CABI plantwise

CABI PEST AND DISEASE PHOTOGUIDE TO

Onion disorders

KNOWLEDGE FOR LIFE

Introduction

This photo booklet has been produced by the CABI-led **Plantwise** programme (www.plantwise.org) to aid extension officers and other plant health advisors in diagnosing the most common pests, diseases and abiotic problems of coffee around the world. The symptoms presented on a real plant sample can be compared with the photos in this guide to identify possible causes.

The booklet is organized into two broad sections, one showing the common insect pests that attack the crop and the other showing the various symptoms of poor health. In the symptoms section, the images are arranged by plant part, with similar-looking symptoms displayed together. Some biotic and abiotic factors cause more than one type of symptom, so there may be multiple images in different parts of the photo booklet for a specific problem. The photos for a particular problem are cross-referenced to make it easy to find all the relevant photos.

Contents

Cutworms

Agrotis ipsilon

Worldwide

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

- Larvae are brown with grey band along mid-line, brown head.
- Adults are brown moths.
- Most damage is on seedlings, larvae chew stem at soil line and plant falls over; chew holes in leaves.

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Bean seed fly and Onion fly

Delia platura and Delia antiqua

Worldwide

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

- White, legless and headless maggots, up to 8 mm long. They eat leaves and bulbs. Delia antiqua is a more specialised pest, *D. platura* will usually only infest diseased or damaged plants.
- Both flies can act as entry points for pathogens, especially Fusarium and bacterial diseases.

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Beet armyworm

Spodoptera exigua

Asia, Africa, Central America, Caribbean, Oceania

Photo: Marina Young, Rural Agricultural Development Authority, Jamaica

- Young larvae pale green/yellow, with pale stripes; older larvae are dark brown with darker stripes; mature larvae can reach between 25-30 mm long.
- Eggs greenish to white colour.
- Insect feeds on green part of leaves and make irregular holes.

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Leek Moth

Acrolepiopsis assectella

Asia, Africa

Photo: Mariusz Sobieski, Bugwood.org

- Greyish-white to pale green larvae with brown head, about 10 mm long; white eggs.
- Bores into the leaf creating translucent windows that turn into holes.
- Can attack the neck of the onion leading to neck rot.
- Damage is usually first noticed at the edge of the field.

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Onion Weevil

*Ceutorhynchus suturalis**

Africa

Photo: Norman E. Rees, USDA Agricultural Research Service – Retired, Bugwood.org

- Typical C-shaped weevil grub.
- Appear similar to a maggot but with well developed head capsule and insect type legs.

*related species shown

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Wireworm

Agrypnus spp. *Conoderus* spp. and *Heteroderes* spp. and others Worldwide

Photo: Frank Peairs, Colorado State University, Bugwood.org

- Larvae have slender, cylindrical bodies and a relatively hard; yellowish to brown in colour and about 20 mm long.
- Seedlings may be eaten off below ground.
- Holes chewed in developing seedlings.

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Leek Moth

Acrolepiopsis assectella

Asia, Africa

Photo: Martin Evans, wildguideuk.com

- Adults 8-9 mm long, reddish brown to grey in colour.
- Wingspan 15-16 mm, with white triangle shaped spot on folded wings.
- Active at night.

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Beet army worm

Spodoptera exigua

Asia, Africa, Central America, Caribbean, Oceania

Photo: Paul Harris, Agriculture and Agri-Food Canada, Bugwood.org

- The adults are medium sized moths with a body length up to 12 mm and a wingspan of 25 mm.
- Forewings are grey with a small round light orange spot in the middle; rear wings are white to light brown with dark brown around the edges.

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Onion Weevil

*Ceutorhynchus suturalis**

Africa

Photo: Hariet Hinz and Ester Gerber, CABI Biosciences, Bugwood.org

- Typical shaped weevil; orange pupae.
- Adults eat into leaves and lay eggs in the holes.

*related species shown

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Click beetle

Agrypnus spp. *Conoderus* spp. and *Heteroderes* spp. and others Worldwide

Photo: Steve L. Brown, University of Georgia, Bugwood.org

- Small (but not tiny) beetles that have an ability to leap into the air to avoid predators.
- They are a large group and colours vary, but usually black or dull brown.
- They are active at night and are attracted to lights.

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Onion fly

Delia antiqua

Worldwide

Photo: PaDIL, Bugwood.org

- The onion fly has an ash-grey body and resembles a small house fly.
- The male has a single stripe on the back, the female does not.

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Bean seed fly

Delia platura

Worldwide

Photo: PaDIL, Bugwood.org

- Brownish-grey flies, resembling house flies but about half the size (5 mm long).
- Three stripes on the back.
- May seek out shade and cooler areas during hot weather.

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Vegetable leafminer

Liriomyza spp. (and others)

Worldwide

Photo: CSL, Bugwood.org

- Adults are small, fast moving flies, 1-2 mm long.
- Shiny black body and bright yellow head.
- Eggs are tiny, cream colour and slightly see through.

