

were planted in each pot. Treatments were replicated three times.

Further treatment details are recorded in Table 13. In Treatment 10, 2,500 ppm P as triple superphosphate was neutralized to pH 6.0 with calcium hydroxide; whereas, in Treatment 11, it was neutralized to pH 6.0 with sodium hydroxide. In Treatment 12, the soil was kept moist by surface additions of water. In Treatment 13, water was added by submerging pots in a container of water, which would prevent leaching downward of the added phosphate. In both cases the soil was sampled and seedlings planted eight days after mixing. In Treatment 14, 2,500 ppm phosphorus as triple superphosphate was mixed with soil and deionized water in an Erlenmeyer flask. Conductivity and pH were measured periodically to determine whether changes occurred with time.

**Copper Mobilization.**—A laboratory experiment was conducted in conjunction with the pot experiments to determine whether phosphates applied to soils high in copper could solubilize the copper. Various rates of triple superphosphate, ordinary superphosphate, and ammoniated superphosphate were added to a virgin soil to which 20 ppm copper had been added and to a grove soil containing 120 ppm copper. Fifty-gram samples of virgin soil were added to 100 ml of a copper solution containing 1,000 micrograms of copper. After shaking several minutes, the phosphate compounds were added in appropriate amounts to each flask. After occasional shaking for three days, the filtrates were analyzed for copper by the carbamate procedure. The grove soil containing 120 ppm copper from fertilizer additions was treated in the same manner except no additional copper was added. Very high rates of phosphate materials were used to simulate the conditions around a particle of phosphate fertilizer in the soil.

To further study copper mobilization, soil samples obtained from various depths in Field Experiment 6 were analyzed for copper to determine whether copper distribution was affected by phosphate and lime applications.

## Results

**Experiment P-I.**—The best growth of rough lemon seedlings was obtained in soil from plots which had received the high rate of phosphate and limestone in Field Experiment 6 (Table 11).