Does improving sub-soil pH improve almond production?

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Introduction

- Nitrogen and potassium are used in large amounts by productive almond orchards. Fertilizers containing these nutrients are expensive.
- Acidic soil pH reduces the plant availability of nitrogen, potassium, phosphorus, calcium, and magnesium (Table 1).
- Growing large almond crops takes large amounts of nitrogen fertilizer every year for 20+ years. Ammonium and urea, common nitrogen fertilizers, produce acid when transformed to nitrate by soil bacteria. This acid can reduce soil pH and reduce nutrient availability.
- At Nickels Soil Lab in Arbuckle, CA, orchards in their second decade have soil pH=5.0 to 24” depth – where most almond roots are found. These orchards still produce good to excellent yields.
- Increasing soil pH is difficult and expensive.
- Does improving soil pH improve production?
- We are not aware of a study that has tested this question on field – scale.

Objectives

Determine if soil pH (0-36”) and nut yield in a replicated trial in a mature almond block at the Nickels Soil Lab are improved by adding one of several minerals:

- Calcium acetate
- Phosphorus fertilizer
- Calcium carbonate (lime)

over several years.

Plans

A suitable orchard will be selected at Nickels Soil Lab in 2014. Pre-study yield and soil samples will be taken in 2014. Treatment applications will begin in the fall, 2014. The calcium acetate will be injected through micro-sprinklers at high frequency/low rates. Lime will be broadcast under micro-sprinklers and P fertilizer will be banded in or on the soil surface under the micro-sprinklers. We expect this study will last at least 2-3 years

Table 1. The relationship between soil pH and nutrient availability