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Sooty Mould Infection on Mulberry-Management

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Black sooty mould fungus was observed on the upper side of the mulberry leaves caused by the *Capnodium* sp. This fungus develops with the utilization of the honeydew dropped by the whiteflies. Few selected insecticides like Monocrotophos, Chloropyriphos and Nuvan were tried to control the whitefly incidence and followed by the application of Maida (wheat flour paste) and Starch solution separately to control the incidence of the *Capnodium* on mulberry. It is found that a significant control of the whitefly incidence with the application of Nuvan (2 ml/L) and followed by Chloropyriphos (2 ml/L) and Monocrotophos (1.6 ml/L) and also a significant control of sooty mould infection were recorded with Starch and Maida application.

Key words: Sooty mould fungus, *Capnodium* sp, Whitefly, Mulberry, Management

Introduction

Mulberry is the prime food plant for the silkworm. The healthy growth of the silkworm and its production of silk cocoon depend upon the mulberry leaf quality. Mulberry cultivation is practiced in Rayalaseema region of Andhra Pradesh. Due to adverse climatic conditions like very low rain fall and high temperature experienced in Anantapur district since decades, many insects and pests especially sucking pests surviving on some other crops, are searching for new palatable hosts for their survival. During rainy and winter seasons, some new infestations with different pests are observed on mulberry, which are detrimental not only to the quality but also quantity. A fungus called sooty mould on mulberry has been reported as Capnodium sp. belongs to, Class: Ascomycetes; Sub-class: Loculo ascomycetidae; Order: Dothideales and Family: Capnodiaceae, is one among them causing threat to the industry in recent years (Lakshmi Reddy *et al.*, 2001). This fungus grows on the upper side of the leaves, which later turns into a thick black patchy layer (Fig. 1a, b, c). It is noticed only on the mulberry plants where there is heavy incidence of the whiteflies (Fig. 1d). These whiteflies congregate on the lower surface of the leaves, suck the cell sap and secrete "honeydew" which falls on the upper surface of the lower side leaves and twigs of the same plant. This honeydew becomes the medium for the faster development of sooty fungus (Geetha Bai *et al.*, 2001; Rajagopal Reddy *et al.*, 2001). Earlier it was also reported on different plants (David, 2001; David and Regu, 1995; Douressamy *et al.*, 1997; Rangaswamy and Mahadevan, 1999).

Sooty mould fungus cuts-off the effective leaf area of photosynthesis, thus interferes with the normal growth of many horticulture and other crop plants (Rangaswamy and Mahadevan, 1999). It also affects the qualitative and quantitative production of mulberry leaf and becomes unsuitable for feeding of silkworms, that ultimately reflects in poor quality cocoon yield. The damage depends on the intensity of incidence of the fungus disease (Rajagopal Reddy *et al.*, 2001). So in the present study a few insecticides were tried for controlling the whiteflies, which indirectly checks the fungus growth and Maida and Starch for direct control of the sooty mould fungus.

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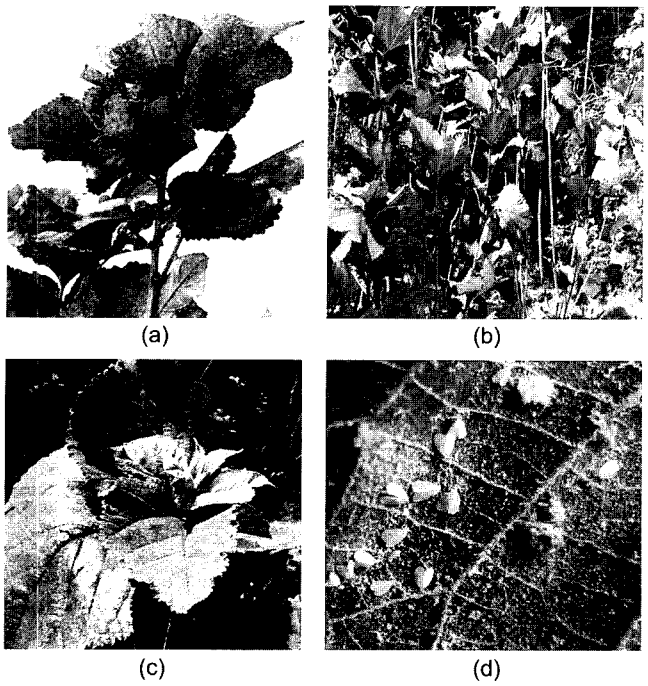

Fig. 1. Infection of whitefly **a.** sooty mould on upper surface of leaves; **b.** Sooty mould infected garden; **c.** Sooty mould infected leaves; and **d.** Nymphs and adult whiteflies.

