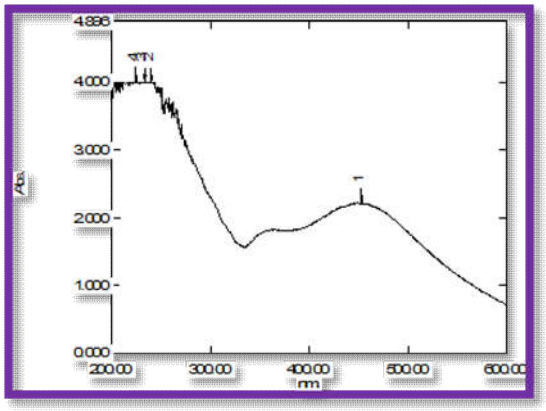

Fig. 1. UV –Vis spectroscopy analysis.

Characterization of silver nanoparticles by FTIR

The FTIR spectrum of leaf extract showed the presence of functional groups of secondary amines, alkenes, aliphatic acids, aromatic ketones, aliphatic aldehydes, tertiary

butyl and cycloalkanes (Fig. 2). The spectrum observed the bands for the functional groups located at 3300 cm^{-1}, 2851 cm^{-1}, 1739 cm^{-1}, 1685 cm^{-1}, 1426 cm^{-1}, 1240 cm^{-1} and 978 cm^{-1}. The FTIR spectrum of silver nanoparticles was recorded in the range of 400-4000 cm^{-1}. The FTIR Spectrogram of leaf extract showed absorption peaks located 3300 cm^{-1} may be assigned to the –N-H, functional groups of secondary amines and peak at 1685 cm^{-1} is assigned to C-C stretch function of aromatic ketones. Mittal et al. (2013) reported that FTIR spectrum *Potentilla fulgens* silver nanoparticles by absorption peaks 3365, 1614, 1519, 1448, 1354, 1235, 1144, 1063 and 822 cm^{-1} regions. The FTIR spectrum of nanoparticles showed the involvement of O-H strecting involvement of C=N in plane vibrations of amino acids, corresponding to amide I, II and III aromatic.

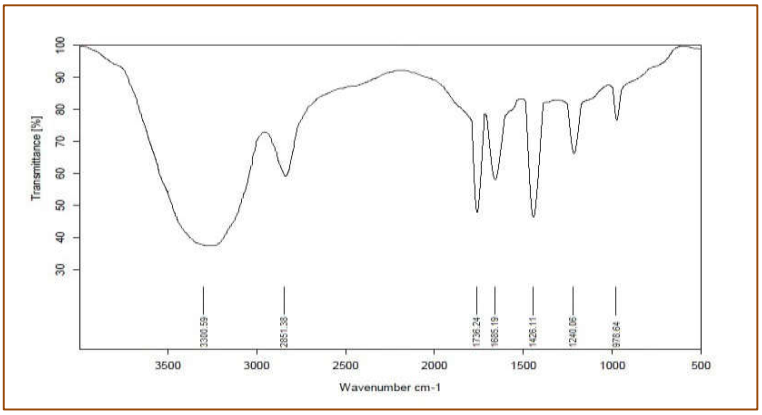

Fig. 2. FTIR spectrum analysis.

Characterization of silver nanoparticles by X-ray diffraction

X-ray diffraction studies were performed to confirm the crystalline structure of the synthesized silver nanoparticles. XRD spectrum released diffraction peaks at 33.17°, 34.25°, 37.08°, 42.01°, 46.13° and 52.29° (Fig. 3). Shankar et al. (2014) reported that XRD analysis *Potentilla fulgens* the XRD pattern of silver nanoparticles illustrated that the synthesized nanoparticles are crystalline in nature. The similar studies carried out on the XRD analysis *Cassia roxburghii*the XRD analysis showed in intense peaks at 2θ values of 38.13°, 44.32°, 49.12°, 64.53°, 77.38°, corresponding to Bragg's reflection based on the face centered cubic structure of silver nanoparticles.

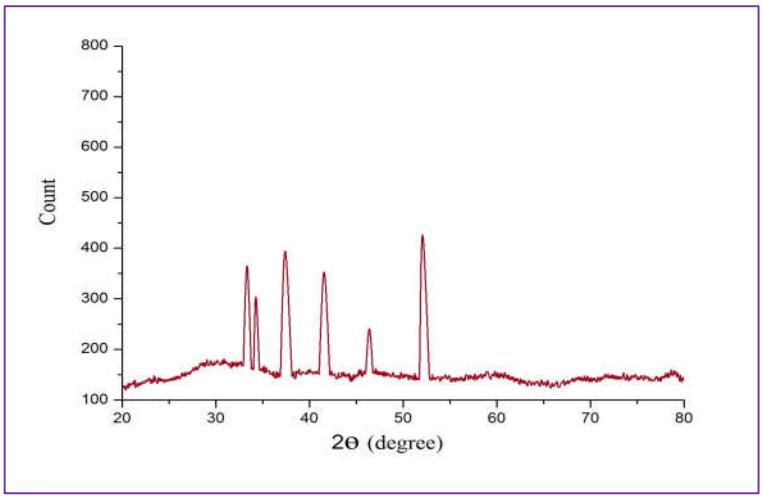

Fig. 3. XRD-analysis

SEM analysis of synthesized silver nanoparticles

Scanning electron microscopy (SEM) image show shape of the biosynthesized silver nanoparticles using *Ziziphus glabrata* (Heyne ex Roth). Leaf extract in room temperature. The particles shape distributions of the silver nanoparticles was observed at different magnifications. Low magnified observation shows that the morphology spherical ranging from 2 µm diameters. The larger silver particles may be due to the aggregation of the smaller ones, due to the SEM measurements (Fig. 4). Jeeva et al. (2014) explored SEM analysis (*Ziziphus spina–christi)* Scanning Electron Microscope as a powerful tool used for investigation of the synthesized silver nanoparticles. SEM image shape showed in ellipsoidal and spherical. SEM analysis demonstrated that the particle sizes located in the range of 30-70 nm.

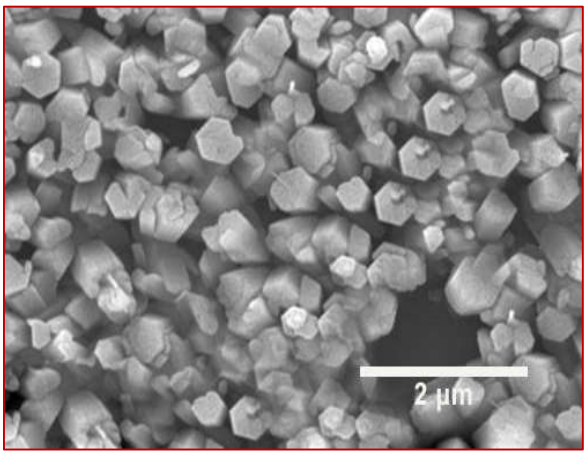

Fig. 4. SEM analysis

Conclusion

Green synthesis of silver nanoparticles using *Ziziphus glabrata* (Heyne Ex Roth). leaf extract are found suitable reducing agent. Aqueous extract solutions resulting in the formation of silver nanoparticles, which is confirmed by UV-Vis spectroscopy. High absorbance value in UV-Vis spectrum at the range 224.50 nm. The FTIR spectrum of silver nanoparticles was recorded in the range of 400-4000cm^{-1}. XRD analysis for detected to examine the crystallographic structure of the purified silver nanoparticles and SEM image of bio inspired nanoparticles display uniformly of spherical shape and 2 µm. Hence the *Ziziphus glabrata* (Heyne ex Roth) synthesis of silver nanoparticles leads further study and applications in targeted drug delivery and clinical diagnostics are required in future. Further studies are needed to be done to obtain additional clear evidences of nanoparticle mediated cell apoptosis in cancer cells.

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Invited Talk – IV

Antifungal activity of microbial nano-particles derived from *Chaetomium basiliense* CB01 against *Magnaporthe oryzae* causing rice blast

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Abstract

Chaetomium brasiliense CB01is proved to be antagonized *Magnaporthe oryzae* causing rice blast. Natural products of *C. brasiliense* CB01 which extracted by hexane, ethyl acetate and methnol as crude extracts significantly inhibited *M. oryzae*. Nanoparticles constructed *C. brasiliense* CB01 namely nano-CBH, CBE and nano-CBM showed antifungal activity against rice blast pathogen caused by *M. oryzae* at the ED50 for spore inhibition values of 29 ppm, followed by nano-BBE and nano CBM which the ED50 values of 64 and 81 ppm, respectively. Further research findings are being evaluated *in vivo*.

Keywords: *Chaetomium brasiliense*; Rice blast; Nanoparticles

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Introduction

The alternative method is discovered to safe human being and protect by nanotechnological method for plant disease control. Nanotechnology is to re-structurematerials to molecular level. A nanometer (nm) is one-billionth of a meter (Li *et al.,* 2011). The researchers have interested in recent year to develop the natural product to materials for disease control in increase crop production is being conducted (Soutter, 2012). Nanoparticles can be easily penetrated through plant cells (Perlatti *et al*., 2013). The natural product from *Chaetomium* spp. applying to control phytopathogens has been investigated by Soytong *et al*. (2001) for example the natural products identified as Chaetoglobosin Cderived from *Chaetomium* sp. act as elicitors to induce alpha to matine leading to immunity against

tomato wilt caused by *Fusarium oxysporum* sp (Soytong *et al.*, 2013). Testing nanoparticles from *Chaetomium* spp. is reported to suppress many plant pathogens, *Colletrotrichum*, *Fusarium*, etc. (Dar and Soytong, 2014). The nanoparticles from *Chetomium globosum* KMITL-N0805 inhibited *Curvulari alunata* causing leaf spot disease of rice var. Sen Pidoa was successfully applied in the field (Tann and Soytong, 2016). The objective was to evaluate nanoparticles from *C. brasiliense* to inhibit *Magnaporthe oryzae* causing rice blast.

Materials and methods

Rice blast pathogen

The aggressive isolate of *Magnaporthe oryzae* causing rice blast from previous experiment was used in this study. It was tested pathogenicity as described by Song *et al.* (2017).

Antagonistic fungus

Chaetomium brasiliense CB01 derived from Biocontrol Research Unit, Department of Plant Production Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand.

Antifungal test of crude extracts from Chaetomium brasiliense CB01

Crude hexane, ethyl acetate and methanol exrtracts from *Chaetomium brasiliense* CB01 was done by following the method of Sibounnavong *et al.* (2012a). The evaluation method for testing was described by Tann and Soytong (2016).The concentrations of 0, 10, 50, 100, 500 and 1000 ppm were tested to inhibit *Magnaporthe oryzae.* The experiment was designed using two factors factorial experiment in Completely Randomized Design (CRD) with four repeated experiment. Data were collected as shown in Tables.

Antifungal activity of nano-particlesagainst rice blast pathogen

Nanoparticles from *Chaetomium brasiliense* CB01 received from Biocontrol Research Unit, Department of Plant Production Technology, KMITL, Bangkok, Thailand. The nano-CCH, nano CCE and nano-CEM were evaluated by poisonous media method against *Magnaporthe oryzae* at the concentrations of 0, 3, 5, 7, 10 and 15 ppm.

Statistical analysis

Data were recorded as colony diameter (cm), number of spores and statistically computed analysis of variance. Treatment means were compared by DMRT at P = 0.05 and 0.01. Effective dose at 50 % (ED_{50}) was computed by Probit analysis program.

Results

Chaetomium brasiliense CB01 grew on potato dextrose agar for 30 days was morphological study as seen in Figure 1.

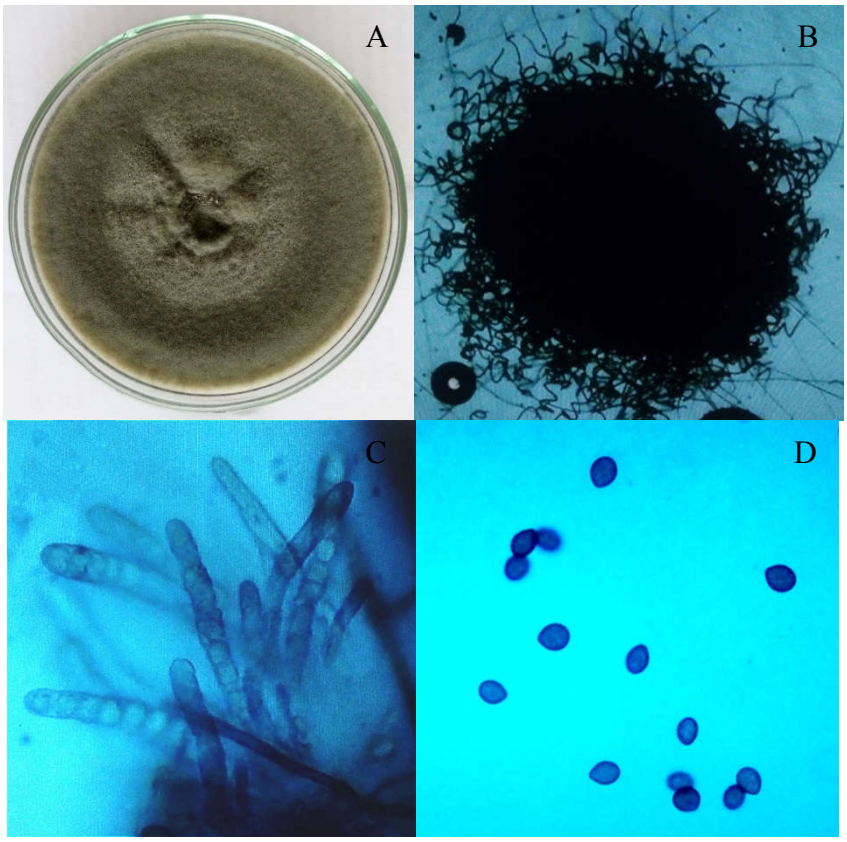

Figure 1.*Chaetomium brasiliense* CB01, A = colony, B = ascocarps, C = asci, D = ascospores

Antifungal test of crude extracts from Chaetomium brasiliense CB01

Result indicated that crude hexane and crude ethyl acetate from *C. brasiliense* CB01 gave significantly inhibited of growth inhibition of *Magnaporthe oryzae* averaged 64 and 66 %, respectively, and followed by crude methanol from *C. brasiliense* CB01 at 49% (Table 1).

Antifungal activity of nano-particles against rice blast pathogen

Nanoparticles namely nano-CBH, CBE and nano-CBM from *C. brasiliense* CB01 gave significantly difference to inhibit *Magnaporthe oryzae.* The nano-CBH was the highest inhibit ion of colony growth as 79 %, and followed by nano-CBE and nano CBM which were 73, and 57 %, respectively. As result, nano-CBH was the highest spore inhibition which the ED50 value of 29 ppm, followed by nano-BBE and nano CBM which the ED50 values for spore inhibition of 64 and 81 ppm, respectively (Table 2).

Table 1. Crude extracts of *Chaetomium brasiliense* CB01 testing for growth inhibition of *Magnaporthe oryzae* at 10 days.

Crude extracts	Concentration (ppm)	Colony diameter (cm)[/1]	Growth inhibition (%)[/2,3]
Hexane	0	5.00^{a}	-
	10	4.22^{bc}	15.50^{ij}
	50	3.98^{de}	20.25^{gh}
	100	3.89^{ef}	22.00^{fg}
	500	2.22^{j}	55.50^{b}
	1000	1.65^{k}	67.00^{a}
EtOAc	0	5.00^{a}	-
	10	4.10^{cd}	18.00^{hi}
	50	3.93^{de}	21.25^{fgh}
	100	3.76^{fg}	24.75^{ef}
	500	2.33^{j}	53.25^{b}
	1000	1.68^{k}	66.25^{a}
MeOH	0	5.00^{a}	-
	10	4.37^{b}	12.50^{j}
	50	3.98^{de}	20.25^{gh}
	100	3.62^{g}	27.50^{e}
	500	3.19^{h}	36.00^{d}
	1000	2.51^{i}	49.75^{c}
C.V.(%)		2.25	5.21

[1]/Average of four replications. Means followed by a common letter are not significantly differed by DMRT at P = 0.01.

[2]/Average of four replications. Means followed by a common letter are not significantly differed by DMRT at P = 0.01.

[3]/Inhibition (%) = R1-R2/R1×100 where R1 was colony diameter of pathogen in control and R2 was colony diameter of pathogen in treated plates.

Table 2. Nano particles of *Chaetomium brasiliense* CB01 testing for growth inhibition of *Magnaporthe oryzae* at 10 days, spore production at 14 days and effective dose (ED_{50}) values

Crude extracts	Concentration (ppm)	Colony diameter (cm)[/1]	Growth inhibition (%)[/2,3]	Number of spores [/1](10^5)	Spore Inhibition (%)[/2,3]	ED_{95} (ppm)
Nano-CBH	0	5.00	-	17.25[a]	-	29.19
	3	4.95	1.00	14.50[bc]	15.75[e]	
	5	4.89	2.25	10.75[d]	37.57[d]	
	10	4.84	3.25	5.50[f]	68.05[b]	
	15	4.83	3.50	3.50[g]	79.74[a]	
Nano-CBE	0	5.00	-	17.25[a]	-	68.12
	3	5.00	0.00	14.00[bc]	18.47[e]	
	5	4.96	0.75	11.75[d]	31.72[d]	
	10	4.92	1.50	7.50[e]	56.36[c]	
	15	4.88	2.50	4.50[fg]	73.89[ab]	
Nano-CBM	0	5.00	-	17.25[a]	-	81.55
	3	5.00	0.00	15.75[ab]	8.34[f]	
	5	4.97	0.50	13.75[c]	20.03[e]	
	10	4.92	1.50	11.50[d]	33.29[d]	
	15	4.88	2.50	7.25[e]	57.92[c]	
C.V.(%)		0.64	44.38	10.23	8.14	

[1]/Average of four replications. Means followed by a common letter are not significantly differed by DMRT at P = 0.05.
[2]/Average of four replications. Means followed by a common letter are not significantly differed by DMRT at P = 0.01.
[3]/Inhibition (%) = R1-R2/R1×100 where R1 was colony diameter of pathogen in control and R2 was colony diameter of pathogen in treated plates.

Discussion

Magnaporthe oryzae are well known as causing rice blast in many countries. It infects to all stages of plant growth and causes severe loss of yield (TeBeest, 2007). As result found that *C. brasiliense* CB01 proved to inhibit *Magnaporthe oryzae* causing rice blast. Crude extracts *C. brasiliense* CB01 significantly inhibited *M. oryzae*. Similar result from previous report of Sibounnavong *et al.* (2012b) that *C. Brasilense* CB01 proved to antagonize *F. oxysporum* f. sp. *lycopersici* NKSC02 race 2 caused tomato wilt of sidavar cherry varieties. It was reported that crude extracts of hexane, EtOAc and MeOH from *Ch. Brasilense* CB01 inhibited spore production of *F. oxysporum* f. sp. *lycopersici*race 2 at the ED50 values as 29.87, 38.99 and 2.99 ppm, respectively.

It is proved that the same isolate of *C. brasiliense* CB01 resulted to control *Magnaporthe oryzae* causing rice blast. Moreover, the research findings showed that nano-CBH from *C. brasiliense* CB01 expressed antifungal activity against rice blast pathogen caused by *M. oryzae* at the ED50 for spore inhibition value of 29 ppm, followed by nano-CBE and nano CBM which the ED50 values of 64 and 81 ppm, respectively. With this, Tan and Soytong (2016) stasted that Nano-CGH, nano-CGE, and nano-CGM derived from *Chaetomium globosum* KMITL-N0805 actively against *Curvularia lunata* causing leaf spot disease of rice var. SenPidoa in Cambodia. The control mechanism of *C. brasiliense* CB01 to rice blast pahogen, *M. oryzae* is possble namely antibiosias as this isolate of *C. brasiliense* CB01 used to publish for it produces new depsidones, mollicellins K-N (1-4), and six known depsidones, mollicellins B (5), C (6), E (7), F (8), H (9), and J (10), Among these compounds 1-3, 5-7, and 10 expressed antimalarial activity against *Plasmodium falciparum*. Only 1 was antimycobacterial activity against *Mycobacterium tuberculosis* and antifungal activity against *Candida albicans*.Moreover, 1-10 exhibited cytotoxicity against the KB, BC1, NCI-H187, and five cholangio carcinoma cell lines (Khumkomkhet *et al.*, 2009). The reserch finding is being studied to test natural products both crude exrtracts and nano-partcles to induce immunity for rice blast and others.

Acknowledgment

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Phytochemical Screening of aerial parts of *Barleria buxifolia* L. (Acanthaceae)

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Abstract

The family *Acanthaceae* consists of a significant number of medicinal plants with broad array of biological activities and attractive number of phytoconstituents.Most of *Barleria* species are potent in anti-inflamatory, analgestic, antileukemic, antitumor, antihyperglycemic, anti-amoebic, virudal, antidiabetic, antifertility, hepatoprotective, nephroprotective and antibiotic activities. The objective of this study is to carry out the preliminary phytochemical screening aerial parts of *Barleria buxifolia* L. Fresh plant sample collected from various parts of Uthangarai. Plant extract prepared by using soxlet apparatus and phytochemical analysis carried out by standardized procedure of Brindha *et al*. Ethanolic extract selected plant samples shows the presence of glycosides, alkaloids, carbohydrates, tannin, phenolics, flavonoids, proteins and amino acids. Medicinal value of plants lies in some chemical substances like alkaloids, flavonoids, tannins and phenolic compounds which serve as defend against many microorganisms. The results obtained from preliminary pharmacognostic standardization of aerial parts of *Barleria buxifolia* L. are helpful in determination of quality and purity of the crude drug and its marketed formulation.

