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Studies on the Biology and Habits of the Maize Stalk Borer *Sesamia cretica* Lederer (Lepidoptera, Noctuidae)

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ABSTRACT

The adult and immature stages of the maize stalk borer, *Sesamia cretica* Led. were described. Eggs are laid in clusters which contain an average of 18.2 eggs per cluster. They hatch after 4.6 days on the average. The larva has six instars which average 4.0, 3.7, 3.4, 3.5, 3.8, and 10.2 days respectively.

Larvae transfer to pupae inside delicate coccoons between plant leaves or in earthern cells in the soil. Adults emerge after an average of 11.2 days; and a generation is completed in 44.4 days on the average.

All larval instars can feed inside the whorls of grown plants. Boring starts in the third instar; but the last three instars are the true borers.

Afpanteles ruficrus Haliday parasitizes the fourth instar of borer larvae during June and July. About 14–37 parasites develop in each host.

INTRODUCTION

The maize stalk borer, *Sesamia cretica* Lederer is considered an African species. It is a serious pest in Egypt (2), the Sudan and Somalia (3). It also occurs in some European countries such as Italy, Sardinia, Yugoslavia and France (5). It seems that its distribution in Europe is restricted to the Southern parts only (7).

This insect is the most destructive and widely distributed pest attacking corn (maize) in the Libyan Arab Jamahiriya. Infestation may be observed any time during the season (1).

Borers severely damage the aerial parts of plants especially stems and ears. This justifies effective control measures that are based on biological knowledge in order to protect corn and improve its yield.

The present study supplies background and basic information on the life history of the pest, habits of various stages, symptoms of infestation and natural enemies.

MATERIALS AND METHODS

Field observations were undertaken at the Experimental Farm of the Faculty of Agriculture, University of Alfateh, Tripoli, during the seasons of 1975 and 1976. Plots

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were sown at various dates according to a previous plan described in detail by Ahmed (1).

These observations were substantiated by laboratory experiments which were mainly designed to study the life history of the various stages of the pest. Small screen cages were used for oviposition studies. Larvae and pupae were reared individually inside glass vials supplied with 3 cm pieces from the top parts of maize plants. Vials were covered with thin cloth which was fastened tightly with rubber bands.

Observations were made every 24 hours to determine the duration of each instar or stage and transfer them to new vials with fresh food material. The temperature during the course of laboratory experiments ranged from 25 to 30°C, and relative humidity was 55 to 75%.

RESULTS AND DISCUSSION

The adult moth has a wing span of 35–40 mm. The forewings, head, thorax and abdomen are light brown in colour. Each forewing carries a long medial transverse brown line which extends from the wing base and over two-thirds its length. The hind wings are white. Usually females are larger than males and have longer and broader abdomens (Fig. 1).

Moths start their activity from the beginning of May and egg laying becomes dominant around the middle of this month (1). It has been noticed that eggs are deposited in Egyptian fields a week earlier (2).

In the Libyan Arab Jamahiriya, females prefere to oviposit in maize seedlings with an average normal and extended heights of 30.6 cm and 57.1 cm respectively (1). However, oviposition may take place on older plants.

Eggs are always laid in clusters of 2–3 unseparated rows. The average number of eggs per cluster is 18.2 eggs. The clusters which consist of one layer of eggs are glued on

