The Libyan Journal of Agriculture: volume 10, 1981

A Two-Year Study on the Population Trends of Certain Insect Groups Attracted to Rothamsted Light Traps in Tripoli (Libya)

NAWAL A. HESSEIN[1]

ABSTRACT

The population trends of 25 insect groups caught in Rothamsted light traps, located in the college farm at two sites, were reported during the 2 years of study. Brief discussion for the seasonal distribution of rate groups was offered. Both traps were supplied with normal light.

Larger catches were obtained by one of the traps located in an area of dense vegetation. The size of the catches for both traps was proportionally affected by factors such as: temperature; rain; relative humidity; existence or abundance of preferred host plants; presence or absence of host insects or natural enemies. These factors also affected the incidence of occurrence, i.e. the abundance and peaks for the seasonal distribution of many insect groups separately caught by the two light traps.

The present study showed that some groups were more abundant than others with very large catches reaching a maximum of 7,000, 8,000 and 3,500 insects per month from family Cicadellidae, moths from Microlepidoptera, and flies from Brachycera respectively, were caught by the 2 light traps in spring, summer and autumn. Smaller catches with a miximum of 280, 240, 450, 400, 800, 300, 500, 240, 240, 500, 340, and 400 insects per month were trapped in case of the hemipteran bugs *Creontiades pallidus* Rambur and *Acrosternum millierei* M. & R.; the green lacewings; the moths, *Mythimna unipuncta* Haw., *Spodoptera exigua* (Hb.), *Spodoptera littoralis* (Boisd.), *Rhodometra sacraria* L., *Ancylolomia innornata* stdgr., *Palpita unionalis* Hb.; the olive-fruit fly *Dacus oleae* Gmel; the scarabaeid *Aphodius lividus* (Ol.); and the braconid *Zele chlorophthalma* Nees, respectively.

INTRODUCTION

Surveys of insect pests and their distribution are essential information for any agro-ecosystem analysis and for the design of an integrated control programme. Therefore, the presence of a pest and its population trends have to be determined for a considerable period of time. This will aid in the establishment of the economic injury level and, subsequently, the economic threshold.

Light trapping is helpful in determining the flight activity, relative abundance, and seasonal population fluctuations. Several workers have used various kinds of light traps for these purposes (2,3,6,11,14,15,18). The United States Department of Agriculture is constantly monitoring insect population fluctuations by means of light traps (7,13). In England the Rothamsted light trap, along with other types, are in use (17).

The purpose of this study is to determine the incidence of occurrence and the population trends of certain insect species that are attracted to Rothamsted light traps

[1] *Department of Plant Protection, Faculty of Agriculture, University of Al-Fateh, Tripoli, S.P.L.A.J.*

in the college farm. This information will help in the prediction of infestation from common pests.

Information related to the occurrence and seasonal abundance of the natural enemies is also most important. The presence of natural enemies can be indicative of the presence, distribution, and abundance of their hosts and prey.

MATERIALS AND METHODS

Normal light was used in a similar procedure described in a previous report (12).

To determine the seasonal occurrence and the population trends of the insect groups under consideration, the experiments were carried out for a period of 2 years as follows: July 1975 to July 1977 for some groups; January 1976 to January 1978 for other groups; and May 1976 to May 1978 for the remaining groups.

The samples were collected twice a week from each trap. Each sample was placed in a paper bag and stored for a few days in a box containing naphthalin balls.

Specimens of each sample were sorted out according to identification done by the British Museum (12). Counting was carried out by hand-tally counters. Monthly totals for each group were recorded and plotted on graphs.

RESULTS AND DISCUSSION

The seasonal trends for some of the insect groups, especially those appearing regularly and in high numbers, are represented in figs 1–25. A brief discussion is given on the seasonal distribution of some other insect groups that were trapped in relatively lower numbers. Each figure included 2 curves, a solid line representing data for the light trap (A) which was located in an area with dense vegetation such as ornamental plants, grasses, lawns, shade trees, and few vegetable crops or fruit trees. The other curve in the figure is an interrupted line, representing the data for the light trap (B), that was located in an area with less vegetation such as shade and fruit trees, field and vegetable crops.

Except for a few cases, it was obvious that the size of catches in general were usually larger in light trap (A) as compared to light-trap (B). The 2 light traps were under the same climatic conditions, except for the relative humidity which was higher in the locality of the first trap, probably due to the dense vegetation. This could have resulted in the larger catches in (A). It was stated by Goel (8) that a high rate of humidity is very important for both egg hatching and adult emergence. Therefore, the dense vegetation present in area of light trap (A) supplied a wider range of host plant varieties, and more favourable conditions. The position of light trap (A), facing to the north, might have resulted in insects being trapped while flying in the direction of the wind. Taylor and French (17) reported that some of the sampling characteristics of the traps used were affected by downwind migration of moths through the sampling site.

Orthoptera:

Gryllidae—The seasonal occurrence of the field cricket *Modicogryllus palmetorum* (Krauss) is represented in Fig. 1. The highest number of this species occurred in July and August for the years 1975, 1976 and 1977.

Gryllotalpidae—Population trends for the mole cricket *Gryllotalpa africana* P. deB. were represented in Fig. 2. A higher number of insects were trapped from June to October 1976, compared to 1975 and 1977.

Tettigoniidae—A long-horned grasshopper identified as *Phaneroptera* sp. was occasionally attracted from March till November of 1976 and 1977, but in low numbers which did not exceed a total of 36 individuals during October.

Acrididae—Small numbers of unidentified grasshoppers were occasionally caught in spring and summer.

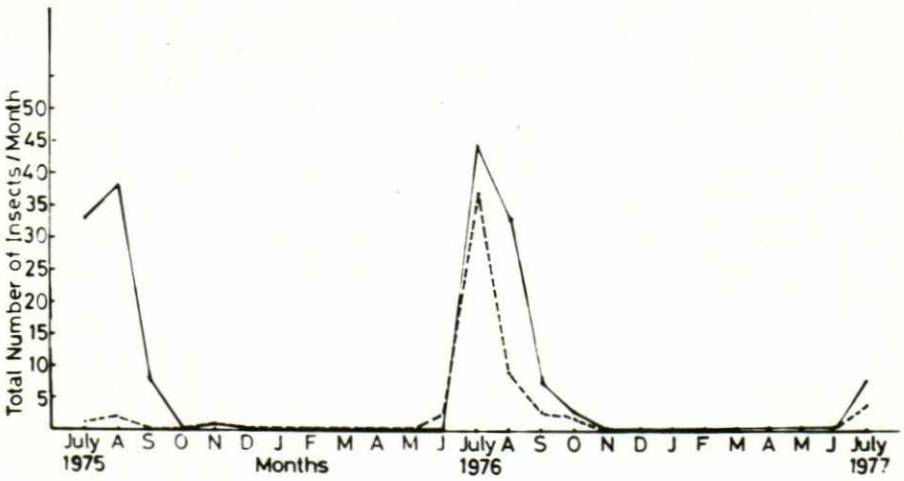

Fig. 1. *Modicogryllus palmetorum* (Krauss).
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

Dictyoptera:

Blattidae—An unidentified species of a cockroach was collected rarely during the period from July to October 1976 and 1977.

Mantidae—The two species of praying mantis *Mantis religiosa* L. and *Sphodromantis bioculata* Burm. were occasionally trapped. The former species was obtained during spring, summer and late autumn, but was especially scarce in November. During the months of July and October, a maximum of only two specimens of the two-spotted mantis were trapped.

