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*In preparation: ACTA TROPICA Supplement n° 7*

# Pests of Crops in Warm Climates and their Control

by

R. WYNIGER

A handbook (size 17 × 24.5 cm.) with many photographs and hand drawings.  
Artificial leather binding. Price about 110 Swiss francs.

Every year in tropical countries a considerable part of the crops is destroyed by insect and other pests. The susceptibility of plants to insect attack and diseases is increasing alarmingly, due to higher claims on their productivity and crop refinement thus resulting. Efficient pest control is the major task set to all those interested in plant production.

Although there are periodicals as well as monographs dealing with the subject a handbook does not at present exist that gives the scientist and the planter reliable and quick information on pests and the latest methods of controlling them.

RENÉ WYNIGER undertook the task of compiling and writing such a work and has now produced a handbook supplying the long desired information and help. His long practice in pure and applied entomology, his teaching at the Tropical School of the Swiss Tropical Institute in Basle, and his field experience gained during several stays in the Tropics qualify him for this task. The book is richly illustrated by so far unpublished photographs taken by the author in the Tropics. They show typical examples of damage, the insects that caused it, and the necessary control measures. With the help of these pictures anybody can identify the symptoms and so find their cause; all technical details of control measures are also given in this book which will be an indispensable help to everyone connected with tropical agriculture.

The contents are so arranged as to make quick and easy reference possible. An important feature is the appendix which gives details of control measures as well as tables of insecticides. It is intended to revise these from time to time. *Thus the book will always be abreast of the times making current scientific practice available.* A specimen of the appendix is on page 8.

## Contents

### *I. Introduction*

Short list of characteristics, systematically arranged, of the various types of insects; information on their morphology and post-embryonic development.

### *II. Identification of the insect by the damage*

Description of the most important damage caused by biting and sucking insects and plant nematodes. Methods for discovering pests in crops and fields as well as their capture, preservation and shipping are fully explained as also the preparation of microscope slides for quick identification.

