



Research Article

Incidence of suitable insecticides for the control of leaf miner (*Phyllonistis citrella*) on Nagpur mandarin at Chhindwara district of Madhya Pradesh, India.

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Abstract: An experiment on the Incidence of suitable insecticides for the control of leaf miner (*Phyllonistis citrella*) on Nagpur Mandarin at Chhindwara District of Madhya Pradesh was conducted at Government Nursery Kudam (Sausar Block of Chhindwara District) under Citrus project – Technology Mission on citrus during 2016. Observation recorded on total leaves and leavers damaged due to leaf miner on 8” long twig were counted before and at 7 days of treatment. The experiment was laid out in Randomized Complete Block Design (RCBD) having seven treatments including control. Each treatment consisted of three replicates on 6 year-old Nagpur Mandarin plants. The insecticides applied as foliar spray twice initiating during the emergence of new flush in the month of February and Month of March Maximum leaf damage due to this pest was found during February to March. Imidacloprid 0.005% Followed by Imidacloprid 0.005% as second spray after 15 days recorded minimum damage as against control.

Keywords: Citrus; Nagpur Mandarin; Leaf Miner; *Phyllonistis citrella*; Imidacloprid

Introduction

Citrus in Madhya Pradesh is estimated to be 74,815 ha of which 55,640 ha is under oranges (*Citrus reticulata* Blanco), 11,116 ha under acid lime (*Citrus aurantifolia* Swingle), and 8,698 ha under sweet oranges (*Citrus sinensis* Osbeck). The area under citrus cultivation is increasing gradually. In Madhya Pradesh orange cultivation was restricted to Chhindwara district which has now extended in Betul, Hoshangabad, etc. districts of Madhya Pradesh. Out of 55,640 ha under orange cultivation Chhindwara commands approximately 25,000 ha only indicating a good potential for orange cultivation in other districts of the state. Pandhurna and Sausar block of Chhindwara district adjoining to Vidarbha region of Maharashtra are famous for quality Nagpur mandarin. Orange cultivation is also becoming popular in two more blocks viz., Mohkhed and Bichhua of the district commanding approx. 1,000 ha each. The area under oranges in Madhya Pradesh is 52490 ha with the production of 894430 MT. The productivity is estimated to be 17.04 MT/ha. This is much higher than that of adjoining state Maharashtra.

Citrus leaf miner larvae feed by creating shallow tunnels, or mines, in young leaves of citrus trees. The pest is most commonly found on citrus. Citrus leafminer is a very small, light-colored moth, less than 1/4-inch long. It has silvery and white iridescent forewings with brown and white

markings and a distinct black spot on each wing tip. The hind wings and body are white, with long fringe scales extending from the hindwing margins. The larval stage is found only inside mines of citrus leaves and other closely related plants. As it feeds and develops, the larva leaves a frass (feces) trail, observed as a thin dark line, inside the meandering serpentine mine just under the surface of the leaf. This visual characteristic is used to help identify the pest. In its last stage, the larva emerges from the mine and moves to the edge of the leaf. It rolls the leaf around itself and pupates in preparation for adulthood, creating a rolled and distorted leaf. The citrus peel miner, a similar moth that attacks citrus, differs from citrus leaf miner because its larval stages do not leave a frass trail in the mine, and it attacks fruit and stems rather than leaves. The peel miner pupa is wrapped in a silken cocoon covered with whitish, crystalline ball-shaped structures. Peel miner pupae are usually concealed in bark cracks and crevices and can be located anywhere on the tree. Citrus leaf miner can survive as a larva only in the tender, young, shiny leaf flush of citrus and closely related species. Older leaves that have hardened off are not susceptible unless extremely high populations are present. The larvae mine inside the lower or upper surface of newly emerging leaves, causing them to curl and look distorted.

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Materials and Methods

Field experiments were conducted to evaluate the efficacy of different novel groups of insecticides for the management of citrus leaf miner on Nagpur Mandarin (*Citrus reticulata*) at Government Nursery Kudam (Sausar Block of Chhindwara District) under Citrus project – Technology Mission on citrus during 2016. The experiment was laid out in Randomized Complete Block Design (RCBD) having Seven treatments including control. Each treatment consisted of three replicates on 6 year-old Nagpur Mandarin plants. Between the treatments two plants were kept untreated to serve as buffer.

Observation recorded on total leaves and leavers damaged due to leaf miner on 8” long twig were counted before and at 7 days of treatment. For infestation of citrus leaf miner, number of leaves in the check and treated plots were counted. A leaf having even a single tunnel was considered as infested leaf. To determine infestation, the number of infested and non-infested leaves in treated and check plants were counted.