Keywords: Phytochemical; *Barleriabuxifolia*; Acanthaceae; Herbal medicine; pharmacognostic

Effect of *Hyptis suaveolens* L. Poit leaf extracts on rice weevil *Sitophilus oryzae* L.

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Abstract

Biological control of storage pests is needed to replace harmful chemical insecticides. The rice weevil *Sitophilus oryzae* L. is the major worldwide pest causing heavy damage in storage grains. *Hyptis suaveolens* L. is an aromatic medicinal plant belonging to the family Lamiaceae used worldwide. The previous investigations show that the plant *Hyptis suaveolens* has high level of genetic diversity and phytochemical variations. In the current study repellency and mortality effects of leaf extracts were tested against *Sitophilus oryzae* L. All the extracts were toxic to larvae and adult insects. Ethanolic extracts shows higher larval mortality then ethyl acetate, petroleum ether and water extracts, and ethyl acetate extract shows high repellency followed by ethanol, petroleum ether and water extracts.

Keywords: Stored grain; Sustainable pest management; Genetic diversity; Herbal insecticide

Studies on ethnoveterinary information obtained from Malayali tribes hills for of Kalrayan curing skin diseases

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Abstract

Man depends on animals for every day needs such as food, milk, medicine and for carrying loads as well as use in agriculture. It therefore becomes important for man to find a cure for diseases that affect animal. Veterinary medicine is popular among the tribals. The malayali tribes have rich knowledge of ethnoveterinary medicine. Hence, the present study was conducted to document the traditional knowledge obtained from them for curing skin diseases in animals. The information was collected by interview method and questionnaire method. 12 different plants belonging to 10 different families were identified to be useful as a cure for skin ailments and control of ecto-parasites. Leaves, stem and seeds were the parts commonly used and these were applied in the form of paste to the affected area. Family Fabaceae was observed to have the highest number of plants that were used for curing skin problems in animals.

Keywords: Ethnoveterinary; Seed oil; Skin diseases; Tribes; *Aristolochia*

Effect of ethanol extract of *Piper nigrum* on pyruvate kinase and Phosphoenolpyruvate carboxykinase of *Cotylophoron cotylophorum*

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Abstract

Gastrointestinal parasitic infections are a worldwide problem for small domestic ruminants like sheep, goat and cattles. Immature flukes cause heavy infection resulting in foul-smelling diarrhoea, dehydration and death of the animal. Effect of ethanol extract of *Piper nigrum* on pyruvate kinase and phosphoenolpyruvate carboxykinase activity of *Cotylophoron cotylophorum* was studied in the present investigation. The parasites were incubated in five different sub-lethal concentrations of *Pl*EE for 2, 4 and 8 h. PK and PEPCK was assessed using standard procedure. The enzyme activity was expressed in terms of protein. The data obtained were analyzed statistically. Maximum level of inhibition in PK and PEPCK was observed after 8 h of incubation in *Pl*EE. Inhibition of PK and PEPCK was dose and time dependent. Inhibition of pyruvate kinase and phosphoenolpyruvate carboxykinase may impair the phosphoenolpyruvate-succinate pathway and reduces the synthesis of ATP in the drug treated parasites. Decreased production of ATP results in the death of the parasites.

Keywords: *Cotylophoron cotylophorum*; *Piper nigrum*; Pyruvate kinase; Phosphoenolpyruvate carboxykinase

Antimicrobial activity of different solvent extracts of indigenous traditional medicinal plants, *Anisomeles malabaricum and Acacia torta*

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Abstract

Nowadays, it is necessary to discover new and efficient antimicrobial drugs because of increasing drug resistance organisms. Using medicinal plants for natural treatment of diseases caused by bacterial origin has mainly been considered. In the present investigation the anti-microbial activity of different solvent extracts of *Anisomeles malabaricum* and *Acacia torta* against *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* was studied. *Anisomeles malabaricum* and *Acacia torta* were collected from the surroundings of Piranmalai hills. The shade dried plants leaves were pulverized to get a coarse powder. Since the solubility of the powdered extract is not known, its solubility was checked in different solvents with varying polarities (Harborne, 1998). The evaluation of antibacterial activity for different solvent extracts of *Anisomeles malabaricum* and *Acacia torta* was carried out using the agar well diffusion method. Results revealed that the methanolic extract of *Acacia torta* showed maximum inhibitory effects on *E. coli, S. aureus, P. aeruginosa* and *B. subtilis* than *Anisomeles malabaricum*. Based on the results obtained, the medicinal value of of *Anisomeles malabaricum* and *Acacia torta* could be attributed to the presence of secondary metabolites in the traditional herbal medicines. Therefore, this antimicrobial activity shows a source for traditional use of the plant as a local health remedy to the indigenous communities of Tamil Nadu.

Keywords: *Anisomeles malabaricum*; *Acacia torta*; *Bacillus subtilis*; *Escherichia coli*; *Pseudomonas aeruginosa*; *Staphylococcus aureus*

LC–MS analysis of aqueous extract of *Beta vulgaris* and *Lawsonia inermis*

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Abstract

Colour is an important element in enhancing foodstuffs, constituting one of the major dietary additives. The food industry has therefore resorted to enhancing or restoring the colour of foods to increase consumer acceptability. The safety of synthetic colorants has been a moot question for the past several decades, and with increased consumer awareness, the demand for an interest in natural colorants has increased significantly. Pigments of plant origin are gaining importance globally as a potential source of natural food colours for their versatility and so as to avoid a variety of health hazards caused by synthetic colours. Keeping in this view, *Beta vulgaris* and *Lawsonia inermis* were selected in the present investigation. *Beta vulgaris* is commonly known as red beet belongs to the family Chenopodiaceae. Betalain is a natural pigments from *Beta vulgaris*, represents a promising and safe alternative to synthetic dyes, but their chemical instability has limited their widespread use. *Lawsonia inermis* is commonly known as henna, belongs to the family Lythraceae. Lawsone is the principle pigment from *Lawsonia inermis* which is responsible for dyeing properties and widely used in cosmetic industry and in therapeutics. In the present investigation LC–MS analysis of aqueous extract of *Beta vulgaris* and *Lawsonia inermis* was analysed. *Beta vulgaris* and *Lawsonia inermis* were collected and subjected to aqueous two phase extraction (ATPE). *Beta vulgaris* and *Lawsonia inermis* aqueous extracts were subjected to LC–MS analysis using standard procedures. LC–MS analysis of aqueous extracts of *Beta vulgaris* and *Lawsonia inermis* revealed the presence of Laxanthone-2, malvidin, sambubiose and Laxanthone, Malvidin and Sambubiose. These components are involved in the pigment biosynthesis and owing to various health promoting effects like reduced risk of stroke and coronary diseases, anti-inflammatory and anti-carcinogenic properties. Natural colourants from *Beta vulgaris* and *Lawsonia inermis* may be suitably exploited for their functional benefits in food product development and therapeutic in use.

Keywords: *Beta vulgaris*; *Lawsonia inermis*; ATPE; LC–MS

Validation of cytotoxicity and mutagenicity of acetamiprid through ames and root meristem study of *Trigonella foenum-graecum* L.

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Abstract

The present investigation has been done to validate the mutagenic and cytotoxic effect of a neonicotinoid insecticide, acetamiprid through ames test and root meristem study of fenugreek (*Trigonella foenum-graecum*.L).presoaked seeds of fenugreek were treated with various concentrations of acetamiprid viz 7.5, 15, 30, 60 ppm for 6, 12 and 24 hrs. The treated seeds were washed thoroughly in running tap water and allowed to germinate on moist filter paper in petriplate at 25 ± 1 °C, after 120 hrs, cytogenetic damages were analyzed. The result showed significant (p 0.05; p 0.01) mitotic index, increased chromosomal aberration and micronuclei. The ames test done at the same concentrations to validate the mutagenicity also reflected similar results showing increased number of revertant colonies for both tester strains of our study namely TA 98 and TA 100. The results were observed to be dose dependent for the selected tester strains. These findings help to validate that the insecticide acetamiprid is a potential mutagen and also have cytotoxic effect on *Trigonella foenum-graecum*.L

Keywords: Acetamiprid; Ames test; Chromosomal aberration; *Trigonella foenum-graecum* L.

Isolation of bioactive compound from soil mycoflora

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Abstract

Soils are the main source of fungal genetic resources. These fungal species have been exploited for the production of bioactive molecules such as antibiotics, enzymes and organic acids but still a lot of compounds remain untapped from diverse soil habitats. Hence, the present study has been planned to isolate the bioactive compound from fungal species found in the agricultural soils of Erode district. Soil samples were collected from the crop fields of 10 selected sites of Erode taluk. Composite soil samples were prepared. It was serially diluted and were spread on the SDA plant medium. All plants were incubated at room temperature for 5 days characterization of pure fungal isolates was carried out based on macroscopic and microscopic examination. Screening was done to isolated the potent fungal species, it was optimized. Secondary metabolite was extracted from pure fungal isolates. This bioactive metabolite was safe and ecofriendly with antimicrobial efficiency.

Keywords: Bioactive compound; Soil mycoflora; Antimicrobial activity

Histological alterations in gill and liver tissues of fish *Oriochromis mosambicus* by the effect of chlorpyrifos

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Abstract

Pesticides are common pollutant in fresh water ecosystem where they induce adverse effect on the aquatic biota. Fish *Oriochromis mosambicus* is important species in Tamil Nadu region having good nutritional values. Fish living in close association with may accumulate pesticides. In the present investigation toxic effect of chlorpyrifos 1/5LC50 sublithal concentration for 7 days and 14 days exposure period. The histopathological changes were observed in the gill and liver tissues. The present study shows the degenerative changes in gills, such as detachment and lifting of the epithelial linings from surface of the gill. Uncontrolled regeneration of primary and secondary lamella, hypertrophy, hyperplasia, necrosis of epithelial cells, dilation of blood sinuses, lamella aneurysm. In liver tissue pathological changes include degenerated hepatic tissues atrophy, necrosis and disappearance of hepatocytic cell wall and disposition of hepatic cords were noticed. The present study concludes that effect of chlorpyrifos changes the architecture of gill and liver tissues.

Keywords: Pesticide; Chlorpyrifos; Hypertrophy; Hyperplasia; Atrophy

Biochemical analysis of the effect on foliar spray of vermiwash and gibberellin in tannery effluent fed *Crotalaria juncea* L.

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Abstract

Tanning Industry is considered to be a major source of pollution and tannery wastewater in particular, is a potential environmental concern as its contains a complex mixture of both organic and inorganic pollutants. The pollutants contained in the effluent discharged by tanneries, are a serious threat to the environment. Plants have been used widely as an agent of Bioremediation. Of these, *Crotalaria juncea* L. is known to reduce metal pollution up to acceptable levels, and thus remediates the contaminated soil effectively. The present investigation was undertaken to study the biochemical constituents as a result of using growth promoting substances such as vermiwash and gibberellin as foliar spray in tannery effluent fed *Crotalaria juncea*. The biochemical constituents like chlorophyll a, chlorophyll b, total chlorophyll, protein, carbohydrates and lipids were estimated for the control and other treatment groups following standard procedures. The Chlorophyll content of tannery effluent fed *Crotalaria juncea* was maximum in plants treated with Gibberellin followed by vermiwash and minimum in plants treated with tannery effluent. The plants treated with the combination of diluted tannery effluent and vermiwash shows high level of Chlorophyll which is similar to vermiwash treatment. Likewise increased level of protein, carbohydrates and lipids were observed in combination of diluted tannery effluent with vermiwash treatment. In 100 % tannery effluent treated plants, a decreased level of bioconstituents was observed when compared to control. The results revealed that diluted tannery effluent with vermiwash increased the biochemical constituents. Considering the importance of these findings, a combination of diluted tannery effluents with vermiwash could be introduced as an effective technology to cultivate plants proving the biofertiliser potential of these agents.

Keywords: *Crotalaria juncea*; Vermiwash; Tannery effluent; Foliar spray

Orchid diversity of Megamalai, Southern Western Ghats: Genus *Zeuxine* Lindley

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Abstract

Among the orchid flora of Megamalai 4 Species of *Zeuxine* recorded *Zeuxine blatteri, Zeuxine longilabris, Zeuxine gracilis and Zeuxine affinis* is an intensive survey during 2012-2016. The present paper deals *Zeuxine* Species diversity and distribution in Megamalai, Southern Western Ghats. This attempt is the first step to correct, taxonomic identification to workout currently accepted botanical names with present ecological status, date of collection, distribution, habitat and phenology. The voucher specimens are deposited in the herbarium of the Madura College, Madurai.

Keywords: *Zeuxine*; Species diversity; Distribution; Southern Western Ghats

Effect of insecticide Malathion on haematological changes of freshwater carp *Cirrhinus mrigala*

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Abstract

The insecticide is one of the important pollutants of fresh water bodies. It gives adverse effects on aquatic animals. *Cirrhinus mrigala* is one of the important Indian major carps. It having good nutritional value, but at the same time it is a vulnerable species. Fishes are highly susceptible for insecticide toxicity. In the present study the toxic effect of insecticide Malathion LC50, 0.25 ppm on total RBC, WBC and Hb in the fish *Cirrhinus mrigala* were estimated. The effect of Malathion on RBC and Hb were found be higher ranges mean values at 10%, low values of haematological parameters were found be 30% SLC, when compared to control. Total erythrocytes of *Cirrhinus mrigala* showed a significant decreasing tendency at 10% and 30% sub lethal concentrations when compared to control. The effect of Malathion on WBC was found to be higher ranges mean values at 30%, low values of haematological parameters were found to be 10% SLC, when compared to control. The leucocytes number of *Cirrhinus mrigala* was increased with increasing Malathion concentration.

Keywords: *Cirrhinus mrigala*; Malathion; Haematology

Effect of synthetic pyrethroid cypermethrin (25% e.c.) on total protein concentration in muscle of tilapia

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Abstract

Pyrethroids are Insecticides that have been used over the past two decades for agricultural and domestic use against Lepidoptera, cockroaches, termites, pest on cotton and lettuce. The indiscriminate use of this insecticide has increased pollution of water bodies adjacent to the aquatic environment leading to the mortality of aquatic organisms. The surface water pollution manifest a problem of global importance. The pyrethroid insecticides are extremely toxic to fishes and sensitivity of fish to the pyrethroids result in slow metabolic process. Fishes were exposed to 1/20, 1/40, 1/60 of sub lethal concentration of cypermethrin for 30 days. The total protein level in muscle was found to decrease which may probably contribute to proteolysis when compared to control fishes.

Keywords: Cypermethrin; Protein; Muscle

Phytochemical analysis of ethanolic extract of *Ardisia blatteri*, an endemic plant from Western Ghats of Tamil Nadu, India

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Abstract

GC-MS analysis of ethanolic extract of *Ardisia blatteri* resulted 40 known compounds with various proportions. Hexadecanoic acid (21.74%), Octamethyl-1 (24.73%) are the major constituents in the extract. About 8 constituents are minor and 30 constituents are trace amount in the ethanol extract of the plant leaf. Antimicrobial activity of *Ardisia blatteri* leaves are tested against various microorganisms such as, *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pneumonia*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Bacillus subtilis*, *Klebsiella pneumonia.*

Keywords: GC-MS; *Ardisia blatteri*; Antimicrobial activity; Ethanol extract

Comparative study of protein, amylase, and fat content in cow`s milk (Jersey)

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Abstract

Milk, as the first food for mammals, supplies all the energy and nutrients need for the proper growth and development of the neonate. For all mammals the consumption of milk ends at the weaning period with the exception of humans that continue consuming milk throughout their life. Milk and derived dairy products are considered an important constituent of a balanced diet. It is a source of many bioactive components such as high-quality proteins, lipids, carbohydrate, lactose, vitamins, minerals, enzymes, hormones, immunoglobulins, and growth factors. These components help in meeting nutritional requirements, but also play a relevant role in preventing various disorders such as hypertension and cardiovascular diseases, obesity, osteoporosis, dental caries, poor gastrointestinal health, colorectal cancer, ageing, and others. In this study we assessed the protein, amylase and fat content, we estimated the protein by Lowry method (1951), amylase by Bernfield method (1955), fat by Gerbers method for a period of 10 days duration 2-10-2015 to 11-10-2015. In the analysis the protein level showed for the control and experimental ranged from 200 µg/ml to 836 µg/ml and the experimental ranged from131 µg/ml to 814 µg/ml and 173 µg/ml to 677 µg/ml. The amylase level from 21 µg/ml to 26 µg/ml and the experimental level from 19 µg/ml to 23 µg/ml and 17 µg/ml to 21 µg/ml. The fat ranged from 4.5% to 4.5% and the experimental level from4.6% to4.9% and 4.1% to 5.6%. Epidemiological studies suggest that the dietary intake of milk and dairy foods is related to decreased risk of hypertension. In addition to their high mineral content that can lower blood pressure. In this present study the concentration level of protein, amylase, and fat studied in the milk showed that grass feeding cows gives a higher protein value in the milk when compared to the milk of cow which was fed with commercial feed.

Keywords: Immunoglobulins; Epidemiological

Isolation and molecular identification of probiotic microorganisms from dairy products

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Abstract

Probiotics were isolated from different source of dairy products in and around Krishnagiri, Tamilnadu, India. Probiotics are beneficial microorganism providing the better alternate providing beneficial effects in various fields. In the present study microbe was isolated and identified.The isolated bacteria was identified as *Bacillus* sp using molecular tools. Further it was confirmed by molecular characterization and biochemical methods. The selected bacterium was identified as *Bacillus subtilis*. *B. subtilis* was tested against various antibiotics and antibiotic patterns were recorded. These strains were able to tolerate successfully from the range 1.0-5.0% $NaCl_2$ concentration.The cell free supernatants and cell masses of the two isolated probiotics namely, *B. subtilis* and *B. bifidum* strains were tested for antimicrobial activity against three pathogenic bacterial strains by disc diffusion method. The *B. subtilis* showed inhibition zones and were measured.The selected *B. subtilis* and *B. bifidum* were grown in various medium and the result showed that the highest survivability. Based on molecular identification of microorganisms which is commonly done by 16S rRNA. 16S rRNA Gene sequencing carried out since it is reported as a emerged,more objective, accurate, and reliable method for bacterial identification, with the added capability of defining taxonomical relationships among bacteria .

Keywords: Probiotics; *Bacillus subtilis*, *Bacillus bifidum*

Biochemical analysis of *Gracilaria edulis* on Indian major carp, *Catla catla*

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Abstract

In the intensive aquaculture, fish feeding represents about 50% of the operating cost and in which protein is a highly expensive dietary source. So researches are being done to find an alternate source to the aquaculture nutrients, with special emphasis to the algae as the demand for the other plant protein sources had increased so as the price. However, genus *Gracilaria* which is a Rhodophyta has also been shown to be better replacement to the nutrient source especially protein in intensive aquaculture because of its availability and easily cultivable. Hence the present research is done to expound the effect of seaweed *Gracilaria edulis* as one of the ingredient in fish feed on biochemical parameters of the Indian Major carp *Catla catla*. Estimation of the growth and development of *Catla catla* was done over the study period through formulated feed with groundnut oil cake, rice bran, fish meal, tapioca powder, minerals, vitamins and consisting of *G.edulis* at different concentrations and fed at 10% body weight of the fishes and the biochemical parameters were estimated on regular basis. The biochemical assay for total lipids is done by Folch et al. (1957), assay for cholesterol is done by Parekh and Jung (1970) and assay for triglycerides is done by Foster and Dunn (1973). This estimation of biochemical composition of *Catla catla* fed with *G.edulis* showed a comparatively higher level of triglycerides, cholesterol and lipid than the fishes fed with controlled diet that indicates the efficacy of the seaweed as a nutrient provider as the fish feed in aquaculture. This data clearly shows that the seaweed *G.edulis* can be used in the commercial formulated feed to get more growth and development of the fishes.

Key words: *Catla catla; Gracilaria eduis*; Total lipid; Cholesterol; Triglycerides

In vitro effect of *Gracilaria Salicornia* on *Labeo rohita* – A biochemical study

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Abstract

Fish is considered as the cheapest source of protein available for mankind. Traditionally, animal protein sources, particularly fishmeal are used as the major ingredients of fish feeds in aquaculture. Therefore for reducing fishmeal inclusion levels many plant like products have been suggested as an alternative to fish meal. Continuous efforts are being made by the nutritionist to reduce the feed cost as a strategy to sustainable aquaculture. Finding alternative protein sources to replace fish meal in fish feed is important if the growth of the aquaculture industry is to be sustained. Seaweeds are excellent dietary sources of vitamins, proteins, carbohydrates, trace minerals and other bioactive compounds. Hence the present work was undertaken to elucidate the effect of seaweed *Gracilaria salicornia* as one of the ingredient in the feed on the biochemical parameters of the Indian Major Carp *Labeo rohita*. Estimation of the growth and development of *Labeo rohita* was done over the study period through formulated feed with groundnut oil cake, Rice Bran, Fish meal, Tapioca powder, Minerals, Vitamins and consisting of *G. salicornia* at different concentrations and fed at 10% body weight of the fishes and the parameters were estimated on a regular basis the. This estimation of biochemical composition of *Labeo rohita* fed with *G.salicornia* showed a comparatively higher level of Triglycerides, cholesterol and Lipid than the fishes fed with controlled diet that indicates the efficiency of the seaweed. The result of present study prove significant role of *G.salicornia* as an herbal growth promoter when mixed in the basal diet for *L. rohita*. The incorporation of *G.salicornia* in fish diet does not show adverse impact on health of *L. rohita* and it is environment friendly. On the basis of the results obtained in the present experiment, it can be concluded that *G.salicornia* supplementation diet has paramount importance in enhancing the growth performance and metabolism.

