Crop Walkers' Guide

Stone Fruit

HDC is a division of the Agriculture and Horticulture Development Board

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Credits

Introduction

Every year a significant proportion of the UK stone fruit 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 stone fruit 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

Spotted wing drosophila

(*Drosophila suzukii*)

- This is a notifiable pest.
- Egg laying gives rise to stings on the surface of fruits followed by collapse of fruit as the larvae feed. Egg breathing tubes may be visible protruding from fruit surface.
- The larvae are small and white. Pupae may also be present in fruit.
- The pest has many life cycles and moves from crop to crop including cherry. Monitor adults with vinegar traps.

Damson-hop aphid

(*Phorodon humuli*)

- A spring pest of plum, damson and sloe.
- Found on underside of leaves especially on growing shoots. Diagnostic feature is a pair of protuberances between the antennae on the head. Adults are pale yellow-green with one dark stripe down the back and on each side.
- From May, winged forms migrate to hops returning to winter hosts in September to lay eggs. The aphid produces honeydew and sometimes causes slight curling of the leaves. It also transmits plum pox virus.

Leaf-curling plum aphid

(*Brachycaudus helichrysi*)

- This is often a serious pest of plum. Adults are yellowish-green, small rounded and shiny (difficult to see).
- Over-wintering eggs hatch before bud burst and aphids migrate to alternate hosts (*Aster, Chrysanthemum* and clover) in May. Return to plum occurs in autumn when over-wintering eggs are laid.
- Damage caused is primarily leaf curl and distortion. Nymphs feed at the base of fruit buds, later attacking fruit/leaf buds and young shoots. Stunting of growth may occur. This aphid also transmits plum pox virus.

Mealy plum aphid

(*Hyalopterus pruni*)

- A pest of plum, damson and occasionally peach.
- This aphid has a waxy appearance and is pale green with a bluish-grey tinge. Eggs are laid in autumn and hatch in spring with colonies developing on the underside of leaves well into the summer.
- Migration to reeds and waterside grasses occurs in the summer, followed by a return to plum in autumn.
- Leaves turn yellow and drop prematurely. In addition, honeydew leads to growth of sooty mould.

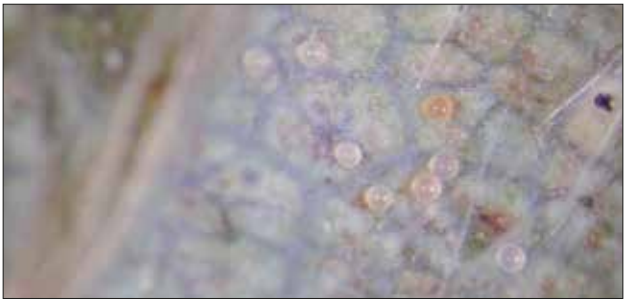
Cherry blackfly

(*Myzus (cerasi) pruniavium*)

- A damaging pest of cherry.
- Aphids are black and shiny. Eggs are laid in the autumn and hatch from white bud (March/April) onwards. Large colonies quickly develop. In summer they migrate to *Euphrasia, Galium* and *Veronica*, but may persist on cherry until August. Migration back to cherry occurs in the autumn.
- Aphids attack shoot tips. Leaves become curled and shoot tips become stunted or die. Honeydew leads to contamination of fruits and leaves with sooty mould.

Two-spotted spider mite

(*Tetranychus urticae*)



- This pest is a problem on protected cherry, as the mite likes warm, dry conditions.
- Adults are creamy-yellow with dark patches on either side of their body. Females turn red in autumn before over-wintering.
- Damage starts as speckling on the leaves, especially older leaves in the centre of the tree close to the trunk. Leaf bronzing develops leading to poor fruit quality, reduced fruit size, weakening of the tree and premature leaf drop.

