https://doi.org/10.29321/MAJ.10.A03179

Madras agric. J. 64 (4) : 243—246, April, 1977

Effect of Certain Insecticides and Fungicides on the Growth of the Coffee Green Bug Fungus, *Cephalosoprium lecanii* Zimm,

S. EASWARAMOORTHY[1] and S. JAYARAJ[2]

The effect of twelve insecticides and four fungicides each at three concentrations was investigated under laboratory conditions on the vegetative growth of the fungus *Cephalosporium lecanii*. Among the insecticides tested dichlorvos reduced the growth drastically by 95.4, 99.8 and 100.0% at low, medium and high concentrations respectively. Carbaryl, monocrotophos, malathion and endrin were also found to inhibit the growth greatly. Ethyl parathion, BHC and dimethoate were less destructive and acephate, DDT and phosphomidan caused the least inhibition. Among the fungicides Bordeaux mixture, Dithane M 45 and Dithane Z 78 inhibited the growth by 75.1-77.8%. When all the concentrations were considered together while sulphur was found to be least inhibitory (7.6%). Greater inhibition was found at higher concentration than at lower concentrations of the chemical.

Insecticides and fungicides were found to reduce the growth, sporulation and germination of spores of several entomogenous fungi. *In vitro* studies by Cadatal and Gabriel (1970) showed partial to complete inhibition of *Metarrhizium anisopliae* Sorokin and *Entomophthora* sp. Several fungicides were also found to be harmful (Hall and Dunn, 1959; Yendol, 1968; Wilding, 1972). The white halo fungus, *Cephalosporium lecanii* zimm. was found to have appreciable control over several species of coccids (Ganhao, 1956; Inserra, 1968; Kobiashvili, 1972) and during the present investigations at Lower Pulney Hills it showed greater promise against the coffee green bug, *Coccus viridis* Green. Hence with a view to determine the effect of insecticides and fungicides that are used against the pests and disease of coffee the present study was undertaken.

MATERIALS AND METHODS

Twelve insecticides each at three concentrations were tested in a simple randomised block design. The low concentration of each insecticide was fixed by reducing 50 ppm for every 100 ppm of the normal field application dose and the high concentration by adding 50 ppm for every 100 ppm. The medium dose was same as that of normal field application dose, viz. endrin (0.04%), malathion (0.1%), monocrotophos (0.05%), quinalphos (0.05%) dichlorvos (0.05%), ethyl parathion (0.025%), dimethoate (0.03%), phosphomidan (0.1%), BHC (0.1%), DDT (0.1%), carbaryl (0.1%) and acephate

1-2: Department of Entomology, Agricultural College and Research Institute, Madurai.

(0.225%). In the case of fungicides 1500, 2000 and 2500 ppm of Bordeaux mixture, Dithane Z 78, Dithane M 45 and sulphur were tested. Each concentration of the chemical was replicated thrice and suitable checks were also maintained.

Twenty ml of Czapek-dox medium was sterilized in individual boiling tube and the chemical dissolved in sterile water was incorporated into medium just before solidifving. Then it was shaken until an even suspension was obtained and poured into petri dish to solidify.

The fungus *C. lecanii* isolatad from coffee green bug *C. viridis* was maintained on Czapek-dox agar slants. Discs of 10 mm diameter were cut out from the edges of actively growing colony in petri dishes and used as inoculam. The incubation was done at room temperature. The greatest diameter of the growth circle was recorded on the fourth, sixth and eighth day of seedling and the mean was calculated.

RESULTS AND DISCUSSION

It is evident from Table I that different insecticides had varied effect on the vegetative growth of *C. lecanii*. Dichlorvos was found to be most harmful at all the three concentrations and recorded a growth reduction of 95.4, 99.8 and 100.0 per cent at low, medium and high concentration respectively. This may possibly be due to its fumigant action apart from contact toxicity. Carbaryl was also inhibitory to an extent of 59.3, 69.8 and 86.4 per cent in the three concentration. The other chemicals viz. monocrotophos, mala-

TABLE I. Effect of different insecticides on the growth of *C. lecanii* (Mean of 9 observations)

Insecticide	% inhibition of radial growth			
	Low dose	Medium dose	High dose	Mean
Endrin	37.5 (37.6)	56.2 (47.3)	67.3 (55.2)	53.7 (46.7)
Malathion	47.8 (43.9)	58.0 (49 6)	71.0 (57.4)	58.9 (50 3)
Monocrotophos	51.7 (46.0)	59.2 (50.4)	69.3 (56.5)	60.1 (50.9)
Quinalphos	53.7 (47.2)	57.0 (49.1)	64.9 (53.1)	58.6 (49.8)
Dichlorvos	95.4 (81.0)	99.8 (89.2)	100.0 (90.0)	98.4 (86.7)
Ethyl Parathion	37.3 (37 5)	40.1 (39.4)	45.1 (42.2)	40.9 (39.7)
Dimethoate	26.2 (30.6)	29.3 (32.7)	34.9 (36.1)	30.1 (33.1)
Phosphomidan	7.1 (13.4)	12.3 (19.9)	18.9 (25.6)	12.8 (19.6)
BHC	21.3 (27.3)	31.4 (33.9)	42.1 (40.4)	31.6 (33.9)
DDT	11.9 (19.9)	23.9 (29.1)	31.9 (34.3)	22.6 (27.8)
Carbaryl	59.3 (50.4)	69.8 (56.7)	83.4 (66.7)	70.8 (57.9)
Acephate	14.6 (22 3)	24.7 (29.7)	37.6 (38.9)	25.7 (30.3)
Mean	38.6 (38.1)	46.8 (43.9)	55.5 (49.7)	
C. D. (P = 0.05) Between treatments : 1.75 Between concentrations : 08.8				

