SUMMARY

1) A wide range of media were used for growing the fungus and it required several specific elements for growth and reproduction. The requirements for growth are generally less stringent than for sporulation, so it was necessary to try several types of media to identify fungus in culture. It was observed that sporulation was high in isolates; simultaneously it varied from one isolate to other isolates. For the study of sporulation different media were used.

2) Development of resistance in *C. lindemuthianum* isolates to the fungicides through Spontaneous mutation, UV and gamma radiation was demonstrated in the laboratory experiment. Spontaneously development of resistance was more prominent in Mancozeb followed by Carbendazim. Through UV radiation formation of mutants was higher on the plates containing Mancozeb in both the isolates. Through gamma radiation resistant isolate had higher frequency of mutants than that of Sensitive isolate.

3) In this investigation, sensitivity and resistance of twenty isolates of *Colletotrichum lindemuthianum* against Mancozeb, Chlorothalonil, Benomyl, Carbendazim and Thiophanate-methyl was tested. It was noted that there were variation in the MIC of fungicides against different isolates. MIC ranged from 0.05 - 3500 µg/ml of Mancozeb, Chlorothalonil, Benomyl, Carbendazim and Thiophanate-methyl. On the basis of which isolate *C*. 11 was considered to be resistant isolate while *C*. 19 as sensitive isolate. In the present study latent period was varied according to the isolate and the fungicide. Latent period was less in the sensitive isolate than that of resistant isolate.

4) Fungicides application program influenced the development of resistance in the pathogen. Hence effect of successive passages of *Colletotrichum lindemuthianum* on Mancozeb and Carbendazim individually,
alternately or in mixture with other fungicides with different mode of action was studied both in vitro and in vivo. In this investigation continuous passage of sensitive and resistant isolate on Mancozeb increased resistance of pathogen, but culturing of the pathogen on Mancozeb alternately with Chlorothalonil, Benomyl, Carbendazim and Thiophanate-methyl reduced the Mancozeb resistance in pathogen. Use of Mancozeb in mixture with fungicides also showed reduction in the resistance, Carbendazim appeared to be more effective than others in altered passage.

5) A comparison of certain physiological and biochemical characteristic of resistant and sensitive isolates was made. Growth rate of resistant isolate was higher than that of sensitive one. Glucose, Sucrose, Dextrose and Maltose were more favorable. Similarly high sporulation was also observed in the resistant isolate. Of the five nitrogen sources growth of both the resistant and sensitive isolate was stimulated by Potassium Nitrate, Ammonium nitrate and Sodium nitrate which indicated higher sporulation over control. Urea and Ammonium Sulphate was unfavorable for sporulation in the pathogen.

6) Production of certain metabolites in the culture filtrate of the sensitive and resistant isolate showed total protein, total amino acid, total sugars production which was higher in the culture filtrate of resistant isolate when compared with the sensitive isolate. Estimation of total sugars, total amino acids & total proteins in the Mung bean, infected by sensitive and resistant isolate was made. These metabolites were reduced due to infection when compared with healthy plants. This reduction was made in the plants, infected with sensitive isolate was higher. Production of cellulolytic (cX) and pectolytic enzyme (PMG) in the culture filtrates by sensitive and resistant isolate was studied by viscometric method. Production of these enzymes was more in the resistant isolate.
7) Synergistic effect of agrochemicals used in mung bean for crop management was tested in mixture at various concentrations. In case of Mancozeb it was noted that *in vitro* antibiotics streptomycin, tetracycline, herbicide such as 2,4-D and stomp, salts NaCl, CaCO₃, Fertilizer ammonium sulphate, super phosphate, micronutrient Cu, Fe, Bo, Mg, Mo, Al, Zn reduced the resistance as percentage control efficiency was increased. *In Vivo* on the mung bean plants also streptomycin, tetracycline, 2, 4-D, salt NaCl, fertilizer ammonium sulphate, super phosphate, micronutrient, Cu and Zn were more synergistic in disease control, indicating decrease in Mancozeb resistance in *C. lindemuthianum*. Similarly synergistic studies with Carbendazim showed that *in vitro* on agar plate’s antibiotic Tetracycline, Streptomycin, Herbicide 2, 4-D, fertilizer super phosphate and ammonium sulphate, micronutrient Cu, Bo, Fe was highly effective in combination with fungicides. *In vivo* streptomycin, tetracycline, 2, 4-D, NaCl, micronutrient Cu, Zn, Bo, and Al was more synergistic in controlling of disease in combination with fungicides.

8) An antifungal activity of plant extracts was tested against *C. lindemuthianum*. Out of 10 plants leaf extracts *Azadirachta indica*, *Lantana camera* and *Ocimum sanctum* were most effective in reducing mycelial growth which was followed by *Eugenia jambos* and *Hyptis suaveolens*. Leaf extract of *Catharanthus roseus*, *Casuarina equisetifolia*, *Tridex procumbens*, *Adhatoda vasica* and *Calotropis procera* were less effective. In case of bulb and rhizome extract *Allium cepa* was more effective than *Allium sativum*. Rhizome extract of *Zingiber officinale* was more significantly effective in reducing the mycelial growth of *Colletotrichum lindemuthianum* than other plant extracts.

9) Biological control potential against *C. lindemuthianum* was also evaluated. The antagonistic potential for five fungi and two bacteria was assessed against the test organism i.e. *C. lindemuthianum*. The fungi used were *Aspergillus flavus*, *A.*
niger, Gliocladium virens, Penicillium aurantiogriseum and Trichoderma viride. Bacillus subtilis and Pseudomonas fluorescens was used as bacterial source against the test organism. It was recorded that T. viride and G. virens had maximum reduction of the pathogen. In bacterial suspension results recorded maximum zone of inhibition in B. subtilis followed by P. fluorescens.

10) The optima of physical factors such as temperature and pH were checked in order to maintain the growth of Mancozeb and Carbendazim resistant C. lindemuthianum isolate. In general 25° to 30°C temperature and 5.8 - 6.0 pH were most favorable for growth of the pathogen on medium containing fungicides.

11) The resistant mutants were released into natural population of plant pathogenic fungi. It was necessary to study the ability of such resistant mutant or isolate whether it can survive under artificial or natural conditions as a plant pathogen. Such information on the fitness or survival ability of resistant isolate would be most valuable in the management of disease control. In the present investigation survival ability of C. lindemuthianum resistant isolate among the sensitive population was studied on mung bean plants.