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The Major Insect Pests of Economic Importance on Vegetable Crops and Their Biology in Al-Qasir District-Karak-Jordan

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Abstract: The major insect pests of economic importance on vegetable crops and their biology were investigated during three successive seasons (1997-1999). Twelve species belonging to eight different families and four different orders Hemiptera, Homoptera, Thysanoptera and Lepidoptera were recorded on different host plants. Homopterous and Lepidopterous species are the most abundant, representing 42 and 33% , respectively, followed by Hemipterous (17%) and Thysanoptera (8%) orders. Results showed the importance of many species of insects as pests of vegetable crops in the area. Most of them are known only to cause economic damage in the Mediterranean basin.

Key words: Insect pests, Hemiptera, Homoptera, Thysanoptera, Lepidoptera

Introduction

Insect pests of vegetable crops are one of the main factors affecting the production of vegetables in Jordan. They attack vegetable plants immediately after planting or sowing and continue till harvest. Vegetable crop insects feed on the fruits, roots, flowers, leaves, stems and seeds of vegetable crops.

All vegetable cultivated area represent 2% of the total area of Al-Qasir district. It covers an area about 42313.2 hectare laying between longitude 35°-45' E and latitude 31°-16' N the average rainfall range between 178mm/year (Al-Mujib) and 384mm/year in high lands . The altitude range between 200m in Al-Mujib and around 1000m in Shihan (Al-Qasir Department of Agriculture; 1998).

The biology and development of different stages in life cycle, and its indicator dates and host plant species were reported from field observation and laboratory rearing under various constant temperatures as well as ambient condition in study area to determine the yearly generation. There were no studies or researches in this regard before (Sharaf, 1987) .

The objectives of present study were to; identify the major insect pests of economic importance on vegetable crops and their biology, and also to provide information which will be helpful in laying the foundations for further studies of integrated pest management.

Materials and Methods

The study was carried out in Al-Qasir district-Karak-Jordan during the years 1997-1999. Destructive insects were collected using several scientific collection methods to capture the most insect species that attack vegetable crops in study area.

Weekly field visits were conducted to collect the insects. Life cycle of insects collected from all parts of vegetables using different size of mesh wooden cages and Muslin clothes coverage were carefully followed. Most insects were transferred to the laboratory with their associated host under same natural condition and kept until emerged in adult stage. Different life stage periods were monitored along the years (Table 2).

Identification and arrangement were based scientifically on work of Borror *et al.* (1989).

Some insect species identification was confirmed by the international specialists in zoology and entomology in various institutes in Austria (Institute for Zoologie der Universitate, Innsbruck) and Turkey (Ege Universitesi, Ziraat Fakultesi, Bitki Koruma Bolumu).

Results and Discussion

Different stages of life cycle of insect species along with description of study area, host plant, biology and generation indicator tables with dates and (X) and (-) referring to observed, and not observed ones respectively are given below:

I. Hemiptera order
A. Miridae family
I. *Nezidicoris tenius* Reut
(Tomato bug)
Host plant in study area: Tomato, eggplant.

Eggs: Cylindrical shape, white colour.

Nymph: Same as adult but different size pale colour on hatching.

Table 1: Major insect pests of economic importance on vegetable crops in Al-Qasir district / Karak-Jordan.

No	Order	No	Family	No	Species	Host plant in area
I	Hemiptera	A	Miridae	1.	*Nezidicoris tenius* Reut	Tomato, eggplant
		B	Pentatomidae	2.	*Nezara viridula* (L.)	Tomato
II	Homoptera	A	Jassidae	1.	*Empoasca lypica* Bargevin	Tomato, eggplant.
		B	Aleyrodidae	2.	*Bemisia tabaci* Gennadius	Tomato, cucumber, eggplant
		C	Aphididae	3.	*Aphis gossypi* Glover	Tomato, cucumber, pepper
				4.	*Aphis fobae* (Scopoli)	Brood bean, phaseolus
				5.	*Myzus persicae* (Sulzer)	Tomato, eggplant, lettuce, cucumber
III	Thysanoptera	A	Thripidae	1.	*Thrips tabaci* Lindeman	Onion, garlic, beans, eggplant, wheat barley.
IV	Lepidoptera	A	Pieridae	1.	*Pieris rapae* L.	Cabbage, cauliflower
		B	Noctuidae	2.	*Agrotis ipsilon* Hufnagel	Tomato, eggplant, weeds.
				3.	*Helicoverpa armigera* Hubner	Tomato, chickpea, weeds.
				4.	*Spodoptera exigua* Hubner	Tomato, Cabbage, pepper.

