CHAPTER 7

BOTANY

Doctoral Theses

041. ABAT (Jasmeet Kaur)
S-nitrosoproteome Analysis and Target Validation from Kalanchoe Pinnata and Brassica Juncea : Differential Modulation of B. Juncea S-Nitrosylome by Cold Stress.
Supervisor : Dr. Renu Deswal
Th 16543

Abstract

Establishes S-nitrosylation as a prominent NO signalling mechanism in plants. Besides identifying the targets, their modulation by abiotic stresses was also shown to emphasize. The physiological importance of this modification. Also shows that the addition to earlier known mechanisms, abiotic stresses could also manifest their effects by a novel regulatory mechanism i.e. S-notrosylation. The identified targets belong to varied categories covering a spectrum of vital metabolic pathways suggesting significant role of S-nitrosylation in metabolome modification/ re-structuring.

Contents

042. AVINASH KUMAR
Assaying Polymorphism at DNA Sequence Level for New and Novel Genetic Diversity Diagnostics of Native Tree Species and Highly Endangered and Threatened Medicinal Plant Species.
Supervisors : Prof. S. N. Raina and Dr. Vijay Rani Rajpal
Th 16220

Abstract

Attempts to investigate the total spectrum of variation of representative germplasm resources of the five species at DNA level. The three widely utilized DNA markers, RAPD, ISSR and AFLP fingerprinting, were used to assess: (1) the genetic diversity of the genotypes representing ~ total germplasm variability in India of the five species and (2) the interrelationship among poplations/composite (mix of genotypes originating from various regions) populations.

Contents

043. BEHROOZ MOHAMMAD PARAST
In Vitro Evaluation of Some Anticancerous Compounds From Psoralea Corylifolia and Centella Asiatica and Molecular Analysis of Key Enzyme Gene (Psoralen Synthase) Involved in Psoralen Synthesis.
Supervisor : Prof. Veena Agrawal
Th 16213

Abstract

Investigates two traditional herbs *P corylifolia* and *C asiatica* for enhancement of bioactive compounds. In case of *P. corylifolia* evaluation and characterization of psoralen vis a vis isolation and characterization of the key enzyme gene (psoralen synthase) has also been achieved.

Contents

044. BHARDWAJ (AMIT)
Studies to Understand the Structural Basis for the Stability of a Glycosyl Hydrolase 10 Xylanase From an Alkalophilic bacillus sp. NG-27 Under Poly-Extreme Conditions.
Supervisors : Dr. Sudeshna Mazumdar-Leighton and Dr. V. S. Reddy
Th 16217

Abstract

Investigates the protein stability under poly-extreme conditions using a GH10 xylanase (BSX) as a model system. The study enzyme, an extracellular endoxylanase BSX (`41 kDa), belongs to the Gh10 family. It is obtained from an alkalophilic Bacillus sp. NG-27. The enzyme is optimally active at 343 K (thermostable) and at a pH of 8.4 (alkali-stable). It does not contain any cysteine residues, precluding any thermostability due to disulfide bridge(s). Besides showing thermal and alkaline stability, our results have shown that BSX is active in the presence of high salt and shows high level of tolerance against SDS, proteinase K, Trypsin, Elastase, Papain and insect gut extract. Till date, BSX is teh only xylanase reported to be stable under above mentioned extreme conditions, this makes it an ideal candidate to use as a model system to study the structural basis of such a high level of stability under poly-extreme conditions.

Contents

045. CHARU LATA
Putative Role of Nitric Oxide in *In* Vitro Plant Morphogenesis.
Supervisor : Prof. Shashi B. Babbar
Th 16542

Abstract

Explores the role of NO in In vitro morphogenic studies, including both caulogenesis and rhizogenesis, in two taxa viz. Albizzia lebbeck and Linum usitatissimum, both being used as illustrative examples. Initial experiments were conducted on A. lebbeck. However, for detailed experimentation L. usitatissimum was employed as the experimental materials.

Contents

Discussion. 5. Summary and conclusions. Bibliography.

046. GEETA

Chloroplast Transformation in Solanaceous Species : Brinjal and Datura.