### *III. The main pests of crops in warm climates and their control*

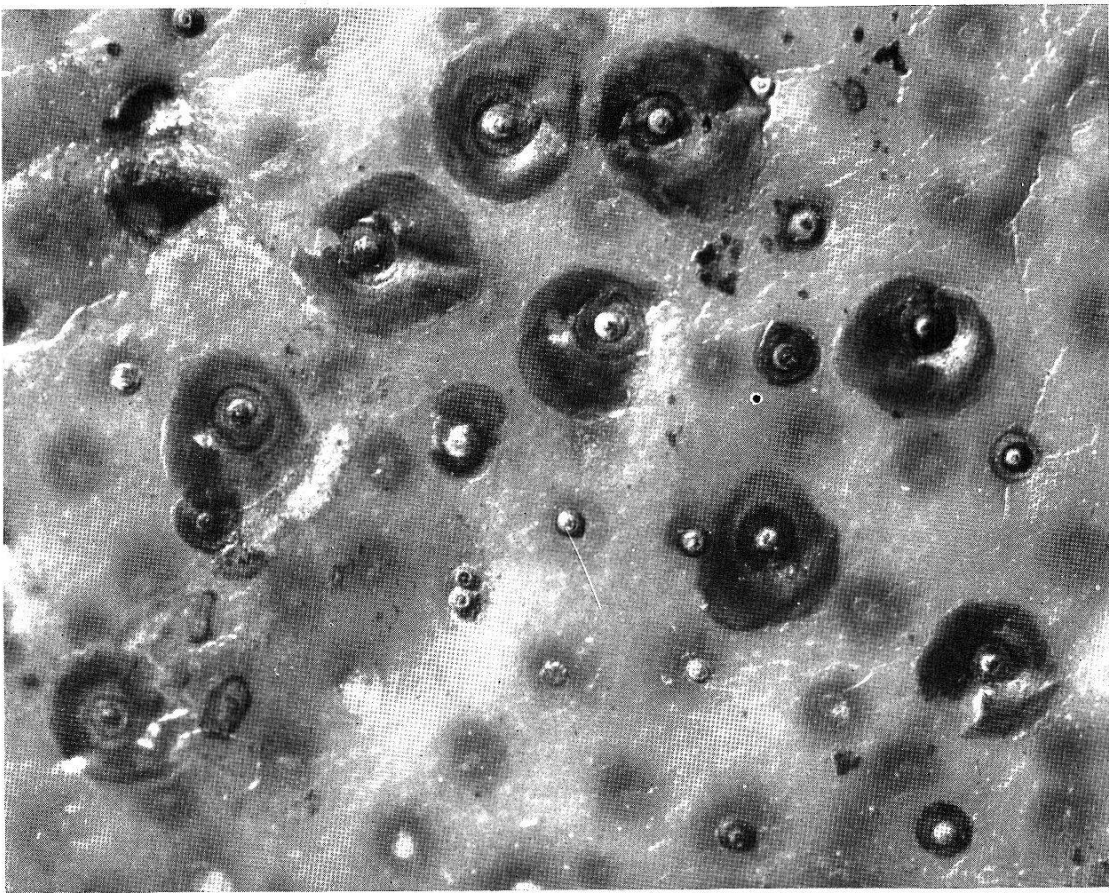
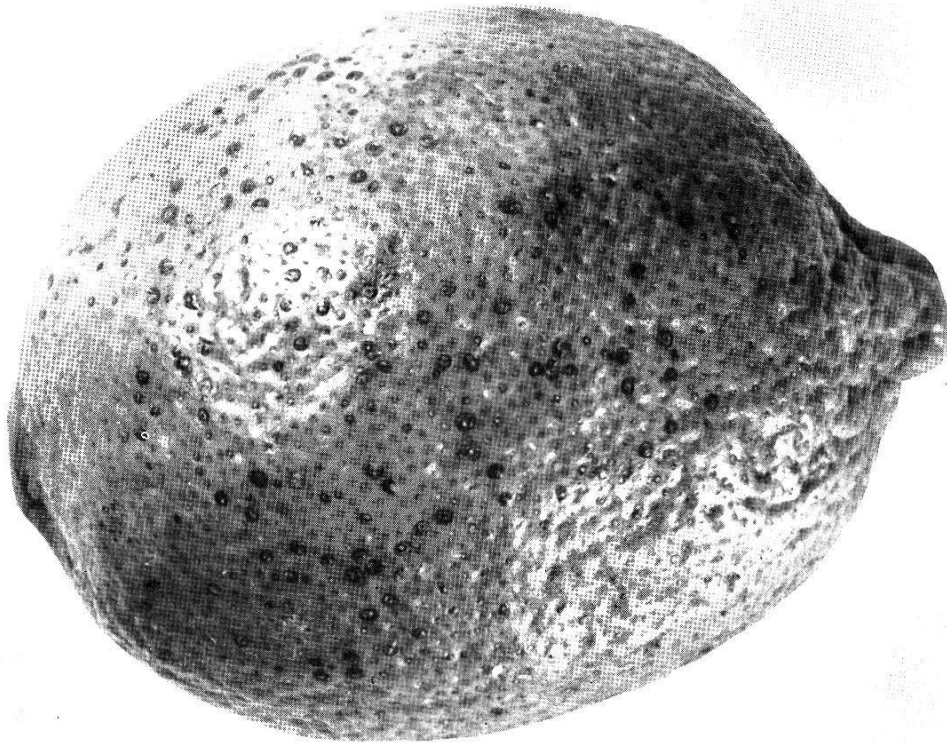
In this part the pests of the following crops and the damage they cause are described: Sisal—cotton—jute—ramie—coconut palm—oil palm—olive tree—groundnut—sesame—castor oil plant—rice—sugar cane—date palm—cassava—maize—sorghum—sweet potato—coffee—cocoa—tea—kola—tobacco—banana—citrus—pineapple—mango—paprika—pepper—rubber—Pyrethrum—Cinchona. A short note on the morphology, biology, and control of each pest is given, followed by details on the control of leaf-cutting ants, locusts and termites.

### *IV. Methods and equipment for pest control*

Part 4 contains the following subjects: composition of insecticides and the principles of their action; timing and organization of phytosanitary campaigns; application of insecticides and their behaviour on the plant; choice of equipment; control of action and resistance; qualitative determination of residual action on plants and stored products; preventive measures and treatment of poisoning by insecticides.

The *appendix* contains tables of insecticides and control measures with details on the application range, dosage and toxicity of the current insecticides. This appendix will be kept up to date and renewed *every 3 years*; it can be ordered separately at any bookshop.

Specimen of illustrations to text



Above: Lemon attacked by *Chrysomphalus pinnulifer*. Mask. Black scale (full size).  
Below: Scales of adult females (magnified 10 $\times$ ).