Keywords: *Labeo rohita; Gracilaria salicornia*; Total lipid; Cholesterol; Triglycerides

Ethnobotanical survey of Irula Tribes in Essakolathur village, Thiruvannamalai district of Tamil Nadu

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Abstract

An Ethnobotanical survey was undertaken to collect information from Irula tribal people of Essa kolathur Village, Thiruvannamalai District, South India. The conventional knowledge of local tribal people on medicinal plants was collected during the study tenure, with the help of questionnaires and personal interview Nearly 45 informants were interviewed. The present study disclose that the irula peoples in Essakolathur used 90 plants species distributed in 54 genera belonging to 36 families to treat a variety of diseases. Based on the information's most of the plants are used for wound healing. Solanaceae and Asteraceae were the most represented plant families among the identified plants. Most commonly used plant parts is Arial parts, while infusion and Maceration were the most common technique of usual drug preparation. The survey affords a genuine source of information of Irula Tribes and folk medicinal plants used by them. Documentation of traditional knowledge of the Ethnomedicinal uses of plants plays a vital role for conservation of plants resources and new drug development.

Keywords: Ethnobotany; Wound healing; *Irula* tribes; Conservation

Invitro analysis of antioxidant and antibacterial activity of *Lannea coromandelica* (Houtt.) Merr and its phytochemical properties

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Abstract

In the present study, the preliminary phytochemical analysis, antioxidant and antibacterial activity of *Lannea coromandelica* (Houtt.) Merr, collected from Damanur village of Gingee taluk, Villupuram District of Tamil Nadu were carried out. The leaf samples of the above plants was dried, powdered and extracted with methanol for the presence of bioactive compounds. The antioxidant assays including DPPH radical scavenging activity, Phosphomolybdenum assay, Fe^{3+} assay and Nitric oxide assay were performed and found at different concentration of *L. coromandelica* show high radical scavenging activity. The preliminary phytochemical screening of the *L. coramandelica* indicates the presence of phenols, flavonoids and tannins in high amounts. Alakaloids and saponins are in moderate level. The quantitative determination of phytochemicals show the plant extract of has high phenols and flavonoid content. In antibacterial activity assay against the bacterial cultures by agar well diffusion method, *L. coromandelica* shows high level of inhibition activity. Thin layer chromatography reveals the presence of bioactive compounds visualized under iodine vapor and UV illumination. Therefore, the present study concludes that the plant *L. coramandelica* is a potential medicinal plant which can be further explored for bioactive compounds.

Keywords: *Lannea coromandelica*; Phytochemical analysis; Antioxidant activity; Antibacterial activity

Phytochemical screening and analysis of antidiabetic and antioxidant activity from leaves of *Plecospermum spinosum*

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Abstract

In the present study, to analysis the pharmacological activities such as anti-diabetic and antioxidant activity in the plant of *Plecospermum spinosum*, collected from Thamanur village of gingee fort in villupuram district of Tamil Nadu, India. Fresh leaves were dried carefully, powdered and extracted with Methanol. The Crude extracts was examined Anti-diabetic and anti-oxidant activity. The anti-diabetic activity of methanolic crude extract of the above plant was assayed and observed as 73.46% (at 1000 µl conc.) for glucose uptake by Yeast cells assay, 73.13% (at conc. 1250 mg/ml) for Nonenzymatic glycosylation of Hemoglobin assay and 51.57% (at conc.125 mg/ml) for inhibition of α-amylase activity test. For the antioxidant activity of the leaf extract it showed a maximum of 72.27% by DPPH assay (at conc. 600 µg/mL), the scavenging activity reached 0.148–0.643% (conc. of 50–350 µl) for Phosphomolybdenum assay and 12.06 to 51.50% (concentration from 50–350 µl/ml) for nitric oxide scavenging assay. The crude extract was screened for the presence of phytochemical constituents and found terpenoids, flavonoids, phenolic compound; glycosides, tannins and saponins are at moderate level. The quantitative estimation of phenol and flavanoids were determined and found 247.99 GAE/g (gallic acid equivalent) and 593.27 QE/g (qurcetin equivalent) respectively. Finally, the crude extract was performed in thin layer chromatography (TLC) and observed the separation of 6 bioactive compounds at the RF value of 0.15, 0.30, 0.45, 0.61, 0.74 and 0.82 and 0.74 as red colour in UV light and brown colour in iodine vapour. This study presents a review, it was found that the methanolic leaf extract of *Plecospermum spinosum* possessed high anti-diabetic and antioxidant activity and found to have potential phytochemical compounds.

Keywords: *Plecospermum spinosum*; DPPH assay; Antidiabetic; Antioxidant; Phytochemical analysis; Thin layer chromatography

Evaluation of *invitro* antioxidant activity and estimation of total phenol and flavonoids content of various extracts of *Stachytarpheta jamaicensis* (L) Vahl. leaves

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Abstract

Stachytarpheta jamaicensis (L.) Vahl belongs to the family of Verbenaceae and is commonly known as Gervao, Brazilian tea, verbena cimarrona, rooter comb, or blue porter weed. It is one of the important plants with high medicinal and nutraceutical benefits. *S. jamaicensis* contains various medicinal properties in traditional and folk medicinal systems, with cures for several diseases. Objective. The objective of this review paper is to collect information concerning the morphology, distribution, traditional usage, phytochemical compositions, biological activities, and antioxidant capacity of *S. jamaicensis*. The high medicinal properties of this plant, for instance, antimicrobial and antifungal effect as the main activities, but verbascoside as the main active chemical component, make it a valuable source of the medicinal compound. In the present investigation was to evaluate the antioxidant capacity of various extracts from leaf of *Stachytarpheta jamaicensis* using by in-vitro antioxidant methods were carried out for total antioxidant activity, DPPH, Superoxide radical scavenging activity, iron chelating activity, Nitric oxide radical scavenging activity, Hydroxyl radical scavenging activity, FRAP assay, total phenol content and flavonoids content. Methanolic extract of leaf of *Stachytarpheta jamaicensis* was showed more effective in total antioxidant activity, DPPH and FRAP. The results obtained in the present study indicate that the methanolic extracts of leaf are potential source of natural antioxidant.

Antimicrobial activity of marine sponges collected from the coastal region in Kovalam, Chennai, Tamil Nadu, India

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Abstract

In-vitro antimicrobial activity of nine marine sponges (Porifera), collected from the coastal region in Kovalam is a fishing village in Chennai, India, against selected clinical Bacteria and fungi isolates. Methanolic extracts of all the sponges confirmed activity against one or more of microbes tested. The Methanolic extracts of *Haliclona oculata* and *Callyspongia fistularis* possessed a broad spectrum antibacterial activity against a variety of both Gram-negative and Gram-positive organisms such as Staphylococcus aureus, Staphylococcus mutaus, Bacillus subtilis, Micrococcus tubeus, Proteus vulgaris, Klebsiella pneumonia, Escherichia coli and Shigella flexneri, with a zone of inhibition from 6 mm to 10 mm. The extract also showed good quality of antifungal activity against selected fungal isolates. The extracts showing remarkable antimicrobial activity are undergoing further analysis to identify the active constituents.

Keywords: Methanolic extracts; *Haliclona oculata*; *Callyspongia fistularis*

Influences of isolated gut probiotics *Bacillus subtilis* on intestinal histological changes in the freshwater fish *Labeo rohita* (Hamilton, 1822) fingerlings

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Abstract

The investigation study was carried out to find out the effect of isolated gut probiotic *Bacillus subtilis* (SUB 3845847 SeqJP2 MH128358) on the histological parameters of freshwater fish *Labeo rohita* (Hamilton, 1822). The gut probiotic *Bacillus* species were culture and isolate by using 16S rRNA sequencing methodology. Isolated gut probiotic bacteria *Bacillus subtilis* in *Labeo rohita* stimulate the better growth and health-promoting effects in same fish species through diet. The two tubs such as control tub (feed without probiotic bacteria) and experimental tub (feed fed with *Bacillus subtilis*) was maintained, 30 fingerlings fish were introduced into each tub and continuous aeration was given. Each treatment had triplicates. The feed used to be given twice a day morning 6 am and evening 6 pm commonly at the rate of 3% physique weight and the experiments were carried out for 60 days of the exposure period. At the end of the day, intestine samples were gathered at the intervals 15^{th}, 30^{th}, 45^{th} and 60^{th} days. The intestinal histological changes were observed in the treatment group increased the epithelial layer of the middle portion of the intestine than the control group.

Keywords: *Bacillus subtilis*; *Labeo rohita* fingerlings; Formulated diet; Intestinal histology

Earthworms as biofertilizer producers

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Abstract

Vermicompost are gifted to improve soil condition and nutrient status. Vermicompost is ideal organic manure for better growth and yield of many plants due to higher nutritional value than traditional compost. Earthworms are one of the most important organisms among soil invertebrates owing to their beneficial effects on soil environment such as modification of soil physical properties and impact on decomposition of soil organic matter. Vermicomposting is the process in which earthworms play a major role with microbes in the conversion of organic solid waste into homogeneous and humus-like material known as vermicompost. Earthworms have the ability to consume various types of organic wastes such as livestock excreta, cattle dung, agricultural residue and other agro-industrial refuse. In the present study leafy vegetable waste was used as a raw material and the earthworm species *Eudrilus euginae* utilized for vermicomposting process. Nutritive value of vermicompost was analysed. The study suggested that leafy vegetable wastes based vermicompost produced by *Eudrilus euginae* earthworms species is a powerful biofertilizer in sustainable agriculture. In the present study, earthworms are described as best biofertilizer producers.

Keywords: Vermicomposting; Biofertilizer

Impacts of agriculture practice on amphibians diversity in Krishnagiri district

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Abstract

Amphibians are prophecies of ecosystems worldwide. Noteworthy for their semi-permeable skin, these sensitive bio-indicators react drastically to environmental abnormalities. All over the world amphibians are declining and a number of theories exist attempting to explain these declines. Previous research indicates that agriculture is believed to contribute to the declines. Amphibians play major role in ecosystem functioning, as prey and predator, especially as consumers of pest insects. They are also food for snakes, birds and small mammals. After examining the possible causes a number of factors to have contributed to this decline. Habitat loss, together with less obvious land-use changes such as intensified farming practice, can have significant adverse impacts on diversity of frogs. Habitat loss and exposure to pesticides are likely primary factors contributing to amphibian decline in agricultural landscapes. The benefits of this increased in cultivated land, perhaps especially for amphibians, may be negated if habitat quality is insufficient to support persistent populations. I examined the presence of pesticides and nutrients in water and sediment as indicators of habitat quality and assessed the bioaccumulation of pesticides in the tissue of two native amphibian species *Duttaphrynus parietalis* (Indian Toad) and (*Duttaphrynus scaber*) (Schneider's Toad) at six Landscape of Krishnagiri District. Concentrations of the pesticides frequently detected in water and sediment samples were not different between three farm land types. The median concentration of Endosulfan in surface water was 0.2 µg/L. Reproductive abnormalities in *Duttaphrynus parietalis* (Indian Toads) have been observed in other studies at these concentrations. Nutrient concentrations were higher in another three sites but lower than concentrations thought lethal to frogs. Complex mixtures of pesticides including up to 8 fungicides, some previously unreported in tissue, were detected with concentrations ranging from 0.08 to 1500 µg/kg wet weight. No significant differences in pesticide concentrations were observed between species, although concentrations tended to be higher in Indian Toad

compared to Schneider's Toad, possibly because of differences in life histories. Amphibians are a striking example of these losses as they disappear at a rate that greatly exceeds historical levels. Consequently, modern amphibian decline and extinction is a lens through which we can view the larger story of biodiversity loss and its consequences. Hence, the results suggest that amphibians are likely to be affected by agricultural processes that operate at several spatial and temporal scales, and that it is probable that various processes related to current-day agriculture will affect both larval and adult amphibians. The results imply that maintaining dense wetland patterns could enhance persistence of amphibian populations in agricultural habitats, and indicate that heterogeneous landscapes may lower the risk of regional amphibian population declines under extreme weather perturbations.

Keywords: Amphibian; Extinction; Pesticide; Pathogens; Diversity loss

Seasonal variations of heavy metal concentration in seawater and sediment samples from Uppanar estuary, Cuddalore coast

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Abstract

The current study was carried out to investigate the impact of heavy metal concentration in seawater and sediment samples from industrial polluted area of Uppanar estuary. Seawater and sediment samples were collected in two different stations during four seasons (post monsoon, summer, pre monsoon and monsoon) the sample was analyze Fe, Cu, Zn, Cd, Cr and Ni. The heavy metal concentration in collected samples was found to be above WHO standards. Results showed that the level of heavy metal concentration was higher in sediment samples were compared with water samples in monsoon season. The order of heavy metal range in seawater and sediment samples was Fe > Cu > Zn > Cd > Cr > Ni. The data were analysed through SPSS-Two way ANOVA. The results show that industrial growth has affected the aquatic environments and normal monitoring will help to adopt several pollution control actions for better managing of the aquatic environment.

Keywords: Uppanar estuary; Seawater; Sediment; Cuddalore coast; Heavy metal

Biochemical and hematological effects of fresh water fish *Oreochromis mossambicus* treated with *Euporbia tirucalli* latex.

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Abstract

The effect of *Euporbia tirucalli* on biochemical and hematological studies of fresh water fish *Oreocromis mosambicus* (Tilapia) treated with plastic tubs in laboratory conditions. In this study aqueous powder of Euporbia tirucalli latex did in LC50 values in the fish. The result was 0.04 mg/L. The fish were treated with subjected to 0.04 for 96 hours of LC50 value. The LC50 values of 1/10, 1/20, 1/30 were exposed with the fish. These fish were analyzed the total protein, glucose, carbohydrate as biochemical and WBC, RBC, HB, MCV, MCH and MCHC as hematological analysis of all these studies in the tissues and blood. The result of this study showed that the tissues and blood of fish *Oreocromis mosambicus* were affected by the milky latex powder of *Euporbia tirucalli.*

Keywords: *Euphorbia tirucalli*; *Oreochromis mossambicus*; LC_{50}; Biochemical; Hematology

The case study of *Eudrilus eugeniae* on vermicomposting is most suitable methods of waste management of poultry waste with *Tectona grandis* and cow dung

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Abstract

Now-a-days poultry industry generates more environmental problems and one of the major problems is the accumulation of large amount of wastes, especially manure and litter. Intensive poultry farms have been mostly located in the suburbs of big cities and produce large amounts of manure, which contains high concentrations of nitrogen and phosphorus. Composting and vermicomposting are most suitable methods of waste management of poultry waste and converting waste to wealth. The present study clearly demonstrates that the conversion of poultry waste into vermicompost using *Eudrilus eugeniae* is an efficient and sustainable practice. Poultry waste, *Tectona grandis* and cow dung were taken in this study, the following ratio is 1:1:2 (T1); 1:2:1 (T2); 2:1:1 (T3) and control 3:0:0. At the end of the 90 days, earthworm biomass and length had increased in all the treatments including control. In general, statistically significant ($P<0.05$) increase in biomass was recorded in T1 (23.8 mg/total worms), followed by T2 (24.2mg/ total worms), T3 (26.6 mg/ total worms) and least in control (21.4 mg/ total worms) treatments. The suitability of vermicompost as an organic fertilizer has been confirmed by having an ideal pH, total organic carbon, an increase in humic acid content, provides nutrients such as available N, soluble K, and exchangeable. This suggests those vermicompost can be used to speed up vegetable seed germination and to accelerate seedling development. Greater amounts of nutrients in poultry waste-based vermicompost seemed to promote a linear increase in germination.

Keywords: *Eudrilus eugeniae*; *Tectona grandis*; Nitrogen and phosphorus; Vermicompost

Food and feeding habits of *Saurida pseudotumbil* (Dutt and Vidya Sagar, 1981) from Parangipettai waters

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Abstract

Food and feeding habits of *Saurida pseudotumbil* was studied during 2012 from Parangipettai waters of the southeast coast of India. A total of 1168 stomachs were examined of which 506 male ranging from 130-369 mm and 662 female ranging from 130-450 mm. Gut content analysis was carried out separately for both sexes (size-wise and month-wise). The stomach contents consisted of fishes, crustaceans, molluscs, fish remains and miscellaneous materials. The general food composition was not found to vary either with size or sex. The preference for the various food items was in the order of fishes, followed by crustaceans, molluscs, fish remains and miscellaneous items. The gastro-somatic index was found to be high during November – December and January and April, which was also found to be the peak breeding months. The results showed this species to be a typical piscivore. Occurrence of juvenile lizardfishes in the gut contents of both sexes showed that they are typical cannibalistic in nature. The species diversity of prey organisms, their richness and eveness were calculated using various indices. The medium diversity values suggested that this fish feeds on many prey items mainly fishes.

Keywords: *Saurida pseudotumbil*; Feeding intensity; GSI; Diversity

Biodiversity of freshwater Phytoplanktons in and around the Lakes of Chennai , Tamilnadu, India

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Abstract

The present Research work was conducted in lakes of Tamilnadu in around thelakes of Chennai. The study discusses the phytoplankton diversity of the Velachery, pallikaranai and Tambaram lake ecosystem. A standard methodology was followed in conducting to complete this study and samples were collected at different points from the lake ecosystem located at the core area of the Chennai city. Through a field survey, thirty five species of phytoplankton were recorded coming under four classes viz., Bacillariophyceae (10), Chlorophyceae (12), Cyanophyceae (10) and Euglenophyceae (2), Charophyceae and twelve families and Fragilariaceae, Bacillariaceae, Zygnemataceae, Desmidiaceae, Oscillatoriaceae, Melosiraceae, Cladophoraceae, Scenedesmaceae, Microcystaceae, Nostocaceae , Phormidiaceae, Characeae. The data were collected over four seasons- January to March (Summer) and Aprilto June (Pre monsoon) July to September (Southwest monsoon), October to December (North-East monsoon) of 2017. A total of 35 species were recorded from the study region of which maximum species were recorded during March to May, while minimum species from September to November.These phytoplanktons are major food for Zooplanktons. Both Phytoplanktons and Zooplanktons are excellent food for fishes, Shrimp and Crab. Hence it facilitates Aquaculture in Lakes, Ponds and Water reservoirs of Tamilnadu.

Keywords: Phytoplanktons; Species diversity; Lakes

Larvicidal activity of endophytic fungal extracts from mosquito repellent plants

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Abstract

Nowadays mosquitoes are becoming life threatening disease causing agent. Synthetic drugs on larvicidal activity leads to lot of complication and health hazardous to human being and environment. Endophytic fungi have received appreciable attention having lot of biopotential compounds which is useful in the control of mosquito larvae. In the present study, the endophytic fungal species isolated from 6 different mosquito repellent plants were subjected to fermentation. WHO method was followed to carry out larvicidal activity. Among the six plants selected for the study, the fungal species isolated from *Vitus negundo* was found to be considerable activity at 20ppm for both *Aedes aegypti* and *Anopheles stephensi*.

Keywords: Endophytic fungi; Larvicidal activity; Mosquito repellent plants; *Aedes aegypti*; *Anopheles stephensi*

Anti-inflammatory, antimicrobial activity and chemical composition of south Indian seaweeds

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Abstract

The present study was intended to investigate the presence of major chemical components and also performed FTIR to identify the major components in the seaweed extracts. To explore the antibacterial potential and anti-inflammatory activity of ethanolic extracts from nine species of south Indian Seaweeds. Total flavonoid content (TFC) and total tannin content (TTC) of ethanolic extracts was determined using spectrometric method. Antimicrobial activity of ethanolic extracts was tested against six bacterial strains using disc diffusion method. Anti-inflammatory activity of seaweed extracts was performed by HRBC membrane stabilization method. *Turbinaria ornata* shows highest TFC and TTC among all the seaweed species. Significant differences were observed in anti-inflammatory activity of ethanolic extracts from various seaweeds investigated using human red blood cell (HRBC) membrane stabilization method. HRBC membrane stabilization activity of ethanolic extracts of seaweeds exhibited dose dependency; and increased with increasing concentration of the extract. Ethanolic extract of *T. ornata* had the strongest growth inhibition against *Proteus mirabilis*. FT-IR Spectroscopy analysis of three seaweeds provided a detailed report of major functional constituents and chemical components. It can be concluded that seaweeds are rich in polyphenols to which acquire potent antimicrobial and anti-inflammatory activity. Seaweed extracts are major breakthrough for pharmaceutical application.

Keywords: Seaweeds; Flavonoid; Tannin; Antimicrobial; Antiinflammatory

Tree census of a 16 – kilometer stretch on Annasalai, Chennai, India stretching from Alandur metro station to Vivekananda cultural centre on Kamarajar promenade

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Abstract

The present investigation has been undertaken in a 16 kilometers stretch on Anna salai starting from Alandur metro station, Chennai, Tamil Nadu via Multi super speciality hospital to Vivekananda cultural centre on Kamarajar promenade for trees growing along both the sides of the road. The census revealed that a total of 2074 trees both shrubs and large trees were present on the selected stretch. The trees belong to 90 different species of several families. Of the Ninety species *Azadirachta indica* was the most dominant while *Lawsonia inermis*, *Phyllanthus embilica* and *Aegle marmelos* were the least dominant species. Seven species are represented in all the ten zones. These are *Leucaena leucocephala*, *Peltophorum pterocarpum*, *Albizia saman*, *Ficus religiosa*, *Polyalthia longifolia*, *Delonix regia* and *Azadirachta indica*. This study thus revealed that the selected stretch has a wide diversity and the dominant plants seen were found to be medicinally or economically important. Since the stretch is a busy highway, the dominant trees show a high level of Air pollution that can be deduced by calculating their APTI.

