reduced root growth of citrus trees. These high salt concentrations are never present in field soils even following fairly heavy applications of fertilizer.

Copper Mobilization.—The application of phosphate compounds lowered the pH of both the virgin and grove soils and increased the amount of copper in solution (Table 14). The phosphate was as effective in mobilizing copper freshly added to the virgin soil at the rate of 20 ppm as it was in mobilizing the copper present in the grove soil, even though the concentration in the latter soil was approximately six times as great. Freshly applied copper is evidently somewhat more active than that which accumulates from fertilizer additions over a period of years.

TABLE 14.—EFFECT OF TRIPLE SUPERPHOSPHATE (TSP), ORDINARY SUPERPHOSPHATE (OSP), AND AMMONIATED SUPERPHOSPHATE (ASP) ADDITIONS ON SOIL pH AND SOLUBILIZATION OF COPPER.

Phosphate Applied		Virgin Soil with 20 ppm Cu Added		Grove Soil Containing 120 ppm Cu from Fertilization	
Source	Rate†	pH	Cu in solution	pH	Cu in solution
	ppm P		ppm		ppm
None	None	5.0	0.05	6.0	0.26
TSP	88	5.0	0.34	5.6	0.25
TSP	352	4.7	0.58	5.2	0.34
TSP	1408	4.3	1.08	4.7	0.68
OSP	88	4.7	0.65	5.5	0.29
OSP	352	4.4	1.51	5.0	0.51
ASP	88	5.0	0.53	5.6	0.17
ASP	352	4.8	0.81	5.2	0.33

† High rates of P were used to simulate conditions in the soil near a phosphate fertilizer particle; 88 ppm P equals 400 lb. P_2O_5/A-6 inches.

Copper analyses of soil samples from Field Experiment 6 indicate that less copper moved into the subsoil in plots receiving annual applications of 2,000 pounds limestone per acre than in plots receiving phosphate with or without limestone (Table 15). These data suggest the possibility that copper mobilization has been increased by phosphate.