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Autor: Wyniger, R.
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RUBBER AND FIBRES

Rubber

Cotton

Sisal

Roselle (Hibiscus)

Ramie

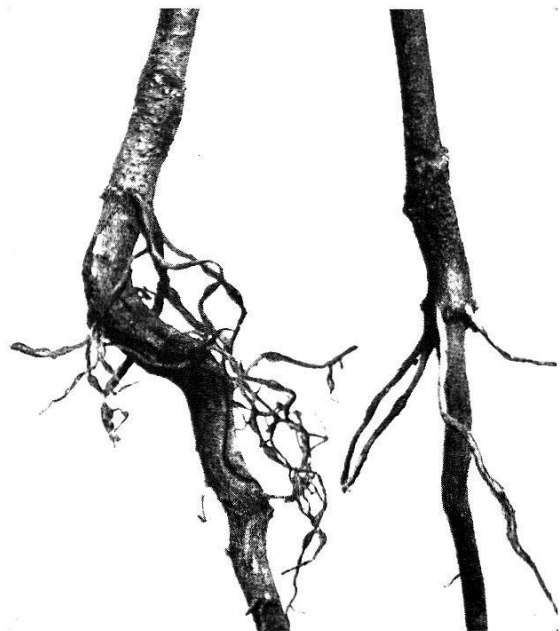
Jute

Kapok

Rubber

(*Hevea brasiliensis* Müll.)

Most important pests: 774, 781, 789, 790



Development of young plants in seedbeds impaired. Growth stunted. Roots beset with knots. Tap root often deformed.

root

Meloidogyne sp.
Root knot nematode.

NEMATODA

771

The pear- or lemon-shaped females of this endoparasitic nematode are concealed in the root knots (see page 37).

Distribution: cosmopolitan



Reluctant growth of young plants. Roots with deep, brown lesions and wrinkled, necrotic tissue. Rootstock deformed.

Pratylenchus coffeae Z.
Coffee nematode.

NEMATODA

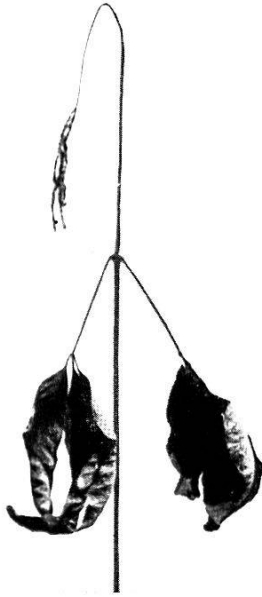
772

3, 53, 103
404, 543

Free living, endoparasitic root nematode (see page 38).

root

773



Leaves wilting, dieback of plants within a short time (few weeks). Roots destroyed.

Psilopholis vestita Sh.

COLEOPTERA; Scarabaeidae

Robust, dark to reddish-brown cockchafer, 20-30 mm long, without any markings, which flies at dawn. The grubs live in the ground where they gnaw the roots of *Hevea*. They develop within one or two years. Infestation rate of grubs per square metre is often very high.

Distribution: Indonesia, Philippine Islands, Malacca

trunk

774



Sudden dieback of trees. Rootstock and trunk beset with earth crusts.

Coptotermes marabitanus Hag.

ISOPTERA; Rhinotermitidae

Coptotermes curvignathus Holmgr.

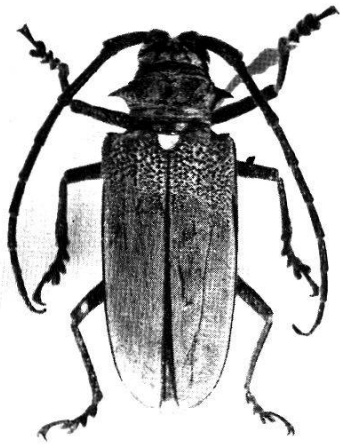
ISOPTERA; Rhinotermitidae

Pseudacanthotermes militaris Hag.

ISOPTERA; Macrotermitidae

The termites, which cause this injury, remain invisible, but the main roots, when laid bare, show galleries made of earth particles in which the white to yellowish termites are found.

Distribution: Africa



Sudden dieback of trees. Latex shedding from injured parts of the plant.

trunk

Batocera rufomaculata Deg.

COLEOPTERA; *Cerambycidae*

775

429

Greyish-brown Longicorn beetle, 40-50 mm long, with a strong spine on each side and two ochrous spots on the surface of the thorax. The beetle feeds on leaves and deposits its eggs in the branches or trunk. The larvae mine zigzag tunnels under the bark. One generation a year.

Distribution: East Africa, India, Ceylon

Twigs heavily attacked.

Stenodontes downesi Hope.

COLEOPTERA; *Cerambycidae*

776

Large, robust Longicorn beetle, which gnaws the bark of young twigs and mines in the trunk.

Distribution: Africa

Small, round holes (1-1.5 mm in diameter) in branches and trunk. Condition of trees generally poor.

branches

Xyleborus affinis Eichh.

COLEOPTERA; *Scolytidae*

777

Small, cylindrical, brown bark beetle, 3 mm long (see Fig. 24), which mainly attacks weak plants of low quality. Xyleborus attack is always a sign of unsuitable conditions of soil or climate. The larvae mine under the bark.

Distribution: Africa, Mauritius, Indonesia, Hawaii, U.S.A.

shoots **Leaves, leaf stalks and young shoots with necrotic patches. Often severe malformation of attacked shoots.**

Lawana candida F.

Coffee cicada.

778

18

HOMOPTERA; *Flatidae*

see No. 18 (Coffee)

Distribution: Indonesia, Indochina

Leaves curled downward. Infestation with sooty mould. White waxy fluff on main leaf veins, shoots and root neck. Growth of young plants disturbed. Presence of ants.

779

Planococcus citri Risso

Common mealybug.

100, 349, 386

123, 530, 692

873

HOMOPTERA; *Pseudococcidae*

see page 288 (Citrus)

Distribution: cosmopolitan

Young plants specially susceptible. Growth impaired. Base of young trunks deformed and wrinkled.

Presence of white wax-covered mealybugs.

Ferrisia virgata Ckll.

780

HOMOPTERA; *Pseudococcidae*

72, 113, 444

733, 819

Ovate-bodied mealybugs, about 4 mm long. Their back is covered with wax, leaving a few small patches free. At the sides of the body are fine and long white waxy filaments. Several generations a year. Development period of one generation: 4-6 weeks.

Distribution: widespread

Shoots of young plants heavily infested with scales. Leaves covered with sooty mould. Growth of shoots stopped.

781

Coccus viridis Green

Green coffee scale.

75, 115, 456

756

HOMOPTERA; *Lecaniidae*

see page 72 (Coffee)

Branches of young plants with necrotic patches. Growth disturbed. Infestation with sooty mould.

shoots

Saissetia nigra Nietn.

Nigra scale.

HOMOPTERA; *Lecaniidae*

782

Oval, convex, dark brown to black scales, measuring 2-3 mm by 1.5-2 mm, which occur on young branches and shoots. They oviposit under the scale and reproduce parthenogenetically.

153, 488

Distribution: widespread

Leaves heavily attacked. Young plants defoliated.

leaves

Orgyia postica Walk.

Small tussock moth.

LEPIDOPTERA; *Lymantriidae*

783

Male moth with a wing span of 20-25 mm. The forewings are dark to light brown and flecked. The hindwings are plain dark brown. The antennae are comb-like. The female is wingless and has the appearance of a light-brown sac with 6 legs. The brownish-red caterpillars have a dark head capsule, dense yellow to reddish-brown hair tufts on the 4th-7th segments and a long hair tuft on each side of the first segment (cf. Fig. 36). Pupation takes place in egg-shaped, dark brown, strongly made cocoons.

34, 134

Distribution: India, Southern China, Philippine Islands, Indonesia, Australia

Leaves severely attacked.

Erinnyis ello L.

Cassava caterpillar.

LEPIDOPTERA; *Sphingidae*

784

343

Moth with a wing span of 60-80 mm. The forewings are plain greyish-brown, sometimes marked with indistinctly outlined longitudinal stripes. The hindwings are brownish-red, edged with dark brown along the outer margin. The abdomen has light grey and dark brown rings. The eggs are laid on the leaves. The hairless caterpillars are large and fat, furnished with a conspicuous dorsal horn at the rear end (see Fig. 39).

Distribution: Central and South America, the West Indies

leaves **Young plants stripped bare.**

Osmilia flavolineata Deg.

ORTHOPTERA; *Acridiidae*

785

Yellowish-brown grasshopper with dark speckled wings and 8 spines at the outer edges of each hind leg.

Distribution: South America



Young plants defoliated. Stems often gnawed or cut off.

Zonocerus variegatus L.
Stink locust.

ORTHOPTERA; *Acridiidae*

786

57, 376, 417

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

Distribution: Africa, the West Indies

Young trees defoliated.

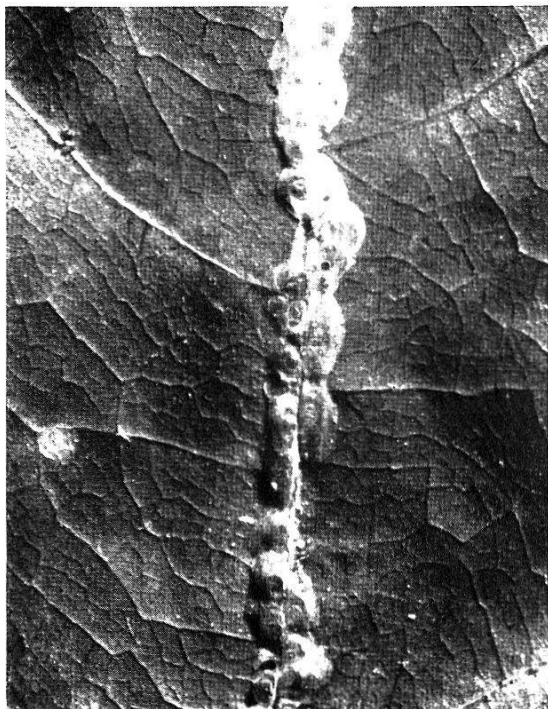
Atta cephalotes L.
Leaf cut ant.

787

HYMENOPTERA; *Formicidae*

Reddish-brown to dark brown ant, about 10 mm long (see page 468).

Distribution: South America



Leaves mottled, withering. Infestation with sooty mould. Presence of yellowish-brown scales on the underside of leaves (especially of young plants).

Abgrallaspis cyanophylli Sign.

HOMOPTERA; *Diaspididae*

leaves

788

Small, yellowish-brown scales, 1-2 mm in diameter.

Distribution: India

Leaves of young plants stained with greyish to yellowish patches; tips of leaves curled up.

Tetranychus urticae Koch

Common red spider.

ACARINA; *Trombidiformes*

see page 415 (Cotton)

789

327, 351, 380

624, 637, 670

769, 820, 868

874



Leaves curled up, asymmetrically developed. Leaf-shedding. Young trees particularly exposed to injury.

Tarsonemus translucens Green

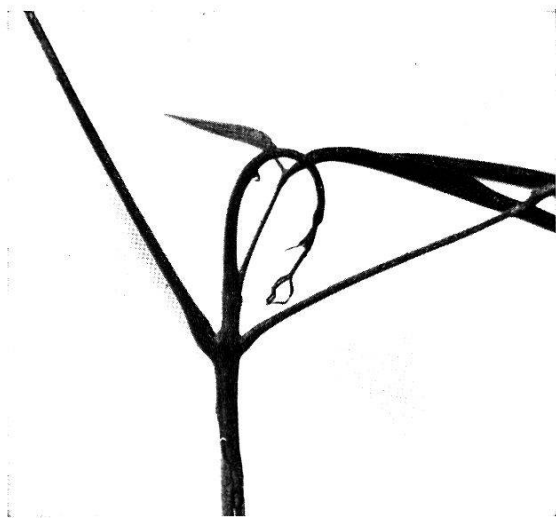
ACARINA; *Trombidiformes*

790

Microscopically small mites (see Fig. 44) which puncture the leaves in order to suck the cell sap. Populations are usually very dense. Several generations a year.