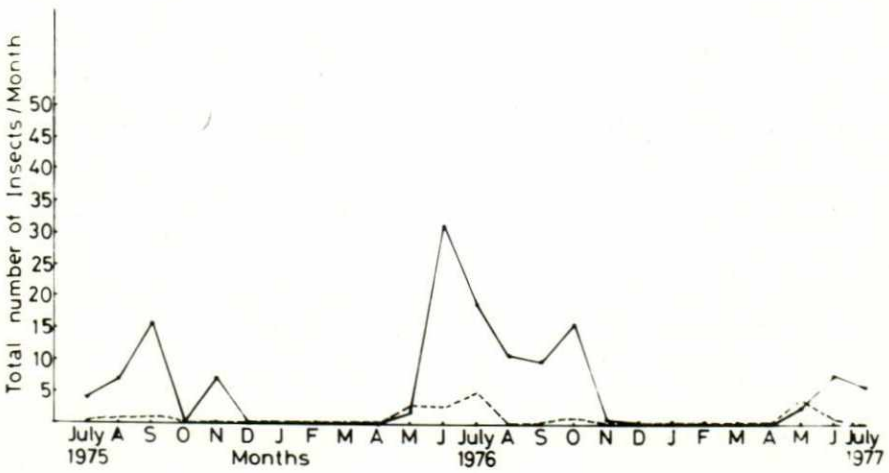

Fig. 2. *Gryllotalpa africana* P. de B.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

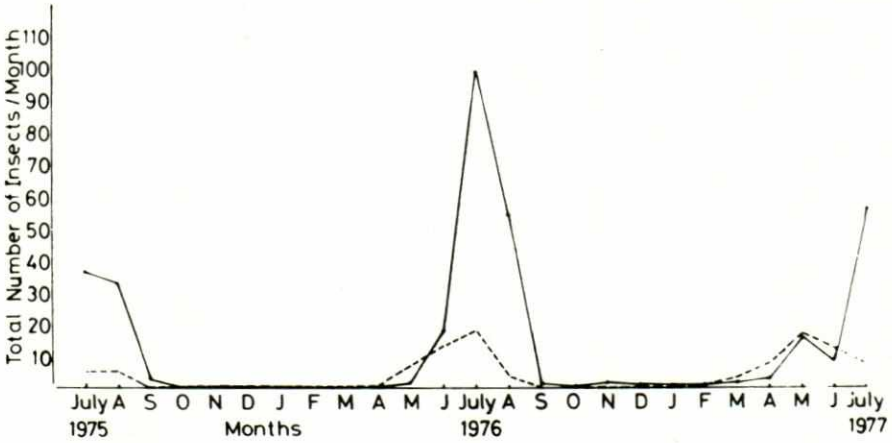

Fig. 3. *Macroscytus brunneus* (F.).
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

Hemiptera:

Cydnidae—The highest number of *Macroscytus brunneus* (F.) occurred during the months of May to August (Fig. 3). Few individuals of *Sehirus melanopterus* (H.S.) were attracted in spring and summer.

Miridae—Two species were attracted regularly and in considerable numbers. The leaf bug *Creontiades pallidus* Rambur was more abundant with a peak in May or June until October (Fig. 4), whereas many peaks were observed for *Tylorilygus pallidulus* (Blanchard), Fig. 5. The peak catches of the latter species were comparatively larger in the case of light trap (B) compared to (A); this might indicate a host preference for this species in the particular locality of light trap (B).

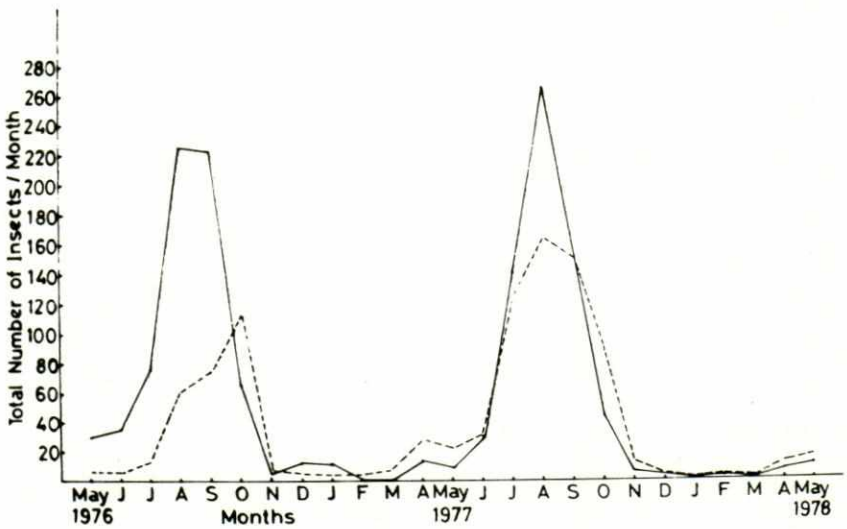

Fig. 4. *Creontiades pallidus* Ramber.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

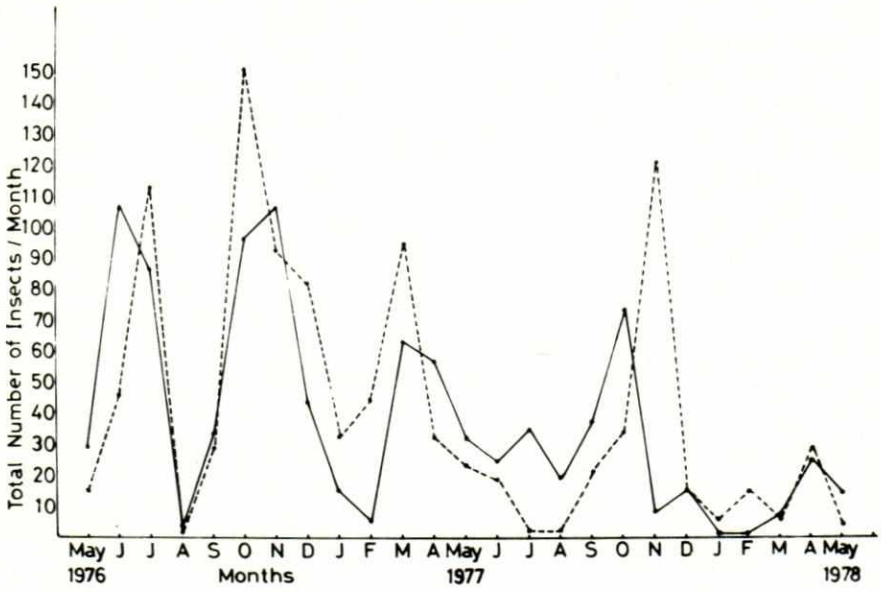

Fig. 5. *Tylorilygus pallidulus* (Blanchard).
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

Pentatomidae—A high number of the green stink-bug *Acrosternum millierei* M. and R. were trapped during the period from May or June until September (Fig. 6). Pentatomids are known to be more common on vegetable crops. This might be correlated with the larger catches trapped by light trap (B), located very close to areas with abundance of vegetable crops. As with many other insect groups, the numbers caught in 1976 were higher than those in 1975 and 1977.

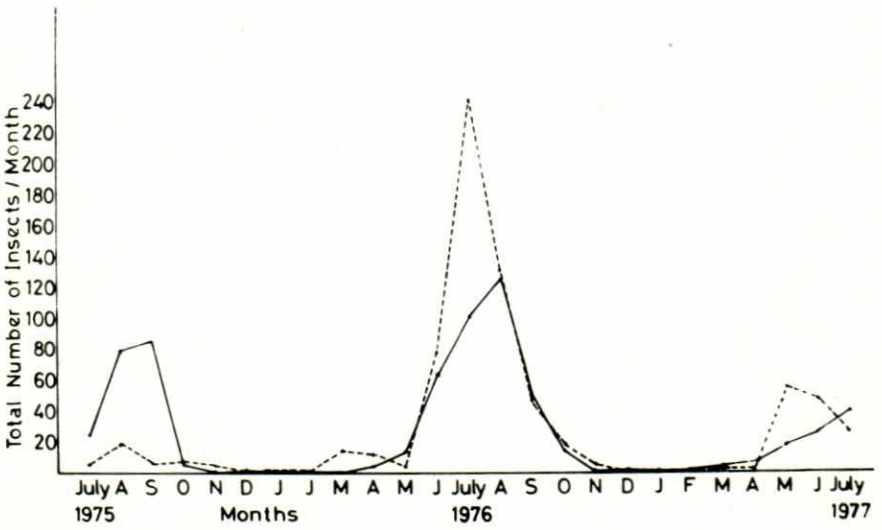

Fig. 6. *Acrosternum millierei* M. & R.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

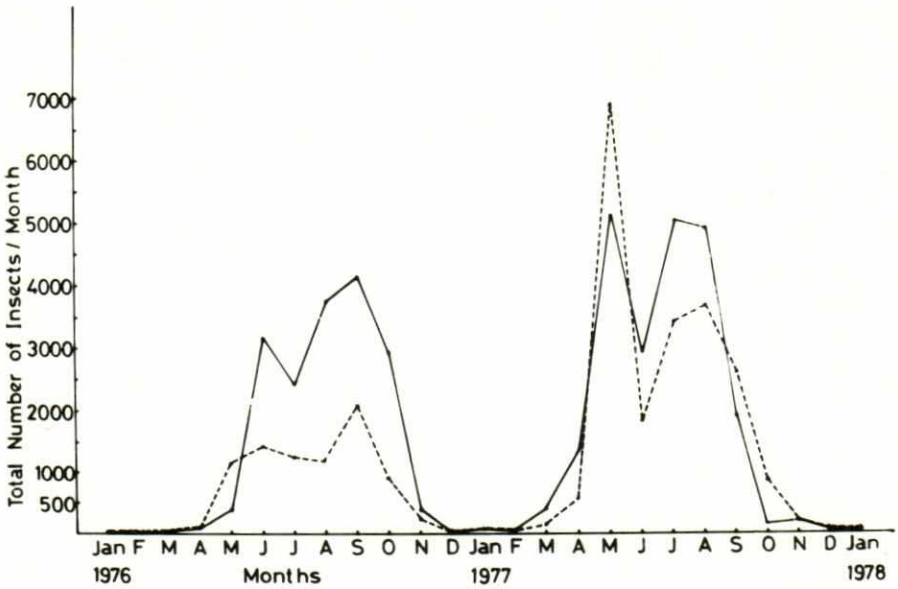

Fig. 7. Leafhoppers—Cicadellidae.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

