

# PHOSPHORUS FERTILIZATION OF CITRUS

W. F. SPENCER<sup>1</sup>

## INTRODUCTION

Phosphates have been added to citrus fertilizers in Florida for many years. In only a few of the many experiments conducted in practically all citrus-growing areas of the world has field-grown citrus shown a positive response to phosphate applications (1, 2, 7, 12, 23, 33)<sup>2</sup>. In Florida favorable responses to phosphate fertilization have been recorded in two experiments—one conducted on a Davie mucky fine sand near Fort Lauderdale (33) and the other with young trees on a highly leached Lakewood soil in Pasco County (23). Whether or not citrus will respond to added phosphates depends mainly upon the amount of phosphorus present in the soil that is available for plant growth and development. Several investigators have shown that fertilizer phosphorus accumulates in soils such as those used in Florida for citrus (5, 20, 22, 27). Therefore, a suitable soil test for available phosphorus should indicate when further phosphate additions are unnecessary.

There is evidence that excess phosphates may have unfavorable effects on citrus growth and development. Applications of phosphates have resulted in changes in fruit quality, inhibited root growth, and lessened cold hardiness. Lower soluble solids content of juice was found to be a consequence of high phosphate fertilization in the field by Young and Forsee (33) and Smith et al. (25), and in solution culture experiments by Chapman and Rayner (6). Smith and Reuther (26) found that moderate applications of superphosphate frequently retarded external color development of Valencia oranges and caused them to regreen readily. Phosphates affect the uptake of various nutrients by citrus trees (3, 30). Smith (22) first reported that root growth of citrus trees was decreased by applications of phosphate materials. Ford (9) found similar effects. Spencer (28, 30) reported that heavy rates of triple superphosphate applied with and without limestone to Ruby Red grapefruit trees markedly reduced the concentration of feeder roots, especially in the surface foot of

---

<sup>1</sup> Formerly Associate Soil Chemist, Citrus Experiment Station, now Soil Scientist, Southwest Branch, Soil and Water Conservation Research Division, ARS, USDA, Riverside, California.

<sup>2</sup> Numbers in parentheses refer to Literature Cited.