Distribution: Europe, South Asia, U.S.A.

buds



Young plants: Buds turn black and wither. Shoots are deformed and spotted with sucking punctures.

Dinocoris variolosus Walk.

HETEROPTERA; *Pentatomidae*

791

Dark, flat plant bug, about 12 mm by 8 mm, slightly speckled with white on its back.

Distribution: British Guiana

Young trees with black, dead buds. Shoots pitted with sucking marks. Latex-shedding.

Theraptus devastans Dist.

792

HETEROPTERA; *Coreidae*

Light to dark brown or greyish-brown plant bug, 25 mm long. The thorax is funnel-shaped, the antennae have a leaf-shaped extension on the third segment. The femora are strong and provided with a spine. The pest is often injurious to young rubber plantations. Several generations.

Distribution: Congo

Cotton

(*Gossypium* sp. = various species and varieties)

Most important pests: 801, 803, 809, 811, 812, 814, 815, 816, 817, 818, 820, 823, 824, 826, 827, 828, 835, 836, 837, 838, 839, 842, 843, 844

Plants wilt and die. Lower portion of stem broken, being severely mined.

stem

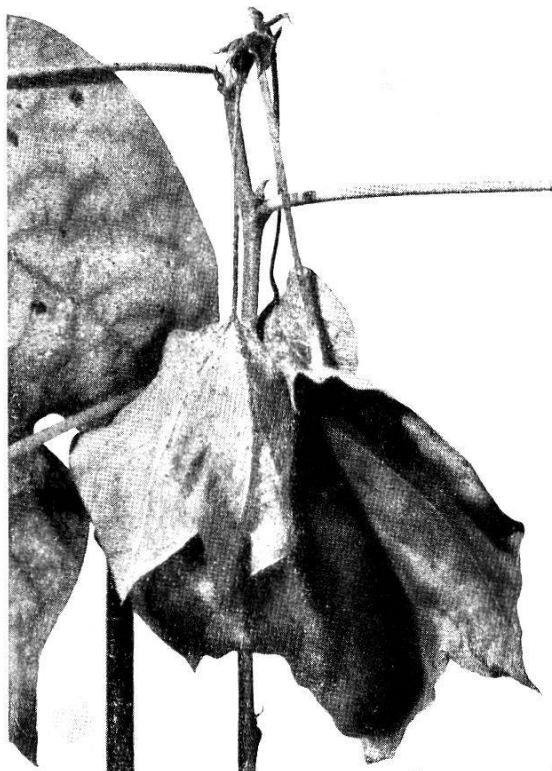
Sphenoptera sp.
Cotton stem borer.

COLEOPTERA; *Buprestidae*

Greenish-bronze, opalescent beetle, 7-9 mm long (see Fig. 21), which lays its eggs on the stem or at the stem base. The larvae are long, creamy-white, slightly flattened; they feed in the stem. Two generations a year.

793

Distribution: West and Central Africa



Young plants wilt and die. Stem beset with blister-like swellings. Stems and shoots of older plants broken (wind damage).

Apion soleatum Wagn.
Cotton stem weevil.

COLEOPTERA; *Curculionidae*

794

Small, black weevil, about 3 mm long, bearing scattered white hairs. The eggs are laid on the stalks or on the leaf stems. The footless larvae are white-bodied and dark-headed. They eat their way into the stalk.

Distribution: East Africa

stem



Plants become stunted, wilt and die. Stem base often broken, owing to feeding galleries riddling it.

Eutinobothrus brasiliensis
var. *gossypii* Herce.
Cotton borer.

COLEOPTERA; *Curculionidae*

795

Strong, grey weevil, about 4 mm long, with a coarsely and deeply punctate pronotum clothed with short, erect hairs. The elytra are broader than the pronotum; they have distinct longitudinal rows of dots which are lined with rows of short hairs. The tips of the elytra are somewhat tightened and the snout is slightly curved. The eggs are inserted in small hollows gnawed out of the stem base. The creamy-white, footless larvae tunnel towards the roots where they eventually pupate. Development period of one generation: 6 weeks.

Distribution: Brazil, Peru

Plants defoliated; bolls underdeveloped, failing to ripen. Stem base heavily attacked.

Hodotermes mossambicus Hag.

ISOPTERA; *Hodotermitidae*

796

0, 307, 645
747

Termite, 8-10 mm long, with a strong, dark brown head, long antennae and dark femora. The body is pale brown, the back darker near the head. Earth galleries are about 5-8 mm in diameter.

Distribution: South and East Africa, as far north as Abyssinia

Terminal shoots become mottled, turn brown and die. Bolls droop.

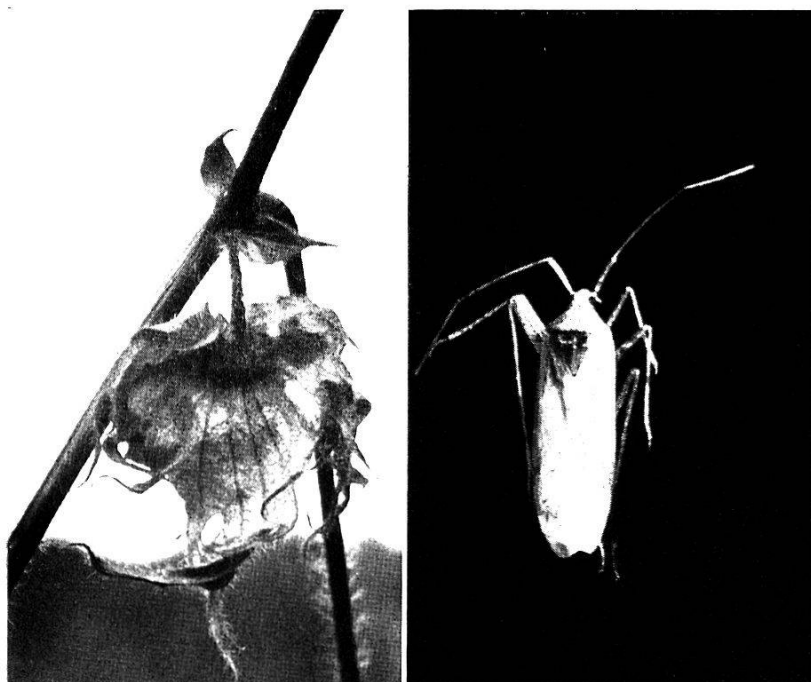
shoots

Creontiades pallidus Ramb.
Shedder bug.

HETEROPTERA;
Miridae

797

649



Slender, pale yellow to greenish plant bug, 8-10 mm long, with transparent wings. The eggs are laid in the terminal shoots and petioles, causing the tissue around the egg sites to turn brown and dry up. Development period of one generation: about 3-4 weeks. The nymphs moult 5 times.

Distribution: Africa, India

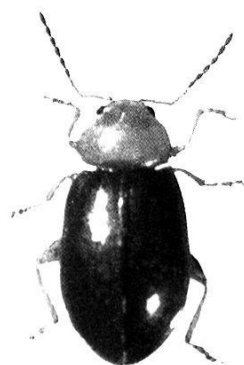
Leaves riddled with shot-holes. Young plants preferred.

leaves

Podagrica puncticollis Weise
Cotton flea beetle.

COLEOPTERA; *Chrysomelidae*

798



Strongly convex, lustrous brown beetle, about 4 mm long, which lays its eggs in the ground where the larvae feed on roots, while the adults attack the leaves.

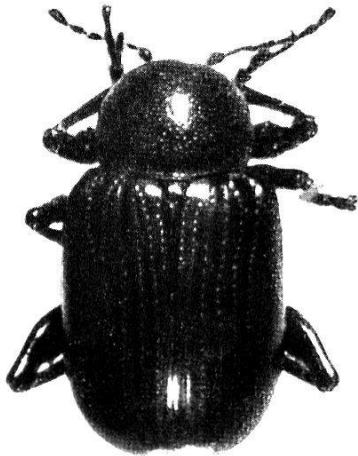
Distribution: Africa

leaves

**Leaves of young plants heavily attacked.
Plants often stripped bare.**

Syagrus rugifrons Bulg.
Cotton leaf beetle.

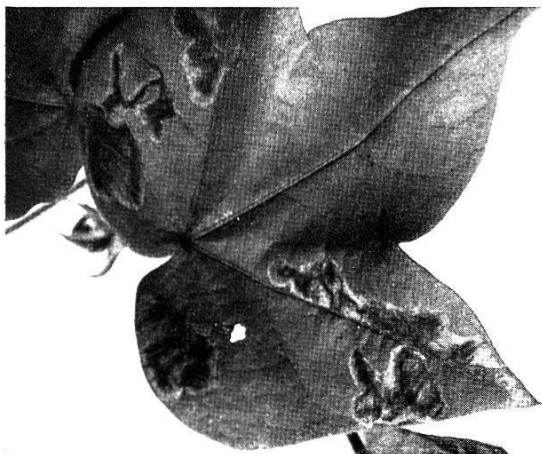
COLEOPTERA; *Chrysomelidae*



799

Black beetle, measuring 8-9 mm by 3 mm. The elytra bear lines of deep punctures. The thorax is much narrower than the elytra. The eggs are laid on the roots, on which the resultant larvae feed, while the adults eat the leaves of young plants. 1-2 generations a year.

Distribution: South and East Africa



**Leaves tunnelled by long serpentine
mines, ending in a widened blotch mine.
Heavy attacks lead to leaf-shedding.**

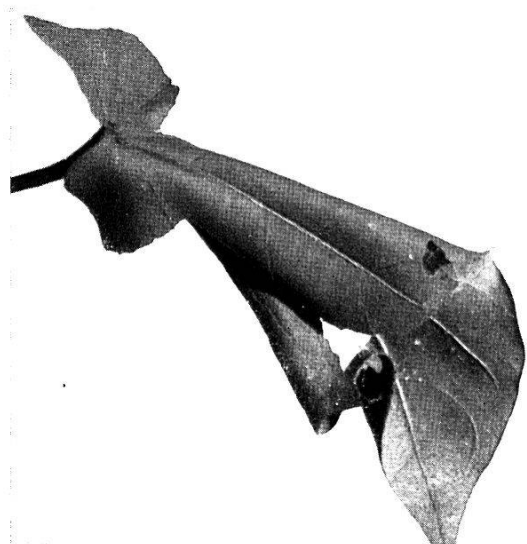
Acrocercops bifasciata Wals.
Cotton leaf miner.

LEPIDOPTERA; *Gracilariidae*

800

Small, frail moth with brown and white marked forewings, expanding to 8 mm. The eggs are fixed to the underside of the leaves, where the pink caterpillars mine, pupating later inside the mine. Development period of one generation: 4-5 weeks. Several generations.

Distribution: Africa



Leaves curled, drooping. Premature ripening of bolls, caused by defoliation. Bud formation severely impaired.

leaves

Syllepta derogata F.
Cotton leaf roller.

LEPIDOPTERA; *Pyralididae*

801

851

Moth with creamy fore- and hindwings, crossed with irregular brown lines. The wing span reaches 30-40 mm. The female lays its eggs on the leaves. The very agile, greenish, translucent, black-headed caterpillars feed on the leaf blades near the stalk, proceeding inwards from the margin, thus forming a roll of leaf. Ten or more caterpillars may be found in one roll. Full grown they are about 20 mm long. Pupation takes place in the leaf roll or in the ground. Development period of one generation: 4-5 weeks.

Distribution: Africa, South and East Asia, Australia

Leaves spun together and showing brown lesions.

Phycita infusella Meyr.
Cotton bud caterpillar.