Keywords: Tree census; Air pollution; Neem tree; Plant diversity

Antimicrobial activity of root extract of *Aristolochia indica* against multidrug resistant *Staphylococcus aureus*

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Abstract

In the present study, the phytoconstituents and antimicrobial activity of *Aristolochia indica,* root extract of hexane, ethyl acetate and methanol were tested against human pathogenic bacteria.The preliminary phytochemical analysis of the root extract revealed the presence ofpresence of alkaloids, fat, oils, glycosides, gums and mucilage's, phenolics, steroids, sugars, tannins andterpenoids in methanol, fat, oils, flavonoids,saponins, steroids andterpenoids inethyl acetate, extract showed the presence of fat, oils, flavonoids, phenolics, saponins, steroids, tannins andterpenoids in hexane. The crude extract of hexane, chloroform and methanol were screened for antimicrobial activity. Among the three extractions, the extract of methanol showed potent antimicrobial activity by inhibiting the growth of all the tested bacterial and fungal pathogens *Escherichia coli*, (16±0.5 mm), *Staphylococcus aureus* (16±0.3 mm), *Beauveria bassiana* (15±0.3 mm), *Candida albicans* (14±0.6 mm), *Pseudomonas aeruginosa* (13±0.4 mm) and *Bacillus subtilis* (12±0.4 mm). The methanol extracts of root were also analysed for antibacterial activity against methicillin, penicillin and vancomycin resistant *S. aureus* strains (1–10). The methanol extract showed an effective antibacterial activity against *S. aureus* strain 9, with a minimal inhibitory concentration of 31.25 mg/mL. The synergistic action of root extract with antibiotics such as methicillin, penicillin and vancomycin was observed against *S. aureus* strain 6. The fractional inhibitory concentration index of methanol extract with methicillin, penicillin and vancomycin was 1.0, 0.5 and 0.375, respectively. These results clearly indicate that the metabolite of *Aristolochia indica* is a potential source of new antibiotics.

Keywords: *Aristolochia indica*; Multidrug-resistant *Staphylococcus aureus*; Antibacterial activity; Synergistic activity

Impact of sugar mill efluent of the growth of *Cajanus cajan* (L.) Mill sp.

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Abstract

Sugar industry effluent has characterization with high pollution load in it. Mostly it has acidic pH with more EC, TDS, TSS, with charged particles, high BOD and COD making the effluent as pollution indicator. Evaluation of sugar mill effluent on growth of 15th day seedling of *Cajanus cajan* (pigeon pea) to know the impact of the effluent on growth performance was studied, with various concentration of effluent starting from 10%, 25%, 50%, 75% and 100%. The observed result showed that the effect of sugar mill effluent on the growth of *Cajanus cajan* by different concentration of effluent had inhibitory effect with increasing concentration of effluent proving that the effluent has more pollutant in it. Usage of effluent directly is not encouraged and proper dilution of effluent can be used for irrigation.

Keywords: Sugar effluent; EC; TDS; Pollution; Pigeon pea

Synthesis of mesoporous silicon with uniform pore size using the ashes of husks from foxial millet:a novel recyclable bio-waste

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Abstract

In this study, a novel source of mesoporous silicon has been reported using the waste husk ashes obtained from foxial millet. Silica was available as the major content to about 94–96 % for the ash heated to 700 °C for 12 hrs. Silica from foxial millet husk ashes is reduced into mesoporous silicon by a magnesiothermic process. Chemical content of the reduced silicon was determined by ICP-OES. Porosity studies were carried out by nitrogen adsorption-desorption studies. The average BJH pore diameter was determined to be 55.674 A°. The resulting adsorption isotherm is type-IV with capillary-condensation of hysteresis H_3 due to aggregates of non-rigid slit pores. Its amorphous nature was determined by TEM and uniformity in pore size distribution was confirmed by BJH pore size distribution. Surface characterization was done by SEM-EDS, TEM and TEM-SAED.

Keywords: Biogenic silica; Mg reduction; Uniform mesoporous; BJH model; TEM

Conservation of medicinal plant resources in Eastern Ghats of Tamilnadu, India

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Abstract

The present study focused to investigate on medicinal plants resources and conservation strategies of threatened plant species from Eastern Ghats of Tamilnadu, India. The Eastern Ghats of Kolli hills a considerable ecological region of Southern India represents an assemblage of medicinal plant sources for curing various ailments of local tribe's and traditional healers. The Eastern Ghats of Kolli hills are prioritized areas possess not only high level species richness, but highest number of endemic and threatened medicinal plants such as *Andrographis lineata*, *Boswellia serrata*, *Canarium strictum*, *Cayratia pedata*, *Celastrus paniculatus*, *Cinnamomum camphora, Curcuma neilgherrensis*, *Crotalaria longipes*, *Decalepis hamiltonii, Hemidesmus indicus*, *Gloriosa superba*, *Gymnema sylvestre* and *Santalum album.* It is concluded that the medicinal plants resources are wealthy diversity and distribution in Kolli hills of the Eastern Ghats region and conserve the threatened plant species through *in situ* and *ex situ* based conservation management. On the other hand create awareness to self-help tribal women for development of medicinal plants resources by sustainable cultivation practices, harvesting and marketing of the medicinal plant sources will help to improve the livelihood of local tribes.

Keywords: Medicinal plants; Kolli hills; Threatened plants; *Crotalaria longipes*

Anti HEV activity of *Andrographis paniculata* by *in-silico* analysis

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Abstract

Hepatitis E virus (HEV) is a an icosahedral, small, non-enveloped, single standard, positive-sense RNA virus and it is the major causative agent for acute viral hepatitis. HEV genome consists of three open reading frames (ORFs) and they are ORF1, ORF2 & ORF3. Among the three ORFs, ORF 1 is the largest and it encodes a non-structural protein containing methyl transferase, helicase, protease and RNA dependent RNA polymerase. These proteins are involved in the replication of virus particle. The second major ORF is ORF2 that encodes the structural protein ie., the Capsid protein.HEV mainly affects the pregnant women particularly at their third trimester. To overcome this infection there is a need to findout a new antiviral agent. Hence, the present study was planned with a view to find out the anti HEV property of Indian medicinal plant *Andrographis paniculata* by *in-silico* method**.** In order to find out the antiviral property of andrographolidefrom *Andrographis paniculata* molecular docking was done between HEV receptor & plant based ligand. The protein sequences of the HEV receptors taken into account are ORF1 & ORF2. HEV ORF1 codes for methyl transferase, helicase, protease & RNA dependent RNA polymerase and were retrieved for BLAST analysis. The BLAST results of the three non-structural proteins like helicase, protease and RNA dependent RNA polymerase showed less percentage similarity. Whereas methyltransferase showed highest similarity with β lactamase and it was found to be in the functional region of β lactamase and hence methyltransferase alone was subjected for homology modelling. The modeled protein of methyltransferase was subjected for docking with a phytochemical andrographolide from *Andrographis paniculata* and thebinding energies of which was -6.54 and IC_{50} value of this compound was 16.05 (μm). Capsid protein of HEV coded by OFR2 had already predicted structure and hence that was reterived from NCBI for the molecular docking with the phytochemical andrographolide. Binding energies of the capsid protein with andrographolide was -5.79 and IC_{50} value of this compound was 57.46 (μm). The overall results of this study indicated that the compound andrographolide will be a remedy or cure for HEV infection, which needs to be proved further to get a lead molecule for an anti HEV compound.

Keywords: HEV; Antiviral; *Andrographis paniculata*; Rographolide

Syzygium alternifolium (Wight) Walp. - A rare endemic of the middle Southern Eastern Ghats finds a habitat at Alagar hills of Madurai District in Tamilnadu

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Abstract

Syzygium alternifolium (Wight) Walp. of the family Myrtaceae is a small and fragile fruit tree of timber and medicinal importance. Known to be an endemic in the tropical dry deciduous forests of Kurnool, Cuddapah and Chittoor districts of Andhra Pradesh, this species is sighted rarely in Chengalpattu and North Arcot districts of Tamil Nadu in southern end of the Eastern Ghat strech. The population size of this taxon is reported diminishing in its original natural niche due to habitat changes, felling of trees for trivial uses, and collection/devouring of fruits. Besides anthropogenic pressures, its sparse distribution, discontinuous and erratic flowering, perishability of fruits leave *S. alternifolium* with only a slim a chance for repopulating itself, hence recently listed as an endangered taxon. Interestingly this timid arborecsent is seen to have crept into Alagar Hills of Madurai District in Tamilnadu and a small stand of less than 20 isolated individuals are found to be inhabiting a particular site. That this attractive Middle Eastern Ghats species of Andra Pradesh is thriving scantily in the geomorphically and floristically interesting Alagar Hills attracted this study. This present investigation looks at its distribution using line transects and 10x10 m quadrats along the hilly slopes and seeks to record the biotic association, especially the threats and disturbances caused to the plant. Special efforts were taken to study the feasibility of propagating the species via conventional nursery practices and *in vitro* techniques that the reintroduction of the selected species is attempted back in its site.

Keywords: Endemic; Eastern Ghat; Line transect; Quadrat; Syzygium

An *in vitro* device to investigate the mycobiota of *Jasminum sambac* L.

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Abstract

Jasmine, the mesmerizing, serene, odoriferous, ornamental is a summer crop that comes to full bloom during summer. Shrubs aging between the two and five years exhibit a good yield which in some cases gets affected due to abiotic stresses, sudden lightening and summer showers. Field observations show that pest infestations are not uncommon. Fungal attack coincides with anthesis. Besides the routine microscopic investigation of infested samples, an *in vitro* culture equipment was developed to pursue studies on fungi associated with Jasmine. SAM and floral receptacles just initiated into flowering could be cultured at desired stages so as to be assessed for their developmental competency. Floral development can be arrested, reverted or redirected as the reproductive apices were inoculated into on MS medium supplemented with different concentrations of PGRs and Salicylic Acid. In addition, cultures opened up an opportunity for the study on fungal microbiota. Even after prudent surface disinfection, endophytic fungal mycelium emerged at the surface of floral axis from near the osmophore. If unchecked, the fungus proliferated and engulfed the explant to form darkly pigmented sporulating structures. Fungal isolates were made through the slide culture. For want conformation of the endophytic nature of the fungus, cross sectional examination of the cultured floral part and the plating of inoculum on PDA medium were done. A co-culture technique of rearing the endophyte infested culture-drawn sample along with fresh uninfested sample in the same petri dish showed the vulnerability of Jasmine flowers. Fungal identification taken up as per the procedures of mycological investigation helped ascertaining the identity and systematic position of the fungus.

Keywords: *In vitro* culture; SAM; Slide culture; Endophyte

Fruit pulp of the showy ornamental *Crescentia cujete* L. elicits grit as a useful phytotherapeutic in mitigating CNS ailments

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Abstract

Tree Calabash (*Crescentia cujete* L), adorned with cauliflory and large green globose fruits, is a showy ornamental claimed to be used in folk medicine. The light sensitive fleshy pulp contained within the hard indehiscent shell instantly changes colour on being exposed and renders the seeds non-germinable. Though the pulp is seen as a deterrent to the propagation and thus species perpetuation, notes on its ethnic and indigenous use makes it an interesting material for study. Notwithstanding to its attractiveness, noticeablity and the claims on its medicinal role, the species has not been investigated well. Owing to the paucity of information on the therapeutic efficacy, efforts were taken in this study to screen the photochemical complements and look for their presence in somatic tissues. Solvent extract made out of dried pulp was checked for its effectiveness in regulating CNS activity. Results of the histochemical examination of tissues and phytochemical extractions prompt the presence of substances that could exert a prophylactic and curative role. Preclinical trials performed with animal model show that the methanol extracts of fruit pulp can exert a significant influence in treating neuropharmacological disorders.

Keywords: Solvent extracts; Phytochemicals; Antimicrobial assays; Neuropharmacological functions; Anxiolytic properties

Effect of humic acid, fertilisers and zinc nutrition on soil fertility and productivity of sri rice in an inceptisol of Tamirabharani command area

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Abstract

Several scientific studies, well known factored that the humic substances in influencing soil quality or soil health hardly requires any over-emphasis. It is well known that a product of organic matter decomposition which has humic acid as one of its components is familiar to promote growth and yield of crops by sustaining the soil fertility. Recognizing this need, the present investigation was undertaken to study the effect of humic acid with zinc nutrition and fertilisers on soil fertility and productivity of rice under SRI in an Inceptisol of Tamirabharani command area with a source of readily available humic acid as potassium humate on the following aspects: A field experiment in Manakkrai soil series at B block, Central Farm, Agricultural College and Research Institute under Tamil Nadu Agricultural University, Killikulam on rice during pishanum, 2010–2011 was conducted with fifteen treatments (Three modes of humic acid viz., soil application (10 and 20 kg ha^{-1}), foliar spray (0.1 % at tillering and panicle initiation) and seedling dipping (0.3 %), two levels of fertilisers (75 % and 100 % of recommended NPK) replicated two times with Randomized Block Design (RBD). Laboratory investigation of soil and plant samples at critical stages were made and observations on growth attributes of rice besides yield and its components were recorded. The salient features of the investigations are the following.

There was pronounced effect of humic acid as potassium humate with zinc and fertilisers on the growth, yield components and yield of rice. The effect on uptake of nutrients at critical growth stages was also significant. Application of 75 % of recommended NPK kg ha^{-1} + $ZnSO_4$ @ 12.5 kg ha^{-1} as soil application + 0.3 % HA as seedling dipping +0.1 % HA as foliar

spray at tillering and panicle initiation increased the plant height, no.of tillers per hill, dry matter production, number of productive tillers per hill, number of filled grains per panicle, 1000 grain weight, nutrient content and uptake besides yield and its components.

In respect of soil fertility, the status of available N, P, K, organic carbon, CEC and E_4/E_6 ratios enhanced initially and decreased gradually with crop maturity was associated with 75 % of recommended NPK + Humic acid @20 kg ha^{-1} as soil application (T_5). The availability of DTPA micronutrients (Zn, Fe, Cu and Mn) also increased initially and decreased gradually with crop maturity were associated with 75 % of recommended NPK kg ha^{-1} + Humic acid @20 kg ha^{-1} as soil application + $ZnSO_4$ @ 25 kg ha^{-1} as soil application (T_9). The enhanced agronomic efficiency and apparent nutrient recovery of N, P and K in rice was associated with treatment T_{13} (75 % of recommended NPK kg ha^{-1} + $ZnSO_4$ @ 12.5 kg ha^{-1} as soil application + 0.3 % HA as seedling dipping + 0.1 % HA as foliar spray at tillering and panicle initiation). The partial productivity factor (PPf) was higher for the humic acid, zinc nutrition and fertiliser combinations of 75 % of recommended NPK kg ha^{-1} + $ZnSO_4$ @ 12.5 kg ha^{-1} as soil application + 0.3 % HA as seedling dipping + 0.1 % HA as foliar spray at tillering and panicle initiation compared to control. The PPf calculated as N + P_2O_5 + K_2O applied varied from 23.8 to 41.0 with HA application.

The response ratio was the highest (191) for application of 75 % of recommended NPK + soil application of 10 kg humic acid ha^{-1} and 12.5 kg $ZnSO_4$ ha^{-1} (T_6) followed by the ratio of 171 registered with application of 75 % of recommended NPK + soil application of 10 kg humic acid ha^{-1} and 25 kg $ZnSO_4$ ha^{-1} (T_7) to rice. The present investigation indicated that application of 75 % of recommended NPK kg ha^{-1} + $ZnSO_4$ @ 12.5 kg ha^{-1} as soil application +0.3 % HA as seedling dipping +0.1 % HA as foliar spray at tillering and panicle initiation is suggested on the basis of BCR, which revealed that there is a saving of 25 % NPK and 50 % $ZnSO_4$ for SRI rice in Inceptisol of Tamirabharani command area along with higher yields and greater profits.

Ameliorative effect of ketaconazole in NaCl stressed *Vigna unguiculata* (L.)

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Abstarct

In the present study the ameliorative effect of ketaconazole on the NaCl stressed *Vigna unguiculata* (L.) Walp.var.Vamban-6 was observed. The seeds were sown in plastic pots. All the pots were irrigated to the field capacity with ground water upto 14 days after sowing (DAS). Pots were treated with ground water as control and 100mM NaCl, 100mM NaCl + 20 mgL^{-1} ketaconazole and 20 mgL^{-1} ketaconazole. Plants were harvested randomly on the 20^{th}, 40^{th}, 60^{th} and 80^{th} DAS. Sodium chloride stress inhibited the root and stem length, total leaf area, fresh and dry weight, number of leaves, number of branches, number of flowers, number of pods per plant, and number of seeds per pod, chlorophyll and cartenoid content. Plants tested with sodium chloride with ketaconazole increased these parameters to a larger extend when compared to NaCl stressed plants. The ketaconazole treatment increased the root length, number of branches, leaves, root, fresh and dry weight, chlorophyll and cartenoids when compared to control. The results showed that the ketaconazole causes amelioration of sodium chloride in *Vigna unguiculata*.

Antioxidant activities and GC- MS analysis of ethanol flower extract of *Aerva lanata* (L.) Juss Ex.Schult

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Abstarct

Aerva lanata (L.) Juss Ex.Schult commonly called as Polphala of Amaranthaceae is a perennial shrub which is seen commonly in different waste parts of India. It is familiar in the name of knot grass. They are branching shrub. It is mainly used for urinary disorder. The aim of the study was to evaluate antioxidant activities and GC-MS analysis of ethanol flower extract of *A. lanata*. It is also known as knot grass and it is a perennial shrub. These plants are branching shrub, roots are like woody, and flowers are like soft spikes. They flowers in the first year of cultivation. Leafs are oval in shape, they are 0.5-1.5 in length, are alternately arranged. The leaves are present in the main stem. The whitish flowers have two lobes and red bases, grown in leaf axils have 0.1in long, the pink, green, white flowers are also seen. These plants are self pollinated, bisexual and are cultivated in 90 m above the sea level, and are grown only in tropical climate. The whole plant is useful for many diseases.4,5 Antioxidant activities such as DPPH radical, superoxide radical scavenging assays, phosphomolybdenum reduction and Fe^{3+} reducing power assays were carried out. The maximum DPPH radical scavenging activity was 30.02% at 600 µg/mL concentration and superoxide radical scavenging activity was 52.29% at 120 µg/mL concentration. The maximum phosphomolybdenum reduction was 81.25% at 120 µg/mL concentration. The maximum Fe^{3+} reduction was 68.41% at 300 µg/mL concentration. GC-MS analysis was carried out to identify known active compounds present in the ethanol extract of *A. lanata*.

Keywords: Antioxidant; DPPH radical; GCMS

Brest cancer diseases cure uses of *Bulbophyllum kaitense* L. plant cultivated in Eastern Ghats of Taminadu state Tribals, India

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Abstract

In the present investigation of *Bulbophyllum kaitense* L. plants wild, used for various human diseases by Malayali tribal's, Kolli hills. Such as anti cancer, breast cancer, liver disorders, wounds, diarrhea, skin diseases, haemorrhage and rheumatism, antin-inflammatotory, bowel diseases, hydrophobia, gynecological disorders, urinary discharges, leprosy and intestinal worms, dry cough and loss of voice. Medicinal plants a very important role in the modern century of India. The Eastern Ghats of kolli hills tribals exploration in plant for forest- based plant products for new pharmaceuticals without side effects and the plants increasing in both developing and developed tribals incoming especially among the youth. Surprisingly, the bulk of the traded is still from the very small number of *Bulbophyllum kaitense* L. plant fruits cultivated. The very important role of pharmacological properties of plant recent trends have indicated further increase in this trade with the herbal cosmetic and pharmaceutical industry playing a major role in fuelling the plants. The expanding trade in medicinal plants has serious implications of the survival of plants. Medicinal plant conservation areas (MPCA) have proved crucial in building to tribals in the conservation of medicinal plant for sustainable use and equitable benefit sharing in tribal in yercaud hills. The National Mission on Medicinal Plants NMMP and now continuing under National "AYUSH" Mission (NAM) by Government of India. The added plant Ficus macemosa L prioritized list of medicinal plants for cultivation and medicinal plants board various state have established in the plant their respective areas by diversity conservation.

Keywords: Malayali tribals; Anticancer; Breast cancer; Antiinflammatotory; Hydrophobia Urinary discharges

Biocontrol potential of *Trichoderma* spp. against *Fusarium* Wilt of tomato *(Solanum lycopersicum L.)*

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Abstract

Trichoderma species are one of the most important biocontrol agents and most frequently isolated from soil and root zone of plants. *Trichoderma* strains are antagonistic to some plant pathogenic fungi because they have the ability to suppress the disease. The genus *Trichoderma* spp. effective biocontrol agent against fungal, bacterial pathogen. The fungal biocontrol *Trichoderma harzianum (*Tr01), *Trichoderma viride* (Tr02) and fungal pathogen *Fusarium oxysporum* (Fu04) was also identified through morphological characterization observed under light microscope (10x×40x). The isolates (Tr01, Tr02, Fu04) were confirmed through genetic DNA isolation and PCR analysis. The antagonistic activity of *Trichoderma harzianum,Trichoderma viride* against pathogenic fungi *Fusarium oxysporum* was studied in dual culture method and responsible for*Fusarium*wilt disease.The efficacy of the different eight treatments such as Control, Tr01, Tr02, Fu04, Tr01+ Fu04, Tr02+ Fu04 inoculum was tested at green house level by pot culture study using tomato seeds. In pot culture studies 45 days after inoculation significantly increased the growth parameters (Tr01-60cm) than control. Similarly biomass accumulation highly (Tr01. 13.4 mg/g/fr.wt) noticed in *Solanum lycopersicum* compare to control.

