Crop Walkers' Guide

Pear

HDC is a division of the Agriculture and Horticulture Development Board

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Introduction

Every year a significant proportion of the UK pear crop would be lost to insect pests and diseases if growers didn't monitor their crops and employ effective crop protection strategies.

This Crop Walkers' Guide is aimed at assisting growers, supervisors and their staff in the vital task of monitoring pear crops. It is designed for use in the field to help with accurate identification of pests, their predators and diseases within a crop.

Images of key stages in the life cycles of pests, predators and diseases are included along with short easy-to-read comments to help with identification.

As it is impossible to show every symptom of every pest or disease, growers are advised to familiarise themselves with the range of symptoms that can be expressed and be aware of the new problems that occasionally arise.

This Guide does not offer any advice on the measures available for controlling these pests or diseases as both chemical active ingredients and their approvals frequently change. However, having identified a particular pest or disease in their crop, growers should acquaint themselves with the currently available control measures.

Scott Raffle

Horticultural Development Company

Invertebrate Pests

A

Pear-bedstraw aphid

(*Dysaphis pyri*)

- The most important aphid pest on pear.
- The aphid affects plant growth and produces honeydew. Distorted leaves turn yellow. The adults are medium in size, plump, grey/pink in colour and covered in mealy wax. Antennae are shorter than the body and siphunculi are moderate in length, flanged at the end.
- Overwinters as an egg on spurs and branches of pear. Eggs hatch at white bud and colonise rosette leaves. Invades young shoots and persists beyond June. Winged forms migrate to bedstraw and cleavers from June.

Black bean aphid

(*Aphis fabae*)

- Cosmopolitan pest, also found on apple, pear and quince. Most common on rootstocks and young trees.
- Occurs during the summer and causes leaf curling and, in extreme cases, stunting of growth and death of shoots. Adults are dull black or dark olive green with irregular patches of wax on the back. The siphunculi are short and tapered.
- Overwinters as an egg on its primary host, spindle (*Euonymus europaeus*).

Pear-coltsfoot aphid

(*Anuraphis farfarae*)

- A minor pest of pear.
- Leaves become twisted and folded back along the midrib and are usually green. Colonies do not usually tend to spread to other leaves. Adults are small, plump and dark purple/brown in colour with short antennae. Siphunculi are dark, short and tapered. Cauda are short and broad. Nymphs are yellow/green in colour.
- Overwinters as an egg on pear. Hatches in spring, feeding on leaves and spurs. Moves to coltsfoot roots in late May then returns to lay eggs on pear in the autumn.

Pear-parsnip aphid

(*Anuraphis subterranea*)

- A minor pest of pear, which is not of economic importance.
- Leaves become twisted and folded back along the midrib and turn characteristically red. Colonies do not usually tend to spread to other leaves. Adults are small, plump and dark purple/brown in colour with short antennae. Siphunculi are dark, short and tapered. Cauda are short and broad. Nymphs are brown/green to brown/black in colour.
- Overwinters as an egg on pear. Hatches in spring feeding on leaves and spurs. Moves to umbelliferous plants in late May then returns to lay eggs on pear in the autumn.

Common green capsid

(*Lygocoris pabulinus*)

- Widespread pest of apple and pear which can cause significant damage in some years.
- Nymphs and adults puncture leaves in shoot tips causing holes and shoot distortion. Nymphs puncture developing fruits causing irregular corky scars and misshapen fruits.
- Overwinters in the shoots of woody plants including apple and pear and especially on rootstock sucker growth. Adults feed on shoots and fruits until early May when they migrate to herbaceous hosts.

Pear sucker

(*Cacopsylla pyri/pyricola*)

- Probably the most important pest of pear and a vector of Pear decline (Parry's disease).
- Blossoms and developing fruit buds can be attacked. Heavy infestations lead to misshapen fruits and premature leaf fall. Honeydew production encourages the growth of sooty moulds. Adults are 1.5-3.0mm long and orange/red to black in colour.
- Overwinters as adults and begins to lay eggs as early as February in spurs, later laying on young leaves. There are three or more generations per year if weather is dry and warm.

