Project No. - 93-AA3 - Biochemical Markers for Bud Failure Potential

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Objectives: To identify DNA based molecular markers closely correlated with the potential for BF symptom development in almonds.

Results:

Clonal selections of Nonpareil almond showing various levels of bud failure symptoms were analysed for the development of DNA specific molecular markers that can be used for diagnostic purposes. If found, this would allow early identification of almond clones that are pre-disposed to develop bud failure. Earlier experiments in our laboratory showed that genes involved in protein synthesis (ribosomal genes) in plant cells were selectively deactivated by a process known as DNA Methylation in the almond clones that were severely affected by bud failure. However, the "normal" clones (with NO symptoms) and the clones with mild symptoms did not reveal any patterns of DNA methylation.

Further experiments using the "representational DNA analysis" (RDA) techniques are under progress. The genomic DNA from almond clones with varying levels of bud failure have been isolated and purified. The purified DNAs will be digested (cut)with methylation sensitive and insensitive restriction enzymes. Following the addition of oligonucleotide adaptor primers, the the genomic restriction fragments are amplified by PCR. The resulting DNA fragments (called amplicons) will then be selectively enriched for unique DNA fragments that distinguish "normal" almond from bud failure affected almond by a competitive PCR reaction between normal (Driver) and bud failure affected (Tester) DNAs. The differential DNA fragments will be cloned and further analysed for its diagnostic value as well as physiological and genetic functions.

of the treatments.

For trees from a source with intermediate level of BF-potential, Nonpareil showed increasing BF expression as water stress increased (29%, 48% and 72%, in the wet, medium and dry treatments respectively), but in Carmel there was no apparent treatment effect (52%, 49% and 54%, in the wet, medium and dry treatments respectively). In all cases, however, BF symptoms for the same source material were more severe as the severity of water stress increased. BF symptoms will be further evaluated in 1993.

III Stabilization.

BF production from severely pruned branches of trees with low, medium and high BF growing at UC Experimental Orchards (Davis and Winters) is being compared to BF production from branches that have been grown after consecutive annual graftings. No increase in BF was observed in spring 1993 after the first cycle of grafting.

IV. Climatic patterns.

The pattern of accumulative temperatures above 80 F has been studied in different sites during the past five years. The very high BF symptom level and associated poor flowering observed in many orchards in spring 1993 can be directly related to the unusually high temperatures during August 1992. This pattern contrasts with the usual pattern where highest temperatures occurs in July.

A SUMMARY OF THE DATA UNDERLYING THIS REPORT WILL BE AVAILABLE AT THE BOOTH.