Cicadellidae—More than twenty species were collected and identified (12). Among these species there were many leafhoppers which are significant plant pests and vectors of plant pathogenic viruses. High numbers were caught during the months of March, April, or May to September (Fig. 7). There was a correlation between the size

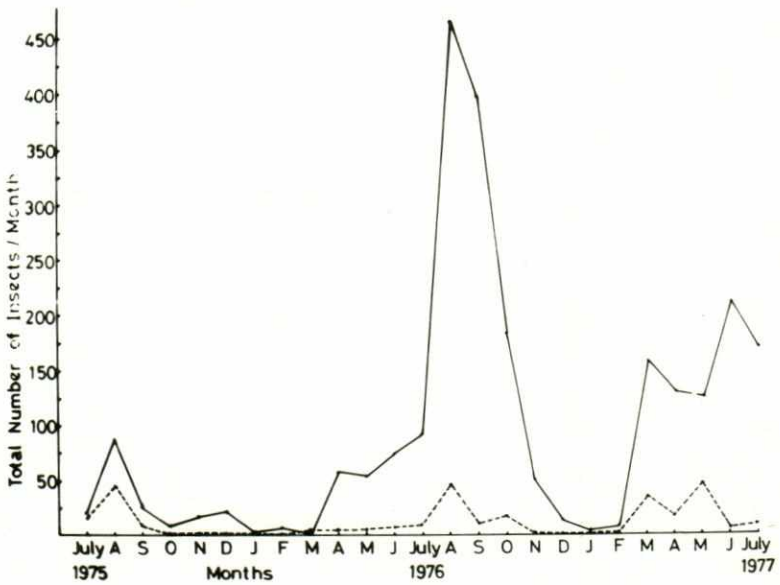

Fig. 8. The green lacewings.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

of catch and the degree of temperature. This group of insects is considered as one of the most abundant groups because it formed the largest catches in this study. This fact might encourage more detailed studies concerning taxonomic, economic, and biological aspects for the group.

Cicadidae—One or two specimens of an unknown species from the genus *Cicada* were trapped during the months of September to November 1976.

Dictyopharidae—A low number of an unidentified species from the genus *Dictyophara* was attracted during the period from May or July to November, with a maximum of 17 in October 1976 and 1977.

Tingidae—An unidentified species from this family was trapped in small numbers during the spring and summer.

Neuroptera:

Chrysopidae—Four species of green lacewings were collected and identified (12). These predatory insects feed mainly on aphids, however, they may prey on eggs of Lepidoptera, the crawlers of Coccoidea, the phytophagous mites and many others (4). This resulted in a correlation between the presence of these prey species and the abundance of the adults of the green lacewings. Higher numbers of this group occurred in March, or April, to November at the time when the mentioned prey species were abundant, especially the aphids and the phytophagous mites (Fig. 8).

Hemerobiidae—A low number of brown lacewings was trapped by the two light traps (Fig. 9). The seasonal distribution of the two identified groups was less regular compared to the green lacewings. They are known to be predatory on many prey species favoured by the green lacewings, however, it had been reported by Clausen (4) that they prefer particular types of host trees. In general they were uncommon.

Myrmeleontidae—Three species of ant-lions were caught. These insects seemed to be the least abundant neuropterans. Their maximum occurrence was recorded during the period from May to November (Fig. 9).

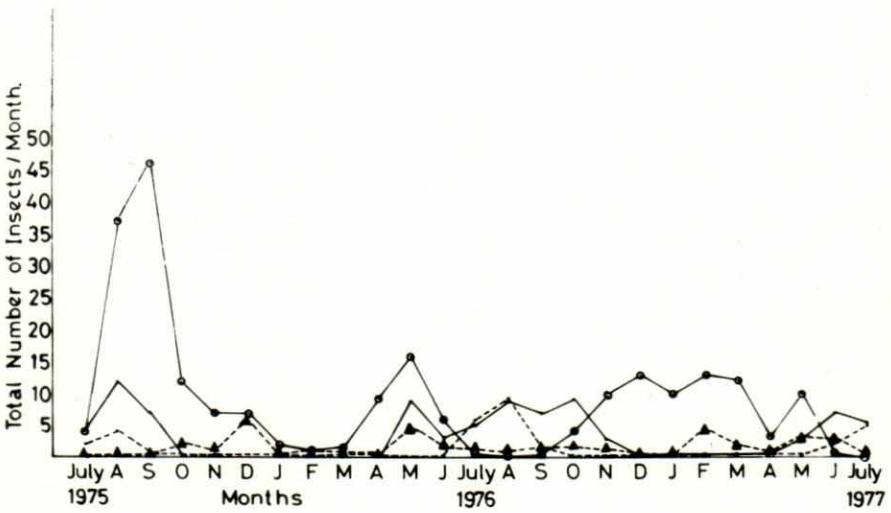

Fig. 9. Adults of the ant lions. ——
The brown lacewings. ○—○ ▲—▲

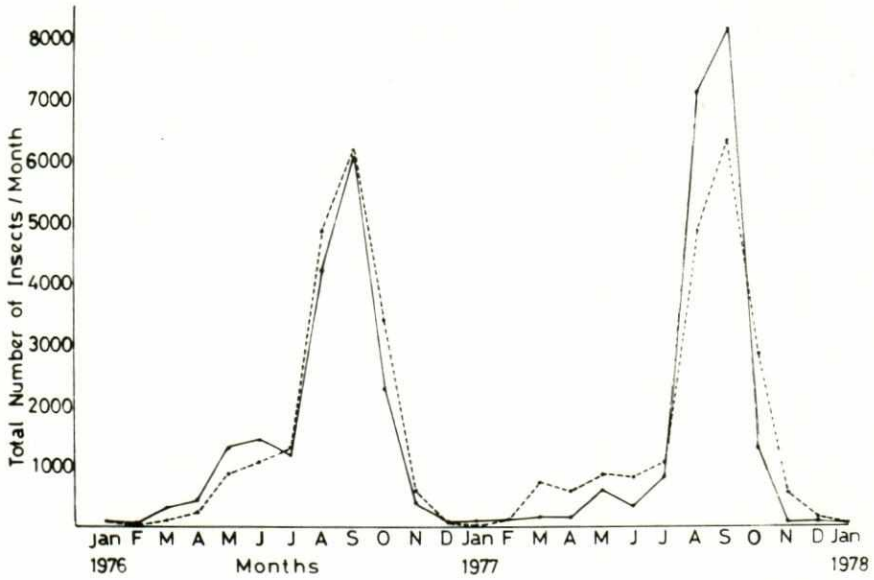

Fig. 10. Microlepidoptera.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

Lepidoptera:

Microlepidoptera—This was one of the most abundant insects caught by both light traps, especially at high temperatures. A high percentage of the catch in this group was the species *Dichomeris ianthes* Mayr. This moth species was reported as a serious pest of alfalfa by Ahmed (1). These microlepidopteran insects were abundant in spring, summer and autumn (Fig. 10).

Noctuidae—Many injurious species from this family were trapped. The numbers of insects caught are comparatively lower than in the previous group. It had been found that many lepidopteran species are attracted in much higher numbers to the black light (7) or to the mercury-vapour bulb (6). In the meantime, it was reported by Taylor and Brown (16) and Taylor and French (17) that the insect density was related to body-size in case of moths. They observed that slender-bodied moths belonging to the families Pyralidae and Geometridae, fly lower than the noctuids, whereas the sphingid moths fly at higher levels due to their large body and strong wings. Therefore, it can be safely concluded that the numbers of the moths trapped may have been affected by body characteristics and the height of the trap.

