دراسات على بعض آفات الخضر وتقييم لبعض المركبات المستخدمة في مكافحتها

رسالة مقدمة من

رفيدة أحمد عوض بسيوني
بكالوريوس العلوم الزراعية (قسم الحشرات الاقتصادية)
كلية الزراعة بكفر الشيْخ – جامعة طنطا 2003

محور من المتطلبات للحصول على
درجة الماجستير في العلوم الزراعية
"الحشرات الاقتصادية"

قسم وقاية النبات
كلية الزراعة
جامعة دمنهور
2012

SUPERVISORS COMMITTEE
Prof. Dr. Khalil Abd Allah Draz
Professor of Economic Entomology, Plant protection Department,
Faculty of Agriculture, Damanhour University

Prof. Dr. Mohammed Abd El-Kader Mansour
Professor of Economic Entomology, Plant protection Department,
Faculty of Agriculture, Damanhour University

Prof. Dr. Samir El-Said Kasem
first researcher of Economic Entomology, Plant protection institute.
Agric., Res. Center, Sakha, Kafr El-Sheikh

SUMMARY
Survey of insect pests and associated natural enemies:

This study aimed to survey insect pests and natural enemies associated with four vegetable crops under separate titles.

1.1. On cabbage, *Brassica oleracea* var. *Capitata* L.:

Results showed that there were eight of arthropod species, belonging to seven families and four orders, collected during the two seasons, 2007/08 and 2008/09. The most prevailing order was Homoptera with a rate of 90.58 %, and the most dominant species were *Brevicoryne brassicae*, with a rate of 72.33 %, followed by *Myzus persicae*, with rate of 15.32 %. On the other hand, the least recorded species was *Trichoplusia ni*, with a rate of 0.01 %, and between them another five species ranged as follows, *Bemisia tabaci*, 2.93 %, *Pieris rapae*, 0.54 %, *Diaeretiella rapae*, with a rate of 7.59 %, *Aphidoletes aphidimyza*, 1.25 % and *Pteromalus puparum*, with a rate of 0.03 %.

1.2. On Cauliflower, *Brassica oleracea* var. *Botrytis* L. :

Data showed that there were ten arthropod species belonging to nine families and five orders in cauliflower field. Order Homoptera was the most abundant order as 3909 individuals with a rate of 94.19 % and represented by three species belonging to two families; (Aphididae and Aleyrodidae), the most dominant species were *Brevicoryne brassicae* (3821 individuals) with a rate of 92.07 % and *Myzus persicae* (82 individuals) with a rate of 1.97% as a pre-dominant species. The second order was Hymenoptera as 206 individuals with a rate of 4.96 %.Such order was represented by three species belonging to three families, *Diaeretiella rapae* was the most dominant species with a rate of 4.51 %.
The third order was Lepidoptera with a rate of 0.59% which was represented by two families and two species, *Pieris rapae* (0.54 %) and *Trichoplusia ni* (0.05 %).

1.3. On Cucumber, *Cucumis sativus*:

Data revealed that there were 18 arthropod species (16 insect species and 2 arachnid species) belonging to 16 families and 9 orders in cucumber field. Order Homoptera was the most abundant order as 6650 at a rate of 72.54 % and represented by six species belonging to five families, the most dominant species were *Aphis gossypii*, at a rate of 64.18 % and *Oliarus frontalis* at a rate of 2.80 % as a pre-dominant species. The other four recorded species were *Empoasca spp*, 1.91 %, *Bemisia tabaci*, 1.57 %, *Orosius* sp, 1.04 %, *Cicada* sp, 1.01 %. The second order was Thysanoptera 15.68 % represented by only one species; *Thrips tabaci*, as 1438 individuals. Hymenoptera (6.42 %). The following five recorded orders were, Or. Diptera 4.35 % represented by three species , Acari 0.52 % represented by one species Tetranychus sp, Coleoptera represented by three predatory species *Scymnus* sp., 0.19 %, *Coccinella undecimpunctata*, 0.13 % and *Paederus alfieri*, 0.12 %, Hemiptera 0.03 % and Or. Aranea 0.02 %.

