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Effect of chemical insecticides used for management of mulberry thrips on leaf yield of mulberry

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Abstract
A field experiment was conducted during 2021, at Gandhi Krishi Vigyan Kendra, UAS Bengaluru, to know the Effect of chemical insecticides on leaf yield of Mulberry. The experiment was planned in Randomized Complete Block Design (RCBD) with 7 treatments T_1: Acephate 75 SP, T_2: Acetamiprid 20 SP, T_3: Dimethoate 30 EC, T_4: Fipronil 5 SC, T_5: Imidacloprid 17.8 SC, T_6: Dichlorvos 76 EC (std check) `and T_7: Control (water spray). It was recorded that initially per plant leaf yield on 45th day after pruning showed highest in the treatment T_6: Dichlorvos 76 EC (std check) and the least leaf yield per plant was recorded in T_2: Acetamiprid 20 SP. Further mulberry leaf yield was calculated per hectare per crop was recorded highest in T_6: Dichlorvos 76 EC (std check) and the least leaf yield per plant was recorded in T_2: Acetamiprid 20 SP.

Keywords: Mulberry, chemical insecticides, leaf yield

Introduction
Sericulture is an integral part of the rural economy in India. It is remunerative and rural welfare oriented agro-based industry, which is highly labour intensive. In the global context, China is the largest silk producing country which is followed by India. India has the uniqueness of being the only country in the world to produce all four types of commercial silks. Mulberry is the only source of food for the silkworm, *Bombyx mori* L. The production of quality mulberry leaves is based on several factors such as cultivation practices, variety, biotic and abiotic factors (Krishnaswami *et al.* 1970) [7].

The production of good quality leaves in required quantity is influenced by pests (18%), diseases (24%), weeds (7%) and others (51%) (Govindaiah *et al.* 2005) [6]. Majority of sericulture farmers all over the country have an opinion that among the insect pests, mulberry is very much prone to sap feeders, which sap feeders cause severe damage to mulberry. They are commonly known as sap suckers which pierce the plant cells in leaves and suck the sap.

Amongst the sap suckers infesting mulberry, infestation by thrips is highest (42.55%) which results in 40-50 percent loss (Etebari *et al*. 1998) [5], which is followed by mealy bug, (20.80%), leaf hopper, 20.28 percent and scale insects, (1.65%) (Anonymous, 1993) [1]. Infestation of mulberry by thrips is at its peak during the months of February-May and lowers during June-July season as reported by Radha and Muthukrishnan (1980) [10]. Among different species of the thrips infesting mulberry in Karnataka, *P. mori* is predominant in eastern, southern and central dry zone (Naik, 1997) [8]. Devaiah and Kotikal (1983) [4] reported thrips infestation on mulberry in Karnataka. *Pseudodendrothrips mori* sucks the sap from fully opened mulberry leaves and tissue in the young buds. During laceration, they secrete saliva which coagulates the sap resulting in the formation of white streaks followed by silvery blotches. Thrips infestation affects both qualitative as well as quantitative characters of mulberry leaf. Severe attack of thrips leads to different morpho-physiological changes in the leaves (Das *et al.* 1994) [3]. Thrips infestation lowers the moisture content (3.57%) of the leaf which in turn deplete leaf yield and it is also reported that chlorophyll a/b ratio is decreased. It was reported that mulberry thrips reduce the protein content of leaves by 17.8% (Etebari *et al.* 1998) [5]. Paik and Lee (1984) [9] reported that total carbohydrate was reduced by more than 16 percent in infested leaves.

Earlier good number of methods were adopted for management of mulberry thrips like cultural,

physical, raising of pest-resistant/tolerant varieties, biological and chemical methods (Reddy and Narayanaswamy 1999) [11] and also through IPM approach (Singh and Saratchandra 2011) [12]. In the traditional areas, since the silkworm rearing is practiced 4-5 times in a year, leaf production must be made at a faster rate maintaining both the qualitative as well as quantitative characters. To match the synchronized rearing schedules, farmers must maintain pest-free mulberry garden for which the methods suggested above are tedious, time consuming and unrealistic. So, the only alternative is to go for insecticidal spray as a measure of plant protection to control thrips and production of good quality as well as quantity of mulberry leaves.