Three species of cutworms were identified. The catches of the brown cutworm *Agrotis spinefera* Hb. and the black cutworm *A. ypsilon* Rott. were comparatively small. More than one peak was achieved for both species as shown in Figs 11 and 12 respectively. The lowest densities of the brown cutworm occurred during the period November to January. Higher numbers were trapped in light trap (B), which indicates the known preference of that species to the vegetable crops present in this locality. Whereas in light trap (A), the highest numbers of the black cutworm occurred during January and February. This noctuid species has a wider range of host plants compared to other cutworms (10). In spite of the low temperatures occurring during this time of the year, the effect of vegetable crop presence was obvious. Few individuals

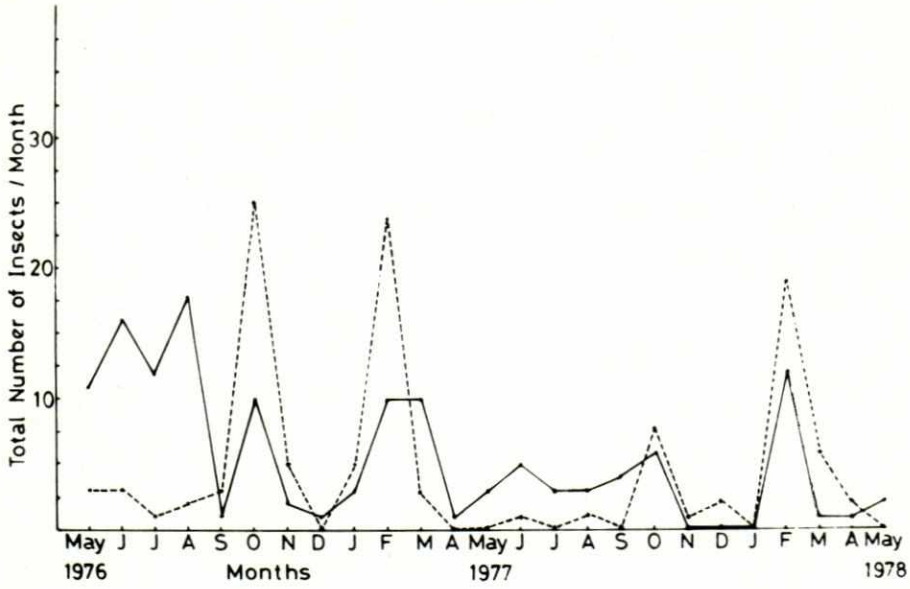

Fig. 11. *Agrotis spinefera* Hb.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

from *A. segetum* Schiff were trapped occasionally during March or September until November of 1976 and 1977.

Small catches were trapped from both semi-loopers *Autographa circumphlexa* L. and *A. gamma* L. The first species showed a different trend and higher numbers in 1976 compared to those in 1977 (Fig. 13). Variable trends were recorded for the other semi-looper. Relatively higher numbers occurred throughout a longer period of the first year compared to the second year, especially for light trap (A), Fig. 14. Moreover,

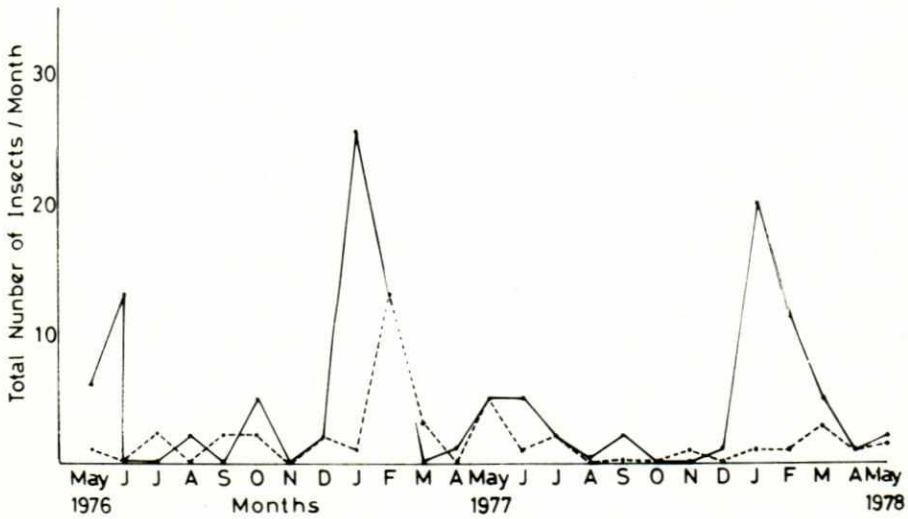

Fig. 12. *Agrotis ipsilon* Rott.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

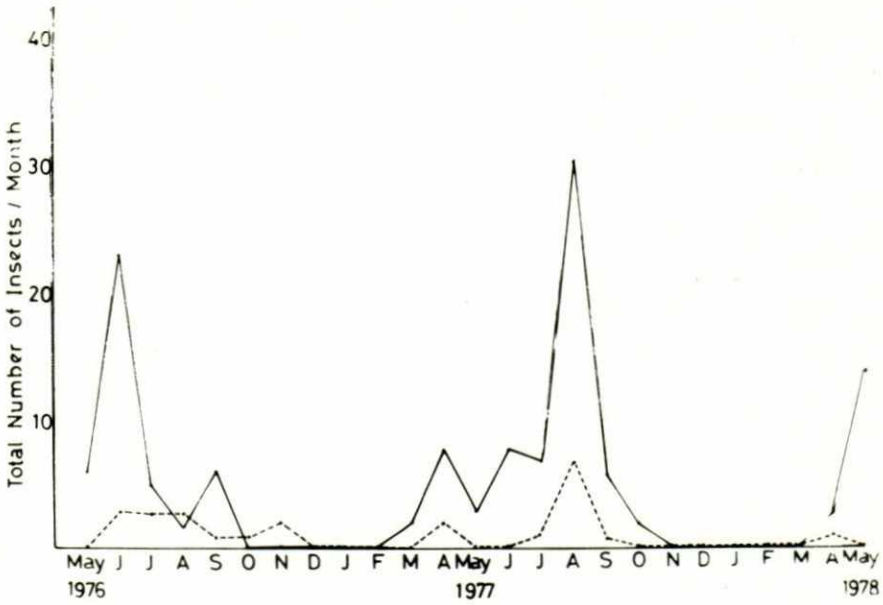

Fig. 13. *Autographa circumflexa* L.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

peaks occurred in different months in 1977 for each light trap. For these two cases, the difference in trends might be correlated to the existence of different host plants and climatic conditions in the years 1976 and 1977. It had been stated by Goel (9) that changes in the time of the rain are responsible for the difference in incidence of peak occurrence. A maximum of only three individuals from the semi-looper *Autographa ni* Hbn. occurred in spring and summer.

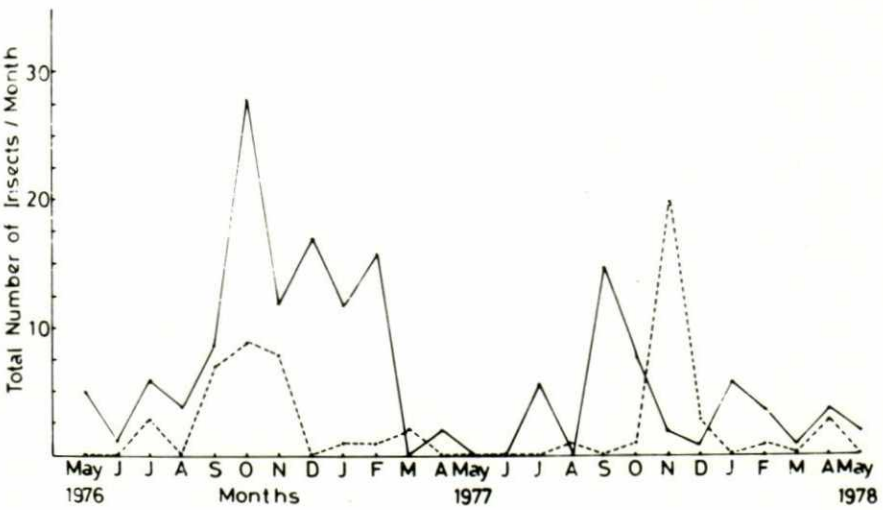

Fig. 14. *Autographa gamma* L.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

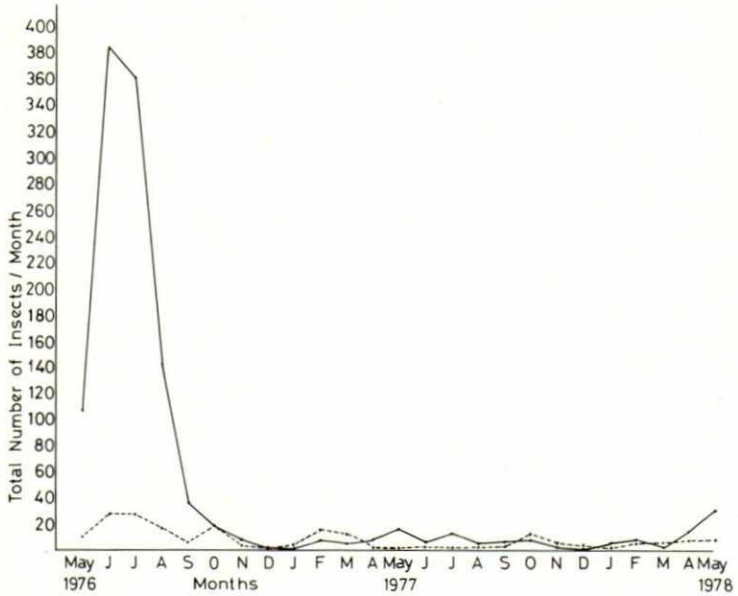

Fig. 15. *Mythimna unipuncta* Haw.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

While small catches were obtained from the previous noctuid species, larger ones were trapped from the noctuids *Mythimna unipuncta* Haw., *Spodoptera exigua* (Hb.) and *Spodoptera littoralis* (Boisd.)