LEPIDOPTERA; *Pyralididae*

802

Moth with a wing span of 15-20 mm. The forewings are flecked grey and yellowish-brown, with no distinct decoration. The hindwings are greyish-yellow, semi-transparent, with a distinct seam. The eggs are laid on leaves and buds. The green to grey caterpillars attack buds and shoots; they pupate on the leaves, usually under a tent of webbing. One generation.

Distribution: India

leaves **Leaves devoured. Heavy attacks lead to destruction of stems as well.**

Estigmene acrea Drury
Salt marsh caterpillar.

LEPIDOPTERA; *Arctiidae*

803

Moth with white and black dotted forewings, which expand to about 50 mm. The hindwings are yellow with scattered black dots. The head and thorax are white while the abdomen is reddish-brown, with a dark dorsal dot on each segment. The eggs are laid in clusters on the leaves. The caterpillars feed thereon; they are densely clothed with reddish-brown hairs. Development cycle of one generation: 10-12 weeks. Several generations a year.

Distribution: U.S.A.

Leaves heavily attacked, plants often stripped bare.

Cosmophila flava F.

LEPIDOPTERA; *Noctuidae*

804

Moth with reddish-brown forewings, traversed by two dark zig-zag bands towards the distal margin. The hindwings are plain light brown. The eggs are laid on the leaves, where the forthcoming caterpillars feed. These are yellowish-green, marked with several white dorsal lines. Full grown they are about 30 mm long. Pupation takes place between the leaves or in the ground. Development period of one generation: about 6 weeks. Several generations.

Distribution: Africa, Asia, Australia

Leaves of young plants destroyed or stem gnawed off at ground level. Curled up dark grey caterpillars may be found in the top soil.

Scotia (Agrotis) ypsilon Hufn.
Greasy cutworm.

LEPIDOPTERA; *Noctuidae*

805

375, 685

Moth with greyish-brown forewings, marked with a kidney-shaped spot in the centre and 3 wedge-shaped, dark spots as well as indistinct faint crosslines. The hindwings are pale and plain. The wings expand to 40-50 mm. The eggs are deposited on the underside of the leaves, on the stem or on the ground. The caterpillars are first greenish-grey, changing later on to brownish-grey; they are hairless and bear pale lateral lines. Development period of one generation: 5-6 weeks. Several generations.

Distribution: widespread

Leaves destroyed. Young plants preferred.

Xanthodes graellsii Feisth.

LEPIDOPTERA; *Noctuidae*

Moth with straw-coloured forewings, marked with a median longitudinal brown stripe and scattered brown spots along the costal margin. The hindwings are plain, whitish with a yellowish margin. Oviposition takes place on the underside of the leaves. The caterpillars are first light green, turning dark green later on, with a pale stripe along the back. Pupation takes place in the soil. Development period of one generation: 6-8 weeks.

Distribution: Africa, India, China

leaves

806



Leaves heavily attacked, plants often stripped bare. Caterpillars active only at night; in daytime hiding in the ground immediately around the stem base.

Laphygma exigua

Hb.

Beet armyworm.

LEPIDOPTERA;

Noctuidae

807

195, 660, 704

Moth with greyish-yellow to reddish-brown forewings. The centre of the wings, near the costal margin, is marked with two small, round, reddish dots and crossed with an indistinct pale zig-zag band. The hindwings are greyish-white with dark veins. They expand to 30 mm. The eggs are placed in clusters on the leaves and covered with woolly material. The caterpillars are grey to reddish-brown with stripes along both sides of the body. Full grown they are about 30 mm long. They feed on leaves and pupate in the ground. Development period of one generation: 4-5 weeks.

Distribution: Europe, Africa, India, U.S.A., Japan

leaves **Leaves heavily attacked. Plants often stripped bare.**

Zonocerus elegans Thunb.

Stinking grasshopper or elegant grasshopper

ORTHOPTERA; *Acridiidae*

808

35, 344, 705

Robust grasshopper of various colours, 40-50 mm long. The head is black, while the antennae are red, ringed with black; the thorax is green and the abdomen black with yellow rings. The eggs are deposited in the ground. The nymphs, hatching in October, moult 5 times. The adults, when handled, secrete an evil-smelling fluid.

Distribution: Africa

Young leaves with transparent patches (tissue eaten away on the underside). Plants often stripped bare, bolls and buds destroyed as well.

Alabama argillacea Hb.

Cotton leafworm.

LEPIDOPTERA; *Noctuidae*

809

Reddish-brown moth with dark wavy lines on the forewings and a circle in the centre of each near the costal margin. The eggs are placed singly on the underside of the leaves. The yellowish-green caterpillars, spotted with black on each segment, walk in looping motion. They pupate in a loosely spun cocoon on the plant. Development period of one generation: 4-5 weeks. Several generations a year.

Distribution: North, Central and South America

Leaves or cotyledons of seedlings turn yellow, then silvery-white or brown, slightly curling. Small black dots become visible. Leaf-shedding.

Thrips tabaci Lind.

Potato thrips.

THYSANOPTERA; *Terebrantia*

810

707, 727

Small, yellowish thrips, about 1 mm long, with brown markings on the abdominal segments. The wings are narrow and fringed with hairs. The female lays its eggs in the leaf tissue on the lower side. The pest is very active during the dry season. Both nymphs and adults cause injury by sucking the cell sap. Development period of one generation: 3-5 weeks.

Distribution: widespread

leaves



Leaves with lustrous silvery coalescent patches and black excrement which cause them to turn brown and curl up. Leaf-shedding and premature ripening of bolls.

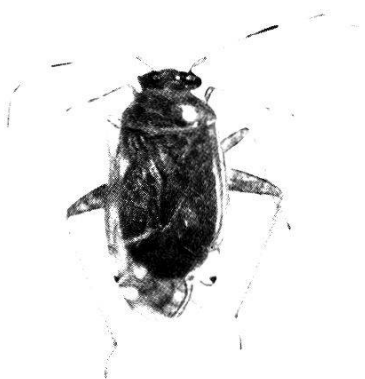
Caliothrips fumipennis Bag.
Cotton thrips.

THYSANOPTERA; *Terebrantia*

811

Slender, blackish-brown thrips, about 1 mm long (see Fig. 13), which inserts its eggs singly into the leaf tissue. Both nymphs and adults cause injury by sucking the plant sap.

Distribution: Sudan



Young, freshly unfolded leaves with regularly distributed patches, edged with brown and yellow and cracking. Older leaves curled upwards. Injury is called "frisolée". Flower buds and bolls stunted. Intense secondary shoot formation.

Lygus vosseleri Popp.
Plant bug.

HETEROPTERA; *Miridae*

812

618

Brownish plant bug, elliptical in outline, 4 mm long, with a dark membrane. The legs are pale except at the base where they are brown. The second segment of the antenna has dark markings. The eggs are inserted in the petioles or peduncles. There are 5 nymphal stages. Both nymphs and adults suck on leaf buds and flower buds. Development period of one generation: 3-4 weeks. Several generations.

Distribution: Africa (West and East Africa)

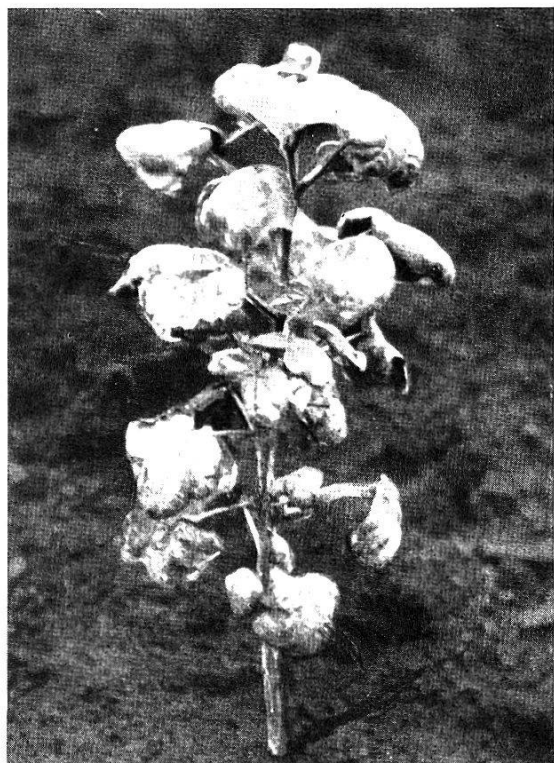
leaves **Young leaves with small, dark green or brown spots. Growth of shoots checked when heavily attacked.**

Campylomma nicolasi Put. et Reut.

HETEROPTERA; *Miridae*

813 Small, oval plant bug, about 2.5 mm long, with opalescent elytra. The abdomen is yellowish to light green and the eyes are black. The eggs are introduced into young sappy tissue. The nymphs are yellowish with red eyes. They attack young leaves.

Distribution: Africa (especially Sudan)



Leaves pale green to yellowish, their edges gradually curling downwards and changing to brownish or red. Leaf-shedding. Plant growth reduced and boll formation impaired.

Empoasca facialis Jacobi

HOMOPTERA; *Jassidae*

814

Small, wedge-shaped leafhopper, 3 mm long, pale green with transparent wings. The adults are very active and lively, quick to fly away when disturbed. The eggs are inserted in leaf veins or young shoots. The nymphs hatch after 6-8 days and are also pale green. They moult 5 times and attack mainly young leaves. Development period of one generation: about 3 weeks. Peak in April. Several generations.

Distribution: West, Central and South Africa

Leaves slightly curled downwards. Leaf margin usually stained red. Leaves turn yellow and fall off. Growth of whole plant stunted.

leaves

Empoasca devastans Dist.
Cotton Jassid.

HOMOPTERA; *Jassidae*

815

853

Wedge-shaped leafhopper, about 2 mm long, reddish to beige in colour. The forewings have a black dot each, while the head has two. The eggs are inserted in the leaf veins. The wingless nymphs are green. Both adults and nymphs suck the cell sap. Development period of one generation: 4 weeks. Life span of adults about 5 weeks. Several generations. Peak in July/September.

Distribution: India

Apical leaves dwarfed and stained red. Leaf-shedding.

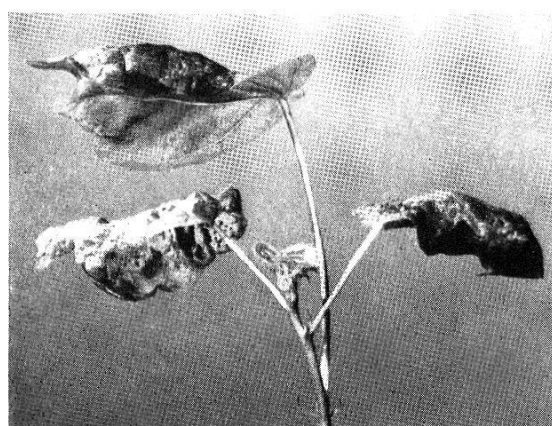
Paurocephala gossypii Russel
Small leaf psyllose.

HOMOPTERA; *Psyllidae*

816

Dark brown Psyllid, 1.5-2 mm long, with transparent wings and dark dots where the veins reach the wing margin. The body is pale yellow with dark sternites. The peduncled eggs are embedded in the leaf veins, along which the whitish-yellow, dark speckled nymphs are found later. Development period of one generation: about 4 weeks.

Distribution: Congo



Leaves curled downwards, dwarfed, wrinkled and brittle, often also discoloured. Capsules underdeveloped. Bud formation impaired. Early leaf-shedding.

Bemisia tabaci Genn.
Cotton white-fly.

HOMOPTERA; *Aleyrodidae*

817

715

Adult insects with two pairs of wings, about 1 mm long and lightly covered with white waxy bloom. They lay their eggs on the underside of the leaves. Only the first larval stage bears legs; later the larvae live as pale yellowish, flattened oval and scale-like bodies on the leaves. Development period of one generation: 3-4 weeks. Peak in June/July.

