

EXECUTIVE SUMMARY

UGC Minor Project : Efficiency of Plant Extracts, Natural Oils and Fungicides against *Colletotrichum gloeosporioides* Penz. the incitant of Anthracnose in Pepper (*Piper nigrum* L)

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Total outlay : Rs 140000/-

In India pepper (*Piper nigrum* L.) is cultivated mostly as mixed crop in homestead garden. It is cultivated for its fruit which is usually dried and used as a spice. Black pepper is the world's most traded spice. The spiciness of black pepper is due to the chemical piperine. Black pepper is believed to treat and cure constipation, diarrhoea, heart diseases, hernia, tooth aches etc. Pepper is cultivated to a large extent in Kerala, Tamil Nadu and Karnataka and to a less extent in Assam. The major problem in all pepper gardens is the attack of various diseases. The diseases may adversely affect the growth rate and thereby the yield rate. Although 17 disorders are recorded in black pepper. Among them anthracnose disease is the most dangerous and serious problem. *Colletotrichum gloeosporioides* cause fungal poll is prevalent in all pepper growing areas. The intensity and spread of disease increasing year by year. The fresh infection of the pathogen is found to be during the pre-monsoon period and the peak of the infection is during south west monsoon period. This disease is one of the major reason behind spike shedding. In dry season the seed harvest is relatively free from disease. Microscopic observations of the fungal structure occurring on the leaves collected from different localities of Thiruvananthapuram, Kollam, Pathanamthitta, Alappuzha and Idukki Districts revealed the constant association of *Colletotrichum gloeosporioides* with the disease, acervuli containing abundant conidia and setae were observed in the lesions. Isolation of causal organism from infected portion of the leaves collected from different localities yielded *Colletotrichum gloeosporioides*. Based on the cultural and morphological characters of the pathogen was identified as *Colletotrichum gloeosporioides*. Pathogenicity of causal organism was established by artificial inoculation on healthy leaves. The nature of the pathogen and its different characters are very important prerequisites for the detailed studies on the process of disease development and disease management.

The ultimate aim of investigation on any plant disease is to evolve an economically valuable disease management strategy. For the management of disease, fungicides, plant extracts and products were applied. Fourteen different angiosperms plant belonging to eleven families were selected for the study. *Pimenta dioica*, *Allium sativum* and *Syzygium aromaticum* proved maximum inhibitory effect. Highest growth rate of *Colletotrichum gloeosporioides* observed on the extract of *Clerodendron infortunatum* at all

three concentrations (1%,2%,4%) . Other plants also had inhibitory effect on *Colletotrichum gloeosporioides* at their higher concentrations. *Colletotrichum gloeosporioides*

The fungal toxicity of extracts of pteridophytes against the anthracnose disease of pepper was tested in laboratory. The fungitoxicity of plant extract against *Colletotrichum gloeosporioides* varied with the concentrations. *Gleichenia* and *Marselia* proved maximum inhibitory effect on the growth of *Colletotrichum gloeosporioides* (76.4 and 70% respectively). Highest growth rate of *Colletotrichum gloeosporioides* observed on the extract of *Lygodium Adiantum* and *Drymoglossum* at all concentrations (1%, 2% ,4%) on 7th day after inoculation. None of the extracts showed 100% growth inhibition at higher concentration

In-vitro evaluation of the plant products against the *Colletotrichum gloeosporioides* varied with concentrations. Analysis of variance showed that there was significant difference among their concentrations in inhibiting the mycelia growth. Isolates showed a significant reduction in one day after inoculation on PDA incorporated with plant products when compared to control. The inhibition of growth decreased with duration of incubation in most cases. Among the five plant products screened *in vitro* Clove oil, Eucalyptus oil were found very effective in inhibiting the growth of the fungi Relative efficacy of five fungicides on the growth of *Colletotrichum gloeosporioides* was evaluated by poisoned food technique . Revive (contact and systemic) superior than other systemic and contact fungicides in checking the growth of *Colletotrichum gloeosporioides* , this may due to combined effect of systemic and contact fungicides. The contact fungicides namely Zinthane M 45 at 1% and 2% concentrations. Indofil M 45 at 2% concentration showed more than 70% inhibitory effect on seventh day . Hexacon super also inhibit 64 % at 2% concentration on seventh day after inoculation. Fytran (copper fungicide) also showed 70% inhibition at 2% concentration on the growth of *Colletotrichum gloeosporioides* on seventh day after inoculation.

Large scale application of fungicides may favour dominance of fungicide tolerant strains. These strains are predominant in the natural population. It is important to know the intra- specific variations in response to fungicides before recommending large scale fungicidal trials . Therefore it is suggested that the fungicides which were found to be promising during the investigations may be used for large scale field trial to control anthracnose disease of pepper after identifying the naturally occurring tolerant strains as well as the strains with induced tolerance as a result of fungicide application. The plant extracts from eight families were used for testing the fungi toxicity against *Colletotrichum gloeosporioides* . *Pimenta dioica* , *Allium sativum* and *Syzygium aromaticum* showed maximum inhibitory power on *Colletotrichum gloeosporioides* growth. The plants were selected on the basis of their known efficiency of inhibiting the fungi. Poisoned food technique was used to study the effect of plant extracts. The antifungal activity of plant extracts was due to the presence of various secondary metabolites . Hence these plants can be used for formulating the botanical fungicides against the pathogen.