HortFlora Research Spectrum
Vol. 5, Issue 3; 255-257 (September 2016)
www.hortflorajournal.com
ISSN: 2250-2823

Research Note :

MANGO HOPPER MANAGEMENT BY IPM PRACTICES INCLUDING INSECTICIDES, BOTANICALS AND CULTURAL PRACTICES

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ABSTRACT : Studies on the effect of IPM, chemical, botanicals and cultural practices on hopper showed that hopper population was effectively controlled in insecticide, IPM, insecticide + botanical pesticide and botanical pesticide whereas maximum hopper population was recorded in control. Fruit set per 100 panicles was significantly higher than control in all treatment whereas it was at par among IPM, insecticide alone and insecticide+botanical pesticide. Fruits harvested were maximum in IPM followed by insecticide and insecticide+botanical pesticide whereas no significant differences in fruits harvest were observed between cultural+ mechanical practices and control. Fruit weight was maximum in IPM followed by insecticide+botanical pesticide and insecticide alone. Lowest fruit weight was observed in control.

Keywords : *Mango hopper, integrated pest management, botanicals.*

The mango (*Mangifera indica* Linn.), known as king of fruits is the single most important tropical/subtropical fruit in the world (Rahman *et al.,* 4 and 5). Tandon and Vergheese (14) reported more than 400 pests which attack mango. Over the period of time insect pests have been the key factors in healthy mango production, in terms of quality as well as quantity (Rahman and Kuldeep, 9). Among these, the mango leaf hoppers, *Amritodus atkinsoni* (Leth), *Idioscopus clypealis* (Leth.) and *Idioscopus niveosparasus* (nitidulus) Leth. (*Cicadellidae* : Homoptera) are most severe all over India on the basis of extent of damage during the flowering and fruiting periods (Rahman *et al.,* 6 and 7 Rahman *et al.,* 3 and 8). Sap sucking insects like aphids, jassids and whitefly are sensitive to changing water levels in their host plants. It was reported that maximum fecundity of mustard aphids occurred on sarsoon and raya when the water level was maintained continuously. Lower soil water regimes created nutritional imbalance and due to this, economic threshold of this pest in the field was reached only at the highest soil water regime. Singh (11) reported that water can accentuate or hinder growth and development of insect pests, or the availability of water in. Keeping all these things in mind, the present investigation was conducted to study the impact of IPM, pesticide, cultural and mechanical practices which can be incorporated into the management practices of mango hopper, the major pest of mango.

Article's History:
Received : 09-08-2016 ***Accepted : 12-09-2016***

Healthy mango trees cv. Dashehari in the age group of 25-30 years were selected for this experiment The trial was conducted at the Horticultural Research Centre, Patharchatta, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (Udham Singh Nagar), Uttaranchal, and it consisted of six treatments with four replications each. One tree was considered as one replication. The IPM practices included ploughing, pruning, digging of the basin thrice i.e. in October, November and December, weeding in rainy season, irrigation in summer after fruit set and fertilizer application as recommended. Planofix (NAA) 40 ppm was sprayed twice in April. Botanical pesticides (Nimbicidine (0.03%) - 0.4%) were sprayed three times. In 2nd treatment two sprays of insecticides (as 1st spray - monocrotophos (36%) – 0.15% and 3rd spray –endosulfan (35 EC) – 0.2%) and one spray of botanical pesticide (as IInd spray –Nimbicidine (0.03%) – 0.4%) were done. In botanicals Nimbicidine – 0.4% alone were sprayed thrice. In cultural + mechanical practices ploughing, hoeing, digging at basin thrice in October, November and December, weeding in rainy season and/or when needed and pruning of dried, infected twigs were done. In insecticidal sprays (three times), Ist spray - monocrotophos (36%) – 0.15%, IInd spray – endosulfan (35EC) – 0.2% and IIIrd spray

–carbaryl (50% WDP) – 0.2% were used. In control no treatment was followed.

Foliar spray of the insecticidal and botanical pesticidal solutions of desired strength were done to the point of slight runoff with the help of tractor operated sprayer. First spray was done after panicle emergence on February 26, 2001, second spray after fifteen days on March 12, 2001 and third spray was done after fruit set on April 12, 2001. Sulphur (80 WDP - 0.2%) was also used in every spray for the control of powdery mildew disease. Observations of hopper population were recorded after one week of each spray on 25 panicles of each tree. Fruit set of 100 panicles per tree was recorded Ist at pea size, IInd at marble size and IIIrd at full size. Weight of the fruits of 100 panicles per tree was also recorded.

It was clear from Table 1 that hopper population was effectively controlled in insecticidal treatment as lowest hopper population (<1) was maintained here. In IPM, the hopper population per panicle was less than 4 in 1st and 2nd observations and <1 in 3rd observation whereas in insecticide + botanical it was < 1 in 1st and 3rd observations and less than 4 in 2nd observation. About 4 hoppers per panicle were maintained in botanical pesticide whereas maximum hopper population (10-15 hopper/panicle in 1st and 2nd observations and >8 in 3rd observation) was recorded in control.