Plum rust mite

(*Aculus (Phyllocoptes) fockeui*)

- Mainly a pest of plum and damson, but cherry under protection is also vulnerable.
- The tiny mite (0.2 mm) is brownish white and somewhat carrot shaped. Mites over-winter under bud scales and feed on the underside of leaves (check underside of leaf at base).
- The mite causes white flecking of leaves which may turn bronze on the underside and turn silvery on the upper surface.

Plum pouch gall mite

(*Eriophyes padi*)

- A minor pest of plum and damson.
- In spring, mites feed on young leaves and young fruitlets may be attacked.
- Damage consists of galls which are finger-shaped (<6 mm long) and red to dark red in colour. They project upwards from the upper surface of the leaves and fruits.

Common green capsid

(*Lygocoris pabulinus*)

- A minor pest causing damage to leaves.
- Adults and nymphs are bright green and move rapidly.
- The pest over-winters as eggs in shoots and the first nymphs occur in early April.
- Damage is seen initially as brown spotting and then necrotic holes on the leaves.

Plum leaf curling midge

(*Dasineura tortrix*)

- An increasing pest of protected cherry, but also plum and apricot.
- Adults lay eggs in late spring. The larvae are small and white.
- Attacks cause leaf curling and distortion. New growth dies and turns black. Shoot tip internodes become shortened.

Pear slug sawfly

(*Caliroa cerasi*)

- Often referred to as the pear and cherry slugworm (the larval stage of the pest), this pest is damaging to cherry.
- Larvae are up to 10 mm long with a slug-like appearance. They start off white, becoming greenish-yellow to orange-yellow and may be covered in black slime. Eggs are laid on undersides of leaves in May-June. There is a second (July) and partial third generation (autumn).
- Larvae feed on the upper surface of the leaf causing a 'windowing appearance'. Heavy attack can lead to leaf discolouration and defoliation followed by poor tree growth the following year.

Summer fruit tortrix

(*Adoxophyes orana*)

- Summer fruit tortrix moth can be a pest on cherry or plum.
- Caterpillars are yellowish-green to olive or even dark green (similar in appearance to light brown apple moth).
- Eggs are laid in batches on leaves in May-June and August-September. Semi-mature caterpillars over-winter and begin to feed again in March/April.
- Caterpillars form webs on leaves (leaf-rolling) and feed on leaves and fruits (grazing the skin bound to leaves by webbing).

Cherry bark tortrix

(*Enarmonia formosana*)

- A locally common pest of almond, apricot, cherry, peach and plum-associated with older trees.
- Adults lay eggs from late May to September and caterpillars feed hidden beneath the surface of the bark. Caterpillars are up to 11mm long with a translucent greyish white body.
- Caterpillars attack the trunk and main limbs of the tree. Brown silk-like tubes of frass may protrude from the surface or there may be gumming at the attack points. Cherry trees are usually infested near the base of trunks.

Web-forming caterpillars

(Various species)

- Caterpillars vary in appearance according to species, some being brightly coloured with irritating hairs.
- Caterpillars form large webs/tents in which multiple individuals can occur, usually webbing leaves together (summer fruit tortrix and light brown apple moth live singly).
- Feeding by the caterpillars can kill new shoots.

Winter moth

(*Operophtera brumata*)

- This is a pest of a wide range of horticultural crops.
- A single generation occurs each year with eggs hatching in early spring, about bud-burst.
- Caterpillars are pale green with a dark dorsal green stripe and several creamish coloured stripes. They have two pairs of prolegs (clouded drab moth, which looks similar, has four pairs).
- Caterpillars feed on leaves, developing flowers and fruitlets and protect themselves by loosely pulling leaves together with silk.

Plum fruit moth

(*Grapholita funebrana*)

- A pest of plum and damson.
- Eggs appear on fruits from June onwards. Caterpillars are pinkish with a dark brown head.
- Larvae entering the fruit feed on the flesh. Damage symptoms appear as prematurely ripening fruits which, when cut open contain frass; the caterpillar may be found near to the stone. Later on, it may be possible to see exit holes along with exudate.