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Green peach aphid (Peach potato aphid)

Myzus persicae

All

Photo: C. Quintin, Flickr

- Can be many colours from yellow, green or pink but individuals are always a continous colour.
- Winged forms are usually black.
- Usually found on lower sides of leaves but are well spaced from each other.
- Can cause curling of leaves and sooty mould.

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Onion thrips

Thrips tabaci

Worldwide

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

- Young (nymphs) and adults very small 0.5-1.2 mm. The body is elongated, elliptical and slender. Their eyes have darker colouration and are easy to see.
- Black oily dots of frass often visible with hand lens.
- Attacks many different types of crop.

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Onion mites

Rhizoglyphus spp. and *Tyrophagus* spp.

Photo: Sandra-Photographie, Flickr

- Shiny, creamy-white, bulbous shape, 0.5-1 mm long; usually found under the root plate.
- Can cause twisting and curling of the leaves.
- Pest in storage as well as in the field.

*related species shown.

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Powdery mildew

Leveillula taurica

Photo:S. K. Mohan, Bugwood.org

- White spreading patches on mature leaves the leaf may appear unaffected beneath.
- Patches become powdery and can be wiped from the leaf with a wet thumb.
- Leaves can turn yellow and then brown, where the fungus has attacked; plant may shrivel up.

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Leek and Onion rust

Puccinia allii

Photo: P Taylor, CABI

- Adults are tiny (about 0.5 mm long), oval, dark red, insect-like creatures that are just visible with the naked eye inset (2).
- Long, white bristles arise from bumps on the back and sides of the mite (1).

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Downy mildew

Peronspora parasitica

Photo: P Taylor, CABI

- Mild mottle may occur on young and mature leaves, sometimes as concentric rings (Target).
- This will be followed by soft downy surface growth especially in high humidity.
- Leaves will begin to collapse and fold over and eventually turn brown, where the water mould is active.

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Stemphylium leaf blight and stalk rot

Stemphylium vesicarium

Photo: Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org

- Small individual lesions develop which can be yellow brown or purple.
- These join together and elongate rapidly as spindle shaped spots that often reach the tips.
- With age the spots darken and often turn black as fruiting bodies develop.

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Purple blotch

Alternaria porri

Photo: H F Schwartz, Colorado State University, Bugwood.org

- To begin with small, water-soaked lesions with white centres appear on older leaves.
- Lesions enlarge and become purplish with light yellow concentric rings (target) at the edges.
- In the latter stages the leaves turn yellow/brown fold over and wilt.

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Botrytis leaf blight

Botrytis squamosa

Photo: Lindsey du Toit, Washington State University, Bugwood.org

- Small white spots with a light green rings. May look like hail damage or insect attack.
- In time the spots become larger, merging together.
- The leaf will break at right angles to the spot when pressed together.
- Often prevalent in older leaves and dense foliage.

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Vegetable leafminer

Liriomyza spp. (and others)

Photo: P Taylor, CABI

- Long winding trails visible within the wall of the leaf.

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White tip

Phytophthora porri

Photo: Rasbak, Wikimedia.org

- Small light coloured spots form on the leaf; surrounded by a watery zone.
- Mainly found on the upper half of the leaf.
- Tips of the leaf will die off and turn white.
- Can carry over into the store to cause rotting.

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Onion thrips

Thrips tabaci

Photo: H F Schwartz Colorado State University, Bugwood.org

- Silvering of the leaves due to feeding of thrips on the outer surface of the leaf.

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Bacterial streak and bulb rot

Pseudomonas viridiflava

Photo: Ronald D. Gitaitis, University of Georgia, Bugwood.org

- Oval lesions and streaks, often water-soaked, initially dark green.
- Streaks darken with age, often becoming black, and lesions turn brown.

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Hail damage

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

- Destruction of the plant depending on the extent of the storm.
- Damage is immediate.
- Bulbs and leaves can both be damaged.

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Xanthomonas blight of onion

Xanthomonas axonopodis pv. *allii*

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- White, very small spots on leaves (leaf flecks) or pale spots initially, rapidly spreading.
- Lesions enlarge and become tan to brown in colour, with extensive water-soaking at edges (arrowed).
- Leaves will eventually dry but retain their tan colour.
- Bulb rotting does not occur.

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Leek yellow stripe virus

(NOT found in Africa)

Photo: L. Bos

- Usually only found on leeks and garlic, extremely rare on onions.
- Irregular yellow striping of the whole lamina, but especially at its base.
- Whole leaves may be more or less evenly yellow.
- Plant growth may be significantly reduced and yield severely impaired.

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Iris Yellow Spot Virus (IYSV)

Photos: Howard F. Schwartz, Colorado State University, Bugwood.org

- Spread by onion thrips.
- Yellow/straw coloured diamond shaped lesions, sometimes with green centres.
- Leaves do not rot but dieback from the tips, if infection is severe.

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Onion yellows phytoplasma

Photos: Howard F. Schwartz, Colorado State University, Bugwood.org

- Yellowing and twisting of the inner leaves.
- Spread by leaf hoppers.

