



**Horticulture
Innovation
Australia**



Pests, Diseases and Disorders of Sweet Corn

A FIELD IDENTIFICATION GUIDE





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The background of the cover is a vibrant green color with a subtle, artistic pattern of overlapping corn leaves. The leaves are rendered in various shades of green, creating a sense of depth and texture. The overall aesthetic is clean and professional, suitable for a technical guide.

Pests, Diseases and Disorders of Sweet Corn

A FIELD IDENTIFICATION GUIDE

Jenny Ekman

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Abbreviations

CIMMYT	International Maize and Wheat Improvement Centre
CSU	Colorado State University
DAFWA	Department of Agriculture and Food WA
IPNI	International Plant Nutrition Institute
MAF	Ministry of Agriculture and Food
NSW DPI	NSW Department of Primary Industries
OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
PaDIL	Pest and Disease Image Library
QDAF	Qld Department of Agriculture and Fisheries
USDA ARS	United States Department of Agriculture Agricultural Research Service
WSU	Washington State University

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Insects



African black beetle

Heteronychus arator

DESCRIPTION

Larvae: Whitish C-shaped grub up to 30 mm long with light brown head and 6 legs. The rear end sometimes has a grey tinge.

Adult: Shiny black, stout bodied beetle around 10–15 mm long. Legs are adapted for digging. Strong flier. Mass dispersal flights by adults occur March–April and occasionally in spring.

DAMAGE

Larvae feed on plant roots, reducing growth and potentially killing small plants. Adults can cause major damage by chewing the bases of plants and ringbarking seedlings.

MOST COMMON

Spring and early summer, mainly in coastal areas from Victoria to south-east Qld and south-western regions of WA. Favoured by winter rainfall followed by a warm, dry spring and summer.



African black beetle larvae or 'curl grub' and adult beetle (PaDIL)

Aphid — corn

Rhopalosiphum maidis

DESCRIPTION

Nymph: Similar to adult though smaller.

Adult: Light to olive green with dark purple spots at the bases of the rear cornicles (tube-like projections) and dark head.



DAMAGE

Sucks sap, reducing plant vigour. Leaves develop yellow and brownish-red streaks.

MOST COMMON

Spring to autumn, but can be found in most growing districts throughout the year.



Corn aphids in close-up, and a colony in the emerging tassel

Aphid — green peach

Myzus persicae

DESCRIPTION

Nymph: Yellowish to green.

Adult: Wingless adults are pale yellow to green and around 2 mm long. Winged females have black heads with dark red eyes and patterned bodies.

DAMAGE

Causes leaf distortion through feeding and can contaminate cob.

MOST COMMON

During warmer months on a large range of host plants.



Green peach aphid mature adults and nymphs on sowthistle and winged form (S Bauer USDA ARS)

Armyworm — common, African, southern

Mythimna convecta, *Spodoptera exempta*, *Persectania ewingii*

DESCRIPTION

Egg: Common armyworms lay clumps of eggs in cracks or crevices, often on dry plant material. African armyworms lay large, irregularly shaped egg masses topped with cottony material.

Caterpillar: Hairless caterpillar 30–40 mm long with four central prolegs. Orange-brown head with green to brown body and three obvious white to yellow stripes starting immediately behind the head.

Adult: Plain, brownish moth around 20 mm long, wings held flat along body.

DAMAGE

Feeding causes characteristic ragged chewing damage, starting along the outer edges of each leaf. Small plants may be killed, others severely damaged. Caterpillars are mainly nocturnal and tend to hide in the central leaf whorl during the day.

MOST COMMON

Spring to early summer, when moths are active.



Mature common armyworm (J Wessels QDAF) and African armyworms (D Ironside QDAF)



Armyworm inside corn leaf whorl, showing ragged feeding damage (Uni Delaware)



Adult moths of common, African and southern armyworms (D Hobern, B Richardson and D Hobern)

Assassin bug

Pristhesancus plagipennis

Beneficial insect ✓

DESCRIPTION

Nymph: Similar to adult but wingless.

Adult: Shield-shaped bug 10–30 mm long with large eyes and powerful, curved, sucking mouthpart. Colour varies from orange to red and brown, sometimes with distinct patterning. Strong front legs for grasping prey.

BENEFIT

Adults and nymphs are aggressive predators on other insects, particularly soft bodied caterpillars. A single nymph may consume

150–200 heliothis caterpillars in less than 3 months.

MOST COMMON

Any time of year.



Common assassin bug adult (P Chew) and nymph (J Wessels QDAF)

Big eyed bug

Geocoris spp.

Beneficial insect ✓

DESCRIPTION

Nymph: Patterned brown, pear-shaped with prominent eyes. Wing buds appearing in later instars.

Adult: Black bug around 5 mm long with prominent dark eyes. Fast moving, with clear wings folded flat over its back.

BENEFIT

Adults and nymphs prey on aphids, mites, heliothis eggs and small caterpillars.

MOST COMMON

Any time of year.



Adult big-eyed bug (Alain C Flickr)

Black headed mirid

Tytthus chinensis

Beneficial insect ✓

DESCRIPTION

Nymph: Pale green, pear-shaped bug with dark reddish eyes and banded antennae.

Adult: Slender black bug around 3 mm long with long antennae. Fast moving, with semitransparent wings held flat along its back.

BENEFIT

Adults and nymphs eat heliothis eggs.

MOST COMMON

Any time of year.