Pear leaf midge

(*Dasineura pyri*)

- A widespread pest of pear. Trees with vigorous shoot growth are attacked most heavily. Important on nursery or young trees during establishment.
- Larvae feed on young leaves and water shoots, preventing the leaf from unrolling. Feeding causes tight leaf curling and distorted leaves which eventually redden then die and turn black.
- Typically there are three generations per year with adults emerging in late April or May, often during or shortly after bloom.

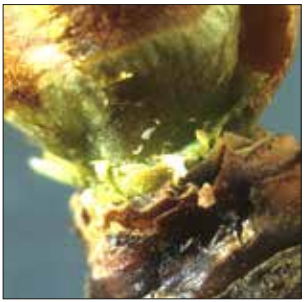
Pear midge

(*Contarinia pyrivora*)

- A widespread pest of pear fruits which causes considerable fruit loss when it occurs.
- Larvae feed on developing fruitlets forming a blackened cavity inside. Fruits appear swollen or deformed and eventually drop to the ground.
- One generation occurs each year. Eggs are laid in open blossoms on the anthers in late April or May, often during or shortly after bloom.

Pear leaf blister mite

(*Phytoptus pyri*)



- A widespread pest which can be common, but a minor pest of pear.
- Leaf tissue becomes blistered, starting on the underside (green/yellow pimples), followed by pocket like galls on the upper surface (red), 2-4mm in diameter. Feeding can spread to fruitlets.
- Adults overwinter under bud scales. Feeding on leaves begins in the spring and continues throughout the summer.

Rust mite

(*Epitrimerus pyri*)

- A widespread and damaging pest of pear.
- Bronzing occurs on the underside of leaves and russeting of fruit appears around the calyx.
- Mites overwinter under bud scales and bark. Rapid lifecycle with many overlapping generations through the growing season.

Pear slug sawfly

(*Caliroa cerasi*)

- A widespread, but locally common pest of pear and cherry.
- Leaf feeding causes skeletonised effect on upper side of the leaves, turning brown on the underside. Severe attacks lead to premature leaf drop. Larvae are up to 1cm long, white in colour, turning shiny black. The body is pear-shaped with inconspicuous legs.
- Adults appear from May to June. Pupation occurs in the soil.

Fruit tree tortrix

(*Archips podana*)

- A moderately important pest of pear.
- Young caterpillars make small, shallow holes in the skin of fruits in July and August. Larger caterpillars graze shallow, irregular patches in the skin, especially at the point where fruits are in contact.
- One main generation occurs per year and a partial second generation in August and September.

Summer fruit tortrix

(*Adoxophyes orana*)

- An important secondary pest of apples and pears, especially in East and South East England.
- Overwintering larvae feed in the blossom clusters and can graze on the receptacle of the flower and young fruitlets. These heal to form early scars. First and second generation larvae cause small holes and grazing on the fruit skin from July until September.
- Two generations occur per year.

Winter moth

(*Operophtera brumata*)

- An important pest of pear which causes direct damage to fruit.
- Larvae emerge in spring and feed on foliage and fruitlets until June, biting holes in fruits, which either drop prematurely or develop into malformed fruits with corky scars.
- Adult females crawl up the trunk in winter and lay eggs in crevices in the bark. One generation occurs per year.

Codling moth

(*Cydia pomonella*)

- A widespread but occasional pest of pear.
- Eggs are flat, oval, clear and 1mm across. Larvae are up to 2cm, white to pink in colour with a brown head capsule. Single larvae eat through the skin of fruit and burrow to the seeds in the centre. Dry brown frass often appears at the surface of the fruit and in the cavity. Larvae can enter through the fruit calyx.
- Adults occur in mid to late May and again in the summer, with one complete and one partial generation. Most larvae overwinter in cocoons after feeding in the soil or bark of the tree.