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White rot

Stromatinia cepivorum

Worldwide

Photo: Elizabeth Bush, Virginia Polytechnic Institute and State University, Bugwood.org
Bruce Watt, University of Maine, Bugwood.org

- Yellow and wilting especially in dry conditions. If wet the plants may not wilt but become loose in the soil.
- The pathogen rots the roots and then invades the bulb.
- White fluffy growth appears on the base of the bulb, which then becomes covered in small, black, round structures.

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Fusarium Basal Rot

Fusarium oxysporum f. sp. *cepae*

Worldwide

Photo: H F Schwartz Colorado State University, Bugwood.org

- Curling curving and yellowing of the spreading down from the tips of the leaves.
- Leaf death (necrosis) from the tip begins and wilt may develop.
- Infected bulbs may appear brown and watery when cut open.

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Onion and leek smut

Urocystis cepulae

Worldwide

Photo: CABI

- Dark pustules develop on the seedlings.
- Pustules enlarge with the plant, becoming raised and blister-like.
- The leaves may become distorted and split.
- Plants often die before maturity.

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Black mould

Aspergillus niger

Worldwide

Photo: S. K. Mohan, Bugwood.org

- Develops between the dry outer scales of the onion bulb and the fleshy inner ones.
- The fleshy inner scales can become water soaked.
- Black dusty spores develop on the onion.
- Secondary pathogens may invade causing a rot.

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Onion smudge

Colletotrichum circinans

Worldwide

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Small patches of fungus develop just under the surface of the outer scales.
- The patches of fungus usually appear dark green and then rapidly turn black.
- Concentric rings (target) may also develop.

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Blast and neck rot

Botrytis allii and other *Botrytis* spp.

Worldwide

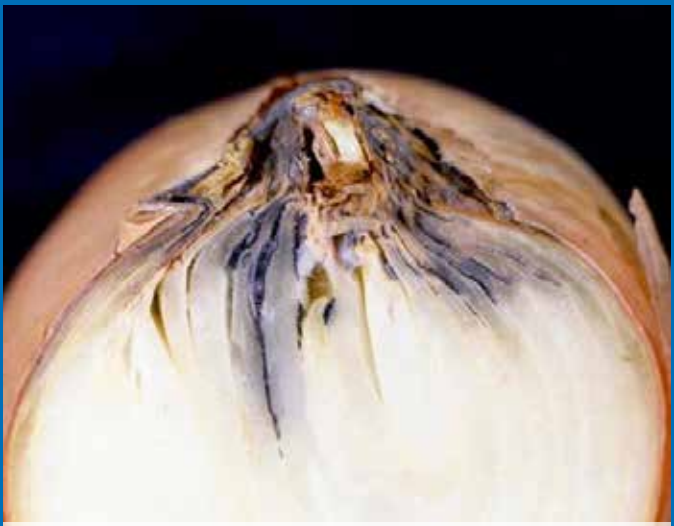

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Rot begins at the neck and spreads down.
- The scales become water soaked and translucent.
- Fungus may be seen between the scales.
- In the later stages sclerotia (small, hard fungal balls) may form.

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Physiological splitting

Photo: P. Taylor CABI

- Onion bulb splits due to internal pressures within.
- May be due to over fertilization or irregular watering.
- Once split the onion becomes prone to storage rots.

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Sclerotium rot

Athelia rolfsii

Worldwide

Photo: Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org

- Dirty white spots seen on outer scales.
- Thread like fungal growth often spreads out from bulbs onto the soil around the onion.
- Black fruiting bodies (small hard black balls) develop, as for white rot fungus.

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Fusarium basal rot

Fusarium oxysporum f. sp. *cepae*

Worldwide

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Can attack at any stage of development.
- Above ground symptoms are not seen until the basal plate is infected and rotting.
- Will start in the field but can continue as a storage rot.

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Penicillium blue mould

Penicillium spp.

Worldwide

Photo: S. K. Mohan, Bugwood.org

- When cut open several of the scales may appear light brown and water soaked.
- A musty/damp smell may develop.
- Dusty blue/green spores develop in the latter stages.

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Mechanical damage

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Internal bruising due to heavy handling at harvest.
- The watery/translucent areas are not rotten but will be more susceptible to bacterial and fungal attack.

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Bacterial soft rot

Pectobacterium carotovorum

Worldwide

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Softening and water soaking of one or more of the inner, fleshy scales of the bulb.
- Affected tissue is yellow initially, turning brown later on.
- The neck of the bulb may become soft.

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Pink root of onion

Pyrenochaeta terrestris

Asia, Africa, S America

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Roots turn light colour, usually pink but can be yellow, and then darkening with time.
- Roots become translucent and disintegrate.
- Plants may appear to have a nutrient deficiency or be suffering from drought stress.

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Stubby root nematode

Paratrichodorus spp.

Worldwide

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Reduced root system.
- Sometimes consisting of a few short and thick (stubby) roots that have turned yellowish, with dark brown tips and numerous localised lesions.
- Plants may be stunted.

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High temperature stress

Photo: Howard F. Schwartz, Colorado State University, Bugwood.org

- Exposure to high temperatures can be especially damaging during transplanting.
- Possible soft, pale areas, which can become brown and dead.

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