Table 2: Major insect pests of economic importance on vegetable crops and their yearly generation and life cycle duration in Al-Qasir district / Karak-Jordan.

Species	Generation per year	Life cycle duration / days
Nezidicoris tenius Reut	5	26-37
Nezara viridula (L.)	3	35-52
Empoasca lypica Bargevin	6	21-28
Bemisia tabaci Gennadius	10	26-30
Aphis gossypi Glover	Several	4-10
Aphis fobae (Scopoli)	30	12-23
Myzus persicae (Sulzer)	Several	4-10
Thrips tabaci lindeman	12	13-21
Pieris rapae L	3	30-46
Agrotis ipsilon Hufnagel	4	45-47
Helicoverpa armigera Hubner	3	22-35
Spodoptera exigua Hubner	8	25-49

Adult: Small elongate shape, pale green colour except apical part of antennae and rostrum is brown colour. Hemelytron fore wings, has 4 dark spots for each. It is 3 mm long.

Biology: Field observation indicate 5 generations a year (Table 3) over- wintering in both nymphal and adult stage. Life cycle requires only 35 days under field condition in study area. Adult female after mating lays group of eggs during spring inside plant tissue. Eggs hatch in 5-7 days, nymphal stage, 5 instar lasts about 21-30 days

Table 3: *Nezidicoris tenius* Reut life stages

Observation date	Egg stage	Nymphal stage	Adult stage
8.4.1997	X	X	X
6.5.1997	-	X	-
17.5.1997	X	-	X
12.6.1997	-	X	-
22.6.1997	X	-	X
25.7.1997	-	X	-
10.8.1997	X	-	X
2.9.1997	-	X	X
10.9.1997	X	-	X
17.9.1997	-	X	-
15.10.1997	-	-	X
1.4.1998	X	-	X
9.5.1998	-	X	-
16.5.1998	X	-	X
13.6.1998	-	X	-
12.8.1998	X	-	X
5.9.1998	-	X	X

B. Pentatomidae family
2. *Nezara viridula* (L.)
(Green stunk bug)
Host plant in study area: Tomato.

Eggs: Cylindrical shape, creamy white colour when laid, turning to yellowish green. It is 1.2mm long and 0.75mm wide.

Nymph: Different colours; first instar red, second instar brown, third instar dark brown; fourth and fifth instar green; full grown nymph 13mm long.

Adult: Small head flat and oval, body colour with three variations, ranging from apple to reddish-brown, second thoracic scutellum cover most of abdomen part; size (15X8mm^2), produce strong scent that is discharged from dorsal metathoracic gland as a defense reaction against enemies (Ishiwatari, 1974).

Biology: Green stunk bug showed only 3 generations a year in study area (Table 4), adult females emerge from overwintering sites in early spring; female deposits about 700 eggs on the under side of leaves from early March until November, the eggs are hatched in about 7 days, hatching nymphs pass through 5 instars which take about (42-45) days; first three nymphal stage period (14 days) still gregarious; 4th instar nymphs 7 days and 5th instar nymphs two week (Liljesthrom, 1999) both nymphs and adults fed by piercing plant tissue and sucking juice

Table 4: *Nezara viridula* (L.) life stages

observation date	Egg Stage	Nymphal Stage	Adult stage
15.4.1997	X	X	X
26.4.1997	X	X	X
5.5.1997	X	X	X
25.5.1997	X	-	X
15.6.1998	X	X	X
22.7.1998	X	X	X
2.8.1998	-	X	X
15.9.1999	-	-	X
10.10.1999	-	-	X
30.10.1999	-	-	X

II. Homoptera order
A. Jassidae family
1. *Empoasca lypica* Bargevin
(Eggplant jassid)
Host plant in study area: Tomato, eggplant.

