

BIOLOGICAL AND ECOLOGICAL STUDIES
ON
THE SPINY BOLLWORM EARIAS INSULANA BOISD.
IN EGYPT.

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By
SUZAN HAMZA TAHER
B. Sc. AGRICULTURE
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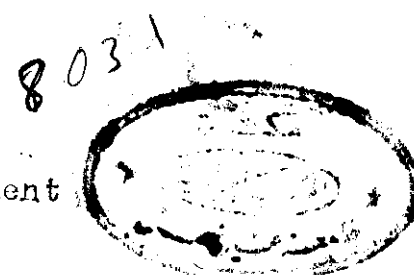
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Biological And Ecological Studies On
The Spiny Bollworm, Earias insulana Boisd.

By

Suzan Hamza Taher

This thesis for M.Sc. degree has been approved by:

M. Hafez

Amr Amr Hossny

A. G. Mettewally

Date : 26/5/77

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List of Contents

	Page.
Introduction	1
Literature Review	3
Part I. : Seasonal occurrence of spiny bollworm infestation in cotton in the differ- ent localities of Egypt.	10
Section 1. The build up of spiny bollworm populations in the different local- ities.	12
Procedure	12
Results	14
Discussion	14
Section 2. The seasonal abundance of spiny bollworm moths in 5 different cotton growing areas in Egypt.	27
Procedure	27
Results and discussion.	31
Section 3. The spiny bollworm chronic-infest- ation cotton areas in Egypt.	57
Procedure	58
Results and discussion.	59

	page.
Part II. Host plants favoured by the spiny bollworm, and their importance as sources of infestation.	90
Procedure	92
The first experiment	92
The second experiment	96
Part III. Temperature and relative humidity as factors influencing the emergence of spiny bollworm moths.	103
Procedure	104
Results and discussion	106
Summary	111
References	116
Arabic Summary	

INTRODUCTION

The spiny bollworm, Earias insulana Boisd., is an important pest of cotton and certain other crops in tropical and sub tropical countries.

It was in 1865 when the spiny bollworm attracted the attention in Egypt and was first recorded as a serious pest of cotton about which early records of some value were made.

The spiny bollworm is thought to be introduced to Egypt with okra plant, Hibiscus esculentus, imported from southern Europe. Dudgeon (1916) claimed that it might have been introduced from India. Willcocks and Bahgat (1937) are of the opinion that this pest is indigenous to Egypt and inhabited the country long before cotton was grown on a commercial scale. The insect was probably feeding on local Malvaceous weeds, With the spread of the cotton cultivations its population increased.

The terminal growing points of the plants are liable to be attacked by young larvae which feed on unexpanded leaflets and tiny squares. Larvae of the spiny bollworm also attack squares, blooms and green bolls. A single larva may attack several bolls, feeding on lint and affects its quality and quantity.

The larvae are characterized by the long hairs they bear and the irregular holes they make in bolls. Fungi enter the injured bolls through these holes causing rotting of the whole boll or one or more locules.

Although a great deal of work has been carried out on E. insulana in Egypt, still there are some points which need to be clarified. Among the most important of these is the reason for the consistent high infestation by this pest recorded in certain parts of the country year after year.

In the present work the following points were determined:-

1. Seasonal occurrence of spiny bolloworms in cotton fields in different localities of Egypt and areas of chronic infestation.
2. Host preference.
3. Temperature and relative humidity as factors influencing the emergence of moths.

LITERATURE REVIEW

(I) Geographical Distribution .

The spiny bollworm, Earias insulana Boisd., is an old world tropical and sub-tropical insect. The pest is widespread in Africa and seems to occur there wherever cotton is grown. It has been recorded in Nigeria (Lamborn, 1914) , Kenya (Anderson, 1927), Morocco and Algeria (Widliez, 1931), Uganda and Tanganika- (Harris, 1935), Nuba Mountains (Beddford, 1937). In the Sudan, Badawi (1971) mentioned that the spiny bollworm is found mainly in the drier irrigated areas in the north, east and west as well as in the central parts of the country. It also occurs in southern Europe and Cyprus (Morris, 1938), in Spain (Planes, 1946) , Palestine and Syria (Yathom, 1956). Eastwards, the spiny bollworm is known as a serious pest of cotton, especially in India (Haroon Khan et al. 1946) and Turkey (Alkan, 1947). Its occurrence in Japan, Formosa and the Phillippines is on record. Dudgeon (1916) and Willcocks & Bahgat (1937) stated that the spiny bollworm is recorded in Brazil and Australia but according to Christidis and Harrison (1958), this pest does not seem to occur naturally in the United States of America.

In Egypt, the spiny bollworm is well known as a cotton pest since more than a hundred of years. It occurs now all over the country from Aswan in the south to the northern parts of the Delta. Records of its occurrence in Wadi El Natroun and Kharga Oases (Western Desert) were given by Willcocks and Bahgat (1937). Ballon (1920) showed the importance of Earias on cotton before the advent of Pectinophora gossypiella in Egypt. He mentioned that the pink bollworm has become more abundant than Earias which became relatively of little actual importance.

