Nutrition of Date Seedlings

glasshouse tests with Deglet Noor variety in sand and soil cultures indicate which nutrients best stimulate growth

A. R. C. Haas and Joseph N. Brusca

The date palm is a one seed-leaf—monocotyledonous—plant, and stock to be used for orchard plantings is usually obtained as offshoots from the parent palm.

To study the nutrition needs of date palm seedlings, tests were conducted—with Deglet Noor variety—under glasshouse conditions at Riverside because of *1*, certain quarantine restrictions, *2*, the large size of most rooted offshoots, and *3*, the high temperatures where date palms are grown.

As nitrogen is one of the fertilizers most commonly applied to soils planted to date palms, a study was made of the effect of increasing nitrogen levels on the growth and composition of date seedlings. Seedlings were planted in 3-gallon-capacity crocks containing silica sand and provided with drainage. The use of a nutrient solution permitted control of the content levels of the components.

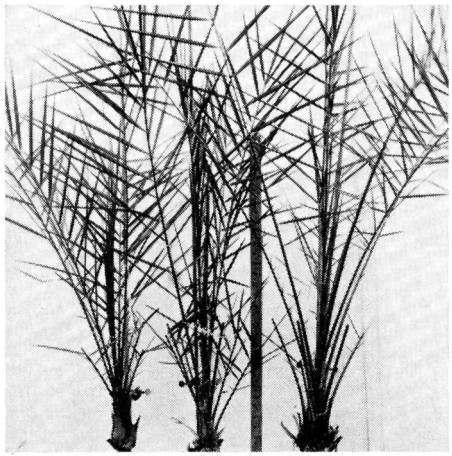
Because the age of the leaf stalk and its leaflets—pinnae—greatly affects their chemical composition, the brown, dead leaf stalks were always removed and only the leaflets of the most mature, or oldest leaf stalks still green, were used for chemical tests.

Calcium percentages in the dry matter of the leaflets and roots increased as the calcium nitrate levels increased. The percentages of magnesium and total phosphorus in the leaflets tended to increase but the percentages of potassium in the roots tended to decrease as the calcium nitrate in the nutrient increased.

Potassium cultures were set up in a manner similar to the nitrogen cultures, but no definite trend was shown in the growth of the tops which appeared stunted. One effect of increasing potassium levels was to decrease the percentages of magnesium in the tops, whereas in the roots the effect was to increase the potassium and total phosphorus.

As in the nitrate set of cultures, tests with phosphate showed promising results.

The effect of phosphate on the growth of the seedlings was marked. The content of total phosphorus in leaflets and roots increased as the phosphate levels increased. There was a high potasium content in the roots and a tendency to decrease as the higher phosphate levels were increased. The best top growth was made at the 93 ppm—parts per million—phosphate level and there was also an excellent root growth.



Tops of Deglet Noor date seedlings grown in sand cultures supplied with a nutrient solution differing in nitrate concentration. *Left to right:* 50, 150, and 350 ppm nitrate as calcium nitrate. Note the largest base of the tops at the highest nitrate level.

In the dry matter of the skin of whole fruits of several varieties obtained at the United States Department of Agriculture Date Garden at Indio, the total phosphorus contents were: variety Khadrawi, 1,010 ppm; Dayri, 980; Khalasa, 870; Barhee, 780; Deglet Noor, 750; and Sukkar Nabot, 1,560.

In other tests, seedlings were grown in Hoagland's nutrient solution with magnesium replacing the calcium and in other cultures where potassium replaced the magnesium. The effects on the growth of the seedlings may have significance because many irrigation waters where date palms are grown are reported as containing an extremely low content of magnesium. The seedling roots remained white when potassium replaced the magnesium, whereas when sodium was the replacing agent the growth of the roots was stimulated but they were somewhat dark in color.

Date palms frequently are grown in soils containing considerable sodium, so tests were conducted to determine whether sodium is of benefit for the growth of date seedlings. Initial tests were made with undrained soil cultures—6″ in diameter by 7″ deep—adding to each culture equal amounts of a nutrient solution consisting of distilled water containing calcium acid phosphate and calcium nitrate. Sodium nitrate was added to each culture. The control culture received additional calcium nitrate to eliminate the nitrate factor.

To have each culture receive the same nutrient except for various ratios of sodium to calcium, a large number of drained sand cultures were set up—7.5″ in diameter by 12″ deep—with two seedlings in each culture. The best growth occurred when 94.5 ppm of sodium was present in the nutrient solution. This same type of test was conducted for 40 months with 10-gallon capacity, drained sand cultures with various ratios of calcium and sodium as the nitrate.

The above tests were repeated with soil instead of sand cultures and with containers—7.5″ in diameter by 12″ deep—having nutrient solutions with 14 variations in their calcium-sodium ratios. The results indicated that sodium was of value in stimulating the growth of the date seedlings.

Because chlorine frequently accompanies high concentrations of sodium in date gardens, tests were made with small undrained soil cultures—each containing two seedlings—for about 20 months. The findings of the tests suggest that chloride may possibly stimulate the growth of Deglet Noor date seedlings.

When both sodium and chloride were used in small, undrained soil cultures, the growth showed some improvement. In cultures containing 4,000 grams of air-dry soil, one application was made of equal quantities of calcium nitrate solution, together with distilled water containing sodium chloride. After 20 months the growth appeared to benefit from the addition of some sodium chloride.

A similar test was conducted for 30 months with various concentrations of sodium chloride added to the same amount of nutrient applied only once to the small—6″ in diameter by 7″ deep—undrained soil cultures. It was evident that a certain range of sodium chloride concentration in soil may stimulate the growth of date seedlings.

A. R. C. Haas is Plant Physiologist, Emeritus, University of California, Riverside.

Joseph N. Brusca is Principal Laboratory Technician, University of California, Riverside.

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