## Specimen page of Part III: The main

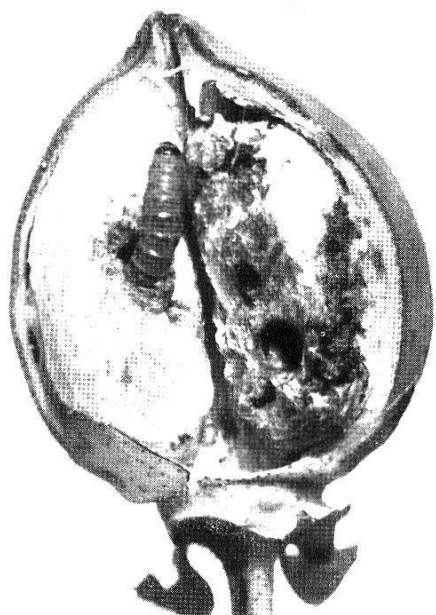
### Description of damage and its cause



Bore hole at the base of flower buds. The bud is hollowed out. Bracts curling back. In an advanced stage the bolls are completely destroyed.

#### Cause:

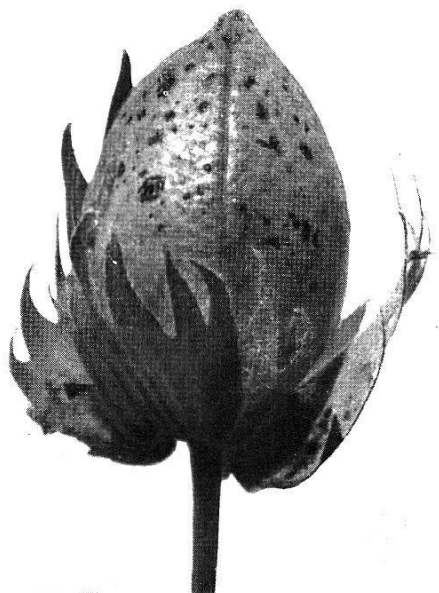
*Heliothis obsoleta* F.  
(Noctuidae).  
American  
cotton  
bollworm



Frequent blotch mines on the unopened bolls; bore hole 1-3 mm wide. Wool inside the boll mostly destroyed. Seed also damaged. Supervening boll rot.

#### Cause:

*Platyedra gossypiella* Saund  
(Microlepidoptera).  
Pink bollworm



Young punctured bolls dropping off. Opening of bolls prevented. Typical dark sucking marks. Colour of wool yellow to brownish; abnormal development of fibres. Seed germination reduced. Damage often exceeding 80%.

#### Cause:

*Dysdercus fasciatus* Signoret  
(Rhynchota).  
Red bug

crops in warm climates and their control

Morphological and biological data

Nocturnal moth. Wing-spread = 4 cm. Anterior wing yellow. Female depositing eggs singly on leaves and buds. Development of eggs within 3-4 days. Young larvae feeding on leaves, shoots and buds. The green to reddish yellow coloured and very polyphagous larva hollows out several buds or bolls. Pupation in the ground. Pupal stage about 8 days. Total time of development: 25-30 days.

Distribution: Congo, Madagascar, Rhodesia, Tanganyika, Union of South Africa, further districts of Africa and American cotton districts.

Contact poison

Moth with dark spotted wings. Female depositing 200-400 eggs under the calyx. Larvae boring into bolls and feeding on wool and seed. Larval development rapid (about 30 days). Pupation taking place inside boll, seed or underground. Total time of development: up to 6 weeks. Insects (pupal stages) can be disseminated with the seed.

Distribution: Northeastern, West, Central and East Africa.

Contact poison

Thin bugs, about 2 cm long. Back yellowish red with dark crossband. Eggs 1 mm long, deposited in small heaps 1-2 cm underground at the base of a plant. Egg production 500-800 per female. Heavy increase during wet season. Development cycle (over 5 molts) lasting 25-30 days under optimal conditions. 8-9 generations possible within one year.

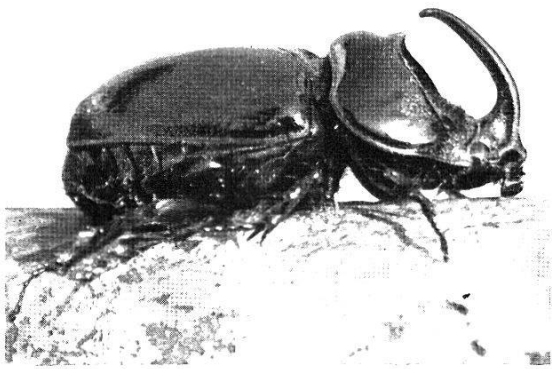
Distribution: Equatorial Africa, Ghana, Nigeria, Congo, Madagascar, Mozambique, Nyasaland, Rhodesia, Tanganyika, Uganda.  
Other related species in the U.S.A. and other cotton growing countries.

