

FIELD STUDIES ON RHINOLURE TRAP IN THE CONTROL OF RHINOCEROS BEETLE (*ORYCTES RHINOCEROS*) IN COCONUT

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ABSTRACT

The adult rhinoceros beetle damages the coconut palm by boring into tender and soft tissue of bud region i.e., unopened leaves and spathes resulting in the reduction of yield up to 10 per cent. Sometimes, it acts as a carrier for bud rot disease and also pre disposes the palm to the attack of red palm weevil. Although chemical control remains the most effective control measure to date, current emphasis is mainly on the use of eco friendly measures like bio control agents, plant origin pesticides, pheromones etc., with an aim of reducing the use of chemicals for control. The major effect of Integrated Pest Management has been to reduce pesticide use to very low level. Studies with *O. rhinoceros* have helped to identify an active compound i.e., aggregation male pheromone (ethyl 4 - methyl - octanoate) and opens up new prospects for controlling the pest effectively. Hence, present studies were carried out to test the efficacy of the pheromone in reducing the beetle damage, as this has direct impact on the pest build up in the field.

INTRODUCTION

The adult rhinoceros beetle damages the coconut palm by boring into tender and soft tissue of bud region i.e., unopened leaves and spathes resulting in the reduction of yield up to 10 per cent. Sometimes it acts as a carrier for bud rot disease and also pre disposes the palm to the attack of red palm weevil. Although chemical control remains the most effective control measure to date, current emphasis is mainly on the use of eco friendly measures like bio control agents, plant origin pesticides, pheromones etc., with an aim of reducing the use of chemicals for control. The major effect of Integrated Pest Management has been to reduce pesticide use to very low level. Studies with *Oryctes rhinoceros* have helped to identify an active compound i.e., aggregation male pheromone (ethyl 4 – methyl – octanoate) and opens up new prospects for controlling the pest effectively. Hence, present studies were carried out to test the efficacy of the pheromone in reducing the beetle damage, as this has direct impact on the pest build up in the field.

MATERIALS AND METHODS

The studies were conducted in two sets, each in three different gardens during the years 2000 and 2002. In the year 2000, the trial was carried out in three distinct pest infested gardens in Ambajipeta village whereas in the year 2002 it was conducted in pest infested gardens of three separate villages viz., Ambajipeta, Gangalakurru,

and Munganda. An experimental area of 20 acres in each location which is heavily infested with rhinoceros beetle was selected. Pheromone traps having a male aggregation pheromone of *Oryctes rhinoceros* (Ethyl 4 – methyl octanoate) i.e., "Rhinolure"; supplied by Chemm Exports Pvt.Ltd., Trichur, Kerala was arranged in a bucket and vane, and installed in three selected gardens @ one/experimental garden at 8 mt height on a bamboo stand to coincide with the crown height. The traps were inspected on alternate days for counting trapped beetles. Data on pest incidence i.e., total no.of leaves, no.of leaves damaged and spindle damage was recorded prior to treatment and further at monthly intervals till the pheromone exhausted and also after exhaustion of pheromone i.e., up to 3 months, thereby per cent reduction in leaf and spindle damage was assessed.

RESULTS AND DISCUSSION

Careful observation of traps on alternate days revealed that, the catches of rhinoceros adult beetles dwindled after 60 days indicating the effect of lure up to 60 days only. Number of beetles trapped per trap varied from 4 to 19 numbers (Table-I & Fig.1). From the data of weekly counts, it was found that the trap worked for 10 weeks with maximum catches in 2nd and 4th weeks (Table-II and Fig.2). Continuous trap establishment i.e., throughout the year in three locations resulted in a total catch of 105 beetles with female catches dominating male catches (76...@ and 29...B). Peak

Field studies on Rhinolure trap in coconut

catches were obtained during March, April, May and June months (18 beetles/month). Single trap caught 3.3 beetles/month on an average in the entire year (Table-III & Fig.3).