Fruit set was significantly higher than the control in all treatments except in 2nd observation, where it was at par with the cultural+ mechanical practices (Table 2). Fruit sets were at par among IPM, insecticide alone and insecticide + botanical pesticide in most of the observations. Fruits harvested were maximum (113.75 fruits per 100 panicles) in IPM practices followed by insecticide only and insecticide+botanical pesticide whereas no significant differences in fruit harvest were observed between cultural + mechanical practices and control. Fruit weight was maximum (20.65 kg per 100 panicles) in IPM followed by insecticide + botanical pesticide and insecticide alone. Lowest fruit weight (16.52 kg per 100 panicles) was observed in control. The neem formulation (Nimbicidine) as botanical pesticide was also effective as hopper population was significantly less than control in all observations. Singh (13) tested the efficacy of neem formulation and reported that NSKE and Nimbicidine gave significant reduction in hopper population as compared to control and population of pollinators was not affected also. Hopper populations were significantly less in cultural + mechanical practices when compared to the control except in 1st observation where the hopper control was partly successful. Singh (12) reported that keeping the orchard clean by regular ploughing, removal of weeds, dead and excess branches were found advantageous in reducing the pest damage. The treatments with 3 sprays of insecticides (1st– monocrotophos, 2nd– endosulfan and 3rd– carbaryl) and insecticide + botanical pesticide (1st monocroto- phos, 2nd - nimbicidine and 3rd – carbaryl) were most effective in hopper control and as compatible as IPM in fruit set, fruits harvested and fruit weight. Similar findings by Rajesh and Patil (10) who released nymphs of A. atkinsoni and I. niveosparsus on mango seedlings treated with insecticides and found 0.04 per cent monocrotophos and 0.1 per cent carbaryl were the most effective and persistent whereas Mishra and Choudhary (1) reported that monocrotophos 0.03% a.i., endosulfan 0.05% a.i. and carbaryl 0.2% a.i. are recommended for the control of Amritodus atkinsoni. Low fruit set, less yield and low fruit weight in control and cultural practices can be attributed to growth of sooty mould which hampered photosynthesis, growth and yield. Wen and Lee (15) who found that honeydew excreted by these insects fell on plant parts causing sooty mould which interfered with photosyn- thesis and reduced fruit set.

In this experiment, the IPM treatment was found most effective when all the parameters like hopper control, fruit set, fruits harvested, and fruit weight were considered. As the treatment consisted of fungicides, botanical pesticides, hormones and cultural+ mechanical practices, some positive effects were observed on plant growth and development besides hopper management. Similarly conclusion was drawn by Pena *et al.* (3) that pest management programme must be taken into account the effect of cultural practices, horticultural sprays and disease control.

Table 1 : Effect of IPM, insecticides, botanicals and cultural practices on hopper population.

Treatments	Hopper population /panicle (one week after each spray)		
	1st Obs	2nd Obs.	3rd Obs.
IPM	3.58^{a}	2.89^{ab}	0.18^{a}
Insecticides	0.19^{b}	1.72^{a}	0.17^{a}
Insecticides + botanicals	0.21^{b}	3.55^{b}	0.19^{a}
Botanicals (neem)	4.78^{c}	4.23^{b}	3.40^{b}
Cultural + mechanical practices	9.21^{d}	10.12^{c}	6.85^{c}
Control	10.08^{d}	14.29^{d}	8.12^{d}
CD (P = 0.05)	1.07	1.80	0.69
CV	9.15	19.56	14.66

Means followed by same letters are not significantly different

Table 2 : Effect of IPM, insecticides, botanicals and cultural practices on fruit set, fruits harvested and fruit weight per 100 panicles.

Treatments	Fruit set /100 panicles		Fruits harvested /100 panicles	Fruit weight/ 100 panicles
	At pea stage	At marble stage		
IPM	358.00[a]	153.25[a]	113.75[a]	20.65[a]
Insecticides	314.75[b]	144.50[a]	110.50[ac]	19.87[ab]
Insecticides + botanicals	380.50[a]	150.00[a]	110.25[ac]	20.60[a]
Botanicals (neem)	239.25[c]	124.50[b]	105.00[bc]	18.42[bc]
Cultural + mechanical practices	212.50[c]	119.00[bc]	102.50[b]	17.02[cd]
Control	121.75[d]	111.00[c]	100.25[b]	16.52[d]
C.D. (P = 0.05)	37.39	9.94	7.31	1.71
CV	9.15	4.93	4.53	6.04

Means followed by same letter are not significantly different

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Citation : Rahman S.M.A., Srivastava K. and Singh G. (2016). Mango hopper management by IPM practices including insecticides, botanicals and cultural practices. *HortFlora Res. Spectrum,* **5**(3) : 255-257.