

NITROGEN FERTILIZATION OF BACON AVOCADO — YIELD AND GROUND-WATER SALINITY

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In 1967 a nitrogen fertilizer experiment was established on 8-year-old Bacon avocados growing in a Mocho loam soil near Santa Paula. Four rates of N ($\frac{1}{4}$, 1, 2 and 4 pounds of N per tree annually) were combined with four timings of application (January, October, January and June, and January and October). There were 16 replications of the single-tree plots. Ammonium nitrate was the N source through 1971. Thereafter it was calcium nitrate.

Neither the N rate nor timing treatments had any significant effect on the concentration of N in leaf samples obtained in August each year. The N concentrations varied, over the years, in the range 2.02 to 2.28%, and there was no clear trend with time.

The only effect of N treatments on yield was a slight reduction for the 4 pound per tree rate in 1971 and 1973. Although salinity in the soil in the root zone was somewhat higher than desirable in some samples there was no clear indication that it was higher in the high-N rates than in the lower-N rates. Leaching appeared to equalize the amount of salt in the root zone.

The above indicates that a leaf-N value of 2.0% in August is sufficiently high to maintain production of the Bacon variety.

In 1972 soil samples were obtained on three different dates from the 10.5 to 11.5 foot depth to determine the amount of salt that was being leached below the root zone. The methods for calculating the salt moving below the root zone were patterned after those of Pratt *et al.* (1) for determining the amount of $\text{NO}_3\text{-N}$ that passed through root zones. Total saluble salt in ppm in soil water (as calculated from EC_e) was obtained by multiplying EC_e in micromhos by 0.64 (2).

The irrigation water contained about 800 ppm total soluble salt. Leaching fractions ranged between 16 to 22%.

The amounts of salt found below the root zone are shown in Table 1. The higher rates of soil-applied N were associated with considerably greater quantities of salt in the soil solution at the 10.5 to 11.5 foot depth. This indicates that the higher-N rates, with sufficient time, can contribute excessively to the salt load of ground waters.

TABLE 1. Nitrogen application in relation to amount of salt below Bacon avocado root zone.

<i>N added in fertilizer and irrigation water, lb/acre per year</i> ¹	<i>Total soluble salt leached below root zone, lb/acre per year</i> ²
45	4131
136	4069
259	5660
559	6302

¹ The irrigation water contributed about 13 lbs. of N per acre annually.

² Means from samples of February, April, and September, 1972.

Conclusions

This study indicates that a leaf N value of 2.0% in an August sample of spring-cycle leaves is sufficiently high to maintain production of the Bacon variety.

Evidence is presented which shows that overuse of N fertilizer can contribute excessively to the salt load of ground waters.

LITERATURE CITED

1. Pratt, P. F., W. W. Jones, and V. E. Hunsaker. 1972. Nitrate in deep soil profiles in relation to fertilizer rates and leaching volume. *J. Environ. Quality* 1:97-102.
2. Richards, L. A. [Ed]. 1954. *Diagnosis and improvement of saline and alkali soils*. U.S.D.A. Agr. Handbook No. 60. 160 pp.