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# STATUS OF PHEROMONE TRAP CAPTURED FEMALE RED PALM WEEVILS FROM DATE GARDENS IN SAUDI ARABIA

Date palm, *Phoenix dactylifera* L. is closely associated with the life of the people in the Arabian Peninsula for the past 7000 years (Thomson, 1949). In the Kingdom of Saudi Arabia, the crop was attacked by the dreaded pest of palms *Rhynchophorus ferrugineus* Oliv. (Coleoptera: Curculionidae) during 1987 and since then the pest has spread to other date growing centres in the country (Abozuhairah *et al.,* 1996). Red palm weevil is now reported in all the date growing countries of the middle east (Oehlschlager, 1995). Initial attempts to control the pest with insecticides in Saudi Arabia were not successful (Bokhari and Abozuhairah, 1992). Ever since Hallet *et al.* (1993) synthesized the male aggregation pheromone "Ferrugineol" (4-methyl-5-nonanol) for *R. ferrugineus* and Oehlschlager (1994) demonstrated a pheromone trapping system using Ferrolure in food baited bucket traps containing insecticides, trapping the weevil using pheromone traps has become a vital component of the IPM strategy. It has been seen that weevil captures using Ferrolure in pheromone traps are female dominated with a sex ratio of 1 : 2.7 in favour of females (Anonymous, 1998). From the weevil management point of view, this is an encouraging trend. However, it is essential to know the status of the female weevils captured by pheromone traps i.e., (i) age (ii) egg laying potential and (iii) viability of the eggs laid by the trapped female weevils, as these factors have a direct relationship to the damaging potential of the pest. If trapped females are old and have already completed egg laying in the plantations, before entering the trap, then pheromone traps would not help to reduce the build up of the weevil population. In this case, pheromone traps are more likely to serve only as monitors, keeping an eye on the activity of the pest. If, on the other hand, young female weevils with potential for laying viable eggs are trapped, pheromone trapping would significantly contribute in suppressing the population build up.

In order to gather information on the above aspects, studies were conducted in Al-Hassa, by rearing trap-collected female weevils in the laboratory during October 1995 to October 1996. This was done by collecting 28 live female weevils from pheromone traps, in the field without insecticides. During the study, weevils were collected thrice from such special traps, which were observed daily for a period of 10 days. The trapped weevils were then transferred to the laboratory, where they were caged in perforated plastic containers and reared on one to two date palm stem bits (5 x 2 x 2 cm). These palm stem bits, besides acting as a source of nourishment for the caged weevils, also formed a media for egg laying. Eggs laid in these stem bits were collected every day and placed on moist tissue paper in petriplates for hatching. Also, fresh palm stem bits were provided to the caged weevils every day.

The above trap-collected female weevils were reared in the laboratory in two sets. In Set-I, trap-collected female weevils were caged individually with an active male partner collected from infested palms in the field, while in Set-II, trap-collected female weevils were caged and reared individually without a male companion.

Females reared with a male companion had a longer average life of 98 days (range 29 to 153 days) as compared to the average life of females reared singly, which lived for 85.32 days (range 36 to 142 days). Previous reports on the biology of *R. ferrugineus* suggest that the adult life span ranges from two to four months (Rahalkar *et al.*, 1972, 1978). Thus, it can be inferred that mostly young and newly emerged adult females were attracted and captured by pheromone traps in date plantations.

It was seen that 58.82 and 36.36 per cent of the females from Set-I and II, respectively had a life span ranging between 90 to 153 days. While only 23.50 and 9.09 per cent of the females from Set I and II, respectively lived for more than 30 but less than 60 days.

Trap-collected female weevils laid on an average 329.47 eggs (83 to 707) when reared with a male partner as compared to those caged in solitude, where the average egg lay was only 151.32 (43 to 210). Also, the hatching per-

Table 1. Longevity and fecundity of trap captured female weevils

| Parameters | Set-I (M+F) | Set-II (F only) |
|---|---|---|
| Average life of female weevils (days) | 98.00 (± 10.41) | 85.82 (± 12.10) |
| Average number of eggs laid | 329.47 (± 44.37) | 151.82 (± 16.58) |
| Per cent average hatch | 72.09 (± 3.65) | 53.56 (± 9.41) |
| Average number of days without laying viable eggs before death (days) | 17.12 (± 2.13) | 39.39 (± 8.22) |
| Post-ovipositional period (days) | 10.28 (± 4.05) | 17.85 (± 13.35) |

M = Male, F = Female, Figures in parentheses are standard errors.

centage was better in case of the former. During, this study, it was seen that the incubation period of the eggs varied from 2-6 days. Eggs laid during the summer, hatched faster as compared to the eggs laid during winter. For female weevils reared during October 1995 to March 1996, most of the egg lay was completed during the first four weeks of collection and rearing in the laboratory. In case of Set-I, 63.42 per cent of the eggs were laid during the first four weeks of the study, while in Set-II, 85.41 per cent of the eggs were laid during this period.

A significant and unique finding of this study is the fact that only one (9.09%) of the 11 females reared without a male companion, laid eggs (43) of which none hatched. This showed that it had not mated before entering the trap, while most of the other females (90.90%) of Set-II laid viable eggs, suggesting that they had already mated before being trapped. Mating had already taken place in the infested palm itself and the trapped females had flown out of the infested palm in search of a suitable site for egg laying. This finding also suggests that frequent mating is not essential for females to lay viable eggs. However, frequent mating enhances egg lay and improves the hatching percentage. Rearing trap-collected females with a male partner also prolonged egg lay. Table 1 reveals that females in Set-I (with male partner) laid viable eggs throughout their life except for the last 17.12 days, while in Set-II, laying of viable eggs stopped 39.39 days before death. Also, post-ovipositional period was shorter (10.28 days) for female weevils reared with a male as compared to a longer post-ovipositional period (17.85 days) for females reared without any male. However, these observations are not likely to have bearing on the damaging potential of the pest as most of the eggs were laid during the first four weeks itself.

This study therefore, reveals that pheromone traps used to capture weevils from date plantations in Saudi Arabia, trapped (i) young females that had already mated before being trapped (ii) frequent mating was not essential for females of red palm weevil to lay viable eggs and (iii) pheromone traps besides monitoring the activity of the pest also suppress the population build up of the weevil by capturing female weevils which are capable of laying eggs.

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