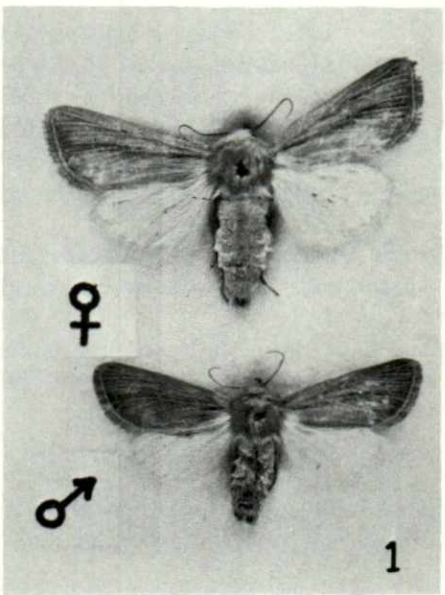
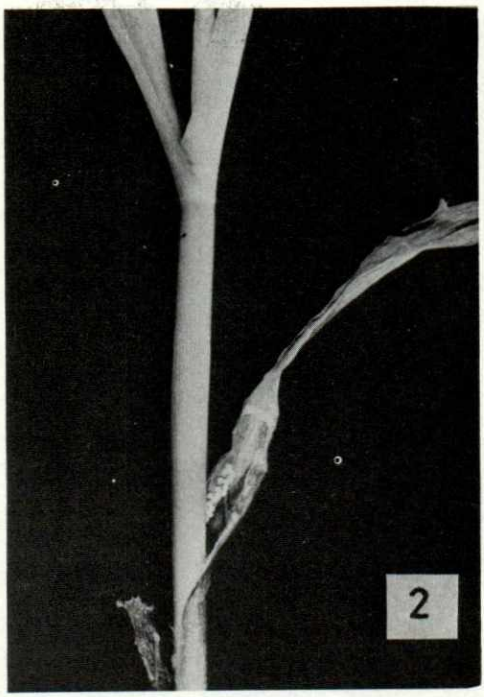


Fig. 1. Female and Male adults of maize stalk borer with spread wings and antennae.



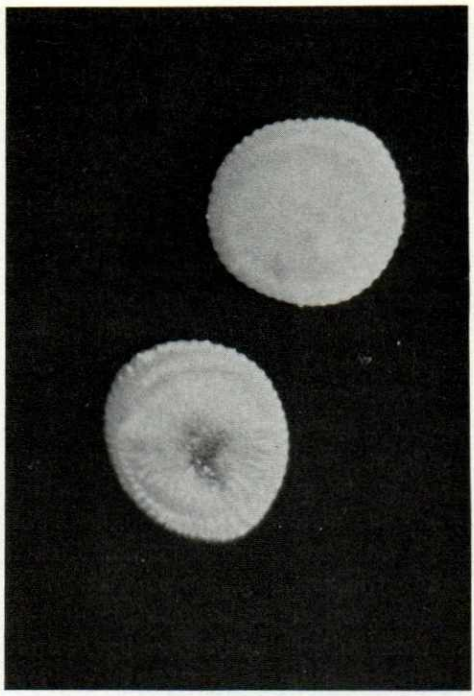


Fig. 2. An egg cluster deposited inside the sheath of second leaf.

Fig. 3. Upper and lower surfaces of newly deposited eggs.

the inner surface of the first and second leaf sheaths (Fig. 2). These oviposition sties are prefered because the sheaths of lower leaves are somewhat separated from the stems. Whereas the sheaths of higher leaves are tightly fixed around the stems, and females cannot insert their ovipositors between them.

In few cases egg clusters were found inside the sheaths of other bottom leaves, between the folded leaves of the whorls of grown plants or inside the whorls. In Egypt, Ahmed (2) and Ismail (5) mentioned similar oviposition places. The second author also stated that eggs were seen on the leaf sheaths which cover the newly formed ears. He further quoted a report from Yugoslavia which indicated that eggs were observed in the field on the upper surface of the fourth to the sixth leaves, and sometimes eggs were deposited on both leaf surfaces.

The newly deposited egg is creamy white in colour and averages 0.79 mm in diamter. It is almost round, flattened, and with a ridged edge and surface (Fig. 3). It turns to light brown before hatching. Under laboratory conditions, the average of the incubation period is 4.6 days. In Egypt, eggs hatched after 4–6 days under Alexandria conditions (4).

The newly hatched larva is creamy in colour except the head, the prothoracic and the anal shields which are black. It measures 2.41 mm long and 0.25 mm wide on the average. The head length and width averages 0.27 mm and 0.25 mm respectively. The first instar larva completes its growth and molts after an average of 4.0 days.

