

CHAPTER 8

BOTANY

Doctoral Theses

043. AGRAWAL (Renuka)

Genome Organisation and Diversification of Allotetraploid Finger Millet [*Eleusine Coracana* (L.) Gaertn.] ($2n = 4x = 36$) and Diploid Safflower [*Carthamus Tinctorius* L.] ($2n = 2x = 24$), and Their Allied Diploid and Polyploid Taxa : Evidences From Isolated Repeated DNA Sequences, Fish Mcfish and Gish and DNA Markers.

Supervisors : Dr. Rajesh Tandon and Prof. S. N. Raina
Th 16821

Abstract

Provides the novel understanding of genome organisation and diversification of *Eleusine coracana* and *Carthamus tinctorius*, and their allied taxa.

Contents

1. Introduction. 2. Materials and methods. 3. Novel repeated DNA sequences isolated in finger millet (*Eleusine coracana*) (Poaceae) : cloning, sequencing, characterization, and physical mapping. 4. The distribution, organisation and evolution of the two isolated abundant *EcHind* III and *EcKpn* I repeated DNA sequences in the genomes of *Eleusine* species, and genome diversity of *Eleusine* vis-a-vis poaceae taxa based on these and other widespread satellite repeats isolated from other genera. 5. Molecular basis of genetic diversity in chloroplast genomes of *Eleusine*. 6. Physical mapping of the genes 18S-58S-26S and 5S ribosomal RNA, and that of repeated DNA sequence families in the diploid and polyploid *carthamus* taxa. 7. Genomic in situ hybridization (GISH) in an attempt to identify diploid/tetraploid progenitors of allotetraploid and allohexaploid *carthamus* taxa. 8. Summary. Bibliography.

044. ANITA RANI
Assessment of the Influence of Some Local Anaesthetics on Plant Growth and Development Modeled by Adventitious Root Differentiation on Hypocotylar Cuttings of Vigna Mungo (L.) Hepper.
 Supervisor : Prof. S. K. Sawhney
Th 16596

Abstract

Assesses the influence of some local anaesthetics (LAs) on plant growth and development, employing adventitious root (AR) differentiation on hypocotylar cuttings of Vigna Mungo (L.) Hepper, as the model system. Anaesthetics constitute an important group of chemical compounds that block the conduction of nerve impulse in animals resulting in both sensory and motor paralysis. Used extensively in clinical practices, induced anaesthesia is generally short-lived and reversible. Understands the manner in which a specific plant growth and developmental response would be influenced by applied LAs in the absence of a “neural system”, and to find out the nature of any similarities and/or dissimilarities with the known effects generated in other system.

Contents

1. Introduction. 2. Review of literature. 3. Material and methods. 4. Experimentation and results. 5. Discussion. 6. Summary. Bibliography and appendix.

045. BHAT (Divya S.)
Genetic Engineering of Tomato (Solanum Lycopersicum L. cv. Pusa Ruby) for Improved Tolerance to Salt Stress.
 Supervisors : Prof. Veena Agrawal and Prof. K. C. Bansal
Th 16820

Abstract

Develops transgenic tomato with halotolerant gene DHAL2 from yeast *Debaryomyces hansenii* for improved tolerance to salt stress.

Contents

1. Introduction. 2. Review of literature. 3. Material and methods. 4. Results. 5. Discussion. 6. Summary and conclusion. Bibliography and appendix.

046. BHATTACHARYA (Minakshi)
In Vitro Pseudobulb and Inflorescence Formation, Plantlet Regeneration and Acclimatization in Dendrobium Lituiflorum Lindl. - A Threatened Orchid.
 Supervisor : Prof. I Usha Rao
Th 16593

Abstract

Studies seed germination under the influence of different plant regulators and to note their distinct effects on seed germination and development of the protocorms into seedlings. Investigates the early formation and enhancement in the per cent induction of pseudobulbs, by using plant growth regulators and mineral nutrients in Dendrobium lituiflorum. The problems of in vitro hardening and ex vitro establishment have been explored. Different methods of in vitro hardening have been experimented with the ex vitro establishment of the plants has been studied in the green house. In addition, the changes brought about in the morphology of leaves of leaves in terms of wax deposition and stomatal shape have been traced through scanning electron microscopy. The effect of nutrients specifically nitrate and phosphate was studied on the formation of pseudobulbs and flowering- the two important aspects of the development of orchids.