(II) Biology :

The biology of Earias insulana was the subject of study by many investigators. An extensive study on the life-cycle of this insect and its seasonal history was carried out by Dudgeon (1916). The durations of the different developmental stages, the egg-laying behaviour, site and formation of cocoons were determined. Full description of the different developmental stages, extent of damage to cotton and methods suggested for control were also included. A similar study was also given by Willcocks and Bahgat (1937). Under laboratory conditions in Punjab, Chopra (1928) found that

the life cycle of E. insulana lasted 31-50 days compared to 35 - 61 days in the field. From August to November (in the same country), Husain (1930), recorded a life-cycle of 18 - 36 days, but 90 days were required during the period from November to February.

Ripper and George (1965), stated that the length of the life-cycle of the spiny bollworm , in the Sudan, varies according to temperature. Several generations per year (about 13) were recorded, the length of winter generation being much extended.

According to Schmutterer (1969) this pest seems to have no resting stage in the irrigated areas in the Sudan and thus several generations per year may occur. As mentioned by Kaushik et al. (1969) the peak of E. insulana infestation in India during the cotton seasons of 1964 - 1968 was in October and November.

Hammad (1967) stated that Earias insulana has six generations a year in the laboratory, and that the whole life cycle seems to be influenced by the prevailing conditions of temperature and relative humidity. The whole life-cycle lasted about 75 days at an average temperature of 18.6°C and 66.2% R.H., and was completed

in about 45 days when the temperature was raised to 24 - 27 °C. and the relative humidity was about 70%.

Willcocks and Bahgat (1937) reported that the first agricultural legislation for the control of the spiny bollworm was based on studies carried out on the winter history of this pest.

(III) Behaviour :

Young larvae of the spiny bollworm, commonly attack the terminal growing points of the cotton plant, feeding on the unexpanded leaflets, and tunnels down the terminal shoot. The larvae also attack the well-developed squares and the newly set and small bolls. On the contrary, larvae of the pink bollworm are much less common in these parts, they concentrate on 3 - 4 weeks old bolls with well developed seeds.

Willcocks and Bahgat (1937) stated that the spiny bollworm tends to foul a boll more than a pink bollworm does, and this perhaps is due to the fact that it tends to feed rather more on the unripe fibres than is the habit of the pink bollworm which tends to make its way as directly as possible to the seeds. On

completing its development, the larva of the spiny bollworm attacks more than one boll, while the pink bollworm, feeds and develops in one boll only. Individually, the spiny bollworm seems to be more destructive than the pink bollworm. They added that the presence of dirty quantities of excrement, the frass, inside and outside the boll, and the large irregular entrance holes enables one to easily identify the work of the spiny bollworm. Unlike Earias the pink bollworm is a clean feeder, usually making small and round entrance holes.

In the Sudan, Badawi (1971) stated that early in the season and in the absence of buds and bolls, young tender shoots of young cotton plants were attacked by the spiny bollworm. He added that this pest is much more destructive in its feeding than the pink bollworm, and several bolls may be invaded in the course of its development. Its attack was usually followed by boll rot and complete loss of bolls.

(IV) Host Plants .

Cotton is the most preferable host plant of the spiny bollworm, malvaceous plants are, however, alternative hosts. According to Bishara (1930), E. insulana depends

mainly on cotton but can attack other malvaceous hosts after picking and may continue its development on retton cotton.

Willcocks and Bahgat (1937), stated that the population of the spiny bollworm in Egypt increased with the spread of cotton cultivations. The pest is not only injurious to cotton but can feed on other local malvaceous plants such as Okra (Hibiscus esculentus), Til (Hibiscus cannabinus), Hollyhock (Althaea rosea), the ornamental red Hibiscus (Hibiscus rosa sinensis), Karcadieh (Hibiscus sabdariffa), Khobbeza (Malva parviflora) and Abutilon indicum. El-Zoheiry and El-Mistikawy (1951) recorded the infestation of rozal (Karkadieh) Hibiscus sabdariffa.

In recent years, infestation of maize crop in Egypt was observed by Megahed and El-Nahhal (1958), Metwally and Mabrouk (1959) and Hosny and Saadany (1967). Mabrouk (1967) mentioned that the attack of the spiny bollworm., is restricted to nili maize, and that summer maize escapes damage. Infestation to maize usually starts in September, continues during October, and in late cultivations it may extend up to December.

In Iraq , the important alternative host plants before cotton becomes available are Hollyhock, Althaea rosea, (Walker, 1952) Abutilon indicum (Rahman, 1940 and Cherian and Kylason, 1947) and Sida cardifolia (Hussain, 1929). In the Sudan, Bedford (1940) recorded Hibiscus esculentus as an important host plant of the spiny bollworm . Ripper and George (1965) stated that, in the Gezira, Abutilon sp. is probably the most important host plant enabling the carry over of the spiny bollworm from one season to the next. In Punjab, Haroon Khan et al., (1946) found that E. insulana prefers Abutilon indicum in the absence of cotton.

Mabrouk (1967) mentioned that spiny bollworm larvae attack several parts of the cotton plant; the terminal shoots, lateral buds, fruiting branches, squares, flowers and bolls. He added that attack on flowers is mostly a result of a previous attack on squares before the opening of their respective flowers. Attack on bolls increases as they grow in age. Generally, the terminal shoot infestation is very low at first (0.02 - 0.16 %) but increases gradually reaching a peak in mid-June. The same author stated that Okra pods in the stage prior to complete ripening, and green maize cobs in the state of starch accumulation, proved suitable for rearing E. insulana in the laboratory.