Contact poison

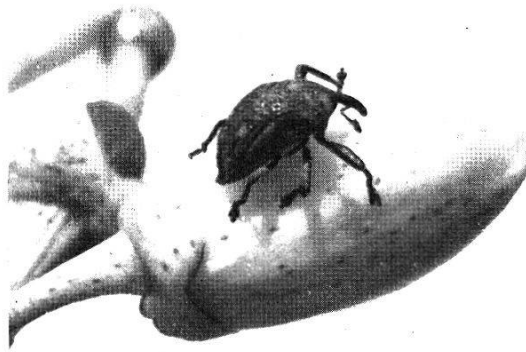
For detail see appendix: table of insecticides and control measures



Specimen of illustrations to text



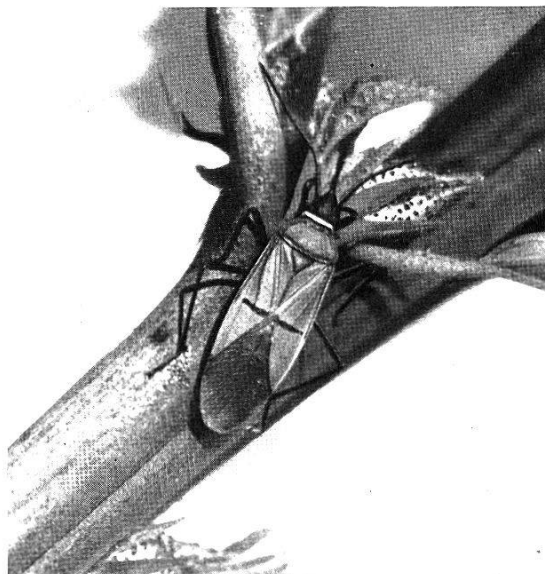
Rhino-beetle



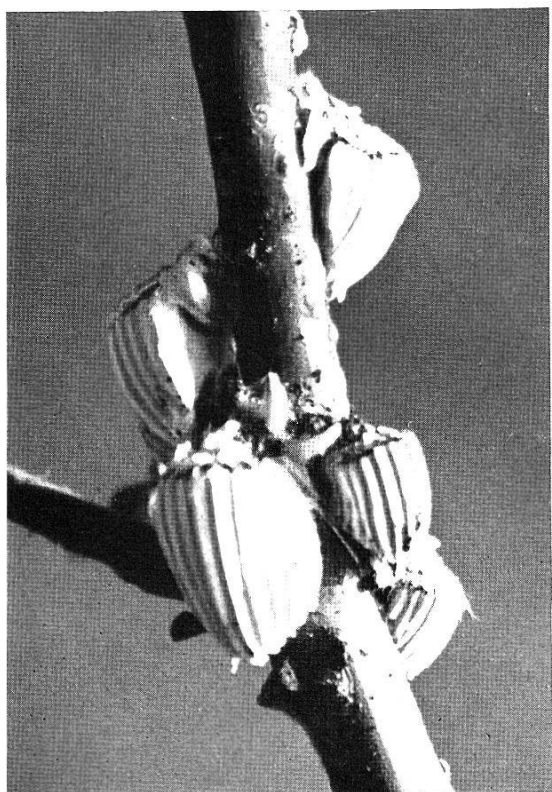
Grapefruit weevil



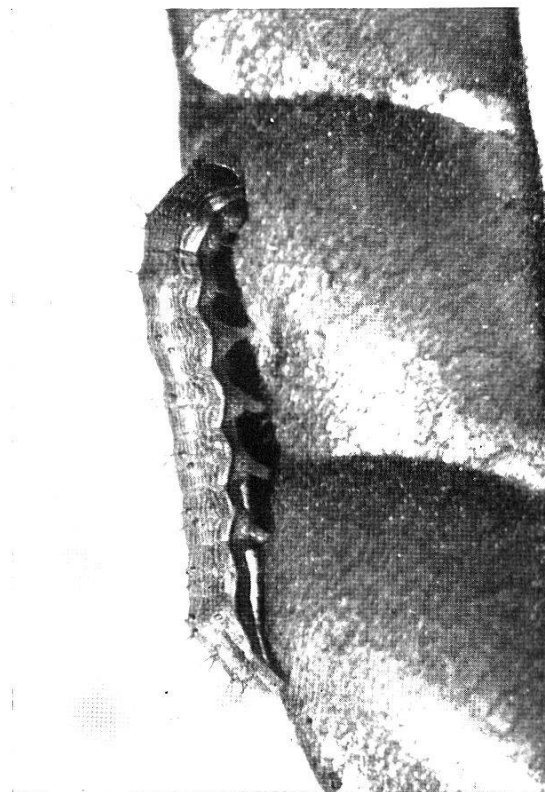
Plant lice (Aphids)



