

PHEROMONE BAITED TRAPS : A PROMISING TOOL IN INTEGRATED PEST MANAGEMENT

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Many insects use chemicals called pheromones to communicate with other individuals of the same species. Various kinds of pheromones such as alarm pheromones, trail pheromones, sex pheromones and aggregation pheromones are produced by insects which function differently. Many members of coleoptera the largest insect order into which beetles and weevils belong produce aggregation pheromones.

Aggregation pheromones which are produced by the male insect attract both sexes of that species to help aggregation. In red weevils this pheromone signals the presence of an oviposition site and a food source.

Insects are the dominant group of animals on earth. They have lived on the earth for about 350 million years, compared with less than 2 million years for human. Chemical communication in insects is highly developed. They can perceive and respond to remarkably small quantities of chemicals. Insects generally perceive odours by means of specially adapted sensillae on the antennae. More often, insects use pheromones to communicate with other individuals of the same species. Most pheromones are produced by ectodermal glands secreting to the outside of the body. The members of Coleoptera produce male aggregation pheromones, which the male emits a scent to attract other members of both sexes resulting in forming aggregations.

Scientists have studied the communication systems of insects and discovered the chemical structures of the pheromones. These pheromones could be synthesized in the labo-

ratory and subsequently used in pest control programmes.

It would be good news for coconut growers to be aware that red palm weevil and black beetle which are the most serious pests of coconut could be managed by trapping them using their aggregation pheromones. '4-methyl-5 nonanol' commonly known as 'ferrugineol' is an aggregation pheromone of the red palm weevil which is emitted by the male insect. Laboratory and field tests carried out at the Coconut Research Institute have proved that ferrugineol could be successfully used to trap both males and females of red palm weevil. Red palm weevil populations can be suppressed to a minimum level by installation of plastic bucket traps lured with ferrugineol in coconut plantations.

Essentially, a pheromone trap consists of 4 main components :

1. plastic or a suitable container with a smooth surface.
2. A dispenser to release the pheromone at a constant rate. Pheromone level should be clearly visible through the dispenser so that the growers could replace it when the pheromone is fully used.
3. Mechanism to kill trapped weevils.
4. Food component to simulate the natural sources of attraction such as fermenting sap of coconut palm.

Two types of traps lured with ferrugineol have been tested and found effective for red weevil.

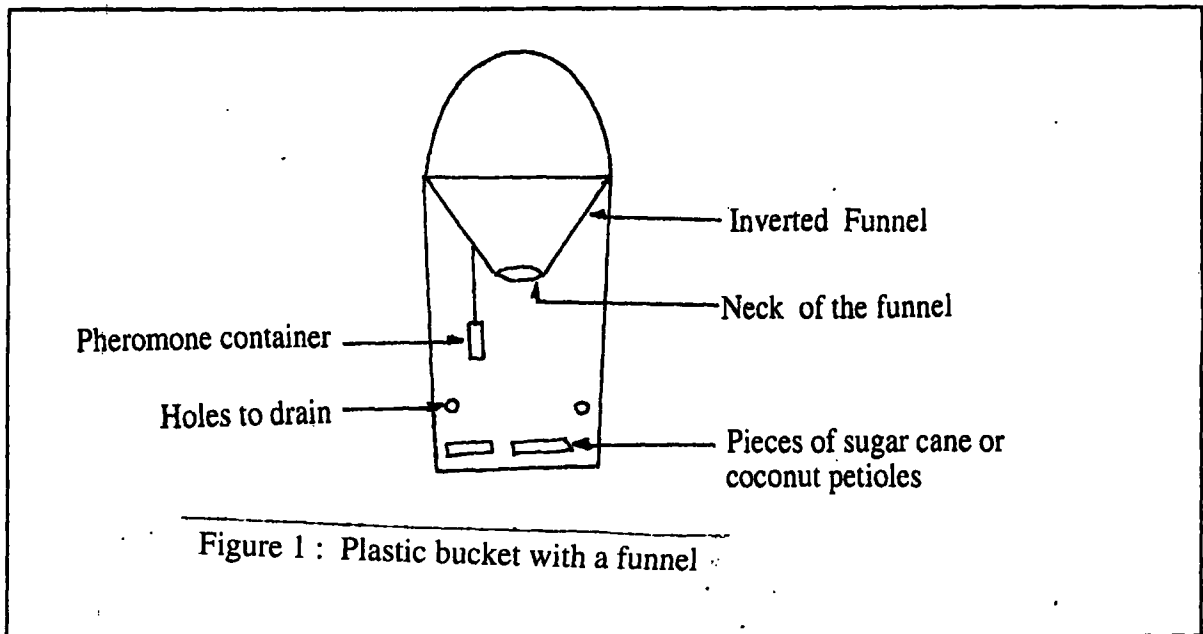
1. Open bucket trap (Fig. 1)

