

What is Bubbly Bark?

Bubbly Bark is a condition of Chestnut trees characterised by bubbling and softness of the bark; poor bud development or bud death; wilting and dying of branches or the tree, usually above the graft.

History

Bubbly Bark was first noticed in north-east Victorian chestnut orchards during the late 1980s, and was first reported in 1993. Initially it was of relatively minor significance, causing tree deaths or severe setbacks in tree health in several orchards, but on a relatively small scale across the industry. Periodic outbreaks were severe in some orchards and minor in others. In 2005 its occurrence has spread geographically and its effect on chestnut orchards was more significant. Some orchardists reported losses of hundreds of trees in a single season.

Three research projects over 3 years from 2004 were conducted by the Australian Chestnut Industry:

- a) David Klinac, a noted New Zealand chestnut researcher was employed in 2004 to complete a detailed summary of all the possible causes.
- b) In 2005 Plantation Development Services Pty Ltd from Bright, Victoria was engaged to conduct trials and identify any pathogens on affected orchards.
- c) A further project by Erin Powell and Michael Brain also attempting to isolate a pathogen and testing copper and antibiotic treatments.

No conclusive evidence as to the cause or remedy for Bubbly Bark was found

Impacts of Bubbly Bark

In most years Bubbly Bark has little or no impact on the chestnut orchards. The cumulative losses reported by growers in 2005/2006 indicate that affected growers lost about 3.4% of their total number of trees. The loss varied between growers from less than one per cent to about thirty per cent. The loss of trees in the most affected areas of orchards was up to 48%, with losses averaging 22%. The rate of symptom display can be very high, but tree losses may be low. At one site 97% of trees were affected, but only 4% of the trees had died.

Chestnuts Orchard Study

The 2005 study involved the monitoring of thirteen orchards during the 2005/2006 growing season, some with Bubbly Bark and others without. Growers were surveyed about the management practices and history of each orchard. To determine whether there are pre-disposing factors the following data was collected from the monitoring sites: Previous land use, rootstock variety, source of planting stock, pruning practice, soil texture, soil preparation for planting, weed control methods, herbicide use, fungicide use, nutrient analyses of foliage and soil, use of irrigation, slope, aspect, altitude, presence of native forest, apples, olives and other crops, and weather data from the Department of Sustainability's offices at Ovens, near Myrtleford. The data was analysed to identify any correlations with Bubbly Bark occurrence.

Pathogen testing on several samples selected from different sites was also conducted. In one case three two year old grafted trees with Bubbly Bark symptoms were potted up and transported to a glasshouse at a testing site and monitored for six months.

Further pathogen testing was completed during the Powell and Brain project.

Results

Many factors have been shown not to be correlated with Bubbly Bark incidence, including:

- Soil salinity,
- Soil nutrient levels of phosphorus, magnesium, potassium, sulphur, chloride, manganese, total nitrogen, copper, zinc, iron, boron, hydrogen, aluminium, calcium and sodium.
- Foliar nutrient levels of phosphorus, potassium, sulphur, chloride, manganese, total nitrogen, copper, zinc, iron, boron, aluminium, magnesium, molybdenum, calcium and sodium.
- Environmental factors including slope, aspect, elevation and adjacent vegetation.
- Management practices including irrigation, pruning, pruning intensity, weed control, use of glyphosate and previous land use.

Relevant observations include:

- Seedling trees rarely have Bubbly Bark; affected trees are almost invariably grafted trees.
- Many trees regrow from their base if the main trunk dies. It is rare for trees to reshoot above the graft. New shoots can grow in a healthy manner for over 15 years.
- Trees that are healthy in December do not contract the Bubbly Bark symptoms for the remainder of the growing season.
- Bark symptoms may be present in winter or early spring. Some of the affected trees may suffer bud death, while others may grow vigorously.
- It appears to affect all planted varieties to at least some extent.
- The age of trees affected is usually between two and ten years, and most commonly between two and six years. Older trees are infrequently affected.

Further Observations

- Bubbly Bark is most prevalent in spring when the July-October rainfall is high.
- Bubbly Bark is most prevalent in spring when the mean maximum temperatures for July-October are at their lowest.
- No pathogens have been found despite the study of over 25 Bubbly Bark infected trees and soils being sent to six pathology laboratories over a period of 16 years.
- Calcium soil levels and soil pH are significantly higher under Bubbly Bark affected trees compared to non-affected trees.
- Potassium levels are significantly higher in Bubbly Bark affected trees compared to non-affected trees.

CONCLUSION

Combining the results and observations it would appear that Bubbly Bark is a physiological response to certain environmental conditions, rather than a response to a pathogen.



Bubble effects on the bark of a young Chestnut tree.



A young Chestnut tree showing poor bud development and wilting leaves - typical symptoms of Bubbly Bark.

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