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FOOD CROPS

Maize

Sorghum

Rice

Sugar cane

Beans

Cassava

Sweet Potato

Maize
(*Zea Mays L.*)

Most important pests: 169, 177, 179, 180, 182, 183, 185, 190, 191, 192, 193, 194

Leaves of young plants turn yellow. Growth stopped. Roots hypertrophic, with dark, patchy lesions. root

Pratylenchus zeae Graham.
Corn nematode.

NEMATODA

168

Nematodes, 0.5-0.75 mm long, developing in the roots (see page 38).

Distribution: Europe, Africa, India, Indonesia, Hawaii, Central and South America

Growth stopped. Plants wilt and die. Roots and underground stems attacked.

Melanotus communis Gyll.
Corn wireworm.

COLEOPTERA; *Elateridae*

169

258

see page 168 (Sugar cane)



Plants turn yellow, die and topple over. Roots destroyed. Heaviest injury occurs during dry periods.

Hodotermes mos-
sambicus Hag.

ISOPTERA;
Hodotermitidae

170

307, 645
747, 796

see page 383 (Chillies)

root **Heavy loss among emerging maize. Young shoots destroyed by orange-red to brown larvae, found around the roots of young plants.**

Astylus atromaculatus Blanch.
Spotted maize beetle.

COLEOPTERA; *Melyridae*

171 Beetle, 12-15 mm long, slender and robust, with strong, hirsute legs, the lower segments of which are distinctly curved. The elytra are spotted black and yellow. The pest occurs mainly in January/February and, lacking flowers, feeds on tassels. The eggs are inserted in clusters in the folds of rolled up leaves, on the underside of leaves and on stalks. The orange coloured larvae turn brown in later stages. They penetrate the ground, where they attack maize roots and young shoots.

Distribution: South Africa

Plants wilt and topple over. Roots and root neck heavily mined.

Diabrotica 12-punctata F.
Corn budworm (corn rootworm).

COLEOPTERA; *Chrysomelidae*

172 Beetle, 6-8 mm long, slightly tapering towards the head, yellow-green with 12 dark spots on their elytra. The female deposits its eggs in moist soil from where the larvae tunnel into the underground parts of the plant. The stalks are also mined above the root neck. The larvae are light in colour, 10-12 mm in size, their posterior end obtuse. Development period of one generation: 7-8 weeks. Several generations a year.

Distribution: Canada to Mexico

stalk **Young plants destroyed close to the ground.**

Heteronychus licas Burm.
Black maize beetle.

173

264

COLEOPTERA; *Scarabaeidae*

see page 170 (Sugar cane)



Plant growth stopped. Plants usually of normal colour but showing distinct swellings or deformation at the stalk base. Fruit formation often prevented, leaf deckle-edged.

stalk

Ditylenchus dipsaci Kühn.
Stem nematode.

NEMATODA

174

693

Endoparasitic nematodes, 1-2 mm long, found mainly in the stalks and leaves (see page 37).

Distribution: Europe, Africa, Asia, Australia, North, Central and South America

Young plants wilt and die. Taproot and stalk base heavily mined.

Calandra callosa Ol.
Maize billbug.

COLEOPTERA; *Curculionidae*

175

Black, robust weevil, 10-12 mm long, with distinct callouses on the elytra. The larvae are fleshy, white to creamy-white, brown-headed, 10-12 mm in size. The eggs are deposited in the stalk, close below or above the ground.

Distribution: Southwestern States of North America

Emerging maize destroyed. Young plants mined above the ground, thus easily breaking off.

Gryllulus domesticus L.
Black headed cricket.

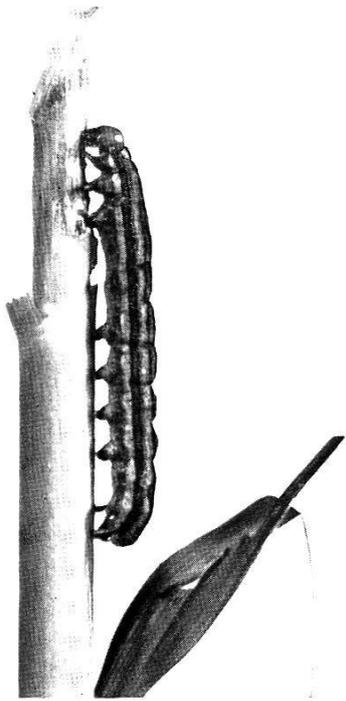
ORTHOPTERA; *Gryllidae*

176

The adult cricket is greyish-brown, 15-20 mm long, with dark brown markings. The head is dark, often black. The female has a strikingly long ovipositor and two lateral appendages about equally long. The hind legs are specially thick for leaping. The antennae are filiform and long. Oviposition takes place in earth cracks. *Gryllulus* often occurs in great swarms.

Distribution: cosmopolitan. Damage particularly heavy in India and Pakistan.

stalk



Young plants completely devoured above the ground. Even older plants almost entirely destroyed. Presence of masses of caterpillars, which feed ravenously, mainly at night.

Mythimna (Cirphis) unipuncta Haw.
Armyworm.

LEPIDOPTERA; *Noctuidae*

177

230, 288

Brownish-grey to brownish-yellow moth, marked with a white dot in the middle of the forewing. The eggs are deposited in rows on the leaves and leaf sheaths, and covered with a secreted substance. The caterpillars are greenish, marked with 3 lines along each side of the body, the upper greenish-yellow, the middle one black and the lower light yellow, each line edged with white. Full grown the caterpillars are 30-40 mm long. Several generations a year. The pest often occurs in great masses.

Distribution: Subtropical and tropical regions, India, Indonesia, Fiji Islands, Australia, U.S.A., South America



Plants stunted; reluctant growth. Pro-tuberances above root neck.

Diatraea crambidoides Grote
Southern cornstalk borer.

LEPIDOPTERA; *Pyralididae*

178

202

Small, straw-coloured moth, which heaps its eggs in several layers on the under-side of the leaves. The creamy-white to white caterpillars, marked with dark speckles, bore into the stalk. 2-3 generations a year.

Distribution: Southwestern U.S.A., Mexico, South America



Upper parts of plants heavily attacked. Deposits of wet, pale green to yellowish excrement in the leaf axils or wherever injury is done. Inflorescences and young cobs destroyed and soiled with excrement.

stalk

Chilo suppressalis Walk.
Purple lined borer.

LEPIDOPTERA; *Pyralididae*

179

215

Yellowish-brown moth, whose wings expand to 20-25 mm. The forewings are darker than the hindwings. The eggs are deposited in rows on the underside of the leaves, each row being covered with a brownish secretion. The caterpillars tunnel into the heart or feed on the upper parts of the stalk. They are brownish-grey, marked with two brown lateral stripes along the body. Often several caterpillars are found feeding in one stalk; their tunnels are filled with excrements.

Distribution: Africa, South-East Asia

Injuries on leaf sheaths, laminae or stalks. Dead heart; leaves withered.

Chilo traea infuscatella Sn.
Gele topboorder.

LEPIDOPTERA; *Pyralididae*

180

276

Relatively large moth, greyish-yellow, with dark, indistinct markings, their wings expanding to 35 mm. The eggs are placed in heaps on the underside of the leaves. The yellow caterpillars, decorated with 5 rows of reddish speckles, feed on leaf sheaths, rolled up leaves and inside the stalks, where several caterpillars can be found together. Development period: 9-12 weeks.

Distribution: India, Indonesia, Burma, Korea, Formosa, Philippine Islands

stalk



Growth checked. Signs of attack on leaves and stalk. Development of cobs impaired or heavily injured.

Elasmopalpus lignosellus Zell.
Lesser cornstalk borer.

LEPIDOPTERA; *Pyralididae*

181

9, 280, 311

Dark grey to almost black moth with a wing span of 20-25 mm. The eggs are deposited on the shoots or in the leaf axils. The pale green caterpillars, striped with reddish-brown, feed on the leaves and mine from the stem base upwards, eventually destroying the apical bud; frass is evacuated through bore holes as they proceed. For pupation the caterpillars descend to the plant base or into the topsoil.

Distribution: Tropical and subtropical America

Plant growth impaired. Fruit setting reduced or stopped altogether. Stems riddled with mines harbouring greyish-white caterpillars, up to 20 mm long.

Dichocrocis punctiferalis Guen.
Peach moth.

LEPIDOPTERA; *Pyralididae*

182

640, 876

Moth with a wing span of 25 mm. The wings are pale orange-yellow, speckled with numerous small, black dots. The eggs are laid on leaf stalks near the stalks or on the main stem. The caterpillars emerge after a few days and start tunnelling the stem. After 3-4 weeks they pupate inside a silky web either on the plant or on the ground. *D. punctiferalis* attacks also pods of Castor beans and cocoa.

Distribution: India, Burma, Ceylon, China, Japan, Australia



Leaves partly destroyed. Inflorescences tied in a web. Stalks with bore-holes, their entries soiled with pale green to cream-coloured wet excrement. Plants in poor condition, many of them broken off.

stalk

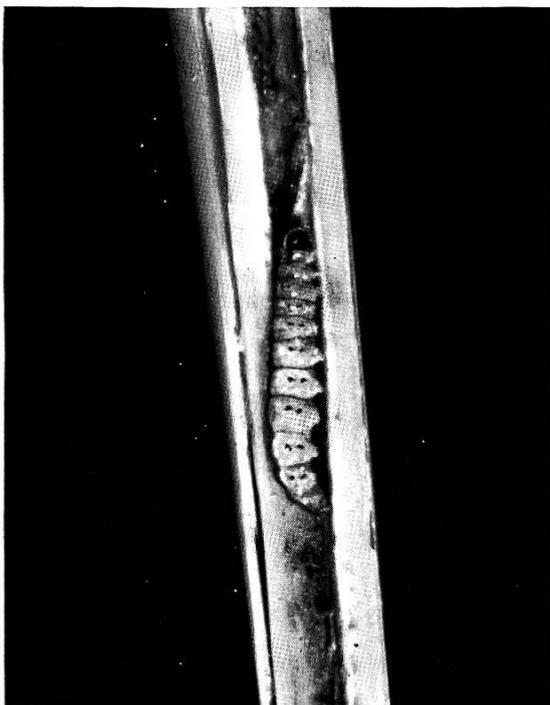
Pyrausta nubilalis Hb.
European corn borer.

LEPIDOPTERA; *Pyralididae*

183

Moth with a wing span of 25-30 mm. The forewings of the female are ochrous, crossed by 3 dark zig-zag lines, while the hindwings are straw-coloured, crossed by 2 similar lines. The males have brown forewings with yellow zig-zag lines and grey hindwings with a yellow margin. The eggs are placed in clusters on the underside of young leaves, preferably on plants in or nearly in flower. The caterpillars tie the panicles together with a web, they hollow the stalk and tunnel the shoots. Their colouring is creamy-white to brown, each segment being furnished with 6 dark round warts. When full grown they are up to 30 mm long.

Distribution: Europe, Africa, Asia Minor, India, Indonesia, America



Leaves partly destroyed. Inflorescences tied in a web. Stalks with bore-holes, their entries soiled with pale green to cream-coloured wet excrement. Plants in poor condition, many of them broken off.

Chilo zonellus Swinh.

LEPIDOPTERA; *Pyralididae*

184

201

see page 146 (Sorghum)

stalk



Young leaves and inside of stalk attacked. Several caterpillars found together in one stalk which shows many bore-holes. Cobs sometimes completely destroyed.

Busseola fusca Hmps.
Maize stalk borer.

LEPIDOPTERA; *Noctuidae*

185

Moth with reddish-brown and dark mottled forewings and greyish-brown hindwings, expanding to 40 mm. The eggs are heaped within the leaf sheaths. The caterpillars first feed on foliage, burrowing later on into the stalk. Full grown, they are about 30 mm long, hairless and of various shades of creamy-white to pink, while the young larvae are black-headed and pink. The moth is on the wing when the maize emerges. Several generations overlapping.

Distribution: Africa

Young plants wilting. Growth of old plants checked. Development of cobs impaired. Numerous caterpillars found inside hollowed out stalks. Young maize plants are particularly liable to damage.

Sesamia vuteria Stoll.

186

LEPIDOPTERA; *Noctuidae*

282

Moth with greyish-yellow forewings, here and there speckled with small, dark dots, while the hindwings are yellowish-white to greyish-white. The females lay 600-700 eggs each in batches under the leaf sheaths. The caterpillars feed on leaves, tender grains, mining later on into the stalk. One single caterpillar can damage several stalks. The young caterpillars are creamy-white, dark-headed, their prothorax and anal shield distinctly hirsute. Full grown they are pink, with a light brown head, prothorax and anal shield. Each segment bears a lateral grey or brownish, round tubercle. Several generations.

Distribution: Mediterranean region, Africa, Indonesia

Young plants particularly liable to injury. Leaves withering and turning brown. Presence of larvae and sometimes pupae on leaves.

Epilachna similis Thunb.

Ladybird beetle.

COLEOPTERA; *Coccinellidae*

Oval beetle, 4.5-5 mm long. The hard elytra are red to reddish-brown, with black spots, while the prothorax and legs are black. (Most ladybird beetles feed on aphids, but *E. similis* attacks maize). The orange-yellow eggs are dark at one end and placed erect in heaps of about 50 on the underside of the leaves. Full grown larvae are 8-10 mm long, clothed with hairs, dark-brown to black, with pale dots on the thorax, yellow underneath. Up to the 4th moult the larvae are yellow. The pupae are fixed by the posterior end to leaves. Both adults and larvae feed on leaf tissue leaving the upper epidermis intact, thus skeletonizing the leaves. The peak of attack occurs in January/February.

Distribution: South Africa, Rhodesia

187

Leaves with white, rasped patches.

Cnaphalocrocis medinalis Guen.

Rice case worm.

LEPIDOPTERA; *Pyratididae*

Small moth with a wing span of 12-15 mm. The wings are bright straw-yellow. The costal and outer margins of the forewings as well as the outer margin of the hindwings are edged with greyish-brown. Fore- and hindwings are crossed by 1-2 fine, brown stripes. The body is long and slender. The eggs are laid on the leaves. The hairless, creamy-white to greenish caterpillars feed on the underside of the leaves and roll their tips to a quiver-like case. Several generations.

Distribution: East Asia, Australia, Texas, Samoa

188

225

Plants turn pale and wither. Signs of partial wilting. Growth and fruit formation impaired.

Blissus leucopterus Say.

Chinch bug.

HETEROPTERA; *Tingidae*



189

Elongate, straight-sided plant bug, about 5 mm long. The wings are whitish, marked with a dark triangle. The body is greyish-black. The young larval stages are reddish, darkening gradually at each moult. Both short-winged and wingless forms may occur. The eggs are placed in spring into the leaf sheaths or at the roots below the ground. The nymphs suck the sap of leaves and green roots. Two to three generations each season.

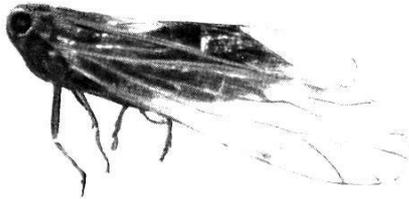
Distribution: South America, Southern States of North America

leaves

Young plants stunted and eventually dying. Growth severely impaired.

Peregrinus maidis Ash.
Corn lanternfly.

HOMOPTERA; *Aracopidae*



190

Leafhopper, 3 mm long. The light brown wings are longer than the body; their venation is dark and conspicuous. The outer third of the wings is marked with a small, dark brown spot. The prothorax is brownish, striped with two yellow longitudinal bands, while the abdomen is dark brown. The larvae are dark brown to dark reddish-brown. The females place their eggs into the midribs on the leaf surface. The insects are mainly found on the underside of the leaves or in the leaf sheaths. Several generations a year. *P. maidis* transmits virus diseases such as corn mosaic virus, and freckled yellows disease of Sorghum.

Distribution: widespread in Tropics and Subtropics

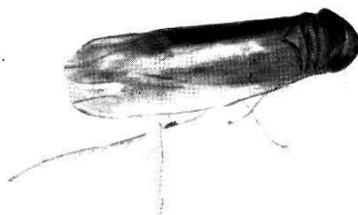
Sucking injuries negligible. Damage is done by transmitting virus diseases such as maize streak virus, sugar-cane streak virus.

Cicadulina mbila Naudé
Leafhopper.

HOMOPTERA; *Jassidae*

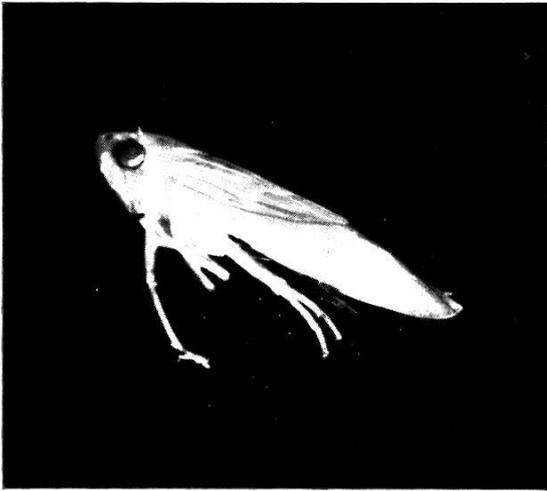
191

294



Leafhopper, 2-3 mm long, with transparent wings, bearing brown, longitudinal lines in the centre. The head is yellow; the thorax and abdomen are also yellow, dark brown on the back. The eyes are dark brown to black. The female lays its eggs in the leaf tissue. Development period of one generation: 5-6 weeks. Several generations. *C. mbila* occurs on maize and sugar cane.

Distribution: Africa, Mauritius, India



Vector of Mosaic virus and of Corn stunt disease.

Baldulus maidis D. & W.
Corn leafhopper.

HOMOPTERA; *Jassidae*

leaves

192

Small leafhopper, about 3 mm long, with opaque yellowish wings and two black spots on the top of the head. The eggs are inserted in the tissue of the leaves. The larvae reach the adult stage after 3 weeks. Both larvae and adults feed on plant sap.

Distribution: Southern States of U.S.A., Central and South America



Leaves, leaf sheaths and inflorescences covered with colonies of dark green aphids, slightly powdered white. Leaves often misshapen and mottled. New growth dwarfed. Sterility of plants due to injured inflorescences.

Rhopalosiphon maidis Fitch
Corn leaf aphid.

