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FIELD EFFICACY OF SOME INSECTICIDES AND BIOPESTICIDES FOR THE MANAGEMENT OF SHOOT GALL PSYLLA, *Apsylla cistellata* Buck.

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ABSTRACT: Studies were conducted to study the field efficacy of insectides, botanicals and entomopathogenic fungi for the control of shoot gall psylla, *Apsylla cistellata* Buck and subsequently their effect on fruit set and fruit yield of mango. Maximum per cent embryo mortality and minimum number of galls/twig and nymphs/gall were recorded in monocrotophos followed by quinalphos whereas minimum per cent embryo mortality and maximum number of galls/twig and nymphs/gall were observed in nimbicidine, neem seed kernel extract, *Baeauveria bassiana* and control. Maximum fruited shoot, fruits harvested and fruit yield were recorded in monocrotophos and quinalphos whereas about zero fruit yield was recorded in nimbicidine, neem seed kernel extract, *B. bassiana* and control.

Keywords : *Shoot gall psylla, Apsylla cistellata , mango, management.*

The mango (*Mangifera indica* Linn.), the King of fruits is the most important tropical/subtropical fruit in the world. 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, 3). Mango leaf hopper, mango mealy bug, bark eating caterpillar, mango fruit fly and mango shoot gall psylla are reported to cause serious damage to mango crop (Dwivedi *et al.,* 1; Rahman *et al.,* 7; Rahman *et al.,* 4 and 5). The malady caused by mango shoot gall psylla has a localized and definite distribution in various regions It is one of the most serious problem of the mango cultivation and distributed in north Punjab, Uttar Pradesh, Bihar and Bengal and probably in north-eastern states of Assam, Meghalya, Tripura, Nagaland, Mizoram and Sikkim (Rahman *et al.,* 6). *Apsylla cistellata* (Buckton) (Psyllidae-Homoptera), the causal organism, interferes fruiting directly by affecting panicle formation. A severely affected tree yields very little fruits as compared to ten times or more from a healthy tree (Singh, 8). It induces axillary and apical buds into the cone shaped green galls, which directly interfere with the formation of inflorescence, and subsequent growth is arrested, resulting in no or low yields. Owing to the formation of galls, most of the affected branches dry out after the emergence of the insect and opening of galls. Singh and Mishra (9) reported that a heavily infested tree yields only 10-20 kg fruits as against 300 kg from a healthy tree. They further observed that affected trees did not yield in the succeeding year as the new growth had been arrested in the preceding years. It was also observed that cooler climatic areas and places near the foothills/tarai with annual rainfall above 1100 mm and relative humidity above 55 per cent were found to be most suitable for the gall formation.

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MATERIALS AND METHODS

Mango trees cv. Bombay Green in the age of group of 25-30 years infested with the eggs of A. cistellata were selected for this experiment. The trial was conducted to see the efficacy of insecticides, chemicals (diesel, surf etc.), plant products and entomopaphogenic fungi for the control of shoot gall. There were eight treatments each with four replications. One big main branch, leaves of which were heavily infested with the eggs of *A. cistellata* was considered as one replication. The different treatments used for each spray in this experiment were quinalphos (25% AF), cartap hydrochloride (50 SP) and monocrotophos (36%) @ 2%; diesel (1%) + surf (1%); Nimbicidine (0.03%) - 0.2%; neem seed kernel extract (NSKE) - 4% and entomopaphogenic fungi (*Beauveria bassiana*) - 8% whereas in control no spray was done. All the sprayed solutions were prepared by mixing the required quantities of the concentrates with water to give the desired strength. Foliar spray of the sprayed solutions were done to the point of slight run-off with the help of a knapsack sprayer. Three sprays were

done, 1st on 1st August when the nymphs were hatched and started feeding, 2nd and 3rd on August 12 and 24, respectively. Observations were recorded on the eggs died in one cm length of the leaf midrib on August 8 and 19 after a week of the spray to work out the per cent egg/nymphal mortality. The nymphs still in the feeding stage and secreting the whitish exudates were considered alive while others as dead. The observations were also recorded on total number of galls per 30 cm twig of 10 twigs, number of nymphs per gall of 10 galls and number of fruited shoots per 100 panicles for each replication. Total number of fruits harvested and fruit weight per 100 panicles for each replication were also recorded.

