

Crop Information

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Apples & Pears - Deficiency Symptoms

This Tech Bulletin is for visual observation use and reference only and may make the grower more aware of the visual symptoms that occur in an orchard. CAUTION should be taken in that some symptoms do look alike and a misdiagnosis could be possible disastrous. Confirm all of your observations with Laboratory analysis.

Nitrogen (N)

Apple and pear trees deficient in N exhibit reduced terminal growth and leaf size. Leaf color is pale green (apple) to bronze (pear) and similar in appearance to normal leaves senescing in the autumn. Color is uniform across the leaf with no mottling. Older leaves at the base of the shoots and spurs develop chlorosis earliest and may abscise prematurely. New twigs are usually thin, with light brown reddish bark.

Fruit on N-deficient trees are smaller and my color and mature earlier than normal. Fruit drop may be excessive.

Maintaining N levels throughout the season on trees is more important to the next seasons crop than it is to this season as if N is low it will reduce bud set.

A pro-active program that monitors N levels allows the grower to maintain adequate levels of N for tree growth and bud initiation without over doing N application.

Phosphorus (P)

Deficient trees exhibit reduced shoot growth and flowering. Bud break may be delayed and fruit set will be poor. Fruit mature early and are often misshapen, russeted, or cracked. Trees with low P will produce fruit that will not store well and in varieties that are prone to pre-harvest drop, drop will be severe. Good P levels will help to colour fruit.

Internal quality and density of the fruit is very much influenced by good P levels.

Leaves on P deficient trees develop a characteristic dark green to purple colour, which is usually most intense in or near the main veins of the leaf. Trees slightly deficient in P may not show purple tints in leaves until late summer or autumn. If the deficiency is severe, symptoms may develop soon after bud break. Leaves are smaller than normal and remain upright, with a narrow angle between the petiole and shoot. As the deficiency progresses, leaves turn light green or yellow, and older leaves abscise early.

P deficiency in a pear orchard will exhibit scorching of leaf margins decreased terminal growth and leaf size, knotty misshapen fruit, scaly bark, and dieback of shoot terminals.

Apple trees poorly fertilized with P exhibit decreased shoot growth and leaf size. Leaf curling and reddish bark are also obvious.

Potassium

Potassium deficiency is characterized by a scorching of leaf margins often called "leaf scorch". The scorch and leaf rolling appears first on basal or spur leaves and progresses upward toward the younger leaves. With pears the leaf margins are usually affected first by a purplish discolouration then marginal scorch may appear. Margins may first appear light green and later turn necrotic. Necrosis starts at the margin and progresses inward toward the midrib. Leaves may appear tattered as necrotic areas fall off. Symptoms may also be accompanied by leaf abscission. Scorching is typically most severe on older basal leaves and becomes less apparent on the most apical leaves. Symptoms usually develop late in the season on slightly deficient trees or earlier if the shortage is acute. K deficiency may also reduce colour of fruit.

Potassium deficient fruit will have a lower pressure test and poorer flavour.

Potassium deficient trees will be more prone to winter injury.

Calcium (Ca)

Calcium deficient trees rapidly cease shoot growth and root growth. Shoot tips dieback, and viable roots thicken abnormally.

Characteristic leaf symptoms develop first near the terminal leaf margins but may extend into interveinal tissue.

Affected areas turn chlorotic and eventually necrotic. A purplish tint may also develop, appearing first on minor veins and eventually on larger veins.

Calcium deficiency in the fruit of apple and pear is associated with various disorders and reduced fruit quality. Fruit disorders associated with inadequate Ca include bitter pit, cork spot, internal breakdown, senescent breakdown, and water core in apple and cork spot of pear.

Magnesium (Mg)

Magnesium deficiency often occurs in sandy soils or soils that are naturally low in Mg (soils less than 10% saturation Mg). It can also be induced by heavy applications of K, or K applications in the spring that do not contain Mg.

Leaf symptoms start with a marginal interveinal chlorosis that may develop into necrosis. Magnesium deficiency usually does not appear until late August.