Adult mirids (American Natural History Museum (top), QDAF)

Brown marmorated stink bug

Halyomorpha halys

Exotic pest ✗

DESCRIPTION

Nymph: Initially black and orange, progressing to patterned brown with rust-red markings.

Adult: Brown and white shield shaped bug approximately 17 mm long. Two distinctive white bands on antennae.

DAMAGE

Sap sucking by all life stages on fruit and leaves, including sweet corn kernels, causes severe damage. Adults overwinter inside buildings. Brown marmorated stink

bugs were first found in the USA in 1998, spread rapidly and are now a major horticultural pest.

MOST COMMON

Not yet in Australia, but has been detected inside shipping containers. Most active during summer.



Brown marmorated stink bug on corn (B Little Uni Georgia), an adult, and feeding damage to kernels (TP Kuhar Virginia Tech)

Cluster caterpillar

Spodoptera litura

DESCRIPTION

Egg: Laid in a large mass, usually covered with fluffy light brown material.

Caterpillar: Initially grey-green and feeds in a group, but separate as they grow. Mature caterpillars are 30–40 mm long and smooth skinned. They are distinctively patterned with thin yellow stripes and conspicuous dark spots and triangles. Larvae tend to curl into a ball if disturbed.

Adult: Patterned brown, cream and grey moth with wings held in a tent over the body.

DAMAGE

Caterpillars skeletonise leaves.

MOST COMMON

Spring to autumn in Queensland.



Cluster caterpillar and adult moth

Cricket — black field

Teleogryllus commodus

DESCRIPTION

Nymph: Similar to adult, but with less developed wings.

Adult: Stout, black cricket with large head, short wings and powerful rear legs. Females have long ovipositor. Males make distinctive chirruping call at dusk.

DAMAGE

Not usually a major problem, but can cause damage by chewing on prop roots. Can also damage irrigation by chewing on drip tape.

MOST COMMON

Active during warmer months. Crickets usually hide in cracks or crevices during the day and come out at night to feed.



Black field cricket

Cricket — mole

Family Gryllotalpidae

DESCRIPTION

Nymph: Similar to adult, but with less developed wings.

Adult: Brown, roughly cylindrical cricket 3–4 cm long with muscular appearance. Forelegs are adapted for digging and the head and thorax are reinforced with thickened covers. Hind legs are small compared to other crickets. Females are capable flyers.

DAMAGE

Eats plant roots, both above and below ground, which it accesses using a network of burrows.

MOST COMMON

Urban areas and well-watered grasslands. Most active during warmer months, when males dig special resonating burrows and produce a distinctive loud, vibrating call at dusk.



Mole cricket (Wikicommons)

Cutworm

Agrotis spp.

DESCRIPTION

Egg: Ribbed creamy domes. Similar to heliothis eggs but laid in a compact cluster.

Caterpillar: Grey-green initially, darkening as they age. Mature larvae are hairless, up to 40 mm long and dark grey to black with inconspicuous red, yellow and cream markings.

Adult: Patterned brown, cream and grey moth with wings held in a tent over its back.

DAMAGE

Larvae cut off seedlings at soil level, usually during the night. Plants may be



Active cutworm; Cutworm damage to corn (QDAF) and adult moth

dragged underground to feed on during the day.

MOST COMMON

Damage is most likely during spring, especially in damp areas newly converted to cropping.



Damsel bug

Nabisi spp.

**Beneficial
insect** ✓

DESCRIPTION

Nymph: Similar to adults except smaller and wingless.

Adult: Slender, light tan bug 8–12 mm long with long, prominent sucking mouthpart. Long legs, with front two stronger for grasping prey.



Damsel bug

BENEFIT

Nymphs and adults are aggressive predators on many other insects including aphids, leafhoppers, moth eggs and small caterpillars.

MOST COMMON

Any time of year.

Dried fruit beetle

Carpophilus spp.

DESCRIPTION

Larvae: Tiny cream-coloured grub.

Adult: Small (2–3 mm long), oval-shaped black to brownish beetles.

Several different species can infest corn.

DAMAGE

Beetles get inside corn husks which have been loosened due to damage by other insects (eg heliothis) or disease. They chew on the kernels and are a contamination issue.

MOST COMMON

During summer, especially if heliothis is not adequately controlled.



Beetles in corn showing feeding damage

Earwig — black field

Nala lividipes

DESCRIPTION

Nymph: Similar to adult but lighter in colour and with less developed wings and pincers.

Adult: Dark brown to black with slender flattened body up to 15 mm long and beaded antennae. Obvious pair of pincers at the end of the body which are curved in males and straighter in females. Darker and smaller than other earwig species.



DAMAGE

Usually a minor pest that feeds on decaying plant material. However, they can also eat germinating seeds and young plants and upper parts of corn roots.

MOST COMMON

In heavy, black soils and moist conditions. Nymphs tend to emerge during spring.



Adult male black field earwig (D Hobern); Black field earwig

Earwig — brown

Labidura truncata

Beneficial insect ✓

DESCRIPTION

Nymph: Similar to adult but smaller and lighter coloured.

Adult: Light brown, flattened and segmented body up to 35 mm long with dark brown patches and dark eyes. Large pincers on the tail, which are curved in males and straighter in females.

BENEFIT

Attacks caterpillars and moth pupae, such as heliothis.

MOST COMMON

Any time of year.



Adult brown earwigs (J Wessels QDAF, A Henderson Minibeast Wildlife)

Glossy shield bug

Cermatulus nasalis

Beneficial insect ✓

DESCRIPTION

Egg: Cylindrical, black eggs with short white spines laid in a neat raft of up to 50 eggs on a leaf or stem.

