

## **Chemical synthesis of ferrugineol and field assay for trapping *Rhynchophorus ferrugineus* Oliv.**

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*Rhynchophorus ferrugineus* Oliv. (Coleoptera: Curculionidae), commonly known as the red weevil, is a serious pest of coconut in many countries including India, where the pest is distributed in all coconut growing states (Nirula, 1956). Due to a large number of grubs (larval stage of the weevils) feeding on the internal tissues, crown or trunk falls, thus killing the palm. Affected palms are saved only if treated early during infestation. In the IPM strategy for red weevil, one of the effective components is the trapping of the floating population of the weevil by employing pheromone based lure traps. Male red weevils are known to emit an aggregation pheromone that gives signal to the other weevils for orientation to locate site of feeding, oviposition, etc. Aggregation pheromone is more promising than sex pheromone because both male and female are attracted to aggregation pheromone. The male produced aggregation pheromone of red weevil is a mixture of ferrugineol (4-methyl-5-nonanol) and ferrugineone (4-methyl-5-nonanone). However, the ferrugineol is more attractive component of natural pheromone of the red palm weevils (Hallet *et al.*, 1993). This paper reports the results of chemical synthesis of ferrugineol and field assay of the activities for attracting red weevils in coconut garden.

The chemicals used for synthesis were procured from chemical manufacturers in India and Aldrich, USA. Ferrugineol was synthesized according to the technology provided by Coconut Research Institute, Sri Lanka. The pheromone was carried out eight times i.e. three times in June and five times in September. The yield was calculated based on the molarity of the last reactant used. The pheromone dispenser was glass capillary vial made from Pasteur pipettes, which is about 6 cm length with capillary diameter of 1.5 mm. Chemically synthesized ferrugineol was loaded into glass capillary dispenser, 78.5 mg (100  $\mu$ l) as neat liquid. Plastic buckets – 5 lit, 22 cm diameter and 19 cm height - were used as trap. The trap was filled with one third of banana food bait. The capillary dispenser was placed inside a plastic sachet and suspended at the center of the bucket above the food-bait. The lid of the bucket was kept raised 4 cm above the bucket for entry of the weevils. Nine traps were set up in 25 ha area in CPCRI Regional Station, Kayangulam campus. The traps were attached at 1.5 m height to coconut palms in random manner. The weevil catch was noted daily in all traps and the experiment was conducted for five months from August to December 2001. The foot bait in each trap was replaced every week.

## *Extended Summaries – NCCAR, 2002*

The yield of ferrugineol was ranged from 71 per cent (20 g) to 98 per cent (27 g). The maximum yield was obtained during dry days in September. The low yield was during heavily raining days in June. The high yield in September could be attributed to low humidity prevailing during those days, because one of the intermediate compounds is very sensitive to moisture, which destroys the compound. The final product of chemically synthesized ferrugineol was a slightly viscous neat liquid, colorless, but it gives slightly yellow in color in bulk quantity. It has a characteristic odour. Density (weight per milliliter) of the ferrugineol was 0.785-0.786 g and boiling range: 53-55 °C.

The results of the field assay with chemically synthesized ferrugineol as follows. The attraction of *Rhynchophorus* to ferrugineol recorded 20 weevils (6 male and 16 female) in August, 16 weevils (6 males and 10 females) in September, 18 weevils (9 males and 9 females) in October, 14 weevils (7 males and 7 females) in November and 12 weevils (6 males and 6 females) in December. The results showed that the weevil catch during the initial period of field assay was higher than that of latter months of Nov. and Dec. This could be attributed to low volatility of ferrugineol due to dust contaminants in the dispenser. Interestingly, the catch female weevil is in general higher than that of male weevils. Because, the ferrugineol is an aggregation pheromone, which is known to attract both male and female weevils unlike sex pheromone. It is important that it traps more female weevils than male weevils. From the data it is clear that a mean catch of two weevils /trap/month was obtained. This level of catch is very low compared to some published work (Gunawardena and Herath, 1995). The major factor that is attributed to this performance of ferrugineol is that, the area wherein the experiment was conducted, trapping of floating population of the weevils over the years was carried out using pheromone lures of Chem Tica, thus the campus has become a low populated area.

## **References**

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