HOMOPTERA; *Aphididae*

193

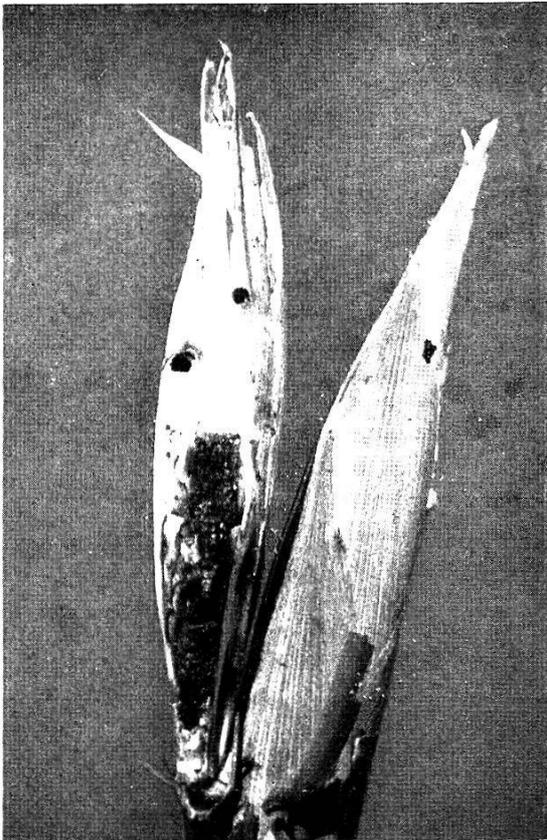
298

Winged or wingless aphids, oblong in shape. The adults are about 2 mm in size; they are provided with short, strong siphons. The posterior end of their body bears a distinct caudal process, furnished with long, striking hairs. The antennae are also hirsute. Development period of one generation: about 8 days.

Corn leaf aphid transmits various virus diseases, such as leaf fleck of maize, sugar cane mosaic, yellow dwarf of onion, cereal yellow dwarf virus.

Distribution: In most areas of the tropics and subtropics where maize is grown

cob



Leaves heavily attacked. Plants sometimes stripped bare. Stalks often mined and young grains in the ear injured.

Prodenia litura F.
Cotton worm.

LEPIDOPTERA; *Noctuidae*

194

132, 321, 629
662, 703, 837
867

see page 423 (Cotton)

Leaves heavily attacked, often stalks and surface of grains also destroyed.

Laphygma exigua Hb.
Beet armyworm.

LEPIDOPTERA; *Noctuidae*

see page 409 (Cotton)

195

660, 704, 807



Immature and ripening grains in the cobs destroyed.

Poecilophila maculatissima Bohem.

COLEOPTERA; *Scarabaeidae*

196

833

see page 421 (Cotton)



Foliage, upper parts of stalks as well as ripening grains in the ears heavily attacked. Cobs irregularly injured. cob

Heliothis obsoleta F.
American cotton bollworm.

LEPIDOPTERA; *Noctuidae*

197
702, 826

see page 418 (Cotton)

Sorghum, Kaffir-corn, Juar, Guinea corn

(*Sorghum guineense* Stapf and *S. bicolor* L. = various varieties)

For pests of sorghum see also under maize

Most important pests: 199, 201, 202, 203, 205



Young shoots cut off close above the ground.

stalk

Chrotogonus trachypterus Blanch.

ORTHOPTERA; *Acridiidae*

198

Small, brownish-grey grasshopper, 15-20 mm long. The body is depressed, the median keel of the thorax interrupted. The tips of the antennae are slightly thicker than the other segments. The eggs are deposited in the ground. Several generations overlapping.

Distribution: East India



Plants with "dead heart". Growth checked, terminal bud destroyed. Stem severely mined.

Proceras argyrolepidus Hamps.

LEPIDOPTERA; *Pyralididae*

199

Moth with ochrous to brownish forewings, marked with a small black dot in the centre. The hindwings are plain pale yellow; they expand to 25 mm. The fairly flat eggs are fixed in clusters to the underside of the leaves or on the stems, where the caterpillars hatch after a few days and mine in the stem. They are creamy-white to reddish-grey, with pale dots. The head and prothorax are dark brown. Development period of one generation: 5-6 weeks. Several generations.

Distribution: East Africa, Nyasaland

stalk **Growth stunted. Necrotic blotches on stalks.**

Saccharicoccus sacchari Ckll.

Pink sugar cane mealybug.

200

HOMOPTERA; *Pseudococcidae*

271

see page 173 (Sugar cane)

Plant growth impaired. Upper portion of stem often dead, owing to presence of several hairless caterpillars which fill the mines with a moist, pulpy mass of excrement.

Chilo zonellus Swinh.

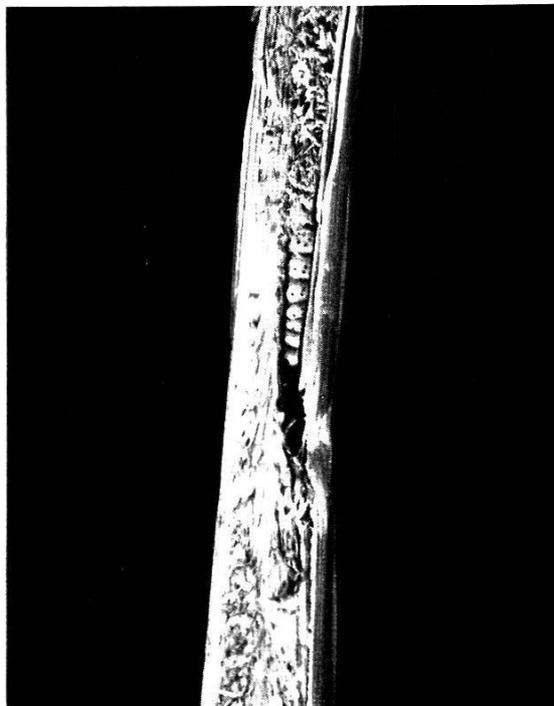
201

LEPIDOPTERA; *Pyralididae*

184

Moth with a wing span of 25-30 mm. The forewings are pale ochrous to greyish-yellow without any distinct markings, while the hindwings are greyish-white to white. The eggs are fixed to the underside of the leaves. The creamy-white to dirty-grey caterpillars feed in the upper portion of the stem. Development period of one generation: 5-6 weeks.

Distribution: India



Upper parts of shoots heavily attacked. Growth stunted; plants often deformed.

Diatraea crambidoides Grote
Southern cornstalk borer.

LEPIDOPTERA; *Pyralididae*

202

178

Brownish-yellow moth with one small dark dot on each forewing. Wing span 30 mm. The eggs are laid in small groups on the underside of the leaves. The caterpillars are greyish-white, speckled black. They tunnel into the shoots and destroy the central bud; they also attack the stem base.

Distribution: Southern States of U.S.A., Mexico, South America



Several conspicuous bore-holes on one shoot, causing the stem to break off. Presence of pupae in the lower bore-holes. Damage visible at the beginning of August.

stalk

Sesamia cretica Led.
Dura stemborer.

LEPIDOPTERA; *Noctuidae*

203

227

Moth with greyish-yellow to brownish-yellow forewings, the outer margins of which are dark, while the hindwings are light in colour. The wing span extends to 40 mm. The eggs are placed in clusters in the leaf sheaths or at the leaf base in May. The caterpillars are creamy-white, with dark spots along the sides of the body. They tunnel into the stem, crawl out and bore in again later on for pupation. Each tunnel has usually two exits.

Distribution: Italy, the Balkans, North Africa, Central Africa, Nigeria, Dahomey, Togo

Central leaves dry up, ears fail to form. Infested plants produce several side shoots.

Anatrichus erinaceus M.
Sorghum shoot fly.

DIPTERA; *Chloropidae*

204

Small, black fly, 1.5-2 mm long, which lays its eggs on plants as they emerge from the ground. The hatching maggots are long and thin and crawl into the growing tissue, attacking the centre. Pupation takes place at the stem base or in the soil. Development cycle: 3 weeks. Peak of emergence occurs in January.

Distribution: South Africa, Rhodesia

leaves



Dieback of stalk, giving rise to several side shoots. Presence of white fly maggots.

Atherigona soccata Rond.
Great millet stem maggot fly.

DIPTERA; *Anthomyiidae*

205

Small fly, about 3-4 mm long. The females deposit their eggs singly at the leaf base. The larvae penetrate into the stalk where they feed, causing heavy disturbance of its growth. Several generations.

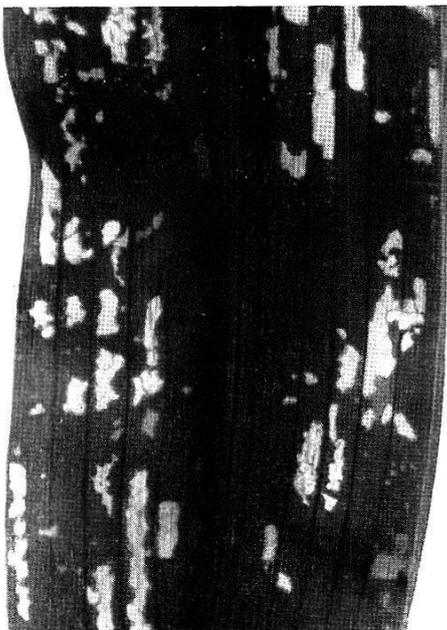
Distribution: North Africa

Leaves striped with feeding marks between the veins. Often stalk injured also.

Chaetocnema sp.
Flea beetle.

COLEOPTERA; *Chrysomelidae*

206



Small, elongate, oval beetle, 1.5-2 mm long, brown and iridescent bronze. The femora of the hind legs are thickened. The adults feed on leaves and stems of young plants.

Distribution: India

Leaves devoured to the midrib, young shoots often completely destroyed.*Hieroglyphus nigrorepletus* Bol.*Jowar Phadka.*ORTHOPTERA; *Acridiidae*

The general body colour is light lemon yellow with thick black lines behind the head, bluish-green lower parts of the legs with a prominent black blotch midway on the hind legs. The eggs are placed in heaps in the soil, where the hoppers hatch after the rainy season (June/July). After five moults they reach the adult stage (September/October). After oviposition the females die.

Distribution: India

leaves

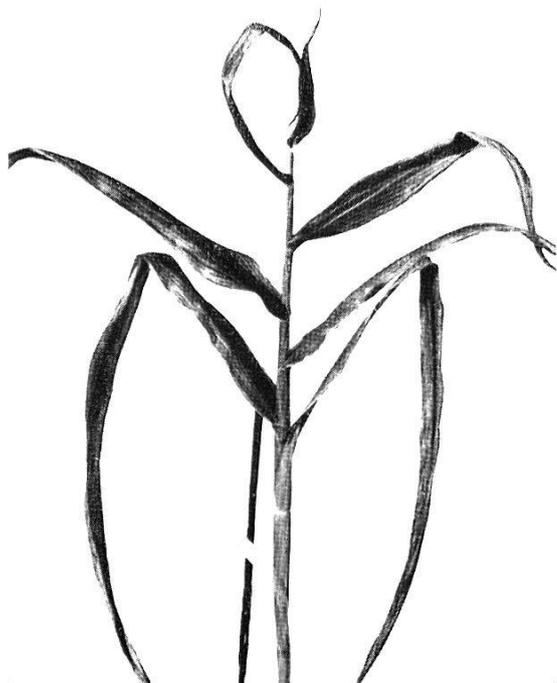
207

Leaves blotchy and necrotic. Presence of very large and dense aphid colonies on leaves, stems and panicles. Deformation at grain setting.*Schizaphis graminum* Rond.*Spring-grain aphid.*HOMOPTERA; *Aphididae*

Pale green aphid, 1.5-2 mm long, with dark green lines along the body.

Distribution: Africa, Asia, U.S.A., South America

208



Leaves become brittle, and turn pale green to yellow with longitudinal reddish stripes. Fruit setting impaired or altogether stopped. Heavy attack leads to death of plants.

Paratetranychus indicus Vt.*Jowar mite.*ACARINA; *Trombidiformes*

209

Small, yellowish spider mite, about 0.4 mm long, which appears mainly during the dry season.

Distribution: India

grains **Grains in the ears heavily attacked. Seed heads beset with caterpillars.**

Celama sorghiella Riley.
Sorghum webworm.

LEPIDOPTERA; *Arctiidae*

210

White moth with dark markings along the anterior margin of the forewings. The wings expand to about 20 mm. Oviposition takes place in April/May on the panicles or in the grains. The caterpillars feed on seed heads. Webworms generally occur in localised areas but they may cause heavy damage. Several generations.

Distribution: Central and North America



Sterile ears, seed head development impaired and seed formation reduced. Grains hollowed out and occupied by pink larvae.

Contarinia sorghicola Coquil.
Sorghum midge.

DIPTERA; *Itonididae*

211

Small, yellowish-red midge, 2-3 mm long, mosquito-like, having two frail, transparent, slightly hairy wings. The antennae and legs are long, distinctly clothed with hairs. The eggs are inserted in or laid on the flowers or between the seed and the glume. One female may lay up to 100 eggs. The larvae, varying from orange to pink and about 3 mm long when full grown, destroy the seeds. Pupation on the plant or in the ground. The midges appear when the humidity is high, i.e. after the rainy season. Development period of one generation: 16-18 days.

Distribution: Africa, U.S.A., the West Indies, Australia, Hawaii

Rice

(*Oryza sativa* L. and *O. glaberrima* Steud. = various varieties)

Most important pests:

214, 215, 216, 217, 218, 220, 221, 222, 223, 226, 232, 239, 240, 248, 249, 252

Infested fields with large patches of fallen plants. No distinct injuries visible. Presence of galleries in very wet soils.

root

Sesarma africanum (Africa) and
Paratelphusa convexa H. (Indonesia).

Pink and ivory coloured crabs, reaching sometimes the size of a fist. They penetrate into the rice fields and damage the crop by undermining it or by burrowing into the bunds.

212

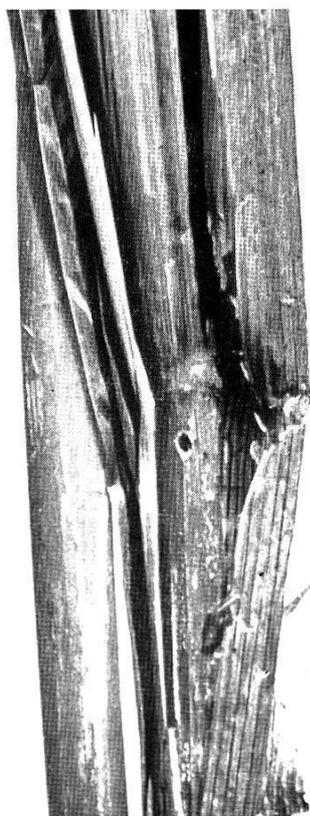
Older roots dead. Central cylinder and epidermis intact, but parenchymatous tissue greatly reduced, lamellae filled with water. Plant growth severely stunted.

Radopholus oryzae Cobb.
Burrowing nematode.
NEMATODA

213

Fairly large, endoparasitic worms, up to 2 mm long, which occupy the roots of rice plants (see page 37).

Distribution: Indonesia and other rice growing districts



“Hearts” wilt and die. Flower panicles of older plants destroyed. Stalks break, owing to feeding galleries filled with excrement.

stalk

Chilo auricilia Dudg.
Gold fringed moth.

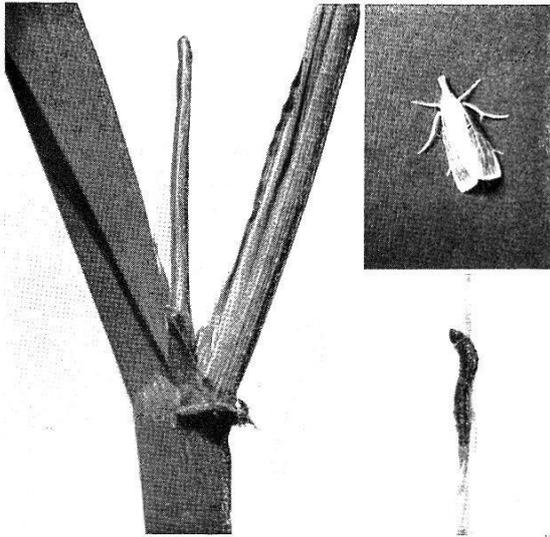
LEPIDOPTERA; *Pyralididae*

214

Moth with a wing span of about 30 mm. The forewings are decorated with metallic spots. Oviposition takes place from December to February. The whitish caterpillars have a black head and purplish-brown stripes. Development period of one generation: 8-10 weeks.

Distribution: India, Malaya

stalk



Plants with dead hearts. Leaf sheaths stained yellow; stem breaks off easily, its inside being hollowed out and filled with excrement.

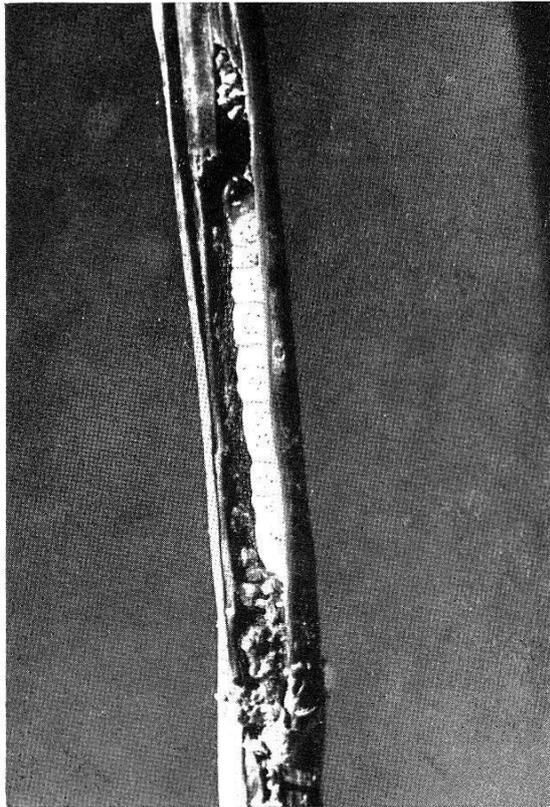
Chilo suppressalis Walk.
(*simplex* Butl.)
Purple lined borer.

LEPIDOPTERA; *Pyralididae*

215

179

see page 135 (Maize)



Young leaves withering. Foliage eaten away; hearts destroyed, causing death of plants. Leaf sheaths with bore-holes. Yield often greatly reduced, due to destroyed ears and withered inflorescences.

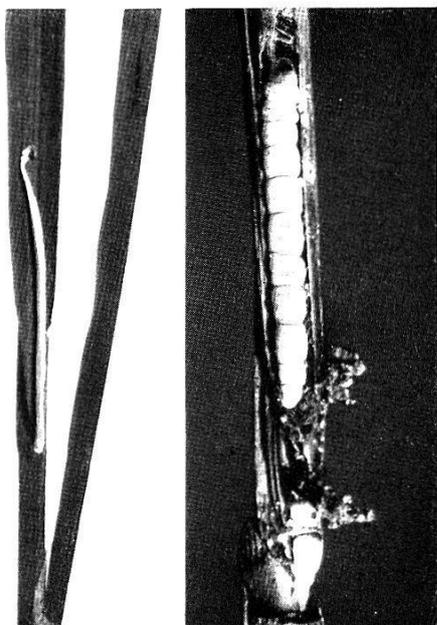
Scirpophaga innotata Walk.
White rice borer.

LEPIDOPTERA; *Pyralididae*

216

White moth with a wing span of 25-30 mm, which flies at night and is attracted by light (optical bait = lamp). The eggs are fixed to the underside of the leaves and the egg-clusters covered with brown fluff. The creamy-white caterpillars feed on leaves or tunnel through the leaf sheaths into the central bud. The ears of older plants are gnawed away. Several (4-5) generations each season. The insects go through diapause before they pupate.

