

CHAPTER 19

GENETICS

Doctoral Theses

213. AMARENDRA KUMAR
Molecular mapping of Gene(s) Conferring Resistance to Allernaria blight (Alternaria Brassicae) in Arabidopsis Thaliana.
Supervisor : Prof. Akshay K. Pradhan
Th 16674

Abstract

Studies genetic diversity in alternaria brassicae. Search for resistance against A. brassicae in A. thaliana germplasm and molecular mapping of gene(s) conferring resistance against A. brassicae in A. thaliana.

Contents

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

214. JUYAL (Garima)
From Testing Candidate Genes in Inflammatory Bowel Disease to Discovering Genome Signatures of Two Indian Sub-Populations.
Supervisor : Prof. B. K. Thelma
Th 16672

Abstract

Deals with non-replication of caucasian association findings in the genetically heterogeneous Indian population despite commonality in clinical features, it was undertaken to generate a mini HapMap, a useful genetic resource, for two Indian sub-populations namely north and south Indians. Systematic analysis revealed : Genetic distinctness between north, south and GIH populations suggesting differences in the architecture of genome organisation (LD structure) across the three Indian sub-groups. Limited utility of caucasian based commercially

available genome analysis platforms. The need to generate resources such as HapMap for distinct Indian endogamous groups which will facilitate the understanding of distinctive genomic features and assist in designing appropriate association studies and possibility of cross ethnicity based fine mapping of disease loci.

Contents

1. Review of literature and introduction. 2. Materials and methods. 3. Association of CARD 15 and ulcerative colitis. 4. MDRI in genetics and pharmacogenetics of ulcerative colitis. 5. Non replication of TNF- α and DLG5 in ulcerative colitis. 6. Status of caucasian specific IBD genes/loci among North Indian uc cohort. 7. Genetic landscape of two Indian sub-populations. 8. Leads from the study. Bibliography and Appendix.

215. MITTAL (Kirti)
Identification of Putative Loci for Mental Retardation Using an Integrated Approach.
 Supervisor : Prof. B. K. Thelma
Th 16677

Abstract

Attempts to identify the DCMs/DCVs, by using the rather recent technology of targeted capture of the linked regions by microarray and then resequencing the entire aliquot for the mother and the three sibs. Major technology limitations, as evidenced, failed to pin-point the DCV/DCM for the disease phenotype, however it did provide us with some leads which can be taken up further the resequencing approaches to confirm the pathogenic/functional status of the variants thus identified. The result from this study warrants confirmation after the quality check issues are addressed, or independently with the conventional PCR and resequencing strategy. Other putative loci for Seckel syndrome have been identified in this study, however more insight into the pathophysiology can be achieved only after extensive analysis and additional experiments in this regard.

Contents

1. Review of literature and introduction. 2. materials and methods. 3. Chromosomal/genetic characterization of mr cohort. 4. Microsatellite scan of X chromosome. 5. Suggestive linkage to the X chromosome in a family with (syndromic?) MR (F#17).

6. Suggestive linkage to the X chromosome in a family with syndromic MR (F#20). 7. Conclusion and perspectives. Bibliography and Appendices.

216. RAWAT (Preeti)
Development of Genetic Transformation Protocol for Cotton (*Gossypium Hirsutum L.*) Using Mutant Acetolactate Synthase Gene and Strategies for Improved Expression of Cry 1Ac Gene.
 Supervisor : Prof. Deepak Pental
Th 16675

Abstract

Describes the development of a genetic transformation protocol for cotton using a herbicide based selectable marker system for both in vitro and field level selection of transformants. Further, strategies for improved expression of cry1Ac gene are also presented.

Contents

1. General introduction. 2. Development of a genetic transformation protocol for cotton using mutant acetolactate synthase gene as a selectable marker. 3. Development of transgenics in cotton with cry1Ac gene for resistance against *helicoverpa armigera*. 4. Synthesis of SBTI+cry1Ac fusion gene for development of insect resistant transgenic cotton. 5. Effect of cry1Ac expression on in vitro regeneration, growth and development of transgenic plants. 6. Summary. Bibliography.

217. SINHA (Smitha)
Isolation and Characterization of Bowman-Birk Proteinase Inhibitors From Different Species of Vigna.
 Supervisor : Prof. Deepak Pental
Th 16671

Abstract

Isolates Bowman - Birk proteinase inhibitor gene from different species of vigna (wild and cultivated varieties) homologous to cowpea trypsin inhibitor gene. Describes in silico analysis of variability in terms of structure and predicted function of the isolated proteinase inhibitor. Expression of proteinase inhibitors in *E.coli* and purification. Analyses inhibitory activity of the different isolated proteins by proteinase inhibition assay.

Contents

1. Introduction. 2. Isolation of Bowman-Birk proteinase inhibitor (BBPI) from different species of Vigna. 3. Expression of Bowman-Birk proteinase inhibitors (BBPIs) in *E. coli* and protein purification. Bibliography and Appendix.

218. UPADHYAY (Ashutosh)
Genetic Evaluation of Biocontrol Properties of Plant Growth Promoting Strains of *Pseudomonas fluorescens* Psd and PFT-1.
Supervisor : Prof. Sheela Srivastava
Th 16676

Abstract

The investigation is an effort towards elucidating the PGP potential of both the *P. fluorescens* strains and identification of gene targets for mutation so to assess the contribution of each of these functions in overall biocontrol in strain Psd. Attempts to amalgamate the biochemical, genetic and functional information generated to identify antibiotics, biosynthesis pathway genes in the strain Psd. Results of targeted modifications of the two antibiotics biosynthesis genes and overexpression studies to identify structural and regulatory aspects involved in biocontrol and plant growth promotion have been included. It also deals with the plant protective response of the generated mutants along with the wild type strains against *Fusarium* and *Verticillium* infection in tomato seedlings.

Contents

1. Introduction. 2. Materials and methods. 3. Discussion. 4. Summary and conclusions. References and Annexures.

219. VIKASH KUMAR
Molecular Mechanism of RNAi Suppression by Begomoviral AC2 Proteins and Their Use in Molecular Farming Through Transgenic Routes.
Supervisors : Prof. M. V. Rajam and Dr. Sunil K. Mukherjee
Th 16673

Abstract

Demonstrates the RNA silencing consequence on transgene expression and application of RNA silencing suppressor to overcome the effect. Attempts to study in-depth the effect of AC2 suppressor

proteins on the RNA silencing pathway. Also exploited the silencing suppression activity of MYMIV-AC2 to increase the transgene expression in stable transgenic tobacco, as a model bioreactor system. These suppressor proteins may be used in a way forward to achieve high level expression of economically important proteins by overcoming the major drawback of nuclear transgenic plant system i.e., gene silencing. Describes the mechanism of suppression activity of AC2 proteins and make use of AC2 in molecular farming using transgenic routes.

Contents

1. Introduction. 2. Review of literature. 3. Materials and methods. 4. Results and discussion. 5. Summary and conclusions. Bibliography and Annexure.