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CHAPTER 5

SUMMARY

The present study was initiated at two investigated date palm orchards, in the villages of Koom El-Tarfaya & Kombanyiat Abo-Kir, Kafr EL-Dawar center, EL-Beheira Governorate, during the growing seasons of 2006-2007 & 2007-2008, to evaluate three food baits, and a chemical attractant in the management of red palm weevil, by pheromone / Food based trapping system during the growing season; and determine the more attractive food bait throughout the consequent annual seasons under the performed agro-technical practices, agroclimatic conditions and followed intercropping system in each of the investigated orchards at Kafr – EL-Dawar center. In addition to evaluation of the toxic efficiency of some new insecticides, and the use of a sound detector for asiging the occurring infestation and performance of demanded control measure against the insect. Besides, surveying the possible associating mite species with the weevil in the infested farms. The obtained results indicated the following:

5.1. Effect of intercropping system in the investigated date palm orchards, on the annual variations in populations of the red palm weevil *Rhynchophorus ferrugineus* Oliv.:

The effects of followed intercropping under the conditions of applied agro-technical practices and prevailing climatic conditions on the existing red palm weevil, populations in the investigated date palm orchards showed a delayed flight activity of both adult-sexes throughout most months of the growing season, with three recorded prominent peaks during May, July & October-November, indicating the probable occurrence of three generations of red palm weevil in EL-Beheira governorate.

The rate of emerging adult females was higher and nearly twice as that of the emerging adult males, showing a female based sex ratio ranged between 1 male : 2.3 and/or 2.4 female.

The delayed flight activity of adult-weevils is greatly related to the resulted interaction of performed interplanting and agropractices with the prevailing hicrothermic conditions. The estimated correlation coefficient (r) values between the numerical rates of weevil's catches in tested traps and mean values of prevailing hicro-therim parameters during the season proved the high significant relationship between the number of caught weevils and each of the studied parameters of daily temperature and relative humidity.

The higher and/or lower numbers of captured adult-weevils were detected in case of interplanting citrus and banana trees and/or guava trees and field crops with the growing date palm varieties. Interplanting guava trees decreased the rate of infestation (0.98-1.6 %), versus increased level of infestation of red palm weevil in case of interplanting citrus and banana trees (3.9-5.4 %) with date palm varieties in the inspected orchards.

5.2. Efficiency of the tested chemical and/or food bait attractants in the management of red palm weevil by the aggregation pheromone lure – food based trapping system.

The prolonged annual intervals of delayed flight activity of the attracted adult weevils to the tested traps ascertained that the calibrating delayed emergence of the insect-pest occurs during most months of the growing season. The seasonal abundance and seasonal activity of this insect pest showed higher rates of weevil's catches in the monthly periods of March – April, May-July and October-November. Whereas the averages of adult – catches during these monthly intervals respectively comprised 12.0-15.7, 17.4-17.5 & 18.3-16.7. Weevils for the 1st orchard; 39-14-55.28, 42.85-30-14 & 14.42-12.85 weevils for the 2nd orchard and 50.85-71.28, 60.28-47.71 & 32.71-29.57 weevils for both orchards.

The determined efficiency of used aggregation pheromone lure with or without the tested food baits in the evaluated traps in each of 1st & 2nd date palm orchards, proved that the utmost efficient aggregation pheromone –food bait trap which gave higher rates of adult-weevils catches of both sexes was the food baited pheromone trap with treacle + yeast + tap water; with total weevils catches reached to 279 & 565 insects; resembled 26.1 & 31.6% of the grand total of captured adults per year, respectively. That superiority was followed by the nextly ranked pheromone traps supplied by date fruits + yeast or ethyl acetate and/or the aggregation pheromone alone. The supplemented traps with diluted treacle + yeast; date fruits + yeast and ethyl acetate alone were to more extent inefficient and gave rather decreased rates of weevil's catches.