Distribution: Indonesia, Philippine Islands



Plants wilted, growth stopped. Hearts withered. At flowering time "white ear-heads" appear.

stalk

Schoenobius bipunctifer Walk.
Paddy borer.

LEPIDOPTERA; *Pyralididae*

217

Moth, 15-18 mm long, with a wing span of 35-40 mm. They are straw-coloured with yellow forewings. The females have one black dot on each side. The caterpillars are pale yellowish-white and about 25 mm long. The eggs are deposited on the tips of leaves and covered with yellowish hairs. The young caterpillars may first feed on tender leaves for a day or two and then start boring into the stem. Four to five weeks after feeding inside the latter they are fully grown. They then pupate inside the stem within a transparent silken cocoon. The pupal period lasts 8-10 days. The pest remains as caterpillars or pupae in the stubble left in the field after the harvest of the crop until the next monsoon. It becomes active from June, developing further to emerge as a moth and thus start a new generation. 5-8 generations.

Distribution: South and East Asia

Plants with wilted or dead hearts. Stem hollowed out by caterpillars.

Proceras polychrysa Meyr.
Top borer.

LEPIDOPTERA; *Pyralididae*

218

Greyish-yellow to reddish-brown moth, the forewings of which bear a golden line, while the margin is brown. The eggs are arranged in rows on the leaves. The young caterpillars work into the stem near the leaf-base and hollow it out. The body is greyish-white, striped with 5 purple or reddish-brown longitudinal lines. They are full grown after 4 weeks and are found in the stem immediately above water level. Several generations.

Distribution: Malaya, Indonesia

stalk



Plants wilted, growth stopped. Hearts withered. Stem breaks off easily, its inside being hollowed out and filled with excrement.

Elasmopalpus lignosellus Zell.
Lesser cornstalk borer.

LEPIDOPTERA; *Pyralidae*

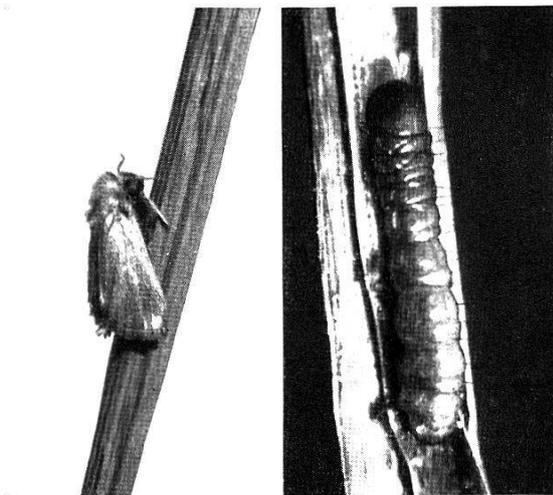
219

31, 280, 311

Dark grey to almost black moth with a wing span of 20-25 mm. The eggs are deposited on the shoots or on the leaves. The pale green caterpillars, striped with reddish-brown, feed on leaves and mine from the stem base upwards. Frass is evacuated through bore holes as they proceed. For pupation the caterpillars descend to the plant base or into the topsoil.

Distribution: Tropical and subtropical America

220



Leaves and culms dead. Plant growth stopped.

Sesamia inferens Walk.
Paarsrooder borer.

LEPIDOPTERA; *Noctuidae*

Moth with beige to brownish forewings, distinctly darker in the centre, while the hindwings are almost white. They expand to 30-40 mm. The eggs are placed in the leaf sheaths. The caterpillars, slightly purple on the back, feed on the leaf sheaths and gnaw into the culm. Pupation takes place inside the stem base.

Distribution: From India to Japan



**Plants wilting. Sucking marks on stems.
Virus infection: stripe disease.**

stalk

Calligypona marginata F.
Smaller brown planthopper.

HOMOPTERA; *Araeopidae*

221

Small, pale yellow to beige plant hopper, usually with a dark thorax and a dark spot on the margin in the centre of the elytra. The pest appears from March to May and attacks rice nurseries, migrating later on to the rice fields. The eggs (over 300) are placed in the leaf sheaths. Damage occurs usually only when the second or third generation of the plant hopper is present. The pest also attacks oats, barley, wheat and millet; it may transmit virus diseases as well.

Distribution: Southern regions of Russia, India, Japan



**Leaves streaked with mines, turning
yellow when heavily attacked. Growth
greatly impaired.**

leaves

Hispa armigera Oliv.
Rice leaf-beetle.

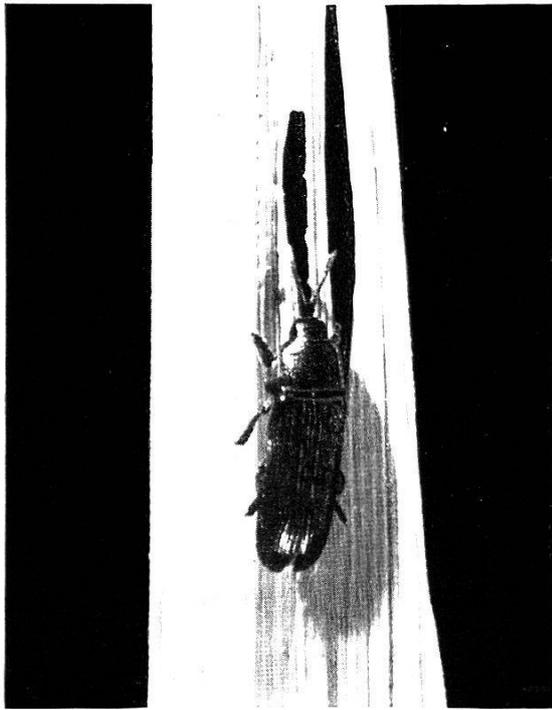
COLEOPTERA; *Chrysomelidae*

222

Small beetle, about 5 mm long, the elytra of which are furnished with long and sharp erect bristles. The eggs are deposited on the leaves where the hatching larvae consequently mine. Several generations .

Distribution: India, Indonesia, China

leaves



Upper surface of leaves eaten off. Leaves curled upwards. Pest active from July to September.

Leptispa pygmaea Baly.
Blue beetle.

COLEOPTERA; *Chrysomelidae*

223

Metallic blue, oblong, straight-sided beetle, 4-5 mm long, with strikingly broad tarsi. Its upper surface is distinctly punctate. The pest emerges in July. Oviposition takes place on the leaves, where the hatching larvae as well as the adults feed.

Distribution: East India, Ceylon

Leaves mined in streaks, growth stunted. Plants turn yellow. Heavily infested fields have "parched" appearance.

Lema oryzae Kuw.
Rice leaf beetle.

224

COLEOPTERA; *Chrysomelidae*

Beetle, about 8 mm long, with blue elytra and yellow thorax. The eggs are heaped on the leaves in spring. The larvae are dirty yellow and bear a row of hairs on the dorsal surface of each segment. The body is covered with excrement. Both adults and larvae feed on leaves. One generation a year. The adults hibernate under grass or other plants near rice fields.

Distribution: Japan, Formosa, Manchuria

Tips of leaves white and withered. Lower portion of leaves eaten away in strips, upper epidermis remaining intact. From a distance rice plants have a white appearance.

Cnaphalocrocis medinalis Guen.
Rice case worm.

225

LEPIDOPTERA; *Pyralididae*

Small moth with a wing span of 12-15 mm. The wings are bright straw-yellow. The costal and outer margins of the forewings as well as the outer margin of the hindwings are edged with greyish-brown. Fore- and hindwings are crossed by 1-2 fine, brown stripes. The body is long and slender. The eggs are laid on the leaves. The hairless, creamy-white to greenish caterpillars feed on the underside of the leaves and roll their tips to a quiver-like case. Several generations.

Distribution: East Asia, Australia, Texas, Samoa

Leaf tissue completely eaten away, leaving only the lower epidermis; leaves thus transparent. Green, cylindrical cases up to 20 mm long, fixed to the leaves, harbouring caterpillars. Damage particularly heavy in seedbeds.

leaves

Nymphula depunctalis Guen.

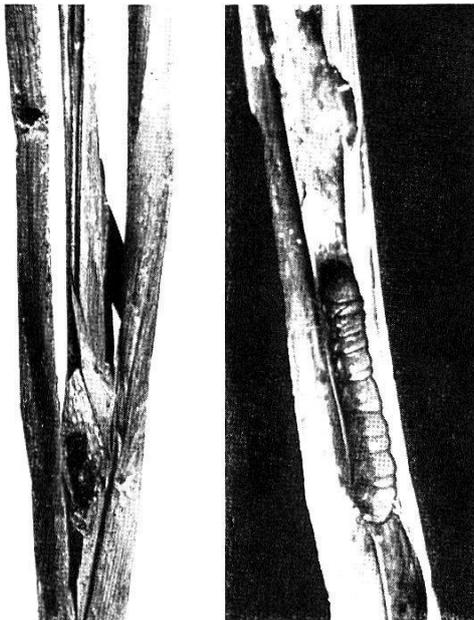
Rice case worm.

LEPIDOPTERA; *Pyralididae*

226

Small, white to silvery-white moth with dark markings on the wings, the tips of which bear dark bands. The wings expand to about 30 mm. The eggs are laid on the leaves, where the caterpillars build cylindrical cases in which they hide.

Distribution: Malaya, South-East Asia, Burma, Philippine Islands, Australia



Leaves and culms heavily attacked.

Sesamia cretica Led.

Dura stemborer.

LEPIDOPTERA; *Noctuidae*

227

203

see page 147 (Sorghum)

Distribution: Italy, Republic of Central Africa, Nigeria, Dahomey, Togo, and other parts of Africa

Leaves very heavily attacked.

Mocis repanda F.

Grass looper.

LEPIDOPTERA; *Noctuidae*

228

Large caterpillars, 30-50 mm long, greyish-green to yellowish-brown with pale lines along the body. They are gregarious, attacking rice fields in great masses, especially after rainfall following a long dry period.

Distribution: Southern U.S.A., South America (Brazil), the West Indies

leaves Leaves and stems severely attacked.

Laphygma frugiperda S. & A.
Fall armyworm.

229

LEPIDOPTERA; *Noctuidae*

287

see page 180 (Sugar cane)

Distribution: Japan, the West Indies (British Guiana), Argentine, Paraguay, U.S.A.

Plants heavily attacked, often stripped bare.

Cirphis unipuncta Haw.
Armyworm, paddy climbing cutworm.

230

LEPIDOPTERA; *Noctuidae*

177, 288

see page 134 (Maize)



Young plants heavily attacked, especially in newly planted fields (seedbeds). Plants often completely devoured.

Spodoptera mauritia Boisd.

LEPIDOPTERA; *Noctuidae*

231

Moth with a wing span of 35-40 mm. The forewings are greyish-brown with golden-yellow lines, while the hind wings are very light in colour, almost white. The eggs are placed on the underside of the leaves when the seedlings emerge, and covered with greyish-brown fluff. The caterpillars feed at night. Their body is dark brown, striped with pale lines along the sides. 3-5 generations.

Distribution: West Africa, Southern China, Japan, Formosa, Fiji Islands, Australia

Foliage, including heart completely destroyed.

Parnara guttata Brem.

232

LEPIDOPTERA; *Hesperiidae*

Small, stout moth, which deposits its eggs on the leaves. The caterpillars are light green, slightly darker on the sides of the body. The head is large and the thorax narrow. Several generations each season.

Distribution: Indonesia, Japan.

Leaf tips turn yellow and wither, being partially eaten away. Leaves often misshapen, deckle-edged. Development of ears impaired, culms often hollowed out.

leaves

Chlorops oryzae Mats.

Rice stem maggot.

DIPTERA; *Chloropidae*

Small, insignificant yellow fly, which deposits its eggs on young plants in the nurseries. The hatching maggots gnaw into the central bud, while those of the second generation cause injury to the ears, partially preventing the development of grains. The infested ears can be determined by observing the partial lack or incompleteness of blossoms after heading. The third generation lays its eggs on perennial grasses. Two to three generations.

233

Distribution: Japan, Korea

Leaves streaked with mines, chlorotic; their tips withering.

Agromyza oryzae Munakata

Rice leaf miner.

DIPTERA; *Agromyzidae*

234

Small, black fly with transparent wings. The female inserts its eggs into the leaf tissue. The eggs develop within 6 days and the hatching maggots mine into the leaf tissue. After about 10 days these latter pupate on the surface of the leaves. The pupal stage lasts about 8 days. 3-4 generations a year.

Distribution: Japan

Upper leaves of young rice plants withered.

Atherigona exigua Stein.

Bibit fly.

DIPTERA; *Muscidae*

235

Small, dark fly, 3-4 mm long which lays its eggs near the leaf sheaths. The maggots penetrate between the latter and the stalk into the culm. Seedlings in seedbeds are preferred.

Distribution: Formosa, China

Leaves curled up, turning yellow.

Thrips oryzae Will.

Paddy thrips.

THYSANOPTERA; *Terebrantia*

236

Small, light brown thrips, 1.5-2 mm long which occurs mainly in seedbeds and lives in the leaf sheaths. Several generations.

Distribution: India, Malayan Archipelago

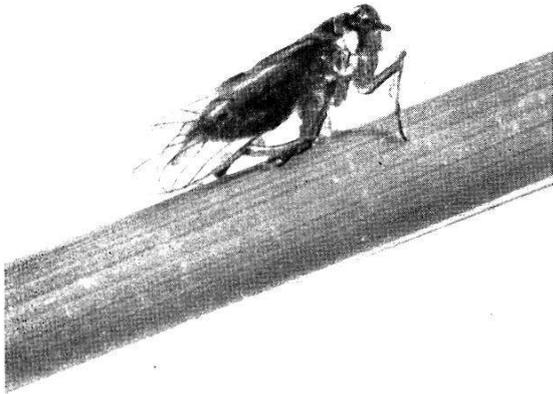
leaves

Plants wilted and dwarfed. Heavy sooty mould infestation.

Nilaparvata lugens Stal.
Brown planthopper.

HOMOPTERA; *Araeopidae*

237



Light brown plant hopper, 5-8 mm long. The females insert their eggs into the midribs of the leaves. Development period of one generation: 4 weeks. The first generation appears in April, the third in August, the latter causing the heaviest injury. The adults are usually found in the lower parts of the plants, while the nymphs pierce the leaf sheaths.

Distribution: India, Ceylon, Malaya, Indochina, Formosa, Japan

Midribs on the underside of leaves stained red or brown (egg deposits). Foliage turns yellow, culms mottled, wilted or dead. Frequent formation of sooty mould at which stage damage is visible in rice nurseries.

Calligypona furcifera Horv.
White-back planthopper.

HOMOPTERA; *Araeopidae*

238



Pale yellow, robust plant hopper, about 6-8 mm long. The thorax is covered with dark, oblong spots on each side. The legs are greyish-beige, the eyes dark brown. Oviposition takes place in June/July in the leaf sheaths or in the midribs on the lower side of the leaves. Both larvae and adults feed on plant sap. Development period of larvae: 20-24 days. The second and third generations emerge in August/September. Severe damage is caused mainly by the third, sometimes by the fourth generation.

Distribution: Ceylon, Indochina, Formosa, China, Japan

Young rice plants much dwarfed. Chlorotic patches. Heavy infestation with sooty mould. leaves

Nisia atrovonosa Leth.

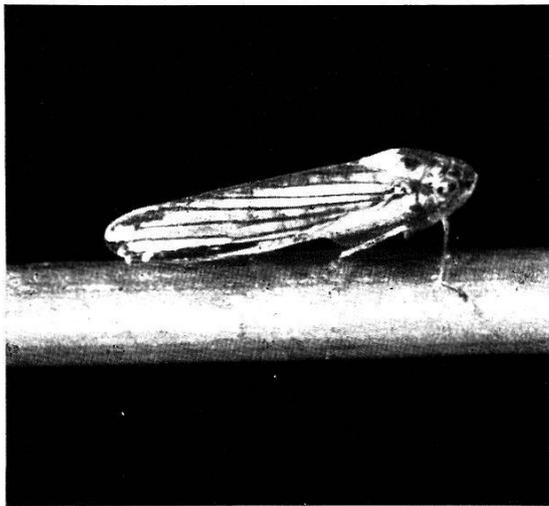
Rice fulgorid.

HOMOPTERA; *Flatidae*

Brownish insect, about 3 mm long. The wings are folded into a tent when at rest. They are almost transparent with a conspicuous reddish-brown venation. The forehead is furnished with 2 protuberant ridges. The eggs are placed on the upper side of the leaves or on the stem. Both larvae and adults injure the plants by sucking the sap. Secretion of honeydew leads to infestation with sooty mould. The pest hibernates in the egg stage. Several generations each season.

239

Distribution: Africa, India, China, Japan, Formosa, Australia



Plants turn yellow; growth impaired.

Tettigella spectra Dist.

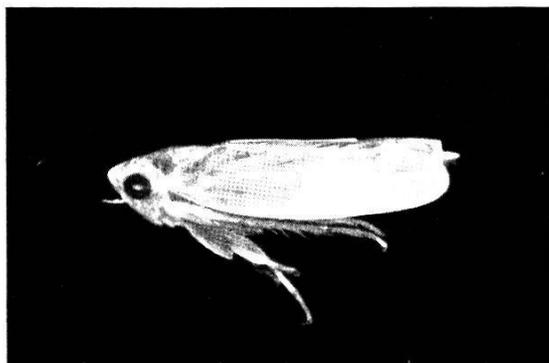
Paddy white Jassid.

HOMOPTERA; *Jassidae*

240

Robust, pale Jassid, about 8 mm long, with plain and almost white wings. The eggs are placed in the leaf sheaths.

Distribution: India, Ceylon, Indonesia



Upper leaves wilted. Young plants stop growing and die. Ear formation often seriously impaired. Virus infection: dwarf disease.

Nephotettix bipunctatus F.

Green rice leafhopper.

HOMOPTERA; *Jassidae*

241

Light green leafhopper, 5-7 mm long, with black wing tips and black eyes. The head is as broad as the body. The pest appears in nurseries in May/June and attacks young plants, the third generation being the most injurious. The eggs are introduced under the epidermis.

Distribution: India, Indochina, Malaya. The variety *cinctipes* in Korea, Japan, Formosa, Philippine Islands

leaves **Leaves wilting and withering.**

Snazuma dorsalis Mits.
Zig-zag-striped leafhopper.

HOMOPTERA; *Jassidae*

- 242 Whitish-grey to beige leafhopper, 5-7 mm long. The wings are marked with a brown V-shaped zig-zag line. The eyes are red. The eggs are placed in the leaf sheaths or in the leaves. The first generation emerges in June, followed by several generations until November.

Distribution: South and East Asia

Leaves and leaf sheaths with brown patches. Plants dwarfed. Stem stained black near the uppermost leaf-bearing joint. Ear formation impaired, grains shrivelled.

Aphelenchoides besseyi Christie
White tip.

- 243 NEMATODA: *Aphelenchoides*

Endoparasitic worm, about 1 mm long, which migrates from stubble to healthy young plants (especially during heavy rainfall). The worm lives in the inflorescences and in other aerial parts of the plant, but never in the grains. The seeds are often infested. Amman rice is preferred. Three generations a year.

