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## HARNESSING PGPR MECHANISMS, STRATEGIES AND CHALLENGES IN SELECTION OF SUITABLE BACTERIA FOR DROUGHT STRESS

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**Abstract:** Plants are continuously exposed to a wide array of environmental stresses. Abiotic stress is one of the foremost limiting factors that are responsible for low agricultural productivity. The incidence of extreme events like prolonged drought, salinity, heavy rain and flooding, heatwave, and frost damage, metal toxicities in problematic soils are increasing day by day under the scenario of changing climate. Crop plants need to acclimatize against adverse external pressure created by environmental and edaphic conditions with their intrinsic biological mechanisms. Drought is one of the significant constraints on agricultural productivity worldwide and is likely to increase further. Several adaptations and mitigation strategies are required to cope with drought stress. Here, microorganisms can come to the rescue in an economical and eco-friendly manner to help plants for better fitness against abiotic stressors. Their interactions with compatible microbes evoke various kinds of local and systemic responses that improve the plant's metabolic capability to fight against abiotic stresses. Root-associated bacterial communities play a vital role in maintaining the health of the plant host. Therefore, it is essential to understand better the mechanisms that influence microbial communities composition and structure and what role the host may play in the recruitment and control of its microbiome. Plant growth-promoting rhizobacteria (PGPR) could play a significant role in alleviating drought stress in plants. These beneficial microorganisms colonize the rhizosphere/endorhizosphere of plants and impart drought tolerance by producing exopolysaccharides (EPS), phytohormones, 1-aminocyclopropane-1-carboxylate (ACC) deaminase, volatile compounds, inducing accumulation of osmolytes, antioxidants, upregulation or downregulation of stress-responsive genes, and alteration in root morphology in the acquisition of drought tolerance. In the present review, we elaborate on the role of PGPR and various mechanisms, which in turn helping plants to cope with drought stress.

**Keywords:** Abiotic stress, Antioxidants, Microbiome, Osmolytes, Phytohormones, Rhizobacteria

## STUDY ON THE EFFECT OF STORAGE CONTAINER, POLYMER FILM COATING, FUNGICIDE AND INSECTICIDES ON STORABILITY OF GREEN GRAM *VIGNA RADIATA* (L.) WILCZEK

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**Abstract:** The effect of different storage containers, polymer film coatings, fungicide and insecticides on storability of green gram was studied with green gram Var. GAM 5. The seeds were treated with various treatments *i.e.*, Control (T<sub>1</sub>), Imidacloprid 48% FS @2.5 ml/kg seed (T<sub>2</sub>), Thiram 75% WS @3 g/kg seed (T<sub>3</sub>), Polymer seed coating @5 ml/kg seed (T<sub>4</sub>), Imidacloprid 48% FS @ 2.5 ml/kg seed + Polymer seed coating @5ml/kg seed (T<sub>5</sub>), Thiram 75% WS @3g/kg seed+ Polymer seed coating @5ml/kg seed (T<sub>6</sub>), Imidacloprid 48% FS@2.5 ml/kg seed+ Thiram 75% WS @ 3g/kg seed+ Polymer seed coating @5 ml/kg seeds (T<sub>7</sub>). These treated seeds were stored in three different storage containers *i.e.*, Non woven Bag (C<sub>1</sub>) Polythene bag (700 gauge) (C<sub>2</sub>) and Double lined Polybags(C<sub>3</sub>) for period of 3 months (D<sub>1</sub>), 6 months (D<sub>2</sub>) and 9 months (D<sub>3</sub>). The results revealed that the seeds stored in Polythene bag (700 gauge) (C<sub>2</sub>) and treated with Imidacloprid 48% FS @2.5 ml/ kg seed+ Thiram 75% WS @ 3 g/kg seed+ Polymer seed coating @ 5 ml/kg seeds (T<sub>7</sub>) show promising results even after 9 months of storage (D<sub>2</sub>).

