

**WET FEET IN CIDER ORCHARDS 2001****Spring symptoms**

The first alarming symptoms were failure of the blossom to open at flowering time and die-back and drop of the young leaves. Some trees were only partially affected with foliage developing normally on some branches. Later many trees developed papery blisters on the trunk. Further investigation revealed that although the wood is superficially green and live below the dead bark, the heartwood is stained black underneath, this marking often extending to 4 or 5 feet up the leader and into the affected branches. Many trees are completely girdled with dead bark from ground level to the union. Excavation below ground shows that affected trees have all or some of the major roots that are black, smelly and rotting. In some cases only the crown of the tree has been killed, surrounding roots are alive and sending up suckers.

**Causes of the symptoms**

So far there is little to suspect phytophthora although it may be present in a few odd cases. More likely, the exceptional winter, with prolonged rain and soil saturation from October through to March was the major cause of widespread root asphyxiation and death by drowning. This led to extensive rotting of the collar and crown in the worst affected trees. Toxins from the breakdown of the roots [acids and alcohols] are responsible for the papery bark and heartwood staining, and probably contributed to the leaf drop.

**Questionnaire**

Thanks to the excellent response of those NCGA members who replied to the NACM enquiry, it has been possible to build up a good picture of the extent of the problem. In most orchards from 1 – 35% of trees have been affected but up to 50% are unlikely to revive in the worst cases. Often only odd trees are sick or dead, sometimes patches, sometimes whole rows. All rootstocks are equally affected, though M25 possibly less so. Clearly some varieties have suffered more than others. Dabinett is worst and Major a close second. Somerset Redstreak seems least affected. Sadly trees aged 3 – 5 years have suffered most, especially those anticipating their first heavy crop this year.

**Prime causes of root rot**

Worst affected areas are usually subject to annual winter wet, often in patches where drainage problems regularly occur and perhaps trees have not been growing well for a year or two. The severity of the problem seems closely related to the ground conditions on each site, the greatest number of fatalities occurring where the subsoil is heavy and often the topsoil is rather shallow [41% of cases] and perhaps heavy [85%]. On slopes normally well drained, this combination of soils can create temporary winter springs as water surfaces in places where the more permeable topsoil is too shallow to hold it. Tree roots in these patches may have been without air for weeks on end. These 'springs', together with flooded ditches and burst drains accounted for 25% of the problems reported, but some 37% could have been linked to inadequate under-drainage or lack of drains altogether. Some causes are more difficult to pinpoint, the owner apparently having done many things to improve drainage. In some cases, drains were not backfilled, others more recently drained just prior to planting may not have had time to settle down. Other orchards are below a large catchment area for rainfall, the volume of water running off from higher land being just plainly too much to deal with quickly, but held in the soil like a sponge. 7% of affected sites are low lying, and here a high water table may have been responsible for root death.

Although the nature of the soil type in each case has a major influence on tree growth and survival, the way that the site is prepared before planting may be almost as important. It has become clear this year that the 'safest' preparation is to establish a grass sward and plant into it. In this way the grass roots open up and improve the soil structure, making natural channels for water to drain away. This type of 'blocky' soil structure also gives better anchorage for trees and stakes. Cereal crops leave a notoriously poor soil structure, often made even more

fluffy and formless by repeated ploughing, sometimes leaving a hard 'pan' of compressed soil below.

In some orchards, on good slopes or near the top of slopes and the causes are more difficult to pin-point.

Impermeable, perhaps clayey subsoil, shallow in places, restricting root zone.

Poor soil structure from overworking the soil in preparation for planting. Light, fluffy soil settles down but has poor structure and little natural drainage.

An impermeable plough pan following site preparation or cereal/maize crops. Water cannot drain away quickly but is held in young tree root zone.

Inadequate under-drainage unable to carry heavy rainfall away fast enough.

Soil settlement around the trunk base after planting, often with an auger, creating a 'pot'.

Some cases have been aggravated by wind rock. Where trees were blown over in autumn gales and been righted in wet soil, conditions were just right for pockets of stagnant water to collect around the disturbed and perhaps damaged roots.

Mole draining where there is no back-fill may cause under-drains to burst in heavy rain and flood in patches,.

#### **Preventing further wet feet problems.**

- Subsoil plough in dry conditions to open up drainage channels between the wheelings and the tree rows.
- Mole in wet soil conditions, but only if the under-drains were backfilled.
- Clear and enlarge ditches to carry excessive run-off.
- Put in extra drains where temporary springs have occurred.
- For future planting, avoid over-working the soil or creating a pan. Planting into herbicided grass maintains a good soil structure.
- Avoid planting Dabinett, Ashton Bitter and Major on sites where trouble is expected.
- Adequate stakes and ties are essential and must be installed before trees get to any size to attract wind-rock.

#### **Signs of recovery**

There are some encouraging signs in some orchards where trunks are not completely girdled, new leaves have emerged, but in many cases buds remain dormant or dead. It is possible that some trees may recover next year to some extent. A Long Ashton flood tolerance study suggests that MM106 may recover roots more easily than other rootstocks.

- Aliette and/or potassium phosphite may help if phytophthora is there.
- Foliar feeding is beneficial where there is some life left and sufficient leaf to absorb sprays.
- Summer pruning not advised. It is probably ineffective, definitely depressing and could be a waste of time and money.

#### **NACM trials are in progress:**

- Biostimulants to revive ailing trees.
- Testing rootstocks, seedling rootstocks and ciders on their own roots for resistance to flooding and phytophthora.
- There are Technical reports available for further details.

Liz Copas, BSc Hons. Hort.  
Technical Advisor  
National Association of Cider Makers  
August 01