Rhinolure trap studies during the year 2000 revealed that trapping and destruction of rhinoceros beetles resulted in the decrease of leaf damage from 28.27 to 26.54, 28.03 to 27.10, and 30.0 to 25.17 i.e., 6.1, 3.3, and 16.7 per cent decrease when compared to prior infestation level in three different gardens of Ambajipeta, respectively. From the studies, it is also evident that the spindle damage had also decreased considerably i.e., from 36.66 to 3.33, 43.33 to 16.66 and 41.0 to 20.00 i.e., 91.0, 61.6, 51.2 per cent decrease when compared to prior infestation level in the three gardens, respectively during the year 2000. But a gradual increase was recorded both in leaf and spindle damage in control plot i.e., 17.09 and 16.33 per cent, respectively (Table-IV).

The above studies were conducted in three separate villages again in the year 2002 too. The gradual increase in the decrease of leaf and spindle damage was also recorded from one month to 3 months after the trap establishment in all the villages. The leaf damage decreased from 38.61 to 35.62 per cent, 9.41 per cent to 8.23 per cent, and 31.24 to 29.76 per cent in Ambajipeta, Gangalakurru and Munganda, respectively after the placement of rhinolure traps. Similarly, spindle damage had also decreased from 39.0 per cent to 15.6 per cent, 45.0 per cent to 12.0 per cent, 57.0 per cent to 8.0 per cent in Ambajipeta, Gangalakurru and Munganda, respectively. Where as the leaf and spindle damage had increased from 56.05 per cent to 63.09 per cent, 77.77 per cent to 84.38 per cent respectively in control plots i.e., 12.57 and 8.51 per cent increase respectively (Table-5).

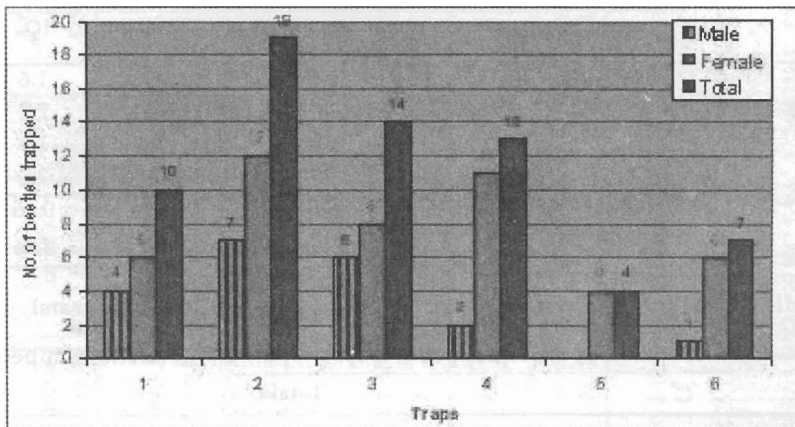


Fig.1: Studies on number of beetles trapped/trap and the exposure period

Table 1: Studies on number of beetles trapped/trap and the exposure period

Trap No.	Period	No. of beetles trapped		
		Male	Female	Total
1	60 days (13.5.2000 to 12.7.2000)	4	6	10
2	59 days (13.5.2000 to 10.7.2000)	7	12	19
3	60 days (21.10.2000 to 19.10.2000)	6	8	14
4	60 days (14.1.2002 to 16.3.2002)	2	11	13
5	60 days (14.1.2002 to 16.3.2002)	—	4	4
6	60 days (14.1.2002 to 16.3.2002)	1	6	7

