

Figure 1: Typical xylem staining (a) and dieback (b) associated with *X. translucens* pv. *pistaciae* infection in Pistachio; *X. translucens* pv. *pistaciae* on Sucrose Peptone Agar (c).



Photo credits: C. Taylor (a, b) and A. Salowi (c)

Disease: Pistachio Dieback

***Xanthomonas translucens* pv. *pistaciae* (Xanth) is the causal agent of dieback of Pistachio (*Pistacia vera*, *Anacardiaceae*). The disease is endemic to Australia and is characterised by trunk and limb lesions, excessive resin exudates, discolouration of mature xylem (Fig. 1a), stunted growth and shoot dieback (Fig. 1b). Affected trees gradually decline, fail to produce marketable nuts and eventually die. The first outbreak of the disease occurred with the onset of commercial production in the mid-late 1990s, killing or rendering unproductive up to 10% of the trees. Another serious outbreak occurred in 2005.**

The Pathogen

X. translucens pv. *pistaciae* has recently been classified as a new pathovar of *X. translucens* on the basis of several biological, biochemical and molecular criteria, including its distinct pathogenicity to Pistachio. Two biologically and genetically distinct groups (A and B) coexist in Australian orchards but only group A is widespread.

Host Range

The only natural host identified is Pistachio, a dicotyledonous woody host. In this respect, *X. translucens* pv. *pistaciae* is unique among *X. translucens* pathovars which are all pathogenic on monocots in the Poaceae family. *X. translucens* pv. *pistaciae* may also infect Poaceae artificially, but natural infections have not been reported. It may also artificially infect several species within the Anacardiaceae, unlike *X. translucens* pv. *translucens*.

Spread

X. translucens pv. *pistaciae* seems to be transmitted through pruning. No natural means of transmission has been demonstrated. Leaf inoculation and transmission through lenticels and roots has rarely resulted in infection. No insect vector has been found.

Detection

X. translucens pv. *pistaciae* produces typical yellow slimy colonies (Fig. 1c) on synthetic media. They are useful for diagnostic purposes. Multiplex PCR and RT-PCR are also available and can detect and distinguish the two pathogen groups. RT-PCR is the more sensitive, allowing detection in asymptomatic trees.

Prevention and Management

High level hygiene focus and practices are paramount and growers are advised to disinfest pruning tools to minimise the spread of the disease. Drastic pruning, where trees are cut back to secondary or tertiary branches, has shown some benefit in managing severely-affected trees and restoring productivity. Biological control options are being investigated.

Observed changes in the rate of disease spread and symptom development are not clearly understood. The reduction in spread following the two major outbreaks suggest that *X. translucens* pv. *pistaciae* requires biological and/or environmental trigger(s) to cause the disease pistachio dieback. Further investigation into this will assist the development of timely and efficient control strategies.

UPDATE

The “Xanth” is back - 2011

Having largely been absent for the last six or seven years, *Xanthomonas translucens* pv. *pistaciae* is re-appearing in some Australian orchards.

The Xanth is a bacterial disease that affects the xylem of the pistachio tree. The xylem becomes blocked by the bacteria, resulting in dieback of shoots and limbs and the premature death of the tree. Symptoms include exudates from limbs and the upper trunk which may be associated with a canker; crinkled leaves and small, intensely-coloured, red fruit. The dieback typically manifests with the arrival of very hot weather as the damaged xylem cannot transport sufficient water through the plant system. The necrotic xylem can be seen by scraping back the bark of 1 or 2 year old wood.

Damaged, necrotic xylem is also typical of another disease of Pistachio. Verticillium wilt is less common, but not unknown, in Australian pistachio orchards. The two diseases are distinguishable in the orchard, with Xanth resulting in trunk exudates. Xanth appears to be a top-down disease, while Verticillium wilt originates from root infections.

Despite a dedicated decade of research by the researchers at the University of Adelaide and DPI Victoria in association with PGAI and HAL, the source of Xanth remains unconfirmed, and methods of spread other than by equipment have not been confidently demonstrated. While its management is yet to be sufficiently understood and defined, the following management strategies have limited the disease, and it is now considered of minor commercial significance in most orchards.

- Minimise overwatering, particularly in heavy, high water holding areas or in areas with perched water tables.
- Maintain good orchard sanitation with copper sprays
- Apply phosphorus acid in spring. PGAI research, in association with DPI Victoria, produced a reduction in disease incidence with this practice, but it was not statistically significant.
- Sterilise pruning equipment between cuts. Laboratory trials show the bacterium can be spread via pruning, but this has not been conclusively demonstrated in orchards.

The reappearance of Xanth is likely the result of two wet winters followed by a very wet summer in 2011/12.

Current advice is to minimise overwatering and to employ the high sanitation standards recommended above.

Further Reading

Facelli, E. *et al.*, Australasian Plant Pathology (in press); Giblot-Ducray *et al.*, Systematic and Applied Microbiology (in press); Marefat *et al.* (2006) European Journal of Plant Pathology **116**, 57-68; Marefat *et al.* (2006) Plant Pathology **55**, 639-649; Facelli *et al.* (2005) European Journal of Plant Pathology **112**, 155-165.

Key Contacts:

Drs Danièle Giblot-Ducray (daniele.giblotducray@adelaide.edu.au) and Eileen Scott (eileen.scott@adelaide.edu.au), The University of Adelaide, Adelaide.