Nymph: Early instars have bright red bodies with black head and legs. Later instars develop bright red, orange and black markings.

Adult: Shield-shaped bug up to 12 mm long with brown to black patterning and small light yellow markings. Obvious piercing and sucking mouthpart.

BENEFIT

Nymphs and adults attack soft bodied insects such as heliothis caterpillars.

MOST COMMON

Spring to summer.



Glossy shield bug nymph (P Chew) and adult bug (C Harding MAF)

Green vegetable bug

Nezara viridula

DESCRIPTION

Egg: Neat rafts of barrel-shaped, creamy eggs laid on leaf undersides, turning golden as they mature.

Nymph: Initially orange-red, then darkening with bright red, green and white patterning. Tend to stay in groups.

Adult: Green, shield-shaped bug around 15 mm long.

DAMAGE

Sucks sap from young shoots and directly from developing kernels. Feeding sites can become diseased.

MOST COMMON

An occasional pest, most common during spring and summer.



Green vegetable bug eggs, nymph (A Ryland) and adult

Heliothis

Helicoverpa armigera

DESCRIPTION

Egg: Ribbed white domes 1 mm diameter laid singly or in small groups. Darken to brown before hatching.

Caterpillar: Initially 1.5 mm long, light brown with dark heads. When they reach around 15 mm long they darken and develop distinctive stripes. Colour ranges from brown to greenish or reddish. Up to 30–40 mm long.

Pupae: Golden brown and usually found just under the soil surface. Rain stimulates emergence.

Adult: Stout moth with lightly patterned brown wings held flat across the body. Hind wings are pale with a dark section towards the margin.

DAMAGE

Larvae feeding results in damage to silks, large ragged

holes in leaves, holes in husks and destruction of the cobs. Frass can be a contamination issue, even if caterpillars are removed. Heliothis is the most serious pest of sweet corn.

MOST COMMON

Warm weather, such as from late spring to autumn in

Queensland and summer in more southern states. Populations usually peak during late summer. Heliothis is resistant to many insecticides. Nuclear polyhedrosis viruses (marketed as ViVUS) can assist control.



Caterpillars attacking the tassels and cob (A Ryland)



Heliothis egg laid singly on a corn silk (QDAF) and typical feeding damage and frass in the leaf whorl



left: Heliothis caterpillar killed by the biopesticide Vivus (a virus); right: Heliothis moths often hide in the leaf whorl during the day

Hoverfly

Syrphidae spp.

Beneficial insect ✓

DESCRIPTION

Larvae: Cream to brownish maggot with stripe on upper surface and dark mouth hooks, up to 10 mm long.

Adult: Resembles a bee or wasp with black and yellow bands across its rather flattened abdomen, but actually harmless. Often hovers near flowers, feeding on nectar and pollen.

BENEFIT

Larvae eat large numbers of aphids.

MOST COMMON

Warm weather, especially summer.



Hoverfly larvae attacking aphids (P Scanlon DAFWA) and adult

Lacewing — brown and green

Micromus tasmaniae

Beneficial insect ✓

DESCRIPTION

Nymph: Brown lacewing nymphs are slender, brown and up to 10 mm long with a smallish head but large jaws and a long tail. Green lacewing nymphs are thicker bodied, up to 8 mm long and usually camouflage themselves with the remains of their prey.

Adult: Brown lacewings are up to 8 mm long with large green eyes. Green lacewings are up to 15 mm long with large round red eyes and long antennae. Both have large, delicately-veined wings held upright along the body.

BENEFIT

Adults and nymphs are voracious predators of aphids, small caterpillars, thrips and mites.

MOST COMMON

Year round.



Clockwise from above: Brown lacewing nymph attacking aphids (C Freebairn QDAF); Brown and green adult lacewings; Green lacewing nymph (S Broughton DAFWA)

Ladybird

Coccinella transversa, *Hippodamia variegata*, *Harmonia conformis*

Beneficial insect ✓

DESCRIPTION

Nymph: Black with coloured markings and 'crocodile like' appearance, up to 6 mm long.

Adult: Most are brightly coloured, dome-shaped beetles 3–5 mm long with distinctive spots and stripes on their outer wing covers. In contrast, *Stethorus* is black, hairy and 1–2 mm long.

BENEFIT

Both adults and larvae are active predators of aphids, thrips, moth eggs and mites.

MOST COMMON

Late spring to autumn.



White collared ladybird (*H. variegata*) adult and nymph (opposite)



Transverse ladybird (*C. transversa*) adult



Common spotted ladybird (*H. conformis*) and mite eating ladybird (*Stethorus*) with two spotted mites (QDAF)

Maize leafhopper (Wallaby ear)

Cicadulina bimaculata

DESCRIPTION

Nymph: Similar to adult but smaller, paler and wingless.

Adult: Wedge-shaped golden yellow insect with clear wings, dark eyes and black spots either side of the 'nose'. Looks like a tiny (3 mm long) cicada. They quickly jump away in any direction if disturbed.

DAMAGE

Maize leafhoppers inject a toxin into the leaf during feeding. This toxin causes a syndrome known as 'wallaby

ear'. Symptoms include severely stunted growth and swelling of the leaf veins. Leaves tend to crinkle and in-roll, developing a shortened, upright habit.

MOST COMMON

Late summer, particularly in coastal areas. Some varieties are more susceptible to damage than others. Plants can recover from wallaby ear symptoms if leafhoppers are controlled.



