Health of Fruit Trees

Natural England provides useful information on identifying and managing the main pests, disease and nutrient deficiencies that may affect a traditional orchard. They make some key points.

- The addition of nutrients is usually unnecessary and may harm trees by disrupting their mycorrhizal associations.
- Where applied, fertilisers should be confined to beneath tree canopies rather than across the whole sward.
- Pesticides and fungicides should only be used to control specific recorded pests and diseases.
- Organic methods should be used where possible.
- Extensively managed, traditional standard orchards are less likely to suffer from significant pest and disease infestations or nutrient deficiencies than commercial bush tree orchards. However, problems can still occur.

A tree's root system extends a long distance and, over time, develops associations with fungi called mycorrhizae which operate within certain pH regimes. These beneficial fungi colonise the roots and help the tree by extending its root system into the surrounding soil, via an extensive network of thread-like filaments. They extract nutrients and other elements from a large soil volume and exchange these for carbon from the plant. Mycorrhizae help maintain tree vigour by making nutrients and water available at times of stress, as well as acting as natural blocks to the passage of root pathogens. The application of fertiliser can result in the loss of these mycorrhizal fungi as the trees abandon their associations in response to the temporary abundance of nutrients; where an orchard has a history of being fertilised the mycorrhizae associations may not be established.

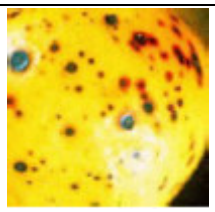
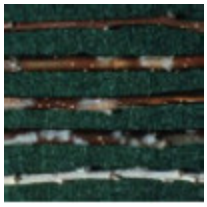
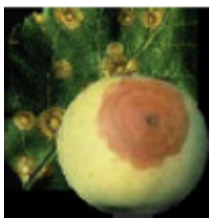
Nitrogen deficiency is not usually a problem as atmospheric nitrogen and nitrogen fixed by legumes maintain soil nitrogen levels. This deficiency can occur when woody material such as bark chippings is added to the soil. Soil organisms will utilise any nitrogen in order to break down this material, thus making it temporarily unavailable to growing plants. The symptoms are a pale greenish colour of the leaves, which turn yellowish in extreme cases, and small highly coloured fruits which are delayed. The deficiency can be corrected by applying a nitrogen-containing fertiliser during the growing season or a composted mulch such as well rotted farmyard manure.

Trees may be affected by various diseases which can reduce yield, damage or even kill them. Regular inspection of an orchard is important. Most common diseases such as scab, fireblight, silverleaf, bacterial canker of cherries and cobnuts, and canker of apple and pear are best controlled by pruning and removing affected branches and leaves at the first signs of infection. Perimeter hedges and trees should also be checked for these diseases. All infected material should be removed and burnt (well away from the canopy of any fruit or hedgerow trees).

Defoliation is often a sign of insect pests. These may include aphids or winter feeding caterpillars. Codling moths, whose caterpillars can cause maggoty apples, are a common pest. In a traditional orchard, most pests will be controlled by predators before they reach unacceptable levels. Where necessary, many pests can be controlled using biological or organic methods.