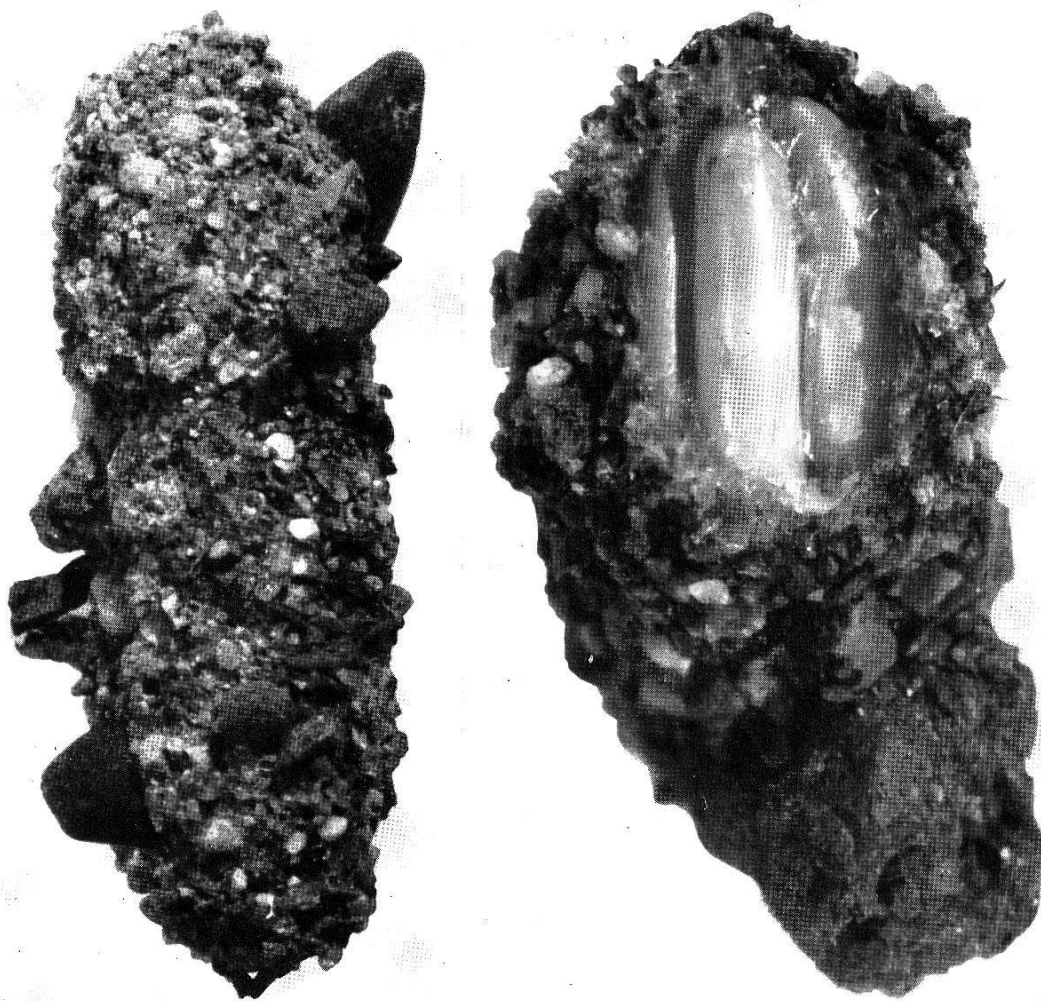
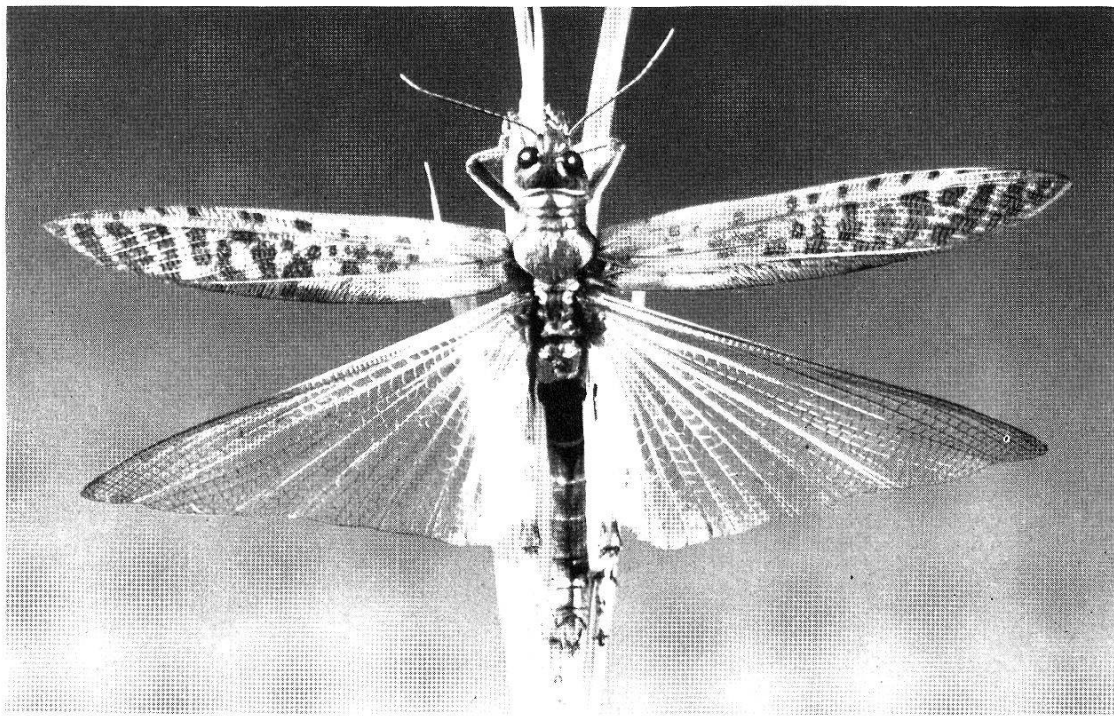
Bug



