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Cabbage looper

Images

Cabbage looper on cabbage - The first instar is white and almost clear with a black head capsule. Later instars are green with a thin white line on each side. Mature larvae reach 3 to 4 cm in length.

A.M. Varela, icipe

Young cabbage looper feeding on a kale leaf. Mature caterpillar reach 3 to 4 cm in length.

A. M. Varela, icipe

Cabbage looper caterpillar

(approximately 2cm long). Mature caterpillar reach 3 to 4 cm in length.

Alton N. Sparks, Jr., The University of Georgia, www.insectimages.org. Courtesy of Ecoport (www.ecoport.org)

Pupa of the cabbage looper. During its last larval stage the caterpillar spins a

cocoon.

A. M. Varela, icipe

Cabbage looper adult. The adult is ca 2.5 cm in length and mottled, grayish-brown. The

wingspan is ca. 4 cm.

Joseph Berger, www.insectimages.org. Courtesy of EcoPort (www.ecoport.org)

Moth of the cabbage looper. Real size: ca 2.5 cm in length, wingspan is ca. 4 cm

A. M. Varela, icipe

Damage by cabbage looper on cabbage

A.M. Varela, icipe

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Cabbage moth

Images

Cabbage moth larva: When fully grown (1.5 to 2 cm long), larvae move to pupate in the soil. The pupal stage lasts about 10 days.

Ooi P. Courtesy of EcoPort

(www.ecoport.org)

Eggs of cabbage moth are laid in clusters and held together by a gelatinous glue.

Ooi P. Courtesy of EcoPort (www.ecoport.org)

Cabbage moth larvae: Upon hatching, larvae feed together on leaves

Ooi P. Courtesy of EcoPort (www.ecoport.org)

and complete 5 instars in about 12 days.

Caterpillars of the cabbage moth *(Crocidolomia binotalis)* feeding on cabbage. Fully grown larvae are

1.5 to 2 cm long.

A.M. Varela, icipe

The cabbage moth (*Crocidolomia*

***binotalis*). Cabbage moth adults emerge during the night. Wingspans are 2 to 2.5 cm.**

A. M. Varela, icipe

Cabbage plant damaged by caterpillars of the cabbage moth

A.M. Varela, icipe

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Snails (Giant East African Snail)

Images

The Giant African Snail *(Achatina fulica)*. Adults of the species may exceed 20 cm in shell length but generally average about 5 to 10cm

The Giant African Snail *(Achatina fulica)*. Adults of the species may exceed 20 cm in shell length but generally average about 5 to 10cm

Yuri Yashin. Courtesy of Ecoport (www.ecoport.org)

The Giant African Snail *(Achatina fulica)*

damage on banana plant

FAO. Courtesy of Ecoport (www.ecoport.org)

The Giant African Snail *(Achatina fulica)*. Adults of the species may exceed 20 cm in shell

length but generally average about 5 to 10cm

David G. Robinson. Courtesy of Ecoport (www.ecoport.org)

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Termites

Images

Termites (*Coptotermes formosanus*)

Scott Bauer, USDA Agricultural Research

Service, Bugwood.org

Termite *Macrotermes jeanneli* mound at Marigat, Kenya.

Zipporah Osiemo

Termites and fungi in

Kenya

Zipporah Osiemo

Termite *Coptotermes* spp.

Georg Goergen/IITA Insect Museum, Cotonou, Benin. Reproduced from the Crop Protection Compendium, 2005 Edition. © CAB International Publishing. Wallingford, UK.

Close-up termites on

mango stem

A. M. Varela, icipe

Harvester termites taking plant material into the nest.

B. Loehr, icipe

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Purple witchweed

Images

Witchweed (*Striga hermonthica*) flowering on a sorghum crop.

Chris Parker/CAB International. Crop Protection Compendium,

2005 Edition.
Wallingford, UK

Purple witchweed (*Striga hermonthica*)

USDA APHIS PPQ Archives,

(www.Bugwood.org)

Purple witchweed (*Striga hermonthica*) infestation in maize field.

USDA APHIS Archives, USDA APHIS, (www.insectimages.org)

Purple witchweed (*Striga hermonthica*) damage to maize.

USDA APHIS Archives, USDA APHIS, (www.insectimages.org)

Purple witchweed (*Striga hermonthica*)

USDA APHIS Archives, USDA APHIS, (www.insectimages.org)

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Storage pests

Images

Angumois grain moth on maize. The moth is small, pale brown, 5-7 mm long with wings folded, wingspan 1-1.6 cm

**Clemson University-
www.insectimages.org**

Storage moth (*Ephestia cautella*).

