WASHINGTON

Time to Re-Apply Lime to Orchards in Washington?

By Timothy J. Smith

The Problem

In the mid-1980s, fruit growers of north central Washington realized that soil pH had dropped to dangerously low levels in a band about 10 feet wide and 3 feet deep under tree rows. Many growers tested blocks in their orchards and applied 2 to 4 tons/A of high quality aglime where pH was found to be too low. Soils are primarily sandy loam in texture, ranging from sand to loam.

> Liming orchards in north central Washington often visibly improves tree growth within a year of application...even when aglime is surface applied.

The Solution

In orchards where aglime was spread, tree growth often visibly improved within a year of application. Nitrogen (N) fertilization was halted or greatly cut back for a few seasons to control tree vigor. Symptoms of manganese (Mn) toxicity (bark measles), which is common on spur-type Red Delicious apples growing in low pH soil, was reduced or totally cured. Leaf size and color were also improved.

All of these positive effects occurred despite the fact that aglime was surface applied, although incorporation is recommended for most rapid benefit. Aglime dissolves very slowly in water and may require many years to move into the soil by irrigation and winter precipitation.

AGLIME application in apple orchards of Washington state can offer several benefits to improve production.

Local studies carried out in the 1970s showed that orchard soil pH would eventually be affected by aglime application, even two or three feet deep. The top foot of soil, however, was most rapidly affected and its pH was increased the most. For example, pH of the top foot in one experiment went from 4.5 to 6.5 after eight years, while pH in the second foot increased from 5 to 6.

The rapid tree response common in treated orchards apparently happens when aglime raises the soil pH in only the top few inches. There is a high level of tree root activity in the surface 6 inches. That means trees can take advantage of the benefits of topdressed aglime, such as enhanced nutrient release, before much pH correction has taken place in the upper 6 to 12 inches. Although improving the pH throughout the soil profile will have a less dramatic effect and will take decades to accomplish, it is necessary for long-term tree health.

At the time the 1980s liming boom took place, univer-

sity and Extension personnel advised growers that surface applied aglime worked slowly and that high rates were no more effective than 2 to 4 tons/A. The recommended approach was to apply 2 tons, wait a couple of years, apply 2 more tons, then give the aglime a number of years to become fully effective.

About 6 to 10 years have passed since liming was emphasized in area orchards, and it may be time for assessment and possible re-treatment. Most orchards have built up a "lime debt" of at least 8 to 10 tons/A over the past 20 years, so we will need to continue coming back to this issue for another decade or so before we can return to a maintenance mode.

Soil pH can be sampled any time the soil is not frozen. Samples should be taken from the top 6 inches, 6 to 12 inches, and 12 to 24 inches, taking care to prevent cross contamination between the samples (e.g., sluffing of surface soil into the sampling hole may result in an artificially high pH for the deeper samples). Assessing pH trends at the three depths will indicate the progress of the aglime application. If the pH of the surface 6 inches is well above 7.0, then there is still free aglime present and applying more will not necessarily speed the correction of pH at lower depths. On the other hand, if the surface pH is near or below 7.0, and the second foot is 6.0 or less, the orchard is probably ready for more lime.

Summary

The positive effect of proper soil pH for fruit production is too important to overlook. Trees pick up important nutrients...especially N, calcium (Ca) and phosphorus (P)...much more efficiently when pH is above 6.0. Since considerable time and money can be spent improving the nutrient status of trees by applying various fertilizer products, it makes sense to maximize their potential benefit with a proper liming program. BC

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period following dolomitic aglime application to three acid soils typical of the mid-Atlantic region. More importantly, crop yields were increased, and these increases were directly associated with the changes in soil chemical properties from aglime applications made at planting. Data clearly indicate that crops planted into acid soils do respond immediately to aglime applications. Aglime applications should never be postponed because of the belief that aglime reaction will be slow. Aglime with a relatively high calcium carbonate equivalency (85 percent or greater) and a significant portion (30 percent or more) of particles passing a 100 mesh sieve, will react immediately with soil acidity and increase crop yields.

Finally, one of the most difficult situations for a grower is to suffer yield losses due to acid soils, and then face the prospect of a large cost per acre for liming. Regular soil testing and aglime use must be a part of the farm management program each year so that costs are not too great in any one year, and soil pH values do not fall to levels that result in crop yield reductions. Liming acid soils is the foundation for an efficient crop production program. BC

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