

# Pollination of Olives

under varying temperature conditions

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Investigations with Ascolano, Manzanillo, and Sevillano olive varieties show that chances of fertilization and fruit set are much greater after cross-pollination than after self-pollination. Pollen tube growth usually is faster following cross-pollination than after self-pollination and more pollen tubes can reach embryo sacs before the sacs degenerate.

Contradictory views regarding the benefits of mixed varieties in olive orchards have long been held in the Mediterranean countries and in California but studies at Davis and at Winters have shown that cross-pollination of varieties does increase fruit set in some years. In

certain districts of California the olive crop is poor in certain years, even when conditions seem favorable for pollination and fruit set.

Temperature is a possible factor in olive fruit set because individual varieties have particular temperature requirements and high or low temperatures affect pollen tube growth.

To gain specific information concerning the rate of pollen tube growth, the olive varieties Ascolano, Manzanillo and Sevillano were used in pollination studies under different temperature conditions in two greenhouses. The warm greenhouse was held at a minimum of 60°F,

and the ventilators were not opened until the interior temperature reached 90°F. The cool greenhouse was not heated, and the ventilators were kept open in an attempt to maintain day temperatures below 80°F. Thermographs were operated in both houses. The difference in minimum temperatures of the two houses was consistently around 8°F.

The first year of the studies, experiments were made with two self-pollinated varieties—Ascolano and Manzanillo—and with one of the cross-pollination combinations—Ascolano flowers with Manzanillo pollen—and were repeated the following year. As the prevailing tem-

## BORON

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centage of shot berries; or an apparently normal set that may shatter severely about midsummer.

Positive identification of boron deficiency symptoms led to the quick remedy of several problem vineyards in Mendocino County and in Merced County and to the location of additional, small, boron-deficient areas within vineyards. In general, in Merced County, the small areas are on the east side of the county in sandy soil where extreme leaching occurs, as near pipeline valves or flood gates in irrigation ditches.

In Mendocino County, and other coastal counties, the trouble areas are usually at the higher elevations, well above the valley streams that sometimes contain toxic levels of boron. The largest general region is Redwood Valley, a few miles north of Ukiah, where about one-fourth of the vineyard acreage has shown reduced yields or leaf symptoms.

Typical boron values of various foliage tissues are listed in the table in the next column. All samples were collected from vines which showed, sometime during the season's growth, visual symptoms. Extensive petiole analyses on a survey basis have been in progress for several

years. Using the boron values tabulated as tentative reference levels, the survey has revealed additional suspect regions in the sandy soils of other areas in San Joaquin Valley—southeast San Joaquin, Stanislaus, and eastern Fresno counties.

Fertilizer trials on a relatively large scale are established and analyses are be-

ing intensified in the suspect regions. Information concerning seasonal fluctuations and the boron levels of various parts of the foliage—tips, petioles, and leaf blades—is being accumulated in an attempt to be able to determine definitely the deficiency level and the best tissue and sampling time for measuring the boron needs of grapes.

Boron deficiency results in extreme crop losses, but it can be easily and cheaply corrected once the symptoms are identified. However, as with most trace elements, toxic effects from overdoses are a danger. Many boron materials are available, and they vary in strength from about 35% to about 65% boric oxide—B<sub>2</sub>O<sub>3</sub>. One ounce per vine of any of the lesser concentrated boron fertilizers or one-half ounce of stronger materials should provide sufficient boron for several years. Applications in excess of these very low rates may result in toxicity, particularly in vineyards on sandy soils.

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**Boron Levels of Foliage Tissues of Grapevines Showing Symptoms of Boron Deficiency**  
Parts per million dry weight

County	Variety	Boron
<b>Petioles adjacent to clusters</b>		
Fresno	Thompson Seedless	24
Fresno	Thompson Seedless	26
Stanislaus	Thompson Seedless	25
Stanislaus	Carignane	26
Merced	Thompson Seedless	22
Mendocino	Carignane	28
Mendocino	Carignane	27
Mendocino	Carignane	26
Mendocino	Carignane	20
Mendocino	Carignane	24
Mendocino	Carignane	26
Mendocino	Zinfandel	28
Mendocino	Alicante	25
<b>Terminal leaves plus petioles</b>		
Merced	Thompson Seedless	5
Mendocino	Carignane	9
Mendocino	Carignane	17
Mendocino	Carignane	5
Mendocino	Carignane	7
Mendocino	Carignane	8
Mendocino	Carignane	11
Sonoma	Carignane	8
Napa	Gamay	5
Santa Clara	Sylvaner	12
<b>Terminal chlorotic blades</b>		
Mendocino	Carignane	8
Mendocino	Palomino	10
Merced	Grenache	8
San Joaquin	Carignane	10