Ministry of agriculture, Japan (Courtesy

of EcoPort)

Adult beetle of Maize weevil (*Sitophilus zeamais*). Adults can be found wandering over the surface of grain.

USDA-ARS. Reproduced from the Crop Protection Compendium, 2005 Edition. © CAB International, Wallingford, UK, 2005.

Adult beetles of Maize weevil (*Sitophilus*

University of Georgia Archives, University of Georgia, Bugwood.org

***zeamais*) in maize. Adult emergence holes with irregular edges are apparent some weeks after the initial attack.**

Grain moth (*Sitotroga cerealella*). The moth is small, pale brown, 5-7

mm long with wings folded, wingspan 1-1.6 cm.

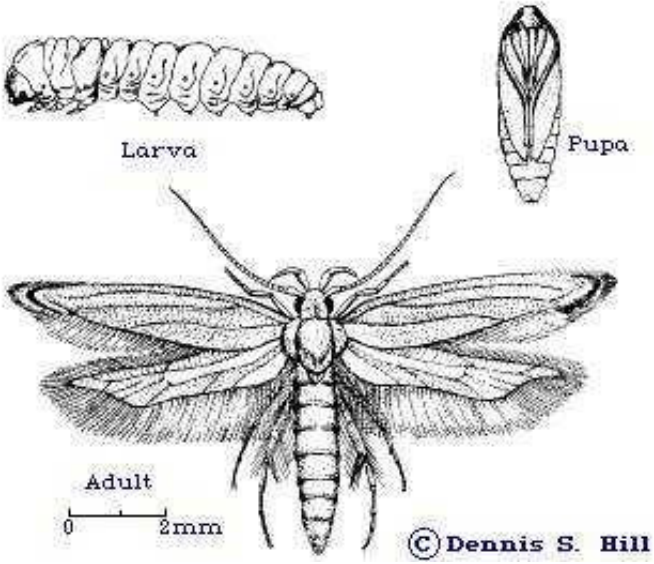
Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

Adult grain moth (*Sitotroga cerealella*). The moth is small, pale

brown, 5-7 mm long with wings folded, wingspan is 1-1.6 cm.

Mark Cook. Reproduced from the Crop Protection Compendium, 2005 Edition.

Grain moth (*S. cerealella*). The eggs are laid singly or in clumps of variable numbers. They are white when first laid and quickly change to a reddish colour.



Dennis S. Hill. Reproduced from the Crop Protection Compendium, 2005 Edition.

Adult beetle of lesser grain borer (*Rhizopertha dominica*),

line drawing. Adults are 2-3 mm long, reddish-brown and cylindrical, head not visible from above.

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Weeds

Images

Mexican marigold

A. Bruntse, Biovision

Information of www.infonet-biovision.org

Information of www.infonet-biovision.org

Tomato mirid bug

Images

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Viral diseases

Images

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Yellow mosaic virus

Images

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Stemborers

Images

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Sour skin

Images

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Scab

Images

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Storage moths and bruchid beetles

Images

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Information of www.infonet-biovision.org

Spider mites

Images

Two-spotted spider mite. The adult female is 0.6 mm long. The male

is smaller.

Warwick HRI, University of Warwick.

Tetranychus predators - predatory mites (orange-red individuals) (*Phytoseiulus persimilis*) in a colony

of the two-spotted spider mite *(Tetranychus urticae)*. Spider mites are very tiny, they rarely exceed a size of 0.5 mm.

Warwick HRI, University of Warwick.

Adult of the predatory beetle *Oligota* sp. a natural enemy of mites.

F. Haas, icipe

Red spider mite on cotton. Females are around 0.6 mm in diameter and dark red, while males are smaller and a lighter red.

AgrEvo. Reproduced from the Crop Protection Compendium, 2004 Edition. © CAB International, Wallingford, UK, 2004.

***Tetranychus evansi*, the common/tobacco spider mite**

M. Knapp, icipe

Cassava green mites (*Mononychellus tanajoa*). Real size: 0.8 mm.

G. Goergen (Courtesy of EcoPort), www.ecoport.org

Spider mites on tomato. Note the mites and their webbing visible beetween the leaves.

Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

Severe spider mite damage to tomato plants.

A. M. Varela, icipe

Spider mites on cotton leaf, they are very tiny (they rarely exceed a size of 0.5 mm).