Keywords: Antagonistic effects; Chlorophyll; NPK content; *Trichoderma harzianum*; *Fusarium oxysporum*; *Trichoderma viride*

Studies on siderophore producing *Pseudomonas* spp and yield attributes on *Vigna radiate*

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Abstract

Siderophores are small protein molecules that can easily bind to ferric iron. As a chelating agent they transport iron molecules inside the bacterial cell for various biochemical reaction. *Pseudomonas* spp were isolated from plant rhizospheric region on *Arachis hypogaea* Pannapatti, Salem district, Tamil Nadu. The isolates werefollowed by biochemical test and conformed with genomic DNA identification. They were confirmed with *pseudomonas fluorescens* (PSA01) and *Pseudomonas aeruginosa* (PSA02). The isolates were the amount of phosphate solibilization and siderophore production was Maximum activity shows in PSF01. The comparative effect of PSF01 and PSA02 on the growth and yield of *vigna radiate* (green gram) was studied. The seeds of *vigna radiate* were treated wih PSF01, PSA02 and their results was recorded after 45 days. The results proved that plant growth with *Pseudomons fluorescens* PSF01 showed excellent results in the morphological and biochemical parameters.

Keywords: Biocontrol; *Pseudomonas* spp; Siderophore; *Vigna radiate*

Bioremediation of heavymetal contaminated soil using PGPR (plant growth promoting rhizobacteria) and *Rhizobium*

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Abstract

The contamination of soil with heavymetal pollutants is escalating day by day due to excessive industrialization, waste disposal, agriculture applications and various anthropogenic actions. Bioremediation is a biological process for cleanup of pollutants from the environment. In the present study, *Rhizobium* and *Pseudomonas aeruginosa* isolated from rhizosphere soil was used for bioremediation. These isolates were characterized for their ability of biochemical tests. *Rhizobium* and *Pseudomonas aeruginosa* were inoculated in *Vigna mungo*.L plants by pots inoculation method and analyzed for the growth promotion efficacy in heavy metal polluted soil. The plant inoculated with isolates showed Plant growth and bioaccumulation, as compared to non-inoculated control. Further analyses of leaves were carried out for the photosynthetic pigment analysis, in *Vigna mungo*.L. Results of the study showed positive growth response of *Vigna mungo*.L on heavy metal polluted soil in green house condition in plants. The study concluded that the heavy metal mobilizing PGPR could be used as effective inoculants for improving the phytoremediation in heavy metal contaminated soil, as well as reclamation of heavy metal polluted soil. These results indicate that the co inoculation of PGPR and *Rhizobium* in in counter acting metal toxicity and provide an efficient strategy for the phytoremediation of metal contaminated soil.

Keywords: Bioremediation, Heavy metal; Environment; *Rhizobium*; Bioaccumulation

The role of arbuscular mycorrhizal fungi in agro and natural ecosystems

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Abstract

Symbioses between plants and beneficial soil microorganisms like arbuscular-mycorrhizal fungi (AMF) are known to promote plant growth and help plants to cope with biotic and abiotic stresses. Profound physiological changes take place in the host plant upon root colonization by AMF affecting the interactions with a wide range of organisms below- and above-ground. Protective effects of the symbiosis against pathogens, pests, and parasitic plants have been described for many plant species, including agriculturally important crop varieties. Besides mechanisms such as improved plant nutrition and competition, experimental evidence supports a major role of plant defenses in the observed protection. During mycorrhiza establishment, modulation of plant defense responses occurs thus achieving a functional symbiosis. AMF are primarily responsible for nutrient transfer from soil to plant but have other roles such as soil aggregation, protection of plant against drought stress and soil pathogens and increasing plant diversity. This is achieved by the growth of their fungal mycelium within a host root and out into the soil beyond. There is an urgent need to study the below-ground microbiology of soils in agro- and natural ecosystems as AMF are pivotal in closing nutrient cycles and have a proven multi-functional role in soil-plant interactions. More information is also needed on the biodiversity and functional diversity of these microbes and their interactions with crops and plants.

Biopotential phytochemicals from *Halimeda macroloba* - A *Chlorophycean* seaweed

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Abstract

The vast varieties of seaweeds were found to have possessed useful untapped phytochemicals which are potentially active pharmaceutical and pharmacological molecules. Search of new drugs for emerging diseases are continuing processes which leads to discover novel molecules with superior activity. Indian seashores are having rich sources of seaweeds with many number useful compounds, it has already been reported that the diversity of seaweeds estimated 434 species of Rhodophycean, 194 species of Pheaophycean and 216 species of Chlorophycean seaweeds. The present study aimed to carry out the bioactive compounds from *Halimeda macroloba,* it shows the presence of 3,7,11,15-Tetramethyl-2-hexadecen-1-ol (phytol), Hexadecanoic acid, (ethyl ester), N-Hexadecanoic acid, 9,12-Octadecadienoic acid (z,z), 1-Hexyl-2-nitrocyclohexane and β-sitosterol by GC-MS analysis of ethanol extract. FTIR analysis reported to have C-H alkane, C-H aldehyde, C=C aromatic, C-O Secondary alcohol, CN Primary amine, C-Cl Aliphatic chloro compound and C-S Disulphides. Many number of compounds here that have been proved already their biopotentiality with pharmacological properties like wound healing, antiseptic, antimicrobial, hepatoprotective, hypoglycemic and antioxidant activities.

Keywords: *Halimeda macroloba*; Bioactive compound; FTIR

Ecodiversity, phenology and genetic diversity analysis of macrofungi from Chitteri hills, Eastern Ghats area of Tamilnadu, South India

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Abstract

A study on the ecodiversity of macrofungi was conducted for two consecutive years (2014-2016) in Chitteri Hills located at Dharmapuri District, Eastern Ghats of Tamil Nadu especially their phenology and genetic diversity. The study of wood-rotting fungi is fundamental to the understanding of fungal diversity in forests. There is no such evidence that the wood rot survey from the study area. These wood rot fungi might have played a vital role in sustaining the forest ecosystem in Chitteri hills. The present work was undertaken the aim to generate a baseline data on the general distribution, eco diversity, phenology and molecular analysis of macrofungi inferred by ITS rDNA sequences analysis. The macrofungal species were the widespread and showing continuous distribution at various altitudes of the study area. Furthermore inventories on macrofungi distribution will conquer the knowledge gap on their ecodiversity and reveal the scope to harness of their bioactive potential for various ailments and industrial applications.

Keywords: Wood rot fungi; Ecodiversity; Phenology; Chitteri hills; Eastern Ghats

Stress amelioration by triadimefon on growth and photosynthsis in sodium chloride stressed black gram

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Abstract

Black gram (*Vigna Mungo L.*) is one of the important oil crops. The field experiments were conducted using CRBD method to estimate the effect of triadimefon compounds on the morphological and biochemical contents of black gram. Plant was irrigated with solution control (water) 100 mM NaCl, 100 mM NaCl + 20 mg triadimefon respectively on 25, 55 and 85 days after sowing (DAS). The plants were harvested randomly on 30, 60, 90 DAS and used for analysis. The root length, fresh and dry weight, chlorophyll, carotenoid contents, electrolyte leakage, protein and amino acid, proline, glycine betaine were analysed. Triadimefon treatment increased the root length, fresh, dry weight, chlorophyll, carotenoid, protein contents while decreased the stem length. NaCl treatment decreased protein and increased amino acid, proline and glycine betaine contents. Triadimefon to the NaCl stressed plants increased protein, amino acid, proline and glycine betaine contents. Triadimefon ameliorate the NaCl stress in black gram plants by increasing dry weight, moisture, chlorophyll, proteins and amino acid contents.

Influence of bitertanol in sodium chloride stressed pea nut seedlings

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Abstract

Variation in protein, proline, amino acid and sugar content in response to NaCl stress and bitertanol (a triazole group of fungicide) treatment was studied in pea nut (*Arachis hypogaea L.*). The seeds were germinated on acid washed sand and irrigated daily with distilled water (control), 40 mM NaCl and 40 mM NaCl + 3 mgL^{-1} Bitertanol. The seedlings were harvested on 10^{th} day after sowing and used for analysis. Sodium chloride stress decreased the protein content and increased the amino acid, proline and sugar contents. However, bitertanol treatment to the NaCl stressed seedlings decreased sugar, amino acid, proline content and increased the protein content. Increase in the osmolytes like amino acid, proline and sugar induced by NaCl may help in protecting the plant cells from osmotic shock and ion toxicity. Under NaCl stress reduction of these contents by bitertanol showed stress alleviation by the triazole in the NaCl stressed pean nut seedlings.

Effect of triazole compounds on the morphological and biochemical responses in sweet potato

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Abstract

Sweet potato (*Ipomoea batatas L.*) is one of the important root crops. The field experiments were conducted using CRBD method to estimate the effect of triazole compounds on the morphological and biochemical contents of sweet potato. The plants were treated with 20 mgL^{-1} propiconazole and hexaconazole on 15, 30 and 45 days after sowing (DAS) by soil drenching. The plants were harvested randomly on 20, 35 and 50 DAS and used for analysis. The shoot length, root length, fresh and dry weight, chlorophyll, carotenoid contents, protein and amino acid contents were analysed. Triazole treatments increased the root length, fresh and dry weight, chlorophyll, carotenoid, protein and amino acid contents while decreased the shoot length. Among the triazoles, propiconozole showed better results than that of hexaconazole treatments.

Biochemical changes of sodium chloride stressed cowpea with paclobutrazol

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Abstract

The effect of paclobutrazol on the NaCl stressed cowpea (Vigna unguiculata(L.) Walp. Var. Vamban-6) was studied to understand the ameliorative effect of this triazole on NaCl stressed cowpea. The seeds were sown in plastic pots filled with red soil:sand:FYM (1:1:1) v/v/v irrigated with ground water upto 14 days after sowing (DAS) to field capacity. Later plants irrigated with ground water was as control, marked and other treated with 100 mM NaCl, 100 mM NaCl + 20 mg L^{-1} Paclobutrazol and 20 mg L^{-1} paclobutrazol. The samples were collected randomly on the 20^{th}, 40^{th}, 60^{th} and 80^{th} DAS. Sodium chloride treatment inhibited the protein content and the activity of ascorbate peroxidase and catalase and increased the glycine betaine content in cowpea when compared with control. The NaCl stressed plants when treated with paclobutrazol showed an increased protein, glycine betaine content, ascorbate peroxidase and catalase activity when compared to NaCl stressed plants. Paclobutrazol treatment increased the protein, glycine betaine content, ascorbate peroxidase and catalase activity when compared to control.

Effect of spermine, spermidine and putresine on *in vitro* shoot regeneration of *S. rebaudiana* Bert

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Abstract

The present study is an attempt to sustain the supply of quality of propagules and to develop a novel protocol for accelerating *in vitro* mass multiplication of *S. rebaudiana* with an efficient procedure and to access the clonal fidelity. Among the three explants, best shoot induction was occurred in shoot tip and responded in almost all the concentrations compared to leaf and nodal explants. Direct regeneration from shoot tip is another alternative step for clonal propagation and germplasm conservation. Hence, in the present study an approach has been made to standardize an efficient protocol for *in vitro* propagation of highly commercial *S. rebaudiana* using shoot tip explants. Among the different polyamines tested, maximum number of multiple shoots regenerated from shoot tip cultured on MS medium fortified with spermine10 mg/L (92±0.25 % and 22±0.27 shoots) in combination with BAP (1.5 mg/L) and 2,4-D (0.5 mg/L). Spermidine 10mg/L favoured (82±0.25% and 17.9±0.27 shoots) in combination with BAP (1.5 mg/L) and 2,4-D (0.5 mg/L). Putresine favoured (56±0.37 % and 16.9±0.31 shoots) in combination with BAP (1.5 mg/L) and 2,4-D (0.5 mg/L). It was concluded that, spermine was effective both in the regeneration frequency and maximum number of shoots/explant when compared to spermidine and putresine.

Keywords: Polyamines; *In-vitro*; BAP; Shoot tip; *S. rebaudiana*

Biofilm formation by bacteria on pet and chemical changes evinced due to bacterial biodegradation of UV exposed pet flakes in MSM

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Abstract

PET consist many desirable characteristics and thus are broadly used in daily life. However, non-biodegradability, once thought to be an advantage offered by plastics, is causing major environmental problem. UV light may be accelerator of bacterial biodegradation. In this study, soil bacteria were selected, specifically *Bacillus lichniformis*. It was interesting to observe that UV treated PET on inoculation with bacteria lead to biofilm formation, surface corrosion and rod shape bacterial colonization as evinced , further the PET degradation was confirmed by FTIR studies, which indicated the formation of ester group, methylene group as evinced in UV exposed PET. Thus bacteria (*Bacillus lichniformis)* could be used as biological agents to degrade of PET.

Keywords: Biodegradation; Bacterial; PET; UV light

Evaluation of salinity stress in *Lablab purpurea* L.

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Abstract

Lablab purpurea L. is a popular food in many countries. It is also known as Indian bean. The several varieties of beans are available in India. The plant is grow in garden has beautiful white flowers and thin broad pods. Young pods are harvested for vegetable use. This plant is also an ideal plant to be used in crop rotation. Rich in nitrogen it can enrich a soil in which the vigour of the soil is in a decline. Generally phytochemical compounds are present in plant. Especially phenols in this plant, are located in several parts of the plant (e.g. leaves, roots and seeds). Phenol contents are responsible for stress condition. Salinity is a major environmental stress, affecting plant productivity and constitutes a problem concerning many areas. Different concentrations of sodium chloride are used to study the capacity of *Lablab purpurea* plant against salt stress. The current study revealed that shoot and root length are showed great variation while intervals, such as 7, 14 and 28 days.

Keywords: *Lablab purpurea*; Phytochemical compounds; Salinity; Shoot and root length

Traditional uses of medicinal plants in Harur, Dharmapuri, Tamilnadu

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Abstract

A survey was conducted to document the information regarding the medicinal plants used by traditional people of Harur (TK), Dharmapuri District in Tamilnadu. Present investigation revealed that there are 25 angiospermic plants belonging to 15 genera of 17 families are commonly consumed as medicinal plants due to the presence of various phytocompounds. These plants are consumed as single or sometime as mixed form. More than 30 traditional people were interviewed including male and female with different age and different locality. Current work revealed that most important part is leaf while considering with other plant parts such as stem, root. People are using these plants for various ailments. Attention should also be made on proper exploitation and utilization of these plants.

Keywords: Traditional knowledge; Medicinal plants; Exploitation; Utilization

Pharmacological screening of *Kigelia pinnata* D.C. Indian medicinal plant

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Abstract

Kigelia pinnata DC. is an ornamental tree, comes under the family of Bignoniaceae. The plant had been already studied by preliminary phytochemical analysis and tissue culture aspects mainly for its medicinal properties. Through the qualitative phytochemical and anatomical observations, we identified the presence compounds such as glycosides, flavonoids, tannins, alkaloids and phenols in leaf tissue. Anatomical investigations also offered some clues on the localization of certain specific metabolites in this species. In this present study, different microbes namely *E. coli* (gram -) and *Staphylo coccus* (gram+) are used as test organisms to determine the antimicrobial efficacy and also the pharmacological actions are performed through CNS activity using the Wistar albino rat animal model for the leaf extracts from the selected plant.

Keywords: *Kigelia pinnata*; Phytochemistry; Microorganisms; CNS activity; Antimicrobial activity

Comparitive evaluation of preliminary chemical constituents and antioxidant property of *Zehneria scabra* (Linn. F) Soud and *Zehneria maysorensis* (Wight & Arn.) leaves

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Abstract

The present investigation was carried out to evaluate the antioxidant activity of *Zehneria scabra* and *Zehneria maysorensis* using different solvent such as petroleum ether, methanol and water. The preliminary phytochemical tests showed the presence of alkaloid, tannin, saponins, phenol, flavonol glycosides, cardiac glycosides, phytosterol, fixed oils and fats, gums and mucilage. A dose dependent antioxidant activity was observed in case of extracts. Phenolics (36.6 g gallic acid equivalents (GAE)/100 g extract), tannin (21.6 g GAE/100 g extract), and flavonoid content (67.5 g rutin equivalents/100g extract) were found to be highest in methanol extract. *Zehneria scabra* and *Zehneria maysorensis* both methanol extract showed maximum antioxidant activity in DPPH (21.6 and 40.87 µg/mL), ABTS cation radical scavenging activity (66923.6 and 71958.3µmol TE/g extract). Hence, *Zehneria* can be a valuable source for antioxidant and seemed to be applicable in medicine.

Keywords: *Zehneria scabra*; *Zehneria maysorensis*; Phytochemical; Antioxidant

Documentation of medicinally important plants of Chitteri Hills Villupuram district, the Eastern Ghats, Tamil Nadu

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Abstract

The present investigation was carried out with an aim to assess and document the medicinally important plants of Chitteri hills, Villupuram district, the Eastern Ghats, Tamil Nadu. During the study field was visited frequently. The plants were collected and identified using Floras and the herbarium were prepared and deposited in the Department of Botany, Nirmala College for Women, Coimbatore. The results revealed that the total of 76 plants belonging to 63 families and 72 genera were documented in the study area. Among them the most commonly available important medicinal plants are *Bambusabambos, Cycleapeltata, Curculigo orchioides, Centella asciatica, Cleodendron inerme, Justicia betonica, Mucuna pruriens, Oxalis corniculata, Pedalium murex, Passiflora subpeltata,Urena lobata,Wattakaka vobulis,*. These are mainly used to treat fractures, gastro intestinal disorders, skin diseases, wound healing, diabetics, kidney stone jaundice, ulcer, fever, cold, cough, bronchitis, snake bites. The reported potentially important medicinal plants are to be considered for further validation and to be conserved for further utilization.

Keywords: Chitteri hills; Medicinal plants; *Curculigo orchioides*; *Pedalium murex*

A survey of ethno-veterinary medicinal plants used by rural village people in Salem District of Tamilnadu, India

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Abstract

A survey of ethno veterinary medicinal plants used by rural village people in Salem District, Tamilnadu, India for has been conducted during June 2018 to November 2018. Ethnoveterinary information was carried out through personal interviews and observations among the rural village people. The investigation revealed that, the traditional healers used 45 species of Ethnoveterinary medicinal plants belong to 24 families and 32 genera were recorded in the survey with the help of village herbalist, village dwellers, herbal practitioners and other traditional healers. The rural village people using different morphological useful parts such as leaves, flowers, whole plant, Stem bark, root, fruit, stem for treatment animal diseases like foot and mouth disease, Anthrax, fungal diseases, indigestive, blue tongue, wound healing, Rheumatism, Psoriasis, Skin diseases, Diarrhea, Dementia, Intestinal diseases etc. In this survey the most dominant family were Meliaceae and Caesalpinaceae. The survey can aid in future planning of endangered species conservation as well as for experimental studies in research of modern pharmacotherapy.

Keywords: Rural village; Ethnoveterinary; Animal diseases; Traditional healers; Herbal practitioners

Effect of paclobutrazol on growth and protein metaboilism in NaCl stressed Pigeon pea seedlings

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Abstract

Red gram *Cajanus cajan* (L.) Mill sp. seeds were germinated on filter paper and irrigated daily with distilled water (control), 70 mM NaCl, 70 mM NaCl + 2 µM Paclobutrazol, solutions till 10 days after sowing. Sodium chloride stress decreased root length, shoot length, leaf area, dry mass and protein content of greengram seedlings. However, the moisture content increased in the root of NaCl stressed seedlings, while it decreased in the stem and leaf. Amino acid, proline contents and protease activity were increased by NaCl stress. Paclobutrazol treatment decreased the amino acid and proline content and increased root length, shoot length, leaf area, protein content and decreased protease activity in NaCl stressed seedlings.

Keywords: Green gram; Paclobutrazol; NaCl

Effect of calcium on the biochemical and enzyme activity of NaCl stressed Pigeon pea plants

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Abstract

The effect of $CaCl_2$ to NaCl stressed pigeon pea plant was studied. The seeds were sown in plastic pots and ground water irrigated with up to 19 days after sowing. On 20^{th} day the pots were irrigated with ground water for control and treated 120 mM NaCl, 5 mM $CaCl_2$, 120 mM NaCl with 5m M $CaCl_2$ solution up to 40 days. NaCl and CaCl2 treatments inhibited protein, total sugar, polyphenol oxidase and catalase acitivity and increased amnio acids, proline and peroxidase acitivity when compared with control plants. NaCl with $CaCl_2$ treatment decreased amino acids, proline and peroxidase acitivity while increased protein, total sugars, polyphenol oxidase and catalase acitivity when compared with NaCl treated plants. However it was lower than the control.

Keywords: Pigeon pea; NaCl, $CaCl_2$

Distribution and collection of mushroom species in Maruthamalai hills Western Ghats of Coimbatore district, Tamilnadu

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Abstract

The present study was to investigate that the distribution and collection of mushroom species in Maruthamalai hills Western Ghats of Coimbatore district, Tamilnadu. The study was undertaken during the year 2017-2018. Field study was taken out and collected mushrooms species were identified and documented by the name of the species, family, common name, habitat and utilization. The mushroom species confirmation of identification using taxonomic keys of a manual of soil fungi. The present result totally 12 mushroom species belongs to the 7 families and nine genera were collected. Some important mushroom species, such as *Ganoderma lucidum*, *Pleurotus ostreatus*, *Lentinus sp*. In future, the mushroom species could be a valuable source of food supplement to improve human health as well as medicinal importance as nutritional values, antioxidatives, cardiovascular, hypercholesterolemia, antimicrobial, hepatoprotective, and anticancer.

Keywords : Wild mushroom, Maruthamalai hills, anticancer.