Maize leafhoppers on a leaf (QDAF) and in close-up (H Lockyer NSW DPI); Symptoms of 'wallaby ear' due to leafhopper damage

Maize thrips

Frankliniella williamsi

DESCRIPTION

Nymph: Cream to yellowish, wingless, generally <1 mm long.

Adult: Light to dark brown, torpedo-shaped and 1–2 mm long. Narrow transparent wings fringed with long hairs are held along their backs.

DAMAGE

Feeding in the leaf whorl can cause the leaves to become distorted and cupped, with yellow streaks developing. While this does not appear to significantly affect plant

growth, feeding on the cob creates an entry point for diseases such as Fusarium.

MOST COMMON

Warm to hot, dry weather.



Feeding damage on sweet corn leaves. A single thrips is just visible in the close-up (J Duff QDAF)

Mite — predatory

Phytoseiulus persimilis

**Beneficial
insect** ✓

DESCRIPTION

P. persimilis can be purchased commercially. Various other predatory mites can also be found in unsprayed crops.

Nymph: Pale orange, pear shaped.

Adult: Orange to reddish, pear shaped. Faster moving and larger than pest mites.

BENEFIT

Predatory on two-spotted mite.

MOST COMMON

Multiplies rapidly at temperatures $>26^{\circ}\text{C}$.



Predatory mite *Phytoseiulus persimilis* attacking a two spotted mite (QDAF)

Mite — two-spotted

Tetranychus urticae

DESCRIPTION

Nymph: Translucent white, changing to bright orange in overwintering form.

Adult: Whitish to yellow green, around 0.5 mm long with a dark olive spot either side of its body. Overwintering form has a dark red body and white legs.

DAMAGE

Feeding damages leaves, which initially develop light yellow stippled areas. As populations increase

the yellowed area spreads and may turn reddish. Leaf undersides become covered in fine webbing.

MOST COMMON

Hot ($25\text{--}30^{\circ}\text{C}$) dry weather.



Two-spotted spider mites (F Peairs CSU Bugwood.org) and leaf damage with close-up

Parasitoid wasps

Trichogramma spp. *Telenomus* spp. *Microplitis* spp. *Cotesia* spp.

Beneficial insect ✓

DESCRIPTION

There are many different types of parasitoid wasp, of which a number are sold commercially for control of caterpillars and aphids.

Adult: Egg parasitoids such as *Trichogramma*, *Telenomus* and *Trissolcus basalis* are tiny black or brown wasps <0.5 mm long. Larval parasitoids are larger, 3 to 20 mm long.

while *T. basalis* attacks green vegetable bug eggs. *Microplitis* lays a single egg into heliothis and *Spodoptera* spp. caterpillars. Braconid wasps such as *Cotesia* spp. parasitise heliothis, armyworm and sorghum head caterpillars, with up to 30 mature larvae forming fluffy white pupae on the outside of the dead host.

BENEFIT

Trichogramma and *Telenomus* parasitise heliothis eggs

MOST COMMON

Any time of year.



Telenomus spp. (B Scholz QDAF) and *Trichogramma* spp. (NSW DPI) laying into heliothis eggs



Microplitis spp. (JK Lindsey)



Parasitoid wasp newly emerged from its mummified aphid host (J Duff QDAF); *Cotesia* wasp pupae (J Duff QDAF)

Pirate bug

Orius spp.

Beneficial insect ✓

DESCRIPTION

Nymph: Bright orange-red, wingless nymph with dark red eyes and plump appearance.

Adult: Oval bug 2–3 mm long with clear wings folded flat across its back. Prominent piercing and sucking mouthpart.



BENEFIT

Feeds on thrips, mites and a variety of moth eggs including heliothis.

MOST COMMON

In summer.



Pirate bug nymph (A Sisson Iowa State Uni Bugwood.org), adult (P Scanlon DAFWA) and pirate bug hunting on corn silks, showing its small size

Plague soldier beetle

Chauliognathus lugubris

DESCRIPTION

Larvae: Soil dwelling grub. A strict carnivore that eats insect pupae, eggs and young caterpillars.

Adult: Slender beetle with bright orange abdomen and metallic green wings. Up to 15 mm long.

BENEFIT / DAMAGE

Predatory on aphids, caterpillar eggs and other pests. However large numbers may cause crop damage and contaminate cobs.



Plague soldier beetle singly and swarming on corn tassels (A Ryland)

Planthopper

Family Delphacidae

DESCRIPTION

Nymph: Creamy coloured, oval nymph with short wing stubs.

Adult: Mottled brown with lighter patch on the top of the head. Resemble tiny cicadas. Adults may be short- or long-winged, with the latter being around 4 mm long.

DAMAGE

Adults and nymphs can gather in large numbers inside the leaf whorl, where

they suck plant sap and excrete honeydew. This reduces plant vigour, resulting in leaf yellowing, wilting and withering. Young seedlings may be killed. Growth of sooty mould on honeydew reduces photosynthesis. Planthoppers can transmit viruses, particularly maize stripe virus.

MOST COMMON

Warm, humid weather.



Maize planthopper (*Peregrinus maidis*) (USDA ARS); Planthopper adult, species undetermined

Red and blue beetle

Dicranolaius bellulus

Beneficial insect ✓

DESCRIPTION

Larvae: Creamy, soil-dwelling grub.