Clouded drab

(*Orthosia incerta*)

- A minor pest of apple and pear, feeding on foliage and fruits in early summer.
- Larvae have a single pale stripe down the back and move with a looping action. Early larvae feed in blossom trusses and later on can make large holes in fruits.
- Adults occur from March to early June.

Pear bud weevil

(*Anthonomus piri*)

- Normally a pest of apple, but sometimes damages pear.
- Feeding damage by adults occurs on petioles, buds and spurs, resulting in leaf and bud death. Eggs are laid on fruit buds and the larvae feed on the bud resulting in a deformed bud where the larvae can be found.
- One generation occurs per year. Feeding occurs in May and June.

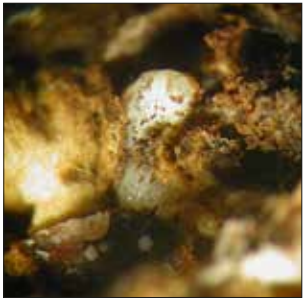
Common leaf weevil

(*Phyllobius pyri*)

- Common on pear but of little importance.
- Adults are copper, golden or green in colour with stout rostrum (snout). Feeding damage is seen as notching or holes in the leaves and flower petals.
- Eggs are laid in the soil and adults emerge in the spring. Also feed on nettle.

Rhynchites weevil

(*Tatianaerhynchites aequatus*)



- Normally a pest of apple, but sometimes feeds on pear.
- Adults have chestnut brown body and darker head with long rostrum (snout). Feeding damage by adults results in corky, indented, puncture marks on the fruits, sometimes many punctures appearing per fruit.
- One generation occurs per year. Hawthorn is the usual host. Adults feed and lay eggs from May to June.

Wasps

- Can be a problem for fruit pickers if abundant in orchards.
- Attracted to the honeydew of pear sucker.
- Also an important aerial predator of other insects.

Mammal damage

- Deer and rabbits are common and local pests of pear.
- They commonly strip the bark at ground level or higher for deer.
- Damage often occurs during the winter months when other food sources are scarce.

Bird damage

- Usually insignificant with only occasional fruits damaged.

Introduced and Naturally Occurring Predators

B

Predatory bugs

- Includes Anthocorids, important predators of pear sucker, but also species of Mirid and *Orius*.
- Feed on a variety of pests, including aphids, midge larvae, scale insects, pear sucker, mites, caterpillars and insect eggs.
- Both adults and nymphs are predatory.
- Adults are good flyers and can migrate into orchards.

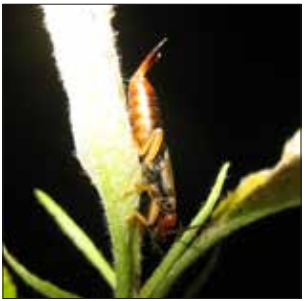
Lacewings

- Particularly good predators of aphids.
- All larvae and some adults are predators.

Ladybirds

- Aphids are the preferred prey, but ladybirds will also feed on moth eggs, midge larvae, small caterpillars and mites.
- Both adults and larvae are predatory.
- All stages of the lifecycle can be found in the crop.

Earwigs



- Very important predators of pear sucker. Also feed on scale insects, midge larvae, codling moth eggs, aphids and caterpillars.
- A useful nocturnal generalist predator on perennial crops.
- Over-winters in soil in and around the orchard.
- Can feed on shoots causing minor damage along mid-rib or on anthers of flowers.

Predatory beetles

- Generally found feeding on soil stages of pests on the ground, including caterpillars; only occasionally found feeding on trees.
- Both larvae and adults of many species found in orchards are predatory.
- Some rove beetles can be seen feeding in trees at night.

Spiders and harvestmen

- Web-spinning or actively hunting generalist predators of many fruit pests.
- Predatory potential in orchards probably underrated as they are often active at night.

