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ECOLOGY OF MANGO NUT WEEVIL *STERNOCHAETUS MANGIFERAE* (F.) AND EFFICACY OF INSECTICIDES

D Srinivasa Reddy

Horticulture Research Station, Dr Y S R Horticultural University,
Ananthrajupeta 516105, Andhra Pradesh, India
Email: dsr2020@gmail.com (corresponding author)

ABSTRACT

An experiment was conducted for six years at the Horticulture Research Station, Anantharajupet to study the behavior and management of mango nut weevil *Sternochaetus mangiferae* (F.). Maximum number of adults (99.50%) emerged from middle portion of the fruit, while only negligible numbers (0.50%) emerged from sinus (lower) portion (3rd year), in 4th to 6th years it was 98.50, 98.00 and 98.50%, respectively. Most of these emerged adults hide in bark, cracks and crevices in the trunk followed by collected nuts, fallen leaves and debris as the offseason shelter. The evaluation of efficacy of insecticides carried out for three years revealed the least damage of (8.66%) with spinosad treated mango trees followed by profenophos (11.33%), emamectin benzoate (15.33%), indoxacarb (16.33%), thiodicarb (19.33%), triazophos (23.33%), while in control it was 32.00%.

Key words: *Sternochaetus mangiferae*, mango, behaviour, fruit parts, emergence, oviposition, off season shelter, spinosad, profenophos, emamectin benzoate, indoxacarb, thiodicarb

Mango is an important fruit crop and it is attacked by about 492 species of insects, 17 species of mites and 26 species of nematodes of which 188 species are from India (Tandon and Verghese, 1985; Srivastava, 1998). The mango nut weevil *Sternochetus mangiferae* is a specific pest on mango and it is known from all principal mango growing areas (Dey and Pande 1987), and mainly from south India including Andhra Pradesh (Ramakrishna Ayyar 1940). The grubs and adults feed on the endocarp of the fruit and hasten its maturity resulting in early fruit drop (Subramanyam, 1925; Peter Follett, 2002). It causes losses up to 90% of marketable fruits in the export market (Bagle and Prasad, 1985; Verghese, 2000). The weevil also reduces seeds germination and seed as a source of rootstocks is a concern. The import of Indian mangoes into USA has been withheld for the reason that it might be introduced there (Sundarababu, 1966). The quarantine restrictions prevent the export of fresh mangoes into uninfected areas (Hansen, 1983). Prevention of nut weevil incidence is essential to get better price for produce. Considering the economic importance of the pest, experiments on the behavior and management of *S. mangiferae* were carried out under field conditions in the present study.

MATERIALS AND METHODS

Six-year studies were carried out at the Horticultural Research Station Farm, Ananthrajupeta (13.9976°N, 79.3304°E). The data was collected for off season shelter by examining the adult weevils/ 100 trees, number of eggs in 200 fruits for the preferential sites of oviposition within the fruit of mango, and for adult emerging sites 100 fruits were inspected and expressed as %. For management aspect, experiment was conducted for three years period at the HRS Farm, on Neelum cultivar with seven treatments viz., spinosad 45SC @0.3ml/ l, triazophos 40EC @1ml/ l, profenophos 50EC @2ml/ l, thiodicarb 70WP@1g/ l, indoxacarb 14.5SC @1ml/ l, and emamectin benzoate 5SG @0.75g/ l with three replications and in randomized block design (RBD). The spraying of insecticides was carried at marble stage of the fruit and for data recording on nut weevil damage, fruits were collected at the time of harvest and destructive sampling followed. The sample size was 50 fruits/ replication and expressed as % damage. The data was subjected to statistical analysis using ANOVA.