Contents

1. Introduction. 2. Material and methods. 3. Observations. 4. Discussion. 5. Summary. Bibliography.

047. DEO (Sourav Singh)
Reproductive Biology of Mangrove - Associate Excoecaria Agallocha L. in Battighar Island of Orissa and Affinity Analysis With Populations in Four Other Coastal States of India.
 Supervisor : Prof. A. K. Bhatnagar
Th 16822

Abstract

Studies floral display and other features that give uniqueness to the species such as nectary, salt excreting glands, pollen grains, stigma, style, fruit wall, seed and leaf surface using scanning electron microscopy. Investigates embryological stages such as microsporogenesis, megasporogenesis, endosperm and embryo formation to observe any neiotic and mitotic abnormalities, or reproductive barriers. Also investigates

microbial association of the species, determining both ectophytic and endophytic mycorrhizal associations and the edaphic factors governing the distribution of the fungi. Generated a distance based affinity tree (neighbour - joining criterion), within and among various populations growing in east and west coast of India, based on plastid rbcL and mitochondrial cox I gene sequences.

Contents

1. Introduction. 2. Materials and methods. 3. Observations. 4. Discussion. Summary and Conclusions. Bibliography

048. GASKAREI (Reza Ebrahimi)
Effect of Sodium and Chloride Ions on The Growth and Nutrition in Sunflower.
 Supervisor : Prof. S. C. Bhatla
Th 16598

Abstract

Focuses on toxicity effects of NaCl salinity on growth and mineral nutrition of sunflower plants at vegetative stages of growth. On the basis of preliminary work, seedling establishment and early growth (1-10 days) in sunflower plants has been found to be most critical in its life cycle under NaCl salinity. So, in this work, after undertaking preliminary experiments, initial work was focused on 1-10, 10-20 and 20-30 day old plants in order to compare their sensitivity index and growth and uptake rates of sodium and chloride ions. Final experiments have been taken up in 30 d old plant, particularly in roots, with regard to sodium and chloride accumulation in high salinity.

Contents

1. Introduction. 2. Review of literature. 3. Material and methods. 4. Results and discussion. 5. Summary and conclusion. Bibliography.

049. MEHROTRA (Shweta)
Isolation, Cloning and Characterization of Novel Repetitive Sequences from Carthamus Tinctorius L. and their Utilization in Phylogenetic Analysis of Genus Carthamus L.
 Supervisors : Prof. I. Usha Rao and Dr. Vijay Rani Rajpal
Th 16588

Abstract

Identifies the major repeat sequences in the genus *Carthamus*. 18 taxa comprising of 7 species, 5 subspecies, 2 varieties and 5 unverified species obtained from United States of Agriculture (USDA) were investigated using isolated repeat sequences. Four novel repeat sequences, pCtHaeIII-I, pCtHaeIII-II, pCtHaeIII-III and pCtTaqI-I were isolated and characterized. Two repeat sequences already reported in *C. tinctorius* (pCtKpnI-I and pCtKpnI-II) were also included in the present study. pCtKpnI-I was found to occur in other angiosperm taxa but with a very low copy number, whereas the other five repeat sequences were *Carthamus* specific. Four repeat sequences, pCtKpnI-I, pCtKpnI-II, pCtHaeIII-I and pCtHaeIII-II have been comprehensively analyzed to elucidate the phylogenetic and evolutionary relationships between the species of the genus *Carthamus*.