The second instar larva averages 2.96 mm in length and 0.44 mm in width. Its head measures 0.50 mm long and 0.47 mm wide on the average. Its body is very light brown

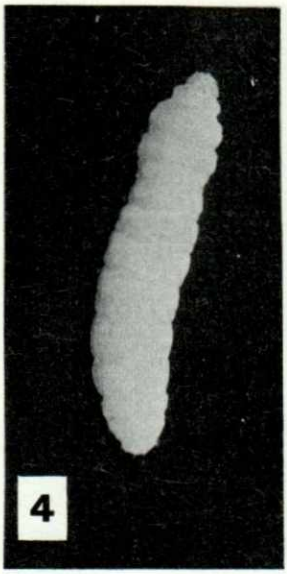


Fig. 4. Fullgrown larva showing the light brown head.

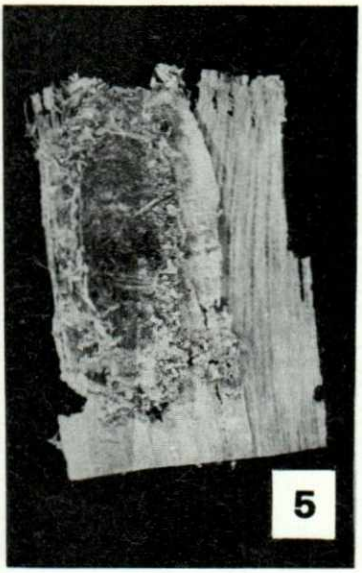


Fig. 5. Silken coccoon without pupa.

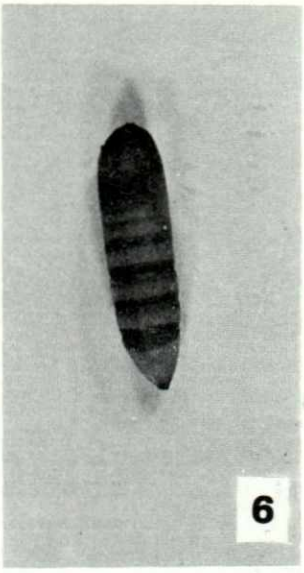


Fig. 6. Pupa without coccoon.

from the dorsal side and the lower surface is yellowish white. The head, the prothoracic and the anal shields are dark brown. This instar lasts 3.7 days on the average.

The third larval instar is 4.78 mm long and 0.76 mm wide on the average at the beginning of this stage. It has exactly the same colour of the second instar. Its head averages 0.64 mm in length and 0.61 mm in width. It requires 3.4 days on the average to complete its development.

The body of the fourth instar is also light brown dorsally and may develop a pinkish touch as the larva grows older. Ventrally, the colour is creamy white. The head is dark brown or nearly black, while the prothoracic shield is pale brown and the anal shield is brown. This instar averages 7.84 mm in length and 1.60 mm in width and lasts 3.5 days on the average. The average length and width of the head is 0.91 mm and 0.87 mm respectively.

The colour of the fifth instar larva is the same as the fourth instar. The mean length and width for the body of the newly formed larva is 19.0 mm and 2.40 mm respectively; and for its head is 1.82 mm and 1.70 mm respectively. This instar is completed in 3.8 days on the average.

The dorsal and ventral sides of the body of the sixth larval instar as well as its shields have the same colour of the fifth instar except that the head has become light brown (Fig. 4). It measures 26.2 mm long and 3.5 mm wide on the average at the beginning of this stage. But the fullgrown larva is 39.0 mm long and 4.5 mm wide on the average, while its head averages 2.1 mm long and 1.9 mm wide. This stage lasts 10.2 days on the average.

The sixth instar larva feeds for six or seven days only, then stops feeding for one or two days. Before pupation, it goes through a prepupal stage which lasts another two days. The larva of this instar averages 19.0 mm long and 3.8 mm wide.