B. tabaci transmits various virus diseases such as leaf curl virus.

Distribution: Africa, India

leaves



Presence of colonies of aphids on growing shoots and on underside of leaves, the latter curled downwards, wrinkled and discoloured. Severe infestation with sooty mould on leaves and bolls. Plants stunted, their development impaired.

Aphis (Cerosipha) gossypii Glov.
Cotton aphid.

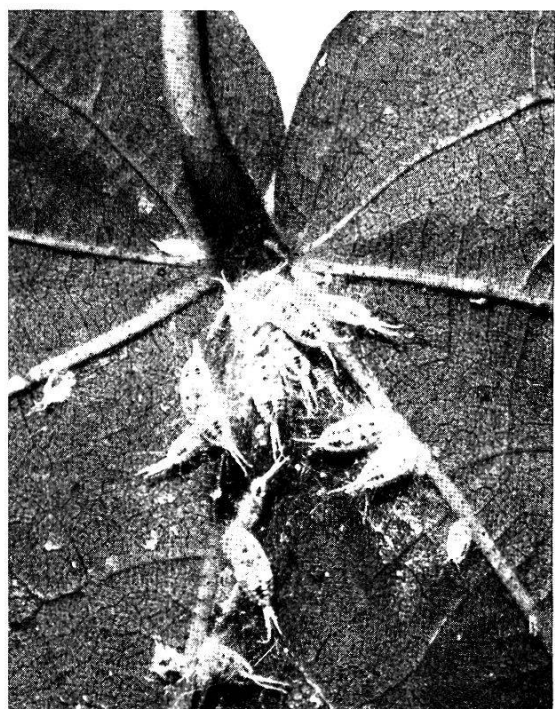
HOMOPTERA; *Aphididae*

818

854

Yellowish to green or black aphids, about 1.5 mm long. The nymphs are green to brown. The female may reproduce parthenogenetically and/or viviparously, one female producing up to 15-20 nymphs a day. The nymphs pass four moults before reaching the adult stage. Development period of one generation: 8-10 days. *A. gossypii* transmits many virus diseases of various crops. Several generations.

Distribution: widespread



Plants stunted, shedding their leaves. Leaves covered with honeydew and infested with sooty mould.

Ferrisia virgata Ckll.
Mealybug.

HOMOPTERA; *Pseudococcidae*

819

2, 113, 444
733, 780

The female is white and soft-bodied, about 4 mm long, with numerous white waxy filaments. The adult female lays its eggs in loose clusters. The larvae hatch after 8-10 days and beset young parts of the plant where they become fixed after 3-4 days, sucking the cell sap. They moult 4-5 times within 4 weeks. Several generations.

Distribution: widespread: Africa, India, Indonesia, South America, Philippine Islands



Leaves first white, later on speckled grey to brownish. Leaf margins slightly curled, covered with webbing. Leaf-shedding and premature ripening of bolls.

leaves

Tetranychus urticae Koch
Common red spider.

ACARINA; *Trombidiformes*

820

327, 351, 380
624, 637, 670
769, 789, 868
874

Small, oval, 8-legged mite, only 0.3-0.4 mm long, greenish to pale yellow, with a dark spot on each side of the body (see Fig. 44). The female places its eggs singly on the underside of the leaves where the larvae hatch after 5-6 days and begin their sucking activity. Going through the so-called protonymph and deuteronymph stages, they reach the adult stage after 2-3 weeks. They cover the lower surface of the leaves with fine webbing. Several generations.

Distribution: cosmopolitan

Underside of leaves shiny grey. Leaf edges curled downwards, later on frilled and deformed. Leaf fragments fall off so that leaves become riddled with holes. Abnormal growth of stem.

Hemitarsonemus lata Bks.
Yellow mite.

ACARINA; *Trombidiformes*

821

147, 770

Minute, brilliant yellowish mite, about 0.2 mm long, elongate, which favours young crops. Development period of one generations: 8-10 days. Several generations.

Distribution: Europe, India, Ceylon, Indonesia, U.S.A., Central America

leaves

Leaves mottled and stained grey, later on turning brownish-red; edges curled downwards. Leaf-shedding.

Anychus latus C. et F.

ACARINA; *Trombidiformes*

822



Small, oval, convex mite, about 0.4 mm long, yellowish to orange-red, which deposits its eggs on the surface of the leaves. Larvae, nymphs and adults suck the cell sap of the leaf tissue. Several generations.

Distribution: Southern Europe, Africa

Leaves wrinkled, badly deformed and beset with blister-like galls. These are lined with a layer of felty substance.

Eriophyes gossypii Banks.
Cotton blister mite.

ACARINA; *Tetranychidae*

823



Minute, fusiform white mite, about 2 mm long, invisible to the naked eye (see Fig. 45). Its sucking produces broad, lobate galls.

Distribution: the West Indies



Bracteoles spread out. Buds turn brown and fall off, having a white larva inside. Very early attacks are recognizable by a small bore-hole at the side of the flower-bud.

buds

Anthonomus grandis Boh.
Boll weevil.

COLEOPTERA; *Curculionidae*

824

Elongated-oval weevil, measuring about 5 mm without the rostrum. This latter is 3 mm long and round. The upper side of the elytra is pale and moderately clothed with smooth hairs. All femora are provided with a strong tooth on the inner side. The female places its eggs singly into the flower-buds, which the resultant white, footless larvae eat away before they pupate 8-10 days later. After another 5-6 days the young weevils emerge. The adults hibernate. As many as 8 generations each season.

Distribution: Cotton growing areas of U.S.A.

Leaves with pale, transparent patches caused by feeding, the upper epidermis being left intact. Leaves with long serpentine mines. Flower-buds often pierced also. Buds and bolls fall off.

Bucculatrix thurberiella Busck.
Cotton leaf perforator.

LEPIDOPTERA; *Lyonetiidae*

825

Small moth, 7-9 mm long, the forewings of which are white with a dark dot in the centre of each and brownish-yellow tips. The head is clad with erect scales. The eggs are fixed on the underside of the leaves where the young caterpillars feed, mining them; later they also attack the buds. They are dark green with black specks and bear white tubercles. Pupation takes place on the plant. Several generations a year.

Distribution: North, Central and South America

buds



Bore-holes at the base of flower-buds, the latter hollowed out. Bracteoles spread out, and curled downwards. Bolls in advanced stage completely destroyed.

826

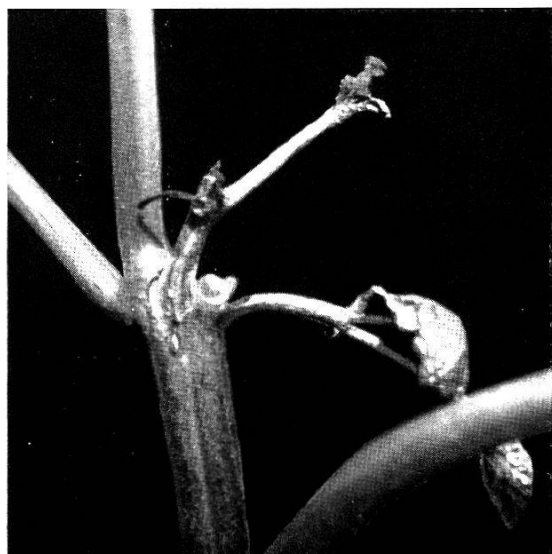
197, 702

Heliothis obsoleta F.
American cotton bollworm.

LEPIDOPTERA; *Noctuidae*

Nocturnal moth with a wing span of 40 mm. The forewings are dark yellow or olive-grey to brown, with a dark crossband near the outer margin, and dark spots along the costal margin. The hindwings are pale with a dark apical border. The female deposits its eggs singly on leaves and buds, where they develop within 3-4 days. The young caterpillars feed on leaves, shoots and buds. They are dark green, reddish-brown or brown, and marked with a pale bordered line along the back and on each side of the body. The very polyphagous larvae hollow out several buds or bolls. Pupation takes place in the ground, the pupal stage lasting about 8 days. Total time of development: 4-5 weeks. Several generations.

Distribution: widespread



Terminal shoots withered, dead. Flower-buds and young bolls discoloured, pierced with bore-holes and hollowed out, eventually darkening and falling off.

Earias insulana Boisd.
Cotton spotted bollworm.

LEPIDOPTERA; *Noctuidae*

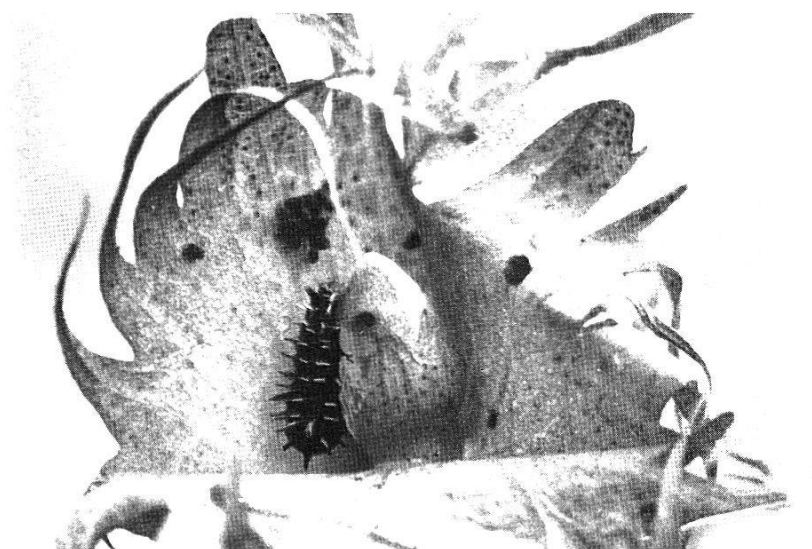
827

Moth with yellowish-green forewings, edged with yellow and marked with a broad brown and yellow crossband in the centre. The hindwings are silvery-white, their margin fringed. The eggs are laid singly on shoots, flower-buds or young cap-

sules, into which the hatching caterpillars eat their way. They are green to brownish, spindle-shaped, their segments bearing lateral appendages with a number of hairs and two dorsal, dark tubercles on each segment. Full grown they may be 15-18 mm long. They moult 5 times and pupate at the base of the plant in the ground. Development period of one generation: 4 weeks. Several generations. Peak in March/April.

Distribution: Mediterranean region, Near East, Africa, Madagascar, India

buds



as under *E. insulana*

Earias biplaga

Walk.

Spring bollworm.

(*Earias fabia* Stoll
= *India*)

LEPIDOPTERA;
Noctuidae

828

80

Moth with a wing span of 20-25 mm. The ground colour of the female's forewings is yellowish-green with a light brown spot or stripe in the centre. The hindwings are silvery-white. The male has also yellowish-green forewings with a dark margin at the tip. The eggs are laid with the beginning of flowering, the female placing them singly on shoots, at the base of flower-buds or on young capsules. The green or brownish, spindle-shaped caterpillars are furnished with long hairs or setae on each segment. The abdominal segments bear two strong dorsal tubercles each. Full grown the caterpillars are about 20 mm long. They bore into shoots and flower-buds, each destroying several buds. Development period of one generation: 4 weeks. Several generations. Pupation takes place at the plant base.

Distribution: Africa south of the Sahara

Flower buds black, withering and falling off. Small, reddish larvae visible inside them. Infested bolls stained dark. Growth stopped. Seeds or ovules destroyed.

Contarinia gossypii Felt.

Cotton flower bud maggot.

DIPTERA; Itonididae

829

Small, mosquito-like fly, 1.5-2 mm long, which oviposits in the flowers and flower-buds or in young bolls. The yellowish-white to reddish maggots feed inside the buds or bolls.

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

buds

830

726



Leaf-buds and flower-buds discoloured, their development retarded. They open reluctantly and are frilled and misshapen. Presence of greasy-black spots = excrement.

