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NATURAL ENEMIES OF MAJOR INSECT PESTS IN SALALAH, SULTANATE OF OMAN

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Abstract

A survey on natural enemies of major insect pests infesting vegetable and field crops as well as fruit trees and ornamentals was carried out during the period from March 1994 to February 1995 in Salalah.

Such pests included four species of mealybugs; the wax scale, *Ceroplastes rubens*; the potato-tuber moth, *Phthorimaea operculella*, the sweet potato moth, *Hydriris oratalis*; the diamond-back moth, *Plutella xybostella*; the American bollworm, *Heliothis armigera* and the beet armyworm; *Spodoptera exigua*. Most of natural enemies obtained in this study are considered first record in Oman. These are about 13 parasitoid species of the familes Braconidae, Eulophidae, Encyrtidae, Aphelinidae and Tachinidae, and about 14 predatory species of the families Coccienellidae, Staphelinidae, Cecidomyiidae, Syrphidae, Chrysopidae, Hemerobiidae, Anthocoridae, Geocoridae and Nabidae.

INTRODUCTION

Successful applied biological control projects were carried out in Sultanate of Oman starting from 1984 when the parasitoids, *Amitus hesperidum* and *Encarsia opulenta* were introduced from Florida, USA, and released against the citrus blackfly, *Aleurocathus wooglomi*. Only *E.opulenta* was established but only in Salalah; the southern region of Oman (Sankaran, 1985). In 1985 the coccinellid, *Chilocorus nigritus* was introduced from India and released against the coconut scale *Aspidiotus destructor* in Salalah by the Director of the Diwan of Royal Court Affairs and became well established by 1986 (Elikewela, 1986; Kinowi, 1991).

In 1989, a project was carried out to use the virus *Baculovirus oryctes* against the coconut beetle, *Oryctes rhinocerus* and within a few years the beetle's population declined sharply (unpublished).

The present investigation deals with surveying natural enemies of major eco-

nomic insect pests in Salalah with the aim of finding some promising ones to be utilized as native biocontrol agents in Oman.

MATERIALS AND METHODS

A survey of natural enemies of the major insect pests infesting vegetable and field crops as well as fruit trees and ornamentals was carried out during March 1994 till the end of February 1995. Plants and trees were checked at 1-2 week intervals for infestation with different insect pests. The insects were collected and transferred to the laboratory. The larvae were reared on their natural food until pupation or emergence of any parasitoids. Leaves and shoots infested with mealybugs and/or wax scale insects were kept in glass jars, covered with muslin, and were checked daily for emergence of any parasitoids or occurrence of predators. Specimens of most of parasitoids and predators obtained were sent to the International Institute of Entomology, CAB International, London, UK, for identification.

RESULTS AND DISCUSSION

Survey on natural enemies of major insect pests infesting vegetable and field crops as well as fruit trees and ornamentals gave rise to 15 parasitoids and 14 predators. Most of such natural enemies are considered first record in Oman and some may be new species.

1. Parasitoids

1.1. Parasitoids of the potato-tuber moth, *Phthorimaea operculella* (Gelechiidae) infesting tomaato plants: *Bracon gelechiae* Ashm. (Hym.; Braconidae). It is an ecto-parasitoid of larvae. Percentages of parasitism ranged 17.5-84.3% during April-June (8 samples). Abbas *et al.*, (1993) recorded 3 species of parasitoids in Egypt; *Bracon instabilis, Apanteles litae* and *Diadegma molliplum.*

1.2. Parasitoids of the sweet-potato moth, *Hydriris ornatalis* (Duponchl), (Pyralidae) ifesting sweet potato: *Bracon gelechiae. Apanteles? antilla* Nixon (Hym.; Braconidae). Percentages of parasitism ranged 0.0-6.4% by *B.gelechiae* and 16.7-74.0% by *A.antilla* (8 samples) during June and July, 1994.

The second parasitoid was identified by A.K. Walker who mentioned that "Although very close to the species antilla, there is a discrepancy in the wing venation which makes me cautions about using the name antilla. There is no host information available".