**Keywords:** Film coating, Fungicides, Green gram, Insecticides, Storage containers, Treatments

## POLLINATORS DIVERSITY THROUGH COLOURED PAN TRAPS ON MUSTARD

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**Abstract:** The study was undertaken at Raj Mohini Devi College of Agriculture and Research Station, Ambikapur during 2019-20 for diversity of insect pollinators/ visitors in mustard ecosystem. Different insect pollinators/ visitors i.e. *Apis dorsata*, *A. indica*, *A. mellifera*, *Syrphus ribesii*, *Musca domestica*, *Lasius niger* *Monomorium minimum* and *Coccinella septempunctata* were recorded in different fluorescent colored pan trap i.e. White, yellow and blue at different flowering period onset of bloom, full bloom and end of bloom of mustard at the onset of bloom maximum insect pollinators/visitors were recorded in blue pan traps (13.2 insect/trap) with mean (1.46 insect/trap) followed by in white coloured pan trap (11.03 insect/trap) with mean (1.22 insect/trap) and minimum in yellow pan trap (10.36 insect/trap) with mean (1.15 insect/trap) however, during full bloom period highest insect pollinators/visitors were observed in yellow pan trap (27.55 insect/trap) with mean (3.06 insect/trap) followed by in blue fluorescent coloured pan trap (21.82 insect/trap) with mean (2.42 insect/trap) and minimum population was recorded in white coloured pan trap (20.13 insect/trap) with mean (2.23 insect/trap). Similarly at the end of bloom maximum population was recorded in yellow fluorescent coloured pan trap (17.85 insect/trap) with mean (1.98 insect/trap) followed by white fluorescent coloured pan trap (16.22 insect/trap) with mean (1.80 insect/trap) and lowest in blue coloured pan trap (16.17 insect/trap) with mean (1.79 insect/trap).

**Keywords:** Colored pan traps, Mustard, Pollinator, Visitor diversity

## SPATIAL ESTIMATION OF VEGETATION INDEXES IN ANAIYUR CATCHMENT USING LANDSAT 8 IMAGE

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**Abstract:** The objective of this paper is to estimate three vegetation indexes for Anaiyur catchment of Kamuthyaluk, Ramanathapuram District, Tamil Nadu. The indexes estimated were Normalized Difference Vegetation Index (NDVI), Soil Adjusted Vegetation Index (SAVI), and Leaf Area Index (LAI). Landsat 8 satellite images with Operational Land Imager (OLI) Sensor and Thermal Infrared Sensor (TRIS) was used. Two Landsat Image of April 2017 and August 2019 belonging two different seasons, was downloaded from the USGS website and used in calculation of the three indexes. The Normalized Difference Vegetation Index of Anaiyur Catchment for April, 2017 varies between 0.001 and 0.42 and for August, 2019 varies between 0.04 and 0.48. The Leaf Area Index of Anaiyur Catchment for April, 2017 ranges from -0.40 to 1.89 and for August, 2019 ranges from 0.27 to 2.82. The predicted value of Soil Adjusted Vegetation Index of Anaiyur Catchment for April, 2017 ranges from 0.002 to 0.63 and for August, 2019 ranges from 0.068 to 0.72. These vegetation attributes can be used in various study related to surface albedo, photosynthesis, carbon budgets, water balance, rainwater harvesting potential and related processes.

**Keywords:** Landsat Image, Remote Sensing, Vegetation Indexes

## GC- MS ANALYSIS OF METHANOLIC EXTRACT OF NEEL (*INDIGOFERA TINCTORIA*) ROOT

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**Abstract:** *Indigofera tinctoria* L. is famous as Indian indigo plant from early periods. It belongs to the family Leguminosae and is one of the oldest colouring agents known to man. Neel leaves are used in ayurveda and it forms a major ingredient of preparations like Neelibringadi oil, Aravindasavam, Neelithulsyadi kashayam etc. The Juice of the Neel leaves mixed with honey is effectively used against enlargement of liver and spleen, epilepsy and other nervous problems. The root of the plant which was usually abandoned after harvest also has very good therapeutic potentials reported. It is being used by traditional healers and also in folk medicines. Decoction of the root is given to treat calculus. An infusion of root is given as an antidote in cases of arsenic poisoning. Root infusion is used as an antidote against snakebites and to treat insect and scorpion stings. It is an antidote against mushroom and arsenic poisoning. Root preparation is used in Tanzania as a remedy against syphilis, gonorrhoea and kidney stone. In the present study, phytochemical investigations were carried out in the roots of Neel. The methanol extract of root when subjected to GC-MS analysis revealed the presence of many compounds which are reported to have pharmacological activities supporting the medicinal usages of this root. The specific TLC fingerprint developed can also be made useful for authentication of Neel root when used as raw herbal drug.

**Key words:** *Indigofera tinctoria*, Neel, GC-MS analysis

## COMPARATIVE STUDIES OF DIFFERENT GENOTYPES OF *TRITICUMAESTIVUM* FOR CALLUS INDUCTION AND REGENERATION USING DIFFERENT GENERATIVE EXPLANTS, MEDIA AND PHYSICAL AND CHEMICAL MUTAGENS

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**Abstract:** This paper compared the behavior of diverse set of wheat genotypes in their tissue culture response. Significant differences were detected in plant callusing, culture efficiency and regeneration capacity when immature embryo (non treated or EMS treated) and mature embryo (NS, ES, 30KR(ES) and 35KR(ES) of six wheat cultivars were compared. In immature embryo callus induction was significantly higher on 2, 4-D (Raj3765 98.4%) supplemented medium than 2, 4, 5-T (Raj3765 89.2%) in case of non treated while in EMS treated one it was higher on 2, 4, 5-T (Raj3765 88.3%) containing medium. Non treated and EMS treated immature embryos showed significant differences and better was in non treated explants. Regeneration was highest in PBW 343 (82.7%) when non treated callus were transferred to regeneration media. Similar type of response was observed with mature embryos for callus induction as it was highest in NS (UP2338 100%) among all ES system (non treated (UP2338 87.90%), 30KR (WH542 87.3%) and 35KR gamma irradiated (Raj3765 88.6%). Regeneration was best in 30KR(ES) mature embryo derived callus among all (PBW343 92.5%). PBW343 was the best genotype regarding regeneration in mature embryo (NS PBW343 91.4%), ES non treated (DI9 83.3%). Mature embryo was superior explant than immature embryo for callusing and regeneration.