Frankliniella dampfi Priesn.
Cotton bud thrips.

THYSANOPTERA; *Terebrantia*

Light brown to cream-coloured thrips, 1.5 mm long (see Fig. 13), which deposits its eggs in the young stalks of the cotton plant. Both nymphs and adults attack leaf buds and flower buds. Development period of one generation: 3-4 weeks.

Distribution: Africa (Sudan)

Buds, capsules and leaves with black feeding punctures. Young buds and capsules shrivel and fall off.

Adelphocoris apicalis Reut.

HETEROPTERA; *Miridae*

831

641

Elongate, oval, flattened plant bug, about 8 mm long, with light greyish-brown to dark reddish-brown wings. The membrane is hyaline. The head and prothorax are dark brown. The antennae and the first and second pairs of legs are light brown, while the hindlegs are dark brown. Several generations. The nymphs are green with dark wing rudiments. Peak in May. *A. apicalis* attacks also Castor.

Distribution: East, Central and West Africa

Small, young buds turn black and fall off. Leaves with yellowish-brown patches. Main shoots elongated and slightly deformed. Bud setting defective.

Psallus seriatus Reut.
Cotton flea hopper.

832

HETEROPTERA; *Miridae*

Small, pale green fleahopper, about 3 mm long. Both adults and nymphs suck on the underside of leaves and on flower-buds. The eggs are deposited singly in the plant.

Distribution: U.S. A.



Large holes, measuring 5-10 mm in diameter, on the sides of unopened bolls. Ovules destroyed.

bolls

Poecilophila maculatissima Bohem.

COLEOPTERA; *Scarabaeidae*

833

196

Large, oval rose chafer, measuring about 15 mm by 8 mm. The elytra are light brown with irregular spots of various sizes. The legs are light brown and black. The females lay their eggs in all sorts of decaying plant material. Development period: 1 year. The pest attacks well developed bolls. Secondary infection of bolls injured previously by bollworms is frequent.

Distribution: Africa (East Africa)



Seeds inside injured bolls destroyed by feeding caterpillars. Stored seeds attacked.

Pyroderces simplex Wals.

LEPIDOPTERA; *Momphidae*

834

Small moth with a wing span of 9 mm. The forewings are light brown at their base and dark at their tip. The eggs are laid in damaged bolls, inside which the caterpillars feed on seeds. Full grown they are about 10 mm long, faintly pink, bearing scattered hairs; their head is brown.

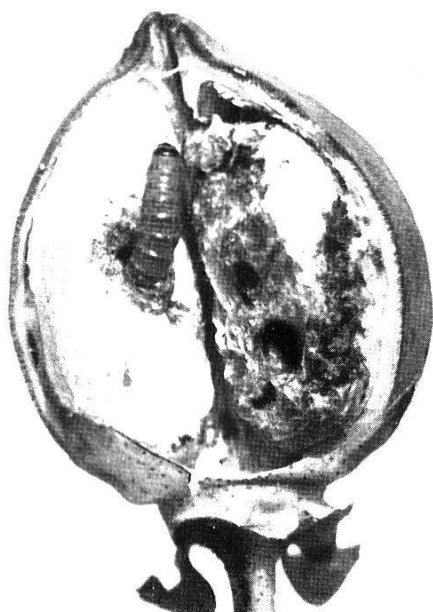
Distribution: most cotton growing areas of Africa

bolls

Frequent blotch mines on unopened bolls. Bore-hole 1-3 mm wide. Lint inside boll mostly destroyed. Bolls fall off. Seeds also damaged. Supervening boll-rot.

Platyedra gossypiella Saund.
Pink bollworm.

LEPIDOPTERA; *Gelechiidae*



835

Moth with yellowish-brown to ochrous and dark spotted forewings, expanding to 15-20 mm. The hindwings are silvery. The female deposits 200-400 eggs singly under the calyx, on terminal buds and on young immature bolls. The young caterpillars are creamy to yellow, older ones have two pink transverse dorsal bands on each segment. Head and prothoracic shield are dark brown. The caterpillars bore into the bolls feeding on lint and seeds. The larval development is rapid (about 30 days). Pupation takes place inside the bolls, seeds or underground. Total time of development: 5-6 weeks. The pupal stages of the insect can be disseminated with the seeds. Several generations.

Distribution: wherever cotton is grown

Half ripe, unopened bolls show bore-holes surrounded by superficial mining. Damage similar to that caused by *P. gossypiella*. Seeds inside bolls attacked.

Argyroploce leucotreta Meyr.
False codling moth (Orange moth).

LEPIDOPTERA; *Tortricidae*

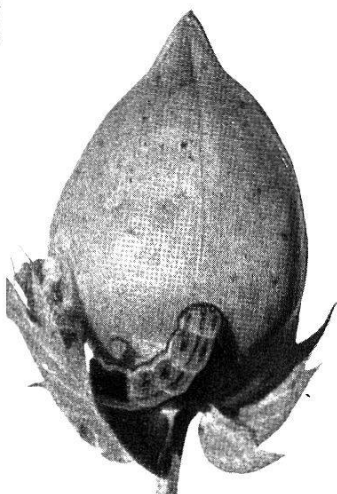


836

518

Moth with variegated brown and grey forewings, a white spot in the centre, while the hindwings are light brown to grey. They expand to 18-20 mm. Oviposition takes place on half-ripe, unopened bolls. Peak in June. Several generations.

Distribution: Africa (widespread)



Leaves heavily attacked, plants often stripped bare. Bolls with large holes, from which yellowish-green to dark green excrement protrudes.

bolls

Prodenia litura F.
Cotton worm.

LEPIDOPTERA;
Noctuidae

837

132, 194, 321
629, 662, 701
867

Noctuid moth with a wing span of about 35 mm. The forewings are reddish-brown with pale longitudinal and transverse lines, while the hindwings are greyish-white. The eggs are heaped on the leaves. The hairless, dark green to reddish-brown caterpillars, marked with dark and light spots, feed on foliage and tunnel into the bolls. They are very polyphagous and emerge in great numbers after the rainy season. Pupation takes place in the ground. Development period of one generation: about 4 weeks. Several generations.

Distribution: widespread in Africa, Asia and Australia



Bore-holes in buds and capsules. Bracteoles spread out. Presence of caterpillars inside the capsules. Seeds destroyed or lint strongly discoloured and worthless.

Sacadodes pyralis Dyar.
Gusano rosado grande.

LEPIDOPTERA; *Noctuidae*

838

Moth with a wing span of 30 mm. The forewings are yellowish-brown with 3 dark crossbands, while the hindwings are white. The eggs are deposited singly or in clusters on bolls, flower-buds or leaves. The caterpillars eat their way into the buds or capsules, destroying them. Full grown they may be 35 mm long. They are reddish-brown and hairless and have a dark brown head. Two generations.

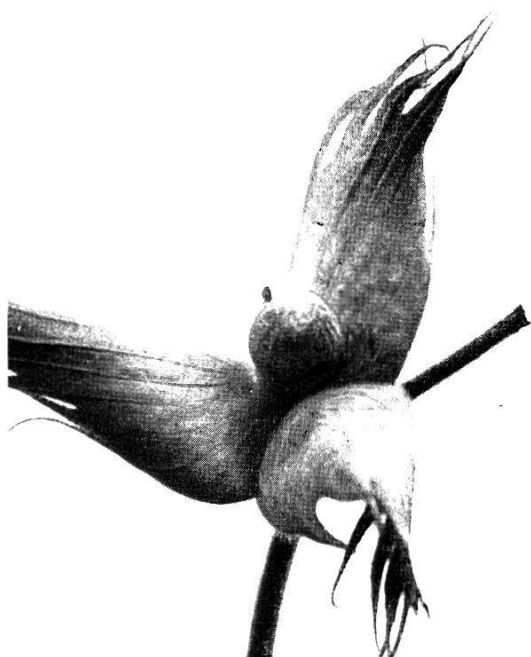
Distribution: many cotton growing areas in South America

bolls

Bracteoles spread out. Buds fail to open and drop off, being hollowed out by caterpillars. Bolls with a dark, usually lateral bore-hole, dwarfed and unable to open. Presence of red caterpillars inside the bolls.

Diparopsis castanea Hmps.
Red cotton bollworm.

LEPIDOPTERA; Noctuidae



839

Moth with yellow or green forewings, crossed by a broad grey band near the wing tip, while the wing pad is dark. The hindwings are white to silvery with a light yellow edge. The eggs are laid on leaves, buds or tips of shoots. The caterpillars are light brownish-red with darker spots on their segments. Short, inconspicuous black hairs are scattered over the body. The prothorax and anal plate are black, while the head is red. The caterpillars bore tunnels into the buds and bolls, one being capable of destroying several bolls. They pupate underground. Development period of one generation: 6-7 weeks. Several generations.

Distribution: Africa

Young leaves largely destroyed. Bolls with relatively large bore-holes and occupied by caterpillars.

Tarache notabilis Walk.

LEPIDOPTERA; Noctuidae

840

Moth with greyish-yellow to creamy coloured forewings, bearing a grey spot and expanding to about 40 mm. The eggs are laid on leaves and buds. The caterpillars are semi-loopers; they are green to grey with pale, partly indistinct longitudinal stripes. Pupation takes place on the soil surface.

Distribution: India



Young bolls speckled with black dots; they turn yellow and fall off. Older bolls with black, calloused punctures. Seeds shrivelled, lint stained yellow.

Nezara viridula L.

Green plant bug.

HETEROPTERA; *Pentatomidae*

bolls

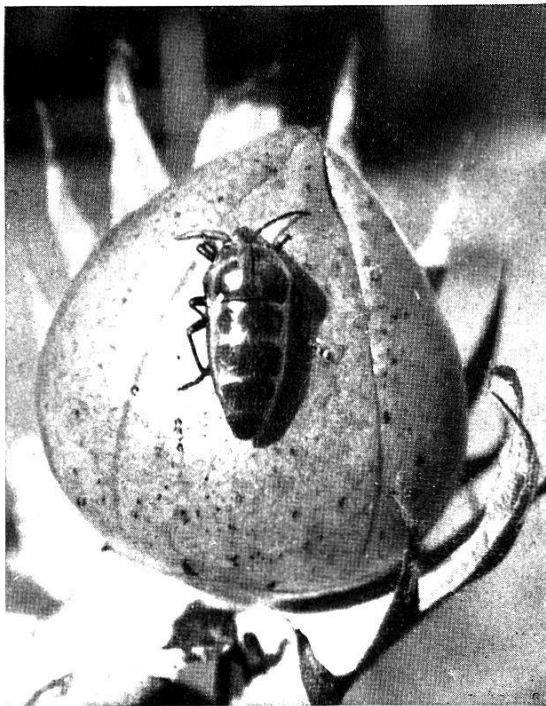
841

250, 312, 480
638, 691

Robust, broad-oval plant bug, about 15 mm long, emerald-green (see No. 691) which lays its eggs in rows on leaves and stems. The red and yellow nymphs hatch after about one week. After 5 moults, which take place within 4-6 weeks, the adults emerge. Several generations each season.

N. viridula attacks also many other crops, such as maize, rice and tobacco.

Distribution: widespread



Young plants cease development; bud setting prevented. Bolls mottled, failing to open properly.

Calidea dregii Germ.

HETEROPTERA; *Pentatomidae*

842

857

see page 434 (Roselle)

Bug, migrating from roselle, sunflowers, or sorghum to cotton, where it occurs only temporarily.

Distribution: Africa

bolls

843

855



Germination and weight of seeds reduced. Opened seeds show brown discoloration and severe shrinking. Lint stained, its quality deteriorated.

Oxycarenus hyalinipennis Costa
Cotton seed bug.