A 5 litre plastic bucket is suitable for this trap. Ferrugineol is in liquid form and is filled in either a sachet (50 x 50 x 0.12 mm) made out of 500 gauge polyethylene layflat tubing or in a Polythene vial (20 x 15 x 2.0 mm). Polythene sachet should be filled up to 2 cm and sealed. These sachets release 0.96 mg of the pheromone per hour under normal atmospheric conditions. The polythene vial

can be fixed to the bucket as in Fig. 1. It has been proven the pheromone-food baited trap is more efficient than the trap baited with pheromone alone. These food material should be replaced at least fortnightly while the pheromone filled dispensers remain intact. The trap should be filled with a soap solution up to a 8 cm level to kill the trapped weevils. Few holes should be made just above the level of soap solution to drain excess rain water.

2. Plastic bucket with a funnel (Fig. 2)

A funnel fixed plastic bucket (5 litre) is used for this type. Galvanized funnel is fit-



with 200 μ l of ferrugineol releases 0.08 mg per hour at the field temperature. The reduction of the level of the ferrugineol could be clearly visible in these slow release pheromone dispensers as ferrugineol permeates through the wall with time. The dispenser containing ferrugineol is hung on the brim of the bucket and to protect the pheromone from rain water, a small galvanized hood is fixed to the bucket just above the dispenser. Peeled pieces of coconut petioles or sugar cane stem cuttings can be kept in a small container which

ted to the bucket opening and the tapered end of the funnel mouth should be 2 cm in diameter. Pheromone filled dispenser is fixed inside the bucket close to the funnel mouth. Adult red weevils attracted to the pheromone, slip through the funnel mouth into the bucket. Trapped weevils cannot escape through the funnel mouth as the size of the mouth is smaller than the wingspan of the weevil. Attractiveness of this trap could be improved by placing stem cuttings of sugarcane or peeled coconut petioles inside the

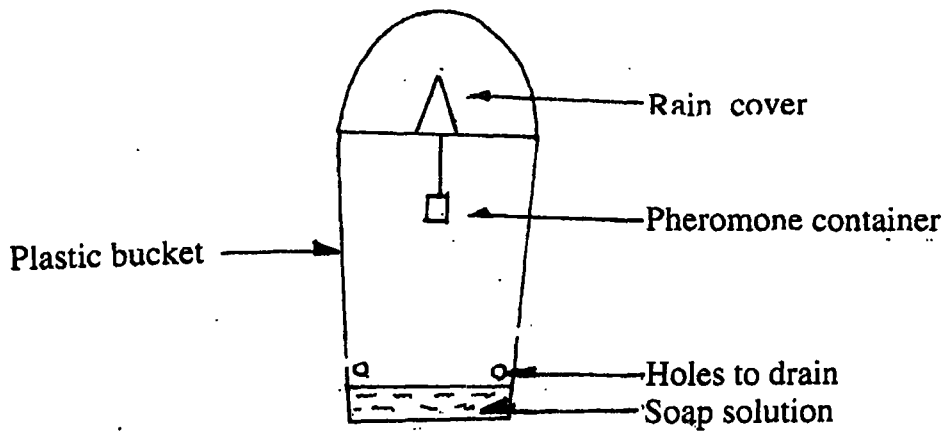


Figure 2: Open bucket trap

bucket. These food material should be treated with carbofuran or diazinon to kill the trapped weevils.

Both types of pheromone traps should be hung on trunks of coconut palms at a height of 1.5 m from the ground level with 40 m distance between two traps. Comparatively more weevils are attracted to the traps hung in open areas than in shady areas. Red palm weevils can fly around 900 m hence, 12 traps per hectare is desirable.

Pheromone traps for Black beetle

Another aggregation pheromone, chemically known as 'ethyl-4-methyl octonoate' secreted by the male black beetle has also been identified and synthesized in the laboratories. Traps lured with this pheromone are being tested by the CRI at the moment. So far, two trap designs have shown promising results with a higher number of adult beetles of both sexes. Deep plastic containers, probably 11 plastic buckets are suitable for trapping black beetle. Simple open plastic bucket lured with the pheromone buried in the ground near young palms and a similar

trap fitted with metal cross vanes and kept on the ground beside palms caught very high number of beetles within a short period of time.

Pheromone traps could be used to :

1. Reduce Red weevil or Black beetle population in neglected coconut plantations.
2. Identify areas where weevil or beetle populations are high.
3. Trap Red weevils emerging from untreated infested palms or unattended rotten trunks and black beetles emerging from their breeding places.

In coconut plantations heavily infested with red palm weevil, continuous trapping over several months significantly lower the incidence of reinfestations. However it is important to keep in mind that pheromone traps are not the ultimate solution to control these major pests of coconut. Pheromone based mass trapping should essentially be considered as one of the tools in integrated management programmes of these pests.