Parasitoid wasps and flies

- Parasitic flies and wasps are important biocontrol agents of many insect pests including aphids, fruit flies and caterpillars.
- Different species of parasite may be specific to different species of pest, e.g. *Platygaster demades* for pear leaf midge.
- Adult wasps lay eggs in aphids, which then have a characteristic mummified appearance.
- Larvae usually develop internally, but can be external.

Predatory midge larvae

(*Aphidoletes aphidimyza*)

- Important in June-August for control of aphids.
- Female lays eggs near to aphid colonies.
- Larvae are the predatory stage.

Hoverflies

- Larvae feed mainly on aphids, but also other small prey.
- Adults are not predatory, but many feed on pollen and nectar, so may contribute to pollination.

Predatory mites

- *Typhlodromus pyri* has 3-4 generations per year and is an excellent predator of rust mite.
- Predatory mites are very small and active. They are normally colourless or pale depending on what they have been feeding on.
- Commonly seen on the underside of leaf bases where many of their prey are found.

Bacillus thuringiensis

- Widely used as a foliar spray to control feeding caterpillars.
- Bacterial toxin paralyses and destroys the cells of the insect's gut wall, allowing the gut contents to enter the insect's body cavity and bloodstream.
- Poisoned insects die within two or three days, but stop feeding soon after ingesting.

Parasitic nematodes

- These minute worm-like parasites (microscopic) occur naturally, but can be applied as a drench to control diapausing caterpillars.
- They kill their prey by causing septicemia.

C

Fireblight

(*Erwinia amylovora*)

- One of the most important diseases of pear. Young pear trees are especially at risk.
- Initial symptoms appear as dead blossom and infection of growing shoots. When cut, cankers present on larger branches are dark green-brown, often water soaked and with an indistinct margin between healthy and infected tissue.
- Infected fruits have dark water soaked areas resembling a bruise. Milky bacterial ooze may be present. Shoot infection can be confused with Nectria canker (see C.3).

Brown rot

(*Monilinia fructigena*)

- An important disease of pear, resulting in significant fruit losses in store and in the orchard.
- The fungus infects fruits through wounds (caused by pest and bird damage).
- Infected fruit exhibit a mid-dark brown circular rot and later, become covered in buff-coloured pustules, usually in concentric rings.
- The fungus overwinters both as cankers and on mummified fruit on the tree and orchard floor. Cankers are usually located at the base of fruiting spurs.

Canker

(*Neonectria distissima* formerly *Nectria galligena*)

- An important disease on pear causing cankers on trees and rots in store.
- The fungus enters the host through natural/artificial wounds and lenticels including leaf scars, pruning wounds and fruit scars. It can also enter through wood and fruit lesions caused by Venturia pirina (see C.7). Infected branches exhibit internal brown staining when cut.
- Infection is most often seen on young shoots, causing die-back. It can be confused with fireblight (see C.1). Presence of distinct canker at shoot base confirms the problem as canker.

Armillaria root rot

(*Armillaria* spp.)

- A common and widespread fungus which causes death to the roots of plants.
- Infection can be confirmed by removing the bark below the soil line at the base of the tree. A creamy/white layer of mycelium and a scent of mushrooms confirms the presence of this fungus.
- Often present in the orchard as a patch of affected trees with dead or missing trees in the centre, surrounded by yellowing trees and then trees with poor terminal growth.

Silver leaf

(*Chondrostereum purpureum*)

- A wood rotting fungus that frequently attacks pear trees, particularly those that have undergone heavy pruning.
- The leaves of affected trees have a characteristic silver appearance. Affected branches, when cut, often show purple discolouration in the wood.
- Bracket-shaped fruiting bodies are produced on dead branches in the autumn. These have a light purple lower surface and a pale brown hairy upper surface (variable in size and shape, usually 1.5-3cm across and 0.2-0.5cm thick).