Contents

1. Introduction. 2. Materials and methods. 3. Results. Discussion, summary. Bibliography and appendix.

050. PALLAVI (J. K.)
Molecular Marker Tagging and Selection for Leaf Rust Resistance in *Triticum Aestivum* L. em Thell. (Bread Wheat).
 Supervisors : Prof. I Usha Rao and Dr. K. V. Prabhu
Th 16589

Abstract

Identifies reproducible and polymorphic codominantly segregating microsatellite markers for two important and highly exploited seedling leaf rust resistance conferring genes, Lr24 and Lr28 in the bread wheat cultivar, PBW343. Attempts to pyramid three leaf rust resistance genes into one economically important background, PBW343. Three important validated and reproducible microsatellite markers specific for two seedling resistance genes, Lr24 and Lr28 and one loosely linked but polymorphic SCAR marker for the recessive adult plant resistance gene Lr48 were identified. Apart from this, a three gene pyramid was developed carrying three important and effective rust resistance genes in the Indian sub-continent.

Contents

1. Introduction. 2. Materials and methods. 3. Observations and results. Discussion and summary. Bibliography

051. RAKESH KUMAR
Alternate Host Plant Utilization and Midgut Serine Proteinases in Fourth Instar Pieris Brassicae Collected from Cauliflower Fields of Haryana.
 Supervisor : Dr. Sudeshna Mazumdar Leighton
Th 16591

Abstract

Aim to contribute towards development of an effective control strategy to reduce recurrent pest loads of P. brassicae in cauliflower fields of Haryana by better understanding of its midgut digestive physiology and interactions with host plant proteinase inhibitors. It focuses on the variability of midgut proteinases of 4th instars and its relation to nutrition when feeding on and switched to cauliflower and alternate host plants. Life history traits affected by feeding on various host plants is addressed briefly. Ingested plant compound such as proteinase inhibitors affectiv herbivory are also studied as a prelude to understanding protein-protein interactions in the gut of larvae feeding on various host plants.

Contents

1. Introduction and review of literature. 2. Materials and methods. 3. Results and discussion (Insects). 4. Results and discussion (Host Plants). 5. Summary and conclusion. Bibliography.

052. ROY (Ansuman)
Involvement of Phytochrome A in Near - Etiolation Photomorphogenesis in Rice (Oryza Sativa L.).
 Supervisors : Dr. Dinabandhu Sahoo and Prof. B. C. Tripathy
Th 16595

Abstract

The suppression of photomorphogenesis and greening process by continuous red light via meristematic zone in the shoot bottom of rice seedlings is substantially mediated by phytochrome A. This photomorphogenic event could be red light high irradiance response (HIR) of PHYA. However, PHYB could also be partially responsible for the suppression of photomorphogenesis. Partial restoration of greening process by continuous far-red light when irradiated along with Rc is probably mediated by both PHYA and PHYB. PHYC does not play a significant role in down regulation

of the greening process in continuous red light. The light signal perceived by PHYA present in shoot bottom activates downstream signaling cascade of CAM kinases resulting in phosphorylation of several soluble and thylakoid proteins leading to the suppression of greening process. Application of calmodulin antagonist W7 of TEP suppress CaM kinases activity leading to down regulation of phosphorylation and restoration of greening process and chloroplast development. Continuous red light also modulates cytokinin and gibberellins accumulation that regulates the greening process.

Contents

1. Introduction. 2. Review of literatures. 3. Materials and methods. 4. Results. Discussion, summary. References.

053. SANAVAR
Comparative Studies on Heavy Metal Acquisition and Retention by Mosses of Five Different Sites of India.
 Supervisor : Dr. P. L. Uniyal
Th 16823

Abstract

Describes collection of bryophytes from urban areas to identify tolerant and sensitive species. Quantitative analysis of plants and soil substrata for the presence of heavy metals : Cd, Cr, Cu, Ni and Pb. Carries out comparative study for the element accumulation in the collected samples from different sites. Gives comparison of trend of emission in different localities and to study the trend of absorption and accumulation of elements.

Contents

1. Introduction. 2. Review of literature. 3. Materials and methods. 4. Description of taxa and results. 5. Discussion. 6. Summary and conclusions. Bibliography.