**Keywords:** Callus induction, Media, Mutagens, Regeneration, *Triticum aestivum*

## EXTENT OF RELATEDNESS AMONG PRE-RELEASED AND RELEASED VARIETIES OF FINGER MILLET (*ELEUSINE CORACANA* L. GAERTN)

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**Abstract:** A field study was conducted at Research cum Instructional Farm, S.G. College of Agriculture and Research Station, Kumhrawand, Jagdarpur, IGKV, Raipur (C.G.), in *Kharif* -2019, in a Randomized Block Design with 3 replications to evaluate 11 accessions of finger millet (*Eleusine coracana* L. Gaertn). The observations of 13 qualitative and 13 quantitative characters were recorded at different stages of plant growth from flowering stage to harvest, according to the Guidelines for the test of DUS on Finger millet by PPV& FRA, Government of India. Genotypes were grouped into three clusters based on the  $D^2$  values irrespective of geographical diversities, among which maximum inter-cluster distance was found between cluster II and cluster I, followed by cluster III and cluster II and cluster III and cluster I, which indicates that the use of genotypes from these clusters can serve as potential parents for hybridization. In view of cluster mean and genetic distance, the crossing of entries of cluster I with entries of cluster III would be fruitful for obtaining transgressive segregants for developing high yielding and better quality finger millet varieties.

**Keywords:**  $D^2$  statistics, Finger millet, Genetic closeness, Heterotic parents

## EFFECT OF BUND PLANTED EUCALYPTUS ON THE YIELD OF AGRICULTURAL CROPS AND SOIL PROPERTIES IN SEMI ARID REGION OF HARYANA

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**Abstract:** The study was conducted in 2 year old east-west and north-south directions bund plantation at CCS HAU, Hisar during 2016-2017 to evaluate the effect of Eucalyptus tereticornis bund planting on the yield of agricultural crops and soil properties in Haryana. Total biomass yield of dhaincha was recorded non significant at different distance from tree line of both east-west and north-south planted rows of eucalypts. Different aspects also had no significant effect on total biomass yield of dhaincha. Same pattern of grain yield of barley was recorded in both east-west and north-south planted eucalypts. Eucalyptus planted in east-west direction has attained 7.3 cm girth and 6.9 m height whereas in north-south direction it has attained girth of 4.5 cm and height of 5.1 m. The soil organic carbon and available N, P and K content were recorded maximum in bund planted Eucalyptus compared to control in different aspects.

**Keywords:** Agricultural crops, Eucalyptus, Haryana, Soil properties

## FORAGING BEHAVIOR OF ROCK BEE (*APIS DORSATA*) ON MUSTARD ECOSYSTEM IN AMBIKAPUR, CHHATTISGARH

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**Abstract:** An observation was undertaken for foraging activity of *Apis dorsata* on mustard that the *Apis dorsata* was recorded. After the entire study during the different flowering period viz...onset, full bloom and end of bloom it was concluded that no population of rock bee, *Apis dorsata* was recorded at 7.00-8.00 hrs. However, its reached its peak at 11.00-12.00 hrs (13.60 bees/5min/m<sup>2</sup>) followed by at 9.00-10.00 hrs (6.20 bees/5min/m<sup>2</sup>). The minimum population of rock bee, *Apis dorsata* was recorded at 1.00-2.00 hrs (5.20 bees/5min/m<sup>2</sup>). During the present study maximum population was observed in the full bloom stage in mustard ecosystem.

**Keyword:** Rock bee, *Apis dorsata*, Foraging behaviour, Mustard ecosystem

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## **PRODUCTION AND MARKETING OF COTTON IN GUNTUR DISTRICT, ANDHRA PRADESH**

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**Abstract:** The production and marketing of cotton cultivation have been studied in Guntur district of Andhra Pradesh for the period of 2018-19 by collecting the data on costs and returns, marketing channels. Cost concepts, input use efficiency, marketing margins and price spread have been used for analysis. The study has shown that BCR ratio is 1.27 for cotton crop. In input use efficiency a negative significance was noticed for plant protection chemicals. The price spread analysis for the selected channel indicated that the producer received 80.76 per cent of consumer's price in the marketing channel.

**Keywords:** Andhra Pradesh, Cost concepts, Cotton, Input use efficiency, Price spread