

SURVEY OF THE PARASITIDS OF MAIN LEPIDOPTEROUS PESTS IN VEGETABLE CROP FIELDS IN EGYPT

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INTRODUCTION

Lepidopterous larvae are considered the main pests in most of our cultural crops due to their polyphagous feeding behaviour. According to the fact that vegetable fields in many cases receive no insecticidal treatments, therefore, it is convenient to utilize the biocontrol agents to keep these pests under the economic injury level. Since limited study was previously investigated on this topic in Egypt (El-Ghadrie, 1937; Hassanein, 1958; Hafez *et al.*, 1976; Abbas, 1981, 1985 and Abbas & El-Dakroury 1985), the aim of this present study is to evaluate the role of parasitoids in controlling the lepidopterous pests in vegetable crop fields to facilitate any integrated control program in vegetable fields.

MATERIAL and METHODS

Bi-weekly samples of the main lepidopterous larvae were collected from certain infested vegetable crop fields in three Governorates (Giza, Fayoum and Beni-Suef) from middle Egypt and other three Governorates (Qalubia, Menoufia and Gharbia) from lower Egypt during the successive seasons 1981, 1982 and 1983. Collected larvae that were counted and confined individually, were fed either on fresh parts of their hosts or on the semisynthetic diet of Shorey and Hale, 1965. Larvae were kept under laboratory conditions till emergence of the parasitoids that were identified and counted. Percentage of parasitism by each parasitoid was estimated.

RESULTS and DISCUSSION

a) Survey of the parasitoids :

Among the extensive samples (300) collected during the three years of study from middle Egypt and (209) from lower Egypt, parasitized samples were 88 (29.3%) and 97 (46.4%), respectively. Eleven vegetable crops; cabbage, Jew's mallow, eggplant, cowpea, tomato, okra, potato, beans, Egyptian mallow, artichoke and cauliflower were taken in consideration during this study.

Twelve species of lepidopterous larvae were observed attacking these host plants frequently. These species were *Spodoptera littoralis* Boisd., *S. exigua* Hbn., *Heliothis armigera* Hb., *Autographa* spp., *Agrotis ipsilon* Rott., *Pieris rapae* L., *Vanessa cardui* L., *Cosmolyce baeticus* L., *Hellula undalis* F., *Euzophora osseatella* T., *Plutella xylostella* L. and *Phthorimaea operculella* Zell.

The following species of parasitoids were secured from the considered lepidopterous pests collected from the six Governorates during the three seasons of study :

<i>Apanteles litae</i> Nixon.	(Hym., Braconidae)
<i>Apanteles ruficrus</i> Hal.	(Hym., Braconidae)
<i>Apanteles</i> spp.	(Hym., Braconidae)
<i>Brachymeria femorata</i> Panz.	(Hym., Chalcididae)
<i>Bracon? instabilis</i> Marsh.	(Hym., Braconidae)
<i>Diadegma molliplum</i> Hlmgrn.	(Hym., Ichneumonidae)
<i>Exorista larvarum</i> L.	(Diptera, Tachinidae)
<i>Meteorus gyrator</i> * Thunberd	(Hym., Braconidae)
<i>Microplitis rufiventris</i> Kok.	(Hym., Braconidae)
<i>Pteromalus puparium</i> L.	(Hym., Pteromalidae)
<i>Strobliomyia aegyptia</i> Will.	(Diptera, Tachinidae)
<i>Zelee chlorophthalma</i> Nees.	(Hym., Braconidae)

All the above mentioned parasitoids emerged from larvae or pupae of the collected hosts.

b) Rate of parasitism :

1 — Tomato :

During the three seasons of study *S. littoralis*, *P. operculella*, *H. armigera* and *Autographa* spp. were the main pests attacking tomato. The parasitoids *M. rufiventris* and *S. aegyptia* were recorded on *S. littoralis* larvae representing

* Firstly recorded in 1984 on certain lepidopterous larvae in Egypt (El-Heneidy and Hassanein, 1984).

the highest rate of parasitism (21% and 10% in Middle and Lower Egypt, respectively) in October 1983. *B. instabilis* and *A. litae* were secured from *P. operculella* during 1981 and 1982; the highest rate of parasitism (12.3%) was found in October 1981 in Lower Egypt. On *H. armigera*, *E. larvarum* and *Apanteles* spp. were obtained; the highest percentage of parasitism reached 25% at the end of March, 1983 in Middle Egypt. No parasitoids were secured from *Autographa* spp.