054. SHANTANU SUMAN
Mosses of Idduki in Western Ghats, India.
 Supervisor : Dr. P. L. Uniyal
Th 16599

Abstract

Describes morpho-taxonomic studies carried out on the mosses occurring in Idukki district in Kerala, India since april 2005, with the objectives, (a) Survey of mosses of Idukki district through field studies and available literature. (b) Documentation and enriching herbarium of mosses of Idukki district. (c) To provide illustrations of preferably all the mosses of Idukki district for easy identification. (d) Preliminary evaluation of mosses for their habitat preference. (e) To bring out illustrated moss flora of Idukki district. Deals with a comprehensive morphological study and illustrated account of 135 species of mosses belonging to 75 genera and 25 families from Idukki district, specially the hilly areas of Munnar and its surrounding, representing several interesting taxa from just 13.07% of the total geographical area of the state of Kerala. Shows that the area is rich in bryophyte species and harbours many of the endemic taxa. Developmental activities are threatening the bryophyte species and also the associated organisms. Some of the areas should be protected for the habitat for bryophytes and to be declared as moss gardens. Epiphytic species play an important role in protecting the host species by providing continuous moisture.

Contents

1. Introduction. 2. Review of literature. 3. Area of study. 4. Material and methods. 5. Taxonomic description. 6. Results and discussion. 7. Summary and conclusions. Bibliography.

055. SHARMA (Rashmi)
Studies on Indoor Fungi as Sensitizers in Allergic Patients in Delhi.
 Supervisors : Prof. V. P. Singh and Prof. A. B. Singh
Th 16592

Abstract

Examines the spectrum of airborne fungal flora inside and immediate outdoor of the home of allergic patients in Delhi Metropolis. Investigates the quantitative prevalence and seasonal distributions of dominant fungi in the homes of allergic patients in Delhi. Identifies the sensitization patterns to dominant airborne fungal allergens occurring indoor. Correlates the sensitization pattern of patients with aerobiological information obtained from the homes. Characterizes the

dominant fungal proteins by immuno-biochemical methods. Studies cross-reactivity among dominant species of *Aspergillus*, identified indoors in Delhi metropolis.

Contents

1. Introduction. 2. Review of literature. 3. Materials and methods. 4. Results. 5. Discussion. 6. Summary and conclusions. Bibliography. Tables, Figures and Appendices.

056. SHARMA (Roopam)
Embryological and Molecular Investigations of Apomixis in F2 Individuals of *Cenchrus Ciliaris* L. (syn. *Pennisetum Ciliare* (L.) Link).
 Supervisor : Dr. Vishnu Bhat
 Th 16594

Abstract

Deals with embryological and molecular aspects of apomixis in F2 hybrids segregating for apomixis and sexuality in *Cenchrus ciliaris*. The embryological work mainly tries to establish differences between these 2 pathways through a recent technique in microscopy i.e. Confocal Microscopy. Stages of microsporogenesis, microgametogenesis, megasporogenesis and megagametogenesis have been easily observed using this technique at high resolution in both sexual and aposporous forms. Other aspects of male and female gametophyte development like chromosomal studies at male meiosis, pollen viability and co-relation of different morphological stages to embryological stages have also been studied. Molecular studies were undertaken to characterize the contigs obtained through subtractive hybridization using sexual plant mRNA as control or driver and apomictic plant mRNA as tester. Bioinformatics approach, RT PCR and Quantitative Real Time PCR were used to identify two contigs which are contemplated to play a role in aposporous development in these plants as they showed differential expression with respect to the pathway as well as with respect to the stages being studied. Complete genes for these two contigs were isolated using different approaches like Homology-based PCR, Genome-walk and 5'RACE analysis. Isolated genes and their respective mRNAs were subjected to different analyses using the Bioinformatics' tools and the results helped us to compare these two genes to already isolated genes or ESTs associated with apospory.

Contents

1. Review of literature on apomixis. 2. Embryological studies on F2 individuals of *Cenchrus ciliaris*. 3. Molecular studies on F2 individuals of *Cenchrus ciliaris*. Conclusions. Bibliography.