The treatments evaluated in the experiment were T₁-Imidacloprid 0.005% Followed by Imidacloprid 0.005%, T₂-Cypermethrin 0.01% Followed by Cypermethrin 0.005%, T₃-Neem oil 1% Followed by Same T₄-Triazophos 0.06% Followed by Imidacloprid 0.005%, T₅-Acephate 0.1125% Followed by Neem oil 1%, T₆-Dimethoate 0.025% Followed by Neem oil 1%, T₇-Control. The insecticides applied as foliar spray twice initiating during the emergence of new flush in the month of February and Month of March. The percentage of the mortality was recorded and the mortality was corrected with Abbot Formula (Abbott, 1925). The analysis of variance (ANOVA) was done by SPSS program and the comparison of mean was done.

Results and Discussions

As observation from table 1 all the insecticides were found to reduce leaf miner damage as compared to control. Imidacloprid 0.005% Followed by Imidacloprid 0.005% as same spray after 15 day recorded minimum 25.75% leaf damage after one month of the first application. Second best combination was Triazophos 0.06% Followed by Imidacloprid 0.005%, as second spray after 15 days where 28.50% Leaf infestation was recorded.

Table 1. Efficacy of different insecticides against leaf miner

Treatment	Leaf damage			
	First Spray (February)		Second Spray (March)	
	7 DAS	14 DAS	7 DAS	14 DAS
Imidacloprid 0.005% Followed by Imidacloprid 0.005%	18.50	16.00	20.75	25.75
Cypermethrin 0.01% Followed by Cypermethrin 0.005%	20.75	30.25	33.00	38.00
Neem oil 1% Followed by Same	31.00	39.00	36.00	39.75
Triazophos 0.06% Followed by Imidacloprid 0.005%	21.00	20.00	26.00	28.50
Acephate 0.1125% Followed by Neem oil 1%	22.00	28.50	29.00	35.00
Dimethoate 0.025% Followed by Neem oil 1%	21.75	18.50	32.50	38.75
Control	45.50	50.75	56.00	69.75
SE + _	1.70	2.32	2.26	2.79
CD at 5%	NS	7.16	6.98	8.61

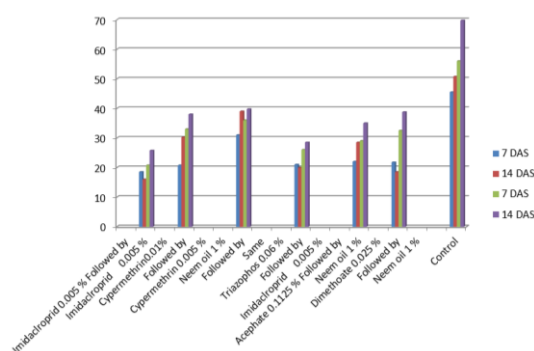


Figure 1. Percent infestation of leaves

The mean data of two years (2010-11 and 2011-12) in respect of leaf infestation caused by citrus leaf miner in acid lime are present in Table revealed that all the insecticidal treatments significantly recorded

less in gestation First Spray (February) (18.50-21.75, 16.00-18.50%) 7th & 14th DAS and Second Spray (March) (20.75-32.50%, 25.75-38.75%) 7th & 14th DAS over untreated control (45.50, 50.75, 56.00 and 69.75%) on 7th & 14th DAS on both month spray application. Imidacloprid 0.005% Followed by Imidacloprid 0.005%, was recorded minimum infestation of leaves (18.50, 16.00 and 20.75, 25.75%) followed by Triazophos 0.06% Followed by Imidacloprid 0.005% (21.00, 20.00 and 26.00, 28.50%) and Dimethoate 0.025% Followed by Neem oil 1%, (21.75, 18.50 and 32.50, 38.75%) recorded on both month spray in 7th and 14th DAS, respectively. The rest of the treatments *viz.*, Cypermethrin 0.01% Followed by Cypermethrin 0.005%, Neem oil 1% Followed by Same and Acephate 0.1125% Followed by Neem oil 1%, also reduced the leaf miner infestation and it was 1st

spray 27.75, 30.25% and 2nd spray 33.00, 38.00%; 31.00, 39.00 & 36.00, 39.75% and 22.00, 28.50% & 29.00, 35.00%, 7th and 14th DAS, both month spray (February / March) respectively.

Conclusion

Leaf miner damage was recorded in all the orchards it was more severe in young orchards. Maximum leaf damage due to this pest was found during February to March. Imidacloprid 0.005% Followed by Imidacloprid 0.005% as second spray after 15 days recorded minimum damage as against control.

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