The symptoms first appear as pale regions between the main veins or older shoot or spur leaves. Leaves initially take on a yellow appearance around the margins and as time progresses this yellowing may move into the inner venial area toward the midrib. Faded areas normally turn brown (apple) to dark brown (pear) and eventually die, leaving necrotic regions.

As the season progresses the symptoms move upward on the limb. The necrotic areas usually progress towards the leaf margins in apples or may be confined between the veins towards the interior of pear leaves. Symptoms may not appear uniformly on all branches. Marginal necrosis will often follow and in severe cases, the leaves may take on a burn appearance when portions of the tissue die. Basal leaves are most severely affected and generally abscise by late summer, leaving bases of shoots bare.

Early Magnesium deficiency is harder to detect and begins around fruit set as small light green spots seen on the leaf if held up to the light. Until the deficiency becomes severe, shoot and fruit growths are not reduced, although early fruit drop may occur.

Sulfur (S)

Symptoms of S deficiency include a uniform chlorosis of leaves, which appears similar to N deficiency on younger leaves. Yellow leaves eventually develop necrotic areas near the margin. Tree growth is reduced if symptoms are severe.

Iron

Iron deficiency occurs on calcareous soils, and is characterized by a distinct pattern of chlorosis, developing first on the actively growing leaves on shoot tips. Major and minor veins remain green while interveinal tissues turn chlorotic to near white. Necrotic regions may develop along the margins or interior of leaves. Severely affected leaves abscise prematurely, shoot extension and diameters are reduced.

Zinc (Zn)

Zinc is an element that may be required annually in many orchards. Zinc deficiency sometimes called "little leaf", because of the smaller and narrower leaves is usually not difficult to detect. Deficiency symptoms are usually associated with small leaves, blind wood on last year's growth and a cluster of normal leaves at the terminal end of affected limbs. Symptoms of Zn deficiency may include a yellowing or loss of chlorophyll in interveinal areas so some leaves. Spur leaves may show deficiency symptoms before terminal leaves. The yellowing and rosetting may not be evident in cases of mild deficiency. A combination on Zinc and Boron late in the season (2-3 weeks prior to leaf drop) will help protect the buds over winter and harden off the trees.

Manganese (Mn)

Manganese deficiency causes chlorosis of leaf tissue, beginning at the leaf margin and progressing inward, Tissue adjacent to leaf veins remains green, producing a pattern similar to that caused by Fe shortages. However, symptoms on Mn deficiency are usually seen first on

older leaves (terminal leaves are first affected by Fe deficiency). A limited amount of chlorosis may not adversely affect the tree, but severe cases can completely stop growth.

Copper

Necrotic lesions developing on the terminal leaves of rapidly growing shoots are the first indications of a Cu shortage. Leaves eventually abscise, and the terminal portions of the shoot may die. Branching occurs the following season from below the point of death, often resulting in witches'-broom growth. Trees appear "brushy" and low in vigour.

Boron (B)

Vegetative symptoms of B deficiency include dieback of shoot tips. This most often occurs in late summer, but more severely deficient trees may exhibit symptoms earlier. The youngest leaves first turn slightly chlorotic and margins may burn off. Branches may proliferate just behind the affected area, causing a witch's-broom growth that is subject to winter injury. Blossom blast is a specific disorder of pear caused by an early-season shortage of Boron. Blossoms on affected trees begin to open normally but soon wither and die. Leaves on the same trees are usually not affected. The Condition develops sporadically and usually affects only a small percentage of trees in a given orchard. Boron applications may also improve fruit set on apple and pear. Fruit from B deficient trees are often small, misshapen and cracked. Several corking disorders of fruit (drought spot, internal cork, corky core, York spot, bitter pit) can be partly or completely eliminated by B applications. Lesions developing early in the season usually distort fruit shape severely, whereas those developing later may not change fruit shape.

Boron deficiency may also induce symptoms similar to the "measles" disorder of bark caused by excessive accumulation of Mn. Measles caused by Boron deficiency are less severe in pitting and usually more uniform across the orchard whereas measles caused by Mn toxicity is usually isolated to pockets of low pH in the orchard.