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EVALUATION OF DIFFERENT INSECTICIDES AGAINST ARECANUT NUT BORER, *Tirathaba* sp.*nr.rufivena* (Walker) (LEPIDOPTERA: PYRALIDAE)

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Abstract: *Arecanut nut borer, Tirathaba sp.nr.rufivena (Walker) (Lepidoptera: Pyralidae) is an important pest in young arecanut palms during nut formation stage in Malnad tracts of Karnataka, as a new record on areca palm during nut formation stage. Lack of awareness against the pest to the farmers and without recommended chemicals on this pest in appropriate time for its management resulted in loss to the arecanut growers. In order to circumvent the problem, conventional insecticides, new molecules and botanicals were assessed against the pest. Hence, a multilocation trail was conducted in farmers field for two consecutive years (2008- 09 to 2009-10). One spray was given on arecanut bunches in infested palm with gutter spray. Five days after treatment, thiodicarb 75 WP (2 g/lit) recorded significantly lower number of 1.24,1.33,1.34 and 1.54 damaged nuts/rachis/palm in Attigunda, Bhadravati, Malali and Navile plots, respectively. The next best treatment was indoxacarb 14.5 SC (0.5 ml/lit) which recorded 1.04, 1.23, 1.80 and 1.84 damaged nuts/rachis /palm in same plots, respectively. The new molecules thiodicarb and indoxacarb were highly effective when compared with conventional insecticides viz., malathion, carbaryl, endosulfan and plant based azadirachtin.*

Key words: *Arecanut nut borer, thiodicarb and indoxacarb.*

Introduction

The arecanut palm is the source of common masticatory nut, popularly known as arecanut, betelnut or supari. It is largely cultivated in the plains and foot hills of Western Ghats and of north eastern regions of India. Since from time memorial it is being used in chewing, religious and social ceremony. In India, It is grown in an area of 3.87 lakh hectares with a production of 4.81 lakh tones with a productivity of 1243 kg per ha and accounts for about 67 per cent of the world production (5.93 lakh tones), of which Karnataka occupies 1.85 lakh hectares with a production of 2.22 lakh tones with a productivity of 1214 kg per ha. The area and production in different states indicate that, Karnataka, Kerala and Assam accounts over 90 per cent. About 102 insect and non insect of pests infest in one or other stage of the arecanut palm. They infest all the parts of the palm such as roots, stem, leaves, inflorescence and nuts. Among the insect pests which cause major economic loss to the crop are root grub, *Leucopholis lepidophora* Blanch (Puttarudriah and Channabasavanna, 1956), Spindle bug, *Carvalhoia arecae* Miller and China (Annon, 1967). The non insect pests that cause major damage are three species of foliage mites *viz., Oligonychus indicus* Hirst, *O. biharensis* Hirst, and *Raoiella indica* Hirst (Puttarudriah and Channabasavanna, 1957). On inflorescence of areca, mealy bugs (Puttarudriah and Channabasavanna, 1957), perianth mite (Sadanandhan and Anthony, 1973) and scale insects (Nair and Menon, 1963, and Nair, 1975) are reported to cause minor damage leading to nut fall, nut shrivel and pre mature button and flower shedding. Before opening of spike, the inflorescence caterpillar, *Batrachedra arenocella* (Walker) is a known pest on coconut. Nair and Menon (1963) reported *Batrachedra* sp on areca causing damage on floral parts. Further, Gowda *et al.* (1999) reported *B. arenocella* damage on areca inflorescence to the tune of 53.60 to 82.00 per cent and yield loss up to 40.00 to 80.00 per cent leading to significant economic loss to the farmers in Bhadra command area of Davanagere district. In the later stages, after formation of nuts, tender nuts are severely bored by *Tirathaba* sp.*nr.rufivena* was record in Malnad belt.

The female moth deposits its eggs on the tender green nuts. The caterpillars on emergence

bore into the nuts and feed on the developing kernels resulting in ribbon like frass on nuts. The affected nuts dries before maturity and remains in the bunches till harvest. This pest attaining major status in areca gardens of malnad belt and causing severe economic loss to the farmers. Keeping this point in view, the present investigation was carried out to know the efficacy of different insecticides for the management of arecanut nut borer, *Tirathaba* sp.*nr.rufivena* under field conditions.

Materials and Methods

Efficacy of insecticides against arecanut nut borer was assessed in multilocation trails in farmers field for two consecutive seasons. Arecanut nut borer infested plants of about to 12 years old were selected and marked with yellow paint for identification. Eight treatments were imposed and replicated thrice in RCBD design. Ten plants were selected in each treatment. A day before spray, pre treatment count (PTC) was observed for damaged nuts in three rachis of one infested bunch. Five days after treatment observations for damaged nuts were recorded on the same bunch of the selected palm. The eight treatments replicated are Carbaryl 50 WP 4g/l, Malathion 50 EC 2ml/l, Endosulfan 35 EC 2ml/l, Azadaractin 0.03% 4 ml/l, Chlorpyriphos 20 EC 2ml/l, Thiodicarb 75 WP 2g/l, Indoxacarb 14.5 SC 0.5ml/l and Control. The efficacy was computed as number of damaged nuts. The data thus collected were subjected to arc sin transformation and the RCBD analysis was adopted.