Distribution: India, Indonesia, and other rice growing districts

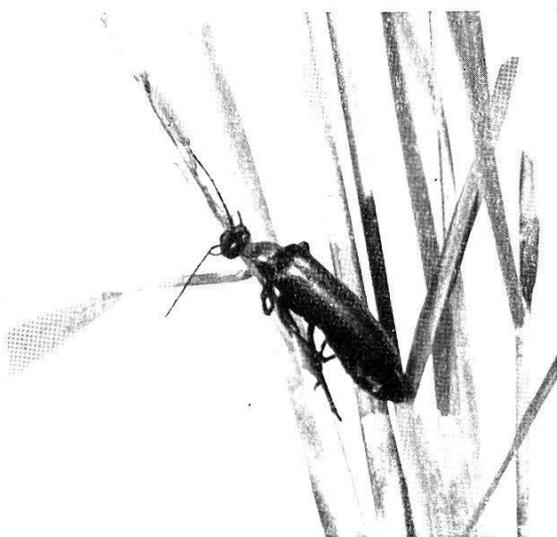
grains

Milk-ripe grains heavily attacked.

Epicauta sp.
Paddy cantharid.

COLEOPTERA; *Meloidae*

244



Dark blue or black, metallic shiny beetle, about 25 mm long.

Distribution: India



Leaves and tender grains severely attacked. Plants often stripped bare.

grains

Hieroglyphus banian F.

ORTHOPTERA; *Acridiidae*

245

615

Yellowish-brown, robust grasshopper, 50-60 mm long, marked with several dark stripes across the thorax. The insect favours moist areas.

Distribution: India

Stems hollowed out; earheads distorted (long cylindrical galls). Growth stopped. Presence of red maggots and pupae inside galls.

Pachydiplosis oryzae W. + M.
Rice gall fly.

DIPTERA; *Itonididae*

246

Small gall midge, about 5 mm long, reddish to grey, which lays its eggs in the leaf sheaths of young plants. The maggots eat into the culm, hollowing it out, thus destroying the central bud. Several generations.

Distribution: East and South Asia

Leaves turning yellow and withering. Young ears misshapen.

Hydrellia griseola Fallén
Smaller rice leaf miner.

DIPTERA; *Ephydriidae*

247

Small, greenish-grey fly with transparent wings and yellowish-green tarsi. The eggs are deposited on either side of the leaves or on the stem. The maggots gnaw into the leaf tissue, mining it. They pupate inside the tissue of the tunnelled leaves. Development periods: eggs 6 days, larval stages 2-3 weeks, pupae 2-3 weeks. 3-4 generations a year.

Distribution: North Africa, India, Indonesia, Japan

grains

Leaves and ears chlorotic. Black grains interspersed among healthy ones. Plant development seriously impaired.

Scotinophora lurida Burm.
Black rice bug.

HETEROPTERA; *Pentatomidae*

248



Uniformly dark brown and flattish plant bug, 12-15 mm by 7-8 mm. The round, white, opalescent eggs are arranged in parallel rows on the leaves, each female producing about 200 eggs. The light brown nymphs hatch after 5 days and immediately attack the plants, piercing the panicles. After 4 moults which take place within 4-5 weeks, the adult form appears; this latter hibernates. The peak of attack occurs in June/July. One generation a year.

Distribution: India, Ceylon, Japan, Formosa

Milk-ripe rice frequently injured. Grains mottled or black.

Solubea poecila Dall.
Rice bug.

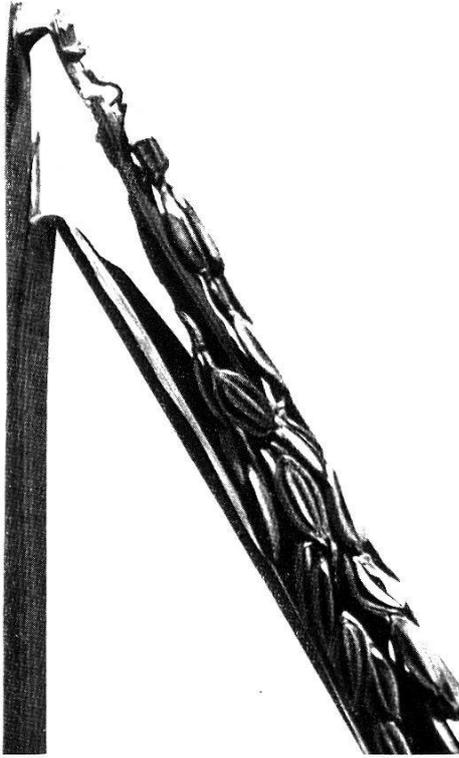
HETEROPTERA; *Pentatomidae*

249



Broad, robust and dull-coloured plant bug, 10-12 mm long. The thorax tapers towards the posterior end. The female heaps its eggs on the plant. Both nymphs and adults suck on unripe grains. Several generations.

Distribution: Central and South America



Feeding punctures on stems and grains. Growth greatly impaired. Ears often misshapen and disintegrating.

grains

Nezara viridula L.
Green plant bug.

HETEROPTERA; *Pentatomidae*

250

312, 480, 638
691, 841

see page 363 (Tobacco)

Distribution: widespread

Dark, speckled grains; ears often seriously injured or misshapen.

Cletus trigonis Thunb.
Slender rice bug.

HETEROPTERA; *Coreidae*

251

Light brown plant bug, 16-18 mm by 5-6 mm. The thorax bears on both sides a sharp thorn at right angles with the axis of the body. The triangle of the elytra is dark, the antennae and legs brown. Oviposition takes place on the leaves. Both adults and nymphs pierce the tender grains and suck their milky sap.

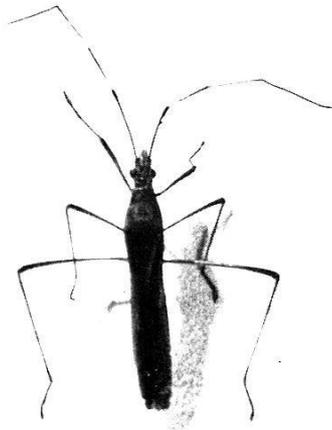
Distribution: South Asia

grains

Grains stained dark or black. Ear heads distorted and underdeveloped.

Leptocorisa varicornis F.
Paddy bug.

HETEROPTERA; *Lygaeidae*



252

Unusually slender, light brown plant bug, about 15 mm long, with a greenish thorax and long legs and antennae. They deposit their eggs in long, string-like rows on the leaves. The peak of attack occurs in July/August. The nymphs emerge within a few days and suck on unripe grains of the ear. Total development cycle: 4 weeks. The bugs are most active at night.

Distribution: South Asia, Ceylon, China, Japan, Indonesia, Philippine Islands, Australia

Stems shooting upwards; grains stained dark. Ears pale, slightly misshapen, disintegrating.

Lagynotomus assimulans Dist.
Rice sting bug.

253

HETEROPTERA; *Pentatomidae*

Flat, light brown plant bug, 15-16 mm by 6-7 mm. The legs are also light brown. Oviposition takes place on the leaves and in the leaf sheaths. The nymphs hatch after a few days, attacking mainly the tender ears of early varieties. Development period of one generation: 4-5 weeks, one or 2 generations a year. The adult insects hibernate.

Distribution: South Asia

Sugar cane

(*Saccharum officinarum* L. = various varieties)

Most important pests: 257, 258, 260, 262, 263, 268, 271, 273, 274, 275, 276, 277, 278, 279, 281, 290, 291, 293, 295, 297

Young plants chlorotic, growth impaired. Presence of knots on roots.

root

Meloidogyne sp.
Root knot nematode.

254

NEMATODA

Endoparasitic, oval or pear-shaped female nematodes occupying the root-knots.
(see page 37)

Growth impaired. Roots stained red or dark brown.

Radopholus similis Cobb.
Burrowing nematode.

255

NEMATODA

Endoparasitic, slender worms, about 1-2 mm, living on the roots.
(see page 38)

2, 102, 353, 3
403, 466, 625
731, 746

Weak, unhealthy plants. Root tissue shows dark patches and dead portions.

Hoplolaimus coronatus Cobb.
Lance nematode.

256

NEMATODA

Ectoparasitic nematode, about 1.5 mm long, living on the roots.
(see page 38)

Plants wither and die. Roots eaten off. Damage occurs mostly on freshly cultivated ground.

Odontotermes obesus Ramb.

257

ISOPTERA; *Macrotermitinae*

see page 258

Distribution: India

root



Shoots fail to sprout. Young canes break off. Patches of destroyed plants in cane fields. Shoots, roots and underground portions of stem mostly eaten away (tunnels).

Larvae of click-beetles = Wireworms
Lacon variabilis Cand. (Queensland)
Lacon humilis Er. (Queensland)
Heteroderes laurenti Guer.
 (South America, USA)
Melanotus Tamsuyensis Bates
 (Japan, Formosa)
 other species in other countries.

COLEOPTERA; *Elateridae*

Beetle, generally 15-20 mm long, slender, cylindrical and strongly chitinized. Thickly overgrown soils are preferred for oviposition. The shiny yellowish-brown to reddish-brown larvae are slender, markedly segmented, hard, and up to 30 mm long. They are found in huge masses in freshly cultivated soil and are thus very harmful for the second crop (sugar cane). Cultivated ground may also be chosen for oviposition. Development period of larvae: 1-4 years, according to species and regional conditions. Wireworms feed on roots and shoots (see also No. 679).

Distribution: widespread

Growth impaired. Patches of canes wilted and dead. Roots heavily attacked. Presence of grubs around the roots.

Phytalus smithi Arr.
Brown hardback.

259

COLEOPTERA; *Scarabaeidae*

Robust, convex beetle, 14-18 mm long (cockchafer), which is on the wing mainly at dusk. The eggs are deposited in the ground where the resultant grubs feed on plant roots.

Distribution: Mauritius, the West Indies

Plants become stunted, turn yellow and die. Stalks gnawed off immediately below the ground. Roots eaten away by grubs.

Lepidiota frenchi Blkb.

260

COLEOPTERA; *Scarabaeidae*

Robust cockchafer, emerging from November to January from the ground. The eggs are deposited in sugar-cane fields or in fallow land. The first and second larval stages hibernate in September of the following year. One generation in 2 years.

Distribution: Australia (Queensland)

Plants become stunted, turn yellow and die. Stalks gnawed off immediately below the ground. Roots eaten away by grubs. root

Dermolepida albohirtum Waterh.
Greyback cockchafer.

COLEOPTERA; *Scarabaeidae*
(*other species in other countries*)

261

Very strong, greyish-brown cockchafer, which is on the wing at dusk from October to December. It feeds on trees of the rain forest or Eucalyptus forest before it flies to the sugar-cane fields for oviposition which takes place deep below the ground. The grubs hatch after 2 weeks and after 3 moults they pupate in September in earthen cells. After another 4-5 weeks the adults emerge. One generation a year.

Distribution: Australia (Queensland)

Leaves turn yellow and wilt. Growth of shoots checked.

Tomaspis varia Fabr.
Sugar-cane froghopper.

HOMOPTERA; *Cercopidae*

262

Leafhopper, 6-9 mm long, with broad, brown forewings, decorated with 2 yellow bands. The head and prothorax are greenish. The eggs are deposited singly in wilting leaves. The whitish larvae are completely covered with spittle.

Distribution: the West Indies

Plants chlorotic. Leaves turn yellow and wither. Shoots brittle. Secondary fungus infection. Sugar content greatly reduced. Roots covered with balls of frothy material which harbour pale larvae of various sizes.

Tomaspis saccharina Dist.
Sugar-cane froghopper.

HOMOPTERA; *Cercopidae*

263

Froghopper, 8-12 mm long, with brownish, rather strongly chitinized forewings. The females deposit their eggs in the ground, a high degree of moisture being necessary for their hatching. The larvae invade the plants in great masses and are found in a frothy substance on the roots.

Distribution: Trinidad, Granada

shoots
and
stems

Young shoots eaten away. Great losses among young plants.

Heteronychus licas Burm.
Black maize beetle.

COLEOPTERA; *Scarabaeidae*



264

173

Black, globular beetle, about 20 mm long. The larval development is similar to that of *Euethola rugiceps*.

Distribution: Congo, Uganda, Tanganyika and other parts of Africa

Buds and sprouting shoots eaten off immediately above the ground.

Heteronychus plebejus Klug.

COLEOPTERA; *Scarabaeidae*

265

Shiny black chafer, 15-20 mm long (cockchafer type), which deposits its eggs in the ground in December and January. The larvae (grubs) are white, halfmoon-shaped and have a strongly developed head.

Distribution: Madagascar



Great losses among young plants. Shoots attacked close above or below the ground. Central buds of older plants often stained yellow; roots severely injured. Heavy damage mainly in spring, caused by overwintered beetles.

shoots
and
stems

Euethola rugiceps Lec.
Sugar-cane beetle.

COLEOPTERA; *Scarabaeidae*

266

Beetle (resembling cockchafer), 15-20 mm long, oval and convex, strongly chitinized. The larvae are white, fleshy and halfmoon-shaped. Fully grown they may reach about 30 mm. Development period of larvae: 2 months.

Distribution: Southern States of U.S.A.

Losses among young shoots. Cane eyes destroyed. Roots injured.

Anacentrinus subnudus Buch.
Sugar-cane weevil.

COLEOPTERA; *Curculionidae*

267

Dark brown, robust weevil, measuring about 8 mm by 3 mm. The larvae are white, about 5 mm long when full grown, and have an amber-coloured head. They attack shoots, young canes and roots close above or below the ground.

Distribution: U.S.A.

shoots
and
stems



Plants stunted, their growth stopped. Stalks, especially at the base, heavily mined.

Rhabdocnemis obscura Boisd.
Hawaiian sugar-cane borer

COLEOPTERA; *Curculionidae*

268

421

Reddish-brown weevil, 15-18 mm long, with a strong snout. The prothorax and elytra bear dark markings. The weevils lay their eggs singly in hollows gnawed into the stalks. The larvae are white, footless and curved. They tunnel downwards in the stalk and penetrate into the roots. Development period of one generation: 3 months. Several generations a year. *Rh. obscura* attacks also bananas, coconut and sago palms, and papaw.

Distribution: Jamaica, Barbados, St. Lucia, British Guiana, Hawaii, Fiji Islands, New Guinea, Tahiti, Queensland

Stems with irregular, external feeding marks. Buds or eyes also destroyed, i.e. hollowed out.

Ereunetis flavistriata Wals.
Sugar-cane bud moth.

269

LEPIDOPTERA; *Lyonetiidae*

Small moth with a wing span of 15 mm. The forewings are yellowish-white with yellow lines; the hindwings are pale golden to yellowish-white. The caterpillars are white with a reddish-brown head and hairs on darker tubercles. They feed on the outside of young stems and hollow the buds out. When full grown they are about 15 mm long. *E. flavistriata* attacks also pine-apple.

Distribution: Hawaii

Young shoots bitten off immediately above the ground.*Acheta bimaculata de G.*ORTHOPTERA; *Gryllidae*

Large, robust, light or dark brown cricket. Its head is globular and the hind legs have strongly developed femurs. Development period: 8-10 weeks. Several generations a year.

Distribution: India, Indonesia, Formosashoots
and
stems

270



Reluctant growth. Plants sometimes of chlorotic appearance. Shoot base often speckled.

Saccharicoccus sacchari Ckll.
Pink sugar cane mealybug.

HOMOPTERA; *Pseudococcidae*

271

200

Pink, egg-shaped mealybug, up to 5 mm long. Its wax secretion is not very abundant. The insects are found mostly at the base of the shoots close above or below the soil surface. Several generations a year.

Distribution: practically wherever sugar cane is grown**Plant growth checked. Shoots heavily mined.**

Castnia licus Drury
Gigant moth borer.

LEPIDOPTERA; *Castniidae*

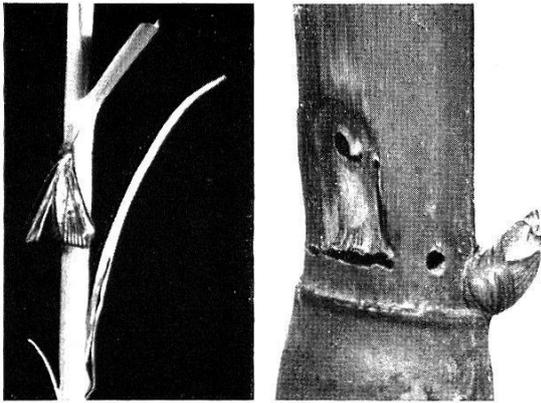
Moth with a wing span of 50-60 mm. Both forewings and hindwings are brown with a white band crossing each wing and a few yellow spots. The eggs are fixed singly on leaves and shoots. The whitish caterpillars have a reddish-brown head; full grown they are about 50 mm long. Development period of one generation: several weeks.

Distribution: Trinidad, British and Dutch Guiana

272

589

shoots
and
stems



Young plants with dead hearts. Tips of older, more advanced canes dead, or their shoots broken off (wind damage), revealing bore-holes filled with excrement. Sugar content of attacked canes reduced.

Diatraea saccharalis F.
Sugar-cane borer.

LEPIDOPTERA; *Pyralididae*

273

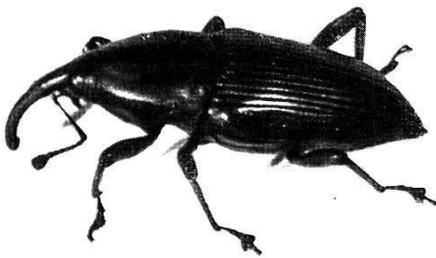
Straw-yellowish to reddish moth with a wing span of about 35 mm. The forewings bear two small black dots. The flat eggs are placed in clusters on the leaves, one female producing over 100 eggs. The caterpillars of the first generation burrow into the heart of the growing cane. Further larval generations penetrate through the leaf axils and tunnel into the shoots, hollowing them out. The caterpillars are yellowish-white and reach about 30 mm in length. Development periods: eggs 5-7 days, larvae 40 days, pupae 2 days.

Distribution: Africa, India, Indonesia, U.S.A., South America

Plants cease to grow, turn yellow and become stunted. Stalks riddled with large galleries.

Metamasius hemipterus L.
West Indian sugar-cane borer.

COLEOPTERA; *Curculionidae*

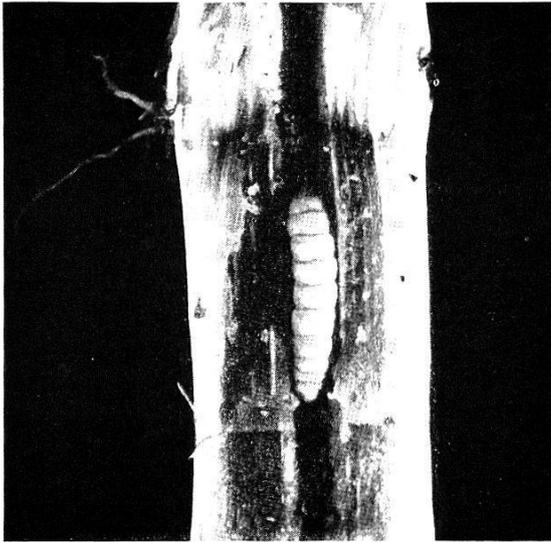


274

409

Robust weevil, 12-15 mm long, with a strong, long, slightly curved snout. The prothorax and elytra are black, with irregular, dark red decorations. The eggs are deposited singly in the shoots or in the leaf sheaths, whence the larvae tunnel towards the roots. They are pale yellow, footless, with a brown head and a distended abdomen. Pupation takes place inside a cocoon in the shoots. *M. hemipterus* attacks also banana.

