Prune Industry Research - Annual Progress Report

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Project Title: Mineral Nutrition Aspects of Rootstocks

Investigator(s): R.M. Carlson (C.O. Hesse and Larry Fitch collaborating)

Objectives:

To identify physiological differences that determine a rootstocks ability to accumulate mineral nutrients and to develop screening techniques for selection of rootstocks according to their ability to supply nutrients to plants.

Results and Conclusions Obtained During Past Year:

Two field plots for testing some of Dr. Hesse's plum seedling rootstocks were established in the Sacramento valley. Evaluation of these trials will require some years.

Leaf samples were collected from a prune rootstock trial established by Dave Chaney in 1964. Rootstocks included Lovell Peach, Myrobalan seedling, Marianna 2624, Corrotto Marianna and Myrobalan 29C. These are 10 replicates of each rootstock. Analysis indicate that, for potassium, the only statistically significant difference is lower potassium in French prune on Lovell than in French prune on the other rootstocks. The variability suggests that large numbers of trees will be required to obtain significant differences in the field unless differences between rootstocks are very large.

Development of solution culture techniques to study potassium uptake is proceeding well. Experiments with French prune on Marianna 2624 and Myrobalan 29C rootstocks indicate that potassium uptake continues until the potassium concentration in solution reaches 40 parts per billion (low K plants). The plants reach their maximum rate of uptake when the solution concentration is ~ 1 part per million. Further increase in concentration does not increase rate of uptake. Other experiments are in progress to study effects of temperature, calcium-magnesium ratios, etc.

Study of potassium behavior in prune orchard soils has continued. Unexpected results have been obtained in a study of the effect of temperature on the release of mineral potassium to solution. There appears to be a threshold temperature above which potassium release rate is greatly increased. This threshold temperature is somewhere between 68°F and 86°F; in the range of field soil temperatures. Perhaps this phenomenon explains the high potassium status of the Tulare County orchards.

Current Status of Project and Work Planned:

The project is continuing: further field observation of rootstocks, studies of effects of temperature and other factors on K uptake by various rootstocks, and studies of temperature and moisture potential effects on soil mineral K release are planned.