Does Improving Sub-Soil pH Improve Almond Production?

Project Leader: Franz J.A. Niederholzer
University of California Cooperative Extension, Colusa County, P.O. Box 180, Colusa, CA 95932
(530) 458-0570, fjniederholzer@ucdavis.edu

PROJECT SUMMARY

Objectives:

- Determine if injecting calcium acetate and/or phosphorus with irrigation water will increase soil pH to 36" depth and subsequently significantly increase almond yield.
- Determine if injecting calcium acetate and/or phosphorus reduces water stress in almonds – particularly just prior to the next scheduled irrigation.
- For the current year: Establish location for trial and purchase equipment needed to continually fertigate calcium acetate at a constant concentration and inject phosphorus.

Background and Discussion:

Nitrification of ammonium and/or urea fertilizer materials decreases soil pH. This is particularly true under micro-irrigation of lower quality soils (Class 2-3) with high quality surface water. For example, soils under micro-sprinklers in a 15-year old almond orchard at the Nickels Soil Lab have a pH = 5 to a depth of 24". The pH of the soil outside of the sprinkler wetting pattern is 6.8. However, the low soil pH under the irrigation sprinklers does not appear to have resulted in low crop production – although no research has been conducted that effectively increases soil pH so that the impact of low pH on tree health and production can be tested.

Efforts to amend low pH almond orchard soils have been limited to surface application of lime, a very insoluble material. Limited impact on subsoil pH results from surface broadcasting of ground limestone. However, there are no other tested, effective options available at this time so growers spend time and money to spread lime in orchards with low soil pH in the hope that improvements will occur.

Calcium acetate, a soluble calcium source, has been documented to significantly increase soil pH under microirrigation and improve irrigation water infiltration rate as well. Unfortunately, calcium acetate is extremely expensive so phosphorus is also included in this study. In this experiment, calcium acetate and/or phosphorus will be delivered via fertigation at a constant concentration to the root zone of almond trees in low soil pH conditions. Yield data will be taken for both trees treated with and without calcium acetate and/or phosphorus. The results of this study should help growers understand the potential for yield improvement from increasing soil pH.

This project has just begun and no treatment results are yet available. Changes in irrigation water source and quality due to the drought have also changed conditions of the experiment. Use of high pH well water may become one of the treatments if we have another dry winter.

_____

Project Cooperators and Personnel: Stan Cutter, Nickels Soil Lab