RESULTS AND DISCUSSION

The results on the preferred sites for oviposition of *S. mangiferae* revealed that in the first year of observation, female *S. mangiferae* prefer to lay eggs in sinus (lower) portion of the fruit (18 eggs) followed by middle (7) and pedicel portion (4); while the third year data s showed a different trend- maximum number of eggs were laid in middle portion of fruit (25 eggs) followed by sinus (9 eggs) and pedicel (upper) with 7 eggs; and same trend was noticed later (IV, V and VI years) indicating that the *S. mangiferae* female prefers the fruit middle portion for oviposition (Table 1). In contrast, females were observed to oviposit on infested fruit (Hansen et al., 1989), and lay eggs mostly on the sinus of the fruit or sometimes on the stems (Shukla et al., 1985). The observations with regard to emerging sites of *S. mangiferae* indicated that maximum weevils emerged from middle portion of the fruit and negligible (0.50%) emerged from sinus (lower) portion (III year data); similarly in fourth, fifth and sixth years, 98.50, 98.00 and 98.50% emerging from middle portion, respectively; the mean data over a four-years period revealed 98.62% emergence was from middle portion followed by 1.37% from sinus and negligible of 0.25% from pedicel part. Maximum number of *S.* weevils prefer to hide in trunk bark, cracks and crevices (11.67) followed by leftover and collected nuts (3.83) and fallen leaves and debris (2.17). Pinese and Holmes (2005) indicated that adult weevils can live for two years, so even with a crop failure in one season some weevils can survive into the following year through hide in trunk bark. Robert et al. (2006) noted that weevils overwinter under loose bark around the base of mango trees or in the forks of branches.

Table 1. Behavioural biology of *S. mangiferae*

Portion of fruit part	I year	II year	III year	IV year	V year	VI year	Mean
Oviposition sites							
Pedicel (Upper)	4*	8	7	9	9	9	7.67
Middle	7	21	25	25	25	23	21.00
Sinus (lower)	18	5	9	12	12	12	11.33
Emergence of adults (%)							
Pedicel (Upper)	0.00	0.00	1.00	0.00	0.25	0.00	0.00
Middle	99.50	98.50	98.00	98.50	98.62	99.50	98.50
Sinus (lower)	0.50	1.50	2.00	1.50	1.37	0.50	1.50
Off season shelters							
Trunk bark, crack and crevices	12#	8	13	14	12	11	11.67
Fallen leaves and debris	2	2	2	2	2	3	2.17
Leftover and collected nuts	3	3	4	4	5	4	3.83

*Number of eggs/200 fruits; #Number of weevils/ 100 trees

Table 2. Efficacy of insecticides against *S. mangiferae*

Treatments	damage (%)			
	I year	II year	III year	Pooled Mean
Spinosad 45SC @0.3 ml/ l	8.00 (16.42)	10.00 (18.43)	8.00 (16.42)	8.66 (17.11)
Triazophos 40EC @1 ml/ l	24.00 (29.32)	25.00 (29.99)	21.00 (27.26)	23.33 (28.87)
Profenophos 50EC@2 ml/ l	10.00 (18.43)	13.00 (21.13)	11.00 (19.36)	11.33 (19.66)
Thiodicarb 70WP@1g/ l	17.00 (24.34)	20.00 (26.55)	21.00 (27.26)	19.33 (26.07)
Indoxacarb14.5SC@1 ml/ l	15.00 (22.78)	16.00 (23.57)	18.00 (25.09)	16.33 (23.83)
Emamectin benzoate 5SG @0.75g/l	14.00 (21.96)	15.00 (22.78)	17.00 (24.34)	15.33 (23.04)
Control	30.00 (33.20)	32.00 (34.44)	34.00 (35.65)	32.00 (34.44)
CD (p=0.05)	4.04	3.83	3.77	2.92
SEM	1.85	1.24	1.22	0.94

Figures in parentheses arc sign √ % transformed values

The efficacy of insecticides evaluated for three years revealed mean infestation levels between 8.66 to 23.33% in treated plots and 32.00% in untreated control. The pooled data showed that spinosad was the best treatment (8.66% damage) and the next best was profenophos (11.33%). These observations corroborate those of Karuppaiah (2015) on spinosad 2.5SC, and indoxacarb 14.5EC also found to be superior in ber). Muriuki et al. (2011) noted that chlorpyriphos band applied once per month + sanitation reduced the infestation. Ramakrishna Rao (2015) observed that carbaryl was effective followed by endosulfan and malathion. Emamectin benzoate (15.33%), indoxacarb (16.33%), thiodicarb (19.330%), triazophos (23.33%) reduced the damage (Table 2). Verghese et al. (2004) in their studies observed infestation levels between 3.3 and 14.8% from plots treated with synthetic insecticides against a mean of 33.0% in the untreated control plot.

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