1.4. On Cantaloupe, *Cucumis melo*:

Results showed that 21 arthropod species, belonging to 19 families and 7 orders were recorded. It was found that order Homoptera was considered the dominant one in that category at a rate 78.61 %, and the most presence species in it was *Aphis gossypii*, 71.30 %, followed by *Empoasca* sp, 4.99 %, followed by *Oliarius frontalis*, 0.10 % and *Cicada* sp, 1.01 %. On the other hand, *Orosius* sp, was the least in that category
and was represented by 0.10 %. The second one in descending order was Thysanoptera at a rate of 17.29 % and represented by 2 species, *Thrips tabaci*, 17.28 % and *Haplothrips* sp., 0.01 %. The third order was Hymenoptera (2.38 %) represented by 5 species the most dominant species was *Camponotus* sp. (1.96%). Order Hemiptera was the least in that category (0.03 %) represented by 2 species *Orius* sp., with a rate of 0.02 % and *Murgantia* sp, 0.01 %. The other three orders were Trombidiformes (0.83%), Diptera (0.78%) and Coleoptera 0.08 %.

2. Population fluctuations:

2.1 On winter crops, Cabbage and Cauliflower:


Data indicated that *B. brassicae*, appeared by the mid-Nov. by 55 individuals, then, a high increase was occurred recording the first peak as 480 individuals in 19\textsuperscript{th} of Nov. the second and the highest peak occurred in the third of Dec. as 787 individuals. Then a dramatically decrease was obtained from the tenth of Dec. as 450 individuals till 22\textsuperscript{nd} Jan. to increase again in the end and mid of Jan. to record two small peaks as 54 and 14 individuals.

Whereas, *B. tabaci*, showed four peaks the first occurred at the beginning of the season at 12 Nov. as 17 individuals, the second one was in 26 Nov. as 39 individuals, the third was in 17 Dec. as 32 individuals, and the last peak occurred at the end of Jan. with leak numbers, 6 individuals.
On the other hand, *A. aphidimyza*, showed one peak in low numbers in the beginning of the cabbage season, while, *D. rapae*, showed two peaks, the first was in the mid of Dec. as 59 individuals and the second one was in 20\textsuperscript{th} Feb. as ten individuals.

While, the population fluctuation of *B. brassicae*, and *B. tabaci*, and one associated parasitoid *D. rapae* and the predator *A. aphidimyza* during season 2008/2009 showed that the highest catch was found at three times declaring three peaks, the first of Dec. as 480 individuals, mid. of Jan. as 150 individuals and the first week of Feb. as 40 individuals. Also, *B. tabaci* recorded three peaks at the mid. of Nov. as 10 individuals, the first week of Dec. as 26 individuals, and at the last week of Dec. as 19 individuals. The same trend was happened with the parasite, *D. rapae*, with three peaks at 5/Dec. as 36 individuals, 19/ Dec. as 45 individuals and 17/Jan. as 50 individuals. Whereas, *A aphidimyza* had only one peak at the end of Nov. as 12 individuals.

The Population fluctuations of Cabbage aphid, *B. brassicae*, and *B. tabaci* and two associated natural enemies in cauliflower field during season 2007/2008. Data reveled that Cabbage aphid had three peaks the first and the highest one was in the tenth of Dec. as 1235 individuals, the last one was in 20\textsuperscript{th} of Feb. as 22 individuals. While, *B. tabaci* showed four peaks, the first one occurred at 12 Nov. as six individuals, the fourth was occurred in the end of the season at 20 Feb. as four individuals. On the other side, *D. rapae* and *A. aphidimyza* were acted in low numbers recording two peaks for each one.

2.2. On summer crops, Cucumber and Cantaloupe:

In the first season the melon aphid, *A. gossypii*, initiated its appearance in cucumber field during early season as 120 individuals decreasing in the next week to 103 individuals before increasing gradually in the next weeks to reach the maximum number recording a clear peak in 19 Jun. as 694 individuals. This number decreased again till the end of the season. The same trend was happened with onion thrips, *T. tabaci* that it appeared in the beginning of the season in low numbers as 41 individuals increasing in the next two weeks to reach the maximum number in 4 Jun. as 413 individuals, then a dramatically decreased happened till the end of the season. Whereas, *C. undecimpunctata* appeared in low numbers throughout the season, the maximum numbers occurred in 27 May. as three individuals and in 19 Jun. *C. undecimpunctata*

On the other side, *A gossypii* in the second season was recorded in high numbers as 3639 individuals, it appeared in the first of the season as 160 individuals. A progressive increase was occurred from 27 May. as 189 individuals till 19 Jun. as 694 individuals recording a peak before decreasing again till the end of the season. The same happened with *T. tabaci*, it began in high numbers by the beginning of the season, decreased rapidly by the end of it.