Seaweed supiemented diet as natural carotenoid source for pigmentation and growth of freshwater ornamental fish Koi carp

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Abstract

Carotenoids and their complexes produces biological pigments that can be used to display the visible spectral colours from red and orange to yellow, green blue and violet. Seaweed *G. edulis, U. lactuca* and *G. cornea* were proved to have great potential as an alternative ingredient in diet was improvement in growth performance. Seaweed does not hold prime position in feeding field but used only supplementary feed. Meals prepared from seaweeds can be given as supplements to the daily of the cattle, poultry, shrimps and fin fishes. The present work was undertaken to assess the carotenoid source for pigmentation and growth of freshwater ornamental fish Koi carp (*Cyprinus carpio*) fed with different feed supplemented diet for different days (10,20,30 and 40 days). Skin and muscle sample were obtained from both in control and experimental fishes and carotenoid was extracted using two different solvents namely acetone, dimethyl ether. In both control and experimental samples, total carotenoid was assessed by spectrophotometric method and qualitative estimation was made by thin layer chromatographic method TLC and UV visible spectrophotometric analysis was also made to assess changes in carotenoids in the tested tissues.

Keywords: Koi carp; Carotenoids; *Cyprinus carpio*

Phytochemical analysis and larvicidal effects of aqueous extract of few medicinal plants against *Aedes aegypti*

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Abstract

Mosquito borne diseases still remain a major health problem in mankind causing millions of deaths every year. Synthetic chemicals are expensive and destructive to the environment and also toxic to humans and animals. There is an urgent need to develop new materials for control mosquitoes in an environmentally safe way, using biodegradable and target-specific insecticides against them. Plants are rich source of alternative agents for the control of mosquitoes, because they possess bioactive chemicals, which act against limited number of species including specific target-insects and are eco-friendly. In the present investigation, phytochemical analysis and larvicidal potential of the aqueous extracts from the bark of *Azadiracta indica* and *Vitex negundo,* leaves of *Lecus aspera, Acalypha indica* and *Eclipta prostrata* against *Aedes aegypti* was studied *in vitro*. Qualitative analysis of the phytochemicals of aqueous extracts of bark of *Azadiracta indica* and *Vitex negundo,* leaves of *Lecus aspera, Acalypha indica* and *Eclipta prostrate* revealed the presence of flavonoid, steroid, alkaloid, saponin, triterpenoid, quinone, tannins, acids, sugars and phenol. All the tested plants possessed different range of larvicidal property which may be used as a traditional mosquito control agent. On the basis of the present investigation, we conclude that the aqueous extracts of bark of *Azadiracta indica* shows the maximum mortality at highest 300 ppm followed by *Vitex negundo,* leaves of *Lecus aspera, Acalypha indica* and *Eclipta prostrata*. The activity of crude plant extracts is often attributed to the complex mixture of active compounds. These plants contain potent larvicidal bioactive principles which may be needed further purifications to have its synthetic analogues which will be carry out in future.

Keywords: *Aedes aegypti*; *Azadiracta indica*; *Vitex negundo*; *Lecus aspera*; *Acalypha indica*; *Eclipta prostrata*

Phytochemical and antimicrobial investigation of *Cissus vitiginea* L stem. An ethno medicinal plant

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Abstract

Medicinal plants are the main sources of chemical substances with potential therapeutic effects. A lot of compounds were characterized from plants which are now using in the treatment of many diseases. The present study focused on the phytochemical and antimicrobial activity of the *Cissus vitiginea* stem where collected from the Kanjamalai hills, Salem district, Southern Eastern Ghats, Tamil Nadu, India. Belongs to the family vitaceae. *Cissus* genus is one of the most widely used in alternative medicine for the various diseases. Preliminary phytochemical screening of methanolic extract of stem revealed the presence of the bioactive compounds such as steroids, alkaloids, flavonoids, tannins, amino acids. The fungal *Aspergillus niger, Candida albicans, Aspergillus flavus* and bacterial strains (Gram positive *Bacillus subtilis, Staphylococcus aureus, Bacillus cerus* and Gram negative *Klebsaiella planticola, E coli, Klebsiella pneumoniae*) strains were tested for antimicrobial activity against *Cissus vitiginea* using well method. Based on the diameters of the zone of inhibition. The significant the antibacterial activity showed against *Bacillus cerus* in concentration of 80 µl (10.27 mmin diameter zone of inhibition). The potential of fungus activity showed against fungal *Aspergillus niger* concentration of 90 µl (9.32 mm for the zone of inhibition).

Keywords: *Cissus vitiginea*; Phytochemistry; Antimicrobial activity

Assessment of Genetic diversity of *Stevia rebaudiana* Bertoni by DNA fingerprinting

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Abstract

The genomic DNA polymorphism variation of *Stevia rebaudiana Bertoni* was investigated by RAPD-PCR analysis. For initial PCR screening, about hundred Oligo-nucleotide primers were used to amplify the genomic DNA from three accessions of *Stevia rebaudiana* (S1 to S5). A total of a primer were finally selected to generated RAPD fingerprints that revealed III bands, which 88 bands (80%) were found to be polymorphic bands. Five accessions were clustered in to two major groups in the dendrogram. The present results suggested that there was strong correlation between the variables in DNA polymorphism data. The present study concluded that the results of the genetic diversity could be used to select best accessions for planting and conservation of the *Stevia rebaudiana* pharmaceutical applications.

Keywords: *Stevia rebaudiana*; RAPD-PCR; Polymorphism

Tree diversity and density, population structure in Pachaimalai Hills of Southern Eastern Ghats, Tamil Nadu, India

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Abstract

Species diversity, density, population structure of tree species and their relation to grids disturbance (= 30 cm dbh), were inventoried in Pachaimalai hills of Southern Eastern Ghats, Tamil Nadu India. Such data are necessary for ecosystem conservation of the understudied Eastern Ghats. 10 ha plot was subdivided into two hundred and fifty 20m × 20m workable sub-plots for tree inventories. A total of 5644 stems covering 61 species belongs to 46 genera and 30 plant families were recorded. Density of trees varied considerably among species, *Memecylon umbellatum* represented by 3113 individuals followed by *Buchanania lanceolata* (605 trees) and *Memecylon edule* (520 trees), *Buchanania lanzan* (350 trees), *Psydrax dicoccos* (203 trees), *Clausena dentata* (146 trees), dominated the study area, collectively contributing to >75% of the total density. Species richness and stand density decreased with increasing tree girth classes. The forest stand contained a growing population, but there was considerable variation in basal area distribution between the grids. All species exhibited clumped dispersion of individuals. The non-metric multidimensional scaling (NMS) ordination, based on the species richness, diversity indices, stand density, basal area and disturbance score, organized the grids in to different clusters influenced by species richness, density and disturbance score. The study reveals the importance of conservation of trees in the biodiversity-rich Pachaimalai hills.

Keywords: Conservation; Species richness; Population structure; Southern Eastern Ghats; Pachaimalai hills

Antibacterial activity of selected ethanoveterinary medicinal plants – *Chloroxylon swietenia* and *Terminalia chebula*

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Abstract

Chloroxylon swietenia and *Terminalia chebula* are two ethanoveterinary medicinal plants used for this study as they have various medicinal properties. *Chloroxylon swietenia* belongs to the family Rutaceae and considered as a folklore medicinal plant since it was effective in folklore remedies. It is a tropical and aromatic plant found in dry deciduous forests. *Terminalia chebula* belongs to the family Combretaceae found to be distributed throughout India and Southeast Asia. The present study was aimed to carry out the antibacterial activity of two ethanoveterinary medicinal plants - *Chloroxylon swietenia* and *Terminalia chebula* against two bacterial species such as *E. Coli* (Gram +ve) and *Bacillus cereus* (Gram –ve). Ethanol was used as solvent system. Various concentrations such as 250µg, 500 µg, 750 µg and 1000 µg were taken. All the samples showed maximum inhibitory action against *Bacillus cereus* than *E-Coli* and the zone of inhibition was expressed in terms of Mean ± SD. Streptomycin was used as a standard positive control.

Keywords: *E. Coli*; *Bacillus cereus*; Zone of inhibition; Streptomycin

Phytochemical and antibacterial efficasy of selected *Salacia* species

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Abstract

Salacia Linn belongs to the family Celastraceae which was formerly known as Hippocreataceae. It is the largest and most valuable genus possessing various Secondary Metabolites which have high medicinal properties. Hence, this study was focused on screening the presence of various phytochemicals such as steroids, terpenoids, tannins, flavonoids, phenols, carbohydrates, quinines, coumarins etc. Methanol was used as a Solvent system for the extraction process. Seven species of *Salacia* such as *Salacia beddomei* Gamble, *Salacia chinensis* L., *Salacia fruticosa* Heyne ex Lawson, *Salacia gambleana* Whiting & Kaul, *Salacia macrosperma* Wight, *Salacia malabarica* Gamble, and *Salacia oblonga* Wall, were selected for this study. The present study showed that steroid, flavonoid, saponins, tannins and alkaloid were found to be present in all species of *Salacia* whereas furan, quinone and phenol were absent in *Salacia chinensis* and *Salacia oblonga* respectively, terpenoid was absent in *Salacia fruticosa, Salacia gambleana*, carbohydrate was absent in *Salacia macrosperma, Salacia malabarica* and *Salacia oblonga,* coumarin was absent in *Salacia beddomei, Salacia fruticosa, Salacia malabarica* and acid was absent in *Salacia chinensis, Salacia fruticosa* and *Salacia gambleana*. Methanolic extract of selected species of *Salacia* was further subjected to antibacterial activity to find their inhibitory action against two bacterial species such as *E-Coli* (Gram +ve) and *Bacillus cereus* (Gram –ve). Various concentrations such as 250 µg, 500 µg, 750 µg and 1000 µg were taken. All species of *Salacia* showed maximum inhibitory action against *Bacillus cereus* than *E-Coli* and the zone of inhibition was expressed in terms of Mean ± SD. Streptomycin was used as a standard positive control.

Keywords: *Salacia*; Celastraceae; Phytochemicals; Zone of inhibition; Streptomycin

Spirulina as supplement feed for fresh water fish *Oreochromis mossambicus*

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Abstract

Macro and micro algae have been supplemented in diets for different cultured fish species and have been reported to obtain positive effects on growth performance, feed utilization, lipid metabolism, stress tolerance and disease resistance. Spirulina can be considered as a nutritional supplement that has various health benefits for humans, and a feed supplement for animals having economic benefits. The Spirulina alga is rich in protein and vitamins, and can be used to improve the immunity capacity of the animals, which consume it. Spirulina is well known for its anti-oxidant properties. In many animals, growth-stimulating micro organisms incorporated in the feed are reported to have beneficial effects. Tilapia are omnivorous that can utilize cyanobacterial blue-green algae. Spirulina diets were most effective in stimulating fish growth. In the present study, the growth rate of the fish *Oreochromis mossambicus* treated with spirulina in different concentration (6 gram spirulina with 6 gram of formulated feed and 9 gram of spirulina with 3 gram of formulated feed) was tested. The results showed a significant growth rate of *O. mossambicus* exposed to different concentration of spirulina for the period of 60 days while compared with control group.

Keywords: Spirulina; *Oreochromis mossambicus*

Antibacterial activity of *Harpullia arborea* (Blanco) Radlk against clinical isolates

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Abstract

The ethanol and chloroform extracts of *Harpullia arborea* were evaluated for activity against medically important bacteria such *as E. coli, K. pneumoniae, S. aureus, Vibrio spp, Proteus spp and P. aeruginosa*. The invitro antimicrobial activity was performed by agar well diffusion method. The chloroform extracts showed minimum antimicrobial activity when compared to ethanolic extracts. The zone of inhibition was ranged from 10mm to 19mm, among the 6 bacterial genera; *E. coli* and *S. aureus* were highly suppressed with ethanol extract. The 2.5 mg of ethanol extract was MIC for *S.aureus* and 3mg for *E. coli.* The use of plant extracts with known antimicrobial properties can be of great significance in therapeutic treatments.

Keywords: *Harpullia arborea*; Antibacterial activity; *E. coli*; *S. aureus*

Sugarcane pest Mealy bug, *Saccharicoccus sacchari* distribution in Idappadi Taluk, Salem District, Tamil Nadu, India

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Abstract

Sugarcane (*Saccharum officinarum* Linn.) has long been regarded as a crop with agro industrial importance of the country. It is cultivated for its economical and medicinal value. It is an important agro-industrial commercial crop in Tamil Nadu, covering about 4.2 lakh ha of which 63.4% is planted and 37.6% is ratoon. Salem along with other few districts accounted for almost 75% of the total sugarcane area of the state. The Mealy bugs are one among the serious pests of sugar cane. The main damage is caused by sucking out plant sap and to the large amounts of excreted honeydew colonized by sooty mold. Mealy bug attacks cause reductions in plant growth, sugar content, stunt growth and even kill young shoots. In addition the pest may transmit plant viruses. Infestations of re-planted fields are often due to scales that had remained on the roots and stubble of the former sugarcane crop. The insect pest species distribution usually depends on various environmental and biological factors. We in the present study used geographical information systems (GIS) and spatial analytical techniques to examine relationships between sugarcane pest population dynamics, soil texture, environmental factors, biological factor and anthropogenic factors. The biological factors affecting sugarcane crop mainly includes predators which are of more than 1500 species in the world. Within GIS, several spatially explicit procedures were used that include an interpolation technique, spatial autocorrelation analysis and ANOVAs. Sugarcane pest metapopulational distributions were found to be significantly aggregated and related to biological, environmental and anthropogenic factors. The techniques described in this paper could easily be extended to study the spatial dynamics between other pest populations in agricultural landscapes.

Keywords: *Saccharum officinarum*; Mealy bug; Environmental factors; GIS; GPS

Green synthesis of zinc oxide nanoparticles using of *Piper betel L.* for suppression of the guava pest, *Ferrisia virgate*

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Abstract

Guava is one of the most refereed and legendary fruit because of its hardy and positive bearing nature, high vitamin C. In India, guava is cultivated on 204.8 thousand hectares of land and production is about 2462.3 million tons. Mealy bugs infest a number of crop plants and results a serious economic loss. The striped mealy bug, *Ferrisia virgata* Cockerell, is a small insect that is a pest of a broad range of plants. Large number of insect pests has been reported to occur on guava at various growth stages, but a few are a real menace to the cultivation of this crop. More than 80 species of insects and mites have been recorded on guava trees affecting the growth and yield. Mealybugs are found throughout the year on guava plants but the population was found in greater numbers in summer months (February–June). Chemical pesticides on environmnt ultimately affecting the human and animal. A biological process has led to the development of an eco-friendly approach for the synthesis of nanoparticles. Green synthesis of Zinc oxide nanoaparticles using of *Piper betle L. (*Piperaceae) leaves has a strong spicy and aromatic flavor. Zinc oxide nanoparticles were characterized by UV-vis Spectrophotometer, FTIR, XRD, and SEM nanoparticles. The present study was undertaken to test the efficacy of biologically synthesized Zinc oxide nanoparticles on the mealy bugs of Guava plants in laboratory.

Keywords: Zinc oxide nanoparticles; *Piper betle L.*; Guava pest; *Ferrisia virgate*

Biofilms Formation of *Actinomycetes sp*. on UV light exposed polyethylene terephthalate (PET-bottle) surface

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Abstract

Persistence of PET bottles in the environment is known to cause detrimental effects on the biota. The present study reports the role of *Actinomycetes* sp., as possible candidates for biodegradation of PET. Pre-treatment of PET flakes with UV rays, resulted in bio-film formation, granules and roughness of PET flakes surface as evinced by SEM images. It was motivating to observe that UV treated PET flake on inoculation with *Actinomycetes sp.,* lead to bio film formation.

Keywords: PET waste; *Actinomycetes sp.*; UV light treatement.

Concentration of gross alpha activity in sediments of the Sunami Kudiirupu, Pulicat Lagoon, Southeast Coast of India

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Abstract

Radioactivity present in the surface soils were mainly due to the presence of radioactive elements in the earth's crust. The earth's crust contains small amounts of uranium, thorium and radium as well as radioactive isotopes of potassium. The average of ^{238}U in earth's crust has been estimated to be 2.7 mg kg ^{1} and the average of ^{232}Th content of the earth's crust is about 9.6 mg kg ^{1}. Uranium in phosphate rock deposits ranges from 3 to 400 mg kg 1 throughout the world. Surface water and especially ground water play an important role in the migration and distribution of radionuclides in the earth's crust. Human activities have contributed to an increased concentration of certain radionuclides in the environment. The present study was aimed to assess the concentrations of the gross alpha radioactivity in sediment samples collected from Sunami Kudiirupu, Pulicat Lagoon, Southeast Coast of India. Pulicat Lagoon is considered to be the second largest brackish water body in India measuring 759 km^2 and is one of the important wetlands in India. Fishing is the major occupation in villages located around the lake periphery and on the islands. The gross-radioactivity concentrations were investigated in May and June in 2018 across the various stations in Sunami Kudiirupu, Pulicat lagoon. Determination of the gross-alpha radioactivity of sediment samples was performed using Radiation Counting System (Nucleonix- RC 605A). The gross-alpha activity concentrations in sediment samples were found to be 0.5042 Bq/kg (S1), 0.5501 Bq/kg (S2), 0.6876 Bq/kg (S3), 0.2750 Bq/kg (S4) and 0.3667 Bq/kg (S5) respectively.

Keywords: Pulicat Lagoon; Gross-alpha; Natural radiation

Measurement of terrestrial gamma radiation dose in the Pulicat Lagoon, Southeast Coast of India

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Abstract

Radioactivity naturally occurs in the environment. The radionuclide content of a river depends on mineralogical features in the catchment area and the chemistry of the river as a whole. Major sources of natural radionuclides in sediments have different possible origins, like weathering and recycling of terrestrial minerals and rocks (igneous or metamorphic) containing ^{40}K and radionuclides of uranium and thorium radioactive series, rainfall and other depositional phenomena such as gravitational settling and precipitation. Direct measurement of absorbed dose rate in air due to exposure from outdoor terrestrial γ radiation and assessment of consequent public health hazard continues to be of environmental and public concern. Present study was aimed to establish a baseline data to assess the outdoor terrestrial γ radiation along the Pulicat Lagoon in Southeast Coast of India. Terrestrial γ radiation exposure doses (excluding cosmic radiation) were measured using a Plastic Scintillation Counter. Terrestrial gamma dose rates in air were measured at five designated locations along the Lagoon banks located in Tamil Nadu and Andhra Pradesh. Pulicat Lagoon is considered to be the second largest brackish water body in India measuring 759 km^2 and is one of the important wetlands in India. The lagoon's boundary limits range between 13.33° to 13.66° N and 80.23° to 80.25°E, with a dried part of the lagoon extending up to 14.0°N.; with about 96% of the lagoon in Andhra Pradesh and 3% in Tamil Nadu. The Scintillometer, a rugged, light weight and portable instrument designed for radiometric, geophysical and environmental reconnaissance survey was used to measure terrestrial gamma radiation level. The gamma radioactivity level was found to be ranged from 05 to 07 µR/h in Anaamalaicherry (TN), whereas the gamma level was found to be 06µR/h in Kallurmuani (TN), 04-05µR/h in Pudukuppam (TN), 04 - 05 µR/h in Opasamuthiram (TN), 04 -06 µR/h in Sunnampukulam (AP) respectively.

Keywords: Terrestrial gamma; Pulicat Lagoon; Natural radiation

Biosynthesis, characterization and antimicrobial activity of silver nanoparticle from Aglemarmelos

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Abstract

Natural products from medicinal plants, either as pure compounds or as standardized extracts, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. In this study we investigated anti cancer and antimicrobial activity of *Aegle marmelos* leaf extracts and their chemical profile characterized by gaschromatography coupled mass spectrometry (GC-MS). *A. marmelos* leaves were extracted with acetone, methanol, ethanol and chloroform. Presence of phenolic compounds was identified in these extracts by qualitative analysis. All the extracts were subjected for anti bacterial activity against the different strains of bacteria (*Staphylococcus aureus, Bacillus subtilis, Bacillus cereus, Bacillus ariyabattai, Bacillus megaterium, Pseudomonas putida, Klebsiella pneumonia, Serratia marcescens, and Escherichia coli*). It is noteworthy that acetone extract elicited maximum growth inhibition on *Serratiamarcescens*. GCMS analysis was performed to characterize the active principles of acetone and methanol extracts of A. marmelos. GC MS data revealed the presence of ten major components. Then the leaf extract was applied for synthesis of silver nanoparticles.The plant extract acts both as reducing agent as well as capping agent. The synthesized AgNPs using A. marmelos extract was different parameters to confirmed by UV– visible spectroscopy

Keywords: *Aegle marmelos*; Silver nanoparticle; GC-MS; UV-visible spectrum

In vitro micropropagation of *Strychnos nux vomica* (L.) through embryo culture

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Abstract

Strychnosnux vomica (L.) belongs to the family Loganiaceae. It is a predominantly pantropical and warm temperate, evergreen or deciduous medium sized tree. Success of Tissue culture mainly depends on the age, types, and position of explants. *In vitro* culturing of medicinal plants is widely used to produce active compounds for herbal and pharmaceutical industries.Embryos of *Strychnosnux vomica* were collected from natural environment and were inoculated on media under sterile conditions. For an efficient embryo culture, a range of various combinations of basal MS (Murashige-Skoog) media were tested with different growth regulators.The best range of embryoswere achievedwithin 3 or 4 weeks of culture on media supplemented with BAP (0.5 mg/ml - 2 mg/ml) and IAA (0.5 mg/ml – 1 mg/ml) and ADS (0.5 mg/ml to 2 mg/ml) for initiation and multiplication of embryos and shoots.The MS medium supplemented with BA (2 mg/ml) and IAA (1 mg/ml) and ADS (2 mg/ml) was found to be suitable for efficient growth of seedlings from embryo culture. This protocolwill help our study plant material to propagate embryos in large scale level.

