E. L. PROEBSTING

# Leaf analysis and Fertilizer Response

An apple orchard in the Booneville area of Mendocino County was shown, by leaf analyses, to be low in phosphorus and potassium. Test plots were established in the orchard in 1952, and fertilized with nitrogen, potassium, and phosphorus. In 1956 potassium sulfate alone was applied. The amounts of phosphorus and potassium were greater than ordinarily used by growers.

Monthly analyses of leaf samples throughout the summer of each year showed maximum nitrogen, potassium, and phosphorus in spring, with a gradual decrease during the summer. Calcium and magnesium increased steadily; sodium was negligible at all times; manganese showed no definite, clear-cut pattern.

Although the potassium level was low—less than 0.5% in some samples—no definite symptoms were present, and trees made no response to added potassium.

Apparently there is a zone or level for each element in which response is uncertain. In a tree falling below that level in content, response to added element is nearly certain; in a tree above the level, response is nearly always absent. The extent of this zone of uncertainty, where response can be determined only by trial, is rather wide for nitrogen, perhaps less so for potassium, and undetermined for phosphorus. There have been so few cases of phosphorus response in deciduous orchards that reliable levels of deficiency have not been established.

The fact that the apple trees in the Mendocino County test plot—deficient in phosphorus and potassium, according to leaf analysis—failed to respond to fertilizer indicates that leaf analysis is a useful tool when used with other tests, but is not adequate by itself for determining a fertilizer program.

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KLAYTON E. NELSON

# Table Grape Quality after harvest

Table grapes are subject to two important types of deterioration after harvest—desiccation and decay. Desiccation is aggravated by high temperatures, low humidities and air movement. It affects the stems before the berries, causing them to turn brown and become brittle. Subsequent breakage of these dry stems during handling results in the market loss called shatter. This can be largely prevented by prompt and thorough precooling of the fruit after harvest followed by storage at 31°F to 32°F with a relative humidity of about 90%. Loss can be further reduced by careful handling of the fruit from the time it is harvested until it is sold at retail. If desiccation is severe the berries look dull and lifeless and become soft in texture, serious detrimental aspects of quality.

## Fumigation

Decay in table grapes is due mainly to *Botrytis cinerea*. It usually starts in the vineyard if the fruit has been exposed to rain when ripe. Field infections can spread during handling and storage causing a serious rot problem. This decay can be quite effectively controlled by the proper application of the fumigant sulfur dioxide. The fruit should be fumigated within 10 hours after it is packed with a 1 per cent concentration for 20 minutes. If the fruit is placed in storage it should be refumigated with a concentration of 0.25% for 30 minutes every seven to 10 days. The latter treatment prevents the mold's spread to unaffected berries.

It has been shown that a uniform and strong air movement between the containers during the fumigation period is a prerequisite for satisfactory fumigation of the fruit. Air velocities of at least 50 to 75 feet per minutes should be maintained past the containers to move the fumigant into the fruit effectively. The fumigant must be distributed rapidly since it is quickly absorbed mainly by the containers. Where the water content of the wood has increased rapidly following pre-cooling and storing, the absorptive capacity of the containers is particularly high. This phenomenon complicates the problem of calculating the correct dosage of sulfur dioxide, which depends not only on the amount of free space in the room but also on the amount of fruit therein.

A comprehensive study is now in progress to determine the following:

1. Methods of calculating the amount of sulfur dioxide to use for maximum uniform concentration of the fumigant on the exposed fruit.
2. Influence of container type and spacing on the rate and uniformity of sulfur dioxide distribution during fumigation, as well as on the rate of pre-cooling.
3. Frequency of fumigation.
4. Container type and tightness of pack in relation to bruising and other types of vibration injury. Particular attention will be devoted to consumer packaging.

A long-term project has been initiated to determine more accurately the relationship of table grape maturity at harvest to palatability and to carrying quality in shipment.

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