July 1 sampling. At no time during the active growing season did any sampled plants of the six treatments have a nitrogen content below the critical level for fresh-market tomatoes.

In treatments 1, 3 and 4, as total nitrogen in the plant increased, the percentage of nitrogen from fertilizer decreased between May 29 and July 1 and increased between July 1 and July 24 (fig. 1). Apparently, in some treatments the soil nitrogen was more available to the plant roots during the early part of the season than was the fertilizer nitrogen, and after July 1 nitrogen availability was influenced by time and placement of fertilizer applications. Had the initial concentration of soil nitrogen been smaller, a higher percentage of nitrogen probably would have been derived from the applied fertilizer.

Figure 2 shows the portions that can be attributed to the fertilizer source, given in percent of the total nitrogen (considered 100 percent at any one sampling date). The 80 kg per hectare of nitrogen applied at planting in treatment 3 resulted in the greatest amount of fertilizer nitrogen in the plants at first sampling (May 29).

Although nitrogen percentages from the added fertilizer for treatments 1 and 4 were about the same (20 percent) in May, they rapidly decreased by July 1, as in treatment 3. The fertilizer-nitrogen percentage in treatment 1 plants thereafter remained at about 10 percent. Treatment 4, which received an added 50 kg per hectare of nitrogen on July 1, increased to the 20 percent level again after July 1. Because of the placement of the banded fertilizer in relation to the drip lines, fertilizer nitrogen in treatment 2 plants remained at a relatively low level throughout the season. Although fertilizer nitrogen in the tomato plants of treatment 5 was low initially, the fertilizer nitrogen rapidly increased as more fertilizer was applied through the drip system during the growing season.

All treatments receiving fertilizer nitrogen through the drip system gave a higher percentage of fertilizer nitrogen in plants—except treatment 3 at harvest—regardless of time of fertilizer application (fig. 2). This indicates nitrogen is used more efficiently when applied through the drip system than when banded and furrow irrigated or banded and drip irrigated.


## Summary

Application of nitrogen fertilizer through a drip irrigation system is efficient regardless of timing. Nevertheless, when nitrogen fertilizer is banded beside the plant row, furrow irrigation is the superior method of irrigation. Fertilizer use is more efficient when nitrogen is applied through the drip system than when banded and furrow irrigated or banded and drip irrigated.

For high efficiency, fertilizer nitrogen should be placed carefully with respect to the plant roots, taking into consideration the direction of water movement during irrigations. When soil-nitrogen levels are relatively high, fertilizer use efficiencies are expected to be relatively low, with negligible crop yield increases from applied nitrogen fertilizer.



*Robert J. Miller is Associate Water Scientist and Lecturer, U.C. West Side Field Station; Dennis E. Rolston is Assistant Professor of Soil Science, U.C., Davis; Roy S. Rauschkolb is Extension Soils Specialist, U.C., Davis; and David W. Wolfe is Staff Research Associate, U.C. West Side Field Station.*

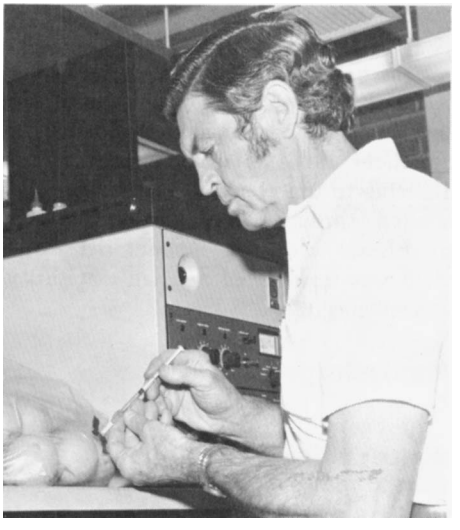

# Research briefs

## Extending storage life

University of California plant physiologists are investigating new techniques of temperature management, modified atmospheres, and special packaging to extend the storage life of commodities, such as oranges.

Studies to evaluate the effects of low temperatures during storage and after transfer to a warmer atmosphere showed that oranges lost little quality when they were washed, waxed, held at 41° F for 12 weeks, and then transferred to 68° F. Fruit stored at lower temperatures (32° F), however, suffered chilling injury, manifested by increased volatile content, rind breakdown, and development of off-flavors.

Plant physiologists also found that Valencia oranges stored in polyethylene bags for four months at 41° were in excellent condition and had lost an average of only 1.7 percent weight compared with 9.5 percent lost by fruit in paper bags. Other crops have been successfully stored by enclosing entire pallets of boxes in polyethylene. Researchers are now attempting to extend the technique to citrus on a commercial scale to maintain fruit quality over long periods. (BCH 2771)



**Research by plant physiologist I. L. Eaks at U.C., Riverside, shows that quality of citrus fruit can be maintained for long periods by storage in polyethylene bags.**

## Genetic advising program

The rapid expansion of knowledge about human genetic disease and the advances in the technology for recognition, therapy, and prenatal diagnosis have led to public demands for service. Birth defect centers have tripled in the last five years. Afflicted persons and their families require skilled counseling in addition to medical diagnosis and therapy in order to cope with emotional, social, and economic problems.

The Genetic Advising Program initiated at the University of California in an attempt to meet these needs is currently the only training program of this kind in California. The program has three components: diagnostic (by a medical doctor at the U.C. School of Medicine in San Francisco); counseling (including in-