HETEROPTERA; *Lygaeidae*

Small bug, measuring about 4 mm by 1.5 mm, its wings black tinged, translucent and appearing grey. The head, thorax and abdomen as well as the femora are dark. The eggs are deposited in the nearly ripe, freshly opened bolls. Both adults and nymphs attack the seeds, affecting their germination, reducing their weight and causing the lint to discolour. Development period of one generation: about 4 weeks. Several generations.

Distribution: Africa, India, Indochina, Philippine Islands, South America

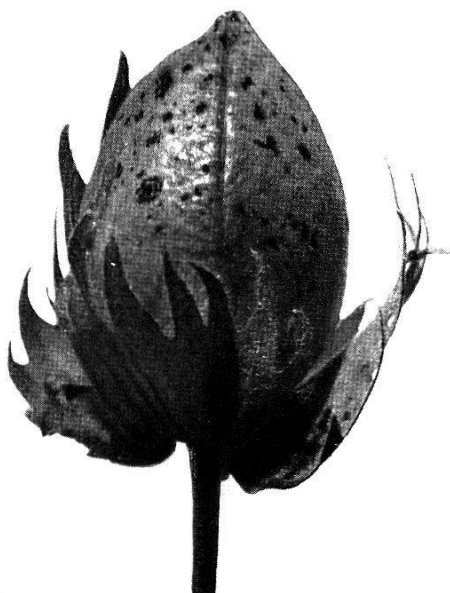
Bolls with round, black, slightly calloused sucking marks. Heavily attacked bolls or flower-buds fall off. Discoloration and abnormal development of lint. Puncture may transmit "internal boll disease" (caused by *Nematospora gossypii*). Boll opening impaired. Seed germination reduced.

Dysdercus fasciatus Sign.
Red cotton bug.

HETEROPTERA; *Pyrrohocoridae*

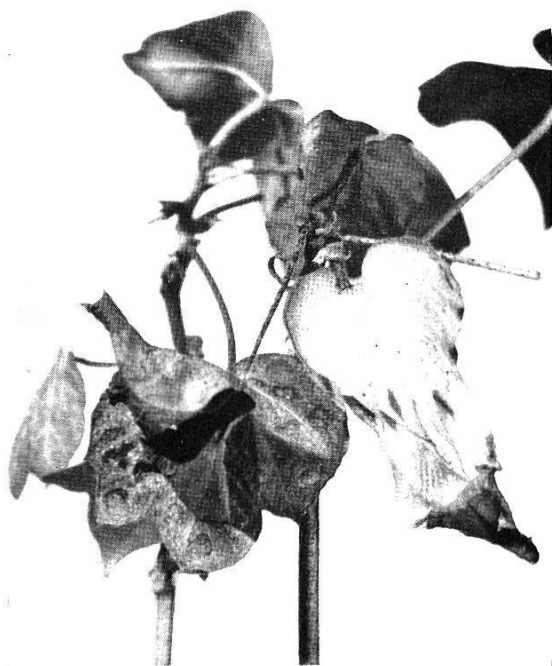
844

848



Thin bugs, about 20 mm long, with red to yellowish-red wings, crossed by a dark band (see No. 879). The eggs, 1 mm long, are deposited in small heaps 1-2 cm underground, each female laying 300-400 eggs. Heavy increase of the pest occurs during the wet season. Under optimal conditions the development cycle (over 5 moults) may last 25-30 days, 8-9 generations being possible within one year. Peak in April/June.

Distribution: Africa. Other related species in the U.S.A. and in other cotton growing countries.



Leaves with dark green patches which turn brown and decay later on, especially along the leaf veins. Leaves curled downwards. Leaf stems hang slightly downwards. Bolls also speckled with dark spots of various sizes and surrounded by callus. Roots produce new shoots. Appearance of elongated tumours on stems.

bolls

Helopeltis schoutedeni Reut.

HETEROPTERA; *Miridae*

845

Very slender plant bug, 8-10 mm long, the antennae of which are much longer than the body. Head, antennae and membrane of the hemelytra are black, while the rest of the body is yellowish-red to red. The scutellum bears a pin-like process which projects vertically 2-3 mm (see No. 95). The female inserts its eggs into the leaf veins, peduncles or leaf stalks so that only the end with the two thread-like filaments is visible. After 12-14 days the nymphs hatch. They reach the adult stage after 5 moults within 6-8 weeks. From the first instar on the nymphs are furnished with the pin-like process on the scutellum.

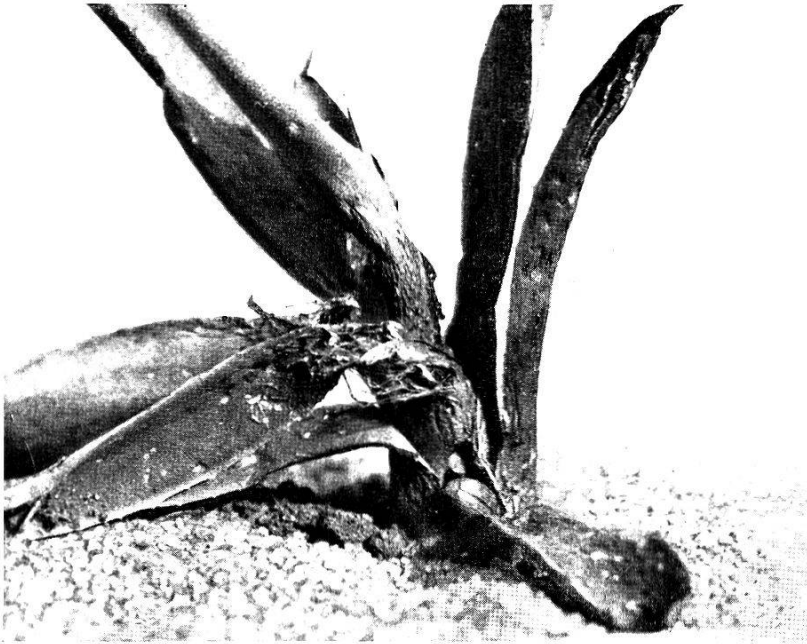
Distribution: West and East Africa

Sisal

(*Agave sisalana* Perr.)

Most important pest: 846

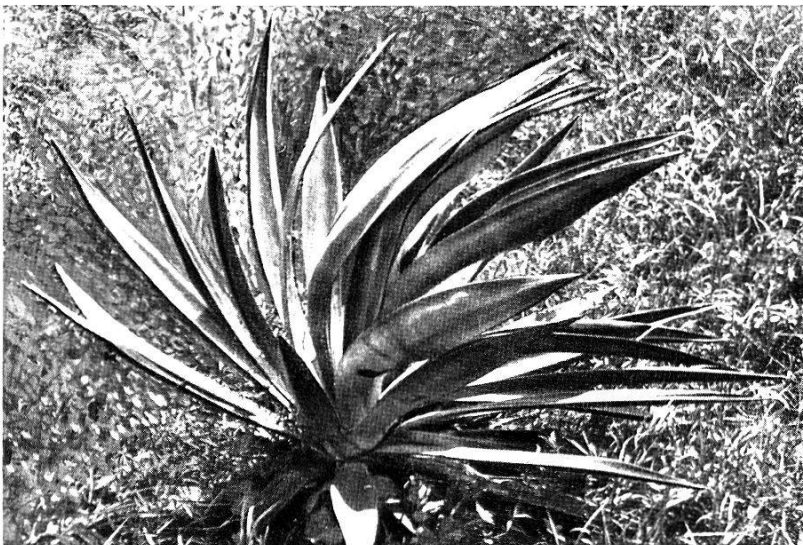
young
plant



In Nurseries:

Young plants stunted; base of outer leaves eaten away or bole completely destroyed by larvae or adults, collapsed in fragments.

trans-
plants



Transplants in the field:

Leaf base with round or oval, brown-edged shot holes (adult feeding lesions). Spike re-curved and bent parallel to ground (caused by larval damage to bole); leaves bunched.

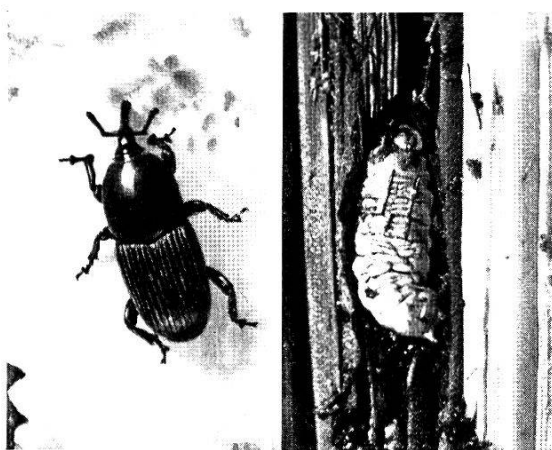


Old plants in the field:

Base of spikes and leaves eaten out (adult feeding lesions).

Large, brown-edged shot holes. Growth of leaves checked. Die-back of boles and spikes, being riddled with larval tunnels (destruction of bole tissue).

old
plants



Scyphophorus interstitialis Gyll.
Sisal weevil.

COLEOPTERA; *Curculionidae*

846

Robust, black weevil, 12-15 mm long. The snout is round and about 4 mm long. The elytra have distinct longitudinal grooves. The adults feed on leaves, producing round to oval shot holes, 1-2 cm in diameter. Each female, during its life period of several months, may lay about 30 eggs singly (about 2 eggs a week) in hollows gnawed in sisal boles. The total life cycle requires 60-80 days (egg stage 5, larval stage 30-40, prepupal stage 8 and pupal stage 20 days). The greatest general weevil activity is confined to the two seasons December/January and March/May. Freshly planted as well as injured sisal plants or older ones having been cut too hard are preferred for oviposition. Plane sections of pruned polings or broken off boles attract weevils, serving them as breeding places.

Distribution: East Africa, Mexico

Roselle or Hibiscus

(*Hibiscus Sabdariffa* L.)

Most important pests: 848, 854, 855, 857

**Stem often slightly swollen, stained dark to black and broken, the interior stem
tunnelled with 30-40 cm-long galleries.**

Agrilus acutus Thunb.

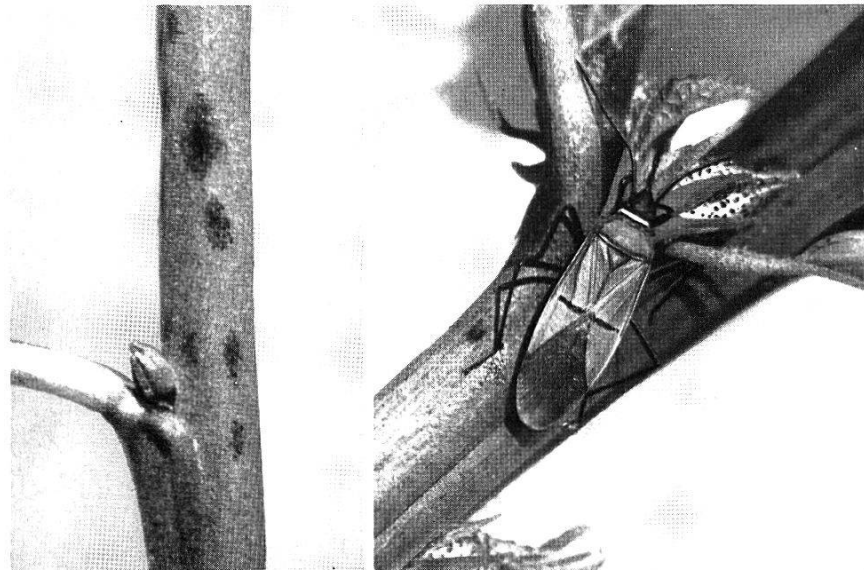
Spiralborer.

COLEOPTERA; *Buprestidae*

847

Metallic green or blue iridescent beetle, about 8 mm long, its body tapering to a point at the rear end. The eggs are placed on the stem. The yellowish-white larvae are footless, flat, and with a strikingly broad prothorax. They bore tunnels up and down the stem, thus interrupting the flow of the plant sap. Pupation takes place inside the stem.