Distribution: Africa, the West Indies



Youngest leaves wilt. Upper leaves when unfolding show cross rows of bore-holes. At first growth stopped followed by formation of bushy sproutings at the plant tip. Sugar content of attacked plants greatly reduced.

shoots
and
stems

Scirpophaga nivella F.

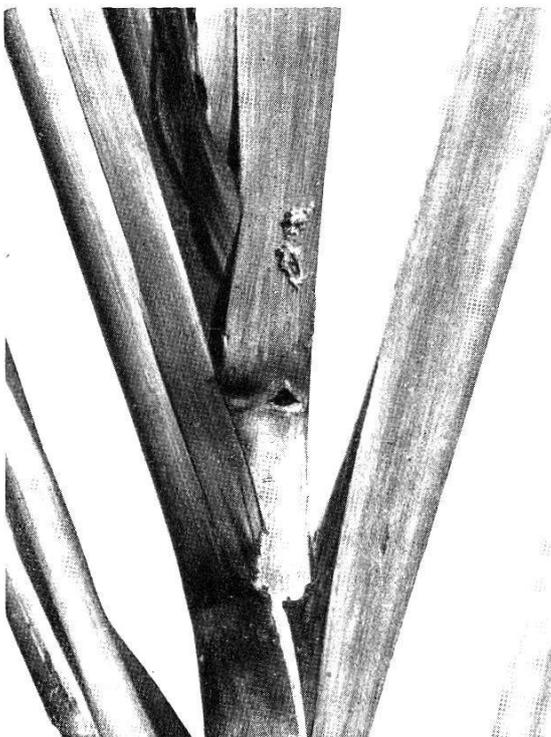
White tip borer.

LEPIDOPTERA; *Pyralididae*

275

White moth with orange caudal filaments, the fluff of which is used by the female to cover the egg clusters. These are laid in several portions on the underside of the leaves. The young caterpillars tunnel into the curled up tips or mine in the central leaf vein, destroying the central bud. Full grown caterpillars are 30 mm long. When young they are dark, furnished with distinctly erect bristles, while older ones are hairless, creamy-white. Total development period: 8-9 weeks. Several generations a year.

Distribution: Indonesia, Philippine Islands



Leaves at tips of shoots riddled with holes. Central bud withered.

Chilo traea infuscatella Sn.

Top borer.

LEPIDOPTERA; *Pyralididae*

276

180

Moth with dark markings on its forewings. The female lays short strings of eggs on the underside of leaves. The resultant caterpillars are creamy-white with dark dots on the segments and reddish stripes along the whole body. The young caterpillars feed on foliage, later penetrating into the central bud. Several caterpillars may be found in one shoot. Development cycle: 2-3 months.

Distribution: India, Burma, Formosa, Indonesia, Philippine Islands

shoots
and
stems



Young plants with dead hearts. Older canes easily break off where shoots are hollowed out.

Proceras sacchariphagus Boyer
Spotted borer.

LEPIDOPTERA; *Pyralididae*

277

Moth with plain pale beige fore- and hindwings which expand to 25 mm. They bear no markings but their venation is prominent. The light to dark brown eggs are laid in double rows on the underside of the leaves. The young caterpillars are creamy-white, crossed with pink bands broken in the middle of each segment. The head and prothorax are brown. Older caterpillars are marked with brown stripes along the back. The caterpillars begin by feeding on leaves, producing distinct patches; later on they penetrate into the shoots. Full grown caterpillars are yellow, decorated with four rows of purple dots. Pupation often takes place inside the leaf sheaths. Total development period: about 6 weeks.

Distribution: Madagascar, Mauritius, Indonesia

Growth of young canes checked. Leaves droop, their margins distinctly undulating. Stems and roots mined and occupied by white caterpillars.

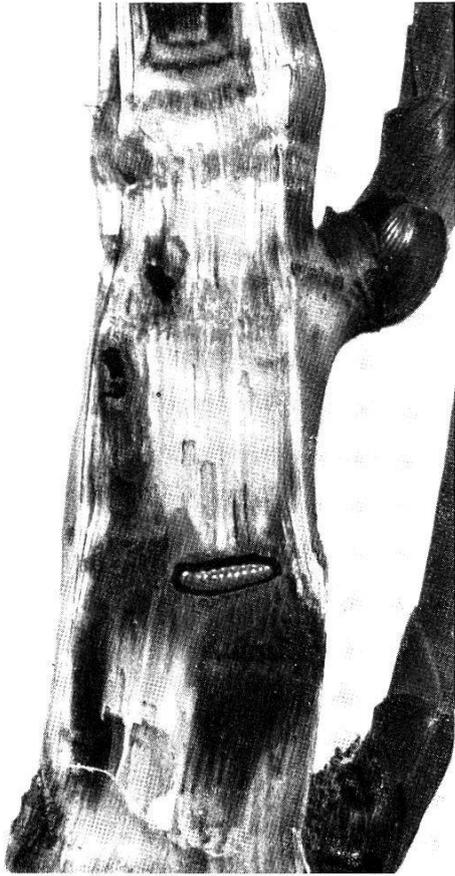
Emmalocera depressella Swinh.
Cane root borer.

278

LEPIDOPTERA; *Pyralididae*

Moth with a wing span of about 25 mm. The forewings are brownish-grey, while the hindwings are white. The eggs are laid on the leaves and stems. The white caterpillars are 15-20 mm long when full grown. They tunnel into the stem, penetrating down to the roots where they hibernate. Several individuals may occupy one root. Before pupating they bore an exit and cover it with webbing. They are active in May/June.

Distribution: India, Indonesia



Malformation of leaves and shoots, causing their death. Terminal growth stopped. Stems with spirally directed galleries.

shoots
and
stems

Eucosma schistaceana Sn.
Grey borer of the sugar-cane.

LEPIDOPTERA; *Tortricidae*

279

Small moth, about 12 mm long, with greyish-brown wings. The eggs are fixed in rows on the underside of the leaves, leaf sheaths or on the shoots. The yellowish to grey caterpillars mine into the stem near ground level, gnawing irregular spiral galleries upwards and changing from one shoot to another. They also often attack leaves of very young plants. Development period of one generation: 6-8 weeks.

Distribution: China, Japan, Formosa, Indonesia, Philippine Islands, Micronesia, Mauritius, Loochoo Islands

Plants stop growing, wither and die.

Elasmopalpus lignosellus Zell.
Lesser cornstalk borer.

280

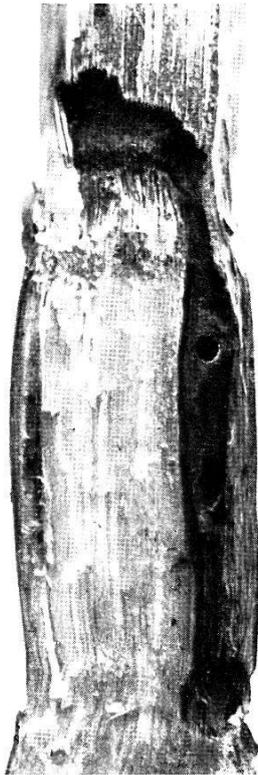
181, 219, 311

LEPIDOPTERA; *Pyralididae*

Dark grey to almost black moth with a wing span of 20-25 mm. The eggs are deposited on the shoots or in the leaf axils. The pale green caterpillars, striped with reddish-brown, feed on the leaves and mine from the stem base upwards, eventually destroying the apical bud; frass is evacuated through bore holes as they proceed. For pupation the caterpillars descend to the plant base or into the topsoil.

Distribution: Tropical and subtropical Americas

shoots
and
stems



Apical leaf wilts and withers. Upper portion of shoot riddled with feeding galleries.

Phragmitiphila truncata Walk.
Sugar-cane moth borer.

LEPIDOPTERA; *Noctuidae*

281

Dull coloured moth with a wing span of 30-35 mm. The female inserts its eggs in the leaf sheaths or fixes them to the stalk, into which the young caterpillars penetrate, eating their way upwards. Pupation takes place inside the stalk. Several generations.

Distribution: Australia



Hearts of plants turn yellow and wither. Young plants particularly exposed to injury.

Sesamia vuteria Stoll.

LEPIDOPTERA; *Noctuidae*

282

186

Moth with grey forewings and white hindwings, expanding to 35 mm. The eggs are placed in batches of 20 to 50 under the leaf sheaths. The caterpillars first destroy the leaves, penetrating afterwards into the shoots. Full grown they are 28 to 30 mm long, pink.

Distribution: Mediterranean region, Africa, Indonesia

Plants dwarfed. Presence of small, round bore-holes under the leaf sheaths.

shoots
and
stems

Xyleborus perforans Woll.
Shot hole borer.

COLEOPTERA; *Scolytidae*

Dark brown beetle, 1-1.5 mm long, the round bore holes of which begin under the leaf sheaths of the upper buds. The eggs are placed in the shoots. The larvae mine the stalk walls in all directions. Several generations a year. Development period of one generation: 4-5 weeks. Cane fields on unsuitable ground or otherwise in bad condition are particularly exposed to injury.

283

Distribution: Practically all sugar-cane areas



Feeding marks along the leaf margin and all over the lamina. Signs of wilting and dieback of whole plants. Roots injured by creamy-white, footless larvae.

leaves

Diaprepes abbreviatus L.
West-Indian sugar-cane root borer.

COLEOPTERA; *Curculionidae*

284

492

Bluish-green to ochrous weevil, 10-18 mm long. The elytra are often marked with dark, longitudinal stripes. The snout is relatively short and obtuse. The adults feed on the leaves and lay their eggs in clusters on them. The larvae feed on the roots and tunnel in the stalks.

Distribution: Mexico, Central and South America, the West Indies

Leaves flaccid and pale, their lower portion injured with linear mines. Canes generally underdeveloped.

Hispa wakkeri Zehnt.
Sugar-cane hispid miner.

COLEOPTERA; *Chrysomelidae*

285

Small, black beetle, about 5 mm long, bristling with strong spines, which lays its eggs on the leaves. The yellowish-white, flat and footless larvae have a brown prothoracic shield and two apical teeth. They mine in the leaves where they pupate inside a cylindrical, yellowish to reddish-brown cocoon, about 7 mm long.

Distribution: Indonesia

leaves **Leaves rolled up lengthwise and destroyed. Presence of very agile green caterpillars inside the rolls.**

Omiodes accepta Butl.
Hawaiian sugar-cane leafroller.

LEPIDOPTERA; *Pyralididae*

286 Moth with a wing span of 25 mm. Both forewings and hindwings are brown, crossed with white lines and the former marked in addition with a short white longitudinal band. The eggs are arranged in rows on the leaves. The green, slightly hirsute caterpillars are 25 mm long when full grown. They feed on leaves, causing them to roll up. Development period of one generation: 5-6 weeks. Several generations.

Distribution: Peru, Hawaii

Foliage very heavily attacked. Plants almost stripped bare.

Laphygma frugiperda S. & A.
Fall armyworm.

LEPIDOPTERA; *Noctuidae*

287 Moth, the wings of which expand from 30 to 40 mm. The forewings are dark grey, spotted with black and white, while the hindwings are white with faint pearly brownish lines. The females lay up to 1000 eggs each in clusters on the underside of the leaves, covering them with grey fluff. The caterpillars are black-headed, with a grey body, marked with three whitish longitudinal bands. Full grown they may reach 40 mm in length. When occurring in masses, they can cause heavy injury on young plants within a very short time.

Distribution: U.S.A., Paraguay, the Argentine, the West Indies, Japan

Plants completely stripped.

288 *Cirphis unipuncta* Haw.
Armyworm.

LEPIDOPTERA; *Noctuidae*

see page 134 (Maize)

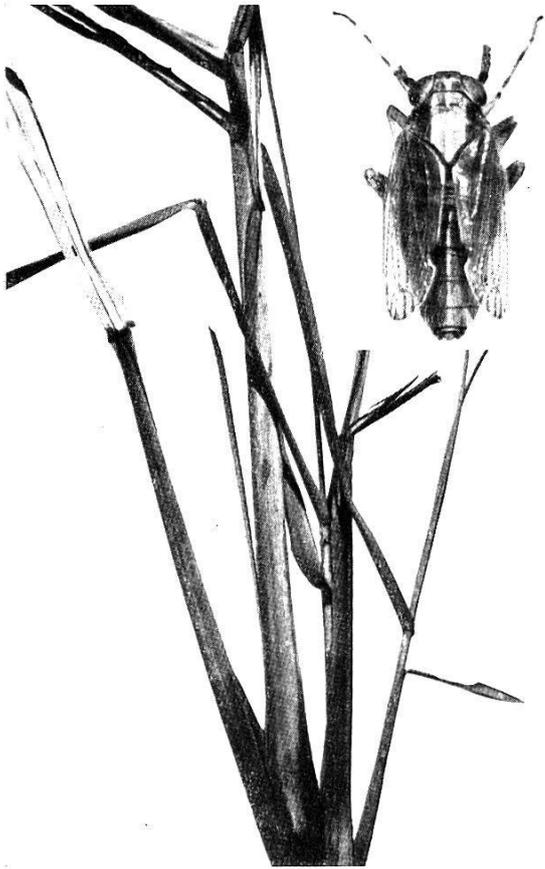
Plants stunted, turning yellow.

289 *Macropes excavatus* Dist.
Lygaeid-bug.

HETEROPTERA; *Lygaeidae*

Elongate oval plant bug, about 5 mm long, dark brown to almost black. The female lays its eggs on the leaves. Both nymphs and adults live in the leaf sheaths. Heaviest attacks occur in hot weather. The adults hibernate in the topsoil or in the stubble. Several (3) generations.

Distribution: India



Leaves and buds turn yellow. Heavy infestation with sooty mould. Plants generally covered with red spots (secondary infection at feeding and oviposition punctures). Sugar content of cane reduced.

leaves

Perkinsiella saccharicida Kirk.
Sugar-cane leafhopper.

HOMOPTERA; *Araeopidae*

290

Light green Fulgorid plant hopper, 4-6 mm long, with a longitudinal band in the middle of the rear quarter of the forewing. The female inserts its eggs into a slit in the central vein of the leaves, piercing the latter to suck their sap. *P. saccharicida* transmits sugar cane Fiji disease virus.

Distribution: Africa, Mauritius, Indonesia, Formosa, Hawaii, Australia

Reluctant growth. Leaves black with sooty mould. Heavily attacked leaves die. Sugar content of cane reduced.

Saccharosydne saccharivora Westw.
West Indian cane fly.

HOMOPTERA; *Araeopidae*

291

Small, very active Fulgorid, 5 mm long, with pale green wings. The hind end of the body is covered with white fluff. The females insert their eggs in rows into slits on the underside of the leaves and cover the slits with white fluff. The nymphs are pale green, their rear end furnished with a white filament; they suck from the leaves. The egg slits may give access to red rot disease and are perhaps also responsible for cane mosaic or chlorotic streak disease. Secretion of honeydew allows sooty mould to form. The Fulgorid occurs especially during the dry season (December-March).

Distribution: Louisiana, Georgia, Florida, Cuba, Jamaica, Haiti, Puerto Rico

leaves **Leaves mottled with necrotic patches.**

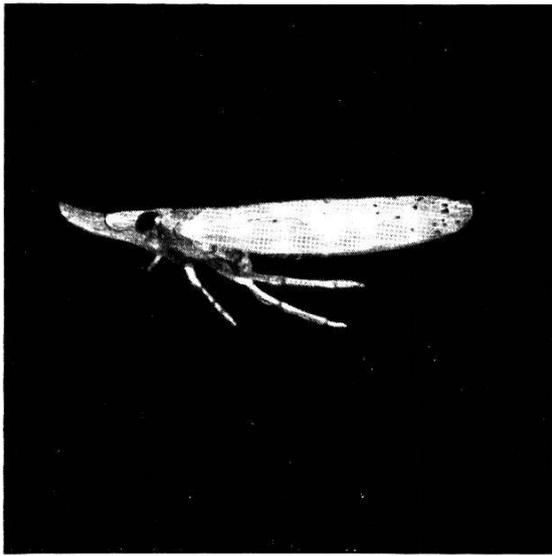
Proutista moesta Westw.
Long-winged planthopper.

292

HOMOPTERA; *Derbidae*

Small, pale plant hopper, the wings of which are heavily veined and considerably longer than the body. The pest lives on sugar cane, sucking its sap.

Distribution: Seychelles, India, Philippine Islands, Formosa



Growth disturbed. Plants in poor condition. Often heavy infestation with sooty mould. Presence of ants. Sugar content reduced.

Pyrilla perpusilla Walk.
Indian sugar-cane leafhopper.

HOMOPTERA; *Dictyopharidae*

293

Pale green to pale brown Fulgorid, about 10 mm long, its head terminating in a conspicuously sharp snout. The wings are densely veined and transparent. The female fixes its eggs (over 500) on the underside of the leaves, covering them with white waxy filaments. Both adults and larvae suck from the undersurface of the leaves. All stages of the pest are present all the year round, the main infestation period being July to October.

Distribution: India, Ceylon

Only slight sucking injuries producing necrotic patches. Vector of sugar cane streak virus.

294

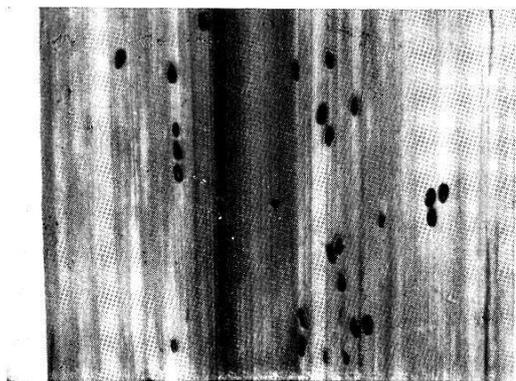
191

Cicadulina mbila Naudé
Leafhopper.

HOMOPTERA; *Jassidae*

see page 140 (Maize)

Distribution: Africa, Mauritius, India



Lower surface of leaves infested with small, oval, black scales. Leaves show pale yellow stripes, wilt and wither.

leaves

Aleurolobus barodensis Mask.
Sugar-cane white fly.

HOMOPTERA; *Aleyrodidae*

295

Small, very frail insect, measuring about 1.5 mm, covered with a white powdery substance (see Fig. 16). Both larvae and pupae have the appearance of oval, flat scales, 1.5-2 mm long; they are covered with white powder and distinctly edged white. They infest the leaves. Development cycle of one generation: 4-6 weeks.

Distribution: Asia (India)

Leaves wilt and die. Growth generally impaired.

Sipha flava Forbes.
Yellow sugar cane aphid.

296

HOMOPTERA; *Chaitophoridae*

Yellowish-orange aphid.

Distribution: North, Central and South America

Growth of young plants generally reluctant. Heavy infestation with sooty mould.