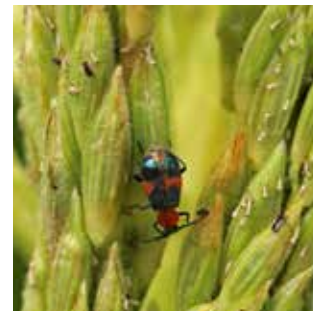
Adult: Glossy beetle around 5 mm long with blue head and orange thorax. The metallic blue wing covers have a distinctive broad orange band across the centre and an orange tip at the end.

BENEFIT

Feeds on heliothis eggs and small caterpillars. Adults also sometimes eat pollen.

MOST COMMON

In summer. Active mainly in the early morning and at sunset.



Female red and blue beetle hunting aphids (top) and male beetle showing distinctive antennae 'clubs'

Red-shouldered leaf beetle

Monolepta australis

DESCRIPTION

Larvae: White grub with brown plates at the head and tail, up to 10 mm long.

Adult: Golden yellow beetle around 6 mm long with dark red band across the shoulders and a dark red spot on each wing cover.

DAMAGE

Adults eat leaves. Larvae feed on plant roots but are not generally a problem in corn. Only occasionally a pest but can cause severe damage if present in large numbers.

MOST COMMON

Swarms appear from spring to autumn, particularly in coastal areas of northern NSW and Queensland.



Adult beetle (P Chew); Red-shouldered leaf beetle feeding on the leaf (QDAF)

Rutherglen bug

Nysius vinitor

DESCRIPTION

Nymph: Pear-shaped, reddish brown and wingless. Nymphs mainly feed on weeds.

Adult: Slender, dark grey bugs 5mm long with transparent wings and large black eyes.

DAMAGE

Sap sucking can dry out tassels and silks as well as damage leaves and husks. Can contaminate packed cobs.

MOST COMMON

Multiplies during spring and early summer in weed species. Usually moves into corn when other hosts are unavailable.



Rutherglen bug adult on a cob, in large numbers sucking sap from the tassel, and the resulting dried out tassels (A Ryland)

Sorghum head caterpillar

Cryptoblabes adoceta

DESCRIPTION

Caterpillar: Young larvae are beige but darken with age to brown or grey with darker stripes. Resemble armyworm but are smaller (up to 13 mm long) and lack the distinguishing three white stripes behind the head.

Adult: Slender mottled grey and reddish-brown moth up to 8 mm long. Wings are folded along the body.

DAMAGE

Caterpillars feed on silks and wrapper leaves of cobs.

Both larvae and their frass can be a contamination issue.

MOST COMMON

An occasional pest in NSW, Queensland and the NT. Mainly attacks sorghum.



Young sorghum head caterpillar with damage, and the caterpillar and moth close up (QDAF)

Symphyla

Scutigera spp.

DESCRIPTION

Juveniles and adults look like tiny (3–7 mm long), white, soft-bodied centipedes. The number of pairs of legs increases each time the animal moults, reaching a maximum of twelve pairs. If disturbed, symphilids move rapidly through pores and gaps in the soil to escape the light.

DAMAGE

While symphyla normally eat decaying vegetation, they will also attack germinating seeds, roots and root hairs. Heavy infestations can cause major losses of germinating seeds and seedlings.

MOST COMMON

Well structured, moist soils, particularly if temperatures are mild. Symphyla move up or down the soil profile in response to moisture levels, so are less likely to attack seeds in dry conditions.



Symphyla in close up (S Martinez) and with a damaged seed showing size (M Hinderager)

Tachinid flies

**Beneficial
insect** ✓

DESCRIPTION

Egg: Creamy oval egg, laid singly or in a small group, usually stuck directly onto the skin of a host caterpillar.

Larvae: White, carrot-shaped maggot that lives inside the host.

Adult: Tachinid flies have a very large size range. Most are grey or brown, similar to a housefly, but strongly bristled and often with a stout appearance.

BENEFIT

Larvae feed inside caterpillars such as heliothis. Although they do not kill the host immediately, it dies during pupation.

MOST COMMON

Any time of year.



Tachinid fly (P Chew) and attacking a heliothis caterpillar (QDAF)

White fringed weevil

Naupactus leucoloma

DESCRIPTION

Larvae: Whitish C-shaped legless grub with creamy head and black jaws, up to 15 mm long.

Adult: Pale grey-brown striped weevil with white side band and short broad snout. Up to 12 mm long. Adults cannot fly but can walk long distances.

DAMAGE

Larvae live in the soil where they eat plant roots. They

can kill young seedlings by chewing through the stem below the soil surface. Adults rarely cause major damage.

MOST COMMON

Mainly a pest of legumes such as peas and lucerne, but will attack corn especially if it is grown after a more susceptible crop. Larvae are active from autumn to spring, adults emerge during summer.



White fringed weevil larvae (S Andreoli BGA AgriServices) and adult

Wireworms — False and true

Gonocephalum spp., Family Elateridae

DESCRIPTION

Larvae: False wireworm larvae are smooth, golden to brown and up to 30 mm long with a round head and dark mouthparts. True wireworm larvae are creamy to light brown with a darker, reddish head and tail. They are softer bodied than false wireworms and the tail is usually forked with a serrated edge.

Adult: False wireworms mature into 'darkling' beetles. These dark, oval-shaped beetles have a thorax with flanged edges (like a pie dish). True wireworms become torpedo-shaped 'click beetles', so called because they can right themselves with a click if placed upside down.



False (Virginia Tech Extension) and true (GRDC) wireworm larvae

DAMAGE

Larvae live in the soil where they feed on germinating seeds, young plant roots and stem bases.