thion, quinalphos, endrin, ethyl parathion, BHC and dimethoate had lesser inhibitory effect. Inhibition of growth of *Metarrhizium anisopliae* and *Entomophthora* sp by carbaryl and endrin (Cadatal and Gabriel, 1970), *Entomophthora* spp. by malathion (Hall and Dunn, 1959), and *Beauveria bassiana* Vuill. by parathion and methyl parathion and methyl parathion (Dirimanov and Angelova, 1962) were already reported that BHC was innocuous while Urs *et al*. (1967) found that it was most toxic to *B. bassiana* and *M. anisopliae*. Acephate, DDT and phosphomidan were found to cause only 25.7, 22.6 and 12.8 per cent reduction respectively when all the concentrations were considered together (Table I). Similar results were obtained by Dirimanov and Angelova (1962), Evalakhova (1964) and Cadatal and Gabriel (1970). The least inhibition of phosphomidan was comparable with the results of Urs *et al*. (1967). Greater inhibition was found at higher concentration than at lower concentration in almost all the insecticides. However dichlorvos and ethyl parathion at high and medium concentrations and dichlorvos and quinalphos at medium and low concentrations caused almost the same effect.

The fungicides Bordeaux mixture, Dithane M 45 and Dithane Z 78 were found to be highly harmful (Table II) recording 67.0-85.1 per cent reduction in growth at 1500, 200 and 2500 ppm. On the other hand sulphur was found to be less harmful with only 7.6 per cent reduction. Hall and Dunn (1959) studied the effect of five fungicides on the growth of six species of *Entomophthora* and found that Bordeaux mixture was the most harmful while sulphur was the most innocuous. So it is evident that when these chemicals are used for the control of pests and diseases of coffee they will have adverse effect on the growth of the fungus under field conditions.

TABLE II. Inhibition of fungal growth by different fungicides at three concentrations
Mean of 9 observations
(Figures in parenthesis represent transformed values)

Fungicides	% Inhibition of radial growth Concentrations			
	1500 ppm	2000 ppm	2500ppm	Mean
Bordeaux mixture	69.71 (56.68)	78.70 (62.67)	85.07 (67.59)	77.82 (62.31)
Dithane Z 78	66.99 (54.95)	74 12 (59.83)	84.47 (67.10)	75.19 (60.63)
Dithane M45	68.87 (56.10)	76.64 (61.22)	85.13 (67.62)	76.88 (61.65)
Sulphur	3 95 (11.32)	5.35 (13.09)	13.53 (21.56)	7.61 (15.32)
Mean	52.38 (44.76)	58.70 (49.20)	67.05 (55.97)	

	C. D. (P = 0.05)
i. Between concentrations	0.53
ii. Interaction between fungicides and concentrations	1.60

The results formed a part of M. Sc. (Ag.) dissertation submitted by the senior author to the Tamil Nadu Agricultural University, Coimbatore. The financial support given by the Indian Council of Agrtcultural Research, New Delhi is gratefully acknowledged.

REFERENCES

CADATAL, T. D. and B. P. GABRIEL. 1970. Effect of chemical pesticides on the development of fungi pathogenic to some rice insecticides. *Philippine Ent.* 1:379-95

DIRIMANOV, M. and R. ANGELOVA. 1962. *Priroda, Sofia* **10** : 58-61.

EVALAKHOVA, A. A. 1964. Effect of DDT and BHC on the growth and virulence of entomopathogenic fungi. *Trudy Vses. Inst. Zashch. Rast.* **21** : 95-100.

GANHO, J. F. P. 1956. *Cephalosorium lecanii* Zimm. Um fungo entomogeno de Cochonilhas. *Broteria* **25** : 71-135.

HALL, I. M. and P. H. DUNN. 1959. The effect of certain insecticides and fungicides on fungi pathogenic to the spotted alfalfa aphid. *J. econ. Ent.* **51** : 341-44.

INSERRA, S. 1968. Experiments on the integrated control of *Aonidiella aurantii* Mask. and other coccids on citrus in Sicilly. *Entomologica* **4** : 45-77.

KOBIASHVILI, B. S. 1972. Study on *Cephalosporium lecanii* isolated from soft scale. *Trudy Enstituta Zashchity Rasteni. Gruz. SSR.* **23** : 178-81.

URS, N. V. R., H. C. GOVINDA and K. S. SHIVASHANKARA REDDY. 1967. The effect of certain insecticides on the Entomogenous fungi, *Beauveria bassiana* and *M. anisopliae*. *J. Invertebr. Pathol.* **9** : 398-403.

WILDING, N. 1972. The effect of systemic fungicides on the aphid pathogen, *Cephalosporium aphidicola*. *Pl. Pathol.* **21** : 137-39.

YENDOL, W. G. 1968. Factors affecting germination of *Entomophthora conidia J. Invertebr. Pathol.* **10** : 116-21.