

Almond Board of California  
1998 Final Project Report  
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Project No.

& Title: 97-JU-o0, Investigations of Yellow Canopy Disorders

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Objectives:

1. To determine graft-transmissibility of two yellow canopy syndromes in Padre and Wood Colony almond cultivars.
2. To continue surveys of affected orchards and determine incidence of newly affected trees.

Work Accomplished:

In **Fresno County**, every Padre/interstem/Hansen tree, i.e. an interstem of Butte or Livingston almond, in two almond orchards (at second-leaf) displayed canopies with an off-color (yellow) and drooped leaves that defoliated prematurely. All symptomatic trees had succumbed prior to the 1995 winter season, while the alternate rows of Livingston and Butte almond/Hansen trees were normal in appearance. Also, 19 Hansen almond budded directly onto Hansen rootstock appeared healthy. The three almond cultivars were planted in a 1:1:1 ratio.

Shoots and budwood were collected in August 1995 from several symptomatic (prior to their death) and healthy Padre trees and either extracted for laboratory assays for ilarviruses and phytoplasmas or T-budded onto Carmel/Nemaguard trees at UCD and buds forced to grow.

ELISA tests for prune dwarf virus and Prunus necrotic ringspot viruses and PCR assays for peach yellow leafroll and X-phytoplasmas were negative. Irrespective of Padre source trees (diseased or healthy), all scion shoots developed normally over a two year period (1995-1997). Even the Carmel trees supporting Padre scion shoots remain healthy.

Further observations and insights in the Padre condition. In 1996, every third row planted to Butte/Hansen had developed similar

symptoms as those previously seen on the Padre/interstem/Hansen trees. However, the Butte trees continued to survive.

The deaths of the Padre interstem trees may have resulted because these trees were "made" on site, i.e., Padre scions were budded onto growing trees of Butte or Livingston/Hansen trees. A possible scenerio might be that "something" was absorbed by the established tree roots and "accumulated to a lethal concentration" in the rapidly growing Padre bud-shoots. At this time, I do not feel that Padre is acutely sensitive to that "something". Remember: There were 19 nursery trees of Padre/Hansen that remain and flourished during this time period. Overall it would appear that Butte almond may be the more sensitive cultivar and the "something" factor might involve a natural element such as boron, which is know to occur to toxic levels in soils along the west side of the San Joaquin Valley.

In **San Joaquin County**, ca 2% of the mature trees of Wood Colony/Nemaguard and one Carmel/Nemaguard tree showed yellowed canopies in an orchard in 1995. An examination of the roots and graft unions revealed only seemingly healthy tissues. Even so, shoot and budwood collections were made and assayed for ilarviruses and phytoplasmas (both tests were negative). Also, multiple buds were grafted onto healthy trees of Nonpareil almond, Thompson almond, and Fay Elberta peach at UCD (all grafted trees remain healthy after two years of observation).

A second orchard survey was done in 1996 and only 2 trees continued to exhibit somewhat similar symptoms; all others were in remission. A more detailed examination of these trees showed bark cankers with margins extending downwards from the tree crotch. We further observed a sprinkler head immediately adjacent to all of the affected and previously affected trees.

Based on results of the assays and observations on site, it would appear that the yellow canopy condition in Wood Colony trees is related to prolong wetting of bark tissues and perhaps introductions of water-borne pathogens such as *Phytophthora* spp. It was suggested to the grower to correct the sprinkler head angle to divert the water away from the tree trunks.