Pear rust

(*Gymnosporangium sabinae*)

- Increasing in incidence in UK pear orchards, particularly in organic production.
- On the upper surface of leaves, bright orange to red spots with black dots appear in summer to early autumn. As infection develops, clusters of brown flask-shaped bodies (cluster cups) develop on the lower surface.
- The fungus infects an alternate host (Juniper species) and produces horn-like growths in spring. Spores then re-infect pear.

Pear scab

(*Venturia pirina*)

- An important disease of pears which can cause significant crop losses particularly when weather conditions are favourable in the early part of the season.
- Pear scab infects all aerial parts of the tree, most notably leaves, fruits and shoots.
- On shoots, lesions appear as brown, velvety spots early in the growing season. Later, these twig lesions become corky, canker-like spots with few conidia. The following spring, the corky outer skin breaks away from the lesions, exposing small blister-like pustules with conidia – wood scab.

Powdery mildew

(*Podosphaera leucotricha*)

- Powdery mildew on pears is usually not as prevalent and important as it is on apples.
- Leaves of pear are very occasionally infected with mildew, which appears as whitish felt-like patches on the underside of leaves.
- The more usual symptom appears on fruit. Initially the disease shows on young fruit as a small white felty patch. This develops into russet patches on the fruit with white mycelial growth of the mildew, visible with the aid of a hand lens, around the margins.

Sooty blotch and Fly speck

(*Gloeodes pomigena* and *Schizothyrium pomi*)

- Two distinct diseases of pear which tend to occur in wet seasons particularly in shaded areas of the orchard and near wind breaks.
- The fungi cause sooty-like discoloration (sooty blotch) or black shiny dot blemishes (fly speck) on near mature fruit. Symptoms of sooty blotch may be confused with those caused by sooty mould, caused mainly by species of Alternaria and Cladosporium (another type of superficial mould associated with the honey dew produced by sap-sucking pests, especially pear sucker-see A.5).

Pear stony pit virus

- Stony pit is a destructive virus disease of pear caused by infection of deformed fruit.
- The first symptoms of stony pit are dark green areas on developing fruits. As the fruit develops further it becomes pitted and deformed in affected areas due to the restriction of cell growth. When cut, the tissue at the base of the pit is composed of stone cells and is usually necrotic. Chlorotic spotting or streaks on leaves may also be present.
- Fruit symptoms can be confused with those caused by hale damage, capsid damage (see A.6) or boron deficiency.

Brown spot of pear

(*Stemphylium vesicarium*)

- This disease is comparable to apple scab in importance in pear growing regions in continental Europe.
- The disease occurs on leaves, fruit, and stalks and to a lesser extent on twigs. Initially the spots on young fruits are circular, brown, and range from 1 to 2mm in diameter, and are sometimes surrounded by a red halo. Later, on mature fruit, spots increase to 1 to 2cm in size.
- Leaf symptoms consist of brown spots, ranging from 1 to 3mm in diameter and blackening of the vein of the leaf. Severe leaf infection can result in premature defoliation.

Bacterial blossom wilt

(*Pseudomonas syringae* pv. *syringae*)

- Caused by a bacterium which attack blossoms, fruits, leaves and wood.
- The bacteria are a natural constituent of the plant surface microflora and it is only under certain conditions that these bacteria cause disease. Cold wet periods during blossom and frost injury predispose flowers to attack.
- Upon flower infection, blackening spreads throughout the blossom truss and the entire spur is killed, leaving black dead blossoms. On developing fruits, black lesions occur at the calyx end after petal fall. On leaves, small black, inconspicuous spots develop.

Pear decline

(Parry's disease)

- A widespread disease of pear caused by a Phytoplasma. The disease is graft transmissible and naturally transmitted by the pear sucker (*Cacopsylla pyricola* - see A.5).
- First symptoms appear in autumn when leaves of affected trees develop a premature red colour followed by early leaf fall. The following spring terminal growth is reduced or may cease completely and leaves are few, small and light green with up-rolled margins.
- A necrotic brown line is visible in the bark at the graft union of decline-affected trees.