The fullgrown larva pupates inside a thin and delicate white coccoon if pupation takes place on the plant (Fig. 5). It is oval in shape and measures about 27.0 mm long and 9.1 mm wide on the average. The newly formed pupa is yellowish brown, and then it becomes dark brown (Fig. 6). It averages 20.1 mm long and 4.3 mm wide. This stage is completed within 11.2 days. In Somalia, the pupa required 17 days (3).

The larval stage is completed in 28.6 days on the average. But the entire life cycle from egg to adult emergence is completed in 44.4 days on the average under laboratory conditions.

The first larval instar has never been noticed to feed in an exposed position, but actively crawls upward after hatching and penetrates into the whorl of the host plant. Usually the larvae from one cluster enter the same plant and feed together in the basal parts of the folded young leaves by eating holes in them. When the attacked leaves of young plants grow and appear outside the whorl, they show one or two rows of holes across the blades (Fig. 7).

All instars can develop and feed inside the folded leaves of the whorl of grown plants. The early instars form small scattered holes in the leaves and eat stripes from the upper or lower sides leaving the other surface intact. Boring habits are partially seen among third instar larvae. They may eat small tunnels in the midribs of leaf blades. Such tunnels are usually short, about 0.5–3.5 cm long, and are not used for living. The larvae usually eat the inside of these tunnels and leave them immediately after feeding.

The fourth, fifth and sixth instars are true borers. They burrow in midribs of leaves for long distances and remain in these tunnels. They also bore into the nodes, internodes, husks, ears, between seed, or along the length of ear cobs (Figs. 8 & 9). Infestation is indicated by the presence of moist or dry sawdust-like castings around the entrance holes.

Pupation may take place on the plants between the leaves and inside silken coccoons as mentioned before. But more often pupation occurs in the soil inside earthern cells.

Only the larval stage was subject to attack by parasites in the field. The Braconid parasite *Apanteles ruficrus* Haliday was the only species reared from the borer larvae during June and July.

Chiaromonte (3) stated that the same parasite attacks *S. cretica* larvae infesting maize in Somalia. But in Bahtim, Egypt, no parasites has been recovered from the larvae of this pest. In this Egyptian region the scelionid parasite *Platytelenomous hylas* Nixon and the pteromalid parasite *Conomorium eremita* (Foerster) are active on the egg and pupal stages respectively (2).

The female of the parasite *A. ruficrus* preferes to attack its host during the fourth

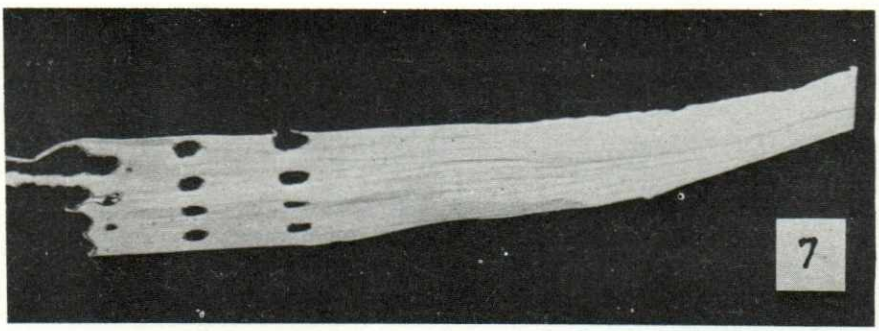


Fig. 7. Two rows of holes in an infested maize leaf.

