

## **RESIDUAL EFFECTS OF HEAVY RATES OF PHOSPHATE AND LIMESTONE**

### **Procedures**

A field experiment conducted with Ruby Red grapefruit trees on rough lemon rootstock from 1951 to 1958 indicated that heavy rates of triple superphosphate applied with or without limestone markedly reduced the concentration of feeder roots, especially in the surface foot of soil (28, 30). The heavy rates of phosphate also decreased tree growth, increased the susceptibility of the trees to cold injury, and affected nutrient uptake (29). Differential treatments, outlined in Table 8 (Experiment 6), were discontinued after the spring 1958 application of phosphate and limestone.

Spring flush leaves from non-fruiting terminals were obtained from the Ruby Red grapefruit trees each summer. Yield of fruit by individual trees and internal fruit quality, peel thickness, fruit size, and diameter ratios, were measured in fruit samples obtained at random each year. In October 1961, three and a half years after the last application of phosphate and limestone, root concentration at various depths under the drip of the branches of the Ruby Red grapefruit trees was measured by the auger method (9).

To help evaluate residual treatment effects, Pineapple orange trees on rough lemon and sour orange rootstocks were interplanted in the plots on May 12, 1959. The trunk diameters of the interplanted trees were measured annually to evaluate residual effects on tree growth. A count was made of fruit produced in 1961. These young trees were removed by pulling in March 1962 in order to provide more growing room for the grapefruit trees. When the trees were pulled, their root systems were examined and given a rating from 1 to 10 based on the concentration of feeder roots in the surface foot of soil.

### **Results**

A comparison of Ruby Red grapefruit quality, yield, and leaf phosphorus contents from treatments which received phosphate plus limestone with treatments which received limestone only are presented in Table 8. Internal fruit quality was affected by phosphate applications—the juice content, soluble solids, and soluble solids to acid ratio were decreased by phos-