76-P3

Project No. 76 - P3 January 1977

Title: Environmental Variables and Crop Production

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Objectives: To use environmental variables, especially temperatures and precipitation, to develop a crop forecasting model.

Interpretive Summary: Temperature and water availability are of obvious importance in determining the size of the almond crop. Early precipitation has historically been of great importance to the coming crop; with timely irrigation this is no longer as critical. Precipitation continues to be a major factor over much of the state, however. Temperature is important in the fall in terms of excessive stress, in late winter and early spring in determining the timing of bloom and the adequacy of pollination, and low temperatures after bloom may of course have a severe effect on the young nuts. May temperatures may be of considerable significance also, but that is a very tentative conclusion.

Experimental Procedure: The forecast for the new crop begins in September and continues through until late June. Temperature and precipitation data are compiled and analyzed in fall and winter. Precipitation totals and intensities are followed; temperatures are analyzed in terms of adequate cooling for dormancy.

In early spring the primary focus is on the bloom period and whether pollination is satisfactory. Temperature, wind, and rain are significant factors. Low humidity is also a factor, especially if accompanied by a wind, as this leads to shortened pollen life, drying of flower parts, etc. After bloom there is the danger of frost, as in April 1975, when the crop was reduced or wiped out in some areas. Frost damage is difficult to monitor as temperatures may vary over short distances and are in any event usually several degrees above those in orchards.

Temperatures in April, May, and June are monitored as to the adequacy of growing conditions. A generally warm spring-early summer seems best but should be free from extremes. May of 1976 seems to have been almost ideal.

Results: The results of the 1975-76 work was both satisfactory and promising. The exceedingly dry winter, one of the two driest in history in much of the area, was of tremendous concern to growers and handlers. My April forecast of 257.5 million pounds was far above what others were expecting; in that this forecast was more accurate than others at that time it was relatively satisfactory and also promising in that the methodology seemed to follow what proved to be the important considerations. This was also the case in 1975, when many grossly overestimated frost losses. The final crop is in the neighborhood of 275 million pounds, however, so the forecast was in error by about 7 percent. Possible reasons for this error are being examined; it is my opinion that 15-20 million pounds were added by the excellent growing conditions in late spring.

Discussion: The work in 1975-76 seemed to go smoothly, aside from the problem of getting accurate acreage data at the appropriate time. This project seems promising and has given satisfactory results. During the coming year I plan to concentrate more on temperatures and on county patterns.