057. SINGH (Archana)
Screening of Extracellular Hydrolytic Enzymes and Characterization of Amylase from *Thermoactinomyces Vulgaris* Tsiklinsky.
 Supervisor : Prof. Ved Pal Singh
Th 16597

Abstract

Concludes that amylase of *T. vulgaris* was thermophilic and thermostable metalloenzyme, requiring Mn^{2+} for its enhanced activity and stability, However, the results of the present investigations suggested that the obligate thermophile - *T. vulgaris* can serve as an ideal model system for the production of extracellular amylase, that can be exploited for high-temperature catalysis of various enzymatic processes of diverse industrial interests.

Contents

1. Introduction. 2. Materials and methods. 3. Observations and results. 4. Discussion. 5. Summary. Bibliography

058. SINGH (Yengkhom Tungenba)
Study of *Antheraea Assamensis* Helfer : Population Biology, Genetics and Genome.
 Supervisor : Dr. Sudeshna-Mazumdar-Leighton
Th 16590

Abstract

Assesses genetic diversity in two hundred and sixty nine moths representing fifteen populations. Variation and clustering of selected morphological traits was examined first. The development and application of useful molecular markers to decipher population genetic structuring was conducted subsequently. Sequences of amplicons from monomorphic and polymorphic loci were also analyzed and used with a Southern hybridization to describe genomic features that may contribute to the observed genetic diversity in these insect populations.

Contents

1. Introduction and literature review. 2. Material and methods. 3A. Results from morphometric analyses. 3B. Results from Genetic analyses. 3C. Results from genome sequence analyses. 4. Discussion. 5. Summary and conclusions. 6. Bibliography and website.

059. VYAS (Shivani)
In Vitro Plantlet Regeneration and Acclimatization of a Threatened Orchid Dendrobium Lituiflorum Lindl. and Hybrid Cattleya Summer Song by Using Natural Additives and Application of Thin Cell Layer Technique in Hybrid Cymbidium Sleeping Nymph.
 Supervisor : Prof. I Usha Rao
Th 16587

Abstract

Devises a protocol that would be simple, practical and beneficial for rapid in vitro propagation of an extremely rare and threatened orchid of North-East India, dendrobium lituiflorum Lindl. and two commercially important ornamental hybrids, Cymbidium Sleeping Nymph and Cattleya Summer Song, leading to the production of mass scale synchronous plantlets by using natural additives and their successful acclimatization and application of thin cell layer technique. Using inexpensive ingredients can cut down the cost of production of orchid plants under in vitro conditions. Application of thin cell layer technique in propagation of Cymbidium Sleeping Nymph along with post-transfer performance studies for acclimatization of these in vitro raised plantlets would also help in successful propagation of precious hybrids.

Contents

1. Introduction. 2. Materials and methods. 3. Observations and results. 4. Discussion. 5. Summary. Bibliography.

M.Phil Dissertations

060. BISWAS (Shreysee)
Effect of Arsenic in Soil on Essential Oil Stress Enzymes and Ultrastructure of Glandular Chomes in Ocimum Basilicuml.
 Supervisor : Prof. A. K. Bhatnagar

061. CHAUHAN (Vibha)
Molecular Systematics of Some Genera of Indian Cucurbitaceae (Cucurbitaceae) Based on its Sequences of Nuclear RIBOSOMAL DNA.
Supervisor : Prof. A. K. Pandey
062. DANDOTIYA (Divya)
Status Survey of Bryophytes of India.
Supervisor : Dr. P. L. Uniyal
063. MAMGAIN (Akshay)
Development of a Genetic Linkage Map for Drought Tolerance Using RAPD Based Markers in Tea [Camellia sinensis (L.) O. Kuntze].
Supervisor : Dr. Vishnu Bhat
064. PANDEY (Indresh Kumar)
Isolation, Cloning and Expression Analysis of a Polycomb Group Gene Ccezi from Apomictic Cenchrus Ciliaris L.
Supervisor : Dr. Vishnu Bhat
065. PRATIBHA KUMARI
Some Aspects of Biology of Ephedra.
Supervisor : Dr. P. L. Uniyal
066. ROY (Sudip Kumar)
Effect of Elevated (CO₂) and (N₂) on Quality of Grain and Ultrastructure of Leaf in Oryza Satival.
Supervisor : Prof. A. K. Bhatnagar