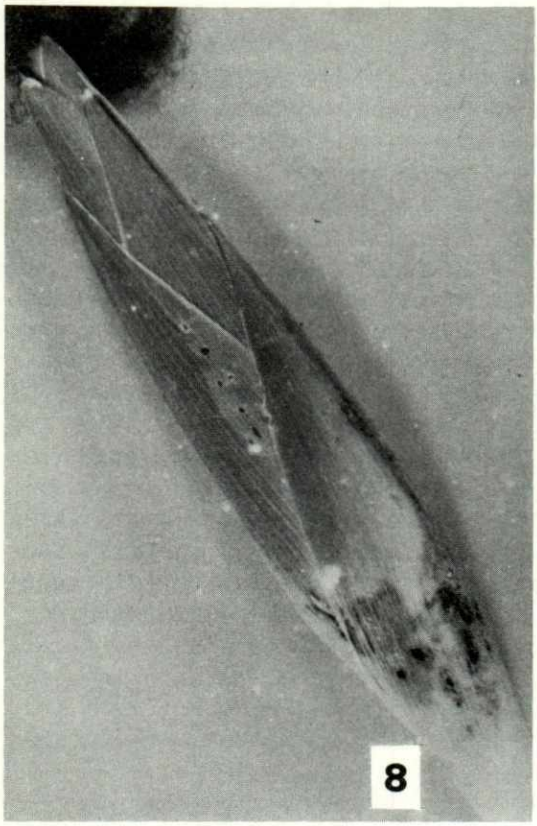


Fig. 8. Infested ear showing holes in husk.

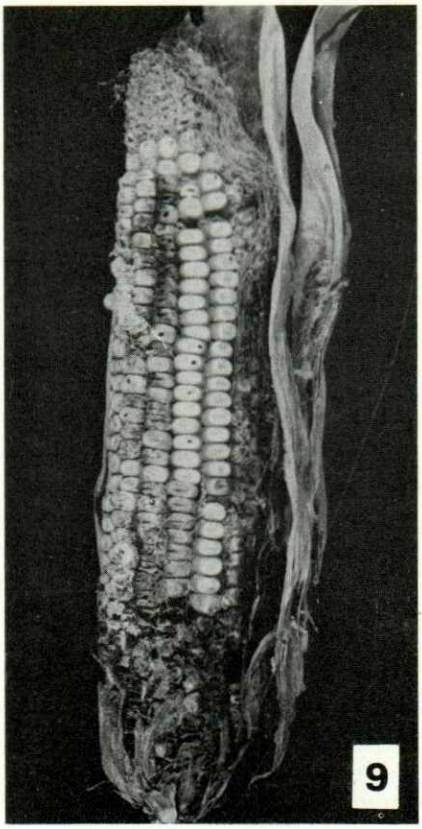


Fig. 9. Infested ear showing destroyed seed.

instar. The fullgrown larvae of that parasite leave their host for pupation after an average of 13 days from oviposition. They escape from the host through minute holes made in the integument (Fig. 10). They crawl few centimeters from the host and immediately spin silken coccoons in which they pupate. The coccoon is oval in shape, white in colour and measures 3.4 mm long and 1.2 mm wide on the average.

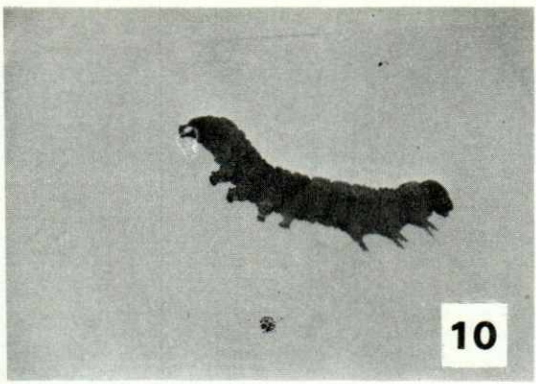


Fig. 10. Fullgrown larva of maize stalk borer showing exit holes of the parasite larvae.

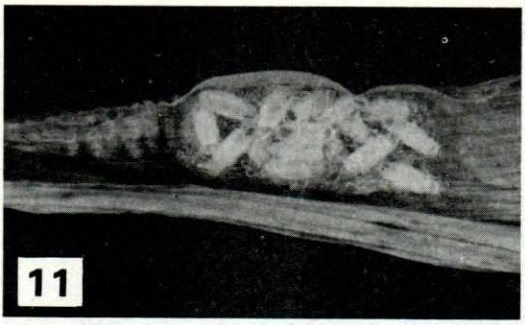


Fig. 11. Coccoons of the parasite *Apanteles ruficrus.*

Usually all the parasite larvae which leave a single host, pupate near each other in a mass of coccoons connected together by silken threads (Fig. 11). About 14 to 37 coccoons were found in each mass with an average of 21.4 coccoons per mass. Adults emerged from pupae after six days on the average.

