

Potential Nitrate Movement below the Root Zone in Drip Irrigated Almonds

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Project Leader:

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Objectives

1. Assess the extent of nitrate movement under drip emitters from different N rates each applied at two water levels.
2. Evaluate nitrate movement beneath drip emitters when different N sources are utilized.
3. Evaluate the effects of different N rates applied at two water levels on growth, nutrient concentrations in leaves and twigs, and nut yields of almonds.
4. Evaluate the changes in soil acidity and nutrient (N, K, Ca, Mg) movement within the drip zone as a result of different applied N rates at two water levels and different sources of N fertilizers.
5. Evaluate the effects of two rates of K on growth, nutrient concentration in leaves and nuts yields.
6. Develop recommendations for N, irrigation and soil management for use in the establishment and early maturity stages of drip-irrigated almond orchards.

Summary

The study was conducted in an orchard planted with three almond varieties (Butte, Carmel and Nonpareil) on a 12 x 18 spacing (202 trees/ acre). One year after plantation, five 5-tree plots were selected from each of the four 28-tree rows of each variety, to which the two replications of the ten treatments were assigned. The ten treatments included two water levels, 0.6 and 1.0 of evapotranspiration (ET), each with five N rates, varying according to years. The results of the N rate at two drip irrigation levels experiment and N source experiment confirmed that the rates of N needed to produce optimum yields at the full water level (1.0 ET) do not result in large amounts of NO₃-N being leached below the root zone. The rates of applied N necessary to produce optimum yields and limit nitrate leaching can be achieved by monitoring early July leaf total N concentrations and applying water at the 1.0 ET level. Excess water or N may result in excess NO₃-N being leached below the root zone. Sustained high yields and vigorous tree growth require large amounts of nutrients, especially K. After observing the large differences in leaf K concentrations during the early part of the growing season, it seems advisable for

growers to take leaf samples twice a year, (about April 1 and July 1), from at least three areas within the field. The areas should represent low, medium and high producing areas of the field. Leaf analyses showing large differences in K or other nutrients in the early season samples may indicate a situation where deficiency is approaching.