Eggs: Oval shape, whitish colour, 1mm long and 0.6mm wide.

Nymph: Up on hatching, pale in colour , at each molting colour changes slightly to final green. It is 2.6mm when full grown.

Adult: Narrow elongate body with light green colour, wings longer than abdomen, fore wings light green and hind wings transparent; 3.3mm long.

Biology: Study area field observation indicate 6 generations a year (Table 5), The overwintering adults emerge during early spring. Three days old mated female lays 5 eggs inside plant tissue; eggs incubation period take about one week. Hatching nymphs pass through 5 instars which lasts about 20 days. Each generation need 21-28 days under optimal climatic conditions (Hamdy, 1992).

B. Aleyrodidae family
2. *Bemisia tabaci* Gennadius
(White fly)

Table 5: *Empoasca lypica* Bargevin life stages

observation date	Egg Stage	Nymphal Stage	Adult stage
21.3.1997	X	-	X
30.3.1997	-	X	X
15.4.1997	X	-	X
20.4.997	-	X	X
10.5.1997	X	-	X
17.5.1997	X	X	-
7.5.1998	X	-	X
10.5.1998	X	X	X
22.5.1998	X	-	X
25.5.1998	X	X	X
10.6.1998	X	-	X
15.6.1998	X	X	X
5.7.1999	X	-	X
12.7.1999	-	X	X
30.7.1999	X	-	X
7.9.1999	X	X	-

Table 6: *Bemisia tabaci* Gennadius life stages

observation date	Eggs	Nymphs	Pupae	Adult
15.3.1997	X	-	-	X
25.3.1997	-	X	-	X
9.4.1997	-	-	X	X
22.4.1997	-	-	X	X
28.4.1997	X	X	X	X
10.5.1997	-	-	X	X
20.5.1997	X	-	-	X
26.5.1997	-	X	X	X
7.6.1997	-	-	X	X
21.6.1997	-	X	-	X
9.7.1997	X	X	-	X
12.7.1997	-	X	X	X
25.8.1997	X	X	-	X
20.9.1997	X	-	-	X
6.10.1997	-	X	X	X
11.10.1997	X	-	X	X
20.10.1997	-	X	X	X
9.11.1997	X	X	-	X
28.3.1998	-	X	-	X
10.4.1998	-	X	X	X
7.6.1998	-	-	X	X
17.9.1998	X	-	X	X

Host plant in study area: Tomato, cucumber, eggplant.

Eggs: Oval green colour, become brown later, transparent (0.2X0.1mm^2) with 0.03mm pedicel length.

Nymph: Has three nymphal instar , crawling nymph (oval yellowish green 0.2X0.15 mm^2 in size and has 16 pair waxy setae appendages), second nymphal instar oval shape pale yellow colour, third nymphal instar oval yellow to green colour 0.7mm long.

Pupae: Curved oval shape, pale yellow colour and (0.65x0.48mm^2) in size with 8 waxy setae appendages.

Adult: Yellow coloured body covered with white waxy material, two pairs of yellow wings covered with white coloured waxy bloom, general size (1.2X0.4mm^2).

Biology: Study area observation indicate 10 generations a year (Table 6) it overwinters in pupal stage , adult fly emergence began in mid march mated female lays 100 eggs in tissue of plant leaves lower surface fixed with pedicel (Sharaf, 1986); eggs period 3-5 days, hatching first instar nymph period live 4 days, second instar nymphal period live 3-5 days and third nymphal instar period live 4 days; pupal stage take about 12 days, parthenogenesis reproduction has been seen in field. Total life cycle in study area is 27 days (Pereira *et al.*, 1996).

