Nitrogen Fertilizer

California deciduous fruit orchards respond in variety of ways due to individual conditions

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Nitrogen is the only fertilizer applied to a substantial acreage of deciduous fruit orchards in California. Usually the first limiting nutrient in the production of those orchards is nitrogen. Only a part of the total deciduous acreage has reached a level where response to nitrogen fertilizer is obtained.

These conditions are due, not only to soil variation, but to varying requirements of different species, and to variations in climate and in cultural practices. It has been found that the same variety of apricot in the Santa Clara Valley makes a much greater response to nitrogen and must be fertilized more carefully than on the same soil type in the Sacramento Valley, where the light intensity and temperatures are greater.

Trials in several sections of the state have shown marked differences in the response of different species on the same soil and with the same cultural treatment. The peach is perhaps the first species to show response in a given environment, and a high percentage of the peach acreage of the state receives some nitrogen. The prune is usually the last among the stone fruits to respond, and the percentage of prune orchards receiving nitrogen is much smaller than that of peaches. The other stone fruits are intermediate in behavior. Apples and pears have seldom shown response to nitrogen; walnuts are higher in the scale of response.

Various sources of nitrogen have been used in field trials during the past 25 years. In most cases there has been little or no difference in response to a given amount of nitrogen, provided suitable allowance was made for the characteristics of the material. For example, an early winter application of nitrate to a sandy soil in a region of high winter rainfall would not be suitable because of leaching. Availability, convenience of use, and cost may well determine the choice of the source of fertilizer.

Experimental work has been done in several orchards to study the relative advantages of various times of applying nitrogen fertilizers. It was found that nitrogen was less effective when applied in early fall than in any other season.

One of the facts developed is that a late spring application has not been effective in increasing the size of stone fruits. Growth curves for peaches and apricots were not modified by this practice, and cherries and prunes reached the same final size whether they received a spring dressing or not. Size seemed to vary in accordance with the ratio of fruits to leaf area.

The great diversity of soils, species, and other factors has resulted in extreme variations in response. No experimental basis for rate of use has been developed, and correlation of response to soil analyses has been poor. This is to be expected, since nitrate at a given moment reflects only the difference between production and utilization, and total nitrogen does not indicate the rate of availability.

Curves of leaf nitrogen show seasonal differences in the same trees, and usually show too steep a drop throughout the season to be used as an index of nitrogen status within wide limits.

Field trials remain the most accurate method of diagnosis, but are slow and require supervision.

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similar in appearance that the Willamette mite may have been mistaken in past years for the Pacific mite. The substitution of Willamette mites for the other species is so gradual that it appears to the unaided eye to be a continuous infestation of Pacific mites.

An approximation of the overall average fluctuations in populations, based on numerous observations over a 10-year period is shown by the graph. It applies to the area north of Fresno, where most of the observations were made.

Actually the curves vary from year to year by being displaced slightly earlier or later. Each district may vary from its neighbors; and finally each vine may pass through cycles of infestation, earlier or later than its neighbors.

The predatory mite may overcome and practically exterminate the Pacific mite at any time after May. When the Pacific mites are nearly extinct on a vine or in a vineyard, the hungry predatory mites become cannibalistic and in about two days reduce their own population almost to zero. The few surviving Pacific mites then multiply rapidly and reach a second peak of abundance in the same year. In some vineyards, in 1949, this cycle was repeated three times.

Sulfur dusting in the spring is responsible for the disappearance of the Willamette mite in May—north of Fresno. Growers who dust more often or more frequently are probably free from Willamette mite damage. Those who put on less sulfur probably allow a few Willamette mites to survive and these are able to establish thriving colonies in the late summer, after the sulfur dust has been dissipated from the vines.

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