Keywords: S*trychnosnux vomica*; Cytokinins; Adenine sulphate; Medicinal plant; Embryo Culture; Micropropagation

Study the growth of *Bacillus cereus* in nutrient broth with different carbon sources

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Abstract

The wide application of pesticides to eradicate crop pest has adverse impact on the biota and quality of the crop field soil. In survey study, Profenofos is the pesticides applied in paddy crop field against Lepidopteran pests in Keelakalkandar kottai village.Soil properties are known to influence the degradation of pesticides. The extent of biodegradability depends upon the chemical structure of the pesticides. Soil physico-chemical properties influence the transformation of pesticides to a great extent. The bacteria persisting in the pesticide contaminated field could be able to utilise these pesticides and its degradative products as carbon source. Present study was initiated. To study the growth of *Bacillus cereus* in the presence of Profenofos and various carbon sources like starch, glucose, sucrose and lactose. Four carbon sources starch, glucose, sucrose and lactose each of 2 mg were added to 100 ml of autoclaved minimal salt media. To this 500 ppm of profenofos was added and 100 µl of *Bacillus cereus* (29 x 10^9 cfu/ ml) was inoculated and incubated at 30 ºC in a rotatory shaker at 150 rpm/ min. Control was maintained without addition of carbon sources in minimal salt medium containing pesticide and bacteria simultaneously. The experiment was conducted in triplicates. Aliquots of 3 ml of culture were withdrawn at initial and after 24^{th} hours of incubation and turbidity was measured at 620 nm using colorimeter. *Bacillus cereus* elicited significantly ($F = 191.073$, $p < 0.001$) higher OD in MSM containing profenofos (0.5767) followed by MSM containing sucrose and profenofos (0.4967), MSM containing glucose and profenofos (0.4567), MSM containing starch and profenofos (0.4350) and MSM containing lactose and profenofos (0.4067). The present study concluded the bacteria *Bacillus cereus* utilize the profenofos as carbon source.

Keywords: Profenofos; *Bacillus cereus*; Degradation; Optical density; Carbon sources

Eco-friendly and sustainable management of zika and dengue vector, *Aedes aegypti* by using nanoemulsion of *Thymus vulgaris* (Lamiaceae) essential oil

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Abstract

Zika and Dengue is fast emerging pandemic-prone viral disease in tropical and subtropical regions of the world.*Aedes aegypti* mosquito is the major vector that transmit the viruses. Unaware and continuously use of chemical pesticides in field of agricultural and vector control for pest management, that pesticides are high toxic and harmful to human, animals and plants. Recently, biosynthesized nano formulations have been proposed as high efficacy in the control vector borne diseases.In this present investigation, to study the nanoemulsion (O/W) of *Thymus vulgaris* (Lamiaceae) essential oil against zika and dengue vector, *Aedes aegypti.T.vulgaris*-Essential Oil(Tv-EO)and*T.vulgaris*-Nano Emulsions(Tv-NE) were characterized by Optimized nanoemulsion of CO was characterized for Droplet Size, Polydispersity Index (PI), ZETA potential (ZP), self-nanoemulsification efficacy, thermodynamic stability, viscosity, percentage of transmittance (%T), and surface morphology.Larval and Pupal mortality were recorded after 24 hrs. The *Tv*-EOand *T.vulgaris*-NE(*Tv*-NE) was toxic against immature stages of *Aedes aegypti*(larvae and pupae) and the LC_{50} and LC_{90} values calculated by SPSS 21. In conclusion ofthis research, theswift synthesis of nanoformulation from *T. Vulgaris* - EO and NEwould be suitable for developing a biological process for arbovirus vector control programmes.

Keywords: Biosynthesis; Essential oil; Biosafety; Dengue; Zika

Synergistic effect of silver nanoparticles using *Chenopdium ambrosioides* and *Gambusia affinis* against rural malaria vector, *Anopheles culicifacies*

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Abstract

Malaria is a diseases caused by *Plasmodium* parasites and transmitted through the bites of female *Anopheles* mosquitoes and its serious emergence in global public health concern. The widely utilized of synthetic pesticides leads to harmful effects on medical and veterinary environment. Recently, plant based synthesized nanoparticles have been proposed as highly effectiveness in the control mosquito borne diseases.In this research, wesynthesizedsilver nanoparticles (AgNP) using the *Chenopodium ambrosioides*leaves extract as reducing and stabilizing agent.AgNP were characterized by UV–vis spectrophotometry, TEM, EDX, XRD, FTIR spectroscopy and ZETA potential.The *C. ambrosioides*aqueousextractand AgNP was toxic against immature stages of *Anopheles culicifacies* (larvae and pupae), LC_{50} were 194.10 ppm (larva I), 214.08 ppm (II), 233.94 ppm (III), 256.54 ppm (IV), and 297.43 ppm (pupa). AgNP LC_{50} were 16.92 ppm (I), 18.93 ppm (II), 21.58 ppm (III), 24.27 ppm (IV), and 28.92 ppm (pupa). In continuation, thepredation efficiency of *Gambusia affinis* against *A. culicifacies* I to IV instar larvae was 90.8 to 77.4%, respectively. In AgNP-contaminated environments, predation was 97.4 to 81.8%, respectively.This research demonstrates that *C. ambrosioides*-synthesized AgNP may be employed at ultra-low doses to reduce larval populations of malaria and arbovirus vectors, without detrimental effects on predation rates of mosquito natural enemies, such as larvivorous fishes.

Keywords: Biological control; Larvivorous fishes; Biosafety; Toxicity; Nanobiotechnology

Studies on preliminary phytochemical screening and antimicrobial activity of *Chloroxylon swietenia* DC.

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Abstract

The aim of the study was to investigate the antibacterial properties and phytochemical evaluation of *Chloroxylon swietenia*. The organic solvents (ethanol, methanol, hexane) and water extracts of the stem bark of *Chloroxylon swietenia* (Rutaceae) were examined against the bacterial species such as *Salmonella typhimurium, Proteus vulagaris, Shigella dysenteriae and* a fungal pathogen *Candida albicans* by Agar disc diffusion method. The results showed that the existence of prominent antimicrobial activity against the tested microbial pathogens of the current concern. Among the diverse extracts, methanol extract was found to have a strong antimicrobial activity when compared to the other extracts. The phytochemicals present in the tested samples were flavonoids, alkaloids, quinones, cardiac glycosides, coumarins and terpenoids.

Keywords: *Chloroxylon swietenia*; Phytochemicals; Antimicrobial properties

GC-MS analysis and antibacterial evaluation of *Acalypha indica* leaf extract

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Abstract

Acalypha indica distributed in the southern part of India, particularly in Tamil Nadu, has potential medicinal properties and used as remedy for diuretic, anthelmintic and respiratory problems such as bronchitis, asthma and pneumonia. The present work has designed to investigate the preliminary phytochemical, antibacterial and GC-MS analysis of methanolic extract of the plant. Phytochemical screening of leaves extract revealed the presence of alkaloids, tannins, steroids, saponins, flavanoids, glycosides and phenolic compounds. The methanolic extract of leaves was found to exhibit antibacterial activity against *Escherichia coli, Salmonella typhi, Pseudomonous aeruginosa* and *Staphylococcus aureus*. GC-MS analysis revealed the presence of various phytochemical compounds in the *Acalypha indica* extract.

Keywords: *Acalypha indica*; Phyto chemicals; GC-MS; Antibacterial

Biochemical Constituents of *Enteromorpha flexuosa* for Mandapam Coastal Region of Tamil Nadu, India

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Abstract

The aim of the present investigation was the biochemical constituents of *Enteromorpha flexuosa* from Mandapam coastal region of TamilNadu, India. The biochemical constituents namely totalproteins, total carbohydrates, total lipids, total phenols, totalchlorophylls and total carotenoids were analysed by using the standard Harborne method with the freshly collected marine green alga *Enteromorpha flexuosa*. In addition to that the phytochemical screening of methanol extract was studied by using the standard procedure for UV-Vis spectroscopic, HPLC and FTIR. This study showed that that *Enteromorpha flexuosa* consisted high level of carbohydrates (30.9% fw.), followed by proteins (19.7%fw.), lipids (1.45% fw.), phenols (1.22% fw.), chlorophylls (0.057%) and low level of carotenoids (0.019%). The UV-Vis phytochemical profile of methanol extract of *Enteromorpha flexuosa* was estimated at 245 to 789 nm. The results of FTIR analysis showed and confirmed the presence of functional groups of different secondary metabolites namely amides, phosphorus compound, alcohols, phenols and halogen compounds. The qualitative HPLC fingerprint profile of methanol extract of *Enteromorpha flexuosa* was selected at a wavelength of 255 nm due to the very sharpness of the peaks and proper baseline. The biochemical profile displayed three prominent peaks at the retention time of 1.157, 1.442 and 2.587 min followed by six numbers of moderate peaks were observed at theretention time of 0.087, 0.125, 0.248, 0.268, 0.324 and 0.458 min. The biochemical of *Enteromorpha flexuosa* showed the presence of various phytochemicals. The results ofthe present study possesses several bioactive compounds and used as food and medicine.

Synthesis, structural and optical properties of Co and Ni doped ZnO nanoparticles

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Abstract

Bare ZnO and Co and Ni doped ZnO nanopowders were synthesized by co-precipitation method and annealed at 400 °C for 2 hrs. The as-synthesized powders were characterized by X-ray diffraction (XRD), scanning electron microscope (SEM) and UV-Vis spectroscopy. The XRD results represented as-synthesized Co and Ni doped ZnO nanopowders in hexagonal wurtzite structure without any secondary phase after copper doping and SEM images demonstrated the shape and size of as-prepared samples. Optical absorption analysis of the samples showed a red shift in absorption band edge with copper doping in ZnO. Photoluminescence spectra of the samples shows prominent peaks corresponding to near band edge UV emission and defect related green emission in the visible region at room temperature Fourier Transform Infrared spectra have shown a broad absorption band at ~490 cm^{1} for all the samples, which corresponds to the stretching vibration of Zn–O bond. All results indicated significant influence of Co and Ni doping on relevant structural properties of ZnO.

Keywords: ZnO nanoparticels; Co & Ni Concentration; Structural and Optical properties

Role of Mitochondrial DNA in Cytotoxic Responses to Oxidative Stress of Colon Cancer Treatments

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Abstract

Mitochondria occupy a canonical cellular role as "the powerhouses of the cell," synthesizing adenosine triphosphate through the process of oxidative phosphorylation. Additional functions provided by mitochondria range from complementary roles in cellular metabolism to more far-ranging relationships with inflammation and programmed cell death. Cancer cells, however, are characterized by high levels of both energy requirements and proliferation, meaning mitochondria may often play a central role in cancer induction and progression. Cancer is characterized by altered energy metabolism, which is triggered by genetic alterations not only in nuclear DNA but also in mitochondrial DNA. While some cancers have mutations in nuclear-encoded mitochondrial tricarboxylic acid (TCA) cycle enzymes that produce oncogenic metabolites, there is negative selection for pathogenic mitochondrial genome mutations. Eliminating mitochondrial DNA limits tumorigenesis and rare human tumors with mutant mitochondrial genomes are relatively benign. Thus, mitochondria play a central and multi-functional role in colon cancer progression, and targeting mitochondria provides therapeutic opportunities.

Key Notes: Mitochoondrial DNA; Colon Cancer; ROS; Cytotoxicity

Immunological Properties of Metal Oxide Doped Silica Nanoparticles

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Abstract

Silica nanoparticles have attracted significant interest as a novel platform in nanobiotechnology and biomedicine because of their convenient surface bioconjugation with molecular probes and their remarkable optical and immunological properties.The immune system cells constitute the first barrier to nanoparticle penetration of animal tissues and cells. Therefore, the study of silica base nanoparticles interactions with phagocytes, the mechanisms of intracellular uptake, and the responses of immune cells to silica nanoparticles is undoubtedly of major interest. Study of the immune response characteristics when using silica base nanoparticles as a carrier and adjuvant for the production of antibodies will allow evaluating their potential for the development of effective vaccines. Nanoparticles can be used as vaccine carriers, adjuvants, and drug delivery vehicles to target specific inflammation-associated diseases or cancer. Nanoparticles, particularly noble metal nanoparticles, have considerable potential for biomedical applications, such as diagnostic assays, thermal ablation, and radiotherapy enhancement as well as drug and gene delivery. Currently, we are still challenged by limited knowledge of nanoparticle pharmacokinetics, biodistribution, and immunotoxicity. So we designed complete suppression of the immune response against a metal oxide doped nanoparticle carrier is well beyond current technology, especially if the particle or certain of its protein domains are also designed to engage cellular receptors for targeting.

Key Notes: Silica nanoparticle; Immunology; Metal oxide; Biodistribution

Identification of Phytochemicals from *Moringa concanensis* and their Anticancer Properties

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Abstract

Phytomedicine has efficient therapeutic activity and so used widely in treating serious disease. Many phytochemical and pharmacological investigation studies result in promising *in vitro* activity and *in vivo* efficacy due to its poor water solubility, lipophilicity, and irregular molecular size leads to poor absorption and poor systemic availability. Hence in depth understanding biopharmaceutics and pharmacokinetics of phytochemical can improve desigining the dosage regimens of drug that targeting specific disease. *Moringa concanensis* is an indigenous traditional medicinal plant belonging to the family of Moringaceae it is commonly named as kattumurungai or peyimurungai widely distributed on the dry lands of Tamilnadu. It act has curative medicine for human ailments like menstrual pain, constipation, jaundice, skin tumors, diabetes blood, and cholesterol level. The phytochemical in the plant *Moringa concanensis* were analyzed by various methods it revealed presence of secondary metabolites such as alkaloids, fatty acids, flavonoids, steroids, terpenoids, anthracen, glycosides, phenolics, saponins, tannins, xanthoprotein, volatile oils and reducing sugars.In this current study the efficacy of the phytochemical present in the methanolic bark extract of *Moringa concanensis* is investigated for anticancer activity on the colon cancer cell line.

Key Notes: *Moringa concanensis; Colon cancer; Phytomedicine ;in vitro*

ROS generation mediated Colon Cancer Susceptibility towards Cisplatin doped DNA Complexes

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Abstract

DNA is a self-accumulating biopolymer built from phosphate backbone, deoxyribose sugar, and bases. It is a fundamental molecule indulged in conservation, expression, and transmission of genetic information. Apart from its role as a cellular repository, DNA has attracted usages not only in chemistry and biology but also in physics, material sciences, and nanotechnology due to its molecular recognition and spontaneous self-assembly driven by hybridization of complementary base pairs. DNA nanotechnology has triggered an impetus for the advancement of metal-based drugs. Positively charged metal ions can bind to electron donor atoms of hydrogen-bonded DNA bases through intercalation. They can also bind to negatively charged phosphate backbone through electrostatic interaction. To shed a light on this, we proposed vehicles made of sequence-designed artificial DNA ring and naturally available DNA duplexes to deliver Pt complex as an active drug. Owing to their significance in biological and medicinal applications such as altering the nature of cancer cells and producing reactive oxygen species in colon cancer.We used distinct Pt based drug with carefully chosen concentrations to enhance their function. We proposed nanocarrier system by using natural and synthetic DNA with low immunogenicity, which actively delivered payload to the site of action. Further studies on these complexes are needed to understand cellular trafficking with in vivo studies. Our expected outcomesuggest that DNA structures can function as therapeutic nanocarriers for efficient drug delivery applications that are readily feasible and economical.

Key Notes: DNA; Pt complex; Nanocarrier; ROS; Cisplatin

In vitro callus formation of Endangered Tree sps *Mitragyna parvifolia (*Roxb.*)* Korth Prain. from Southern Western Ghats

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Abstract

Medicinal plants are regarded as divine gift from the Mother Nature to combat diseases that haunt mankind. We need to conserve this wealth for the sustainable use for present and future generations. The endangered medicinal plants *Mitragyna parvifolia,* it is belonging to the family Rubiaceae, which are commonly used by the tribal's of Western Ghats for the treatments of various diseases was evaluated against few pathogenic bacterial strains. This plant is majorly distributed at low and medium elevations of Southern Western Ghats. The seeds of this plant are used for the treatment of ulcers, biliousness, leprosy and epilepsy. Murashige and Skoog (MS) medium supplemented with cytokinins (BAP) alone or combined with auxins (2, 4-D, NAA, IAA, IBA and GA_3) at different concentrations (1, 2, 3, 4 and 5µM) were used for *in vitro* propagation of *Mitragyna parvifolia*. Best callus proliferation was obtained using MS medium supplemented with BAP and in combination with NAA and 2, 4-D (3µM, 4µM). The callus proliferation, shoot tip proliferation and auxiliary root and shoot formation were observed in MS medium.

Keywords: Benzyl Amino Purine; *Mitragyna parvifolia;* Naphthalene acetic acid; Indole 3-acetic acid; Indole Butric acid; Gibberilic acid; 2, 4- Dichlorophenoloxy acid.

Isolation of antimicrobial compounds from medicinal tree species *Adansonia digitata* L. from Southern Western Ghats.

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Abstract

The aim of the Present study was to investigate the antimicrobial potential of extracts from endangered medicinal plants *Adansonia digitata,* which are commonly used by the tribal's of Western Ghats for the treatments of various diseases was evaluated against few pathogenic bacterial strains. The medicinal plants were extracted using solvents such as ethanol, methanol and acetone. The antibacterial test was performed against *Pseudomonas aeruginosa, Staphylococcus aureus*, Methicillin resistant s*taphylococcus aureus*, *Salmonella typhi*, *Vibrio cholerae*, and *Proteus mirabilis,* and antifungal test performed against *Rhizoctonia solani*, *Trichoderma viride*, *Macrophomina phaseolina*, a common storage fungus by using the agar diffusion assay. The medicinal plant exhibited antimicrobial activity against all the nine pathogenic microbial strains. Particularly, the methanol extract of medicinal plants having certain active compounds showed better antibacterial and antifungal activity against the pathogenic microbial strains. Antimicrobial compounds were identified and characterized using GC-MS Chromatography. These results clearly suggest that they can form the basis for the development of the novel broad spectrum of antibacterial formulation.

Keywords: Antimicrobial activity; Agar diffusion assay; GC-MS Chromatography; *Adansonia digitata*.

Vegetative Propagation of Endemic and Endangered Tree species *Mitragyna parvifolia (*Roxb.*)*

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Abstract

Mitragyna parvifolia is evergreen endangered trees with huge medicinal properties, belonging to the family Rubiaceae, respectively. They grow very well in low to medium elevations of the Southern Western Ghats. In the present study, we aimed to evaluate rooting capability of the tip cuttings of *Mitragyna parvifolia* in response to different growth hormones, under an intermittent mist propagation chamber system in a controlled environment. The effect of different concentrations (Control (0), 500, 1000, 1500 and 2000 ppm) of growth regulators (IAA, GA_3, NAA and IBA) on vegetative propagation was assessed. The rooting growth media used in the present study were garden (red soil), cow dung, neem oil cake, river sand at a ratio of 1:1:1:1. Exogenous supply of IAA had a positive effect on vegetative growth of both *Mitragyna parvifolia* in terms of root development, increase in shoot and root length, number of leaves and leaf area. It is evident from the present study that the addition of IAA at an early growth stage of shoot tip cuttings under the shade tunnel method is an economically viable and rapid multiplication technique for *ex vitro* propagation of both the tree species in general and *Mitragyna parvifolia* in particular. However, air layering method was found very successful in this species and the percentage success achieved was 80-90%. In *Mitragyna parvifolia*, the percentage success during May-June months was only 40%, whereas it was 90% during August-September. Overall, the result revealed that growth hormone treated tip cutting produced abundant and early rooting with higher survival percentage.

Keywords: : Benzyl Amino Purine; *Mitragyna parvifolia*; Naphthalene acetic acid; Indole 3-acetic acid; Indole Butric acid; Gibberilic acid; 2, 4- Dichlorophenoloxy acid

Phytochemical Profiling Antimicrobial and Antioxidant Potential of *Eupatorium triplinerve* Vahl.

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Abstract

Eupatorium triplinerve Vahl. (Tamil – Ayapana) is one of the traditional medicinal plant in rural areas. Even though the plant parts are used in traditional medicine for curing several disorders, especially those against microbial infection. Hence the present study were made to evaluate the phytochemical profile, antimicrobial and antioxidant activities of the leaf, stem and root. Further the active compounds were separated by thin layer chromatography and column chromatography. The compound is analyses using by UV- Vis spectrometry, FT-IR, GCMS, HPLC,^{1}HNMR and ^{13}CNMR were made to identify the phytocompounds in the ethyl acetate fraction of *Eupatorium triplinerve.* The result clearly indicate that the leaves of this plant can be used to discover new bioactive natural products that may serve as a lead to the development of new pharmaceuticals and also a good source of antioxidants.

Keywords: *Eupatorium triplinerve,* phytocompounds, UV- Vis spectrometry, FT-IR, GCMS, HPLC,^{1}HNMR and ^{13}CNMR

Analysis of Food Grain Spoilage Fungi and Aflatoxins in Raw and Parboiled Rice Samples Collected from Chennai, Tamil Nadu

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Abstract

Since rice is the staple crop of India, the present study is focused on the milled rice such as raw rice and parboiled rice to study its contamination with storage fungi and aflatoxins B1 collected from Public Distrinution System (PS) shops of Chennai, Tamil Nadu. Twenty five rice samples (10 raw rice and 15 parboiled rice) were collected for the analysis of moisture content, food grain spoilage fungi and the presence of aflatoxins. The moisture content of the rice samples were determined by hot-air oven drying method and found in the range of 5.0% to 10.4% with the average of 10.09 % for both raw and parboiled rice samples. For the analysis of food grain spoilage fungi through direct plating of grains on Czapak's Dox Agar (CDA) plate, it was found that the fungi mainly comprising different species of *Aspergillus* and *Pencillium*. Few other fungi like *Mucor, Rhizophus, Pyricularia, Helminthosporium* and *cladosporium* also were observed in very less numbers in one or other rice samples. The individual species of fungi such as *Aspergillus niger*, *A. glaucus, A. flavus, A. terreus, A. nidulans, A. fumigatus, A. candidus, Penicillium citrinum, P. Funiculosum, P.Chrysogenum* and *P. tardum* were encountered. The quantitative pattern of fungi showed that the raw rice samples showed higher number colonies of individual fungi when compared with parboiled rice samples which had in lower numbers. Among 25 samples of parboiled and raw rice samples analysed for the presence of aflatoxins, 2 each from raw and parboiled rice samples were found positive for aflatoxin B1 with the range of 2 ppm to 5 ppm as very low level of contamination. For the screening of aflatoxigenic *A. flavus,* 8 strains were found toxigenic among 12 strains of *A. flavus* isolated from rice samples.