Table 7: *Aphis gossypii* Glover life stages

observation date	nymph	Apterus	Alatus
4.3.1997	X	X	-
22.3.1997	X	X	-
20.10.1997	X	X	X
1.12.1997	X	X	-
9.3.1998	X	X	-
7.4.1998	X	X	-
10.4.1998	X	X	-
10.7.1998	X	X	X
4.11.1999	X	X	-
4.3.1999	X	X	-
20.3.1999	X	X	-

C. Aphididae family

3. *Aphis gossypii* Glover

(Melon aphid)

Host plant in study area: Cucumber, Tomato, pepper.

Table 8: *Aphis fabae* (Scopoli) life stages

observation date	nymph	Apterus	Alatus
12.2.1997	X	X	X
22.2.1997	X	X	-
25.3.1997	X	X	X
21.4.1997	X	X	-
10.5.1997	X	X	X
10.6.1997	X	X	-
5.7.1997	X	X	X
7.12.1997	X	X	X
15.2.1998	X	X	X
30.3.1998	X	X	X
3.4.1998	X	X	X
21.4.1998	X	X	X
10.5.1998	X	X	X
5.6.1998	X	X	X
5.7.1999	X	X	X
7.12.1999	X	X	X

Table 9: *Myzus persicae* (Sulzer) life stages

observation date	Vivipare	Apterus	Alatus	Egg
25.10.1997	X	X	X	X
10.11.1997	X	X	X	X
9.11.19971	X	X	X	X
12.2.1997	-	-	-	X
20.1.1998	-	-	-	X
10.2.1998	-	-	-	X
20.3.1998	-	X	-	-
10.4.1998	X	X	-	-
25.4.1999	X	X	-	-
10.5.1999	X	X	-	-

Table 10: *Thrips tabaci* (Lindeman) life stages

observation date	Eggs	Nymphs	Pupae	Adult
22.3.1997	X	-	-	X
7.4.1997	-	X	-	X
15.4.1997	-	X	X	X
20.4.1997	X	-	-	X
7.5.1997	-	-	X	X
24.5.1997	-	X	X	X
15.6.1997	X	X	X	X
12.7.1997	X	X	X	X
6.8.1997	X	X	-	X
2.9.1997	-	X	X	X
10.9.1997	X	X	-	X
12.10.1997	X	-	X	X
25.10.1997	X	-	X	X
28.3.1998	X	X	-	X
17.4.1998	-	X	X	X
23.5.1998	-	X	X	X
13.6.1998	-	X	X	X
13.7.1999	-	X	X	X
11.9.1999	X	X	-	X

Nymph: Pale green to yellow, sometimes white colour.

Adult: Mostly soft bodied and globular; they vary in colour from pale green-yellow and dark green or black; legs yellow to green, antennae reaching the middle of body or slightly beyond it; cauda like body colour and about one third of length; it is 1.5mm long.

Biology: In study area the aphid indicate short life cycle reaching one week (Table 7); insect produced parthenogenetically; 2 days old females give living birth 55-60 nymphs during spring and fall; Aphids are gregarious and occurs in colony, nymphal stage has 4 instars within period about 4-10 days (Al-Dryhim *et al.*, 1995), aphid reached maximum number during April, September and October, numbers decreased during May and early June, disappear from mid June until mid August in Summer and during November, December, January, February and March in winter (Swirski, 1993).

4. *Aphis fabae* (Scopoli)
(Black bean aphid)
Host plant in study area: Broad bean, phaseolus.

Nymph: Similar with wing less adults but smaller.

Adult: Oval shape black to dark , mostly olive-green in colour with marking, 2.2mm long (Blackman *et al.*, 1984)

Table 11: *Pieris rapae* (L.) life stages

observation date	Egg	Larvae	Pupae	Adult
10.3.1997	X	-	-	X
19.3.1997	-	X	-	-
15.4.1997	-	X	X	-
7.5.1997	X	-	X	X
25.5.1997	-	X	-	-
21.6.1997	-	-	X	-
25.6.1997	X	-	X	X
25.10.1997	X	-	-	X
10.11.1997	X	X	-	-
6.12.1997	-	-	X	X
15.12.1997	X	-	-	X
7.3.1998	X	-	-	X
15.3.1998	-	X	-	-
10.4.1998	-	-	X	X
10.5.1998	X	-	-	X
15.5.1998	X	-	-	X
10.6.1998	-	X	-	-
20.6.1998	-	-	X	X
30.6.1998	X	-	-	X
1.11.1998	X	-	-	X
25.11.1999	-	X	-	-
10.12.1999	-	-	X	X
25.12.1999	X	-	X	X

