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Title of the Thesis: STUDIES ON POLYKETIDE SYNTHASES OF ASPERGILLUS

FUMIGATUS & ASPERGILLUS FLAVUS FOR DEVELOPMENT OF

DIAGNOSTICS

Abstract :

Aspergillus species include medically, agriculturally and industrially important species. *Aspergillus fumigatus* is an opportunistic human pathogen inducing hypersensitivity reactions and allergic bronchopulmonary aspergillosis (ABPA) in immune competent individuals while Invasive aspergillosis (IA) in immunocompromised patients. *A. flavus* and *A. niger* species are also frequently encountered by human host. Invasive aspergillosis is associated with significant mortality and often leads to the death of patients in the absence of specific methods for early detection. Aspergillus species are well known agricultural pathogens infamous for their

mycotoxin production in Agricultural produce, such as Aflatoxins. Aflatoxins are hepatocarcinogens and levels of these toxins are critically monitored with respect to food safety and international trade. The detection of *Aspergillus* species in clinical and agricultural produce is important in view of their pathogenic nature and the potential for producing polyketide toxins. This necessitates the development of methods for specific and differential detection of these organisms which is considered as a major challenge in the current day research. Currently available antigen based and gene based methods of these important Aspegillus species have several limitations, and cannot be used effectively either to clinical or Agricultural samples. In view of this there is a need for exploration of new strategies for development of specific and differential detection methods and sensitive probes for important *Aspergillus* species. This will lead to value addition to the diagnostics of *Aspergilli*. With that view, Phylogenetic analysis and domain diversity analysis of *Aspergillus* PKS enzymes resulted in development of specific and differential detection primers and probes for *Aspergillus flavus*, *Aspergillus fumigatus* and *Aspergillus niger*. The primers were observed to be useful in the specific and differential detection of the three important Aspergillus species. Probes were observed to be useful in specific detection of *Aspergillus flavus, Aspergillus fumigatus* and *Aspergillus niger* at 100ng DNA in real time PCR. These results can be translated into diagnostic technology for clinical and agricultural applications. Exploration for novel polyketides of pharmaceutical importance from the Aspergillus species can be carried out based on the observations made by bioinformatics analysis in this study. The study on *Aspergillus flavus* isolates opens a new area of search for atoxigenic *Aspergillus flavus* isolates of biocontrol potential in India.