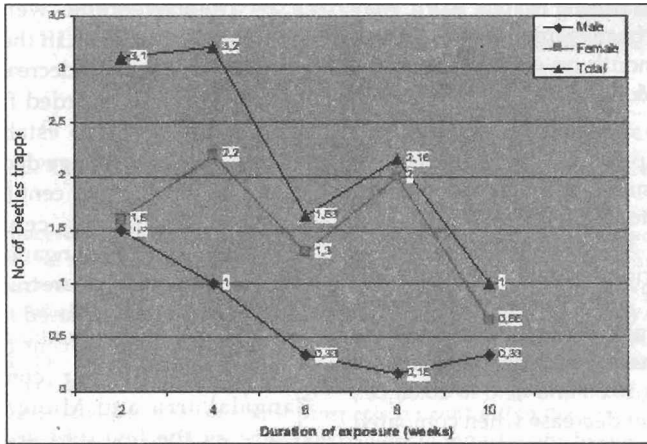


Fig.2: Studies on number of beetles trapped at weekly intervals

Table 2: Studies on number of beetles trapped at weekly intervals

Duration of exposure (weeks)	No. of beetles trapped (6 trap)			No. of beetles trapped/ trap		
	♂	♀	Total	♂	♀	Total
2	9	10	19	1.5	1.6	3.1
4	6	13	19	1.0	2.2	3.2
6	2	8	10	0.33	1.3	1.63
8	1	12	13	0.16	2.0	2.16
10	2	4	6	0.33	0.66	1.0
			Total	3.32	7.76	11.09

Table 3 : Studies on rhinolure trap catches at monthly intervals (2000 ... 2002 years)

Month	No. of beetles trapped (3 traps)			Beetles trapped/trap
	♂	♀	Total	
January	-	6	6	2.0
February	2	6	8	2.6
March	2	10	12	4.0
April	5	22	27	9.0
May	6	9	15	5.0
June	6	12	18	6.0
July	1	3	4	1.3
August	2	2	4	1.3
September	1	2	3	1.0
October	1	1	2	0.6
November	3	2	5	1.6
December	0	1	1	0.3
Total	29	76	105	

Table 4 : Effect of rhinulure trap catches on the leaf and spindle damage during the year 2000

Place	Period	Damage %									
		Leaf					Spindle				
		Pre treatment	After one month	After two months	After three months	Average	Pre treatment	After one month	After two months	After three months	Average
		12.5.00	13.6.00	13.7.00	13.8.00		12.5.00	13.6.00	13.7.00	13.8.00	
Ambajipeta											
Garden 1	60 days	28.27	26.52(6.2%)	26.54(6.1%)	26.57(6.0%)	26.54(6.1%)	36.66	3.23(91.0%)	3.23(91.0%)	3.23(91.0%)	3.23(91%)
Garden 2	59 days	28.03	27.02(3.6%)	27.10(3.3%)	27.19(3.0%)	27.10(3.3%)	43.33	16.66(61.6%)	16.38(62.2%)	16.90(61.0%)	16.64(61.6%)
Garden 3	60 days	30.00	25.17(16.1%)	24.30(19.0%)	25.50(15.0%)	25.17(16.7%)	41.00	20.00(51.2%)	19.93(51.4%)	20.90(51.0)	20.00(51.2%)
Garden 4	Control	38.88	* 42.00(7.69%)	*45.00(15.38%)*	50.00(28.20%)	*45.66(17.09%)	51.00	* 58.00(13.72%)	* 59.00(15.68%)*	61.00(19.60%)	* 59.33(16.33%)

(Figures in parentheses are per cent decrease)

* Per cent increase

Table 5 : Effect of rhinulure trap catches on the leaf and spindle damage during the year 2002

Place	Period	Damage %									
		Leaf					Spindle				
		Pre treatment	After one month	After two months	After three months	Average	Pre treatment	After one month	After two months	After three months	Average
		14.1.02	15.2.02	15.3.02	15.4.02		14.1.02	15.2.02	15.3.02	15.4.02	
1 Ambaji-Peta	60 days	38.61	35.53(2.81%)	36.36(0.68%)	34.98(4.45%)	35.62(2.65%)	39.00	25.00(35.90%)	19.00(51.29%)	3.00(92.30%)	15.60(59.83%)
2 Ganga-lakurru	60 days	9.41	8.34(11.37%)	8.26(11.37%)	8.10(13.92%)	8.23(12.22%)	45.00	24.00(46.67%)	9.00(80.0%)	3.00(93.3%)	12.00(73.33%)
3 Munganda	60 days	31.24	30.40(2.69%)	29.88(3.14%)	29.00(7.17%)	29.76(4.33%)	57.00	18.00(68.42%)	3.00(94.74%)	3.00(94.74%)	8.00(85.97%)
4 Amala-Puram	Control	56.05	59.90*(6.87%)	63.19*(12.74%)	66.19*(18.09%)	63.09*(12.57%)	77.77	81.62*(4.95%)	84.02*(8.03%)	87.52*(12.54%)	84.38*(8.51%)