Materials and Methods

A few selected insecticides were tried like Monocrotophos (Dimethyl (E)-1-methyl-2-methylcarbamoylvinyl phosphate) (1.6 ml/L) and Chloropyriphos (O,O- diethyl O- (3,5,6 thrichloropyridyl (-2) phosphorothionate) (2 ml/L) and Nuvan (O, O dimethyl - 2, 2- dichlorovinyl phosphate) (2 ml/L) for controlling the incidence of whitefly population. For the experimental purpose, 50 infected mulberry plants in a plot were selected for each treatment of the pesticide. Prior to the treatment of the pesticides in the different plots, the whitefly population was recorded from 10 leaves (1 to 10) from top to bottom from each plant because the whiteflies generally prefer to settle on the upper leaves of the plant. Average number of whiteflies per leaf was taken. Recording of the percent of reduction of whitefly were done on day 7 and day 14. Similar treatment of all the pesticides were done on 15 day of the first spray and data was recorded on day 21 and day 28. The collected data is subjected for ANOVA test using INDOSTAT computer package between the pesticides and different days of application. Another set of experiment was conducted on controlling of sooty mould fungus on the infected plants of the respective treated plots by the application of Maida (5%) (wheat flour paste) and Starch solutions (5%) on the 2nd day of the pesticide treatments. These solutions were sprayed on to the sooty mould infected leaves and percent of infection over the leaf area was calculated and subjected for ANOVA test.

Results and Discussion

It is observed that in control groups there is no reduction of whitefly population throughout the experimental period rather increased after some days. It shows these flies preferred mulberry plantation for their further infestation. All the pesticides that were used in controlling the whitefly

Table 1. Effect of different pesticides on whitefly population

Pesticides	Treatment	No. of flies counted before treatment	% of control of whiteflies population			
			Day 7	Day 14[a]	Day 21	Day 28
Monocrotophos 1.6 ml/L	Control	35	91.43	102.86	108.57	117.14
	SD	5.27	5.46	10.57	2.71	7.30
	Treatment	41	80.47*	85.36*	90.24*	73.17*
	SD	4.24	1.89	1.56	1.33	1.41
Chloropyriphos 2 ml/L	Control	31	106.45	125.81	132.26	154.84
	SD	3.97	2.79	2.53	5.76	14.44
	Treatment	37	78.37*	86.48*	91.89*	89.18*
	SD	3.74	1.26	2.32	1.48	1.95
Nuvan 2 ml/L	Control	34	108.82	123.53	102.94	135.29
	SD	9.53	6.45	3.38	5.85	6.43
	Treatment	39	84.61**	89.74**	94.87**	92.30**
	SD	7.24	2.57	1.55	0.98	1.20

Each data is the average of 10 replicates *P ≤ 0.001; **P ≤ 0.005.
[a]2nd treatment of pesticides was given on 15th day of first treatment.

Table 2. Effect of Maida and Starch on Sooty mould fungus[a]

Product used (solution)	Leaf area infected (%)	
	Day 7	Day 15
Control	80	71*
SD	9.380	6.403
Monocrotophos treated plants		
Maida 5 %	5	2*
SD	1.483	1.183
Starch 5 %	6	0
SD	2.097	0
Chloropyriphos treated plants		
Maida 5 %	6	3*
SD	1.341	1.00
Starch 5 %	4	2
SD	1.897	1.095
Nuvan treated plants		
Maida 5 %	3	1*
SD	1.019	1.414
Starch 5 %	2	1*
SD	1.264	0.774

[a]Sooty mould infection (%) over the leaf area and average of 10 replicates.
*$P \leq 0.001$.

population found quite effective. Interestingly, by 7th day in different treated plots maximum reduction of whitefly population was noticed (Table 1). Out of these pesticides, Nuvan was found to be most effective in controlling the whitefly population with 84.61%, 89.74% followed by Chloropyriphos 78.37%, 86.48% and Monocrotophos with 80.47%, 85.36% during 7th and 14th day of first treatment. Even though the whitefly population was reduced after 15th day of treatment, a second treatment of all the pesticides were given to respective treated plants. It is observed that a control of 94.87% and 92.30% with Nuvan; 91.89% and 89.18% with Chloropyriphos and 90.24% and 73.17% with Monocrotophos and on 21st and 28th day of the second treatment respectively. So after 2nd treatment the whitefly population was still reduced in their population and no further incidence was noticed. It was earlier reported by Bandhyopadhyay *et al.* (2001) that 24 whiteflies per leaf are sufficient for causing 24% crop loss in 30 days period. But, in the present study maximum control of whitefly population was achieved below the threshold level of damage with the first treatment itself. In the other study of controlling the sooty mould fungus by the application of Maida (5%) and Starch (5%), in the control plants, the infected leaf area was 80% and 71% on 7th and 15th day whereas, it was reduced to 5% and 2% with Maida and 6% and 0% with starch in Monocrotophos treated plants. In case of Chloropyriphos treated plants it was 6% and 3% with maida and 4% and 2% with starch. Similarly, in Nuvan treated plants, it was 3% and 1% with maida and 2% and 1% with starch treatment on 7th and 15th day respectively. It was observed that Maida or Starch solution helped in peeling off the sooty mould fungus from these leaves. No further growth of the fungus was observed on the leaves that were given first pesticide treatment because of the control of insect population.

So, initially whitefly incidence has to be checked which automatically suppresses the development of the sooty mould fungus on the mulberry leaves.

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