ACKNOWLEDGEMENT

The author is indebted to Dr. N. C. Pant, the Director of the Commonwealth Institute of Entomology, London, and to Mr. G. E. J. Nixon of the British Museum (Natural History), who determined the scientific name of the parasite (6).

LITERATURE CITED

1. Ahmed, M. K. 1978. Insect pests of corn in the Libyan Jamaheriya and infestations associated with its seedling stage. Libyan J. Agr. 7:109–114.
2. Ahmed, M. K. and M. T. Kira. 1960. Studies on corn borers and its control (In Arabic). Egyptian Agric. Organization Tech. Bull. No. 44, 75 p.
3. Chiaromonte, A. 1948. The problem of *Sesamia* in Somalia. Rev. Agric. Subtrop. 42:44–47. (Abstract in Rev. Appl. Ent. 39, p. 99, 1951).
4. El-Sherif, S. I. 1962. Studies on the corn borers in the Alexandria district. M.Sc. Thesis Univ. Alex.
5. Ismail, I. I. 1968. Studies on ecology, biology, and control of corn borers in Giza region. Ph.D. Thesis Cairo Univ. 354 p.
6. Pant, N. C. 1977. Personal communication. British Museum (Nat. Hist.) Coll. No. A. 8571.
7. Tams, W. H. and J. Bowden. 1953. A revision of the African Species of *Sesamia* Guénee and related genera (Agrotidae, Lepidoptera). Bull. Ent. Res. 43:645–678.

دراسات على بيولوجية وعادات ثاقبة ساق الذرة سيزاميا كريتيكا

مصطفى كمال أحمد

المستخلص

تم في هذا البحث وصف الحشرة الكاملة وأطوار البيضة واليرقة والعذراء . تضع الأنثى البيض في مجاميع يحوى كل منها ١٨,٢ بيضة في المتوسط ويفقس بعد ٤,٦ يوما . ولهذه الحشرة ستة أعمار يرقية مدة كل منها ٤ ، ٣,٧ ، ٣,٤ ، ٣,٥ ، ٣,٨ ، ١٠,٢ يوما على التوالى في المتوسط . وتتحول اليرقة إلى عذراء في التربة داخل خلية من الطين أو بين أوراق النبات داخل شرنقة حريرية خفيفة . وتخرج الحشرات الكاملة من العذارى بعد ١١,٢ يوما . ويكتمل الجيل الواحد خلال ٤٤,٤ يوما في المتوسط .

وتتغذى اليرقات دائما وهى مختبئة . وتدخل يرقات العمر الأول داخل قلب النباتات بعد الفقس مباشرة . وقد يؤدى تغذيتها على الأوراق الملتفة حول بعضها إلى إحداث صف أو صفين من الثقوب في نصل الورقة المصابة تظهر بعد نموها خارج النبات .

وتستطيع جميع الأعمار اليرقية أن تتغذى داخل قلوب النباتات . وتبدأ عادة الحفر في العمر الثالث الذى يحفر أنفاقا صغيرة في العروق الوسطية للأوراق . أما اليرقات التي في العمر الرابع والخامس والسادس فتستطيع أن تحفر أنفاقا عميقة في السلاميات والعقد والكيزان وأغلفتها وبين البذور وداخل القوالح .

ويتطفل على يرقات هذه الآفة الطفيل آبنتيلس روفيكراس خلال شهرى يونيو ويوليو . ويفضل هذا الطفيل مهاجمة اليرقات التي في العمر الرابع ويخرج من اليرقة الواحدة ما بين ١٤–٣٧ طفيلا .