Rhopalosiphon sacchari Zehnt.
Cane aphid.

297

HOMOPTERA; *Aphididae*

Yellowish-green aphids with short, black siphons and black, hairy, caudal appendages. In wingless forms the last segment of the antennae is black. The tarsi are also dark coloured. In winged forms the thorax and costal margin are dark.

Distribution: Most tropical regions

Colonies of dark aphids on leaves, the latter showing dead patches. Terminal growth of shoots impaired.

Rhopalosiphon maidis Fitch
Corn leaf aphid.

298

193

HOMOPTERA; *Aphididae*

see page 141 (Maize)

Vector of sugar cane mosaic virus.

leaves **Dark colonies of aphids on stalks near injured leaves.**

Hysteroneura setariae Ths.

Rusty plum aphid.

299 HOMOPTERA; *Aphididae*

Stout, strongly convex, reddish to dark brown aphids, which are frequented and protected by ants. They transmit sugar cane mosaic disease. Several generations a year.

Distribution: Southern States of U.S.A., Central America

Tardy and reluctant growth. Young plants in poor general condition. Often infested with sooty mould.

Oregma lanigera Zehnt.

White woolly aphid.

300 HOMOPTERA; *Thelaxidae*

Small, greyish-green aphid, about 2 mm long, bearing two marked, sharp protuberances on its forehead. The wingless forms of the insect secrete a white waxy substance and suck on the underside of the leaves. Heaviest infestation occurs during the dry season (September to December). The females are viviparous. Several generations each season.

Distribution: India, Indonesia, Formosa

Tardy and reluctant growth.

Pulvinaria iceryi Guer.

301 HOMOPTERA; *Lecaniidae*

Oval, yellow, shield-like insect with two reddish stripes down the back. The adults reach 5 mm by 2 mm in size.

Distribution: Florida, Puerto Rico, Mauritius, China

Leaves turn yellow or brown. Formation of distinct blisters at the leaf base and below. Blisters 0.5-2 mm, yellowish to reddish-brown, each one slightly dented at its centre.

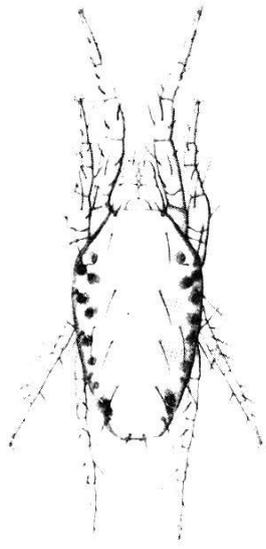
302 *Tarsonemus Bancrofti* Mich

Cane blister mite.

ACARINA; *Trombidiformes*

Minute mites, found mostly inside the leaf sheaths or on soft parts of the shoots. Older stages of the pest may also attack the buds. Their exudation produces blisters on the injured shoots. These prove the presence of mites. The nymphs are pale brown.

Distribution: Florida, the Antilles, South America, Indonesia, Philippine Islands, Hawaii, Queensland



Brownish-yellow to rusty patches on leaves, especially along central veins. Leaves wilt and die. Growth impaired. Damage similar to that caused by drought.

leaves

Paratetranychus exsicicator Zehnt.

ACARINA; *Trombidiformes*

303

Small, pale yellow mite, measuring about 0.4 mm by 0.15 mm, with two red dots on its shoulders and a line of dots along both sides of the body. Their legs are long and moderately hairy. Several generations each season.

Distribution: Indonesia, Philippine Islands

Beans

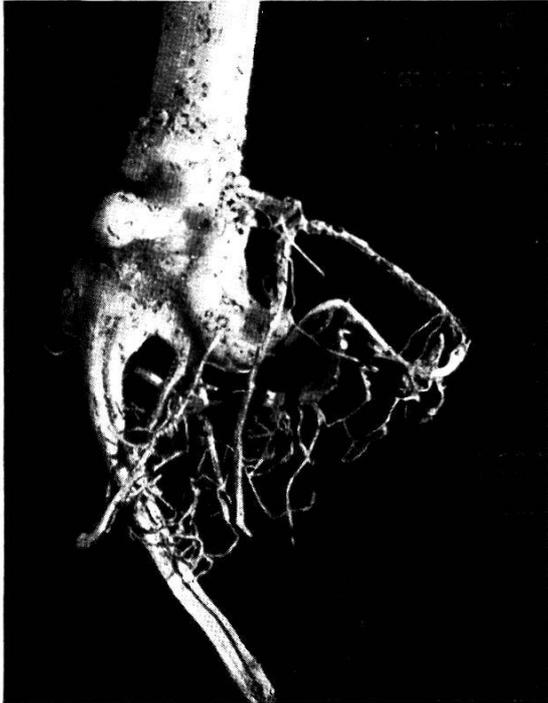
Leguminous crops

Phaseolus sp. (various species and varieties)

Glycine max. (L.) Merrill. (Soya bean)

Vicia faba L. (Windsor-bean)

Most important pests: 314, 316, 321, 323, 324, 325, 327, 334



After successful germination growth is disturbed. Localised large or small patches of chlorotic plants, which turn reddish later on. Fruit formation reduced. Roots with knots.

root

Meloidogyne sp.

Root knot nematode.

NEMATODA;

304

Knots conceal the pear-shaped female nematodes (see page 37).

Distribution: widespread

Injurious to soya bean. Young plants turning yellow, their growth impaired. Seedlings die when emerging.

Pagria signata Motsch.

COLEOPTERA; *Chrysomelidae*

305

Metallic blue beetle, 3-4 mm long, which feeds on foliage, and lays its eggs at the plant base. The larvae attack roots and seedlings.

Distribution: India, Ceylon, China, Japan

root **Particularly injurious to soya beans. Leaves devoured. Heavy attack of larvae on roots cause yellowing and death of plants.**

Colaspis flavida Say.

COLEOPTERA; *Chrysomelidae*

306

Brilliant, metallic-green beetle, convex, 6-8 mm long, with reddish-yellow legs. The adults feed on the leaves, while the larvae attack the roots.

Distribution: South America



Entire plant turning yellow, withering and defoliated. Roots destroyed. Pods shrivelled and useless.

Hodotermes mossambicus Hag.

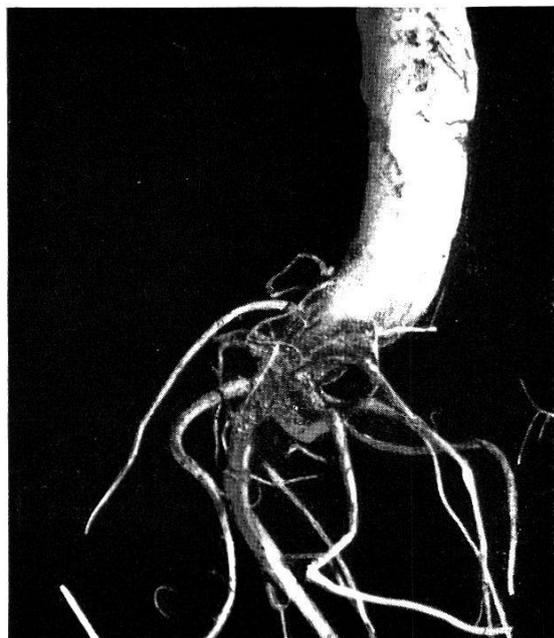
ISOPTERA; *Hodotermitidae*

307

170, 645
747, 796

see page 383 (Chillies)

rootstock



Phaseolus vulgaris is attacked when leaves are unfolding.

Leaves streaked with dark mines. Stem above the rootstock thickened. Growth retarded, in spite of secondary root formation, plants thus stunted. Death after 3-4 weeks.

Attack on *Glycine* spp.

Young plants specially exposed to attack, immediately after emergence. Symptoms similar to those found on *Phaseolus*. In India peas are attacked also.

308

Agromyza phaseoli Coq.

Bean fly.

DIPTERA; *Agromyzidae*

Small, shiny black fly, only about 2 mm long, with a wing span of 4-5 mm. The eggs are laid early in the morning on young leaves (preferably at the leaf base). The maggots are white with black mandibles, reaching 3 mm when full grown. They mine in the parenchymatous tissue, tunnelling from the leaf base upwards to the top and back. Then they proceed through the leaf stalk and stem into the root stock, where they pupate. The head of the yellowish-brown pupa is furnished with black horns. Life cycle of one generation: about 21 days.

Distribution: Africa, India, Indonesia, Philippine Islands, Australia

Leaves riddled with small, round holes. Buds hollowed out and consequently withering. Signs of partial wilting, due to bore-holes in the stem.

stem



Phytonomus nigrirostris F.

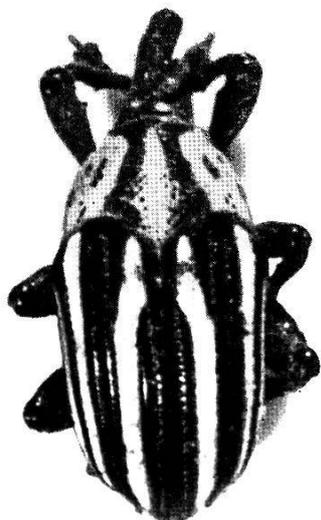
COLEOPTERA; *Curculionidae*

309

Green or greenish-grey, hairy weevil, 3-4 mm long, which oviposits in the leaf veins or stems. The larvae feed in the stem and leaf stalks and pupate in cocoons which cling to the stem or leaves. Development period of one generation: 5 weeks.

Distribution: Europe, North Africa, some parts of Asia

Injurious to *Phaseolus* when occurring in great masses. Plants partially wilting. Pods often destroyed.



Alcides leucogramma Er.

COLEOPTERA; *Curculionidae*

310

Robust, dark brown snout weevil, about 10 mm long, the elytra and thorax of which are streaked with white lines. The eggs are deposited at the stem base; the larvae feed in the stems. Several generations.

Distribution: Africa

stem

Leaves and stems wilt and die. Stems externally injured with irregular feeding marks, internally with linear mines, filled with excrement.

Elasmopalpus lignosellus Zell.

Lesser cornstalk borer.

LEPIDOPTERA; *Pyralididae*

311

1, 219, 280

Dark, almost black moth with a wing span of 20-25 mm. The caterpillars are green with brown stripes along the body. Full grown they are 25 mm long. They first gnaw on the outside of the stem, later on tunnelling into it above the ground and pupating in a cocoon either inside or outside the bore hole.

Distribution: Tropical and subtropical America

Shoots mottled, often with brown sunken pits. Plants partially wilted. Damage visible only when pest occurs in great masses.

312

Nezara viridula L.

Green plant bug.

HETEROPTERA; *Pentatomidae*

see page 363 (Tobacco)

Distribution: widespread

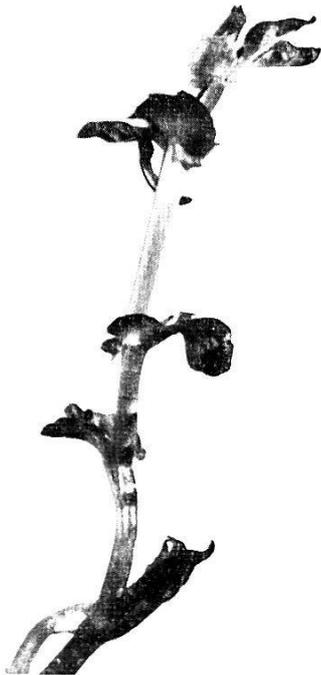
Plants turning yellow, sometimes only partially. Stem with necrotic patches. Fruits mottled, fruit formation reduced.

Physomerus grossipes F.

HETEROPTERA; *Coreidae*

313

378



see page 214 (Sweet potato)



Shoots deformed and distorted, heavily infested with colonies of black aphids. Leaves slightly curled downwards. Fruit formation reduced or prevented.

shoots

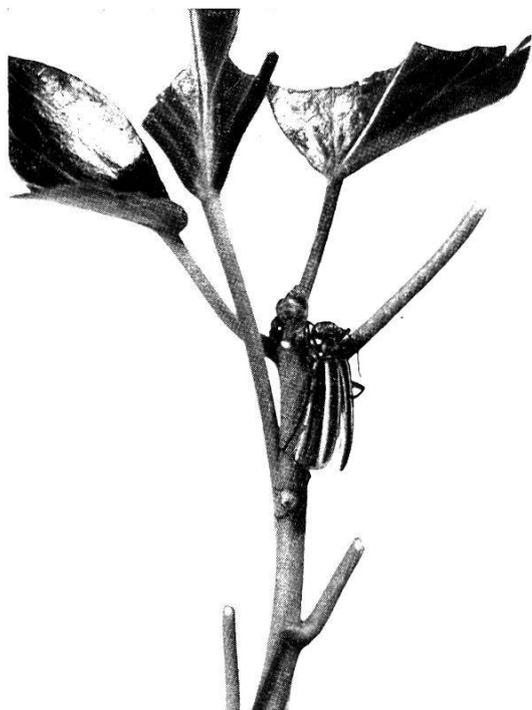
Aphis fabae Scop.
Bean aphid.

HOMOPTERA; *Aphididae*

314

Black, convex aphid, about 2 mm long. The short cornicles and caudal filament are also black. The femora are black, while the other segments of the legs are bluish-green. The antennae have a black tip. The upper side of the abdomen is speckled with white waxy dots. Both parthenogenetic and bisexual reproduction occur. Several generations.

Distribution: widespread



Leaves destroyed. Plants often stripped bare. Pest often occurs in great masses.

leaves

Epicauta vittata F.
Striped blister beetle.

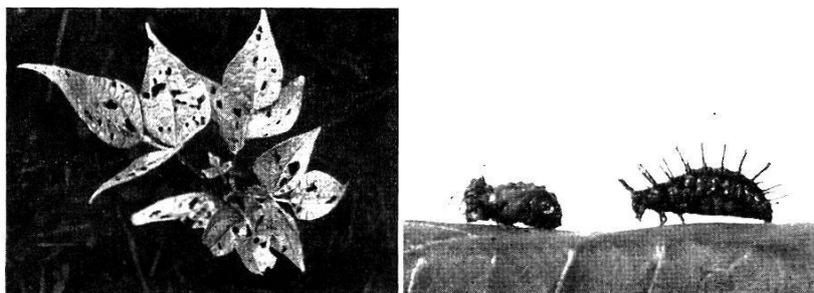
COLEOPTERA; *Meloidae*

315

Clay-yellow, slender beetle, 15-20 mm long, with two black spots on the head, two black lines on the prothorax and two broad black lines on each elytrum. The pest also attacks tomatoes, potatoes and egg-plants.

Distribution: South America

leaves



Leaves severely injured (lamina riddled with holes), stem often attacked also.

Epilachna varivestis Muls.
Mexican bean beetle.

316

COLEOPTERA; *Coccinellidae*

Convex, oval, pale yellow to orange-brown beetle, 6-8 mm long. Each elytrum has 8 black spots. The eggs are laid in clusters on the leaves and stems. The larva is orange-yellow, elliptical, convex above, bearing numerous branched spines. They pupate on the underside of the leaves. Both beetles and larvae feed on leaves.

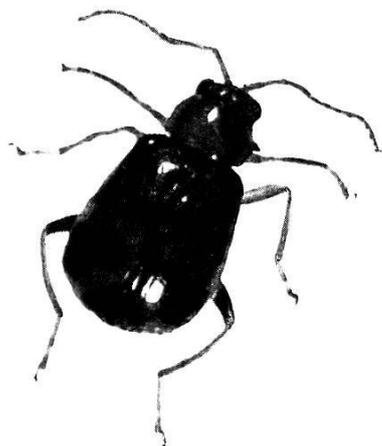
Distribution: Mexico, U.S.A.

Leaves striped with feeding marks.

Cerotoma ruficornis Oliv.
Bean leaf beetle.

COLEOPTERA; *Chrysomelidae*

317



Small beetle, about 5 mm long, slightly broadened towards the rear end. The head is black, the thorax and legs yellowish-red, the elytra black with yellowish-red markings. The eggs are laid underground where the whitish larvae hatch after 8 days and feed on roots of beans, while the adults attack the leaves. Peak in March/April. *C. ruficornis* attacks lima beans (*Phaseolus lunatus*).

Distribution: Central and South America

Leaves severely attacked.*Thosea sinensis* Walk.LEPIDOPTERA; *Limacodidae*

Slug caterpillar moth with a wing span of 40 mm. Both fore and hind wings are beige to brown, the former crossed with a thin, dark brown line. The eggs are laid on the leaves. The caterpillars are green to yellow, with a distinct line along the back, terminated at each end by green and red, 2 mm long spines. Development period of one generation: 10 weeks.

Distribution: India, Indonesia, China

leaves

318

585, 736

Heavy injury to leaves of *Phaseolus* species. Plants often completely stripped.*Acherontia styx* Westw.*Sphinx* moth.LEPIDOPTERA; *Sphingidae*

Large, robust moth. Its forewings are brownish-red with dark, undulating, indistinct lines and one yellow dot in the centre. The thorax is marked on both sides with a strong blue longitudinal line. The hindwings are ochrous, with a brown margin. The wings expand up to about 80 mm. The eggs are laid on the leaves. The colour and markings of the caterpillars are similar to *Acherontia atropos* L. (see No. 554).

Distribution: India, Indonesia, Ceylon, Philippines, Burma

319

Leaves heavily attacked. Plants often completely defoliated.*Diacrisia obliqua* Walk.

Common hairy caterpillar.

LEPIDOPTERA; *Arctiidae*

Moth with beige-brown forewings, often marked with rows of dark brown dots running from the apex to the centre of the inner margin. The outer margin of the hindwings is decorated with 3 large, brown dots. The wings expand to about 40 mm. The body is plump, reddish with dark brown dots in the middle of the abdomen. The young caterpillars remain gregarious for about 10 days and feed on the lower surface of the leaves, skeletonizing them. The pest appears on a crop when it is about 8-10 cm high, and ravages it for more than two months. Several generations a year.

Distribution: India, South and East Asia

320

700, 865

leaves

Leaves heavily attacked. Plants often completely destroyed, due to the stem being cut off at ground level. Pods with deep feeding scars.

Prodenia litura F.
Cotton worm.

LEPIDOPTERA; *Noctuidae*

321

32, 194, 629
32, 703, 837
867



see page 423 (Cotton)

Young plants often completely stripped.

Valanga nigricornis Burm.
ORTHOPTERA; *Acridiidae*

322

135

Robust, reddish-brown grasshopper, 50-70 mm long, without any distinct markings. The thorax is furnished with a high keel-shaped shield. The eggs are deposited in the ground, where the larvae hatch during the rainy season (December).