Only one peak occurred in the case of the first noctuid during June and July 1976. However, small numbers of insects were caught in 1977 and 1978 (Fig. 15). Again, both climatic conditions and host plants might have been responsible for these differ-

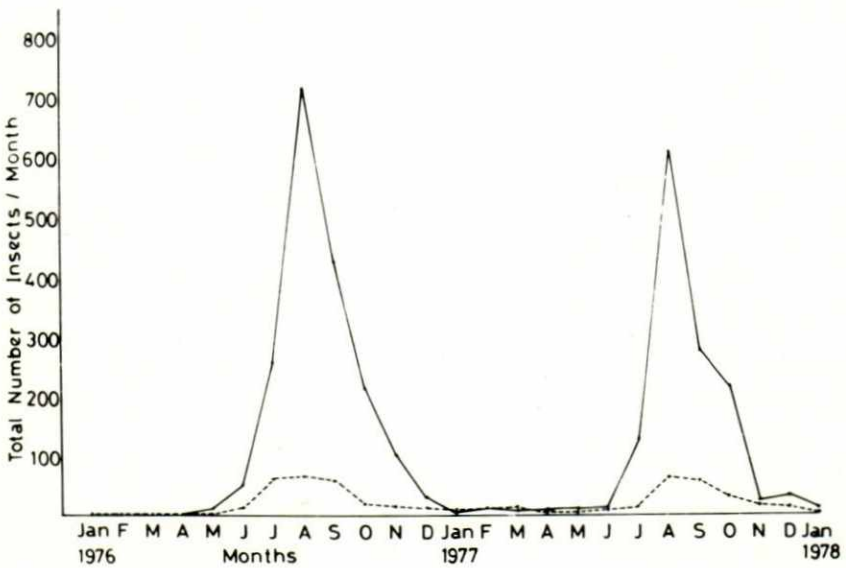

Fig. 16. *Spodoptera exigua* (Hb.)
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

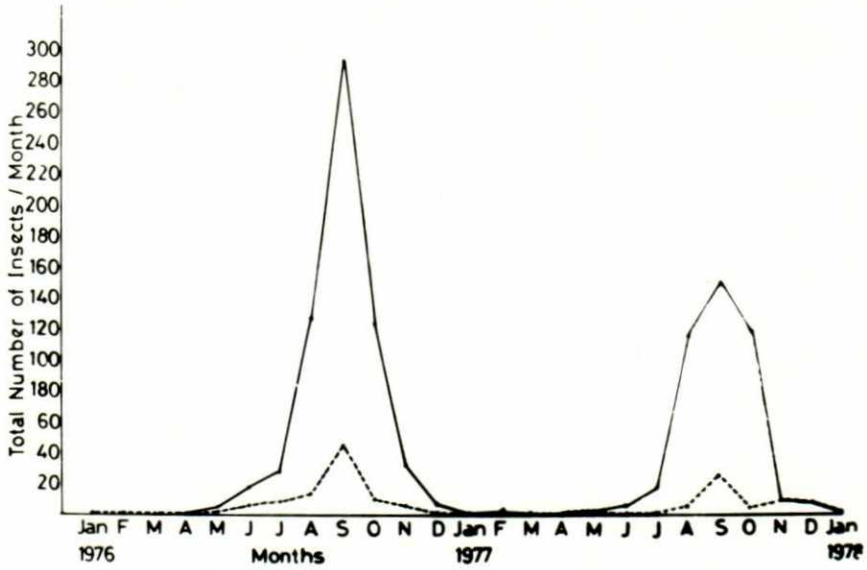

Fig. 17. *Spodoptera littoralis* (Boisd.).
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

ences. A regular trend in the seasonal distribution for both of the leaf worms had occurred. A relatively higher number were attracted in the case of *Spodoptera exigua* (Hb.), especially for light trap (A) during the period from June to November, with a peak occurring in August in 1976 and 1977 (Fig. 16). Smaller size of catches occurred

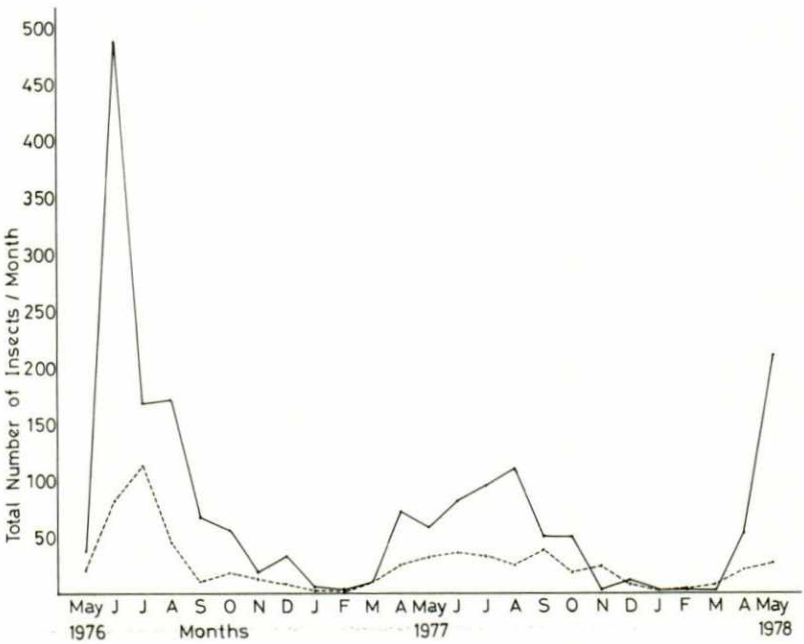

Fig. 18. *Rhodometra sacraria* L.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

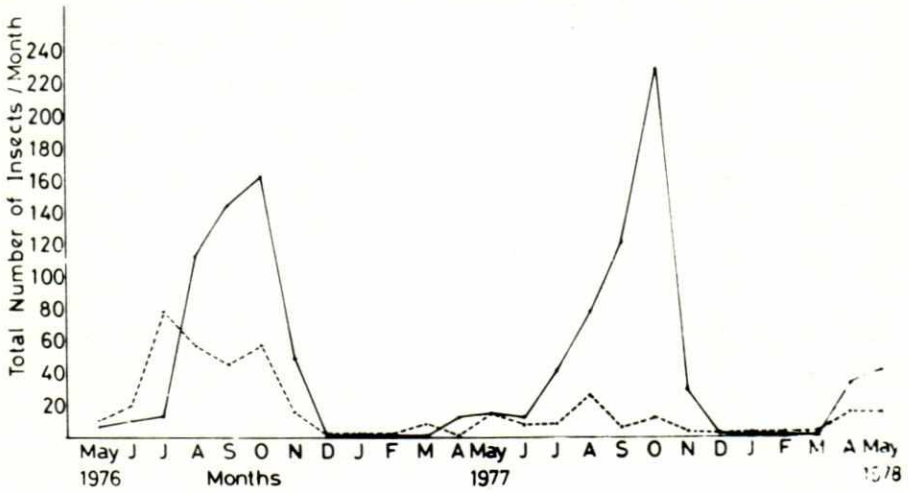

Fig. 19. *Ancylolomia innornata* Stdgr.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

in the case of the noctuid *S. littoralis* (Boisd.). The highest number of this insect species was recorded in September 1976 (Fig. 17). However, in 1977, the peak was comparatively lower.

Very low numbers of some other noctuids were also trapped. Few specimens of the noctuid *Earias insulana* Boisd. were occasionally collected during the period February to December, with a maximum of 5 in June of 1976, 1977 and 1978.

The moth of the corn earworm *Heliothis zea* (Boddie) was caught also, but in low numbers in spring, summer and autumn, with a maximum of 19 per month in June or August of 1976. The noctuid species *Sesamia cretica* Led. was trapped from June to October 1976. About 1–11 insects, with the maximum in July or August, were collected by both light traps.

Geometridae—Two species were trapped from this group. In the case of the species *Rhodometra sacraria* L., the largest catches occurred in the months of March, April, or May to October (Fig. 18). Very few individuals from the geometrid *Eucrestes indigenata* de Villers were caught during July and August.