MOST COMMON

Most likely to be a problem when corn is planted in a field formerly planted with pasture or mulches.



Darkling beetle (adult false wireworm) (U Schmidt) and click beetle (adult true wireworm)

Yellow peach moth

Conogethes punctiferalis

DESCRIPTION

Caterpillar: Up to 20 mm long with a dark head. Creamy yellow to bright pink body with dark spots at maturity.

Adult: Bright orange yellow moth with spotted black markings. Wings held out from body.



DAMAGE

Caterpillars feed on developing cobs.



MOST COMMON

December to May.



Young yellow peach moth caterpillar, caterpillar with feeding damage in corn (QDAF) and adult moth (J Tann)

Diseases

Boil smut

Ustilago maydis

SYMPTOMS

The fungus infects any rapidly growing part of the plant, commonly the cobs, but also stems, tassels and leaves. Pale green to grey galls form and enlarge, reaching up to 150 mm diameter on the cobs. These eventually burst, releasing masses of dark spores.

FAVOURED BY

Infection is increased if corn is physically damaged, as well as by high soil nitrogen. Spores are carried on the wind and in irrigation water,

while resting spores on crop residues are known to potentially survive in the soil for more than 15 years.



Boil smut on a tassel (B Watt Uni Maine Bugwood.org), cob (CIMMYT) and leaf (Z Bliska)



Brown spot

Physoderma maydis

SYMPTOMS

Small, oval chocolate brown lesions develop, usually initially in the leaf axils and whorls. Dark spots appear along the mid ribs with lighter, rust-like spotting on the leaf blade. Severe infection can result in plants collapsing.

FAVOURED BY

Warm (23–30°C) and humid weather. Infection requires free water, so is more likely after heavy rain. Most common on the Atherton Tablelands.



Brown spot lesions on petiole (QDAF) and leaf (D Mueller Iowa State Uni Bugwood.org)

Damping off

Pythium spp., *Fusarium* spp., *Sclerotinia rolsfii*, *Rhizoctonia solani*

SYMPTOMS

Crop emergence is poor. Seedlings that do emerge wilt, lose colour and have stunted growth. Water-soaked, brown lesions appear on the emerging stem near the soil junction and plants may collapse.



Damping off of corn seedling, showing brown lesion near the soil junction (WM Brown Bugwood.org); *Sclerotinia rolsfii* fungus on soil, showing white mycelium and round, brownish sclerotes (resting structures)

FAVOURED BY

Wet soil conditions. The different fungi responsible for damping off can survive in the soil for extended periods, either as resting spores or in crop residues.

Fusarium cob rot

Fusarium vertilliodes, *F.* spp.

SYMPTOMS

White to pale pink fungal growth can affect individual kernels or extend over the whole cob. White streaks radiating from the tips of individual kernels ('starburst') are characteristic of the disease. The mould produces toxins in the infected cob.



Fusarium cob rot (QDAF) and in close-up, showing typical 'starburst' pattern of fungal threads (OMAFRA)

FAVOURED BY

High temperatures and moisture stress. Infection is more likely if insects damage cobs or kernels split due to uneven irrigation. Commonly found in central to southern NSW.

Head smut

Sphacelotheca reiliana

SYMPTOMS

Unlike boil smut, head smut only affects the cob and silk. Tassels become distorted and develop masses of black spores. The husks of infected cobs grow into a teardrop shape and lack silks. Inside, large smut galls bursting with black spores usually replace the entire cob. Within this mass, the vascular system remains relatively intact, giving the spore bundle a distinctive, stringy appearance.



Head smut (RL Croissant Bugwood.org)

FAVoured BY

Infection usually occurs when plants are seedlings, although symptoms are not expressed until flowering and cob formation. Spores can survive at least 5–7 years in cool, dry soils with infection most likely under warm (20–30°C), dry conditions.



Java downy mildew

Peronosclerospora maydis

SYMPTOMS

Pale green to yellowish striping develops along the leaf veins. These have clear borders, with the affected area increasing as the plant grows. Downy growth may appear on either side of the leaf surface. Mature plants are stunted and distorted, forming multiple or deformed cobs.



Leaf striping due to downy mildew (B Kemerait Uni Georgia Bugwood.org)

FAVoured BY

Infection most commonly occurs in seedlings, with plants becoming more resistant with age. Sorghum is also a host, which is why the disease is mainly found in drier areas of north Queensland.

Northern / Turcicum leaf blight

Exserohilum turcicum

SYMPTOMS

Elongated grey-brown lesions develop, often with a yellow halo. These expand, and greyish streaks eventually cover much of the leaf surface. Initial infection is often in the lower leaves. In moist weather masses of dark spores are produced inside the lesions.

FAVOURED BY

Warm, wet conditions, as can occur with heavy dew or overhead irrigation. Spores survive in crop residues and are spread by wind and irrigation water.



Initial (W Khampanich) and more advanced (OMAFRA) symptoms of northern leaf blight

Rust — common

Puccinia sorghi

SYMPTOMS

Elongated, reddish-brown pustules appear scattered over both the upper and lower leaf surfaces. As these mature they turn brownish black. Leaves yellow and can become fragile.

FAVOURED BY

Warm (16–24°C) weather combined with high humidity or heavy dews. Spores are easily spread by wind and can disperse long distances. Some sweet corn varieties are resistant to common rust.