Supervisors : Prof. S. K. Sawhney and Prof. K. C. Bansal

Th 16257

Abstract

Studies to develop a reproducible plastid transformation system for brinjal and datura with uniformly transformed plastids and successfully developed the protocol for chloroplast transformation for both brinjal and datura. The OtsB-A operon was cloned in plastid transformation vector prepared speciafically for brinjal and used for chloroplast transformation of brinjal via biolistic method. Keeping in mind the medicinal importance of datura and chloroplasts as biopharmaceutical bioreactor, plastid transformation was attempted in datura. Datura plant contains the highly toxic tropane alkaoids scopolamine, atropine and hyoscyamine. These alksloids are medically important. Since the chemical synthesis of these alkaloids is difficult and expensive, these compounds are still extracted from plants to supply the needs of the pharmaceuticals industry. So the plastid transformation protocol developed may be one of the important alternative methods to enhance the production of important compounds and alkaloids in Datura.

Contents

047. NELLIE LAISRAM

Studies on Microbial Antagonism : Application of Soil Bacteria Showing Biocontrol Potential Against Fusarium Spp.

Supervisor : Prof. Ved Pal Singh

Th 16221

Abstract

Studies the morphological features of soil bacteria, strains X1 and X2, using Gram-staining and Negative staining techniques; and to screen them for their antagonistic potential for biological control of plant pathogenic fusaria, namely F. moniliforme, F. semitectum and F. udum, using dual-culture assays. Determines

the effect of the potential antagonistic bacterial strain X1 on the growth of Fusarium spp., through SEM and Confocal microscopic studies. Elucidates the structure of antifungal compund(s), using spectroscopic analyses, such as IR and NMR.

Contents

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

048. PANDEY (Vibha)
Bioprospecting of Spilanthes Species - Micropropagation and Bioassay Guided Isolation of Larvicidal Compounds Against Malaria and Filarial Vectors.
Supervisor : Dr. Veena Agrawal
Th 16214

Abstract

Investigates three traditional medicinal herbs Spilanthes acmella var. oleracea, Spilanthes calva, and Spilanthes paniculata for their mass propagation, ex-situ conservation employing in vitro technique and evaluation of bioefficacy against malaria and filarial mosquito vectors using in vivo/in vitro plant parts. The elite Spilanthes spp. showing maximum bioefficacy was selected and isolation of larvicidal compounds has been done through Silica-gel Column chromatography and further characterized through FT-IR and NMR.

Contents

1. Introduction. 2. Review of literature. 3. Materials and methods. 4. Observations. 5. Discussion. 6. Summary and Conclusions. Bibliography.

049. SAIKIA (Mahaswetta)
Identification of Diverse Midgut serine Proteinases in the Fourth Instar larvae of an Economically Important Sericigenous Lepidoptera From North East India, *Antheraea Assamensis* (Helfer) Feeding on *Persea Bombycina* (kostermans) and *Litsea Monopetala* (Roxburgh), Two Primary host plant Species of the Lauraceae Family.
Supervisor : Dr. Sudeshna Mazumdar-Leighton
Th 16210

Abstract

Describes the diversity of digestive proteinases in *A.* assamensis larvae reared on two species of lauraceae. It provides a starting point in connecting host plant choice with digestive physiology and cocoon silk quality in *A.* assamensis. It may be relevant for future insect and host plant improvement schemes such as development of artificial diets or diets or breeding improved host plant types. Tests the hypothesis that midgut proteinases found in larvae reared on *P. bombycina* differ from those reared on *L monopetala* with the premise that proteinase inhibitors are present in the ingested food that can interact with the midgut proteinases.

Contents

050. SAIGAL (Pooja)
Cloning, Partial Purification and Characterization of Nitric Oxide Synthase Like Enzyme From Brassica Juncea.
Supervisor : Dr. Renu Deswal
Th 16215

Abstract

In the thesis, arginine dependent enzymatic source of nitric oxide biosynthesis was identified in Brassica juncea. The biochemical and physiochemical characterization for nitric oxide synthase like activity was undertaken. In addition, attempt was made to partially purify the protein. Besides, cloning of putative B. juncea nitric oxide synthase gene was done.