Symptoms	Picture	Possible cause	Treatment
Botrytis (Grey Mould). A grey to brown discolouration and a fuzzy whitish grey to tan mould growing on the surface of infected areas.		Grey Mould is a very common disease for many plants and vegetables. It is first noticeable as brown spots, which are followed by a furry grey mould. The cause of the disease is too much dampness in cool conditions - growing plants in over-fertile conditions also encourages botrytis.	Remove the conditions which caused the disease in the first place. Avoid over- watering and ensure that the plant has plenty of air circulating - if the plant is congested with leafy growth, prune away some of the growth (especially in the centre of the plant) to permit air to circulate. Where botrytis persists, spray with Copper Fungicide.
Aphids Distorted young shoots and leaves.		Aphids are one of the commonest and most troublesome of all insects. Greenfly and blackfly are aphids and they suck the sap of the plant. They are particularly attracted to young tender shoots. This causes the shoots and leaves to become distorted. It is unlikely to kill the plant, but it can seriously weaken it.	There are many species of aphids but almost all respond to the same control and treatments. A large variety of chemical sprays are available to treat aphids, but all will have some bad affect on other beneficial insects and wildlife. Where edible crops are sprayed with these chemicals, some of the chemical will also remain within the flesh of the plant.
Apple sawfly Ribbon like scars on the apple skin. It is not usually a serious problem and only rarely affects a significant proportion of the crop.		Apple sawfly (Hoplocampa testudinea) are small wasp-like insects which first lay their eggs on the blossoms. The eggs then grow into maggots which tunnel just below the surface of the skin. It is this which causes the ribbon like scars on the outside of the fruit. As the maggots grow, they then tunnel directly into the middle of the fruit, causing it to drop prematurely in early July.	Spray with a bifenthrin insecticide about a week after the flowers have fallen and before larvae hatch. Closely examine young fruits on the tree or on the ground, and destroy any that show signs of entrance holes. This stops the larvae from escaping into the soil and pupating. Rake the soil around affected trees in winter, so the exposed sawflies are killed by frost.
Winter Moth. Holes in the leaves.		The caterpillar stage of the winter moth feeds on the leaves, blossoms and young fruitlets during the spring. As the leaves develop, the holes enlarge and become noticeable, but the caterpillar has done it's dastardly work by that stage and has gone back down the tree into the soil to pupate into the fully-grown winter moth - they will emerge from the soil between November and March.	Preventative treatment is the only reliable way of controlling this pest. Tie a sticky grease band around the trunk during the period when the females might be making their way back up the trunk - October to April should do the job. One tip - if the tree has a supporting stake, tie a band around that as well! Keep the band clean of leaves and other debris. Remove and burn it in April.
Codling Moth. This pest is often impossible to detect until a bite is taken into an apple and the hole made by the maggot in visible in the flesh.		The Codling Moth lays its eggs on the surface of the developing fruit in June. These hatch out and tunnel into the centre. The caterpillar is fully fed around August, so it eats it's way out of the fruit and spends it's winter in loose flakes of bark on the tree trunk.	Hang a 'pheromone trap' in the tree - one trap will do the job for as many as three or four trees. Pheromone is the scent given off by the female moth which attracts the male moth which flies into the trap and sticks there. In scientific tests, this has reduced the number of fertile eggs laid by 80%.

Woolly Aphid. White fluffy areas on the bark which looks like fungus.		The woolly aphid appears in the spring on the bark of some fruit trees - it is common around bark which has not been cleanly pruned. The aphids are covered in a waxy substance which makes them look like a fungus or mould. If you rub your finger over them, the aphids will be crushed and wet, which is the proof that it is not mould.	If the aphids are noticed early, simply paint them with methylated spirits, or scrape them off individually. If they are ignored and larger areas are infected, spray with derris. Failing this, cut the resulting lumps out from the bark.
Canker. Sunken and discoloured patches on the bark.		The canker is first noticeable in autumn as a swelling of the bark - often at the site of a pruning wound or damaged bud. The central part of the swelling begins to die back and the bark flakes off leaving a sunken discoloured area. In summer, white fungus grows on the diseased bark, turning to a red fungus.	Diseased patches should be cut out, back to good wood, using a knife - the diseased wood should be removed or burned. The exposed healthy wood can be painted with a canker paint. If canker is a major problem, spraying with a copper- based fungicide in August, September and October will greatly assist. Three consecutive sprayings are needed for the full effect.
Bitter Pit. Small brown sunken areas on the skin of the fruit. The flesh below the pits is also browned and tastes bitter.		Bitter Pit is a disease caused by a chemical imbalance in the tree, either a shortage of calcium or too much potassium or magnesium. This is often caused by a shortage of water at a crucial time in the development of the apples.	There is no real treatment once the disease has been noticed. Next season, mulch (not straw) round the tree with well-rotted compost to conserve water, especially in dry periods. Do not over-fertilise.
Brown Rot. Browning and rotting of the fruit, especially when in store.		Brown rot is a fungus infection that enters the fruit through wounds made by wasps, caterpillars and birds. The fruit becomes soft and grey spots of fungus grow on the browned fruit. Mummified fruit hang on branches of trees until spring or, alternatively fall to the ground where they remain throughout the winter months, partly or completely buried beneath the soil or leaf litter.	The disease is spread by contact, so all infected fruit, whether on the tree or on the ground should be removed and burnt as soon as possible. Keep the soil and grass around the tree clean, remove leaves and other debris regularly. No chemicals are currently available to treat Brown Rot.
Scab. Brown blotches on leaves and fruit. It is a common disease on apple and pear trees.		Scab is caused by the fungus Venturia inaequalis. It will appear in late autumn and early spring as round, black pimples on the leaves. The pimples release spores in the spring that are carried by wind and rain to other trees. The process can continue throughout the growing season. Leaves will fall from the tree, and infected fruit will mature unevenly and crack. The disease will not harm the tree itself, but it will do a great deal of damage to the leaves and fruit.	Rake up and burn all leaves in the orchard. This alone will make a significant difference to the level of infection the following spring. Before bud burst, it pays to mow the orchard - this helps break down any remaining leaves from the previous year and disturbs the fungus before it is ready to spread. There are chemicals to treat infected trees but they are systemic which means the chemicals are absorbed by the tree and spread throughout the fruit.