Table 12: *Agrotis ipsilon* Hufnagel life stages

observation date	Egg	Larvae	Pupae	Adults
14.5.1997	-	-	X	X
25.5.1997	X	-	X	X
21.6.1997	-	X	X	-
5.7.1997	X	X	X	X
26.7.1997	-	X	X	X
25.8.1997	-	X	X	X
10.9.1997	X	X	-	X
15.9.1997	X	X	-	X
20.10.1997	-	X	X	X
1.11.1997	X	X	X	X
10.11.997	-	-	X	X
1.6.1998	X	X	-	X
20.6.1998	-	X	-	-
1.7.1998	-	-	X	X
27..7.1998	X	X	-	X
27.8.1998	-	X	X	X
5.9.1998	X	X	-	X
15.9.1998	X	X	-	X
20.10.1998	X	X	X	X
20.11.1998	-	X	X	X
15.12.1998	-	X	X	X

Biology: The observation indicated 30 generations a year (Table 8) overwinters wing less females are hatched from the eggs in early spring, after mating produced young which in turn produced winged generation of migrating winged females, mostly production increased during spring (March; April; May) also occurs during(November; December; January; February) and reach peak during July; often found accompanied with *Myzus persicae* Sulzer. Nymphal stage has 4 instars ; each instar period depend on weather conditions, 1st instar period 2-7 days; 2nd instar period 2-8 days; 3rd and 4th instar take 4 days each (Mustafa *et al.*, 1998).

Table 13: *Helicoverpa armigera* Hubner life stages

observation date	Egg	Larvae	Pupae	Adults
15.3.1997	-	-	X	-
26.3.1997	X	-	X	X
9.4.1997	-	X	-	X
7.5.1997	-	-	X	X
14.5.1997	X	-	X	X
21.5.1997	X	-	-	X
4.6.1997	-	X	X	-
18.6.1997	-	-	X	-
28.6.1997	X	-	X	X
5.7.1997	-	X	-	-
16.7.1997	-	-	X	X
2.4.1998	X	X	X	X
10.5.1998	-	-	X	X
24.5.1998	X	X	-	X
18.6.1998	-	-	X	X
29.6.1998	X	X	-	X
16.7.1998	-	-	X	X
24.7.1998	-	-	X	X

5. *Myzus persicae* (Sulzer)
(Green peach aphid)
Host plant in study area: Tomato; eggplants lettuce; cucumber.

Egg: Bright black colour; very small 0.2mm long and distinguished with three longitudinal lines dorsally.

Nymph: Olive green colour; resemble parent 2.1mm long.

Adult: It is about 2.4mm in length; wingless from yellow to green colour, distinguished with 3 brown longitudinal lines extending one in middle and two laterally; cornicles in opposite direction, double length of cauda (Bodenheimer and Swirsky, 1957).

Biology: Adult females called ovipare after mated by male during fall, ovipare lay about 10 fertilized eggs sexually in the crevices around bases of peach trees, (Van Emden *et al.*, 1969), which spent the winter as a pale green coloured eggs. Hatch in early March into soft-bodied olive-green nymphs, which fed by opening buds and after maturity rapidly build up colonies of greenish wingless females which give birth to living young (around 50 progeny) through several generations (Table 9). Early in summer winged forms are also produced, where they spend the summer as colonies of nymphs and wingless adults. Winged forms are again produced in Autumn, which fly back to the peach trees to produce wingless females which lay eggs around the bases of the buds (Swirski, 1963).