Contents

051. RUCHI VIR

Molecular Characterization of Genetic Diversity, Population Structure and Phylogenetic Relationships in Selected Species of *Vigna* Savi.

Supervisors : Dr. Suman Lakhanpaul and Dr. K. V. Bhat

Th 16212

Abstract

Describes molecullar characterization of genetic diversity and assessment of phylogenetic relationships among species belonging to subgenus ceratotropis. This has been achieved by using an array of molecualr markers. The accessions belonging to different studies were collected from different phytogeographical regions across India, alongwith several accessions from exotic collections from belgium. Reveals *V. mungo, V. radiata, V. mungo var. silvestris, V. radiata var. sublobata* and *V. radiata var. setulosa* are distrinct taxonomic groups. *V. hainiana* appears to be a distrinct taxon and closely related to wild relatives of *V. mungo and V. radiata. V. umbrellata* might have originated from *V. minima* during the course of evolution. Wild species of genus *Vigna*, namely, *V. minima, V. trinervia var. bourneae, V. trilobata* and *V. dalzelliana* were found to be diverse from *V. radiata* and *V. mungo.*

Contents

052. SHIPRA SHAHI

Studies on Allergenicity to Different Plant Parts of Brassica Species in Atopic Patients in India.

Supervisors : Prof. A. K. Bhatnagar and Dr. A. B. Singh

Th 16216

Abstract

Determines heterogenecity in water soluble and non water soluble protein (antigens) profiles of different species and varieties of Brassiaca pollen/seeds and industrial seed cakes. Studies IgE mediated hypersensitivity (clinical and immuno-

logical) to pollen, seed flour and industrial seed cake extracts in atopic subjects. Charactrized allergenically important protein profiles of different species of Brassica pollen, seeds and industrial seed cake extracts. Assesses immunoglobulin profile and to elucidate the level of antibodies (IgG, IgGI and IgG4) with increasing duration of employment of workers engaged in the mustard oil processing units, cross reactivity among seed flour extracts from different species of Brassica.

Contents

1. Introduction. 2. Previous work done. 3. Biology of the taxa studied. 4. Materials and methods. 5. Results. 6. Summary and Conclusion. Bibliography and appendix.

053. SHARMA (Kuldeep)
Studies on Sexual Dimorphism in Simmondsia Chinensis (Link) Schneider : Differential Morphogenic Bhaviour and DNA Fingerprinting.
Supervisor : Dr. Veena Agrawal
Th 16258

Abstract

Concludes that, male and female individuals have differential hormonal requirement for their growth and development. In addition to this, male and female individuals exhibited differential morphogenic behaviour on different abiotic stressors. The rate of inhibition of morphogenesis was in the order of $CuSo_4$> NsCl>$ZnSO_4$, in both nodal and shoot tip explants of jojoba. However, lower concentration of metals proved promotory indicating that they are needed in trace amounts. This study thus, provides that the cultivar (Q- 104 male) of choice could be opted for large scale cultivation on heavy metal polluted or saline soil. additionally, the technique DNA fingerprinting has been used for the first time, in this highly economical dioecious crop, S. chinensis for the detection of male and female plants. The identifie two male specific markers offer reliable tools for the early determination of sex in plants before they enter the reproductive stage, overcoming the problems in breeding program.

Contents

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

054. SHARMA (Poonam)
Formulation of Bacterial Consortia For Bioremediation of Tannery Effluents.
Supervisors : Dr. Dinabandhu Sahoo and Dr. Rita Kumar
Th 16222

Abstract

Presents the detailed characteristic of tannery wastewater. Also explores for the potential microorganisms to be used in treatment system for rapid removal of BOD, COD and TDS in the effluent. Series of experiments using various combinations of bacterial isolates and their efficacy in reducing BOD, COD and TDS were investigated. Explains the effectiveness of bacterial consortium in removing pollutants from tannery wastewater. Also demonstrates 8% and 10% TDS reduction in raw and electrofloated effluent, respectively by the bacterial isolated, B5 in 48 hours of incubation time.