Keywords: Parboiled rice, Raw rice, Aflatoxin B1, storage fungi, Moisture content, *Aspergillus, Penicillium.*

Phytochemical Composition and Antioxidant Activity of Medicinal Plants Collected from Thiruvadisoolam Forest.

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Abstract

Indians possess a rich knowledge on the use of medicinal plants for the treatment of sores, wounds, and skin infections, ailments which impose a high global disease burden and require effective treatments. The antioxidant activity and phytochemical contents of methanolic extract, obtained from 10 medicinal plants used by peoples of Tamil Nadu for the treatment of various diseases. Methanolic extracts of *Zingiber officinale*, *Carrissa carandas*, *Euphorbia hirta*, *Strychnosnux-vomica*, *Phyllanthus embilica*, *Gmelina asiatica*, *Senna auriculata*, *Carmona retusa*, *Phyllanthus reticulatus* and *Combretum albidum* were subjected to evaluate the phytochemical components and antioxidant scivity. Above the all plant extracts, *Combretum albidum* shows highest phenol and flavonoid content. Methanolic extract of *Combretum albidum* have potential effect on DPPH assay and ferric reducing power assay. A positive correlation was observed between TPC and free radical scavenging ability. Together, these results support the traditional uses of the examined plants are useful to drug industries.

Key Words: *Combretum albidum*, Phytochemical, DPPH, FRAP

MULTI - COMPONENT ASSEMBLY PROCESS FOR SYNTHESIS, CHARACTERISATION AND BIOLOGICAL STUDIES OF SOME NEW HETERARYL SUBSTITUTED IMIDAZOLE DERIVATIVES .

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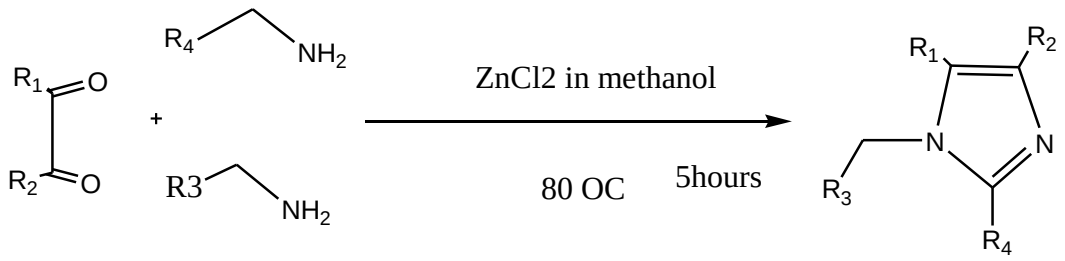
Nowadays, the entire pharmaceutical industry is faced with the challenge of increasing productivity and innovation. The major hurdles are the increasing costs of research and development and a simultaneous stagnating number of new chemical entities (NCEs). The cause of this innovation deficit is definitively not the biology. Decoding of the human genome has led to a wealth of drug targets. With more than 20,000 human genes, the assumption is that at least 1,000 are significantly involved in the emergence and course of disease. Furthermore, because each of these genes is linked to the function of between five and ten proteins, the conclusion is that there might be 5,000-10,000 targets for new drugs. Despite the successful introduction of protein therapeutics and the promise of gene therapy, major pharmaceutical companies are still focused on the discovery and development of low-molecular weight compounds. Hence, the challenge is to select the most drug able targets and to find the corresponding drug-like molecules, substances that not only interact with the target, but also have specific pharmacokinetic and toxicological properties, that allow them to be developed as a drug. This work mainly describe simple and low economic and less time consuming procedures were followed in the synthesis of tri and tetra substituted derivatives have wide range application in the field of medicinal chemistry. A simple and efficient protocol has been developed for the synthesis of 1, 2, 4, 5-tetrasubstituted imidazoles *via* four-component using like 1,2-diketones and hetero aryl methylamines in the presence of zinc chloride as a promoter and methanol as a solvent and stirred at 80 ^{o}C for 5 hours. The procedures which were used in the synthesis have given good yield . Spectroscopic methods like ^{1}HNMR, ^{13}CNMR, ESI-MASS and IR Were used to characterization of synthesized products.

Key words

Imidazole, Diketone, Heteroarylmethylamine Heterocyclic ring.



R = aryl , heteroaryl

STUDIES ON THE REMOVAL OF HEAVY METAL IONS FROM INDUSTRIAL WASTE WATER BY USING TITANIUM ELECTRODES

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ABSTRACT

Water pollution caused by heavy metals is a global problem and has received worldwide attention. Water containing heavy metals used for drinking purpose, if not treated properly can cause serious health problem to human being and severe damage to the environment. The present work focuses on treatment of waste water from Indian chemical process industries containing primarily heavy metal ions. The process makes use of titanium as a working electrode, which is stable, energy efficient and can treat variety of effluents.

Key words: Heavy metal ions, Industrial waste water, Titanium electrodes.

Catalytic activity of palladium supported on Fe_3O_4–polyethylene glycol nanocomposites for the synthesis of substituted imidazoles

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Abstract

In the present study, we carried out chemical synthesis and characterization for a Fe_3O_4–polyethylene glycol–Pd nanocomposite (Fe_3O_4–PEG–Pd). Firstly, poly(ethylene glycol) was functionalized using cyanuric chloride (PEG-Cl_4). Then PEG-Cl_4 was linked with Fe_3O_4 nanoparticles *via* formation of covalent bonds (Fe_3O_4–PEG). The Pd nanoparticles were supported by reducing palladium tetra chloride complexes on the surface of this nanocomposite. Nanoparticles have been characterized by FT-IR, XRD, SEM, EDAX, TGA-DTA, AAS and VSM techniques. The catalytic activity of the Fe_3O_4–PEG–Pd catalyst was evaluated for the synthesis of highly substituted imidazoles. This new catalyst was found to be a highly active and green catalyst for the synthesis of 2,4,5-trisubstituted imidazoles and 1,2,4,5-substituted imidazoles. The synthesized catalysts displayed magnetic properties, which allowed their fast separation from the reaction medium using a simple magnet.

Keywords

Fe_3O_4Nanocomposite, Magnetic properties, spectral studies

Synthesis and characterization of polyaniline–Fe_3O_4nanocomposite: Electrical conductivity, magnetic, electrochemical studies

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Abstract

Fe_3O_4 nanoparticles were prepared by hydrolysis reaction of urea in ethylene glycol as solvent at 160 °C. The prepared Fe_3O_4 nanoparticles were incorporated into polyaniline (PANI) matrix during in situ chemical oxidative polymerization of aniline with different molar ratios of aniline:Fe_3O_4 (19:1, 16:1, 12:1, 9:1) using $(NH_4)_2S_2O_8$ as oxidant in aqueous solution of sodium dodecylbenzene sulphonic acid under N_2 atmosphere. Room temperature conductivities of the synthesized PANI, PANI/Fe_3O_4 (19:1) and PANI/Fe_3O_4 (9:1) are 3.2×10^{-4}, 1.8×10^{-5} and 1.0×10^{-5} S/cm, respectively, indicating decrease of conductivity with increase of Fe_3O_4 in PANI. Saturation magnetizations of Fe_3O_4, PANI/Fe_3O_4 (19:1), and PANI/Fe_3O_4 (9:1) are 27.5, 5.5 and 6.3 emu/g, respectively, indicating an increase of ferromagnetic interaction with more incorporation of Fe_3O_4 in PANI matrix, whereas PANI is diamagnetic. Electrochemical studies shows that Zn-PANI/Fe_3O_4 (9:1) battery had delivered maximum discharge capacity (78.6 mAh/g) as compared to Zn-PANI battery (50.1 mAh/g) at constant current of 0.5 mA cm^{-2}. At constant resistance of 1000 Ω, discharge capacities of Zn-PANI/Fe_3O_4 and Zn-PANI battery are 73.37 and 50.8 mAh/g, respectively.

Keywords

Fe_3O_4Nanocomposite, Magnetic properties, spectral studies

synthesis and characterization of Fe3O4-PEG – cytosine nanocomposite

D.Thilagavathi , M.Saranya , C.Thirumurugan

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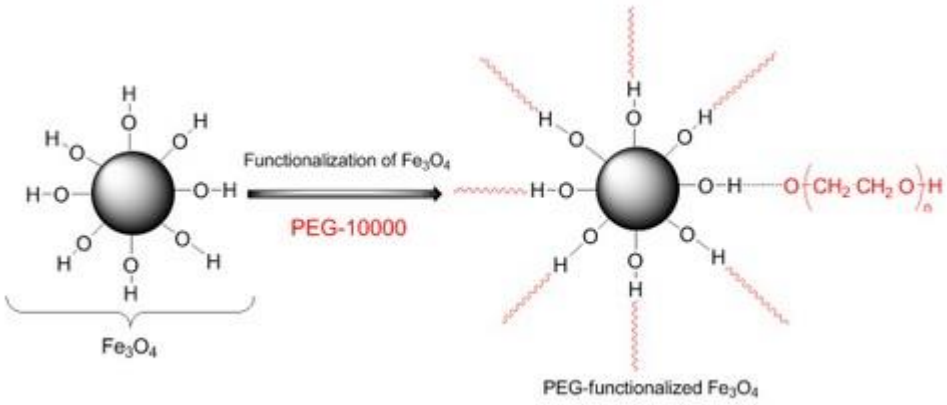
Abstract

Abstract We report a one-step hydrothermal synthesis of Fe3O4 nanoparticles coated with Polyethyleneglycol (PEG) and cytosine. The formation of the Fe3O4 core and the polymer coating took place simultaneously. Fe3O4/polyethylene glycol (PEG) magnetic nanocomposite with a core-shell structure with a 20 nm crystallite size prepared by simple hydrothermal method. Nanoparticles have been characterized by FT-IR, XRD, SEM, EDAX, TGA-DTA, AAS and VSM techniques. The catalytic activity of the Fe_3O_4–PEG–Cu catalyst was evaluated for the synthesis of highly substituted imidazoles. Graphical abstract



Keywords: Fe_3O_4; PEG;cytosine Hydrothermal synthesis; Superparamagnetism

MULTI - COMPONENT ASSEMBLY PROCESS FOR SYNTHESIS, CHARACTERISATION AND BIOLOGICAL STUDIES OF SOME NEW HETERARYL SUBSTITUTED IMIDAZOLE DERIVATIVES .

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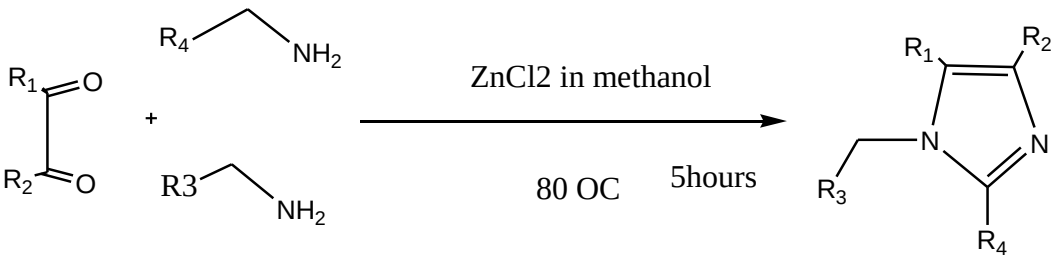
Nowadays, the entire pharmaceutical industry is faced with the challenge of increasing productivity and innovation. The major hurdles are the increasing costs of research and development and a simultaneous stagnating number of new chemical entities (NCEs). The cause of this innovation deficit is definitively not the biology. Decoding of the human genome has led to a wealth of drug targets. With more than 20,000 human genes, the assumption is that at least 1,000 are significantly involved in the emergence and course of disease. Furthermore, because each of these genes is linked to the function of between five and ten proteins, the conclusion is that there might be 5,000-10,000 targets for new drugs. Despite the successful introduction of protein therapeutics and the promise of gene therapy, major pharmaceutical companies are still focused on the discovery and development of low-molecular weight compounds. Hence, the challenge is to select the most drug able targets and to find the corresponding drug-like molecules, substances that not only interact with the target, but also have specific pharmacokinetic and toxicological properties, that allow them to be developed as a drug. This work mainly describe simple and low economic and less time consuming procedures were followed in the synthesis of tri and tetra substituted derivatives have wide range application in the field of medicinal chemistry. A simple and efficient protocol has been developed for the synthesis of 1, 2, 4, 5-tetrasubstituted imidazoles *via* four-component using like 1,2-diketones and hetero aryl methylamines in the presence of zinc chloride as a promoter and methanol as a solvent and stirred at 80 ^{o}C for 5 hours. The procedures which were used in the synthesis have given good yield . Spectroscopic methods like ^{1}HNMR, ^{13}CNMR, ESI-MASS and IR Were used to characterization of synthesized products.

Key words

Imidazole, Diketone, Heteroarylmethylamine Heterocyclic ring.



R = aryl , heteroaryl

STUDIES ON THE REMOVAL OF HEAVY METAL IONS FROM INDUSTRIAL WASTE WATER BY USING TITANIUM ELECTRODES

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ABSTRACT

Water pollution caused by heavy metals is a global problem and has received worldwide attention. Water containing heavy metals used for drinking purpose, if not treated properly can cause serious health problem to human being and severe damage to the environment. The present work focuses on treatment of waste water from Indian chemical process industries containing primarily heavy metal ions. The process makes use of titanium as a working electrode, which is stable, energy efficient and can treat variety of effluents.

Key words: Heavy metal ions, Industrial waste water, Titanium electrodes.

Catalytic activity of palladium supported on Fe_3O_4–polyethylene glycol nanocomposites for the synthesis of substituted imidazoles

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Abstract

In the present study, we carried out chemical synthesis and characterization for a Fe_3O_4–polyethylene glycol–Pd nanocomposite (Fe_3O_4–PEG–Pd). Firstly, poly(ethylene glycol) was functionalized using cyanuric chloride (PEG-Cl_4). Then PEG-Cl_4 was linked with Fe_3O_4 nanoparticles *via* formation of covalent bonds (Fe_3O_4–PEG). The Pd nanoparticles were supported by reducing palladium tetra chloride complexes on the surface of this nanocomposite. Nanoparticles have been characterized by FT-IR, XRD, SEM, EDAX, TGA-DTA, AAS and VSM techniques. The catalytic activity of the Fe_3O_4–PEG–Pd catalyst was evaluated for the synthesis of highly substituted imidazoles. This new catalyst was found to be a highly active and green catalyst for the synthesis of 2,4,5-trisubstituted imidazoles and 1,2,4,5-substituted imidazoles. The synthesized catalysts displayed magnetic properties, which allowed their fast separation from the reaction medium using a simple magnet.

Keywords

Fe_3O_4Nanocomposite, Magnetic properties, spectral studies

Synthesis and characterization of polyaniline–Fe_3O_4nanocomposite: Electrical conductivity, magnetic, electrochemical studies

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Abstract

Fe_3O_4 nanoparticles were prepared by hydrolysis reaction of urea in ethylene glycol as solvent at 160 °C. The prepared Fe_3O_4 nanoparticles were incorporated into polyaniline (PANI) matrix during in situ chemical oxidative polymerization of aniline with different molar ratios of aniline:Fe_3O_4 (19:1, 16:1, 12:1, 9:1) using $(NH_4)_2S_2O_8$ as oxidant in aqueous solution of sodium dodecylbenzene sulphonic acid under N_2 atmosphere. Room temperature conductivities of the synthesized PANI, PANI/Fe_3O_4 (19:1) and PANI/Fe_3O_4 (9:1) are 3.2×10^{-4}, 1.8×10^{-5} and 1.0×10^{-5} S/cm, respectively, indicating decrease of conductivity with increase of Fe_3O_4 in PANI. Saturation magnetizations of Fe_3O_4, PANI/Fe_3O_4 (19:1), and PANI/Fe_3O_4 (9:1) are 27.5, 5.5 and 6.3 emu/g, respectively, indicating an increase of ferromagnetic interaction with more incorporation of Fe_3O_4 in PANI matrix, whereas PANI is diamagnetic. Electrochemical studies shows that Zn-PANI/Fe_3O_4 (9:1) battery had delivered maximum discharge capacity (78.6 mAh/g) as compared to Zn-PANI battery (50.1 mAh/g) at constant current of 0.5 mA cm^{-2}. At constant resistance of 1000 Ω, discharge capacities of Zn-PANI/Fe_3O_4 and Zn-PANI battery are 73.37 and 50.8 mAh/g, respectively.

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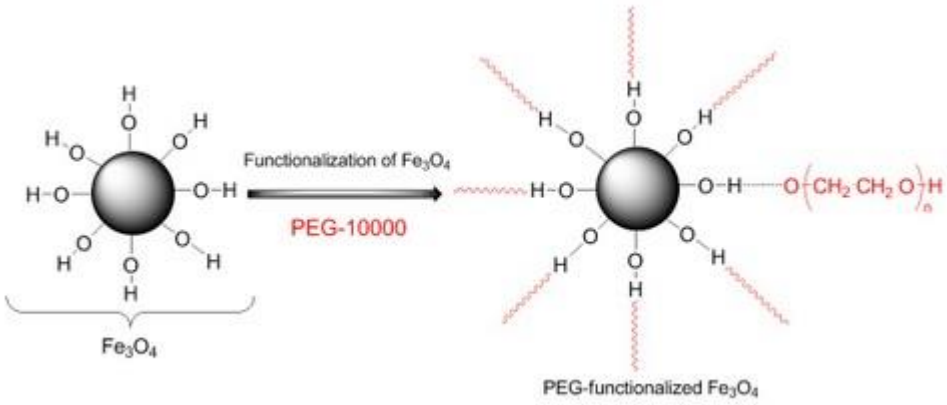

Keywords: Fe_3O_4; PEG;cytosine Hydrothermal synthesis; Superparamagnetism

USE OF SPECTROPHOTOMETRIC METHOD AND FLOW INJECTION TECHNIQUES FOR DETERMINING COPPER (II) BY 2-(4-BROMO 2,6-DIMETHYL PHENYL) AZO 4,5-DIPHENYL-1-IMIDAZOL)

N.CHANDRASEKARAN

ABSTRACT

This research includes use of an organic reagent 2-(4-bromo 2,6-dimethyl phenyl) azo 4,5-diphenyl-1-imidazol) for determination of Cu(II) ion by spectrophotometric method. After determining the optimum conditions of the complex reaction such as pH value, reagent concentration and the results were 8.0 and 10.0×10^{-4} M, respectively and the temperature and equilibrium time of complex determination too. The stoichiometry of complex was determined by methods (mole ratio and Job method) and it was (2:1) (reagent : ion). Then calibration graph was prepared. The linearity ($7 \times 10^{-5} – 10^{-6}$ M) sensitivity 5261.2 and detection limit of Cu(II) complex was found by depend on the calibration graph. The effect of foreign ions was studied and suitable the masking agents were found for each. The new reagent was used for determination Cu(II) ion in new design of flow injection system (FIA). Various parameters, physical and chemical, affecting the determination have been investigated such as flow rate, reaction coil, volume reagent, volume sample pH and reagent concentration. The results were 14 mL/min, 15 cm, 0.253 mL, 0.253 mL, 8, 5×10^{-5} M, respectively then preparation the calibration graph in FIA system and the average of dispersion coefficient determined reliability were studied. The results were compared between two methods (spectrophotometric method and FIA method).

Key words: Copper ion, Flow injection, Determination.

ADSORPTION KINETICS OF Cu (II) AND Zn (II) IONS FROM AQUEOUS SOLUTIONS BY HUSKS OF *IRVINGIA GABONENSIS*

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ABSTRACT

The ability of an economically cheap biomaterial like bush mango (*Irvingia gabonensis*) husks for adsorption of copper (II) and zinc (II) ions from aqueous solutions was investigated. The effect of contact time on the adsorption of these metal ions was studied in a batch process. The adsorption data were correlated with pseudo first-order, pseudo second-order, Elovich and intra-particle diffusion kinetic models. Results show that pseudo second-order kinetic model correlated the experimental data well.Results further revealed that copper(II) was better adsorbed onto the biosorbent as compared to zinc (II) ions. This study shows that the adsorption process using this biosorbent could be an economical method for the removal of these metal ions from aqueous solutions and may be employed in wastewater treatment.

Key words: Adsorption, Biosorbent, Heavy metals, *Irvingia gabonensis*, Biosorption.

SYNTHESIS AND CHARACTERIZATION OF Mn (II) & Fe(II) COMPLEXES WITH N,N-DIMETHYLANILINE & ACETYLACETONATE LIGANDS

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ABSTRACT:

Synthesis of acetylacetonato, ethylenediamine manganese (II) complex and acetylacetonato, ethylenediamine, iron (II) complex were carried out, a pale yellow and brown solids were obtained from the reaction. infrared spectra of manganese (II) complex showed absorption band at 1559cm^{-1} and iron(II) complex showed absorption band at 1576cm^{-1}.

Keywords: Acetylacetone, manganese, iron, N,N – Dmethylaniline.