(Figures in parentheses are per cent decrease)

* Per cent increase

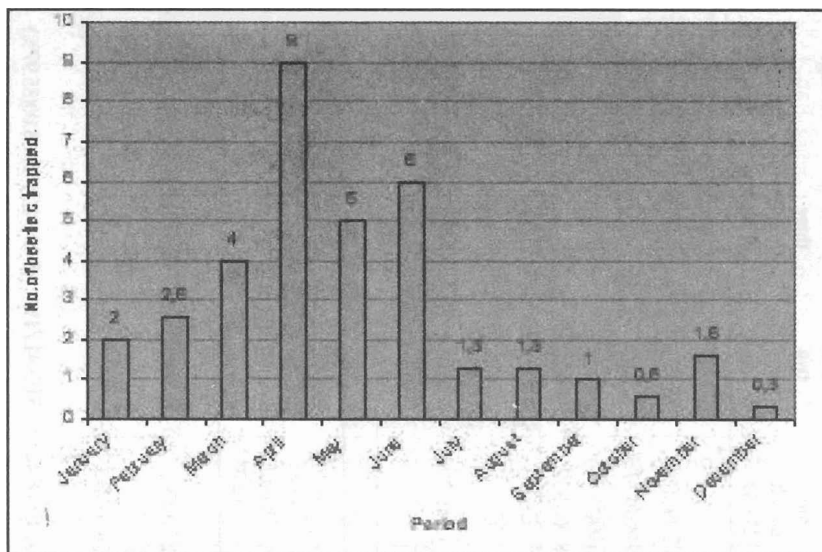


Fig. 3 : Studies of rhinolure trap catches at monthly intervals (2000 & 2002 years)

Similar studies on the effectiveness of rhinolure traps in reducing the pest population, thereby crop damage was reported by Fee (1997) in Malaysia, Morin *et al.*, (1996) in Indonesia. Hallett *et al.*, (1995) also found that the vane traps were more effective than barrier or pit fall traps in capturing *Oryctes rhinoceros* beetles.

From the above studies on rhinolure trap, it is evident that more number of female beetles were attracted. Hence, through pheromone traps more number of females can be eliminated from the population which ultimately reduces further population build up besides reducing the crop damage. The results indicated that there is a potential for using rhinolure traps in IPM programme of rhinoceros beetle in coconut plantations. But farmers should be cautious in monitoring the trap regularly as there are reports of increased damage in the gardens where traps were used (Fee, 1997). Future thrust may be focused on commercial availability of rhinolure trap on a wider scale and at a lower cost to large number of farmers making the technique more feasible.

REFERENCES

- Fee C.G., 1997. The bioefficacy of the aggregation pheromone in mass trapping of rhinoceros beetles (*Oryctes rhinoceros* L.) in Malaysia. *Planter*. 73 (852) : 119-127
- Hallett, R.H., Perez, A.L., Gries, G., Gries, R., Jr. Pierce, H.D., Yue Jun Ming, Oehlschlager, A.C., Gonzalez, L.M., Borden, J.H. and Yue J.M. 1995. Aggregation pheromone on coconut rhinoceros beetle, *Oryctes rhinoceros* (L.) (Coleoptera: Scarabaeidae). *Journal of Chemical Ecology*. 21 (10) : 1549-1570
- Morin J.P., Rochat, D., Malosse, C., Lettère, M., De.Chenon, R.D., Wibwo, H., Descoins, C. and De.Chenon, R.D., 1996. Ethyl 4-methyloctanoate, major component of *Oryctes rhinoceros* (L.) (Coleoptera, Dynastidae) male pheromone. *Comptes-Rendus-de-l'Academie-des-Sciences.-Serie-III, -Sciences-de-la-Vie*. 319(7) : 595-602.

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