Walnut Yield Capacity - Significance of Seedling Rootstock Variability on Cropping

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ABSTRACT

A uniform appearing 6 year old 'Chico' orchard growing in a Yolo loam was selected in Winters, CA in 1985. One hundred 'Chico' trees on J. hindsii seedling rootstocks were measured, harvested, and processed individually in 1985, 1986, and 1987 to assess the variability among trees in tree growth and productivity. Large differences among trees in tree size (as estimated by trunk cross-sectional area), yield, and cropping efficiency (yield/trunk cross-sectional area) have occurred in each of the 3 years of record. These data are currently being analyzed by the combined talents of a quantitative geneticist (D. Shaw) and statistician (R. Azari) to determine the relative significance of the rootstock (genetic) vs environmental sources of variation (orchard soil heterogeneity, etc.) with respect to the total variability in performance among trees within the test plot.

RESULTS AND DISCUSSION

The third and final year of individual tree yield and cropping efficiency data have been collected. These data are in the final phases of analysis prior to drawing intelligible conclusions. These conclusions will be passed on to the Walnut Marketing Board following completion of the analysis.

We anticipate that the analysis will enable us to relate the data collected to our initial objectives which were:

1. Assessment of rootstock dependent variation in tree performance. A component of this analysis includes assessment of the consistency of tree performance over the 3 year period.

2. By products of this work may include:
   a) assessment of the economic significance of rootstock selection to increase production efficiency in walnut.
   b) development of selection strategies to optimize identification of superior rootstocks. This exercise, while specific to walnut, represents a model which may be usefully employed to address similar questions in other deciduous tree fruit species.

Following completion of the analysis and summarization of the data, we anticipate selecting (for propagation) 10 of the most productive and 10 of the least productive trees. Collection of data from this future experimental block will enable us to verify the genetic (rootstock) contribution to tree variability predicted by our statistical analysis.