3. Effect of climatic factors and associated natural enemies on the fluctuation of selected insect pests:

3.1. On cabbage and cauliflower:
The three climatic factors (Temperature, R.H and Wind Velocity) had negative influence on cabbage aphid in the first season and non significant correlation with mean temperature, and negative correlation with R.H and Wind Velocity in the second one. The brachonid wasp, *D. rapae*, had a highly significant correlation with *B. brassicae* in the second season while it showed non significant correlation in the first one. On the other hand, the same three climatic factors had negative influence on *B. tabaci* in the first season and negative significant correlation with mean temperature and non significant correlation with R.H and wind velocity in the second one. And the combined effect of percentage of explained variance (E.V %) of the three factors on *B. tabaci* population was higher in the first season compared with the second one.

Whereas, *Diaeretiella rapae* revealed a highly significant influence with *B. brassicae*, while all of mean R.H, mean wind velocity and the predator *Aphidoletes aphidimyza* had no significant influence with the cabbage aphid, while, the mean temperature showed negative correlation.

### 3.2. On cucumber and cantaloupe:

In the first season there was non significant influence between *Thrips tabaci* and both of mean temperature and the predator *C. undecimpunctata*, and negative correlation with R.H., while there was a significant influence with the mean wind velocity. Furthermore, negative correlation between melon aphid, *Aphis gossypii*, and all parameters in the first season, whereas in the second season temperature, R.H. and wind velocity showed non significant correlation with the melon aphid, while, the predator, *Coccinella undecimpunctata*,
showed negative correlation with it. Significant influence was noticed between *Thrips tabaci* and mean wind velocity in the first season, while in the second one a negative correlation was recorded between the onion thrips, *T. tabaci*, and all of climatic factors and the predator, *Orius* sp. There were non significant influence between *Aphis gossypii* and both of temperature and mean wind velocity, and a negative correlation with mean R.H and *Orius* sp. in the first season. While in the second season non significant correlation between mean R.H. and mean wind velocity and negative influence with temperature were detected.


Data indicated that the parasitism rate was detected in low numbers by the mid of Nov. as one individuals represented by 2.86 %. The percentage of parasitism increased by 26 Nov. to 32.14 %. The percentage of parasitism continued its rising to reach 67.10 % by 10th of Dec., in other word, 225 aphid individuals were parasitized. At 17, 24 Dec. 1 and 8 Jan parasitism rate were 57.8 %, 60.83 %, 69.56 % and 68.96 % respectively. The maximum number of parasitism was occurred in the last of the season by the mid of Jun. as 102 aphid mummy by parasitism rate 80.95 %.

Data of the Parasitism efficiency of *D. rapae* on the green peach aphid, *M. persicae*, indicated that the parasitism rate was low by
the beginning of season at 12 Nov. as 14.00 %, such percentage increased in Nov. 19, recorded 10 mummy represented by 22.22 %. The parasitism rate increased overall the season to reach the maximum rate at the end of the season in 15 Jan. as 70.00 %.

5. Efficiency of selected insecticides against tomato, *Solanum lycopersicum* insects and associated predators:

5.1. Cotton white fly *B. tabaci*:

Data showed that the most efficient insecticide in reducing the population of *B. tabaci* adults was Actellic (89.71 %), the population reduction in the first day after treatment was 96.99 %, reaching to 68.76 % after ten days from the treatment. On the other hand, the least effective insecticide in that trend was Admire (77.80 %) as a percent of population reduction in the first day after treatment reaching to 60.03 % in the tenth day after treatment.

Data showed that the most efficient insecticide against *B. tabaci* nymphs was Actellic, followed by Admire and Actara with values of reductions in populations of 97.22 %, 93.55 % and 90.70 % respectively. Data also revealed that the reduction percentage in the second day was the highest to reach the least percentage in the tenth day of treatment.

5.2. Tomato leafminer, *Tuta absoluta* Meyric:

Data indicated that the most efficient insecticide in reducing the population of *T. absoluta* was Admire. Such insecticide was the most effective (100 %) since the first day after treatment. The second efficient insecticide against *T. absoluta* was Actellic, the maximum level of
reduction in the tenth day after treatment was 100 % reduction. The least one in that category was Actara with a maximum level of reduction in the seventh day after treatment of 71.43 %.

5.3. Tomato mirid bug, *Nesidiocoris tenuis* (Reuter):

Four successive sprays resulted in 72.47 %, 83.83 % and 86.72 % overall reductions in population density of *N. tenuis* caused by Actara, Admire and Actellic respectively. Actellic was the most destructive one against predatory bug. Admire came in the second position, Actara was the least harmful one resulting in 72.47 % reduction since it was the most effective one at the last day of treatment.