Project No. 93-K20 - Noninfectious Bud-Failure

Project Leader: Dr. Thomas Gradziel - (916) 752-1575
Dr. Dale E. Kester - (916) 752-0914
Dr. Ken Shackel - (916) 752-0928
University of California
Davis CA 95616

Cooperating Personnel: W.C. Micke, M. Viveros, M. Freeman, K. Pelletreau, FPMS (M. Cunningham), IAB (P. Randhawa), Paramount Farming Corporation

Objectives:

1. Continue to monitor BF in plantings of clonal selections and add additional sources of "Carmel".
2. Continue observations of BF through 2nd and 3rd year of "Carmel" and "Nonpareil" progeny tests and irrigation experiment.
3. Obtain first year results of stabilization test and conduct 2nd year grafting experiment.
4. Observe BF development in seedling progeny from controlled crosses of almond sources x Nonpareil BF.

Results:

During the past five years, this project has worked closely with the commercial nursery industry to bring about mutually desired goals of low BF-potential sources combined with freedom from viruses, trueness-to-variety and -type. Two basic methods of budwood selection are used. The older traditional method is orchard selection utilizing mass propagation from multiple tree collections in which identity of individual source trees is lost during propagation and nursery handling. Earlier studies under this project concluded that this method not only perpetuates BF within budwood lines but tends to result in build up over time.
The alternate method is "clonal" selection originating from specially selected single trees. Limited numbers of source trees are maintained in special scion orchards. Multiplication and

distribution takes place through limited vegetative generations. Identification of low BF-potential sources requires progeny tests and stabilization of BF-potential is maintained by scion orchard management. The latter method has resulted in low BF-potential sources of Nonpareil which promise to control BF development in future plantings. Five source-clones of Nonpareil, identified by FPMS accession numbers (2-70, 4-72, 5-72, 6-72 and 7-72) and available to nurseries and growers, have been progeny tested up to 20 years in some cases and shown to have low BF-potential. One (FPMS 2-70) has been used commercially since 1986. Several other low BF-potential source-clones are also available but have less test history. Low BF-potential sources of Nonpareil are apparently available from some commercial nurseries but we do not have current information on them.

In contrast, no propagation source of Carmel can currently be relied upon to be completely free of BF but progress under this project indicates reduction of the BF hazard is possible. Second year results were obtained from 2773 progeny trees originating from 15 commercial sources (1991 planting). A range from zero to 45 per cent BF trees was shown among the sources after the first year (1992) with some overall increase the second (1993). These were "orchard sources" in which the identity of each individual tree was retained through propagation and planting. The most important result was that individual (symptomless) source trees segregated for different degrees of BF-potential based on the percentage and grades of BF progeny trees. Elimination (or avoidance) of individual source trees with high BF-potential by individual nurseries in the 1992 season could not be expected to have had an effect in reducing the problem until spring 1994. However, to produce a major impact, additional "single-tree" progeny tests will be required of some nurseries to provide sufficient numbers of sources tree to service the industry.

A second result was that although all but one produced BF trees several (3) sources not only had low percentages of BF progeny but the severity ratings were also low. The only source with zero percentage was the original seedling source tree. Others of this low BF-potential group have been used to select potential source-clones with low BF-potential. However, one group of six "clones" began to produce some BF progeny at four years. The incidence was low and symptoms mild but may represent improvements over standard materials. Of a group of 11 clones selected in 1988 and planted in 1990, all but 2 have produced some BF progeny or have tested virus positive. Both sources came from the Manteca RVT plot. An additional 19 new Carmel single tree selections from the low BF-potential budwood sources described and which tested virus-free in 1993 were propagated for progeny tests. Orchard sites for this material in the southern San Joaquin valley will be needed this winter.

II. Management of young orchards

Differences in overall tree growth and vigor were apparent under three levels of water stress treatments: "dry", "medium" and "wet" and three levels of BF-potential. As expected, essentially 100% of Carmel and Nonpareil trees with high BF potential exhibited BF symptoms in all treaments, whereas none of the Carmel and Nonpareil with low BF potential exhibited any BF symnptoms in any