Pyralidae—The trend for the seasonal abundance of the species *Ancylolomia innornata* Stdgr. was regular. The highest number of this species was recorded during the period July to November, with a peak occurring in October in the case of light trap (A), Fig. 19. However, in the case of light trap (B), more than one peak occurred.

Variable seasonal distribution occurred in the case of the pyralid, *Nomophila noctuella* D. & S. In the first year higher numbers were caught by light trap (A), Fig. 20. However, the reverse occurred in the second year when higher numbers were caught by light trap (B). Many peaks were recorded for that species in the case of both traps. The abundance of preferred host plants during 1977, might have caused this situation.

One peak was the regular trend that occurred for the pyralid *Palpita unionalis* Hb. This insect species was more abundant during the period June to August 1976 (Fig. 21). Very small catches were trapped during the rest of the year. Another species identified as *Uresphila limbalis* D. was also caught, but in low numbers and irregularly. A maximum of 29 or 46 insects were trapped in August or October 1976, respectively. The host plants preferred by the trapped pyralid and geometrid species, were not determined.

Sphingidae—Three species were trapped during this study, *Herse convolvuli* L., *Hyles lineata* F. (the subspecies *livornica* Esper), and *H. euphorbia* L. (the subspecies

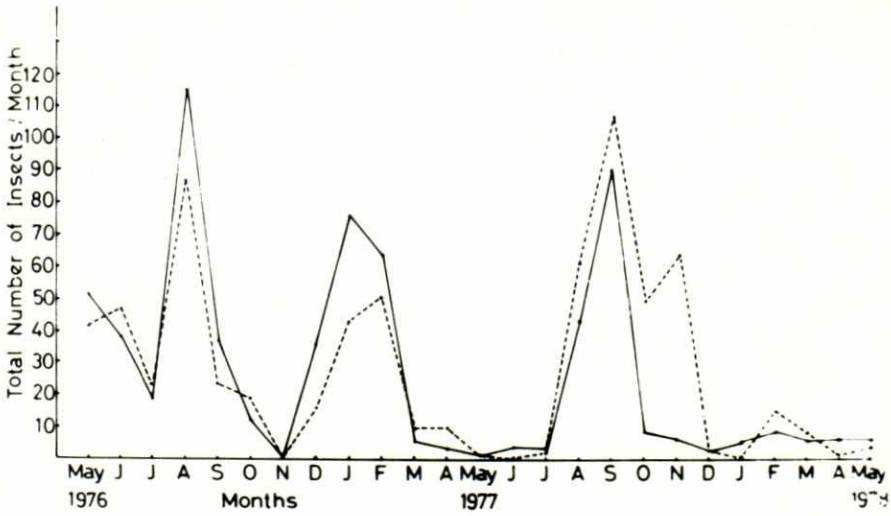

Fig. 20. *Nomophila noctuella* D. & S.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

mauritanica Stdgr.). About 1–18 individuals were trapped occasionally during the period March to September 1976 and 1977. However, no catches were reported in August for the latter two species. Relatively low numbers of these large lepidopteran species were trapped in both localities. This can be explained by the findings of Taylor and Brown (16) and Taylor and French (17) who stated that large moths usually fly at high levels.

Plutellidae—Large catches of the microlepidopteran species *Plutella maculipennis* Curtis were caught regularly especially by light trap (B), Fig. 22. Many peaks occurred at different times of the year. This is a common serious pest of many varieties of cruciferous vegetable crops which were more abundant in the locality of this trap.

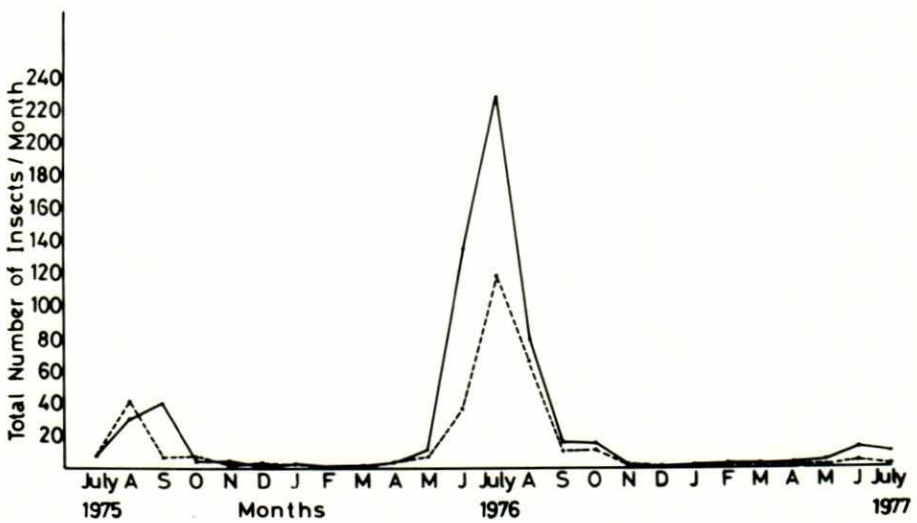

Fig. 21. *Palpita unionalis* Hb.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

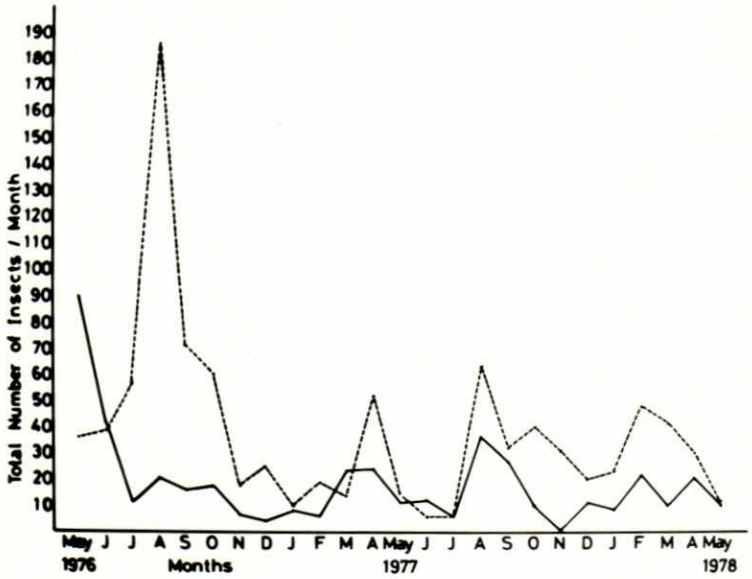

Fig. 22. *Plutella maculipennis* Curtis.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

Tortricidae—Few individuals of the species *Cacoecimorpha pronubana* Hb. were trapped occasionally during the months April to November 1976 and 1977. This species is a common pest of various vegetable and ornamental plants especially in the greenhouse (personal observations).

Diptera:

Extraction, sorting out and identification of species belonging to order Diptera was usually difficult, especially when the catches were large, due to their fragility and contamination with debris of other insects. Therefore, few groups were sorted out; observational reports, and collective numbers were the only possibilities.

Small catches of mosquitoes (Nematocera) were caught almost every month. The size of those catches was directly affected by temperature.

The largest catches for the unidentified short-horned flies (Brachycera) were reported during the months of March or April until June (Fig. 23). Studies on this group continued for $1\frac{1}{2}$ years. Higher numbers of these flies were caught by light trap (B) which was closer to the farm of the college. From this group many important families that include serious plant pests were reported by Damiano (4) and Zavatari (19).

Sarcophagidae—Two groups were reported and identified only as to the genera (12). Those groups were trapped every month of the year except in January. A maximum total number of 42–59 were trapped during the months August to October 1976 and 1977.

Very few individuals of unidentified species from the families Asilidae, Tachinidae, Muscidae, Tabanidae, Psychodidae, and Sciaridae, were trapped. Many species from family Syrphidae were identified (12). They were attracted to both light traps in spring,

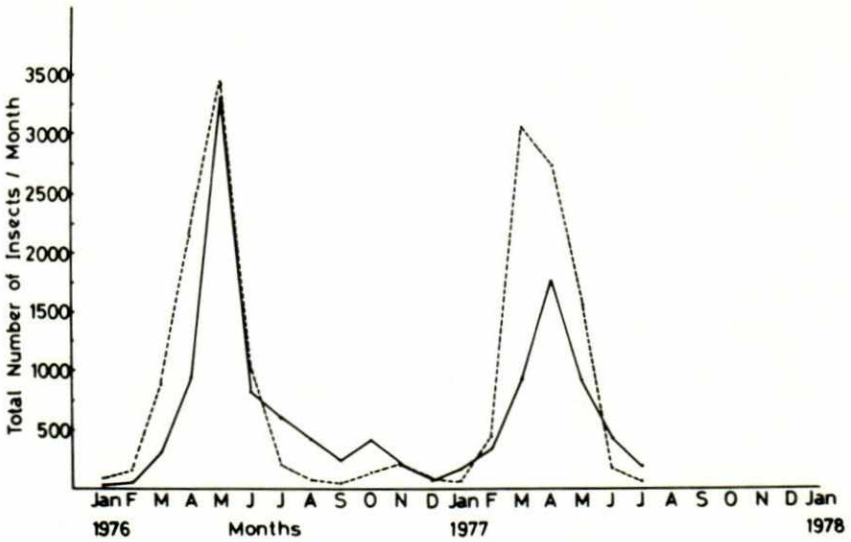

Fig. 23. Short horned flies or members from order Diptera (Brachycera).
Insects collected from locality of light trap (A).
Insects collected from locality of light trap (B).

summer and autumn. One species *Scathophaga stercoraria* (L.), from family Scathophagidae, was caught but in low numbers during the months January to May, and from October to December 1976 and 1977.