III. Thysanoptera order
A) Thripidae family
1) *Thrips tabaci* (Lindeman)
(Onion thrips)
Host plant in study area: Onion, garlic, beans, eggplant, wheat, barley.

Eggs: Curved kidney shape, white transparent colour and it is 0.25mm long.

Nymph: Creamy yellow colour, with dark brown compound eyes, 1mm in length.

Adult: Small elongate shape, pale yellowish or brownish colour, 1.1mm in length, female wings narrow fringes with hair, abdomen end blunt with pale strip, winged male tarsus claws absent.

Biology: Life cycle requires only 13 days during warm months and one month during winter, study area observation indicate 12 generations a year (Table 10), winter is spent as an adult under litter material, activity start in late march, sexually and parthenogenesis reproduction present; mated female lays around 50 eggs inside slits in the leaf tissue eggs hatching period 5-10 days (Ferrari, 1980) , hatching nymphs 4 instar one day old first instar not fed, second instar occurs in one day and fed by plant juice for three days, third instar fed for 2 days nymphal total period, 4-7 days (Hill, 1985) then pupate in mud cell for four days.

Table 14: *Spodoptera exigua* Hubner life stages

observation date	Egg	Larvae	Pupae	Adults
5.3.1997	X	-	-	X
26.3.1997	-	X	X	X
9.4.1997	-	X	X	X
14.4.1997	X	X	-	X
5.5.1997	-	X	X	-
20.5.1997	X	X	X	X
28.5.1997	X	X	-	X
1.6.1997	-	X	X	-
4.6.1997	-	-	X	-
10.6.1997	X	X	-	X
17.6.1997	-	X	-	X
25.6.1997	-	X	X	X
2.7.1997	X	X	-	X
14.7.1997	-	X	X	X
20.7.1997	-	-	X	X
26.7.1997	X	X	-	X
5.8.1997	-	X	X	X
10.8.1997	-	X	X	X
16.8.1997	X	X	-	X
20.8.1997	-	X	-	X
6.9.1997	X	X	X	X
15.9.1997	-	X	X	X
20.9.1997	-	-	X	X
9.3.1998	X	-	-	X
31.3.1998	-	X	X	-
18.4.1998	X	X	-	X
5.5.1998	X	-	X	X
10.6.1998	X	-	X	X
22.6.1998	-	X	X	-
31.6.1998	X	-	X	X
4.7.1998	X	X	-	X
23.7.1998	-	-	X	X
15.8.1998	X	X	-	X
10.9.1998	-	X	X	X
25.9.1998	X	-	-	X

IV. Lepidoptera order
A. Pieridae family
1. *Pieris rapae* (L.)
(Small cabbage white butterfly)
Host plant in study area: Cabbage, cauliflower.

Egg: Pale yellow, spindle-shaped, 1mm long and have longitudinal ribs, reticulated transversely.

Larvae: Green, velvety appearance, dorsally yellow line and elongate yellow spiracular patches along their side, when full-grown with a brownish head and green body. The last larval instar is 25mm long.

Pupae: Cylindrical chrysalis ranging from pale brown through grey to green, the markings are black sometimes, only faint colour slung from the plant by a silken thread at the tip and it is 25mm long.

Adult: Adult light grey or yellowish butterfly, male bears one black spot on fore wing, whereas the female bears two. Average length 20mm and 50mm wingspan.

Biology: Study area indicate 3 generations per year (Table 11), adult emerge from overwintering chrysalides in spring mated females deposited 200 eggs singly on wild and cultivated cruciferous plants, egg hatch in one week, larvae which pass through 5 instar require 25 days, pupae 2 weeks and adult live about 2 weeks and numbers increased during fall (Hassan and El-Ghadrie, 1967).

B. Noctuidae family
2. *Agrotis ipsilon* Hufnagel
(Black cutworm)
Host plant in study area: Eggplant, tomato, weeds.

Egg: Sinuously ribbed and subconical in profile, early stages pale yellow in colour and late stages become brownish grey in colour, 0.6mm in diameter

Larvae: Cylindrical, early stages pale green, late stages dark green to brown in colour, with dark coloured lines along the spiracles and back, head dark-brown. Last larval instar has greasy appearance; and is 35mm long.

