

Citrus species

Edible *Citrus* (Rutaceae) has been cultivated in Australia since its introduction with the First Fleet in 1787. In a relatively short time, the Australian citrus industry has grown to a value in excess of \$400 million annually, more than 10% of the total value of fruit production in Australia. Currently, approximately 32 000 ha of citrus are planted in Australia. The orchards occur in the Riverina region of New South Wales (28%), the Riverland region of South Australia (24%), the Murray Valley region of New South Wales and Victoria (23%), Queensland (15%), and 10% occur in other regions, such as Bourke and Narromine (New South Wales), Kununurra (Western Australia), the New South Wales east coast and the Northern Territory.

The 22 degrees of latitude separating the southern-most and northern-most production areas of Australia

experience a range of climates. This provides the opportunity to produce quality citrus from a diverse array of varieties. The varieties of Australian-grown citrus include (in descending order of production) Navels, Valencias, mandarins, lemons, limes and grapefruit. Lemons, limes and grapefruit dominate plantings in the north; Navels and Valencias in the south; and mandarins are planted in the intermediate regions.

The wide range of climatic conditions and cultivated citrus varieties is largely beneficial in Australia; however, it has also created the opportunity for several citrus pathogens to become problematic. This chapter provides details of many of the citrus diseases present in Australia, as well as some that require strict quarantine to prevent their arrival.

BACTERIA

CITRUS CANKER – BIOSECURITY THREAT

Cause

Citrus canker, caused by the bacterium *Xanthomonas citri* subsp. *citri*, is a serious disease of citrus worldwide. The disease is known also as 'Asiatic canker', 'true canker' or 'cancrosis A'. The taxonomic nomenclature of *X. citri* subsp. *citri* has undergone several changes and some of its previous names have included *X. smithii* subsp. *citri*, *X. axonopodis* pv. *citri* and *X. campestris* p.v. *citri*.

The bacterium causing Asiatic canker has a wide host range and affects almost all citrus species and varieties and some related genera. This includes some native Australian citrus species (e.g. *Citrus glauca* or desert lime), which have been shown experimentally to be hosts of the pathogen.

In addition to *X. citri* subsp. *citri*, the bacteria *X. fuscans* subsp. *aurantifolii* and *X. alfalfae* subsp. *citrumelonis* can infect and cause similar disease symptoms on citrus.

The diseases caused by these species however are not considered to be as economically important to Australia as that caused by *X. citri* subsp. *citri*.

Symptoms

Typical citrus canker lesions first appear on the lower surface of leaves as small, pinpoint, water-soaked and slightly raised spots, which expand, thicken over time and protrude from both leaf surfaces. As the lesion develops, the tissue becomes spongy or corky, and the colour changes from tan or brown, to grey or white, usually surrounded by a greasy, water-soaked margin and a yellow halo. Lesions often occur in clusters in areas where water pools, such as along leaf margins or at leaf tips. Lesions can develop a crater-like centre, which may fall out to create a shot-hole appearance in the leaf blade. The lesions are often associated with leaf miner feeding tracks, because feeding wounds provide an access point for bacterial cells to infect the plant tissue.