Results and discussion

The results with respect to nut borer damage was significant in all the treatments (Table 1) indicating differential efficacy. Pooled data of the two years in all the locations showed significantly less number of damaged nuts/three rachis/palm. Least number of (1.04 and 1.24 damaged nuts/three rachis/palm were recorded in indoxacarb and thiodicarb, respectively at Attigunda as against maximum of 12.10 and 11.90 damaged nuts/three rachis/palm was observed in control. The next best chemical was carbaryl and was on par with endosulfan. However, the plant based azadiractin recorded comparatively higher number of 4.87, 5.24, 5.37 and 5.54 damaged nuts/three rachis/palm at Bhadravati, Malali, Navile and Attigunda, respectively. This might be due to that the larva was less vulnerable to the chemical. Less number of damaged nuts in indoxacarb, thiodicarb and endosulfan were due to the efficacy of the chemical which was target oriented. Endosulfan, chlorpyriphos and malathion were the next best chemicals which recorded 1.77, 3.83 and 4.54 damaged nuts per three rachis per palm at Attigunda. The literature cited on this pest against insecticides is meager. In 1959, Appanna mentioned a Lepidopteran pest on areca palm which bores in to tender nuts but not mentioned control borers. The affected nuts exhibitted webbed brownish excreta and smaller circular holes. However, reports on the efficacy of malathion (Anonymous,1971) on *Tirathaba mundella* and endosulfan and chorpyriphos (Gowda *et al.,* 1999) on *Batrachedra arenosella* which infest in early stage of inflorescence are in conformation with our findings on arecanut nut borer.

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Table 1: Evaluation of different insecticides against arecanut nut borer, *Tirathaba* sp.*nr.rufivena* (Lepidaptera: Pyralidae)

Sl. No	Treatments	Number of damaged nuts/3rachis/plant											
		Navile						Malali					
		PTC			5DAT			PTC			5DAT		
		2008-09	2009-10	Pooled	2008-09	2009-10	Pooled	2008-09	2009-10	Pooled	2008-09	2009-10	Pooled
1	Carbaryl 50 WP 4g/l	7.07 (2.75)*	6.00 (2.54)	6.54 (2.65)	2.33 (1.66)	1.87 (1.53)	2.10 (1.60)	7.07 (2.74)	4.87 (2.32)	5.97 (2.53)	2.20 (1.61)	0.87 (1.17)	1.54 (1.39)
2	Malathion 50 EC 2ml/l	10.93 (3.38)	6.47 (2.64)	8.70 (3.41)	4.07 (2.13)	4.40 (2.21)	4.24 (2.17)	10.13 (3.24)	5.87 (2.52)	8.00 (2.88)	4.27 (2.14)	2.20 (1.61)	3.24 (1.88)
3	Endosulfan 35 EC 2ml/l	6.13 (2.58)	5.87 (2.52)	6.00 (2.55)	2.13 (1.62)	1.47 (1.40)	1.80 (1.51)	5.20 (2.37)	7.47 (2.82)	6.34 (2.60)	1.27 (1.31)	1.07 (1.25)	1.17 (1.28)
4	Azadaractin 0.03% 4 ml/l	8.20 (2.94)	7.93 (2.90)	8.07 (2.92)	4.67 (2.26)	6.07 (2.56)	5.37 (2.41)	9.07 (3.08)	9.73 (3.20)	9.40 (3.14)	5.20 (2.38)	5.27 (2.40)	5.24 (2.39)
5	Chlorpyriphos 20 EC 2ml/l	4.93 (2.32)	6.27 (2.59)	5.60 (2.46)	2.07 (1.59)	3.40 (1.97)	2.74 (1.78)	8.33 (2.96)	9.60 (3.17)	8.97 (3.07)	3.40 (1.96)	3.47 (1.99)	3.44 (1.98)
6	Thiodicarb 75 WP 2g/l	5.60 (2.47)	6.67 (2.68)	6.14 (2.58)	1.87 (1.52)	1.20 (1.29)	1.54 (1.41)	9.93 (3.22)	9.47 (3.15)	9.70 (3.19)	1.60 (1.44)	1.07 (1.25)	1.34 (1.35)
7	Indoxacarb 14.5 SC 0.5ml/l	7.07 (2.75)	6.60 (2.66)	6.84 (2.71)	2.47 (1.72)	1.20 (1.30)	1.84 (1.51)	10.73 (3.35)	5.80 (2.37)	8.27 (2.86)	1.53 (1.42)	2.07 (1.60)	1.80 (1.51)
8	Control	9.40 (3.14)	9.67 (3.19)	9.54 (3.17)	9.93 (3.22)	11.33 (3.44)	10.63 (3.33)	10.53 (3.32)	9.33 (3.14)	9.93 (3.23)	10.53 (3.31)	11.33 (3.44)	10.93 (3.38)
	CV (%)	**0.28**	**4.78**	**6.84**	**0.41**	**6.66**	**8.79**	**0.62**	**13.59**	**10.16**	**0.59**	**9.90**	**8.47**
	CD@ 5%	**5.78**	**0.11**	**0.11**	**11.78**	**0.11**	**0.10**	**11.76**	**0.33**	**0.17**	**17.42**	**0.15**	**0.05**