Light brown apple moth

(*Epiphyas postvittana*)

- A sporadic pest mainly of cherry; it is an increasing problem in crops under protection where caterpillars continue to feed.
- Caterpillars are very similar to other tortrix species (yellowish green), so are difficult to tell apart (both leaf rolling).
- Caterpillars roll and web leaves, feeding on both foliage and fruit in June-July and September-April. Damage to shoots and scarring of fruit is common following severe attacks.

Leopard moth

(*Zeuzera pyrina*)

- A pest of a wide range of woody hosts including plum and cherry.
- Caterpillars up to 60 mm long with yellow bodies and black spots. Development of the larvae takes 2-3 years. Young trees are more vulnerable. Look for signs of their presence which includes frass at entry holes in the stems.
- Initially, caterpillars feed on leaf stalks and veins, buds and shoots. Later damage appears as dead branches and finally caterpillars move to the heartwood of the trunk which can give rise to whole tree death.

Cherry fruit moth

(*Argyresthia pruniella*)

- A common pest of cherry and less frequently plum.
- Females lay eggs the previous summer. Caterpillars are up to 10mm long and light green to greenish-yellow.
- Caterpillar feeding begins in early spring in developing buds and flowers where the ovaries and developing fruitlets are hollowed out. The caterpillars later emerge from young fruitlets.

Mussel scale

(*Lepidosaphes ulmi*)

- More commonly a problem on apple, but also found on plum and cherry.
- The scales are visible on the trunk and branches during the winter/dormant season. They are 2-3 mm long and resemble miniature saltwater mussel shells. They protect the eggs beneath.
- Tiny (<1 mm) crawlers emerge in May-June, migrate over a 6 week period settling on new shoots, leaves and fruits, and then produce a protective shell. Large infestations are debilitating to trees and lead to downgrading of fruits.

Oyster scale

(*Quadraspidiotus osteaeformis*)

- A pest of a range of woody species, including cherry, plum and peach.
- Adult scales are 1-2mm long, roughly circular in shape and flattened (blackish or yellow). Crawlers tend to settle near to the mother scale, so their spread is slow.
- Trees may be weakened if attacks are heavy, but infestations are rare on sprayed trees.

Introduced and naturally occurring predators

B

Predatory bugs

- Includes Anthocorids, some Mirids and *Orius* species.
- Feed on a variety of pests, including aphids, midge larvae, scale insects, 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

- Feed on scale insects, midge larvae, aphids and caterpillars, amongst others.
- A useful nocturnal generalist predator on perennial crops.
- Over-winters in soil in and around orchard.
- Can feed on shoots causing damage along mid-rib or on anthers of flowers.

Ground beetles and rove beetles

- Generally found feeding on soil stages of pests on the ground, including caterpillars; 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 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.
- Adult wasps lay eggs in aphids, which then have a characteristic mummified appearance.
- Larvae usually develop internally, but can be external.

Predatory midge larvae

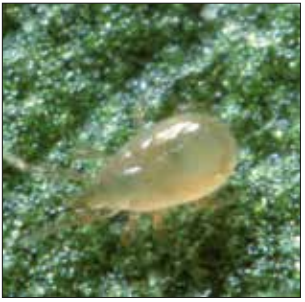
(*Aphidoletes aphidimyza*)

- Important in cherry 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.
- Important predator of cherry blackfly.
- Adults are not predatory, but many feed on pollen and nectar, so may be important pollinators.

Predatory mites



- Important predators of mite pests.
- *Typhlodromus pyri* is important on plums against mussel scale, but possibly less important on cherry, which has smooth leaves.
- 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 2 or 3 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

Brown rot

(*Monilinia laxa and Monilinia fructigena*)

- Affects plum, cherry, apricot and other stone fruits.
- Mummies are the shrivelled remains of brown rot-infected fruit from the previous year. These act as a source of infection.
- During winter and spring (damp weather) *M. laxa* mummies produce grey pustules (spore masses). Spread in wind and rain to infect flowers or developing fruit. During spring and summer *M. fructigena* mummies produce buff-coloured pustules. Spread in wind and rain to infect damaged fruit.