Trypetidae—Occasionally very few examples of the Mediterranean fruit fly *Ceratitis capitata* Weid., were trapped in the months May or August to November. Different trends were reported for the olive-fruit fly *Dacus oleae* Gmel. The study for this insect was conducted from January 1976 until January 1978. During 1976 a range of 22–40

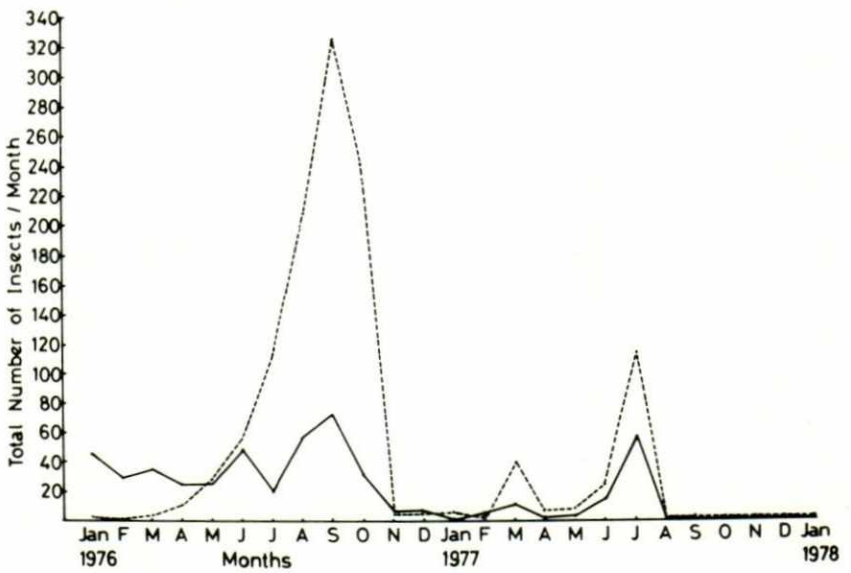

Fig. 24. *Aphodius lividus* (Ol.)
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

flies were trapped in the months June to December, with the maximum occurrence in August to October. Higher numbers were recorded in 1977, with a range of 7–506 flies that were trapped during the period of January until July. The highest numbers were recorded in April and May. Later on, it was occasionally trapped during the months August 1977 until January 1978.

Coleoptera:

Scarabaeidae—More than one species was reported from this family (12). Many species were trapped irregularly in low numbers by both traps. Only one species *Aphodius lividus* (Ol.) had been caught regularly and in considerable numbers. Larger catches were trapped during the months June to October 1976, and July 1978, especially in case of light trap (B), Fig. 24. In 1976 one peak occurred in September, while in 1977 the peak occurred in July, but in very much lower number. Insects were hardly trapped at all from August 1977 until January 1978.

Hymenoptera:

Braconidae—Three species were reported (12). The most abundant was the wasp *Zele chlorophthalma* Nees, which was trapped regularly during the 2 years of study. Large catches from this braconid were caught from April to November 1976, especially by light trap (A), Fig. 25. Comparatively lower numbers were caught in the second year. The host insect for that parasite is not yet determined.

Ichneumonidae—Small catches from more than 1 species were occasionally obtained. Both ichneumonids *Netalia* sp. and *Diplazon laetatorius* (F.) were the dominant groups from this family. The highest numbers of these wasps occurred during February or August 1976 and 1977.

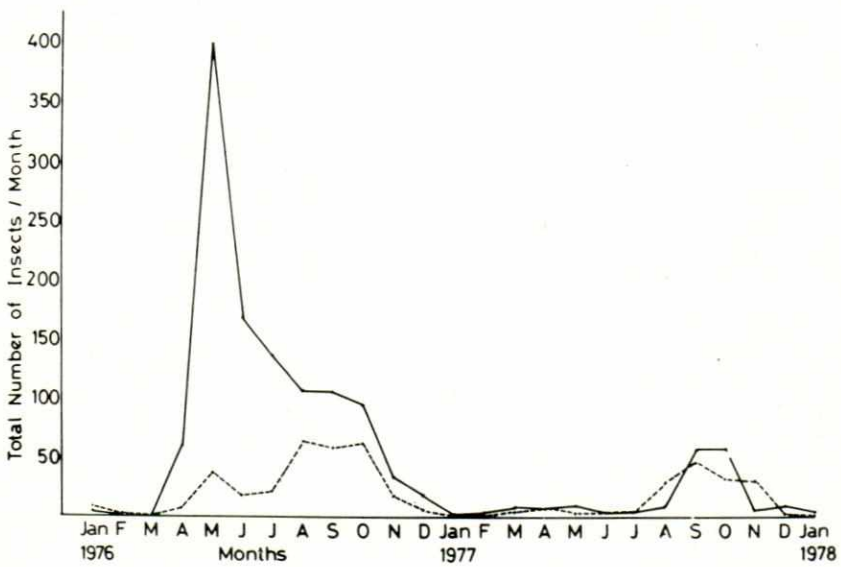

Fig. 25. *Zele chlorophthalma* Nees.
—— Insects collected from locality of light trap (A).
– – – Insects collected from locality of light trap (B).

Table 1. Weather conditions in the years of 1975–1978.

Year and month	Temperature °C Range	Average	Total amount of rainfall in mm	Average relative humidity (RH %)
1975				
January	6.5–16.7	11.6	85.5	67
February	6.8–17.0	11.9	75.4	75
March	8.2–22.5	15.4	23.5	60
April	12.8–25.2	18.9	9.0	57
May	14.7–29.0	21.9	1.0	58
June	16.7–30.5	23.6	2.0	61
July	17.6–31.1	24.4	0.0	64
August	19.3–32.3	25.8	0.0	66
September	19.3–32.6	26.0	0.0	68
October	13.8–27.3	20.6	25.2	69
November	10.8–22.6	16.7	113.1	68
December	9.6–20.7	15.2	71.1	76
1976				
January	6.9–18.2	12.6	119.5	74
February	5.8–17.4	11.6	65.7	86
March	8.9–18.6	13.8	89.0	74
April	10.9–23.7	17.3	59.0	69
May	15.0–26.1	20.6	40.7	69
June	16.7–29.6	23.2	0.0	63
July	19.6–31.1	24.4	0.0	63
August	20.3–35.0	29.7	0.0	60
September	18.1–31.5	24.8	0.0	70
October	16.2–28.4	27.3	76.1	66
November	9.9–21.4	15.7	72.3	72
December	9.6–20.7	15.2	12.0	68
1977				
January	6.3–19.8	13.1	43.2	70
February	7.0–23.0	15.0	20.0	62
March	7.7–24.5	16.1	0.0	61
April	11.7–25.2	18.5	15.7	56
May	13.8–28.1	21.0	1.2	56
June	19.5–30.4	24.0	0.0	63
July	21.3–36.7	29.0	0.0	58
August	19.9–35.2	27.6	0.0	59
September	17.9–31.1	24.5	85.3	67
October	13.3–27.6	20.5	0.0	74
November	10.6–24.0	17.3	112.4	74
December	7.1–32.2	13.6	125.3	74
1978				
January	7.4–17.7	12.5	36.6	66
February	8.0–22.0	15.0	67.6	67
March	8.4–21.2	14.8	22.3	65
April	10.4–28.1	19.3	0.0	50
May	14.4–30.6	22.5	3.2	56
June	19.9–33.5	25.7	0.0	53
July	16.7–31.8	23.3	0.0	60
August	18.6–32.9	25.7	0.0	63
September	17.3–30.7	24.0	0.2	67
October	15.0–26.3	20.7	134.0	73
November	10.9–21.1	16.0	191.0	77
December	6.2–32.2	14.7	1.9	62

Other groups such as honey bees and winged formicid individuals were trapped occasionally.

Because of the similarity of environmental factors in Jamahiria and Egypt, the seasonal distribution of many insect species reported in this study, is similar to those reported and discussed by Hammad and Abd El-Salam (10).