Contents

055. TABASSUM JEHAN
Molecular and Biochemical Characterization of Family Hyacinthaceae in India for Analyzing Populaion Structure and Species Relationships.
Supervisor : Dr. Suman Lakhanpaul
Th 16211

Abstract

Deals with the genetic diversity assessment and population structure using isozymes and DNA based nuclear multilocus markers, namely, RAPD and SRAp. Envisages the molecular genetic relationships using these markers as well as analysis of molecular genetic differentiation and phylogeny using unilocus nuclear and orgganellar markers, namely, ITS and cpDNA loci, respectively. Qualitative and quantitative estimation of bufadienolode, a cardiac glycoside, from members of family hyacinthaceae in India and chemoprofiling of the populations with respect to the bufadienolide content has been done.

Contents

1. Introduction. 2. Review of literature. 3. Taxonomic overview and botanical key to the genera of Hyacinthaceae under study. 4. Materials and methods. 5. Results. 6. Discussion. 7. Summary and conclusions. Bibliography and annexure.

056. VIKAS

Reproductive Biology of Two Native Medicinal Trees of India : Azadirachta Indica (Meliaceae) and Aegle marmelos (Rutaceae)

Supervisors : Dr. Rajesh Tandon and Prof. S. R. Yadav

Th 16218

Abstract

Describes phenology, floral biology, breeding system, pollination ecology and natural fecundity of two tree species, Azadirachta indica A. Juss. (Meliceae) and Aegle marmelos (Rutaceae). Although taxonomically unralated, these two tree species were considered as they are native to the Indian subcontinent and have a strong traditional association with the people of India. The study was primarily ecological, which involved a combination of intensive feild and laboratory work. The field studies were carried out in the natural populations of trees occuring in the Delhi, Haryana and Uttarakhand.

Contents

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

057. YADAV (Anuradha)

In Vitro Micropropagation in Six Novel Genotypes of Chickpea (Cicer Arietinum L.) - A Recalcitrant Crop.

Supervisor : Dr. Veena Agrawal

Th 16219

Abstract

Develops protocol for in vitro mass propagation of Cicer arietinum. Besides, influence of NaCl on in vitro regeneration of seed and nodal explants has also been studied. Concludes that of all growth regulators mentioned in present study BA proved most influential in inducing multiple shoots in all the genotypes. 5uM BA was optimum for eliciting best response in our case for inducing multiple shoots. maximum response has been given by seeds of genotype BG1101 both in terms of

morphogenic cultures as well as average shoots number. Of the six genotypes investigated, best response in terms of percentage of somatic embryogenesis and average number of somatic embryos per culture was observed in BG256 on 20 uM 2,4-D., based on the aforsaid intensive and extensive investigation it has been concludes that BG256 may prove best for further improvement of crop using genetic manipulation. Significance of development of protocol for each genotype as well as best selection of genotype has been well documented in the light of the urgent need for the crop improvement all over the globe, employing techniques of genetic engineering.

Contents

M.Phil Dissertations

058. ALOK ARUN
Isolation and Characterization of a Poly Comb Group Gene Ccezl from Opamictic Cenchruscilian's.
Supervisor : Dr. Vishnu Bhat

059. AMIT KUMAR
Taxonomic Studies on the Genus Nanothamnus with a Discussion on Tribe Inulease in India.
Supervisor : Prof. A. K. Pandey

060. CHAUHAN (Bhawna)
Molecular Systematics of Aralia - Panax Complex in India.
Supervisor : Prof. A. K. Pandey

061. JAIN (Priyanka)
Standardization of Technique for Monoxenic Culture of Abuscular my Carrhizal Fungus Through Root Organ Culture.
Supervisor : Dr. Rajesh Tandon

062. SINHA (Somya)
Cloning of BJNOS & its Expression Analysis in B Juncea Seedings.
Supervisor : Dr. Renu Deswal

063. VERMA (Neha)
Studies on the Variability on Antioxidant Properties of the Selected Sesame (Sesamum Indicum L.) Germplasm.
Supervisor : Dr. Suman Lakhanpaul