AGFACTS
AGFACTS
AGFACTS

www.agric.nsw.gov.au

NSW Agriculture

Boron deficiency (cork) in pome fruits

Agfact H4.AC.2, second edition 2004
Julie Dart, District Horticulturist, Tumut

Boron is required only in very small amounts by apples and pears, but when it is deficient disorders can occur. Waterlogged and very dry soils can lead to boron deficiency, as roots are unable to take up nutrients. Granite soils are generally more likely to be boron deficient than other soils. Symptoms may develop on fruit, twigs and leaves.

SYMPTOMS

Fruit symptoms

Boron deficiency can appear as either internal or external cork.

Fruit affected by **internal cork** often show no external symptoms. The disorder is seen when fruit are cut open. Internal cork is the more common form of deficiency in New South Wales. It is thought to occur when deficiency occurs later than eight weeks after petal fall. Dry climatic conditions are usually the trigger in NSW.

Small, round water-soaked spots appear throughout the flesh. The spots dry out and turn very dark from the centre outwards, finally forming brown spongy lesions, often with a greenish halo. Lesions in the core region sometimes run together, dry out and form cavities. The brown tissue normally occurs closer to the core than the skin. As the corky tissue dies fruit becomes misshapen.

External cork is more likely to occur if deficiency occurs early in the growing season. It causes irregular depressions to appear as fruit matures. Raised brown or reddish spots may occur. These later crack and the skin dries up and scales off, leaving a rough corky layer. Dark brown to greenish-black lesions with a green border occur on or just beneath the skin, mostly in the depressions. These may later become dry and corky. When fruit is cut open, corky lesions are scattered throughout the flesh.

In apples the fruit symptoms of boron deficiency can often be confused with calcium deficiency, especially where cracking has not developed. However, the two disorders can be distinguished by the features in the table 1.

Internal cork symptoms in Granny Smith apple. Note the brown tissue concentrated around the core. Image: P Malcolm, NSW Agriculture

Fruit with severe internal cork may also have a bumpy appearance. Image: P Malcolm NSW Agriculture

Table 1- Comparing fruit symptoms of Boron and Calcium deficiency

Boron deficiency - “cork”	Calcium deficiency - “bitter pit”
Brown tissue occurs near the core	Brown tissue appears closer to the skin
Cracks may develop in fruit	No cracking occurs
Symptoms do not worsen in storage	Symptoms often appear worse, or develop after storage

Advanced external cork symptoms on apple. Note deformity, cracks and brown lesions Image:.P Malcolm NSW Agriculture

Twig and foliage symptoms

If deficiency occurs mid-season, dieback can occur in late summer. Leaves on current season twigs become distorted and turn yellow with red veins. Small brown necrotic areas develop at the leaf tips and margins. The twigs may die from the tips.

If mid-season deficiency is not treated before dormancy, dieback can develop in spring. In spring dieback, buds fail to develop. Affected twigs die back and an abnormal number of small branches may develop from below the dead portion. Dieback can also be a symptom of problems other than boron deficiency.

Boron deficiency can also lead to rosette symptoms in leaves. Leaves become dwarfed, thickened and brittle and are found on very shortened twigs. Zinc deficiency can also cause leaf rosettes, but the presence of corky lesions in fruit will distinguish between the two.

CONTROL

Polyborate powder (20.5% soluble boron) can be applied as a foliar spray. Sprays should be applied in late spring when there is ample foliage to absorb the nutrients. It should not be used when fruit is small and tender.

Boron can be applied after harvest, but must be applied when leaves are still green.

Boron may also be supplied as part of the orchard solid fertilizer program.

Refer to AGFACT H4.AC.3 ***Apple and Pear Nutrition*** for more detailed information

Warning

Excessive application of boron to trees is dangerous. Do not exceed the recommended dosage rate and do not apply both spray and soil dressing in the one season. Do not use boron on non-bearing trees, unless recommended by NSW Agriculture.