ABSTRACT

Monitoring of pistillate flower abscission (PFA) of walnut was continued in 1984. With 'Serr', differences among sites differing in extent of PFA were similar to those found in 1983. This included those where marked increases had occurred in 1983. 'Sunland', 'Howard', and 'Chandler' continued to express about 20% or less PFA. 'Serr' and 'Sunland' were grafted onto common root systems at a high PFA site and excellent growth of scions resulted. A comparison of 'Serr' and 'Tehama' was completed with the conclusion that 'Serr' can experience much higher PFA. Pre-treatment monitoring was done in the N nutrition-isotope plots. Statistical analysis of earlier results indicated the need for increased sampling per tree or site. In addition to PFA, failure to initiate pistils in a high proportion of buds with some trees and orchards continues as a major component of unrealized yield.

OBJECTIVES

To continue monitoring PFA of walnut to characterize its occurrence, especially at locations with differing extent of abscission. Newly added is investigation of the possible role of nitrogen status and nutrition in PFA.

PROCEDURES

Monitoring of PFA consists of inspection of all shoots on sample limbs at approximately 4-5 day intervals from before the time pistils are evident until after emergence is completed. Numbers of vegetative shoots on each limb are also recorded. Trees in the nitrogen fertilization plots (84WMB3) will be taken through a deficiency-adequacy cycle whereas others will be maintained with sufficient N. Cultivars expected to experience high ('Serr') or low PFA ('Hartley') are included in plots, six trees per treatment, and sample limbs for monitoring will be increased from one to three. Tissue samples will be taken to follow N component changes before and during pistil emergence. Supplying isotopic N to some trees will allow the most sensitive possible assessment of changes in N status.

RESULTS AND CONCLUSIONS

Monitoring of 'Serr' at sites differing in PFA in earlier years was continued. Levels of PFA in 1984 at each site were generally the same as in 1983. This included two sites where marked increases had occurred in 1983. Overall, there was a trend toward slightly higher abscission in 1984, but there were exceptions with individual trees within plots and sites which were unchanged. It is very doubtful that changes in 1984 were significant statistically. Reduction in numbers of limbs and/or trees sampled in some plots, necessitated by limitations in personnel and support, decreased
the ability to distinguish differences among sites.

Statistical analyses of abscission results for 1979-83 have been largely completed. The major differences were among sites. In a number of instances, significant differences were not detectable among sites where there were rather large differences numerically because of high variability. An increase in the number of limbs and/or trees per site will be included where possible in future monitoring.

Levels of PFA in 1984 for the more recent U.C. cultivars were as follows: 'Sunland', 6%; 'Howard', 4%; and 'Chandler', 21%. These values are within the range found in four prior years. Eighty percent abscission occurred with 'Serr' in the same planting.

Both 'Serr' and 'Sunland' were grafted onto regrowth from individual rootstocks where scions had been removed. In contrast to earlier attempts, graft success was excellent. These newly grafted trees range from 30-150 feet distant from 'Serr' trees experiencing approximately 80% PFA since 1979.

A third year's comparison of 'Serr' and 'Tehama', with reduction in numbers of plots, confirmed results obtained earlier. In the plots where 3 years' results were obtained, PFA averaged 76% and 8% for 'Serr' and 'Tehama', respectively. It is concluded that for a site where PFA is high for 'Serr', 'Tehama' is much less affected. A very slight reservation remains about differences in flowering time.

Monitoring was begun in plots selected for the nitrogen fertilization-isotope project (84WMB3). Abscission ranged from 17-74%, average 45%, for 'Serr' in one plot, and from 7-37%, average 19% with 'Hartley' in the other one. Earlier senescence and abscission of leaves of trees not supplied with nitrogen was evident in early November.

The possibility of increased PFA with greater tree age continues to receive discussion. Although tree age in itself does not appear to be a direct cause, comparisons are being developed from annual measurements with 'Sunland', 'Howard', 'Chandler', and for 'Serr' trees of four different ages.

The proportion of buds initiating pistillate flowers continues to be highly variable among limbs in orchards. On a limb basis for 'Serr' in 1984, extremes were 10-85%. PFA does not appear related to degree of fruitfulness of shoots, although statistical analyses have not been completed. Year to year reproduciveness of shoots does not follow traditional patterns of alternate bearing. For example, the same limbs of 'Sunland' with very low PFA have had over 90% of their buds with pistillate flowers in each of the past 4 years. A large unrealized potential for yield exists with low flower initiation. In some cases failure to initiate pistillate flowers may have a greater influence on yield than does PFA.

All results in 1984 are consistent with the earlier view that causes prevailing with trees at individual sites are the major
determinants of PFA. This was confirmed by statistical analysis. The nature of these influences is not known, but soil environmental-root relationships continues to be an attractive theory.