Acknowledgements

The HDC is extremely grateful to the following people for their help in compiling this Pear Crop Walkers' Guide:

Michelle Fountain (East Malling Research) who managed the overall production of the Guide and provided both the images and the text for the invertebrate pests and predators sections.

Robert Saville (East Malling Research) who provided the images and the text for the disease section.

Photographic credits

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C2 (TL) Brown rot on conference pear, **Wageningen**
C2 (TR) Brown rot mummies of pear, **EMR**
C2 (BL) Blossom wilt caused by Monolinia fructigena, **EMR**
C2 (BR) Canker caused by Monolinia fructigena, **EMR**
C3 (TL) Nectria wood canker, close up, **EMR**
C3 (TR) Nectria wood canker at base of branch, **EMR**
C3 (BL) Nectria canker showing red perithecia on apple, **Wageningen**
C3 (BR) Branch dieback caused by Nectria, **EMR**
C4 (TL) Armillaria mycelium beneath bark at the base of the tree, **RHS**
C4 (TR) Armillaria toadstools, **RHS**
C4 (BL) Apple tree infected with Armillaria, **RHS**
C4 (BR) Early symptoms of Armillaria root rot, **EMR**

C5 (T) Silver leaf symptoms on pear, **EMR**
C5 (BL) Silver leaf symptoms on plum – healthy on left, **EMR**
C5 (BR) Chondrostereum purpureum fruiting bodies on dead wood, **EMR**
C6 (TL) Pear rust foliar symptoms, **RHS**
C6 (TR) Pear rust upper leaf symptoms, **Umpelby**
C6 (BL) Pear rust lower leaf symptoms, **Agro-Insight**
C6 (BR) Pear rust fruit symptoms, **Umpelby**
C7 (TL) Apple leaf scab, **RHS**
C7 (TR) Pear fruit scab, **RHS**
C7 (BL) Sporulating wood scab, **EMR**
C7 (BR) Wood scab, **EMR**
C8 (TL) Powdery mildew on apple leaf, **EMR**
C8 (TR) Powdery mildew on pear, **Wageningen**
C8 (BL) Powdery mildew on pear – close up, **Wageningen**
C8 (BR) Powdery mildew russet on pear fruit, **EMR**
C9 (TL) Fly speck and sooty blotch on apple, **Wageningen**
C9 (TR) Fly speck on apple, **EMR**
C9 (BL) Sooty blotch on apple, **Wageningen**
C9 (BR) Sooty blotch on pear, **Wageningen**
C10 (L) Stony pit virus affected fruit, **EMR**
C10 (R) Stony pit virus internal symptoms, **EMR**
C11 (TL) Brown spot necrotic lesion on leaf, **Wageningen**
C11 (TR) Brown spot necrotic lesion on leaf, **Wageningen**
C11 (BL) Brown spot lesion on fruit, **Wageningen**
C11 (BR) Brown spot lesion on fruit, **Wageningen**
C12 (TL) Pseudomonas syringae on pear, **Wageningen**
C12 (TR) Pseudomonas syringae on pear, **Wageningen**
C12 (BL) Pseudomonas canker on Prunus, **EMR**
C12 (BR) Dieback caused by Pseudomonas, **EMR**
C13 (TL) Pear decline affected tree – healthy on right, **EMR**
C13 (TR) Pear decline affected tree – healthy on right, **EMR**
C13 (BL) Pear decline affected tree – healthy on left, **EMR**
C13 (BR) Pear decline – necrotic brown staining at the graft union, **EMR**

Key
Image position: (T) = Top, (B) = Bottom, (L) = Left, (R) = Right
Image source:
Agro-Insight = Agro-Insight
Bird = Colin Bird, Agrii
EMR = East Malling Research
Interfarm = Interfarm UK Ltd
MSU = Michigan State University
RHS = Royal Horticultural Society
Umpelby = Roger Umpelby
Wageningen = Wageningen UR, Netherlands

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