Common rust symptoms and close-up of pustules

Rust — tropical / Polysora

Puccinia polysora

SYMPTOMS

Oval, orange-brown pustules up to 2 mm long appear scattered over the upper leaf surfaces. Spots can also develop on the stems and husks. As these mature they turn brownish black. Leaves yellow and can become fragile.

FAVOURED BY

Warm to hot conditions combined with high humidity, as occurs in northern Queensland. Polysora can be distinguished from common rust by its lighter colour, absence from lower leaf surfaces and presence on stems.



Symptoms of tropical rust on the corn plant upper leaf surface and stem (Uni Nebraska)

Virus — Johnsongrass mosaic

SYMPTOMS

Stippled patches of light and dark green develop on the leaves, particularly appearing as broken lines running parallel with the veins. Leaves become yellowed with a marbled appearance. Plants are stunted and yield is reduced.

FAVOURED BY

Transmission is by aphids or mechanical injury. Johnson grass and wild sorghum act as reservoirs for the virus, which is widespread in NSW and Queensland.



Virus symptoms on the plant and close-up of leaf (QDAF)

Virus — maize stripe

SYMPTOMS

Initially appears as small yellow flecks in the young leaves. These broaden and expand with plant growth, forming wide, pale yellow stripes parallel with the veins. Affected plants are stunted and deformed.

FAVOURED BY

Although commonly found in coastal areas, it is usually a minor issue. The virus is transmitted by the maize planthopper.



Maize stripe disease (CIMMYT)

Disorders

Blanking

SYMPTOMS

Blank areas or unevenly sized kernels occur on the cob. This can be a particular problem on the tip of the cob, which fails to develop kernels.

CAUSED BY

Usually due to wet conditions or hot, dry and windy weather during pollination. Stress caused by too much or too little water, nutrient deficiencies or high night temperatures (over 22°C) during pollination and tip filling can also cause blanking. Tip blanking can be a varietal

effect, but may not be a problem if corn is processed.



Severe blanking, caused by heat stress during pollination (P Deuter QDAF); Partial (top) and tip blanking

Boron deficiency

SYMPTOMS

Younger leaves are inrolled, erect and brittle, developing pale yellow streaks and mottled appearance. Plants are shortened with stout, oval stems. Boron affects silk development and pollination, so cobs are curved, small and/or have blank areas.

CAUSED BY

Alkaline or strongly acid sandy soils, particularly in cold weather or very dry conditions.



Boron deficiency symptoms in leaves (JE Espinosa IPNI) and cobs (QDAF)

Calcium deficiency

SYMPTOMS

New leaves develop pale, whitish lesions that tear easily. In severe cases the youngest leaves tend to inroll with leaf tips remaining joined to together, causing a ladder-like appearance.

CAUSED BY

Most likely in acid ($\text{pH} < 5.0$), sandy soils or soils high in sodium, magnesium or potassium.



Calcium deficiency symptoms (MK Sharma & P Kumar IPNI)

Copper deficiency

SYMPTOMS

Younger leaves are yellowed as they emerge. Leaves develop a distorted, twisted habit and may brown and crack along the edges. Yellowing between

the veins gives leaves a striped appearance.

CAUSED BY

Most likely on acid ($\text{pH} > 7.5$), organic soils.



Distorted leaves due to copper deficiency (T Yamada IPNI)

Iron deficiency

SYMPTOMS

Iron is immobile in the plant but is needed for chlorophyll formation. Distinct and severe yellowing between the veins therefore develops in the youngest leaves. Plants develop a striped appearance. Symptoms are similar to manganese deficiency, but chlorotic areas have a more distinct boundary, with veins remaining green.

CAUSED BY

Insufficient iron available to the plant. Worst in sandy soils with low organic

matter, or those with a high pH (>7). Iron deficiencies are more likely in cool, damp springs. Symptoms are worst on seedlings.



Initial yellowing between the veins due to iron deficiency gives a striped appearance to the younger leaves (MK Sharma and P Kumar IPNI)

Magnesium deficiency

SYMPTOMS

Bright yellowing of the older leaves, initially between the veins. Yellowing starts from the leaf tip and margins and spreads inward towards the central rib. This develops into a characteristic reddening or browning, with only the central rib area remaining green and the leaf edges becoming dry and papery.

CAUSED BY

Deficiency is most likely in acid, sandy soils. High levels

of calcium and potassium in the soil can make magnesium unavailable to the plant.



Magnesium-deficient plant and close-up of leaf showing reddish colour between the centre vein and leaf edge (MK Sharma and P Kumar IPNI)

Manganese deficiency

SYMPTOMS

Manganese is immobile in the plant but is needed for chlorophyll formation. Yellowing between the veins therefore occurs in the youngest leaves. Plants can develop a striped appearance. Pale, streaky lesions may occur in severe cases. Cobs are malformed, with poor or uneven kernel development.

CAUSED BY

Deficiency is associated with $\text{pH} > 8$, particularly in chalky soils.



Interveinal yellowing on young leaves due to manganese deficiency (MK Sharma & P Kumar IPNI)

Nitrogen deficiency

SYMPTOMS

As nitrogen is mobile in the plant, yellowing is initially observed in the older leaves. Symptoms can then spread to the whole plant, which becomes pale and spindly. Older leaves may die prematurely. Yellowing tends to appear in a V-shape, starting at the leaf tip and progressing down the midrib to the leaf base.

CAUSED BY

Insufficient nitrogen is most likely in cold, waterlogged soils lacking organic matter. Heavy rain and high carbon crop residues can remove

nitrogen from soils, especially from light, sandy soils.



