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M.Phil Thesis Summary

Eco-friendly Management of Fusarium Wilt Disease of Chillies caused by *Fusarium oxysporum* f. sp. *capsici*

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Key words:
Capsicum annuum, *Capsicum frutescens*, *Fusarium oxysporum* f. sp. *capsici*, systemic acquired resistance, plant activators, salicylic acid, KH_2PO_4, ascorbic acid and benzoic acid

Chilli, which is scientifically known as *Capsicum annuum* and *Capsicum frutescens* is a valuable vegetable crop that belongs to the family Solanaceae[1]. It is the third important vegetable crop of family Solanaceae after the tomato and potato[2]. Capsaicin is an active component that is present in chilies and it is produced as secondary metabolites. Chilli also contains antioxidant compounds that stimulate the immune system and prevent many diseases like cardiovascular disease (CVD) and cancer[3,4].

Many diseases are threatening its production, but Fusarium wilt disease is a serious threat that is caused by *Fusarium oxysporum* f. sp. *capsici*[5]. *F. oxysporum* is an asexual homothallic fungus that belongs to the family Nectriaceae and phylum Ascomycota. High temperature and high moisture play a significant role in the symptom development of wilt[6]. The temperature favorable for *F. oxysposrum* f. sp. *capsici* is 12-32°C. Maximum growth observed at 28°C[7].

Different fungicides can be used for the management of Fusarium wilt disease. These fungicides play an important role in disease management programs, but fungicides have adverse effects on human health and excessive use of fungicides leads to environmental hazards because these are not eco-friendly and left residues on the crop plant[8]. Most importantly, a fungal pathogen is capable of developing resistance against the fungicides[9]. Systemic Acquired Resistance (SAR) plays a significant role in Integrated Disease Management (IDM) and it can be achieved by using different kinds of plant activators.

Accordingly, keeping in view all the above facts new research was conducted to evaluate different plant activators for the management of Fusarium wilt disease of chilies under field conditions. Four plant activators, i.e., Salicylic acid, KH_2PO_4, Ascorbic acid and Benzoic acid were evaluated at 0.5, 0.75 and 1% concentration for the management of Fusarium wilt disease under RCBD design in the research

area of the Department of Plant Pathology. Three different concentrations 0.5, 0.75 and 1% were prepared by weighing 0.5, 0.75 and 1 g on weighing balance (Sartorius Company TH-600) and dissolved in 100 mL of distilled water. Control was treated only with distilled water. All the activators were applied at the seedling stage through the soil drenching method and these activators were transuded to the depth of 10-15 cm for the inhibition of *Fusarium oxysporum*. Soil drenching was done three times after an interval of 7, 14 and 21 days. Each treatment was repeated three times. The percentage of disease incidence was calculated by the following formula, which was given by Weitang *et al*.[9] i. e.

$$\text{Disease Incidence} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

Out of four plant activators, minimum disease incidence was expressed by Salicylic acid (26.681%) followed by KH_2PO_4 (30.719%), Ascorbic acid (33.381%) and Benzoic acid (38.737%) while the control had shown the maximum disease incidence (63.444%). Salicylic acid at 1% concentration was found most effective against Fusarium wilt disease. After the 3rd application of soil drenching, salicylic acid exhibited the best result among other plant activators.

In a nutshell, when activators applied on the plants, these stimulate the natural substances of the plants which are toxic to many fungi and result in the defense of the plant against the fungal pathogens. Activators activate the enzymes that catalyze the biosynthetic reactions which produce defense compounds like polyphenols, pathogenesis-related proteins and alkaloids[10].

Conclusively, salicylic acid is an eco-friendly antioxidant compound that plays a significant role in the management of Fusarium wilt disease and also improves the growth of vegetative parts of the plant.

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