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## SEX RATIO OF PHEROMONE TRAP CAPTURED RED PALM WEEVILS *RHYNCHOPHORUS FERRUGINEUS* OLIV. IN COCONUT GARDENS OF GOA

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### ABSTRACT

Coconut is an important plantation crop of Goa and of late it has been threatened by Red Palm Weevil (RPW) *Rhynchophorus ferrugineus* Oliv, which is the most dreaded pest of young palms. Trapping of adult weevil population with food baited aggregation pheromone (Ferrugineol) traps is becoming an important eco-friendly tactic of the Integrated Pest Management (IPM) programme to tackle RPW infestation in coconut, oil palm and date gardens throughout the world. Since August 1999 a surveillance programme has been implemented to monitor the activity of RPW using pheromone traps. Observations recorded between August, 1999 and July, 2000 on weevil captures from 40 pheromone traps set throughout Goa, showed that trap captures of RPW were female dominated. For every male weevil captured, 1.94 female weevils were trapped during this period, with maximum female activity being observed during April and May, 2000. Although, the natural population of RPW is known to exist in an equal ratio of 1.32 : 1 in favour of males, attraction of more females to pheromone traps, helps not only in monitoring the weevil activity but also to suppress the build up of the pest in the field. Mass trapping of adult weevils in endemic pockets with food baited pheromone traps is therefore, an important component of IPM strategy currently adopted to combat the menace of RPW in coconut.

### INTRODUCTION

Coconut, *Cocos nucifera* L is an important plantation crop of Goa, a coastal state in western India where the crop is cultivated in an area of 24,7000 hectares with an annual production of 119 million nuts (Hore, 1999). However, of late it has been threatened by Red Palm Weevil (RPW) *Rhynchophorus ferrugineus* Oliv, which is a concealed tissue borer and the most dreaded pest of young palms (Anonymous, 1991). Food attractants have been successfully used to trap the floating adult weevil population (Abraham and Kurian, 1975). Since 1991, aggregation pheromones have been identified for several species of palm weevil (Oehlschlager, *et al.*, 1993). However, with the synthesis of the male produced aggregation pheromone "Ferrugineol" (4 - methyl, 5-nonanoi) by Hallett *et al.*, 1993a, and its subsequent availability on a commercial scale, trapping adults of RPW with

food baited pheromone traps has become key tactic in the strategy against the pest (Faleiro *et al.*, 1998). Aggregation pheromones are known to attract both sexes (Hallett *et al.*, 1993a, Oehlschlager *et al.*, 1995). However, from the pest management point of view it is desirable to trap more females as this would check infestation and suppress the population. This study gives an account of the number of male and female RPW adults attracted and trapped in pheromone traps for a period of one year between August, 1999 and July, 2000, in coconut plantations of Goa.

### MATERIAL AND METHODS

In order to monitor the activity of RPW in Goa, an extensive surveillance programme was planned to cover all the talukas (zones) of the state. Food baited pheromone traps (monitors) were set in the field during June and July 1999, wherein one trap monitored weevil activity in

approximately 600 ha. In all 40 pheromone traps were set in the field. Traps were fabricated using a five litre capacity plastic bucket, with four windows (1.5 x 10 cm) cut equidistantly 4 cm below the upper rim of the bucket. Further, to provide better grip to attracted weevil, jute sack was stuck to the outer surface of the trap. Besides the pheromone lure hung on the inner side of the lid with wire, each trap contained 500g of kairomone – releasing coconut petiole (food bait) and one litre water mixed with 10 carbofuran 3G. While the food bait acts synergistically with the pheromone lure and enhances weevil captures by orienting attracted weevil to enter the trap (Nair *et al.*, 2000, Faleiro and Chellappan, 2000), the insecticide kills the trapped weevils (Oehlschlager *et al.*, 1995). All traps were hung

captured weevils lying dead or immobilized. The traps were collected and sexed. Male weevils had a distinct tuft of hair on the dorsal side of the snout, while female weevils had smooth snouts without any hair. Based on the monthly male and female weevil captures in different talukas of Goa, the sex ratio for the month was calculated.

## RESULT AND DISCUSSION

From the Table 1, it is evident that in all the 12 months, between August, 1999 to July, 2000 more number of female weevils were trapped in the pheromone traps. On an average, for one male weevil captured, 1.94 female weevils were trapped. From weevil management point of view, this is a favorable trend, as

**Table 1 Sex ratio of pheromone trap captured red palm weevil (Aug 1999 to July 2000)**

Month	No. of weevils trapped		
	Male	Female	Ratio (male: Female)
August, 99	518	1006	1: 1.94
September, 99	632	1237	1: 1.96
October, 99	784	1603	1: 2.04
November, 99	824	1710	1: 2.08
December, 99	449	887	1: 1.98
January, 2000	501	852	1: 1.70
February, 2000	432	801	1: 1.85
March, 2000	323	695	1: 2.15
April, 2000	328	806	1: 2.45
May, 2000	180	431	1: 2.39
June, 2000	58	120	1: 2.06
July, 2000	320	556	1: 1.73
	5289	10268	1: 1.94

1.5m above ground level either on old palms or other trees viz. mango, jackfruit etc growing within the coconut plantation. Care was taken to hang the traps in shade as recommended by Faleiro *et al.*, 1999, so that uniform and sustained release of the lure could be maintained. Traps thus set in the field were serviced once a fortnight when insecticidal solution and food bait was replaced. Also during servicing of traps, the

weevils lay eggs, which hatch into damaging grubs. Faleiro, 2000 has found through laboratory studies that females of RPW trap in pheromone traps from coconut plantation are mostly young, fertile and gravid. In natural conditions, the female population of RPW has been reported to exist in a ratio of 1.32:1 (Nirula, 1956). The attraction of higher number of females to pheromone traps definitely limits attack and

population builds up of the pest in the field and is in agreement with the hypothesis of Hallett *et al.*, 1993b, who visualised a similar effect when control strategies, such as pheromone trapping which is directed against adult is adopted. Abraham *et al.*, 1999 also obtained female dominant (1:2.70) captures of RPW with ferrugineol based pheromone lures (Ferrolure) in date plantation of Al-Hassa in Saudi Arabia between 1995 and 1997. Thus, the use of food baited pheromone traps which attract more females as compared to males is an important tactic in the integrated pest management strategy currently adopted to combat the menace of RPW in coconut.

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