Nitrogen deficient leaves compared to healthy leaf at right



Symptoms of nitrogen deficiency on a leaf (GR Pugliese IPNI) and whole plants (MK Sharma & P Kumar IPNI)

Overmaturity

SYMPTOMS

Kernels develop dimples and/ or individual kernels brown and soften, developing a fermented flavour. Cobs lack sweetness.

CAUSED BY

Incorrect assessment of maturity, resulting in late harvest. Fermentation

can occur in supersweet varieties, especially under warm, humid conditions. Harvest should occur at the milk stage (squeezed kernels release milky liquid), before cobs start to dry, and convert sugars to starch.



Dimpled kernels due to overmaturity (QDAF)

Phosphorus deficiency

SYMPTOMS

Older leaves develop reddish purple leaf tips and margins. Occurs most frequently in young seedlings, which tend to be small with reduced vigour. Older plants have a shallow root system, silk emergence is delayed and cobs have missing kernels.

CAUSED BY

Soils low in organic matter or high in iron, which ties up phosphorus in a less available form. Symptoms are most likely in cold soils that are excessively wet or dry.

Note: seedlings of some varieties develop purple colours even when phosphorus is adequate.



Phosphorus deficient seedlings and symptoms on a mature leaf (MK Sharma & P Kumar IPNI)

Potassium deficiency

SYMPTOMS

Yellowing and then browning of the older leaves starting at the leaf tip and outer margin. Symptoms usually don't appear until at least a month after planting. As the plant grows the lower leaves yellow and die back from the tip.

CAUSED BY

Heavy rain leaching potassium from the soil, especially if early root growth has been limited by dry or compacted soil. Excess calcium and magnesium reduce potassium availability.



Potassium deficient leaf and resulting death of the older leaves in a crop (MK Sharma & P Kumar IPNI)

Salinity

SYMPTOMS

Seed germination may be slow and patchy. The tips and margins of the older leaves become yellowed and necrotic. Leaves are short, erect and may tend to inroll along the margins. Severe salinity can kill plants.

CAUSED BY

High levels of salts, especially sodium chloride, in the soil and/or irrigation water. While salt tolerance differs widely between varieties, water with an EC reading >1.5 dS/m may affect growth.



Effect of high levels of dissolved salts on plant leaves

Sulphur deficiency

SYMPTOMS

Younger leaves are pale to yellowed. Yellowing may be interveinal, or quite diffuse across the leaf. Plants are stunted with delayed maturity.

CAUSED BY

Most likely in sandy, acid soils with low organic matter, especially if conditions are cold and dry after planting.



Yellowing of the younger leaves may be interveinal (R Taylor Uni Delaware) or diffuse (MK Sharma & P Kumar IPNI)

Uneven germination or growth

SYMPTOMS

Crop fails to grow uniformly.

CAUSED BY

Possible causes include changes in soil type, uneven planting depth, poor seed quality or old seed, planting too deep early in the season

(increasing seed rots), planting while soil temperatures are still below 13°C and uneven watering resulting in dry or waterlogged areas. Soil borne fungi and nematodes can also cause this effect.



Uneven crop of sweet corn

Zinc deficiency

SYMPTOMS

A broad creamy white to translucent band appears either side of the midrib, starting at the bases of younger leaves. Bleaching does not normally extend as far as the leaf tip; the leaf margins and midrib usually remain green. Plants are stunted due to shortened lengths between the leaf nodes.

sandy or low in organic matter due to removal of the topsoil. High levels of soil phosphorus reduce uptake of zinc.



CAUSED BY

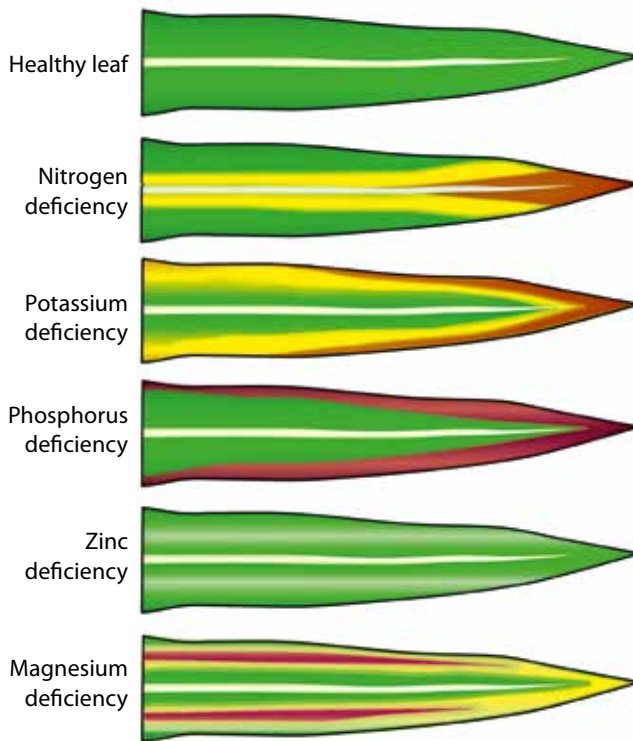
Usually occurs in soils with $\text{pH} > 7$, especially where soil is



Zinc deficient plants and leaf showing white band either side of the midrib (MK Sharma & P Kumar IPNI)

Nutrient deficiency symptoms

The following is a diagrammatic representation only. Note that symptoms can vary significantly between cultivars, environments and soil types.



Problem solver for sweet corn pests, diseases and disorders

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