Blossom wilt

(*Monilinia laxa*)

- Common on sour cherry and plum especially Victoria; rare on sweet cherry.
- Spores are spread in wind and rain to infect blossoms of stone fruits which wilt and die.
- Grey pustules can be seen sporing on dead flower parts (x10 hand lens).
- Disease extends from infected flowers into the fruit spur forming a foot canker. Overwinters on cankers to produce grey pustules in spring (x10 hand lens).

Wither tip

(*Monilinia laxa*)

- Young plum leaves may become infected with *M laxa*.
- Fungus extends down into the shoot forming a brown lesion at leaf base.
- Once shoot is girdled all leaves above wilt and die resulting in wither tip.

Cherry powdery mildew

(*Podosphaera clandestina*)

- Common on protected cherry where conditions are favourable.
- Disease may be visible on leaves, shoots and fruit.
- Pale round lesions found on leaves soon after blossom. Then sporing colonies may remain discreet or coalesce to cover whole leaf, exhibiting a white bloom. Leaves may become distorted.
- On fruit, slightly sunken areas develop; these may coalesce to cover entire cherry.

Cherry leaf spot

(*Blumeriella jaapii*)

- More common on sour cherry and wild cherry, but does occur on sweet cherry, resulting in premature leaf fall.
- Small red / purple spots appear on upper leaf surface, turning brown. Leaves turn yellow but area around spots may remain green, giving leaf a mottled appearance.
- Light pink to white masses appear on underside of spots in moist conditions. In wet conditions spots may appear on leaf stalk.

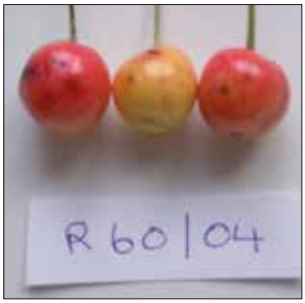
Cherry and apricot leaf curl

(Cherry - *Taphrina minor*, Apricot – *Taphrina deformans*)

- Different pathogens cause leaf curl on cherry and apricot.
- Yellow/red areas on young developing leaves in spring, becoming thickened and distorted, causing leaf curl. Later leaves become brown and fall prematurely.
- Symptoms may be present on a few leaves, a whole branch or the whole tree.
- On cherry, similar symptoms may be caused by related fungus, *Taphrina cerasi* , where affected branches form a witch's broom-like growth.

Cherry scab

(*Venturia cerasi*)



- Occasionally found on cherry.
- On leaves, small dark brown/purple spots appear. Brown/olive green fungal growth may be visible on the spots (x10 hand lens).
- On green fruits, small pink/red spots easily seen. Spots are bright red around the margin and dull red to brown in the centre.
- On ripe fruits, more difficult to see, especially darker coloured varieties. Symptoms are olive green to black diffuse spots.

Plum rust

(*Tranzschelia discolour*)

- On the upper surface of plum leaves, small bright yellow spots appear in summer. The brown pustules of the rust fungus are found on the underside of these spots.
- Later in the season the brown pustules become darker.
- Premature defoliation may occur.

Cherry shot hole fungus

(*Wilsonomyces carpophilus* or *Stigmina carpophila*)

- Occasionally found on sweet and wild cherry, but can be severe on apricot.
- On leaves, small brown spots with a darker margin appear in spring and summer. Dark spore masses may be visible in centre (x10 hand lens). These dry and drop out leaving a shot hole appearance.
- On fruit, pale spots with dark centres appear. On cherry, these cover most of the surface, but are smaller and corky on apricot. In spring dead buds covered in gummy exudate may be present, resulting from infection the previous autumn.

