PROJECT NO.: 75-K

COOPERATOR

University of California, Davis
Department of Pomology
Agricultural Experiment Station
Davis, California 95616

PROJECT LEADER: Dr. Dale E. Kester Phone: (196) 752-0914

PERSONNEL: Pomology Department: Mr. Richard Asay, Mr. Glaser
Agricultural Extension Service: Mr. Marvin Gerdts, Mr. Warren Micke and numerous farm advisors in several counties
Plant Pathology: Dr. George Nyland, Mr. Sunny Lowe

PROJECT: Non-infectious bud failure

I. Objectives and Goals

Factors previously identified that affect distribution of BF include a) variety; b) bud-source within a variety; c) summer temperature at the orchard location; and d) age, not only of the tree but prehaps also of the variety. Practical objectives of this study are; a) to develop methods to predict the BF-susceptibility of a variety for susceptible varieties; b) to establish the level of BF-potential present within bud-source trees; and c) to establish methods to reduce the effects of BF on yield. However, the primary emphasis must at present be to obtain better understanding of the phenomenon, how it affects the basic physiology of the tree, how it is transmitted to offspring plants both in seeds and during vegetative propagation and how its distribution is affected by environment.

II. Abstract of Work In Progress

1) Observations continued on change in incidence of BF trees in orchard plots in different California environments where the trees were produced from the same budwood source.

2) Data was obtained on the new appearance of BF trees in groups of trees where the bud-source was different but the environment was the same.

3) A new growing facility is being developed where trees are to be grown in small containers at high temperatures for BF studies.

4) Physiology of BF expression in normal (Davis) and BF (Winters) 'Nonpareil' trees as influenced by Alar is being studied. Three timings and 2 concentrations were made in 1974 and again in 1975. Trees were planted in 1970.

5) Electron microscope examinations of plant material from BF and normal trees were made by Dr. George Nyland and Mr. Sunny Lowe (Plant Pathology). BF 'Nonpareil' plants were subjected to heat therapy using similar treatments that have successfully removed viruses from other living tissue.

6) Cross-pollinations have been made in 1974 and 1975 to produce hybrid seeds of almond x peach to study transmission of a BF factor from the almond to the F_1 progeny.

III. Results in 1975 (numbers below correspond to topics listed above)

1. Increased incidences of BF trees occurred at Escalon, Chico and Winters showing a continued upward trend in these plots. A few cases of BF are beginning to appear at the Davis plot. The ratio in rate of appearance remains: Lost Hills > Winters > Chico > Escalon > Davis > San Luis Obispo.

2. Five new virus-tested 'Nonpareil' lines continued to remain free of BF for the 3rd and 4th years of test at West Side Field Station (Fresno, CA.).

3. The growth facility is not yet operational on a routine basis but lines of normal and BF 'Nonpareil' are now growing in the greenhouse where they have been kept continuously at high and low temperature conditions for 4 years.

4. First years efforts concentrated on how to measure BF effects in terms of growth, flower initiation and shoot bud behavior. BF trees showed extensive shoot growth, a large tendency for lateral branching to develop the same season and low flower bud density (but not necessarily less numbers of flower buds) as compared to normal trees. Alar produced modifications in these characteristics in favor of reduced symptom expression with greater modification arising from earlier timing. No conclusions should be drawn from these tests since we are only in initial stages.

5. The first series of electron microscope studies have been negative as far as the particular material studied. This is consistent with the current view that a pathogenic organism is not involved. However, further tests are being made. BF 'Nonpareil' plants have now been subjected to heat therapy and are ready to be tested for BF development.

6. Evaluation of progeny of 1972 and 1974 crosses can be completed next spring. Seeds produced from 1975 crosses were germinated and plants produced the same year. These are now ready to be planted directly into the orchard, shortening the growing cycle of seedling production by one year compared to previous procedures.

IV. Conclusions and Discussions

A summary of developments in the bud-failure problem was published this spring (see below). This has clarified aspects of the distribution of BF as influenced by the interaction of climate (primarily summer temperature) and the innate level of BF-potential in an almond tree at the time of planting. The demonstration in orchard tests, that large differences in BF potential does exist in separate propagation sources and can be measured is encouraging but does not yet provide sufficiently reliable indication of complete freedom. The work described in progress entails the beginning of new phases of investigations which will allow a more basic study of the problem under more precise environmental controls. Most of this would not be possible without these support funds.

Publications during 1975

California Agriculture, Vol. 29 (March)

Kester, D. E., et al., pp. 10-12 Variability of bud-failure in 'Nonpareil' almonds.

Kester, D. E., et al., pp. 13 Selection for freedom from bud-failure

Gerdts, M., et al., p. 14 Almond yield reduction

Browne, L. T., et al., p. 15 Replacing bud-failure trees

UNIVERSITY OF CALIFORNIA, DAVIS

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ

COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF POMOLOGY

DAVIS, CALIFORNIA 95616

December 31, 1975

Mr. Dale Morrison
Almond Control Board
P.O. Box 26164
Sacramento, California 95826

Dear Dale:

Here are my Annual Reports for the 2 projects. I hope you had a pleasant holiday season.

Sincerely,

Dale E. Kester/gr

Dale E. Kester
Professor of Pomology

DEK/gr
Enclosures