

soil. Controlled greenhouse experiments by Spencer (29) demonstrated that phosphorus itself is not toxic to citrus roots and the depressing effect of superphosphates on root growth is due to some factor in the phosphate material other than phosphorus.

This bulletin reports on recent research with phosphorus at the Citrus Station and discusses recommendations, based on experimental results, for the use of phosphates in citrus fertilizers. Several field experiments have been conducted to ascertain the phosphorus needs of bearing trees and of young trees planted on virgin Lakeland soil, and to relate possible responses to soil tests for phosphorus. Controlled greenhouse and outdoor pot experiments were also conducted to determine the mechanism of the depressing effect of superphosphate materials on growth of citrus tree feeder roots.

PHOSPHORUS RATE EXPERIMENTS— BEARING TREES

Procedures

Phosphorus rate experiments were established in three bearing Valencia groves on Lakeland fine sand which had not received phosphate for approximately five years. Each experiment consisted of four replications of paired plots receiving 0 or 120 pounds P_2O_5 per acre annually in the form of ordinary superphosphate (18 percent P_2O_5) applied with a fertilizer distributor. Other nutrients were applied by grower cooperators.

Experiments 1 and 2 were located in 25- to 30-year-old groves which had not received phosphate fertilizer, at least since 1953 (records not available prior to that time). Each grove received approximately 200 pounds N and 125 pounds K_2O per acre annually and two one-ton applications of dolomite per acre since the experiments were initiated in 1957. Experiment 3 was located in a 30-year-old grove in which phosphorus had last been applied in February 1952. This grove received approximately 180 pounds N and K_2O per acre annually and dolomite as needed for pH control. All groves received soluble magnesium in the fertilizer.

Prior to the first phosphate application, soil samples were obtained at various depths from each replication. They were analyzed for "available phosphorus" by three methods and for total phosphorus. These analyses are reported in the section on soil testing. Spring flush leaves from non-fruiting twigs were sampled during July or August, and fruit samples were obtained