

# Field Assay of Locally Synthesised Ferrugineol for Trapping *Rhynchophorus ferrugineus*

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## Introduction

*Rhynchophorus ferrugineus* Oliv. (Coleoptera : Curculionidae), commonly known as the red weevil, is a serious pest of coconut and oil palm in many Asian countries including India, where the pest is distributed in all coconut growing states (Nirula, 1956 and Sadakadulla, 1991). Adult weevils are attracted towards wounded palms where they lay eggs and all stages of the life cycle are completed inside the palm. Large number of grubs tunnel into the internal tissues and feed on terminal bud or trunk of the palm, leading directly to death. Feeding damage caused by the grubs is difficult to be detected and often the regenerative apical meristem (bud) of the palm is destroyed. Affected palms are saved only when treated during the early stage of infestation. Elimination of the weevil population helps in a big way reducing the pest incidence.

In the integrated pest management strategy for red weevil, one of the effective components is the trapping of the floating population of the adult weevils by employing pheromone lure traps. Aggregation pheromone is more promising than sex pheromone since both males and females are attracted by this. Aggregation pheromones of many sympatric species of the palm weevils - *Rhynchophorus cruentatus*, *R. palmarum*, *R. phoenicis*, *R. ferrugineus* and *R. vulneratus* - have been identified as secondary methyl branched aliphatic alcohols of carbon lengths ranging from 7 to 9 (Weissling *et al.*, 1994; Rochat *et al.*, 1991; Gries *et al.*, 1993 and Hallet *et al.*, 1993). The male red weevils produce aggregation pheromone that gives signal to the other weevils for orientation to locate the site for feeding and oviposition, and it is a

mixture of two volatiles viz., ferrugineol (4-methyl-5-nonanol) and ferrugineone (4-methyl-5-nonanone). Field experiment with ferrugineol and ferrugineone proved that the ferrugineol is the more attractive component of the natural pheromone of the red weevils and increasing concentration of ferrugineone in the lure reduced the weevil catch (Hallet *et al.*, 1993). This paper reports the result of the field assay for attracting red weevils in coconut garden.

## Materials and Methods

Ferrugineol synthesised as per the procedure standardized at the Coconut Research Institute, Sri Lanka, was used for experimentation.

## Field Assay

**Pheromone Dispenser and Trap :** The pheromone dispensers were glass capillary vials made from Pasteur pipettes, which were about six cm in length with a capillary diameter of 1.5 mm. Chemically synthesized ferrugineol (100 micro litre ie 78.5 mg) was loaded into glass capillary dispensers (Fig. 1). Pheromone release from the dispensers was uniform throughout the experimental period. Plastic buckets - 5 lit, 22 cm diameter and 19 cm height - were used as traps. The lid of the bucket was kept raised 4 cm above the bucket for entry of the weevils (Fig. 2) (Gunawardena and Bandarage, 1995). The bucket was wrapped with jute sack. The traps allowed for the easy entry of weevils

inside but prevented their escape. The trap was filled with one fourth of plantain food bait. The bait consisted of 100-125 g banana (mashed) with 2 g yeast and 2g carbaryl mixture in 1 litre

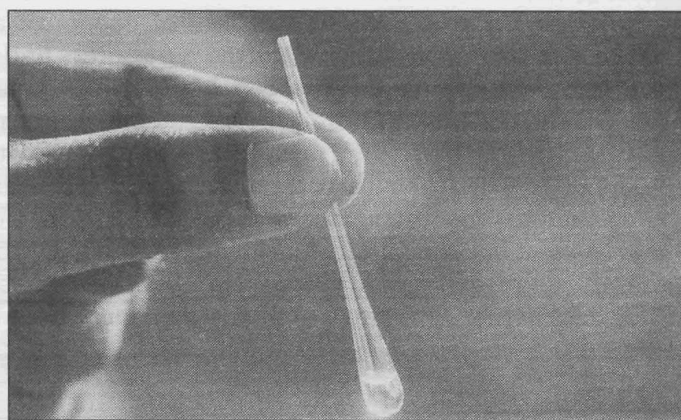


Fig. 1. Glass capillary vial

water. The capillary dispenser was placed inside a plastic sachet and suspended at the centre of the bucket above the food-bait using iron wire from the top.

The field experiment was conducted in 25 ha coconut garden at CPCRI Regional Station, Kayangulam campus from August to October 2001. Nine traps were kept hung at 1.5 m height on coconut palms in a random manner. The servicing and changing of food-bait were carried out at weekly interval. The weevil catch was recorded and the weevils were removed from traps daily and disposed properly.

## Results and Discussion

The yield of ferrugineol by chemical synthesis ranged from 71 to 98 per cent. The final product of chemically synthesized ferrugineol is a slightly viscous neat liquid, colourless in small quantities, assuming a slightly yellow



Fig. 2. Pheromone trap

color in bulk quantity and has a characteristic odour. Density of the ferrugineol was 0.785-0.786 g/cc.

Results of the field assay with chemically synthesized ferrugineol are as follows. The catch of *Rhynchophorus* recorded 20 weevils (6 male and 14 female) in August, 16 weevils (6 males and 10 females) in September and 18 weevils (9 males and 9 females) in October (Table 1). The results showed that the total number of weevils captured during the three months of experiment did not differ considerably. However, the weevil catch during the first month was higher than that of the latter two months. This could be attributed to the low volatility of ferrugineol in latter months due to moisture and air-born dust contaminants gathering in the dispenser. Interestingly, significant differences were found between response patterns of female and male weevils during the month of August,

**Table 1. Catch of red weevils in food-baited traps with chemically synthesized ferrugineol**

Month	Male	Female	Total
August	6	14	20
September	6	10	16
October	9	9	18

September and October, the catch of female weevils being in general higher (14 females and 6 males in August and 10 females and 6 males in September and 9 females and 9 males in October) than male weevils. In studies using this pheromone, significant differences were not found between male and female response to this aggregation pheromone (Hallet *et al.*, 1993; Gunawardena and Bandarage, 1995). Ferrugineol is an aggregation pheromone, which is known to attract both male and female weevils unlike sex pheromone and it is important that in this study, the pheromone attracted more female weevils than male weevils.

From the data, it is clear that a mean catch of two weevils/trap/month was obtained and it is too low and this is attributed to the availability of very low population of weevils in the chosen experimental site. The cost of production for a glass capillary vial dispenser with 100 microlitre of chemically synthesized ferrugineol was worked out to be Rs. 25.

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