CHAPTER 7

BOTANY

Doctoral Theses

041. ABAT (Jasmeet Kaur)


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-nitrosylation. 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 populations/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
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 the 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
1. Introduction and Review of literature. 2. Materials and methods. 3. The role of partially exposed N-terminal valine residue in stabilizing GH10 Xylanase (BSX) from Basillus sp. NG-27 under poly-extreme conditions. 4. (A) The role of N-and C-terminal contact via aromatic interactions in stability and folding of BSX under poly-extreme conditions. (B) The role of surface exposed residue in BSX stability. 5. Discussion. 6. Summary and Conclusions. Bibliography.

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
1. Introduction. 2. Materials and methods. 3. Observations. 4.
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 specifically 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 alkaloids scopolamine, atropine and hyoscyamine. These alkaloids 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
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 compound(s), using spectroscopic analyses, such as IR and NMR.

Contents


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


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
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

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

**Abstract**

Describes molecular characterization of genetic diversity and assessment of phylogenetic relationships among species belonging to subgenus ceratotropis. This has been achieved by using an array of molecular markers. The accessions belonging to different studies were collected from different phytogeographical regions across India, along with 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 distinct taxonomic groups. *V. hainiana* appears to be a distinct 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

**Abstract**

Determines heterogeneity 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. Characterized 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


053. SHARMA (Kuldeep)
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 CuSO₄ > NaCl > ZnSO₄ in both nodal and shoot tip explants of jojoba. However, lower concentration of metals proved promitory 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 identify 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

Formulation of Bacterial Consortia For Bioremediation of Tannery Effluents.
Supervisors : Dr. Dinabandhu Sahoo and Dr. Rita Kumar

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


Molecular and Biochemical Characterization of Family Hyacinthaceae in India for Analyzing Population Structure and Species Relationships.
Supervisor : Dr. Suman Lakhanpaul

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 organgellar 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.
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 Ccezi from Opametic 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