The determined monthly periodic intervals of efficient captures of the red palm weevil adults in the inspected 1st and 2nd date palm orchards indicated that the tested traps of pheromone + diluted treacle+ yeast was ranked the first with comparatively more higher catches all over the year in both orchards. In the 2nd characterized orchard by higher population density the number of caught weevils ranged from 10-20 weevils in August, September & December to more than 100 weevils in April, while in the other months of the growing season the rate of these captured weevils callibrated between 20 – 40 and 80 – 100 weevils. Vice versa, the supplied trap by ethyl acetate alone was utmostly least efficient in all months of the growing season and gave a lowest numerical rate less than ten individuals of caught adult weevils.

The highest calculated annual means of adults catches of both sexes was recorded also for the superior efficient pheromone trap + diluted treacle + yeast, which comprised 22.83-47.08 and 69.91 in the 1st and 2nd and both orchards, respectively followed by the next ranked trap of aggregation pheromone lure alone. The other tested traps showed more or less decreased means of catches ranged between 4.25 for ethyl acetate alone in 1st inspected orchard; and 23.25, 24.66 and 37.91 for pheromone + ethyl acetate in 1st, 2nd and both inspected orchards, respectively.

The measured higher and/or lower density of investigated red palm weevils populations in each of inspected date palm orchards could be attributed to the old of the growing date palms, the numbers of growing date palm varieties in particular, Zaghloul and Sammany varieties, the old and the density of interplanted fruit trees within the rows of growing palms, the followed agro technical practices and the prevailing agroclimatic conditions in both investigated orchards, which all in combination, more or less affect on the occurrence of infestation level of red palm weevil that correspond to the increased or decreased population density of developing weevils that in sequence reflects on the rate of weevils catches.

5.3. Efficiency of certain evaluated insecticides against the immatures and adult stage of red palm weevil in laboratory bioassay tests:

- The assessed toxic efficiency of evaluated six insecticides against the treated immature and adult stage of red palm weevil (RPW) differed significantly between either each of them or each treated stage. In this concern the toxicity of emamectin benzoate, thiamethoxam and/or chloropyritos was firstly or secondly ranked when tested against the different treated stages of red palm weevil. (RPW).
- Emamectin benzoate showed superior toxicity against the treated 4th instar larvae and adult stage followed by the next ranked thiamethoxam. While, thiamethoxam was the highest toxic insecticide, followed by abamectin against the treated egg stage.
- The assessed superior toxicity of emamectin benzoate was insignificantly different with profenofos against the treated 2nd instar larvae; but significantly differed with the next ranked thiamethoxam in case of 4th instar larvae treatment and/or chloropyrifos in case of adult weevils treatment.
- The other evaluated insecticides showed a more or a less toxic efficiency against the treated of red palm weevil (RPW) stages; the least efficient toxicity was detected for lufenuron in case of 2nd instar larvae and adult stage, abamectin in case of 4th, instar larvae and adult weevils and profenofos in case of egg stage.

5.4. The early detection of red palm weevil infestation by means of the tested a sound detector apparatus‘Larven Lauscher’:

The performed field evaluation for determining the valuability of using this apparatus in detecting the occurrence of red palm weevil infestation confirmed the thorough and possible attainment of early detection of red palm weevil infestation in date palm farm; that sound detector equipment would be useful for and mostly improve the efficiency of, early detection of occurring infestation in date palm trees.

5.5. Identification of three gamasid mite species associated with the red palm weevil in infested date palm farms:

Three gamasid mite species associated with the prevalent adult males and females of *Rhynchophorus ferrugineus* (Oliv.) infested date palm trees at farms in both the investigated palm farms, were recorded for the first time in Egypt. The identified three mite species were the pachylaelapid, *Pachylaelaps spectabilis* Berlese, the Uropodid *Leiodinychus krameri*

(Can.) and *Urobovella varians* Hirschman *et* Nicol. The individuals of the three mite species were observed on all parts of the weevil's body tagmata aggregating in large numbers on the thoracic and abdominal terga and sterna; the head, the base of rostrum, antennal socket, articulation sites of coxa, tibia and tarsus and the lower surface of fore wings. The noticed relationships between the weevils and the three gamasid mite species were described and discussed.