

# **Nitrogen Fertilizer Management to Reduce Groundwater Degradation**

## **Project Leader:**

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## **Objectives**

1. Determine the relationship between leaf N concentration and the rate of applied fertilizer. Assess the sensitivity of leaf N concentration to over-fertilization and reassess the validity of the currently accepted leaf N critical values.
2. Assess the relationship between the rate of applied fertilizer N and the recovery of isotopically labeled N-depleted ammonium sulfate.
3. Assess the magnitude of nitrate leaching below the root zone and its relationship to fertilizer N-application rate, efficiency of fertilizer N recovery, and tree N status.
4. Estimate N usage by almond trees.
5. Refine current management guidelines for N usage, which will help to maintain productivity while reducing the amount of fertilizer N leached below the root zone under conditions typical of the Northern San Joaquin Valley.

## **Summary**

Research plots were established in two mature almond orchards located in Salida and Ceres in 1980, both nitrate-sensitive areas of Stanislaus County to obtain data on N fertilizer management to reduce groundwater degradation in almonds. Evidence consistent with over-fertilization included leaf N concentrations greater than 2.5%, lack of yield response to applied fertilizer N, lack of increase in leaf N concentration at high fertilizer N application rates and a 50% reduction in the recovery of labeled fertilizer N by trees fertilized previously at the highest rates. It was noted that several management parameters can be used to increase recovery of applied fertilizer N. Application of fertilizer N can be reduced to the extent that high nitrate irrigation water supplies significant amounts of N. Leaf N concentrations greater than 2.5% were associated with high residual levels of nitrate in the soil and the fertilization can either be omitted for a season or significantly reduced in these orchards. Evidence was presented suggesting that over-fertilization occurred in the present experimental orchards and is likely to be widespread throughout the almond industry in California.