Cherry fruit rot

(*Colletotrichum* spp.)

- Occasionally seen on ripe fruit in orchards during harvest. Also seen on fruit in store or during marketing.
- On fruit, circular sunken lesions develop which, in moist or humid conditions, become covered in pink/orange slime spore masses of the fungus.

Plum pockets or bladder plums

(*Taphrina pruni*)

- A fungal disease that affects leaves, stems and fruit of Prunus species, especially plums and mirabelles. Symptoms develop as a result of infection soon after bud break.
- Affected fruits grow long and narrow, appear crooked, one-sided and pocket-like. Fruits are initially green and smooth, later becoming paler, compressed, wrinkled and covered with whitish bloom.
- Also infects twigs causing a witch's broom effect.

Cherry leaf scorch

(*Gnomonia erythrostoma*)

- A disease of sweet and wild cherry as well as apricot.
- Withered leaves remain on the trees throughout the winter. Fruiting bodies with long necks (proud of leaf surface) develop on these leaves in autumn and winter.
- In spring, spores are released from fruiting bodies as trees come into leaf, infecting new leaves.
- Disease appears on young leaves as yellowish patches which later turn brown. The fungus also grows into the leaf stalk, preventing formation of an abscission layer at the leaf base so dead leaves remain attached to the tree.

Phytophthora root rot and crown rot

(*Phytophthora* spp.)

- Soil-borne fungal disease of stone fruit, especially those on more dwarfing rootstocks. It can be confused with bacterial canker tree death in plum.
- Above ground symptoms include poor extension growth, leaf yellowing, shoot die back or scaffold branch death. By scraping back the bark, a brown lesion may be visible, often with a zonate appearance.
- Decline and death can be rapid in young trees, or take several seasons on more mature trees.
- The problem is associated with poor soil conditions.

Sooty blotch and fly speck

(*Gloeodes pomigena and Schizothyrium pomi*)

- Both fungi can occur on plums in wet years.
- Sooty blotch easily seen on pale varieties as smokey or sooty smudges on fruit (looks like handled by someone with dirty hands). Blotches vary in size but may coalesce to cover whole fruit. Less obvious on dark skinned plums which appear dull and dirty.
- Fly speck is frequently associated with sooty blotch and appears as groups of black circular dots on fruit surface.

Silver leaf

(*Chondrostereum purpureum*)

- Affects both plum and cherry.
- Leaves have silvery or leaden sheen (part or whole tree). Later rusty-brown streaks may appear. Dark brown discoloration may be present in the wood.
- After tree or branch death fruiting bodies become visible on dead wood. They are flattened crusts or bracket-shaped projections (1-5cm) arranged in tiers.
- Surface of fruiting body is smooth, purple-mauve with paler margin (when fresh).

Bacterial canker

(*Pseudomonas syringae*)

- A bacterial disease that attacks leaves and twigs of stone fruit crops.
- Infection occurs at leaf fall. New cankers appear in spring as small, discoloured, slightly sunken areas on twigs at base of flower and leaf buds. Older cankers generally sunken flattened areas on twigs and branches.
- The cankers girdle the stems causing wilting or branch death. On plum, cankers on trunk may lead to tree death. Gum may exude from cankered areas. In spring leaf infections appear as water soaked spots with a yellow halo. They later display a shot hole symptom.

Leaves with holes

- A common symptom in stone fruit caused by both pests and diseases.
- In Prunus species, a common response to disease attack on leaves is for diseased part to drop out causing a shot hole effect (see bacterial canker and shot hole fungus).
- Attack by several insect pests also causes holes in leaves including caterpillars, capsids, winter moth and pigeon damage.

Plum pox virus

- Attacks plums, damsons, greengages, apricots, peaches and nectarines. Cherries are not affected.
- Leaf symptoms visible from early June onwards. All or part of tree may be affected. Leaves have indistinct pale green or yellow blotches and rings.
- Fruits ripen unevenly and develop dark coloured rings. Pitting of the surface may also occur.