O.P. Sharma, NCIPM, New Delhi. India, Bugwood.org

Two-spotted spider mite (*Tetranychus urticae*) on cotton - Adult females are 0.6 mm long.

Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

Spider mite damage on soybean

Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

***Tetranychus evansi* - Spider mites symptoms on**

tomato

M. Knapp, icipe

Red spider mite damage on beans

A.M. Varela, icipe

Mononychellus tanajoa **- Green spider mite damage on cassava**

A.M. Varela, icipe

Male of the cassava green mite *(Mononychellus*

***tanajoa)*. Real size 0.8mm.**

F. Haas, icipe

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Aphids

Images

Magnus Gammelgaard

Cabbage aphids / Green peach aphids (*Myzus persicae*) on pepper leaf. Adult wingless females are oval-bodied, 1.2-2.1 mm in body length, of very variable colour.

Cabbage aphid, winged form. This soft bodied, pear-shaped

Digital diagnostics, OSU

insect is usually wingless and about 1/16 inch long. The wingless female is pale yellow green. The winged migrant form has a yellowish green abdomen with a dark dorsal blotch. Winged forms migrate to other hosts in late spring. During these migratory flights, aphids may spread virus diseases from infected volunteer plants and weeds to healthy crop plants.

Green peach aphid (*Myzus persicae*). Adult wingless females are

1.2-2.1 mm in body length and very variable in colour.

Whitney Cranshaw, Colorado State University, Bugwood.org

Black bean aphids (*A. fabae*) colony (nymphs

Michael J. Amphlett. Reproduced from the Crop Protection Compendium, 2004 Edition. © CAB International, Wallingford, UK, 2004

and alates) on leaf of runner bean (*Phaseolus coccineus*). Note the presence of an attendant ant (Lasius sp.) and, in centre of the picture, a hymenopteran parasitioid ovipositing into the aphids. A. fabae is a dark brownish to matt black aphid. Adults are often bigger than other Aphis spp. Apterae 1.5-3.1 mm, alatae 1.3-2.6 mm.

Groundnut aphid (*A. craccivora*) colony on cowpea. Apterae are 1.4-2.2 mm long. Alatae (winged form) 1.4-2.1 mm.

James Litsinger. Reproduced from the Crop Protection Compendium, 2004 Edition. © CAB International, Wallingford, UK, 2004

Black legume aphid / Groundnut aphid (*Aphis*

Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

***craccivora*) is a relatively small aphid. Immatures are slightly dusted with wax, adults without wax. Apterae are 1.4-2.2 mm long. Alatae (winged form) 1.4-2.1 mm.**

Cotton aphid (*Aphis gossypii*) is a small aphid. Adults range from just under 1-1.5

mm in body length.

Mississippi State University Archive, Mississippi State University, Bugwood.org

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African bollworm

Images

African bollworm on French beans. Fully grown caterpillars are 3-4 cm long.

A.M. Varela, icipe

African bollworm eggs

A.M. Varela, icipe

are tiny (about 0.5 mm in diameter).

Eggs of African bollworm on chickpea: yellowish-white and glistening at first,

changing to dark-brown before hatching; pomegranate-shaped, diameter 0.4-0.6 mm.

A.B.S. King, Reproduced from the Crop Protection Compendium, 2004 Edition. © CAB International, Wallingford, UK, 2004.

African bollworm caterpillar (larva) is initially pale green,

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sometimes with black dots, and a pattern of thin dark lines running along the body, the lines being darker around the second and third segments. In later instars, the dark lines become less conspicuous, and the black spots develop red areas around them. There is a good deal of variation in colour in this species. Lighter and darker forms of both caterpillars and moths are known, for

example, having white instead of black spots on the caterpillars. The caterpillar has posture when disturbed characteristic of a number of species in this family: it lifts its head and curls it under the front of the body. If even more disturbed, it lets go and drops, rolling into a spiral. Fully grown caterpillars are 3 to 4cm long.

Caterpillar of African

A.B.S. King. Reproduced from the Crop Protection Compendium, 2004 Edition. © CAB International, Wallingford, UK, 2004.

bollworm on pearl millet (two colour forms). It varies in color from bright green, pink, brown, to black, with lighter undersides. Alternating light and dark bands run lengthwise along their bodies, the heads are yellow and the legs are almost black. Mature larvae vary in length from 3-5cm. They drop to the ground to burrow into the soil to pupate. The larval stage lasts from 12-24 days.

African bollworm caterpillar (3-4 cm long) feeding on French beans

A.M. Varela, icipe

African bollworm caterpillar (3-4cm long) feeding on french beans.

