phate applications. Size of fruit was not affected, but peel thickness was decreased and the diameter ratio was increased by phosphate. The diameter ratio is the ratio of the transverse to longitudinal diameter and is a measue of the flatness of the fruit. Flatter fruit are somewhat more desirable for the fresh fruit market. In this experiment, phosphorus increased the flatness of the fruit. The yield of grapefruit was lower in plots which had received phosphate. This was probably a reflection of greater freeze damage in the phosphated plots during the severe winter of 1957-58 (28, 30). It is worthy of note that plots which received 4 tons of limestone each year from 1951 to 1958 produced the most fruit. Leaf phosphorus content was considerably increased by the phosphate application.

The concentration of grapefruit tree feeder roots in 1961 was still considerably lower in plots which received phosphate than in plots which received limestone without phosphate (Table 9). The check plots which received neither phosphate nor limestone had an extremely low pH and exhibited root patterns similar to the plots that received phosphate without limestone.

The residual effects of phosphate and lime applications on growth, yield, and quality of root systems of the young Pineapple orange trees are shown in Table 10. The young trees grew best and produced the most fruit in plots which had received the medium rate of phosphate plus limestone. The root system ratings appeared to be related to soil pH. The best root systems were in plots which had received the high rate of limestone regardless of phosphate treatment. The root-rating results on the young trees are not in agreement with root distribution measurements made in the same plots by the auger method. This contrast will be discussed in the section on feeder root growth.

During the severe winter of 1957-58, trees which were receiving the high rates of phosphate suffered considerably more freeze damage than trees not receiving phosphate (28, 30). It was thought that this effect possibly was due to earlier initiation of new growth following freeze damage in trees receiving phosphate than in trees not receiving phosphate. These trees then would be more severely damaged by subsequent freezing temperatures. With this in mind, the young Pineapple orange trees were examined during the spring of 1961 to determine whether or not trees which had received phosphate initiated earlier growth. On February 13, 1961, each tree was examined and rated as follows: 0 - no new growth; 1 - new growth less than 1