Distribution: India, Indonesia



**Stems and buds
with dark sucking
marks. Stems of
young plants dis-
torted and twisted.**

*Dysdercus fas-
ciatus* Sign.
Red cotton bug.

HETER-
OPTERA;
Pyrhocoridae

848

844

Thin bugs, about 20 mm long, with red to yellowish-red wings, crossed by a dark band (see No. 879). The eggs, 1 mm long, are deposited in small heaps 1-2 cm underground, each female laying 300-400 eggs. Heavy increase of the pest occurs during the wet season. Under optimal conditions the development cycle (over 5 moults) may last 25-30 days, 8-9 generations being possible within one year. Peak in April/June.

Distribution: Africa. Other related species in the U.S.A. and in other cotton growing countries

stem **Plants stunted, due to arrest of vertical growth of the apical internodes; these shortened internodes swell up and develop a deep green colour. Leaves arising from the closely placed nodes give the plants a typical "bushy-top" appearance.**

Phenacoccus hirsutus Green
Hibiscus mealybug.

HOMOPTERA; *Pseudococcidae*

849

The female mealybug is pinkish and about 3 mm long. Its anal tubercle bears a long and stout bristle, two small spines, and few hairs. The insect attacks the petiole and the lamina of apical leaves and also the young capsules. Several generations.

Distribution: North Africa, India, Indonesia, Philippine Islands

leaves **Leaves irregularly devoured, often covered with webbing.**

Pandemis heparana Schiff.

LEPIDOPTERA; *Tortricidae*

850

Small moth with a wing span of 25 mm, the reddish-brown forewings of which are crossed by a dark, cone-shaped band, while the hindwings are greyish-brown. The eggs are laid on the leaves. The caterpillars are light green with a whitish lustre. Two to three generations.

Distribution: Europe, Japan

Leaves irregularly devoured, upper epidermis left intact. Lower surface of leaves covered with webbing.

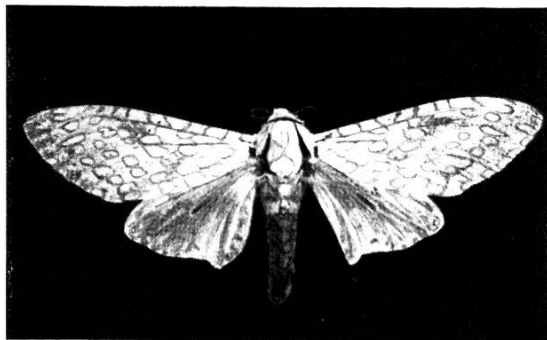
851

Syllepta derogata F.
Cotton leaf roller.

801

LEPIDOPTERA; *Pyrallididae*

see page 407 (Cotton)



Leaves heavily attacked; plants often stripped bare. leaves

Ecpantheria hambletoni Schaus.

LEPIDOPTERA; *Arctiidae*

852

Moth with beige to dirty white forewings and hindwings, decorated with light brown annular designs. They expand to 40-50 mm. The abdomen is brown. The eggs are placed on the underside of the leaves. The young caterpillars live gregariously and feed on leaves. They are reddish-brown to dark brown, clothed with hairs. Full grown they may reach about 40 mm.

Distribution: South America

Leaves with discoloured patches, their margins curled downwards. Vertical growth of stems severely checked.

Empoasca devastans Dist.

Cotton Jassid.

HOMOPTERA; *Jassidae*

see page 413 (Cotton)

853

815

Leaves curled, wrinkled and often badly misshapen. Leaf-shedding. Growth severely impaired.

Aphis (Cerosipha) gossypii Glov.

Melon aphid, Cotton aphid.

HOMOPTERA; *Aphididae*

see page 414 (Cotton)

Distribution: widespread

854

818

Buds flaccid, wrinkled and stained dark green to brownish.

buds

Oxycarenus hyalinipennis Costa

Cotton seed bug.

HETEROPTERA; *Lygaeidae*

see page 426 (Cotton)

855

843

flowers

856



Flowers and flower-buds devoured, often completely destroyed.

Mylabris pustulata Tunb.
Flower beetle.

COLEOPTERA; *Meloidae*

Black beetle, 20-30 mm long, the elytra of which are crossed by 3 yellow stripes. The head, legs, and antennae are black.

Distribution: Europe, Africa, India, Ceylon, Indonesia

capsules

857

842



Young stalks stained dark. Growth impaired. Buds and capsules discoloured, flaccid and often shrivelled.

Calidea dregii Germ.

HETEROPTERA; *Pentatomidae*

Strikingly variegated plant bug, about 15 mm long. The upper side is metallic blue or green, with pale blue or bronze-coloured crossbands on the elytra. The head and thorax are also blue, while the legs are green, their base red. The eggs are laid in clusters on the stems. Both nymphs and adults pierce the flower buds, stems or leaf stalks and feed on the sap of the plant. Peak in May/June. Development period of one generation: 5-6 weeks. *C. dregii* attacks also sorghum and sunflowers.

Distribution: Africa

Ramie

(*Boehmeria nivea* Gaud.)

Most important pest: 860

Stem with irregular feeding marks, often deep. Young plants wither and die above the injured parts.

stem

Paratixus truncatulus F.

COLEOPTERA; *Curculionidae*

858

Slender, dark brown weevil, about 10 mm long, with 4 yellow dots near the seam of the elytra, and irregular grey dots on the sides. The snout is short and round. The weevil attacks the stem and root stock, producing small hollows by its feeding (see also No. 688: Tobacco).

688

Distribution: India, Ceylon, New Guinea

Leaves heavily attacked. Plants often stripped bare.

leaves

Dasychira mendosa Hb.

LEPIDOPTERA; *Lymantriidae*

859

Moth with light to dark brown forewings, crossed by dark, jagged bands. The hindwings are pale yellow to brown. The wings expand to 30-40 mm. The antennae are comb-like. Oviposition takes place on the leaves. The caterpillars have a red head capsule and dense, pale yellow to reddish-brown hair tufts on the 4th-7th segments, while the first segment bears a small tuft of long hairs on each side. The other segments are clothed with pale, erect but short bristles. The general colour of the caterpillars is dark to black. They pupate in egg-shaped, silky cocoons. 2 generations a year.

Distribution: India, China

Leaves heavily attacked. Plants often stripped bare.

Acraea zetes L.

LEPIDOPTERA; *Acraeinae*

860

Dark, greyish-black butterfly with a wing span of 60 mm. The forewings are speckled with one red and numerous black spots. The base and the tip of the hindwings are black, the central area is reddish, speckled with black. Oviposition takes place on the leaves. The very polyphagous caterpillars, up to 40 mm long when full grown, are dark and moderately hirsute.

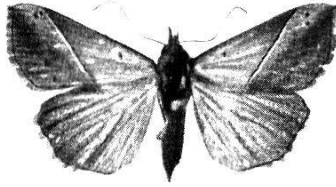
Distribution: Africa

leaves

Leaves irregularly eaten away, often stripped to the midrib; plants thus completely defoliated.

Hypena lividalis Hb.

LEPIDOPTERA; *Noctuidae*



861

Frail moth with a wing span of 20-25 mm. The forewings are light brown, crossed by a fine dark brown band, while the hindwings, of the same colour, are plain. The eggs are deposited singly or in clusters on the leaves. The pale green to creamy-white caterpillars hatch after a few days and are full grown within about 20 days, turning greyish-green to reddish-brown. Several generations.

Distribution: South America

Jute

(*Corchorus capsularis* L. and *C. olitorius* L.)

Most important pests: 863, 864, 868

Plants dwarfed. Roots bushy, beset with many knots.

root

Meloidogyne incognita Kof. + Wh.
Root knot nematode.

NEMATODA

862

The knots harbour pear- or lemon-shaped female nematodes (see page 37). They occur only in areas which had been intensely cultivated for years.

Distribution: widespread



Stems stained dark to blackish and slightly swollen. Shoots above the place of damage wither and droop. Fibres injured and tied into a ball by the feeding larvae ("Knotty fibre").

stem

Apion corchori Mshl.
Jute apion.

COLEOPTERA; *Curculionidae*

863

Greyish-brown to dark brown, minute weevil, 1-1.5 mm long, with a strikingly long, curved snout. The female gnaws a hollow near the growing point, where it deposits its eggs. The larvae are slightly curved, pale yellow, with a dark brown head. They feed on plant tissue and hollow the pith. Full grown they are about 2 mm long. Development period: eggs 3-4 days, larvae about 2 weeks, pupae 4-6 days.

Distribution: India

leaves

864



Leaves irregularly mined. Damaged portion shrivels up. Premature leaf fall.

Trachys pacifica Kerr.
Jute leaf miner.

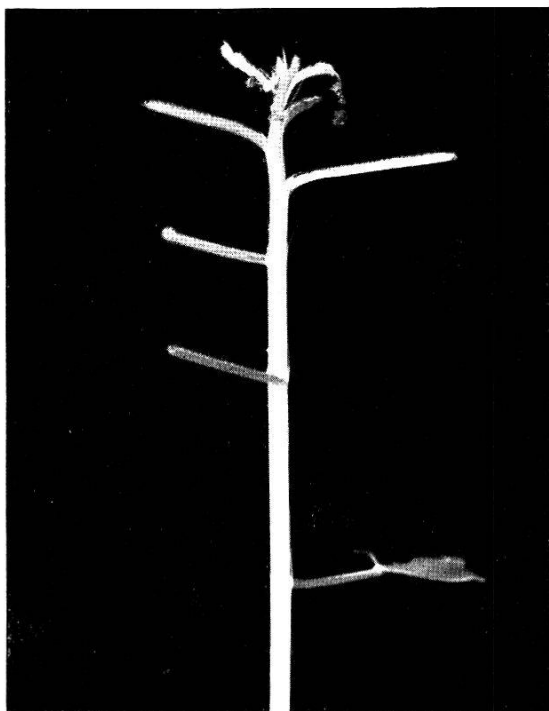
COLEOPTERA; *Buprestidae*

Small beetle, about 2.5 mm long, the body of which is compressed dorso-ventrally. It is of uniform colour, varying from light coppery to iridescent blackish-brown. The eggs are laid on the leaves, into which the larvae tunnel, feeding on the mesophyll without damaging the membranes. Full grown the larvae are about 5 mm long, yellowish. Development period of one generation: 3 weeks.

Distribution: India

865

320, 700



Leaves eaten away. Plants often stripped to the stem.

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

Young caterpillars feed on the epidermal membrane of one side and on mesophyll, leaving the other epidermal membrane intact. Later on apical leaves are repeatedly eaten up. Growing shoots sometimes destroyed.

leaves

Cosmophila sabulifera Gn.

Jute semilooper.

LEPIDOPTERA; *Noctuidae*

Yellowish-brown moth with a wing span of about 50 mm. The female lays the eggs singly on the lower surface of the leaves. The slender, green caterpillars have a slightly yellow head, with narrow, dark green lines down the back and a wavy dark stripe along the side. Full grown they are about 30 mm long. Development period of one generation: 4 weeks. The jute semilooper appears on a crop when it is about 5 cm high, and ravages it for 2 months.

866

Distribution: Africa, India, Indonesia, Australia



Leaves eaten away, plants often completely defoliated. Stems of young plants gnawed off above the soil surface.

Prodenia litura F.

Cotton worm.