A.M. Varela, icipe

African bollworm feeding on flower of French beans (3-4 cm long)

A.M. Varela, icipe

African bollworm caterpillar (3-4cm long) feeding on French bean flower.

A. M. Varela, icipe

Damage by African bollworm on French beans

A.M. Varela, icipe

Young caterpillar of African bollworm feeding on okra leaf and adult moth (inset).

A.M. Varela, icipe

African bollworm feeding on peas

A.M. Varela, icipe

African bollworm feeding on okra

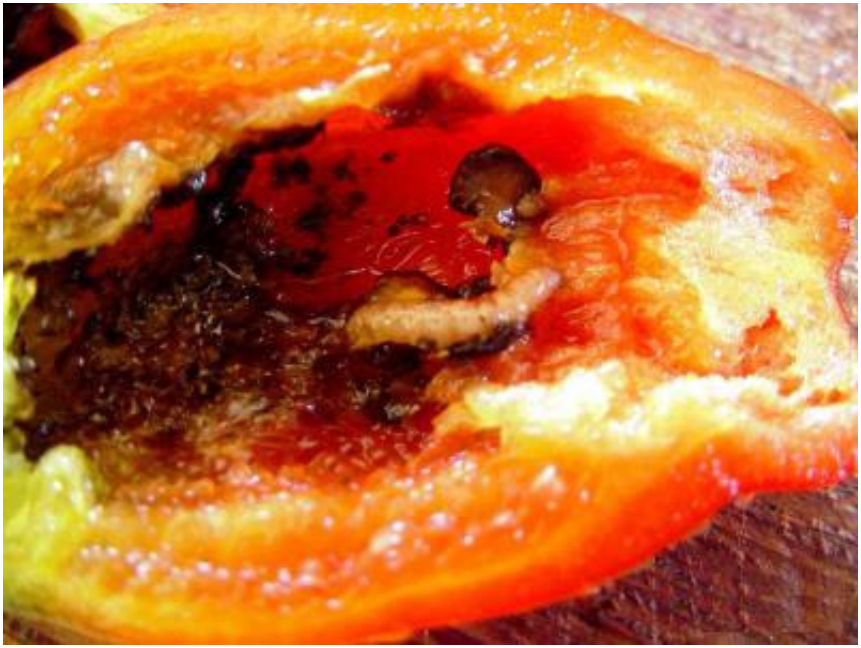
A.M. Varela, icipe

The African bollworm pupa is shiny brown, about 16 mm long

A.M. Varela, icipe

Adult moths of African bollworm are about 14 to 18 mm long with a wingspan of 35 to 40 mm.

A.M. Varela, icipe



African bollworm damage in chilli fruit

A.M. Varela, icipe

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Whiteflies

Images

Whiteflies under leaf. Adult whiteflies are about 1mm long.

Clemson University, Department of Entomology

The cabbage whitefly. Larvae are yellow-white scales, 0.3-0.6 mm long.

Adult whiteflies are about 1mm long.

A.M. Varela, icipe

The tobacco whitefly *Bemisia tabaci* adult

(bottom right) about 1 mm long, beside two *Trialeurodes vaporariorum* adults.

Ian D. Bedford. Reproduced from Crop Protection Compendium, 2004 Edition. © CAB International Publishing. Wallingford, UK.

Silver leaf on squash - *Bemisia tabaci* - Close

Ian D. Bedford. Reproduced from the Crop Protection Compendium, 2004 Edition. © CAB International, Wallingford, UK, 2004

observation of the undersides of the leaves will show the tiny yellow/white larval scales and in severe infestations, when the plant is shaken, numerous small white adult whiteflies will flutter out and quickly resettle. These symptoms do not differ appreciably from those of *Trialeurodes vaporariorum*, the glasshouse whitefly, which is common throughout Europe and

also occurs elsewhere.

Whiteflies on citrus leaf. Adult are about 1mm long.

Gassouma S. Courtesy of Ecoport (www.ecoport.org)

The cabbage whitefly on

a kale plant. Adult are about 1mm long.

A.M. Varela, icipe

The cabbage whitefly. Larvae are yellow-white scales, 0.3-0.6 mm long. Adult are about 1mm long.

A.M. Varela, icipe

Whiteflies on beans - Adult are approximately 1mm long.

A.M. Varela, icipe

Immature stages of the citrus woolly whitefly - Immatures secrete a woolly covering of flocculent white wax.

