ABSTRACT

Monitoring of pistillate flower abscission (PFA) of walnut was continued in 1983. Emphasis was with sites differing in extent of PFA of Serr and continued evaluation of Sunland, Howard, and Chandler. A second year's results indicated Tehama to be less severely affected than Serr. The three new UC cultivars continued to experience very low PFA at Davis. In three locations PFA of Serr increased markedly from low to moderate levels in earlier years. At a new location both high and low PFA occurred within the same orchard and abscission was higher in early emerging flowers.

Foliar application of Cytex or boron had no effect on PFA. Attempts to relate hormonal activity to PFA were not successful, largely for technical reasons. Limited comparisons revealed no differences in either amino acids or the inhibitor, abscisic acid, in xylem sap of high or low PFA trees.

All results in 1983 were consistent with, and strengthened the conclusion that PFA is most strongly associated with causes arising at individual planting sites. The nature of these causes is currently unknown but may involve root-soil environmental interactions.

OBJECTIVES. To continue monitoring pistillate flower abscission (PFA) of walnut to characterize its occurrence, especially at locations with differing extent of abscission.

To conduct limited experiments to eliminate or discover causal influences or to indicate directions for future investigations.

PROCEDURES. Monitoring of PFA consisted of inspection of all shoots on selected limbs at approximately weekly intervals from before the time pistils were evident until after emergence was completed. Through tagging and frequent inspection the fate of all pistils on sample limbs was determined before any confusion with drop due to lack of fertilization occurred. Numbers of vegetative shoots on each limb was also recorded.

Limited exploratory work differed markedly in its nature and is described in Results.

RESULTS AND CONCLUSIONS. Monitoring was conducted for a second year with Tehama trees at a site previously shown to experience extremely high abscission of Serr. At two other sites in the same orchard determination of PFA of adjacent Serr and Tehama trees was also repeated. For all Tehama trees, PFA ranged from 0 to 23% whereas abscission with Serr limbs ranged from 81 to 88%. These results are consistent with those of 1982 and strongly suggest that for sites experiencing PFA Tehama will be less seriously affected than Serr. For the Tehama trees where alternate rows of Serr were removed in winter 81-82 the proportion of spurs forming flowers was more than doubled in 1983.
Monitoring of Sunland, Howard, and Chandler for a fourth year continued to indicate a low incidence of PFA. Serr trees adjacent to Howard and Chandler, and which had experienced low to moderate PFA in earlier years, had a marked increase in abscission in 1983. Differences in susceptibility among these cultivars are only suggestive because of differences in flowering times. Also, Sunland trees were about 300 feet distant from those of Serr.

In another orchard with a history of very low PFA, abscission of Serr more than tripled in 1983. At still another location with low to moderate PFA in two earlier years, abscission ranged from 6 to 16% with three trees but reached 51% with a fourth one. In practically all cases the same limbs were monitored in all years.

Monitoring was initiated in an orchard where spot counts in 1982, without tagging, indicated approximately 10% and 90% PFA at two locations within that orchard. Objectives here were to further establish site effects so that possible soil-root influences could be investigated. PFA differed at the two locations in this orchard in 1983 but not to the same extent as indicated by preliminary counts. In the low abscission area PFA ranged from 16 to 36% and in the high abscission area the range was 28 to 63% among individual limbs. PFA was higher in early emerging flowers than with later ones. Predominance of abscission at a particular time of the cycle of pistil emergence has been rarely found in earlier years.

At the request of a grower and a Farm Advisor the effect of Cytex on PFA was determined. Cytex is alleged to contain cytokinin activity. Foliar applications of 0.25% (1 gallon per acre) Cytex were made during the early stages of the flower emergence cycle prior to the time that growth stopped with affected pistils. There was no effect of Cytex as applied on PFA. This was true for pistils visible at the time of application as well as those emerging later.

Statistical analysis of all data from 1979 through 1983 is in progress.

Foliar applications of boron did not clearly reduce PFA of Serr pistils. Results were the same as in earlier years and these trials will not be continued. Contrary to results with filbert, application of boron did not significantly increase fruit set with walnut.

Reciprocal grafts made in 1982 of shoots from trees with histories of either high or low PFA had a very low rate of success and no results were obtained.

Results of analyses for several hormonal constituents in pistils and in xylem sap from high and low PFA trees were mostly negative. Considerable methodology was required and gibberellins and cytokinins were below limits of detection with procedures used. No differences were found in amino acids in xylem sap and abscisic acid did not differ in pistils or xylem sap of high and low PFA trees. Samples for these measurements were taken at the time of pistil growth stoppage.
All results in 1983 are consistent with the conclusion that causes of PFA are associated with the particular site at which individual trees are planted. Additional circumstantial support for this was gained from large increases in PFA with certain trees or orchards and from a high incidence with early emerging flowers in another orchard. The nature of these causes is currently unknown but may involve root–soil environmental interactions.