Apple Mosaic. Apple trees develop pale to bright cream spots on spring leaves.		The apple mosaic virus is common in most apple tree varieties. Yellow or cream-coloured spots that appear on the leaves in early spring can identify the virus. The spots become larger as the virus spreads on the leaves. Once warm summer weather sets in, the leaves will turn brown and die. After the virus has infected a tree, the apple crop may be diminished by half.	There is no known treatment once a tree has been infected with the virus.
Black Pox. Well defined, conical, shiny black lesions on the twigs and fruit.		Black pox is caused by a fungus that over winters in the infected trees. Black, shiny, cone-shaped lesions form on new twig growth. Leaves may also show signs of the disease, first as red circles eventually turning into a brown or purple colour. Lesions also appear on the fruit, which are small and black and eventually sink in.	The treatment for this disease is sanitation and chemical application. Cleaning up leaves and fruit from the ground by the end of the growing season and applying a fungicide spray will help to eliminate the disease and stop it from spreading to other nearby trees.
White Rot. A distinct canker on tree twigs, limbs, and trunks.		White rot, or bot rot, only infects the fruit and wood, not the leaves. Infections occurring on the limbs and twigs are identified by small circle-shaped spots and blisters. These spots will continue to enlarge during the growing season, eventually causing the bark of the tree to become orange in the affected areas and peel from the tree. The fungus causes skin and internal fruit rots.	The disease can be treated with chemicals and with pruning of affected and dead wood each year. Fungicide should be applied throughout the growing season, from bloom throughout to harvest.
Powdery Mildew. The twigs and young leaves are covered by a white powdery down.		A fungal plant pathogen causes apple powdery mildew. Longitudinally folded leaves identify this disease in the spring, as well as a grey-white powder coating on the twigs, resulting in stunted twig growth. If left untreated, it will result in blossoms dropping prematurely from the trees and overall stunted growth of the tree.	The disease can be treated by implementing a mildewcide program and by pruning away whitened terminal shoots on the trees.
Black Rot. A variety of symptoms on apple trees, including fruit rots, leaf spots and stem cankers.		Black rot is a fungal disease that can cause serious losses in apple orchards, especially in warm, humid areas. Three forms of the disease can occur: a fruit rot, a leaf spot known as frogeye leaf spot, and a limb canker. Severe leaf spotting can result in defoliation which weakens the tree, and limb cankers can girdle and eventually kill entire branches.	Removing dead wood, mummies, and cankers from the trees may help reduce the incidence and severity of the disease. Current-season prunings should be either removed from the orchard and burned or raked and then chopped with a flail or rotary mower. The main method of control is the application of fungicides from silver tip through harvest.

Fire blight. The name aptly describes the characteristic scorched appearance of leaves and stem ends.		Fire blight is caused by the bacterium Erwinia amylovora. In addition to apple and pear, other susceptible plants include quince, hawthorn and raspberry. The first signs of Fire blight are blackened blossoms or fruit clusters and contorted branch tips, which are bent over like a 'shepherd's crook'. Infected blossoms and new shoots die and discolour suddenly, turning greygreen, brown or black.	Fire blight is best controlled using an integrated approach that combines (a) horticultural practices designed to minimize tree susceptibility and disease spread; (b) efforts to reduce the amount of inoculum in the orchard; and (c) well-timed sprays of bactericides to protect against infection under specific sets of conditions.