PTC= pretreatment count, DAT= days after treatment * figures in the parentheses are √x+0.5 transformed values.

Table 2: Evaluation of different insecticides against arecanut nut borer, *Tirathaba* sp.*nr.rufivena* (Lepidaptera: Pyralidae)

Sl. No	Treatments	Number of damaged nuts/3rachis/plant											
		Bhadravathi						Attigunda					
		PTC			5DAT			PTC			5DAT		
		2008-09	2009-10	Pooled	2008-09	2009-10	Pooled	2008-09	2009-10	Pooled	2008-09	2009-10	Pooled
1	Carbaryl 50 WP (4 grams/lit)	8.40 (2.97)	10.40 (3.30)	9.14 (3.40)	1.87 (1.53)	2.80 (1.82)	2.34 (1.90)	11.80 (3.51)	9.27 (3.12)	10.54 (3.32)	2.40 (1.70)	1.33 (1.35)	1.87 (1.53)
2	Malathion 50 EC (2ml/lit)	10.27 (3.27)	9.40 (3.14)	9.84 (3.21)	4.87 (2.30)	3.87 (2.08)	4.37 (2.92)	11.87 (3.51)	10.20 (3.27)	11.04 (3.39)	3.87 (2.09)	5.20 (2.39)	4.54 (2.24)
3	Endosulfan 35 EC (2ml/lit)	8.40 (2.98)	9.93 (3.23)	9.17 (3.11)	2.07 (1.59)	2.00 (1.57)	2.04 (1.73)	9.13 (3.10)	10.93 (3.38)	10.03 (3.24)	2.40 (1.70)	1.13 (1.27)	1.77 (1.49)
4	Azadaractin 0.03% (4 ml/lit)	7.80 (2.88)	8.87 (3.06)	8.34 (2.97)	4.27 (2.17)	5.47 (2.43)	4.87 (3.16)	10.47 (3.31)	11.87 (3.52)	11.17 (3.42)	4.40 (2.19)	6.67 (2.68)	5.54 (2.44)
5	Chlorpyriphos 20 EC (2ml/lit)	10.40 (3.30)	11.73 (3.50)	11.07 (3.4)	3.00 (1.85)	3.93 (2.10)	3.47 (2.47)	9.20 (3.11)	8.87 (3.06)	9.04 (3.09)	3.13 (1.90)	4.53 (2.24)	3.83 (2.07)
6	Thiodicarb 75 WP (2 grams/lit)	10.33 (3.29)	8.00 (2.91)	9.17 (3.10)	1.53 (1.41)	1.13 (1.27)	1.33 (1.34)	11.87 (3.51)	9.73 (3.20)	10.80 (3.36)	1.47 (1.40)	1.00 (1.22)	1.24 (1.31)
7	Indoxacarb 14.5 SC (0.5ml/lit)	8.80 (3.04)	9.13 (3.10)	8.97 (3.07)	1.73 (1.47)	0.73 (1.11)	1.23 (1.27)	10.40 (3.29)	9.07 (3.09)	9.74 (3.19)	1.47 (1.40)	0.60 (1.05)	1.04 (1.23)
8	Control	12.00 (3.53)	8.73 (3.04)	10.37 (3.28)	13.80 (3.77)	10.40 (3.30)	12.10 (6.38)	11.13 (3.41)	9.60 (3.18)	10.37 (3.30)	12.53 (3.61)	11.27 (3.43)	11.90 (3.52)
	CV (%)	**0.41**	**3.42**	**4.81**	**0.55**	**7.82**	**6.2**	**0.36**	**3.44**	**3.71**	**0.35**	**5.54**	**9.19**
	CD@ 5%	**7.46**	**0.09**	**0.07**	**15.66**	**0.13**	**0.10**	**6.21**	**0.09**	**0.10**	**9.90**	**0.09**	**0.08**

PTC= pretreatment count, DAT= days after treatment * figures in the parentheses are √x+0.5 transformed values.