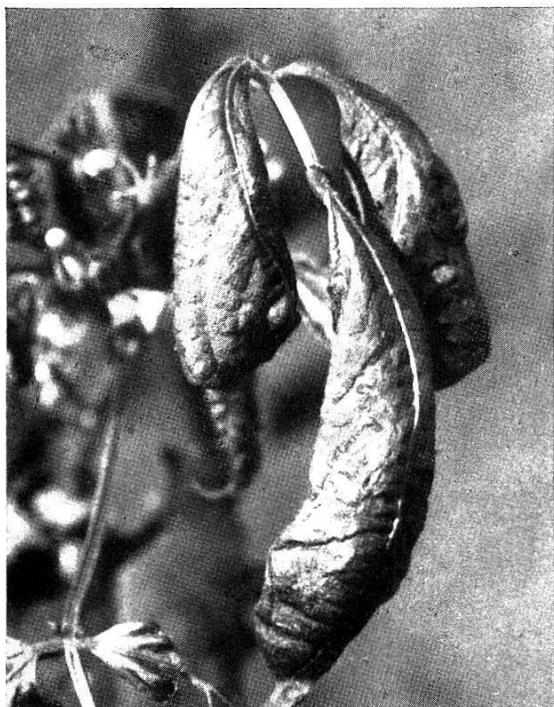
Distribution: India, Indonesia, Brazil

Leaves turning white, drying up and turning brown.

Hercothrips fasciatus Perg.
Bean thrips.

THYSANOPTERA; *Terebrantia*

323



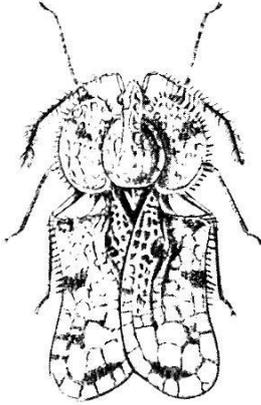
Black thrips, about 1.5 mm long. Each forewing is marked with two white bands. Both nymphs and adults suck the juice of the leaves. The females lay their eggs in the leaf tissue. The life cycle requires 30-40 days; there are several generations a year.

Distribution: Central and South America, China

Leaves chlorotic, curled downwards, their development stunted. leaves

Corythucha gossypii F.
Bean lace bug.

HETEROPTERA; *Tingidae*



324

Small, very flat, hyaline plant bug, 3-4 mm long, the wings of which are reticulate. The thorax is furnished with two large, lateral lobes. The eggs are inserted into the midribs of the leaves. Development period of one generation: 3 weeks.

Distribution: Central and South America

Leaves turning yellow and showing necrotic patches, their margins slightly curled. Shoots deformed. Fruit formation reduced.

Empoasca fabalis DeLong
Bean leafhopper.

HOMOPTERA; *Jassidae*

325

Pale yellow to pale green leafhopper, 3-4 mm long. See also *Empoasca fabae* on page 349 (Ground-nuts).

Distribution: the West Indies

Small, white patches on leaves. Fruit formation impaired. Plants stunted.

Erythroneura (Typhlocyba) sp.

HOMOPTERA; *Jassidae*

326

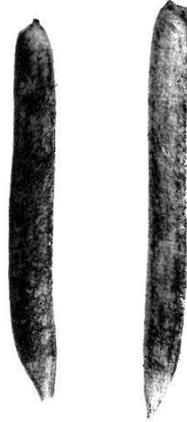
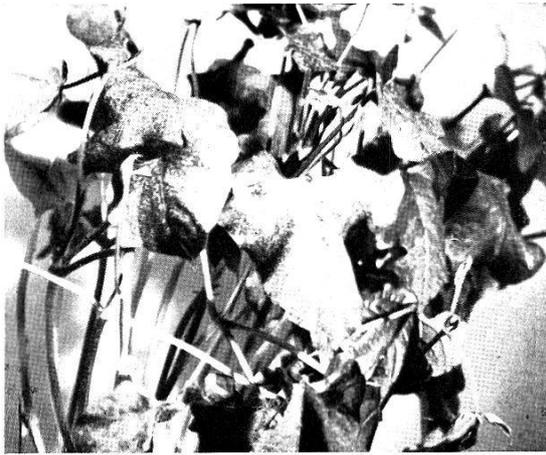
Bluish-green to yellowish leafhopper, 5-6 mm long.

Distribution: India, Ceylon

leaves

327

351, 380, 624
 637, 670, 769
 789, 820, 868
 874



Leaves mottled, stained grey to reddish-yellow. Leaf margins undulating, curled downwards. Pods stained dark; seed formation impaired.

Tetranychus urticae Koch
 Common red spider.

ACARINA;
 Trombidiformes

see page 415 (Cotton)

Distribution: widespread

pods

Flowers, buds and pods wilt and fall off, being hollowed out and occupied by caterpillars. Older pods stained dark, the seeds therein injured.

Fundella cistipennis Dyar.

Bean pod borer.

LEPIDOPTERA; *Pyralidae*

328

Plain greyish-brown moth, about 10 mm long, which keeps its wings tightly folded around the abdomen when at rest. The female deposits its eggs on flower stalks and stems. The light green caterpillars have a dark brown head and thoracic shield. Full grown they are about 15 mm long. They attack lima beans (*Phaseolus lunatus*). Development period of one generation: 3-4 weeks. Several generations.

Distribution: the West Indies

Leaves rolled up and destroyed; rolls contain webbing, excrement and caterpillars. Pods often spun together with leaves and injured with external feeding marks.

Lamprosema indicata F.

Leaf folder.

329

659

LEPIDOPTERA; *Pyralidae*

Moth with golden-yellow wings, marked with several darker transverse wavy lines and expanding to about 40 mm. The eggs are fixed to the underside of the leaves. The caterpillars are greenish, striped with yellow to creamy-white lines. They eat strips from the leaf margin to the midrib, causing the leaves to roll up, after which they pupate inside the leaf rolls. Development period of one generation: about 6 weeks.

Distribution: Africa, East Asia, the West Indies

Pods with bore holes and dark stains. Pods tunnelled and filled with excrement; seeds destroyed.

Laspeyresia glycinivorella Mats.

LEPIDOPTERA; *Tortricidae*

Moth with reddish-brown to yellowish-brown forewings, the costal margin of which is pale with dark dots. The hindwings are grey with pale fringes. The wings expand to 15 mm. The eggs are laid on the pods. The caterpillars are yellowish-white to green; the segments of their body bear tubercles with tufts of bristles. Hibernation and pupation take place underground. *L. glycinivorella* attacks preferably soya beans. Peak in August/September.

Distribution: Japan, Korea, Manchuria

330

330

Leaves spun together and eaten away. Flowers and buds attacked also. Pods with bore holes, inside which excrement is visible. Seeds in the pods also destroyed.

Maruca testulalis Geyer

Mung-moth.

LEPIDOPTERA; *Pyralididae*

Small moth with brown forewings, dotted with white, while the hindwings are greyish-white, marked with a brown spot. The wings expand to 25 mm. The eggs are laid on the leaves. The caterpillars are creamy-white to green, decorated with 4 black or dark grey spots on the back of nearly every segment. Pupation takes place in the ground. Peak in August and October.

Distribution: widespread throughout the Tropics

331

614, 658

Pods partially stained dark, occupied by caterpillars and filled with greenish, pulpy excrement. Seeds destroyed.

Etiella zinckenella Tr.

Lima bean pod borer.

LEPIDOPTERA; *Pyralididae*

Moth, about 12 mm long, the forewings of which are broadly margined with silvery-white. The palpi are strikingly erect. The eggs are deposited on leaves and pods. The caterpillars are cylindrical, light green with a black head and thoracic shield. Full grown they may be about 15 mm long. They tunnel into the pods and destroy the seeds, after which they pupate underground. Several generations. Soya beans are frequently attacked.

Distribution: widespread throughout the Tropics

332

Pods heavily attacked.

Ecpantheria albicornis Gr.

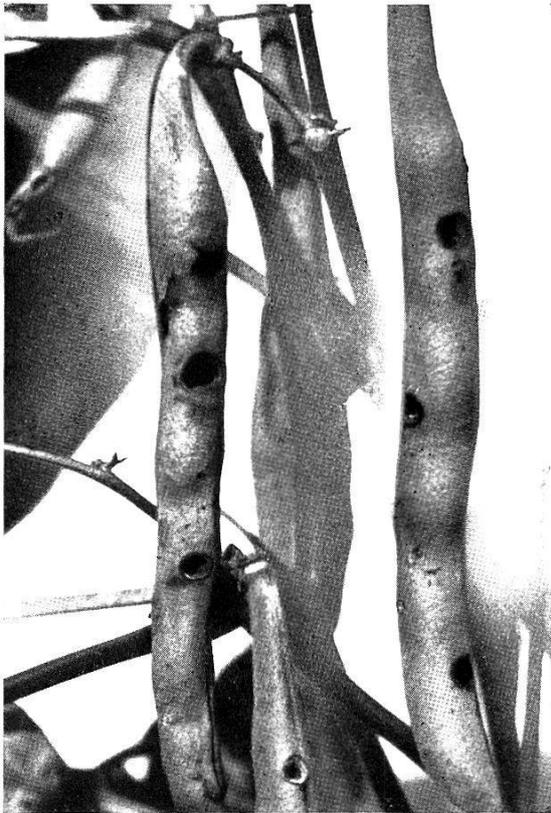
LEPIDOPTERA; *Arctiidae*

Moth with transparent wings, decorated with rows of brownish rings. The abdomen is orange. The eggs are laid on the leaves. The caterpillars are black, densely clothed with hairs. Development period of one generation: 10-12 weeks.

Distribution: the West Indies

333

pods



Heavy injury on leaves; plants often stripped bare. Pods also severely attacked.

Peridroma (Lycophotia) saucia Hb.
Variegated cutworm.

LEPIDOPTERA; *Noctuidae*

334

Moth with beige to brown forewings, bearing a small, dark brown spot in the centre, while the hind wings are pale grey with a brownish margin and strong venation. The wings expand to 40 mm. Oviposition takes place on the leaves. The caterpillars are hairless, greyish-green to brown and grey. Several generations.

Distribution: Europe, Africa, Western Asia, U.S.A.

Leaves of runner beans heavily attacked. Plants often completely stripped; pods also eaten away.

Syngrapha (Plusia) egena Gn.

LEPIDOPTERA; *Noctuidae*

335

Greyish-brown moth with a wing span of about 30 mm. The eggs are laid on the leaves and stems. The hairless, greyish-green to brown caterpillars feed on leaves and pods. Pupation takes place in curled up leaves. Several generations.

Distribution: U.S.A., Argentina, the West Indies

Pods with dark spots, stunting their growth and causing them to fall. The seeds inside are shrivelled.

Megacoelum modestum Dist.

HETEROPTERA; *Miridae*

336

Thin and slender, ochrous to brownish plant bug, about 8 mm long. Its antennae are long, thin and dark yellow. The legs also are long and thin, the eyes very protuberant.

Distribution: Australia (Queensland, New South Wales)

Cassava (Manioc)

(*Manihot utilissima* Pohl)

Most important pests: 338, 345, 348, 351

Roots with dark patches. When heavily attacked tubers have small, round blotches where rotting may set in. Plant growth impaired. root

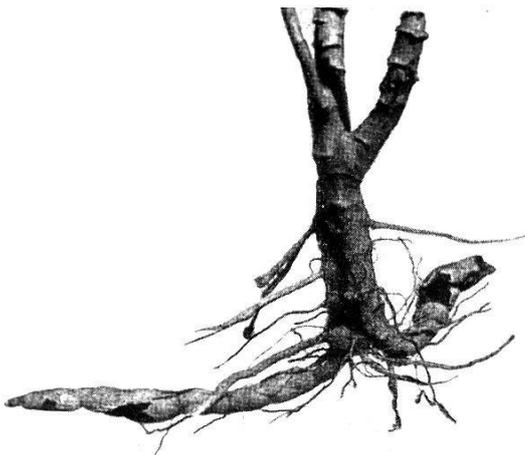
Pratylenchus brachyurus Steiner

NEMATODA

Endoparasitic worm, 0.75-1 mm long, which attacks roots and tubers. Several generations a year.

337

Distribution: Africa



Tubers with large scars, resulting from gnawing. Rotting. tubers

Leucopholis rorida F.

COLEOPTERA; *Scarabaeidae*

338

Dark brown May-beetle, 25 mm long, clad with pale scales, on the wing after the rainy season. The eggs are deposited in the ground. The grubs attack the tubers.

Distribution: Indonesia, in other parts of the world other species

Foliage wilting and drooping. Complete or partial dieback of plants. Presence of larvae in the stem pith. stem

Coelosternus granicollis Pierc.

COLEOPTERA; *Curculionidae*

Dark brown to greyish, robust snout weevil. Its elytra are tapered and beak-shaped at their posterior end and the thorax is broad, 7-9 mm in size. The eggs are laid in the stem, from whence the larvae penetrate the pith.

339

Distribution: South America, the West Indies

stem **Dieback of some branches or of whole plants.**

Lagochirus obsoletus Thoms.

COLEOPTERA; *Cerambycidae*

340

Greyish-brown Longicorn beetle, 8-12 mm long, the thorax of which is provided with a sharp spine on both sides. The adults lay their eggs in the trunk, from where the white, footless larvae bore tunnels into the branches.

Distribution: the West Indies

Central shoot stunted. Leaves shrivelled. Central portion of stem tunnelled out and occupied by yellow to orange-red maggots. Secretion of gum and excrement form a brownish mass on the outside of dying shoots.

341

Carpolonchaea chalybea Wiedem.

DIPTERA; *Lonchaeidae*

Small, dark fly. The female lays its eggs in tender shoots, whence the yellow to orange-red maggots penetrate into the tissue. When full grown they leave the dead shoots, and descend into the ground where they pupate. Development period of one generation: 8-10 weeks.

Distribution: the West Indies

342



Trunk and leaf stalks infested with mussel-shaped scales. Leaves of young plants, when heavily attacked, turn pale green, wilt and fall. Root development impaired.

Aonidomytilus albus Ckll.

Cassava scale.

HOMOPTERA; *Diaspididae*

Female scales silvery-white, mussel-shaped, 2-2.5 mm in size. The golden-brown, oval exuviae are at the front end. The females under the scales are bag-shaped, reddish, while the male scales are straight-sided, measuring only about 1 mm.

Distribution: East Africa, Madagascar, Florida, Central America

Leaf tissue completely devoured, leaves skeletonized.

leaves

Erinnyis ello L.*Cassava caterpillar.*LEPIDOPTERA; *Sphingidae*

Full grown caterpillars may reach up to 50 mm in length. They are fat and hairless, green to reddish-brown, bearing a striking yellowish-red horn at their posterior end (see Fig. 39). The pest usually occurs in great masses. Two generations.

343

784

Distribution: Central and South America, the West Indies**Leaves heavily attacked.***Zonocerus elegans* Thunb.*Elegant grasshopper.*ORTHOPTERA; *Acridiidae*

344

35, 705, 808

see page 79 (Coffee)

Distribution: Africa**Leaves mottled with necrotic patches. Leaf development stunted.***Scirtothrips manihoti* BondarTHYSANOPTERA; *Terebrantia*

345

Small, stout, broad thrips, about 2 mm long, which deposits its eggs in the leaf tissue.

Distribution: South America, the West Indies**Leaves mottled. Necrosis. Young leaves drooping. Small, shiny black dots visible (excrement).***Corynothrips stenopterus* Will.THYSANOPTERA; *Terebrantia*

346

Light brown, flat-bodied thrips, the ovipositor of which is directed downwards.

Distribution: Trinidad

leaves

Leaves with necrotic patches and sometimes misshapen.

Erythroneura cassavae China

HOMOPTERA; *Jassidae*

347



Small, greenish-yellow leafhopper, only a few mm long, which lays its eggs in the leaves.

Distribution: Tanganyika

348



Leaves stunted, their tips drooping, and stained yellow. Presence of Cassava mosaic virus disease (yellowing and deformation of leaves).

Bemisia nigeriensis
Corbett

HOMOPTERA;
Aleyrodidae

Small "white fly", about 2 mm long, living on the underside of the leaves (see Fig. 16), where it deposits its eggs. The larvae are small, hyaline, oval, shield-like bodies, 0.5-1.5 mm in size. Egg to adult development: 3 weeks; several generations each season.

Distribution: Africa

Leaves of young plants misshapen and dwarfed. Stem covered with white fluff.

Planococcus citri Risso
Citrus mealybug.

HOMOPTERA; *Pseudococcidae*

see page 288 (Citrus)

leaves

349

100, 386, 421
530, 692, 771
873



Leaf development impaired. Necrotic patches along the leaf veins. Heavy infestation with sooty mould.

Saissetia coffeae
Walk.
Hemisphaerical
scale.

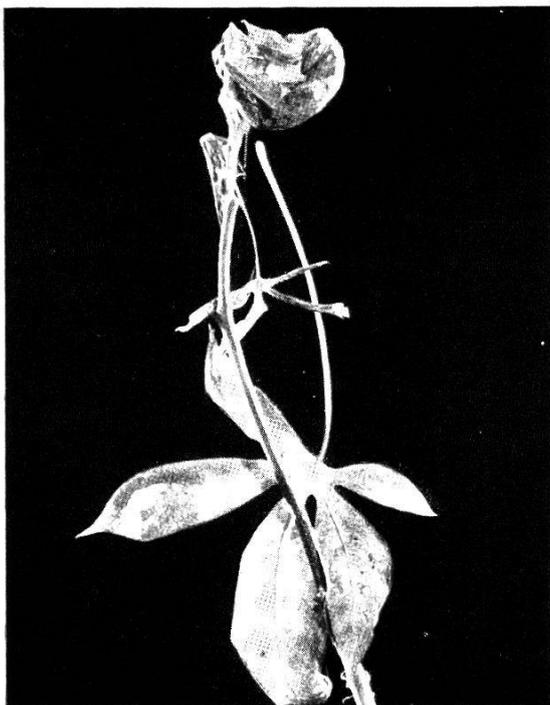
350

21, 455, 734

HOMOPTERA;
Lecaniidae

Light to dark brown, convex scales, 2-4 mm by 1.5-3 mm in size, occurring in dense colonies. When the larger scales are removed, masses of minute pinkish eggs become visible. Parthenogenetic reproduction.

Distribution: almost geopolitical



Leaves turn yellow to brown and fall. Plant growth stunted.

Tetranychus urticae Koch
Common red spider.

ACARINA; *Trombidiformes*

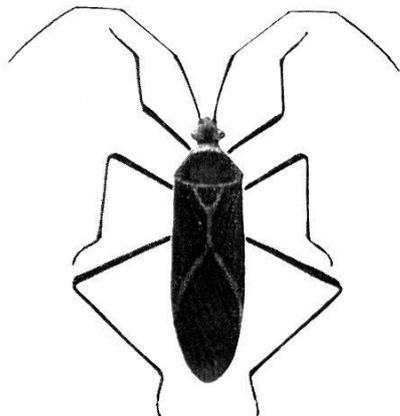
351

327, 380, 62
637, 670, 76
789, 820, 86
874

see page 415 (Cotton)

Distribution: cosmopolitan

leaves

Buds fail to open and turn black. Leaves misshapen.*Dasynus manihotis* BlöteHETEROPTERA; *Coreidae*

352

Slender, dark grey to brownish-black plant bug, about 20 mm long, with protuberant eyes, long and thin legs and long antennae. The eggs are placed on the underside of the leaves and on the buds. Nymphs as well as adults puncture the buds and leaf stalks.

Distribution: Indonesia

Sweet potato

(*Ipomoea batatas* Lam.)

Most important pests: 354, 355, 358, 359, 380

Dark lesions on roots. Developing tubers distorted.

root

Radopholus similis Cobb.
Burrowing nematode.