Materials and Methods

The investigation on **"**Management of mulberry thrips through chemical insecticides and their effect on mulberry leaf yield**"** was conducted during 2020-21, at the Department of Sericulture, University of Agricultural Sciences, GKVK, Bengaluru. The experimental site is located in the Eastern Dry Zone (zone-5) of Karnataka at 12°58′ N latitude and 77°35′ E longitude and at an altitude of 930 m above mean sea level. The material used and methods adopted during the study are detailed below.

Table 1: Experiment details

Crop	Mulberry
Variety	Victory-1(V1)
Spacing	(90+150) *60 cm (paired row)
No. of treatments	7
No. of replications	3
Season	Summer 2021
Crop period	February-April 2021
Design	RCBD
Gross plot size	200.7m2
Net plot size	116.4m2

Table 2: Treatment details

Treatment No.	Treatment	Dosage
T_1	Acephate 75 SP	1.00 g / l
T_2	Acetamiprid 20 SP	0.20 g / l
T_3	Dimethoate 30 EC	2.00 ml / l
T_4	Fipronil 5 SC	2.00 ml / l
T_5	Imidacloprid 17.8 SC	0.30 ml / l
T_6	Dichlorvos 76 EC (std check)	2.63 ml / l
T_7	Control (Water spray)	-

Note: All other practices of mulberry cultivation were followed as per standard package of practices (Dandin and Giridhar 2014) [2]

Observations Recorded

Yield parameters of mulberry

Leaf yield plant^{-1}

Leaf yield plant^{-1} was recorded by harvesting the fresh leaves from two plants of each replication at 45 days after pruning and average yield plant^{-1} was calculated.

Leaf yield (t ha^{-1})

Leaf yield per hectare was calculated by harvesting the fresh leaves from net plot area from different treatments and fresh leaf yield was expressed as t ha^{-1}.

Results and Discussion

Mulberry leaf yield per plant (kg) and kg / ha/ crop after spraying insecticides

Selected insecticides were studied for their efficacy against mulberry thrips in the current study. As thrips feed primarily on mulberry leaves, any reduction in pest population as a consequence of insecticide spraying could contribute for increase in mulberry leaf yield. Hence, the mulberry leaf yield (V-1 variety) was estimated in all the insecticide treated blocks at 45 days after pruning.

Mulberry leaf yield was recorded initially per plant and leaf yield recorded on 45th day after pruning showed highest in the treatment T_6 (Dichlorvos 76 EC @ 2.63 ml / l) (0.37 kg / plant) followed by T_3 (dimethoate 30 EC @ 2 ml / l) (0.35 kg / plant), T_5 (Imidacloprid 17.8 SC @ 0.3 ml / l) (0.34 kg / plant), T_4 (Fipronil 5 SC @ 2 ml / l) (0.33 kg / plant) and acephate 75 SP @ 1 g / l recorded the leaf yield of 0.30 kg per plant. The least leaf yield per plant was recorded in acetamiprid 20 SP @ 0.2 g / l (0.29 kg / plant) (Table 3).

Table 3: Effect chemical insecticide on leaf yield of mulberry (V-1)

Treatments		Leaf yield/plant (Kg)	Leaf yield (Kg/ha/crop)
T_1	Acephate 75 SP	0.30	4175.66
T_2	Acetamiprid 20 SP	0.29	3971.97
T_3	Dimethoate 30 EC	0.35	4851.54
T_4	Fipronil 5 SC	0.33	4587.67
T_5	Imidacloprid 17.8 SC	0.34	4758.95
T_6	Dichlorvos 76 EC	0.37	5069.12
T_7	Control (Water spray)	0.31	4245.10
F- test		*	*
S. Em. ±		0.003	35.673
CD @ 5%		0.008	109.920

Significant at 5%

Conclusion

Along with the effectiveness in management of mulberry thrips owing to lesser phytotoxicity, T_6 dichlorvos 76 EC (2.63 ml / l) recorded higher leaf yield of 0.37 kg / plant and 5069.12 kg / ha / crop. On the contrary lowest leaf yield was recorded with acetamiprid 20 SP @ 0.2 g / l (0.29 kg / plant and 3971.97 kg / ha/crop) due to phytotoxic symptoms which were more conspicuous and prominent at 15 DAS coinciding with the mulberry leaf harvest.

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