PISTILLATE FLOWER ABSCISSION (PFA)

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ABSTRACT:

PFA was not different with shaded vs. exposed limbs of the same trees nor between shaded interior trees and outside ones with high light exposure. Tehama trees expressed lower PFA than adjacent Serr. PFA of Tehama was also low at a site where Serr trees (removed 1982) had very high drop the previous three years.

Fruitfulness of all monitored limbs in 1982 ranged from 6 to 97% and the earlier conclusion that PFA is not related to degree of fruitfulness was substantiated.

In a common planting PFA of Serr was low and only slightly greater than with Sunland, Chandler and Howard. This suggests that PFA for the new U. C. varieties could be high in a location where this problem may be serious.

Comparison of the same limbs monitored in 1981 and 1982 did not support the contention that PFA was less severe in 1982.

Tree age in itself does not appear related to PFA.

All measurements and observations in 1982 support the contention that PFA is related to planting site.

OBJECTIVES:

To continue monitoring of PFA of walnut to characterize its occurrence. Determination of fruitfulness of spurs was a secondary consideration.

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

PROCEDURES:

Monitoring of PFA consisted of inspection of all shoots on selected limbs at approximately weekly intervals from before pistils were evident until after emergence was completed. Tags were attached to shoots bearing pistils. The fate of all pistils on tagged shoots was determined before any confusion with drop due to lack of fertilization occurred. The number of vegetative shoots on each limb unit was recorded. Monitoring was conducted for various comparisons which are described in Results.

Limited exploratory work differed markedly in its nature and is described in Results.
RESULTS AND CONCLUSIONS:

In one comparison with Serr, PFA was low and not different among moderate to highly fruitful limbs with high light exposure and shaded limbs of low fruitfulness. One shaded and one exposed limb was monitored on each of five trees. In another orchard variability of PFA among limbs was greater than differences between interior shaded trees and outside exposed ones. These results agree with those of others and indicate no association between light exposure and PFA.

Tehama trees were monitored which had been interplanted with Serr trees (removed in 1982) having extremely PFA during the three previous years. Tehama PFA ranged from 0 to 24% (one limb on each of four trees). Previously monitored Serr trees had PFA in excess of 80% during three years.

In two other locations within the same orchard where grower belief was that PFA of Serr had been less severe, comparison of adjacent Serr and Tehama trees was made. PFA on limbs of Tehama trees ranged from 0 to 15% whereas that of Serr was 33 to 78%. The lower PFA of Tehama than Serr is in agreement with earlier results with common location of trees of these cultivars at Davis. Conclusions are that for a given location Tehama will be less severely affected by PFA than Serr. However, some caution should be noted regarding conclusions about varietal comparisons until causal mechanisms are understood.

Comparisons were made again of Serr, Sunland, Chandler, and Howard in the same planting. Sunland was not immediately adjacent to the other cultivars. The range of PFA for these cultivars was as follows (four limbs, two trees each); Serr (25-27%), Sunland (7-26%), Chandler (10-16%), Howard (7-22%). These results suggest that for a given location the new UC varieties may have the same or slightly less propensity for PFA as for Serr. As in earlier years the Serr trees in this planting expressed much lower PFA than ones approximately 400 feet distant. Differences in soil classifications exist between the two plantings but the precise differences within each are not known.

With all measurements in 1982 the degree of fruitfulness (occurrence of pistillate flowers) of spurs on limbs ranged from a low of 6% to a high of 97%. Obviously, the failure to initiate pistils can have as large an effect on low yield as high PFA. As with earlier results, there was no relationship between PFA and the proportion of shoots forming pistillate flowers on limbs.

The question has been raised as to whether 1982 was a less severe year for PFA than previous ones. This can only be answered by measurements with the same trees, and preferably the same limbs, for the years in question. Very few such measurements exist. Comparison of seven plots (four Serr, three other cultivars) where the same limbs were monitored in 1981 did not support the contention that PFA was less severe in 1982.

Consideration of tree age as a factor in PFA was continued. To date, tree age alone does not appear related to PFA. As one example, only 15% PFA was recorded in a 17 year old Serr orchard in 1982.

Several things were done in a very limited way with the possibility of pointing direction for further investigation of PFA. Calcium and boron sprays were applied to spurs in autumn and at pistil emergence. The suggestion that
boron might have reduced PFA may be within the range of limb to limb variability.

Use of a fluorescent dye did not reveal extensive blockage of xylem transport into pistils just before or during the abscission (with Polito).

Samples were obtained for hormonal analysis of pistils and xylem sap from high and low PFA trees. Analyses are in progress.

Attempts will be made during winter to obtain trunk cores from trees where monitoring has been done. The intent here is to relate tree vigor as indicated by wood ring increment with measured PFA history.

Reciprocal grafting of shoots from trees with a history of either low or high PFA was done.

All measurements and observations made in 1982 are in agreement with earlier conclusions that PFA is most strongly associated with location of trees in question. This is suggestive of a root-soil environment interaction.