RESULTS AND DISCUSSION

It was clear from Table 1 that per cent embryo mortality was maximum (94.62%) in monocrotophos followed by quinalphos (93.45%) whereas in cartap hydrochloride and diesel+surf, about 55-60 and 30-40 per cent mortality occurred in 1st and 2nd observations. However, very less (9-14 per cent embryo mortality) or no effective control was observed in Nimbicidine, NSKE, *B. bassiana* and control. Number of galls per twig and number of nymphs per gall were also very less (<1) in monocrotophos and quinalphos, whereas in rest of the treatments these were much higher (29.27-33.65 galls per twig and 6.77-7.47 nymphs per gall) in nimbicidine, NSKE and *B. bassiana*. Maximum number of galls per twig (42.80) and nymphs per gall (9.25)

Table 1: Effect of insecticides and biopesticides on per cent embryo mortality, gall formation and nymph population of *A. cistellata.*

Treatments	Embryo mortality(%)		Number of galls per twig	Number of nymphs per gall
	1st obsevation	2nd observation		
Quinalphos (0.2%)	93.45 (75.27[a])	98.17 (84.49[a])	0.12[a]	0.05[a]
Cartap hydrochloride (0.2%)	55.58 (48.27[b])	43.05 (40.91[b])	11.90[b]	3.15[b]
Monocrotophos (0.2%)	94.62 (76.76[a])	98.21 (86.12[a])	0.075[a]	0.05[a]
Diesel (1%) + surf (1%)	58.05 (49.66[b])	31.72 (34.14[b])	16.72[b]	4.10[b]
Nimbicidine (0.2%)	14.66 (22.32[cd])	11.74 (19.70[c])	29.27[c]	7.47[c]
Neem Seed Kernel Extract (4%)	17.79 (24.73[c])	12.13 (20.18[c])	29.75[c]	6.77[c]
Entomopaphogenic fungi (*Beauveria bassiana*) (0.8%)	16.73 (24.04[c])	11.99 (20.00[c])	33.65[c]	7.32[c]
Control	9.47 (17.64[d])	11.26 (19.55[c])	42.80[d]	9.25[d]
CD (P=0.05)	5.66	7.60	7.17	1.00
CV	9.09	12.72	23.75	14.25

**Data given in parentheses indicate the angular transformed value*
Means followed by same letters are not significantly different

Table 2 : Effect of insecticides and biopesticides on fruited shoots, fruits harvested and fruit weight per 100 panicles in shoot gall management.

Treatments	Fruited shoots/100 panicles	No of fruits/100 panicles	Fruit weight/100 panicles
Quinalphos (0.2%)	80.75 (4.39[a])	84.00 (4.43[a])	17.20 (2.88[a])
Cartap hydrochloride (0.2%)	26.75 (3.29[b])	27.75 (3.32[b])	5.02 (1.77[b])
Monocrotophos (0.2%)	88.56 (4.48[a])	96.25 (4.56[a])	19.32 (2.98[a])
Diesel (1%) + surf (1%)	21.75 (2.94[b])	22.25 (2.95[b])	3.92 (1.51[b])
Nimbicidine (0.2%)	0.75 (0.44[c])	0.75 (0.44[d])	0.13 (0.12[c])
Neem Seed Kernel Extract (4%)	1.00 (0.40[c])	1.00 (0.40[d])	0.17 (0.13[c])
Entomopaphogenic fungi (*Beauveria bassiana*) (0.8%)	0.25 (0.17[c])	0.25 (0.17[d])	0.050 (0.045[c])
Control	0.25 (0.17[c])	0.25 (0.17[d])	0.050 (0.045[c])
CD (P = 0.05)	0.71	0.71	0.41
CV	23.92	23.35	23.77

**Data given in parentheses indicate the log transformed value*
Means followed by same letters are not significantly different

were observed in control. Singh *et al.* (10) reported that the embryonic development was much pronounced after 15th July and in August. In this trial, also, therefore spraying of insecticides was started from 1st August when the hatched nymphs started feeding *in situ*. Singh and Mishra (9) also reported that monocrotophos was very effective against mango pests.

Number of fruited shoots per 100 panicles was also maximum (88.56) in monocrotophos followed by quinalphos (80.75) and less numbers, 26.75and 21.75 in cartap hydrochloride and diesel+surf and one or less than one in NSKE, Nimbicidine, *B. bassiana* and control were recorded (Table 2). No of fruits harvested were also maximum (96.25) in monocrotophos followed by qunalphos (84), whereas only 22-28 fruits per 100 panicles were recorded in diesel+surf and cartap hydrochloride and 1 or <1fruit per 100 panicles in NSKE, nimbicidine, *B. bassiana* and control. Similar result in case of fruit weight was observed as maximum fruit weight per 100 panicles (19.32 kg) was recorded in monocrotophos followed by 17.20 kg in quinolphos. In nimbicidine, NSKE, B. bssiana and control <1 kg fruit weight per 100 panicles was recorded.

Gupta and Joshi (2) also reported that nymphs were effectively controlled with monocrotophos at 15-20 days interval starting in late august. Singh (11) observed similar results that quinalphos was equally effective as monocrotophos.

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