1.3. Parasitoids of the diamond-back moth, *Plutella xylostella* (Plutellidae) infesting cabbage: *Dolichogenidea litae* Nixon (Hym.; Braconidae). *Oomyzus sokolowski* (Kurdjumov), (Hym.; Eulophidae). Percentages of parasitism ranged 19.3-31.9% by *D.litae* and 11.6-22.1% by *O.sokolowski* (4 samples). Abbas and El-Dakroury (1985) recorded the same two parasitoids in Egypt.

1.4 Parasitoids of the beet armyworm, *Spodoptera exigua* (Noctuidae) infesting sweet potato, potato, cabbage, okra and alfalfa: *Bracon gelechiae, Chelonus* sp. (Hym., Braconidae), *Peribaea orbata* Wied. (Diptera: Tachinidae), *Microplitis* sp. (Hym.; Braconidae).

The second parasitoid was identified by A.K. Walker who mentioned that "Unable to identify further as the taxonomy of this group has been inadequately studied from your area".

Three samples of S.exigua were collected from sweet potato during April-June. Percentage of parasitism by the three species was 41%. Four samples were collected from cabbage during November and December and parasitism was 45.1%. Only one sample was collected from clover in April and percentage of parasitism was 16.0% (only by P.orbata). No parasitoids could be obtained from three samples collected from potato and okra.

1.5 Parasitoids of *Heliothis armigera* (Noctuidae) infesting alfalfa, okra, tomato and potato: *Exorista larvarum* (Diptera:Tachinidae), *Bracon gelechiae, Microplitis* sp.

Only *E.larvarum* was obtained from *H.armigera* larvae collected from okra during June-August. The total number of larvae collected was 215 and percentage of parasitism was 3.2%. No parasitoids could be obtained from larvae collected from tomato or potato. The three mentioned parasitoids were obtained from larvae collected from alfalfa. The total percentages of parasitism were 12% in May and 2.6% in July. No parasitoids could be obtained from larvae collected during August-Novermber.

1.6 Parasitoids of the long-tailed mealybug, *Pseudococcus longispinus* infesting custard apple and ornamentals: *Blepyrus insularis* (Cameron); (Hym; Encyrtidae).

It was the sole parasitoid emerged from *P.longispinus* nymphs. The parasitoid was obtained from all samples collected from March 1994 to January 1995.

1.7 Parasitoids of the citrus mealybug, *Planococcus citri* infesting citrus and bana-

na: *Leptomastidea* sp. near *jeanneli* Mercet (Hym. Encyrtidae), *Coccophagus* sp. (Hym.: Aphelinidae), *Coccophagus* sp. (lycimnia group).

The first species was identified by J.S. Noyes who mentioned that "the species appears to be undescribed and is nearest to *L.jeaneli*, differing from this and all other species of the genus in the pattern of infuscation of the forewing.

The other two species were identified by *A.polaszet* with no comments.

Leptomastidea was obtained from only one sample of *P.citri* collected from banana in May, while *Coccophagus* spp. were obtained from 6 samples collected from April-June 1994. No parasitoids could be obtained from 9 samples collected during October, 1994 through January, 1995.

Four parasitoids were obtained from *P.citri* in Rumais (Northern region of Oman) (Anonymous, 1991). They were *Anagyrus agraensis, A.dactylopii, A.mirazi* and *Coccophagus* sp.

1.8 Parasitoids of mango waxscale, *Ceroplastes rubens: Cheiloneurus angustifrons* Compere (Hym.: Encyrtidae), *Prochiloneurus* sp. (Hym.: Encyrtidae).

The two parasitoids were identified by J.S. Noyes who mentioned that "It is not possible to identify *Prochiloneurus* sp. to species with certainly males belonging to this genus". *C.rubens* and its parasitoids occurred in two periods; April-June and October-December. Percentages of parasitism were very low; 1-4% in the first period and 1-5% in the second one.

2. Predators

2.1 Predators associated with mealybugs: *Nyphus* sp near *fenestratus* (Sahlberg) (*Coleop. Coccinellidae*):

It was associated with *Pseudococcus longispinus* on only custard apple and with *Planococcus citri* on coconut. The predator was identified by R.G. Booth who mentioned that "this species is similar in size and shape to *N.fenestratus* which is known from Saudi Arabia, but the male genitalia are different.