2 — Potato :

P. operculella was the most abundant pest in potato fields. Three parasitic species; *A. litae*, *B. instabilis* and *D. Molliplum* were recorded on the pest during the study. In Lower Egypt, the highest rate of parasitism (12.5%) occurred in October 1981, whereas it reached 21.3% and 12.9% in May 1982 and 1983, respectively. In Middle Egypt, the highest rates of parasitism were 24, 26.3 and 20% during May, June and November 1983, respectively.

3 — Cabbage :

Cabbage was severely attacked by *S. littoralis*, *S. exigua*, *Autographa* spp., *P. rapae*, *H. undalis* and *P. xylostella* during the whole period of study. In association with *S. littoralis*, 5 parasitic species were secured; *M. rufiventris*, *S. aegyptia*, *Z. chlorophthalma*, *C. inanitus* and *M. gyrator*. *C. inanitus* occurred only in 1982 in Lower Egypt, while the other parasitic species occurred frequently in the three seasons. In lower Egypt, the highest rates of parasitism were recorded in 1981 were (16%) during October and November (14.6%) 1981; reaching 23.2% in October 1982 and 25.7% in November 1983. In Middle Egypt, the highest rates of parasitism occurred during October; 8.7, 10.7 and 2% in 1981, 1982 and 1983, respectively. *P. puparum* and *B. femorata* were encountered on *P. rapae*, with relatively high percentage of parasitism; 56.2 and 55.1% in October and November 1983, respectively in Middle Egypt, and 30.2 and 57.3% in the same months, respectively, in lower Egypt. *Apanteles* spp. were secured only on *H. undalis*. The rate of parasitism reached 23.3. 8.3% in September and October 1981, respectively and 9.6% in October 1983 in Middle Egypt. *A. ruficrus* and *Apanteles* spp. were recorded on *Autographa* spp. in cabbage fields; the rate of parasitism was 5.9% in November and 8.3% in December 1983, in lower Egypt. In November 1983, *M. rufiventris* was reared from *S. exigua* larvae in Middle Egypt with an average of 22.5% parasitism, while no parasites were reared from samples of *S. exigua* collected from Lower Egypt. No parasitic species were secured from *Plutella xylostella* larvae during this study.

4 — Eggplant :

Collected samples from eggplant fields showed a frequent infestation by *P. operculella* and less infestation by *A. ipsilon*, *E. osseatella* and *H. armigera*. No parasitoids were obtained from the last two pests. Relative high rates of parasitism by *A. litae*, *D. molliplum* and *B. instabilis* were recorded on *P. operculella* during the three seasons; 23.1 and 16.7% in June and July 1981, 30.3 and 34.2% in May and June 1982 and 23.5 and 21.6% in April and May 1983, respectively in Middle Egypt. In Lower Egypt, the highest rate of parasitism (28.8%) was observed in June, 1981. *A. ruficrus* was recorded on *A. ipsilon* once in April 1983, 16.7% parasitism.

5 — Jew's mallow :

While Jew's mallow was found attacked by *S. littoralis*, *S. exigua*, *H. armigera* and *A. ipsilon* during the whole course of work in Middle Egypt, four parasitic species were recorded only on *S. littoralis*, i.e. *M. rufiventris*, *Z. chlo-rophthalma*, *M. gyrator* and *S. aegyptia*, with parasitism rates of 9.5 and 48.1% in September and October 1981, 16.5% in June 1982 and 8.6 and 10.8% in September and October 1983. In Lower Egypt, only one sample was found parasitized by *S. aegyptia* in October 1981; the parasitism rate was 2.1%.

6 — Beans :

Samples from bean fields were collected during the three seasons were found attacked by *S. littoralis*; *S. exigua*, *Autographa* spp. and *C. baeticus*. Mainly *M. rufiventris* and partly *S. aegyptia* were the common parasitoids on *S. littoralis* in bean fields, the highest percentage of parasitism (17.1%) was recorded in October 1981 in Lower Egypt and (11.5%) in June 1982 in Middle Egypt. In 1983 season, *A. ruficrus* was found on *C. baeticus* in June with 6.3% parasitism, while 2 individuals of *M. rufiventris* were encountered from 3 *S. exigua* larvae in November in Middle Egypt. However, no parasitoids were found on *Autographa* spp.

7 — Cowpea :

S. littoralis, *S. exigua* and *A. ipsilon* were collected from infested cowpea fields during the period of study. In Middle Egypt, most of parasitic species (*M. rufiventris*, *S. aegyptia* and *M. gyrator*) were secured from larvae of *S. littoralis*, while no parasitoids were found on *A. ipsilon*. The last parasitic species was found parasitizing both *S. littoralis* and *S. exigua*, especially in May 1982. Rates of parasitism peaked in May 1981 and 1982 (21.4 and 25.4%, respectively) and decreased to 9.5 and 7.1% in June 1981 and 1982, respectively. In Lower Egypt, only one sample showed a 4.1% parasitism by the Tachinid parasitoid *E. larvarum* in October 1981.