B. Loehr, icipe

Close-up of whiteflies. Adult are about 1mm long.

Central Science Laboratory, Harpenden Archive, British Crown, Bugwood.org

Adult of the greenhouse whitefly

M. Billah, A. M. Varela, icipe

Close-up of the nymphs of the greenhouse

whitefly

M. Billah, A. M. Varela, icipe

Eggs of the spiralling whitefly

A.M. Varela, icipe

Whitefly killed by fungus

M. Billah, A. M. Varela, icipe

Whiteflies on chilli leaf

B. Nyambo & A. A. Seif, icipe

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Thrips

Images

Close-up of the Western flower thrips *(Frankliniella occidentalis)*. Immature thrips (left) and adults. Very much enlarged, real size 1 to 1.5 mm.

A. M. Varela, icipe

A. M. Varela, icipe

Close-up of thrips (*Megalurothrips sjostedti* (black) and *Frankliniella occidentalis* (yellow). Real size 1 to 1.5 mm.

Adult and immature thrips (*Thrips tabaci*). Immatures (on top) are wingless and generally

Alton N. Sparks, Jr., The University of Georgia, www.insectimages.org, Courtesy of Ecoport (www.ecoport.org)

are light colored. Immatures are generally light colored without wings. Adults vary in color and have four wings lined with long hairs. The adult has four wings lined with long hairs, it is about 1 to 1.5 mm small.

Thrips on onion. Thrips are 1 to 1.5 mm small.

Whitney Cranshaw, Colorado State University (www.bugwood.org)

Thrips damage on tomato

A. M. Varela, icipe

Thrips damage to flower buds on tomato

A. M. Varela, icipe

Thrips damage on

tomato leaflet

A. M. Varela, icipe

Thrips and their feeding damage on tomato fruits. Note residues of pesticide applied seen as white stains

A. M. Varela, icipe

Thrips damage on passionfruit

A. M. Varela, icipe

Thrips damage on cabbage

A. M. Varela, icipe

Scarred eggplants due to thrips damage.

A. M. Varela, icipe

Thrips damage on bean pods

A. M. Varela, icipe

Thrips damage on pea pod.

A. M. Varela, icipe

Thrips on okra flower

A. M. Varela, icipe

Thrips damage on chilli pod

A. A. Seif & B. Nyambo, icipe

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Bacterial wilt

Images

Mauritius Sugar Industry Research Institute. Reproduced from the Crop Protection Compendium, 2004 Edition. © CAB International, Wallingford, UK, 2004

Bacterial wilt symptoms on potato plants. The first visible symptom on foliage is a wilting of the leaves at the ends of the branches during the heat of the day with recovery at night. As the disease develops, a streaky brown discoloration of the stem may be observed on stems 2.5 cm or more above the soil line, and the leaves develop

a bronze tint.

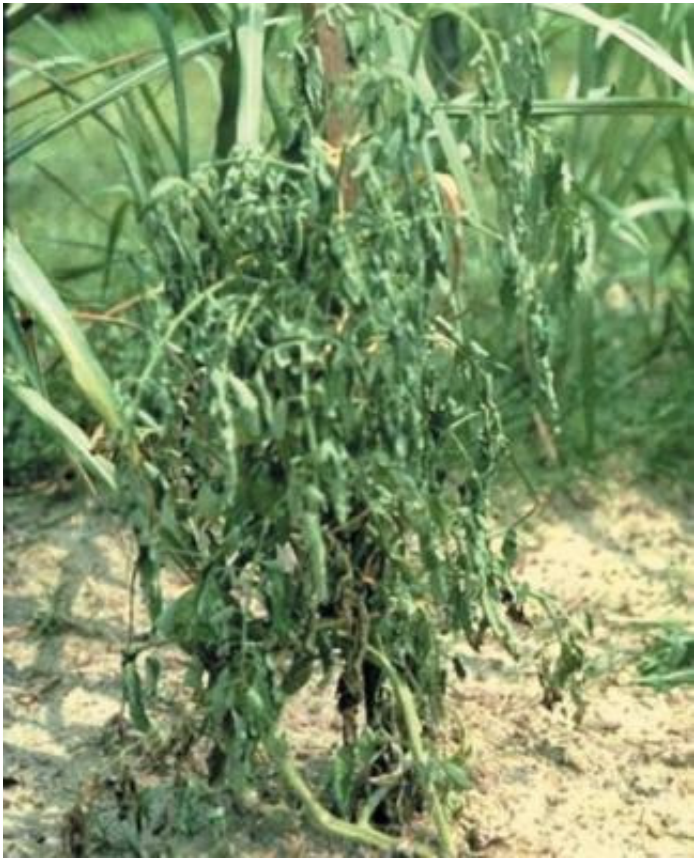
Bacterial wilt symptoms on tobacco plant. One of the distinctive symptoms is partial wilting and premature yellowing of leaves. Leaves on one side of the plant or even a half leaf may show wilting symptoms. The vascular tissues show a brown discoloration when cut. The primary and secondary roots may become brown to black.

