



**Anthracnose on almond:  
epidemiology and characterisation of  
*Colletotrichum acutatum***

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In Australia, anthracnose on almond is caused by the ascomycete fungus *Colletotrichum acutatum*. Anthracnose has been confirmed throughout the major almond growing regions of Australia and significant economic losses have been reported. Fungicide trials carried out in Australia in 2000, prior to this project, yielded variable results that differed from those achieved in California. Two subpopulations of *C. acutatum* from almond have been reported in California, whereas one clonal population of *Colletotrichum* sp. from almond has been described in Israel, which differed from the subpopulations of *C. acutatum* in California. A collection of isolates of *C. acutatum* from almond in Australia was established. The isolates were characterised with respect to morphology, genetic variation and pathogenicity to detached plant tissues, and compared to representative isolates of *Colletotrichum* sp. from California and Israel. Plant material was cultured at regular intervals for isolation of *C. acutatum* to determine which tissues were likely to be the main sources of inoculum. The development of anthracnose on almond was monitored in the field for three successive growing seasons and relationships with weather data examined to elucidate the environmental conditions that are most conducive for disease.

There was considerable variation among isolates of *C. acutatum* from almond in Australia in terms of morphological and cultural characteristics. However, three main morphotypes were evident, namely pink, orange and cream colony colour. In general, isolates of *C. acutatum* from Australia were more similar morphologically to the pink subpopulation of *C. acutatum* from California than to the grey subpopulation from California and the isolates of *Colletotrichum* sp. from Israel.

Isolates of *Colletotrichum* sp. from almond in Australia were confirmed as *C. acutatum* by means of PCR with *C. acutatum*-specific primers. Subsequently, genetic variation was investigated using PCR with inter-simple sequence repeat primers, and the data were clustered using UPGMA. All isolates of *C. acutatum* from almond in Australia, except for one, shared 100% genetic similarity to one another, suggesting that the population of *C. acutatum* from almond was likely to be largely clonal. The isolates of *C. acutatum* from almond in Australia were genetically distinct from the isolates of the pink and grey subpopulation of *C. acutatum* from almond in California and from the *Colletotrichum* sp. from almond in Israel.

Pathogenicity experiments on detached leaves and fruit revealed pathogenic variation among representative isolates of *C. acutatum* from almond in Australia, California and Israel, however, all isolates tested caused disease symptoms. The susceptibility of the main almond cultivars grown in Australia was examined by inoculating detached leaves and fruit with isolates of *C. acutatum* from almond in Australia, California and *Colletotrichum* sp. from Israel. The results were inconclusive, and further research is needed to develop a rapid and reliable screening method to assess cultivar susceptibility.

The isolation of *C. acutatum* from almond tissues monthly for one year suggested that mummified fruit, peduncles and woody tissue were potentially significant sources of primary inoculum. These findings support the recommendation that the removal of mummified fruit and associated woody tissue may reduce inoculum potential and subsequent disease.

Correlating disease incidence in the field with weather data showed that rainfall early in the growing season appeared to be important in the development of anthracnose. Infection of almond tissues occurred when fruit was young, and disease incidence did not increase beyond November in two out of the three years during which disease was monitored. Disease

progress curves and relative area under the disease progress curve data showed significantly greater disease incidence on Price than Nonpareil, whereas the apparent rate of infection for Nonpareil and Price was similar for 2002 and 2003. On balance, these results suggested that there was little difference in susceptibility between Price and Nonpareil, but disease incidence may differ due to other factors, such as timing of fruit set, however, further investigation is needed to substantiate this. These results endorse the current recommendation that preventative fungicide sprays commence early in the growing season, however, sprays may not be necessary beyond November.