- *Nyphus* sp. near *Castanicolor* (Sicard).

It was associated with *P.longispinus* on ornamentals. The predator was identified by R.G. Booth who mentioned that "This African group contains several similar

species of *Nyphus* with similar genitalia, and it was not possible to name your specimens to species level".

- *Rodalia* sp. (Coccinellidae):

It was the main and most common predator associated with *Icerya aegyptiaca* all the year round. It was identified by R.G. Booth who mentioned that "This species is unknown to me. It is similar to the widespread African species *R.iceryae* Janson, but has different genitalia. *R.capunica* Fursch, known to me only from the original description has a similar colour pattern, but has a different body shape and underside coloration".

- *Scymnus interraptus* (Coccinellidae)

Associated with *P.citri* on citrus and with *I.aegyptiaca* on citrus, guava and custard apple.

- Chrysoperla carnea Steph. (Neuroptera : Chrysopidae). Associated with *P.longispinus* on custard apple and ornamentals; with *I.aegyptiaca* on citrus, custard apple and ficus trees and with *I.purchasi* on custard apple.

- *Nesomicromus vagus* (Neuroptera; Hemerobiidae).

Associated with *I.purchasi* on custard apple.

- *Dicrodiplosis manihoti* Harris (Diptera: Cecidomyiidae).

It was the most common predator associated with the mealybugs, *P.longispinus* and *P.citri* on custard apple, banana, coconut and ornamentals.

Four species of predators were found to associate with *P.citri* in El-Rumais district; northern region of Oman, (Anonymous, 1991). They were *Dicrodiplosis manihoti, Nyphus* sp., *Phradonoma nobile* (Reitter) (Dermistidae, Coleoptera) and *Scymnus coccivora* Ayyar.

2.2 Predators associated with banana aphid; *Pentalonia nigronervosa*: *Paragus longiventris* Loew (Diptera: Syrphidae), *Scymnus interraptus, Chrysoperla carnea.*

The predators were found to associate with *P.nigronervosa* during August-November. The most common one was *P.longiventris* followed by *S.interraptus. C.carnea* occurred in few numbers.

2.3 Predators associated with mango waxscale, *C.rubens: Buchaaniella* sp. *near crassicornis Carayon* (Heteroptera:Anthocoridae), *Chilocorus nigritus* (Fab.) (Coleoptera: Coccinellidae).

The first predator was identified by G.M. Stanedahl who mentioned that "Specimens are similar but not identical to a paratype of *B.crassicornis* which is known only from Ivory coast."

C.nigritus was the most common and occurred in the two periods of infestation from April to June and from October to December. *B.crassicornis*, however, occurred in few numbers during April-June.

2.4 Predators prevailing in alfalfa fields:

C.carnea, Geocoris sp. (Heteroptera: Geocoridae), *Orius albidipennis* (Heteroptera : Anthocoridae), *Nabis capsiformis* (Heteroptera : Nabidae), *Paederus alfierii* (Coleoptera : Staphelinidae). and *Scymnus interraptus.*

All forementioned predators were found frequently in alfalfa fields almost during the whole year. *P.alfierii* and *S.interruptus* were the most common, while *N.capsiformis* and *Geocoris* sp. occurred in few numbers.

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الأعداء الطبيعية لأهم الآفات الحشرية فى صلالة – سلطنة عمان

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تم حصر الأعداء الطبيعية للآفات الحشرية الهامة التى تصيب محاصيل الحقل والخضر وأشجار الفاكهة ونباتات الزينة وذلك خلال الفترة من مارس ١٩٩٤ حتى فبراير ١٩٩٥ فى مدينة صلالة بسلطنة عمان. تتضمن هذه الآفات ٤ أنواع من البق الدقيقى، الحشرة القشرية الشمعية سيروبلاستس روبتر، فراشة درنات البطاطس، فراشة البطاطا، الفراشة ذات الظهر الماسى، دودة اللوز الأمريكية، دودة القطن الصغيرة.

وقد وجد من هذه الدراسة حوالى ثلاثة عشر طفيلا واربعة عشر مفترسا وأن معظم الأعداء الطبيعية التى أمكن الحصول عليها تسجل لأول مرة فى سلطنة عمان.