Pupae: Obtect, reddish brown colour with dark brown spiracles having two curved spines at the end of abdomen, 20 mm long.

Adult: Body 25mm long and 42mm wingspan, body and fore wings dark purple-brown to pale brown in colour marked with black lines and black streaks and rings. Hind wings white in colour with brown lines and veins , head and thorax purplish-brown colour, abdomen grayish-brown in colour. (Carter, 1984). Female has comb like, male thread like antennae.

Biology: Study area showed 4 generation per year (Table 12), moth emerge from over wintering larvae or pupae from late march to early may developed female after mating deposit more than 350 eggs singly or group round the base of host plant. Eggs hatch within one week, hatching larvae has 6 instars (Zaz , 1999) fed by plant foliage during night time and descending to the soil during day time. Larva stage about 4 weeks, pupation occurs in an earthen cell at a depth of 10-15cm lasts 10-12 days (Amin *et al.*, 1997).

3. *Heliocoverpa armigera* Hubner
(Tomato fruit worm)
Host plant in study area: Tomato, chickpea, weeds.

Eggs: Small dome-shaped, white yellowish colour.

Larvae: Cylindrical, pale green to dark brown colour. Covered with hair upper side black with double longitudinal line, yellow head has numerous points. Legs black 35mm long, when full-grown (Saoud *et al.*, 1989).

Pupae: Obtect, pale brown colour, average length 16mm each found inside silken cocoon with two spine at abdomen end each 1mm long (Saoud *et al.*, 1989).

Adult: Stout bodied and black colour in general, it is 15mm long and 33mm wingspan, forewing brown to yellowish and has brown strip on marginal area, hind wings creamy yellow with large smoky areas on the margins, fed by plant nectar.

Biology: There are 3 generations per year in study area (Table 13) (Tahhan, 1982) and over wintering occurs in the pupal

stage, male live for some days whereas female live 5-7 days, Nocturnal species mostly occurs during May and June, after mating around 200-240 eggs are laid singly (Jayaraj, 1981) on terminals and foliage in randoman shape egg period 4-6 days, hatching larvae fed on leaves first 2-3 days, 5 days old larvae fed by fruit, larval stage period 10-17 days has 5 molting instar, pupation take place at 3-8cm inside soil pupae covered with silken cocoon period 8-12 days (Akashe *et al.*, 1997).

4. *Spodoptera exiqua* Hubner
(Lesser cotton leaf worm)
(Beet army worm)
Host plant in study area: Tomato, cabbage, Pepper.

Egg: Conical shape, ribbed , nearly spheroid range in colour from greenish grey when freshly laid, to cream colour.

Larvae: Cylindrical shape early stage light green turning to white grey and two green lateral line extending along the body. It is 30mm, when full-grown (Benada *et al.*, 1987).

Pupae: Cylindrical shape obtect, dark brown colour, it is 15mm long, abdomen end with 4 spine.

Adult: Grey to grey-brown colour moth, 13mm long fore wingspan 27mm, each forewing has two kidney and round shape spots and black spots on marginal area, hind wing grey to white, marginal area with brown veins, antennae type is setaceous.

Biology: Study area indicate 8 generations per year (Hill, 1985); (Table 14) one day old female emerge from pupation cells in the soil during spring after mating deposits around 290 eggs in cluster shapes at lower surface of plant leaves eggs hatch in 3 days, 5 instar larvae last 2-3 weeks pupation take place in silken cocoon inside soil and lasts 8-25 days (Ahmed *et al.*, 1997), 4th and 5th larval instar fed on plant during night .

The results mainly show the abundant Homopterous families including the more important species of economic insects (Table 1) especially in temperate regions, where they are principally vectors of plant diseases and they reproduce asexually and rapidly (parthenogenetically and viviparously). Also most species show high yearly generations and short duration of life cycle period (Table 2) and different host plants. Which indicate the importance of this insect pests on vegetable crops in Al-Qasir district / Karak-Jordan.

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