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Photographic Credits

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B10 (BR) Amblyseius cucumeris adult, **EMR**
B11(L) Caterpillars on brassica before treatment with Bacillus thuringiensis, **Interfarm**
B11 (R) Caterpillars on brassica after treatment with Bacillus thuringiensis, **Interfarm**
B12 (T) Caterpillar parasitised by nematodes, **EMR**
B12 (B) Nematodes in caterpillar, **EMR**

Section C - Diseases

C1 (TL) Brown rot on cherry, **EMR**
C1 (TR) Brown rot on plum, **EMR**
C1 (BL) Mummified plums caused by brown rot, **EMR**
C1 (BR) Mummified plums caused by brown rot, **EMR**
C2 (T) Blossom wilt on cherry, **EMR**
C2 (BL) Blossom wilt on plum, **EMR**
C3 (TL) Wither tip on plum, **EMR**
C4 (T) Powdery mildew on cherry leaves, **BC**
C4 (BL) Cleistothecia of powdery mildew on cherry leaf, **BC**
C4 (BR) Powdery mildew on sweetheart cherry, **BC**
C5 (TL) Leaf spot on cherry, **EMR**
C5 (TR) Leaf spot on cherry, **EMR**
C6 (TL) Cherry leaf curl, **EMR**
C6 (TR) Cherry leaf curl, **EMR**
C6 (B) Cherry leaf curl, **EMR**
C7 (TL) Cherry scab, **EMR**
C7 (TR) Cherry scab on fruit, **EMR**
C7 (BL) Cherry scab on leaves, **EMR**
C8 (TL) Plum rust seen on upper leaf surface, **Umpelby**
C8 (TR) Plum rust seen on lower leaf surface, **Umpelby**
C8 (B) Plum rust affecting whole orchard, **Umpelby**
C9 (T) Cherry shot hole fungus on fruit, **EMR**
C9 (B) Cherry shot hole fungus on leaves, **EMR**
C10 (T) Cherry fruit rot, **EMR**
C10 (B) Cherry fruit rot, **EMR**
C11 (TL) Plum pockets, **EMR**
C12 (W) Cherry leaf scorch, **BSR**
C13 (W) Crown rot affecting base of trunk, **BC**
C14 (TL) Sooty blotch on apple, **EMR**
C15 (TL) Silver leaf on plum, **EMR**
C15 (TR) Silver leaf close up, **EMR**
C15 (BL) Silver leaf, **EMR**
C15 (BR) Silver leaf on wood, **EMR**
C16 (T) Bacterial canker on cherry, **EMR**
C16 (B) Bacterial canker on cherry, **EMR**
C17 (TL) Bacterial shot hole on Victoria plum, **EMR**
C17 (TR) Bacterial shot hole on Victoria plum, **EMR**
C17 (BL) Cherry leaf spot, **EMR**
C18 (TL) Plum pox on leaves, **BBIL**
C18 (TR) Plum pox on leaves, **EMR**
C18 (BL) Plum pox on leaves, **EMR**
C18 (BR) Plum pox on fruit, **BBIL**

Key

Image position:
(T) = Top, (B) = Bottom, (L) = Left, (R) = Right, (W) = Whole page

Image source:
BBIL = Biologische Bundesansta lt fur Landund
BC = British Columbia Ministry of Agriculture
BSR = Bavarian State Research Centre for Agriculture
Clement = Patrick Clement
Easterbrook = Mike Easterbrook
EMR = East Malling Research
FDA = Florida Department of Agriculture
Hobern = Donald Hobern
Interfarm = Interfarm UK Ltd
Kimber = Ian Kimber
OSU = Oregon State University
Smart = Ben Smart
Smith = Ian Smith
Umpelby = Roger Umpelby
WSU = Washington State University

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