LEPIDOPTERA; *Noctuidae*

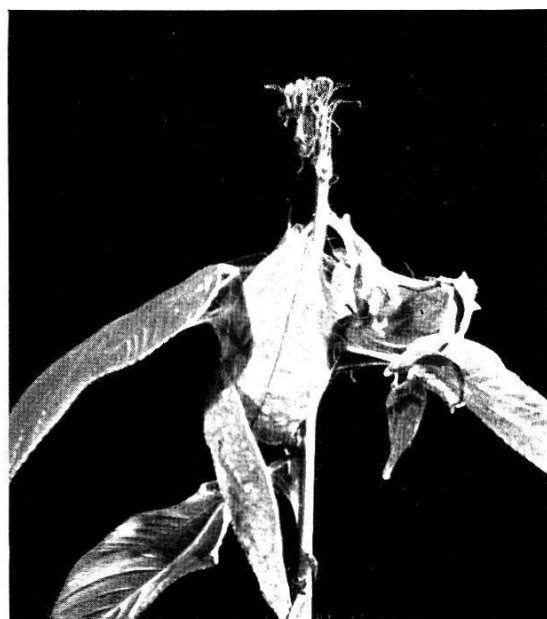
867

132, 194, 321

629, 662, 703

837

see page 423 (Cotton)



Leaves stained grey to brownish, misshapen, the margins curled and covered with white webbing.

Tetranychus urticae Koch

Common red spider.

ACARINA; *Trombidiformes*

868

327, 351, 380

624, 637, 670

769, 789, 820

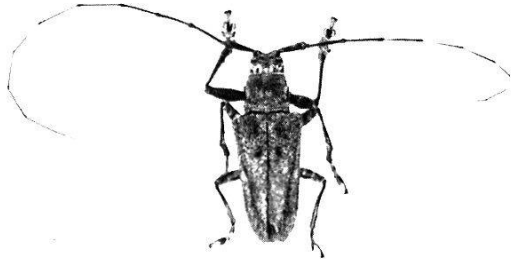
874

see page 415 (Cotton)

Kapok

(*Eriodendron anfractuosum* (= *Ceiba pentandra* Gaertn.)

Most important pests: 873, 874, 875, 878



Trunks with bore-holes, causing death or withering of branches above.

trunk

Ancyronotus tribulus L.

COLEOPTERA; *Cerambycidae*

869

Robust, beige-brown Longicorn beetle, 25-30 mm long. The prothorax is armed with 4 distinct sharp thorns. The front portion of the elytra bears two sharp protuberances placed one behind the other and a prominent median keel running toward the rear end. The forelegs are strikingly long and have large and broad tarsi. The antennae are much longer than the body. The female inserts its eggs into cracks and slits of the bark. The creamy-white larvae, broadened in front, tunnel into branches and trunks.

Distribution: West Africa, Congo

Partial dieback of branches or of whole young trees. External signs of feeding on the bark, beneath which broad-headed larvae, up to 25 mm long, are visible.

branche

Tragischoschema nigroscriptum Fairm.

COLEOPTERA; *Cerambycidae*

Slender, yellow Longicorn beetle, about 20 mm long, decorated with one broad and two narrow dark lines along the head and thorax. The elytra are dark near the outer margin and have a bluish, dark-edged spot in the centre and 3 bluish crossbands interrupted before the margin. The eggs are deposited in shoots or young trunks, where the larvae mine in the sapwood. *T. nigroscriptum* also attacks cotton plants, gnawing their stem off above ground level.

870

Distribution: East Africa

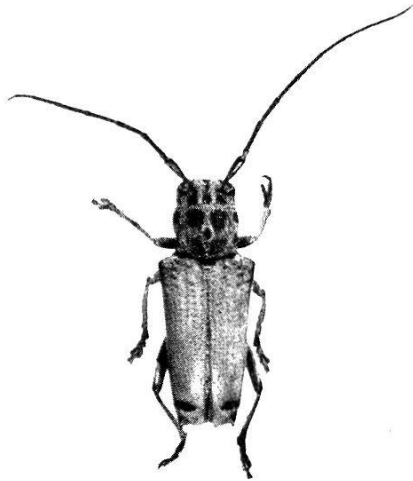
branches

Signs of partial wilting. Leaves of some branches turn yellow.

Glenea cantor F.

COLEOPTERA; *Cerambycidae*

871



Longicorn beetle, 15-18 mm long. The head is dark brown with two pale brown stripes along the forehead. The prothorax has dark and light brown markings; the elytra are light brown with a darker shoulder hump and two short crossbands at the tip. The legs and antennae are dark brown. The adults emerge in October and introduce their eggs into cracks of the bark. The yellowish-white larvae mine under the bark and in the sapwood. Development period of one generation: 2-3 months.

Distribution: Indochina

Trees show signs of wilting and die. Long galleries under the bark lead into the sapwood. Frass ejected from borings in trunks and branches.

Glenea novemguttata Guér.

Cocoa borer.

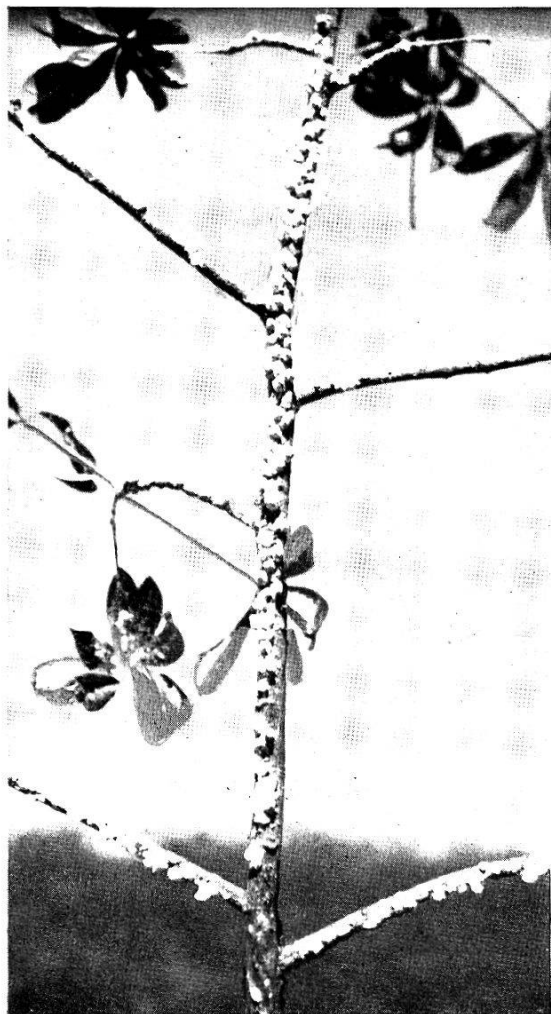
COLEOPTERA; *Cerambycidae*

872

59

see page 89 (Cocoa)

Distribution: Indonesia



Leaf stalks and shoots of young trees covered with white fluff. Leaves chlorotic, drooping and infested with sooty mould.

shoots

Planococcus citri Risso
Common mealybug.

HOMOPTERA; *Pseudococcidae*

873

100, 349, 351
423, 530, 641
779

Yellowish-brown to orange-red, elliptical mealybug, 3 mm long, covered with a white, mealy, waxy secretion. The marginal waxy appendages are short. The eggs are wrapped up in a loose waxy web. The forewings of the male are hyaline, iridescent blue, longer than the body. There are two halteres on the metathorax. The caudal filaments are very long. The male is about 1-1.5 mm long. The female larva has 4 moults, the male 5. They attack shoots, leaves and pods. Several generations.

Distribution: widespread in the Tropics and Subtropics

leaves

Youngest leaves mottled brown and yellow, drooping and covered with fine white webbing. Leaf-shedding.

Tetranychus urticae Koch
Common red spider.

ACARINA; *Trombidiformes*



874

327, 351, 380
624, 637, 670
769, 789, 820
868

see page 415 (Cotton)

Distribution: widespread

Leaves and stems flaccid, infested with green aphids. Youngest leaves turn brown and wither. Abundant secretion of honeydew. Growth severely impaired.

Myzodes persicae Sultz.
Tobacco aphid.

HOMOPTERA; *Aphididae*



875

619, 717, 728

Egg-shaped, green to yellowish-green or brilliant pink aphids, about 2 mm long. The antennae are never longer than the body. The frontal hump projects towards

the centre at the base of the antennae. The syphons are slender, their posterior portion slightly thickened. The caudal process (abdomen) is triangular, with 3 hairs on each side.

In tropical areas anholocyclic races occur, which lay their eggs without an intermediate generation.

There is usually parthenogenetic reproduction.

Development period of one generation: 8-10 days.

Several generations each season.

Distribution: widespread

leaves

Inside of pods largely destroyed, filled with masses of excrement and sometimes occupied by caterpillars.

pods

Dichocrocis punctiferalis Guen.

Peach moth.

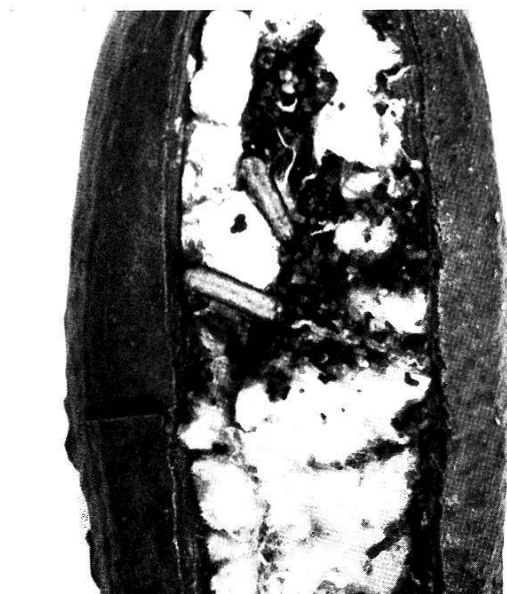
LEPIDOPTERA; *Pyralididae*

876

182, 640

Moth with a wing span of 25 mm. The wings and body are yellowish-orange, dotted with black. The eggs are laid on the pod stalks. The reddish-brown, dark-headed caterpillars tunnel into the pods, destroying their contents. They are very polyphagous, attacking also castor, beans, cocoa, banana, maize and Citrus.

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



Slight feeding injuries on leaves. Pods with bore-holes and traversed by deep galleries, lined with pulpy excrement.

Mudaria variabilis Rpke.

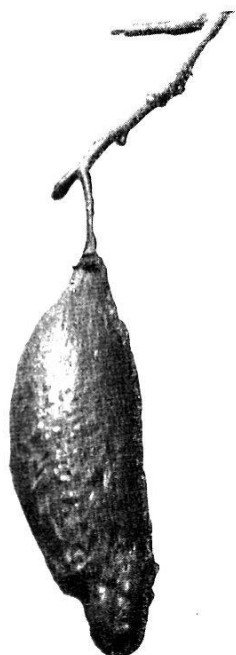
LEPIDOPTERA; *Noctuidae*

877

Dull brownish-grey moth with a wing span of 30-40 mm, which deposits its eggs on leaves and pods. The dark grey to brownish-red caterpillars eat their way into the pods destroying the fibres. Two to three generations a year.

Distribution: Indonesia

pods



Young, freshly developed pods shrivelled, older ones wrinkled and misshapen, failing to open. Quality of floss lowered.

Dysdercus cingulatus F.

Cotton bug (*Kapok-wants*).

HETEROPTERA; *Pyrrhocoridae*

878

Plant bug, 10-12 mm long. The head is red, the pronotum ochrous with a broad black bar along the front margin. The membrane, scutellum, legs and antennae are black, the elytra ochrous with a round black dot in the centre of each. The ventral side of the body is yellow, crossed with fine black lines. Development period of one generation: 4-5 weeks. Several generations.

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

Pods wrinkled and misshapen, dotted with black, corky marks causing them to open abortively. Quality of fibres lowered.



Dysdercus nigrofasciatus Stal.

HETEROPTERA; *Pyrrhocoridae*

879

Plant bug, 15-20 mm long, with brownish-red legs, antennae, head and pronotum, the latter edged with black along the posterior margin. The wings are ochrous, with a black median crossband. The wing membrane is dark brown. The ventral side of the body is yellowish-red. Clusters of eggs are laid in the ground. The larvae moult 5 times. Development period of one generation: 5-6 weeks. Several generations.

Distribution: Africa