In view of these results, it can be concluded that various factors are responsible for the large catches trapped. In addition to the effects of temperature, which proportionally increased the insects' flight activity, other climatic factors such as the relative humidity (which is also affected by rain) might have a great influence. Other environmental factors such as the presence and abundance of preferred host plants, host insects or prey; presence or absence of effective natural enemies was also responsible for the size of the catches.

The high temperatures that occurred during certain times in spring, summer or autumn throughout the years of study (Table 1), were usually accompanied by larger catches, especially in case of most dominant groups such as the leafhoppers (Fig. 7) and Microlepidoptera (Fig. 10). In spite of the lower rainfall in 1977, the higher temperatures that occurred, sometimes reaching a maximum of 35 or 36.7°C (Table 1), had resulted in higher numbers of those insects during this year as compared to 1976. It had been stated by Onsager (13) that much of the seasonal variation of adult southern potato wireworm was caused by variation in temperature.

Moreover, Goel (9) and Onsager (13) stated that fluctuations in the number of insects trapped was correlated with the rain and relative humidity. It had been stated above that, for certain groups, the number of insects caught in 1976 were higher than those of 1975, 1977 or 1978. The higher total amount of rain and relative humidity that occurred in most of 1976 (Table 1) might be the main reason for these large catches. This situation was represented in case of *Modicogryllus palmetorum* (Krauss), Fig. 1; *Gryllotalpa africana* P. deB., Fig. 2; *Acrosternum millierei* M. & R., Fig. 6; the green lacewings Fig. 8; and *Spodoptera littoralis* (Boisd.), Fig. 17. The high numbers of the green lacewings caught by light trap (A) was a result of both favorable climatic conditions and the abundance of its prey species, especially the aphids and the phytophagous mites.

In spite of the low temperatures during winter, certain insect species such as the black cutworm *Agrotis ypsilon* Rott. reached its highest numbers during this season. The host plant abundance and the presence of the favourable environmental conditions (for this particular species at that time) had resulted in higher numbers of insects.

The occasional change in population peaks from one year to another, as mentioned before, was usually correlated with the time of the rain in those years, or in climatic conditions during those years.

It can be safely concluded that, in spite of the belief that the temperature is the main factor governing insect flight activity, and consequently the numbers of insects trapped, many other environmental factors are significantly responsible.

ACKNOWLEDGMENTS

The author is deeply thankful to Mr Shahin M. Sharkawy and Mr Mohammed A. Abd-Allah for helping in counting, and Mr Nory Taknar for taking care of light traps. She is also thankful to the staff of the Meteorology Department, especially Mr Abd El-Rahman El-Sherif for supplying the weather information.

LITERATURE CITED

1. Ahmed, M. K. 1977. Life history and feeding habits of *Dichomeris ianthes* Mayr., a new pest of alfalfa in Libya. Libyan J. Agric. 6(2): 31–38.

2. Banerjee, A. C. 1967. Flight activity of the sexes of crambid moths as indicated by light trap catches. J. Econ. Ent. 60: 383–390.
3. Bowden, J. and M. G. Morris. 1975. The influence of moonlight on catches of insects in light traps in Africa. III. The effective radius of a mercury-vapour light trap and the analysis of catches using effective radius. Bull. Ent. Res. 65: 303–348.
4. Clausen, C. P. 1972. Entomophagous Insects. Hafner Publishing Co., Inc., New York. pp. 595–600.
5. Damiano, A. 1961. Elenco delle specie di insetti dannosi ricordati per la Libia fino al 1960. Tibografia del governo. Nazirato dell Agricoltura, Tripoli. pp. 27–68.
6. El-Sayed, A. N. and N. H. Nazmi, 1975. Identification and abundance of species of the tribe Agrotini by using light traps. Agric. Res. Review 1: 35–42.
7. Floore, T. G., R. L. Robertson, M. C. Ganyard, Jr and H. C. Ellis. 1976. A black-light trap surveillance of adult Lepidoptera in three North Carolina Tobacco Belts. J. Georgia Ent. Soc. 11(2): 131–137.
8. Goel, S. C. 1976. An ecological study on the hemipteran catch on the light trap at Muzaffarnagar, India. Tropical Ecol. 17(2): 89–94.
9. Goel, S. C. 1978. Bioecological studies on two years capture of Hemiptera in Western Uttar Pradesh. Oriental Ins. 12(3): 369–376.
10. Hammad, S. and A. L. Abd El-Salam. 1967. Economic Entomology. Maaref Publisher, Egypt. 978 pp.
11. Hartstack, A. W., J. A. Witz and D. R. Buck. 1979. Moth traps for the tobacco budworm. J. Econ. Ent. 72(4): 523–525.
12. Hessein, N. A. 1980. Functioning of Rothamsted light traps and their use for collecting insect species. Libyan J. Agr. 9: (in press).
13. Onsager, J. A. 1976. Influence of weather on capture of adult southern potato wireworm in black-light traps. U.S. Dept. Agric. Tech. Bull. 1527, 27 pp.
14. Selman, C. L. 1973. The flight periods of several sibling species of moths. J. Res. Lepidoptera 12(4): 217–224.
15. Selman, C. L. and H. E. Barton. 1972. Seasonal trends in catches of moths of twelve harmful species in black-light traps in Northeast Arkansas. J. Econ. Ent. 65: 1018–1021.
16. Taylor, L. R. and E. S. Brown. 1972. Effects of light-trap design and illumination on samples of moths in the Kenya highlands. Bull. Ent. Res. 62: 91–112.
17. Taylor, L. R. and R. A. French. 1974. Effects of light-trap design and illumination on samples of moths in an English woodland. Bull. Ent. Res. 63: 583–594.
18. Walker, A. R. 1977. Seasonal fluctuations of Culicoides species (Diptera: Ceratopogonidae) in Kenya. Bull. Ent. Res. 67: 217–233.
19. Zavatari, E. 1934. Prodromo della Fauna della Libia: Pavia, Co-operativa, VII, 1234 p.

دراسة لمدة سنتين لتعداد مجاميع معينة من الحشرات تنجذب الى مصائد روثها مستيد الضوئية في طرابلس / ليبيا

د. نوال أحمد حسين

المستخلص

تمت دراسة تعداد خمس وعشرين مجموعة من الحشرات جمعت بواسطة مصيدتين ضوئيتين من نوع روثها مستيد كانت موضوعة في موقعين بمزرعة الكلية . اعطيت مناقشة ملخصة لتغيرات بعض المجاميع الأخرى النادرة . استعمل الضوء العادي في هذه الدراسة .

تم الحصول على عينات كبيرة الحجم بواسطة أحد المصائد التي كانت في موقع مزدحم بالنباتات . تأثر حجم النبات لكل من المصيدتين تأثرا نسبيا بعدة عوامل مثل درجة الحرارة ، المطر ، الرطوبة النسبية ، تواجد أو وفرة العوائل النباتية المفضلة ، تواجد أو غياب العوائل الحشرية أو الاعداء الحيوية . أثرت هذه العوائل أيضا ولكن باختلاف على مواعيد ظهور أو كثرة عدة مجاميع من الحشرات التي جمعت بكل من المصدتين الضوئيتين .

أوضحت هذه الدراسة أن تعداد بعض المجاميع الحشرية كان أعلى من البعض الآخر . ففي حالة كل من نطاطات الأوراق أو الفراشات من مجموعة ميكروليبيد وبترا أو الذباب من مجموعة براكيسيرا كان التعداد عاليا حيث وصل أعلاه الى ٧٠٠٠ ، ٨٠٠٠ ، ٣٥٠٠ حشرة في الشهر على التوالي . وفي بعض الحالات الاخرى كان التعداد أقل من السابق حيث وصل أعلاه الى ٢٨٠ ، ٢٤٠ ، ٤٥٠ ، ٤٠٠ ، ٨٠٠ ، ٣٠٠ ، ٥٠٠ ، ٢٤٠ ، ٢٤٠ ، ٥٠٠ ، ٣٤٠ ، ٤٠٠ حشرة في الشهر على التوالي لكل من البقتين النباتيتن كريونتيادس باليدس رامبير ، اكروسترنيم ميليريادي م. ،ر. ،. أنواع اسد المن . وكل من الفراشات ميثيمنا يونيبنكتا هاو . فراشة الدودة الخضراء (هـ . ب) ، فراشة الدودة الخبيثة (بويسد) ،رود وميترا ساكراريال ، انسيلولوميا انورناتا ستجر ـ ،بالبيتا يونيونالـ هـ . ب ، ذبابة الزيتون ذاكس اوليي جميل ، الجعل افوديس لفيدس (آول .) ، والبراكونيد زيل كلوروفشالما نيس .