Jürgen Kranz. Courtesy of Ecoport (www.ecoport.org)

Moko disease in banana caused by *Ralstonia solanacearum*. The pseudostems show brown vascular discoloration.

Jürgen Kranz. Courtesy of Ecoport (www.ecoport.org)

Bacterial wilt on tomato.



David B. Langston, University of Georgia, Bugwood.org

Bacterial wilt on sweet pepper

A.M. Varela, icipe

Bacterial wilt on sweet pepper

A.M. Varela, icipe

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Root-knot nematodes

Images

Root-knot nematode galls on tomato roots.

Bridge J., IIP. Courtesy of Ecoport (www.ecoport.org)

Root-knot nematodes (*Meloidogyne incognita* / *M. javanica*) affected plants are normally stunted and eventually wilt and die. The most characteristic symptom is formation of root galls (knots) and these can be seen with the naked eye. Affected roots rot.

Root-knot nematode (*Meloidogyne*

***incognita*) damage to potato.**

DAFF Archives, www.insectimages.org.

Courtesy of Ecoport, (www.ecoport.org)

Root-knot nematodes. Field symptoms are typically of stunted, poorly growing plants with yellowing leaves. Infected root systems show characteristic knots or galls.

H.J. Jensen (Reproduced from CABI 2006)

Okra roots damaged by root-knot nematodes. Note gall or root-knots (left) and healthy roots (right).

A.M. Varela, icipe

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Powdery mildew

Images

Powdery mildew on cabbage.

A.M. Varela, icipe

Powdery mildew of pea. Symptoms are similar on green gram.

AgrEvo (Reproduced from CABI 2006)

Powdery mildew on mango

Jürgen Kranz. Courtesy of Ecoport (www.ecoport.org)

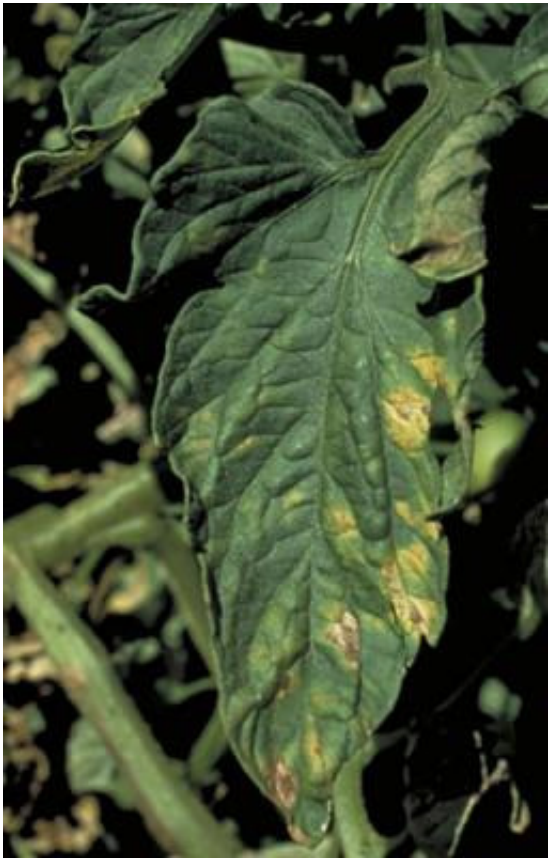
Powdery mildew on mango fruitlet. The leaf blade is most often

affected by powdery mildew. Petioles, stalks and flowers are rarely affected and fruits are occasionally infected.

A.A. Seif, icipe

Powdery mildew on sesame (*Erysiphe cichoracearum*)

Jürgen Kranz (Courtesy of EcoPort, www.ecoport.org)



Powdery mildew on tomato (*Leveillula taurica*)

Denis Persley and Tony

Cooke, Department of Primary Industries and Fisheries, Queensland, Australia (Courtesy of EcoPort, www.ecoport.org)

Powdery mildew on cucumber

Jürgen Kranz, Courtesy of EcoPort (www.ecoport.org)

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