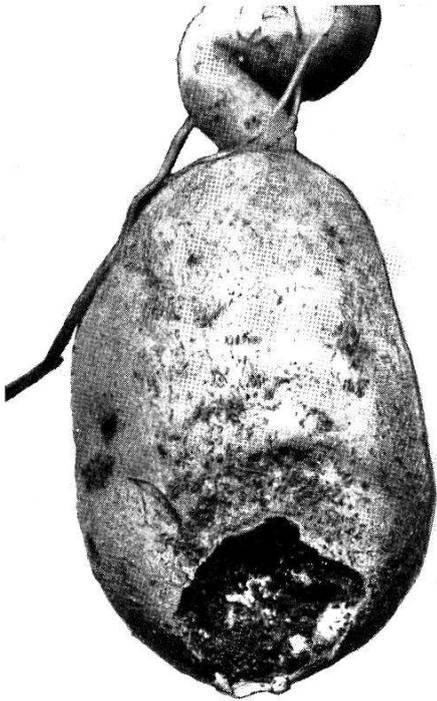
NEMATODA

353

2, 382, 403,
625, 731, 74

see page 38

Distribution: widespread throughout the Tropics and Subtropics



Tubers gnawed, showing deep channels.

Lachnosterna sp.
May-beetle.

COLEOPTERA; *Scarabaeidae*

354

Large, creamy-white grubs with a slightly distended abdomen, the dark gut content showing through. Development period: several months.

Distribution: North, Central and South America

tubers

**Tubers traversed by tunnels and rotting.**

Heteroderes laurenti Guér.
Gulf wireworm
Click beetle.

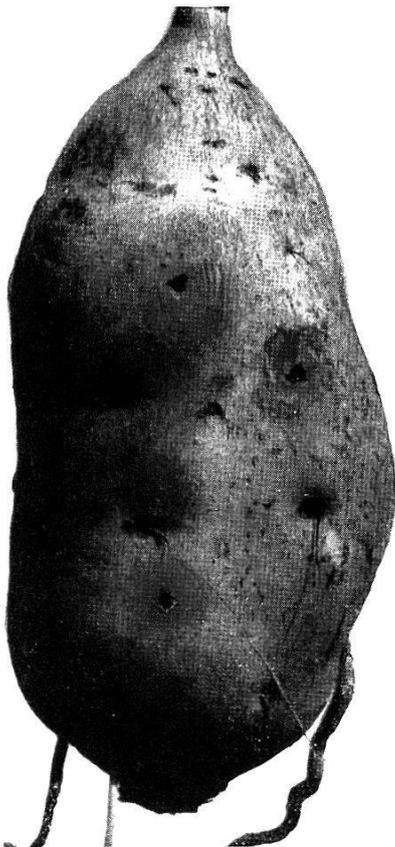
COLEOPTERA; *Elateridae*

355

258

Thin, yellowish-brown, heavily chitinized wireworm, 15-20 mm long. The beetle is about 10 mm long, dark brown and slender. The legs are reddish-brown. Time of development from egg to adult: only a few months.

Distribution: Southern States of U.S.A., Central America, South America

**Tubers with greenish patches, surrounding bore-holes. Tubers taste bitter.**

Chrysochus chinensis Baly.

COLEOPTERA; *Chrysomelidae*

356

Oval, fairly convex beetle, 6-8 mm in size, which places its eggs into the top soil. The hatching larvae tunnel through the tubers. They pupate in the ground. One generation develops within 6-8 weeks.

Distribution: China, Japan, Korea

Roots and tubers often badly gnawed.

tubers

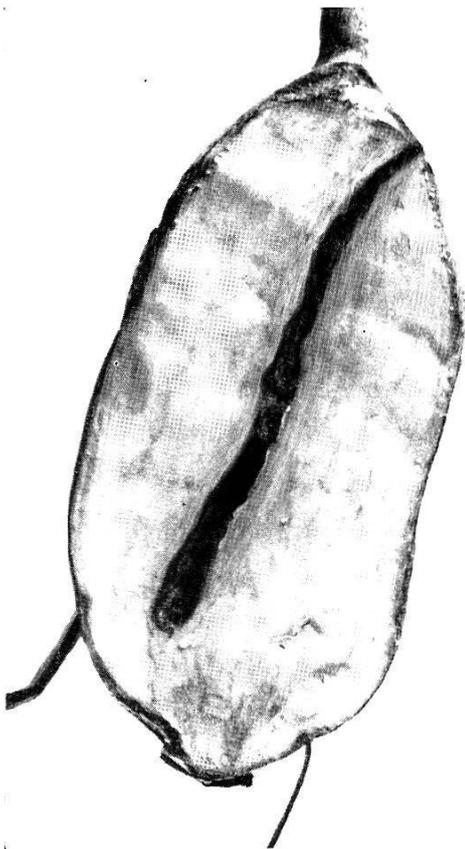
Paria viridicyaneus Crotch.
Sweet potato leaf beetle.

COLEOPTERA; *Chrysomelidae*

Dark, fairly convex beetle, 5-7 mm long, which lays its eggs at the base of the plant. The posterior end of the larvae is thickened. They feed on roots and tubers.

357

Distribution: Southern States of U.S.A.



Tubers riddled with irregular galleries, up to 5 mm in diameter. Stems often mined also, the mines occupied by white, footless larvae, 10-15 mm long.

Alcidodes orientalis Mshl.

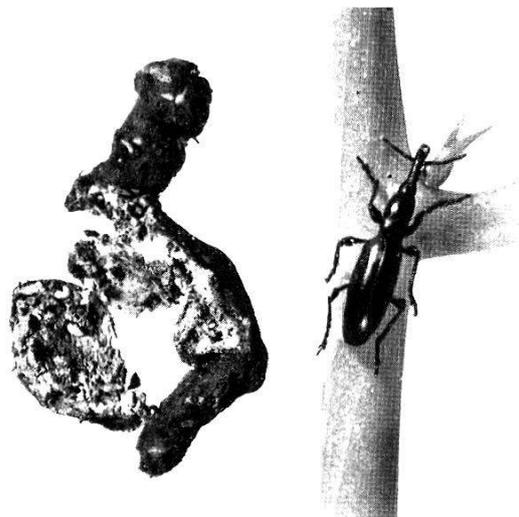
COLEOPTERA; *Curculionidae*

358

Brownish-black weevil, 10-12 mm long, the elytra of which are irregularly dotted pale white. The female lays its eggs in stems and tubers where the larvae make galleries. Development period of one generation: 5-6 weeks.

Distribution: East Africa

tubers



Tubers with rotting patches, sometimes also bore-holes. Tubers, when opened, show many tunnels containing white, slightly curved larvae, about 10 mm long.

Cylas formicarius F.
Sweet potato weevil.

COLEOPTERA; *Curculionidae*

359

Slender, long-legged, dark-blue snout weevil, 6-8 mm long, which deposits its eggs into hollows on the stem or inserts them right into the tubers, where the hatching larvae feed and some of them also pupate. Others pupate in the ground. Cut up tubers may be placed as baits in moist areas. The pest usually appears at the time when the tubers are beginning to form. Egg to adult life cycle 6-7 weeks, several generations occurring each season.

Distribution: throughout the Tropics (practically wherever sweet potatoes are grown)

Tubers with superficial scars and tunnels, caused by gnawing.

Euscepes batatae Waterh.
Sweet potato weevil.

COLEOPTERA; *Curculionidae*

360



Dark brown to dark reddish-brown weevil, 3 mm long. The snout is relatively long and curved. The centre of the last quarter of the elytra is marked with a small, yellow spot. Oviposition and larval development resemble those of *Cylas formicarius*.

Distribution: India, Hawaii, California

Tubers and roots superficially gnawed. tubers

Blosyrus ipomoeae Mshl.

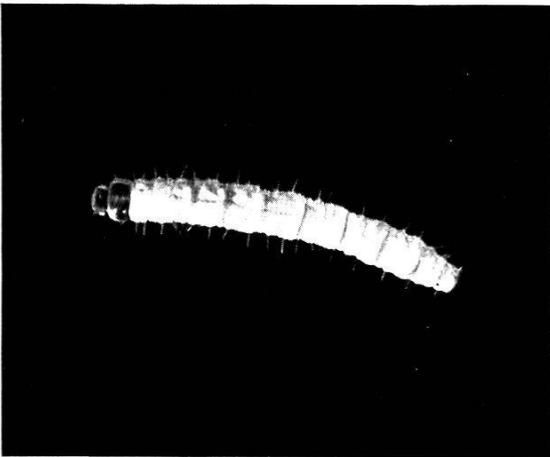
COLEOPTERA; *Curculionidae*



361

Brownish-red weevil, about 6 mm long, with a short, broad and obtuse snout. The prothorax is considerably narrower than the elytra; these are dark brown, flecked with pale brown. The larvae live underground and attack the tubers; they are active in May/June.

Distribution: East Africa, Rhodesia



Stem base swollen to a gall, traversed by feeding galleries. Tubers often attacked also and occupied by caterpillars. stem

Aegeria sp.

LEPIDOPTERA; *Aegeriidae*

362

White moth with black dots, the wings of which expand to 20-25 mm. The female deposits its eggs in clusters on the stems and leaf stalks. The white caterpillars hatch within a few days and penetrate into the stem where they tunnel downward, causing the stem base to swell.

Distribution: East Africa

stem



Leaves droop, wilt and die. Stems riddled with galleries which contain yellowish-white caterpillars, up to 30 mm long. Tubers also mined when heavy attacks occur.

Omphisa anastomosalis Guen.
Sweet potato stem borer.

LEPIDOPTERA; *Pyralididae*

363

White moth with a wing span of 35 mm. The forewings have a rufous suffusion on the basal area. The hindwings are also rufous at the base and have two irregularly waved post-medial lines of the same colour. The eggs are deposited on the stems, leaf stalks or leaves. The yellowish-white caterpillars are furnished with brown tubercles. Development period of one generation: 6-8 weeks.

Distribution: India, Ceylon, Indonesia, China, Hawaii

Growth checked. Leaves wilt and die. Stems as well as tubers tunnelled and occupied by white caterpillars.

Megastis grandalis Guen.

364

LEPIDOPTERA; *Pyralididae*

Small, dull coloured moth with a wing span of 25-30 mm. 2-3 eggs are laid together in the axils, on the petioles or on the undersurface of the leaves. The caterpillars hatch after a few days and penetrate into the stem, descending towards the roots, i.e. tubers, in which they feed without injuring the surface. Larval development: 6-8 weeks. *M. grandalis* is active during the dry season.

Distribution: South America, the West Indies

Stems stained and deformed. Growth stunted. Leaf buds withered.

Coreocoris fuscus Thunb.

Sweet potato bug.

365

HETEROPTERA; *Coreidae*

Ochrous-yellow plant bug, 15-20 mm long, the abdomen of which is brown and oval in shape, broader than the wings, giving the insect a somewhat plump appearance. The eggs are deposited on the leaves and the stems. Both nymphs and adults feed on the stem, sucking the cell sap.

Distribution: Central and South America.

Small holes or long streaky channels on leaves. Infested leaves turn brown and die. Damage shows mainly in dry weather.

leaves

Chaetocnema confinis Crotch.
Sweet potato flea beetle.

COLEOPTERA; *Chrysomelidae*

366

Small bronze-black beetle, about 1.5 mm long, with reddish-yellow legs. The adults leap off when disturbed. Life cycle 6-8 weeks. The first appearance of the pest occurs in May/June.

Distribution: U.S.A.



Large round holes eaten in the leaves.

Aspidomorpha areata Klug.

COLEOPTERA; *Chrysomelidae*

367

Oval, shield-like, brownish to greenish beetle, 6-8 mm long, with broad and flat elytra. The female oviposits on the leaves. The larvae are oval, with a fringe of spines along the margin of the body. They carry the cast skin on their back. There are several generations.

Distribution: East Africa, Indonesia

Leaves heavily injured.

Cassida bivittata Say.
Two-striped sweet potato beetle.

COLEOPTERA; *Chrysomelidae*

368

Oval, convex, brownish-yellow beetle, 5-7 mm long, with two black stripes on each elytrum. Oviposition takes place in May, the eggs being placed singly on the leaf stem or on the underside of the leaf. The oval larvae bear a fringe of spines along the margin of the body and carry the cast skins on the posterior end of their back.

Distribution: U.S.A.

leaves **Young leaves devoured. Older leaves injured, curling up.**

Oidaematophorus monodactylus L.

Plume moth.

LEPIDOPTERA; *Pterophorinae*

369

Yellowish-brown to reddish-brown moth with a wing span of 20-25 mm. The wings are split and have a plume-like appearance. The legs are long. Oviposition takes place on the leaves. The creamy-white to reddish caterpillars have dark red spots between the lateral tubercles; they feed on foliage and roll up the leaves. Several generations a year.

Distribution: Europe, Asia (U.S.S.R.), U.S.A.

Leaves curled up and injured. Presence of caterpillars inside leaf curls.

Lecithocera effera Meyr.

LEPIDOPTERA; *Gelechiidae*

370

Small moth with dark brown front wings and brownish-grey hindwings, which expand to 20-50 mm. The latter have long fringes along the inner margin. The antennae are long. Oviposition takes place on the leaves. The caterpillars are light green to grey and have a somewhat darker line along the back.

Distribution: Mauritius

Sucking and blotch mines on leaves. Heavy attacks lead to withering of leaves.

Bedellia orchilella Wals.

LEPIDOPTERA; *Gracilariidae*

371

Small, dull, yellowish-brown moth with a wing span of about 25 mm, which deposits its eggs on leaves. The caterpillars are pale green with a red band along the back and red spots on the sides.

Distribution: Hawaii

Leaves heavily attacked, often stripped to the midrib.

Herse cingulata Fabr.

Sphinx moth.

LEPIDOPTERA; *Sphingidae*

372

Large, dark, brownish-grey moth with indistinct light spots, the body segments of which are reddish-brown and dark brown. Its wing span reaches up to about 100 mm. The hairless and fleshy caterpillars are greyish-brown with light and dark dorsal lines, their posterior end bearing a dorsal horn of orange and red colour (see Fig. 39). Full grown they may be 60-80 mm in length. Pupation takes place on the ground. Egg to adult life cycle: 6-8 weeks.

Distribution: Central and South America, the West Indies, Australia

Leaves severely attacked, often stripped to the midrib.

leaves

Theretra japonica Orza.LEPIDOPTERA; *Sphingidae*

Olive-grey hawk moth. The caterpillar is green and brown, its abdomen bearing a dorsal horn, while the first segments are marked with lateral spots.

373

Distribution: China, Japan, Korea, Formosa**Leaves and stems heavily attacked.***Aedia (Anophia) leucomelas* L.LEPIDOPTERA; *Noctuidae*

Moth with a wing span of about 40 mm. The front wings are greyish-brown, crossed with dark brown zig-zag lines. Half of the hindwings is white. The female lays its eggs on leaves. The caterpillars are hairless, grey to green in colour, speckled with black, and lined with orange-yellow dorsal and lateral stripes. Several generations a year.

374

Distribution: Southern Europe, Japan, Formosa**Leaves heavily attacked (stripped to the midrib).***Scotia (Agrotis) ypsilon* Hufn.
*Greasy cutworm.*LEPIDOPTERA; *Noctuidae*

see page 360 (Tobacco)

Distribution: widespread

375

685, 805

Leaves stripped to the midrib.*Zonocerus variegatus* L.
*Stink locust.*ORTHOPTERA; *Acridiidae*

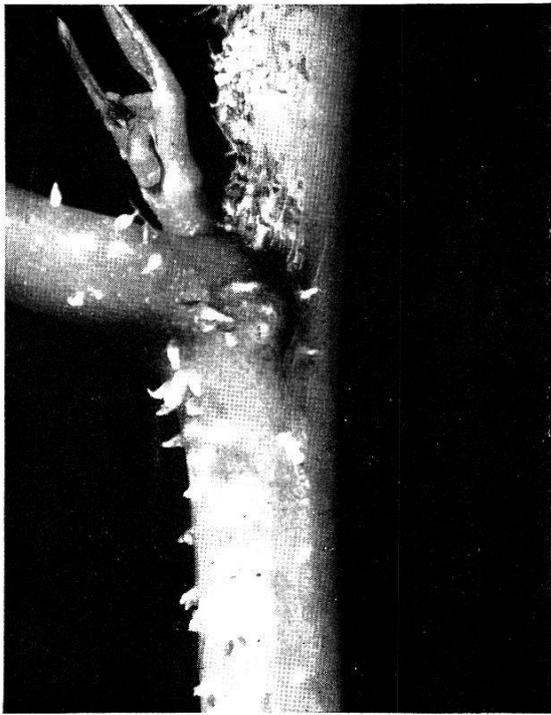
Yellowish-green grasshopper, 40-50 mm long, with yellow and black legs, dotted with red.

376

81, 157, 417,

Distribution: Africa, the West Indies

leaves



Leaves drooping and stained white to yellow. The sucking activity of the pest produces spiny galls, 1-2 mm long, on the leaves and stems.

Dendrothripoides ipomoeae.

THYSANOPTERA; *Terebrantia*

377

Small, brownish thrips, which mainly attacks young leaves and is found at the base of leaf stalks. It often appears in great numbers after the rainy season.

Distribution: Barbados

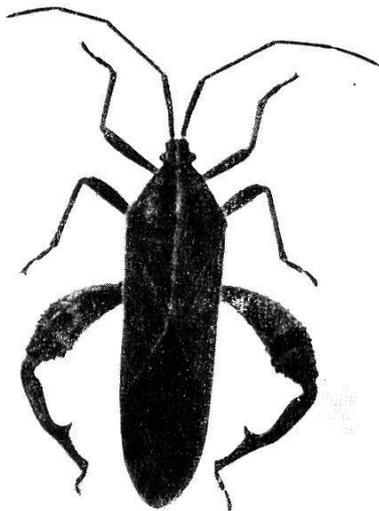
Plants partially or totally wilted. Growth above as well as below the ground distorted.

Physomerus grossipes F.

HETEROPTERA; *Coreidae*

378

313



Dark brown plant bug, 20-25 mm by 5-7 mm. Its shape is long, straight-sided with a light central line along the head and thorax. The femora of the hind legs are strongly clubbed, the tibiae bear a conspicuous spine at the inner margin. The eggs are laid in batches on the leaves. One generation develops within 3 months.

Distribution: South-East Asia, Central and South America

Light yellow patches on leaves, which turn completely yellow when heavily attacked.

leaves

Halticus tibialis Reut.

HETEROPTERA; *Miridae*



379

Small, shiny black plant bug, 1.5-2 mm long. The wing membrane is hyaline. The femora are black, while the other parts of the legs are light brown. The femora of the hindlegs are thickened. The eggs are inserted in the leaf tissue. Total life cycle: 6 weeks.

Distribution: West Africa, Indonesia, Japan

Leaves stained yellow to lead-grey, withering.

Tetranychus urticae Koch.

Common red spider.

ACARINA; *Trombidiformes*

see page 415 (Cotton)

Distribution: widespread

380

327, 351, 624

637, 670, 769

789, 820, 868

874