Mealybugs



Cutworm



Above: Locust *Schistocerca paranensis* Burm. South America (full size).  
Below: Locust eggs in earth tube (magnified about 4×).  
Right: Earth tube opened, showing eggs.



# Specimen of table of insecticides and control measures

Extract from appendix which comprises about 60 pages of the book

## Table of Insecticides

*Group 4: Synthetic organic insecticides Phosphoric esters.*

Common name	Application against	Action*	Acute oral toxicity for rats LD 50 in mg/kg
Chlorthion	Cotton pests, vegetable and fruit pests, midges	St C D	625
DDVP	Household pests, flies	C G	80
Delnav	Cotton insects, flies, ticks, mites	C	111
Demeton	Plant sucking insects, spider mites	St C Sy	9
Diazinon	General plant pests, ectoparasites, pests in stored products	St C D G	200
Dipterex	Plant pests, flies	St C D	475
EPN	Spider mites, mosquito larvae	St C	40
ET 14	Ectoparasites of cattle	C	1000
Gusathion	Plant pests	St C D	20
Rogor	Plant sucking insects, spider mites, fruit flies	St C Sy	200

\* Explanation of abbreviations: St = stomach poison, G = gassing poison, C = contact poison, D = insecticide with depth action, Sy = systemic insecticide.

## Control Measures

Cotton			
Heliothis obsoleta F. (Bollworm)	Dusts:	a) 10% DDT—40% Sulfur	10-15 lb per acre
		b) 20% Strobane—40% Sulfur	
		c) 2.5% Endrin—5% DDT—40% Sulfur	
		d) 20% Toxaphene—40% Sulfur	
		e) 2.5 Endrin—40% Sulfur	
		f) 10% Sevin—40% Sulfur	
	Sprays:	a) DDT	1 ½ lb a.i. * per acre
		b) Toxaphene—DDT	2.0-1.0 lb a.i. per acre
		c) Endrin—DDT	¼-½ lb a.i. per acre
		d) Endrin	½ lb a.i. per acre
		e) Sevin	2.0 lb a.i. per acre
		f) Strobane—DDT	2.0-1.0 lb a.i. per acre
		g) Methylparathion—DDT	½-1.0 lb a.i. per acre

*Time of treatment:* First application when eggs or 4-5 larvae per 100 shoots are observed. Treatment repeated at 5 days' intervals.

\* a.i. = active ingredient.