8 — Okra :

This host plant was attacked severely by *S. littoralis* and *Autographa* spp. No parasitoids were secured from *Autographa* spp., while four parasitic species were encountered from *S. littoralis*. These parasitoids were *M. rufiventris*, *M. gyrator*, *S. aegyptia* and *Z. chlorophthalma*; the highest rate of parasitism occurred during November in 1981 and 1983 seasons (28.6 and 32.0%, respectively, in Lower Egypt. In Middle Egypt, in 1981 season, *M. rufiventris* and *Zelex chlorophthalma* were secured with a peak of 33.3% parasitism in May. However, *Meteorus* spp., *S. aegyptia* and *M. rufiventris* were obtained in 1982 with a percent of 10.9% and 25% in May and September, respectively. In 1983, *M. rufiventris* was only secured with a rate of 19.1% in May.

9 — Egyptian mallow :

Four Lepidopterous pests were found infesting this host plant; i.e.: *S. littoralis*, *Autographa* spp., *H. armigera* and *V. cardui*. No parasitoids were obtained from the last two pests, while *S. aegyptia* was secured from *S. littoralis* in October 1982 (5.5% parasitism) and *Apanteles* spp. from *Autographa* spp. in December 1981 (26.2% parasitism) only in Lower Egypt.

10 — Artichoke :

Few samples were collected from artichoke fields during this work. Only one sample infested with *S. littoralis* was found parasitized by the Tachinid parasitoid *S. aegyptia* (2.6% parasitism in October, 1982) in Lower Egypt. In Middle Egypt, no parasitoids were obtained from larvae of *V. cardui* attacking artichoke fields.

11 — Cauliflower :

Few samples were collected from cauliflower fields only during 1983 season as well as from Middle Egypt. The main pest, *Autographa* spp. was found parasitized by *A. ruficrus*, with 8.3% parasitism in April.

CONCLUSION

Among the extensive samples (300 from Middle Egypt and 209 from Lower Egypt) collected during the three years of work 1981-1983, 12 species of the main Lepidopterous pests were recorded attacking the considered 11 vegetable crops. *S. littoralis* (represented by 56.8% in Middle Egypt and 47.3% in Lower Egypt) and *P. operculella* (represented by 20.5% in Middle Egypt and 47.3% in Lower Egypt) were the most abundant pests commonly found on vegetable crops. *S. littoralis* was collected from tomato, cabbage, Jew's mallow, beans,

cowpea, okra, Egyptian mallow and artichoke during the whole period of work (April-December, 1981-1983). *P. operculella* attacked mainly tomato, potato and eggplant in two periods, May-August and October-December.

Rate of parasitism in the three years of study seems to have two peaks: the first during April-June and the second during September-November. These two periods represented the periods before and after the seasonal spray against cotton pests in cotton fields. Among the 12 parasitic species recorded during the whole period of study, *Microplitis rufiventris* (represented by 33.3% in Middle Egypt and 26.3% in Lower Egypt), *Apanteles* spp. (represented by 17.1% in Middle Egypt and 24.1% in Lower Egypt), *Strobliomyia aegyptia* (represented by 17.1% in Middle Egypt and 17.3% in Lower Egypt), were the most abundant species followed by *Meteorus gyrator*, *Bracon instabilis* and *Zelex chlorophthalma*.

In agreement with the findings of Hammad et al (1965), Hafez et al (1976) and Hassanein and El-Heneidy (1985), the highest fraction of parasitism appears to be caused by the Braconid species especially *Microplitis rufiventris* that was found associated with several Lepidopterous polyphagous pests; mainly *S. littoralis*, *S. exigua* and *H. armigera*.

Hafez (1972) suggested that the change of the leading species of parasitoids from the two Tachinids *Exorista larvarum* and *Strobliomyia aegyptia* to the Braconids; especially *M. rufiventris* may be attributed to the more tolerance of these Braconids to pesticides.

SUMMARY

Bi-weekly samples of the main Lepidopterous larvae infesting certain vegetable crops were collected for three years (1981-1983) from six Governorates (Giza, Fayoum and Beni-Suef) of Middle Egypt and (Qalubia, Menoufia and Gharbia) of Lower Egypt to evaluate the role of parasitoids in controlling such pests. Considering, eleven vegetable crops in this study, 12 Lepidopterous species were found attacking the host plants frequently.

Among the secured Hymenopterous and Dipterous parasitoids *M. rufiventris* was the most dominant parasitic species (represented by 30%), followed by *Apanteles* spp. and *S. aegyptia*. Two periods of high rates of parasitism were recorded in April-June and September-November.

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