Project No. 86-KB1 - Tree and Crop Research
Bud Failure and Amino Acid Metabolism

Project Leader - Dr. Donald J. Durzan (916) 752-6854
Dr. Dale E. Kester (916) 752-0914

Personnel: Linda Liu, Frank Ventimiglia

Objectives:

1. Carry out seasonal studies on amino acid metabolism with emphasis on the role of proline in the development of bud-failure symptoms.

2. Continue to investigate the inherent nature of bud-failure potential in cell and tissue culture with emphasis on the possible role of proline (or other compounds) as a marker or causal agent in the expression of bud-failure.

Interpretive Summary

1. Seasonal (1986) sampling of normal (N) and bud-failure (BF) trees was extended one month because of the unusual weather conditions. All samples have been extracted for amino acid analysis and analytical work is progressing at the rate of 40 samples per month. This rate is consistent with earlier projections that the analytical work will be completed in late May 1987.

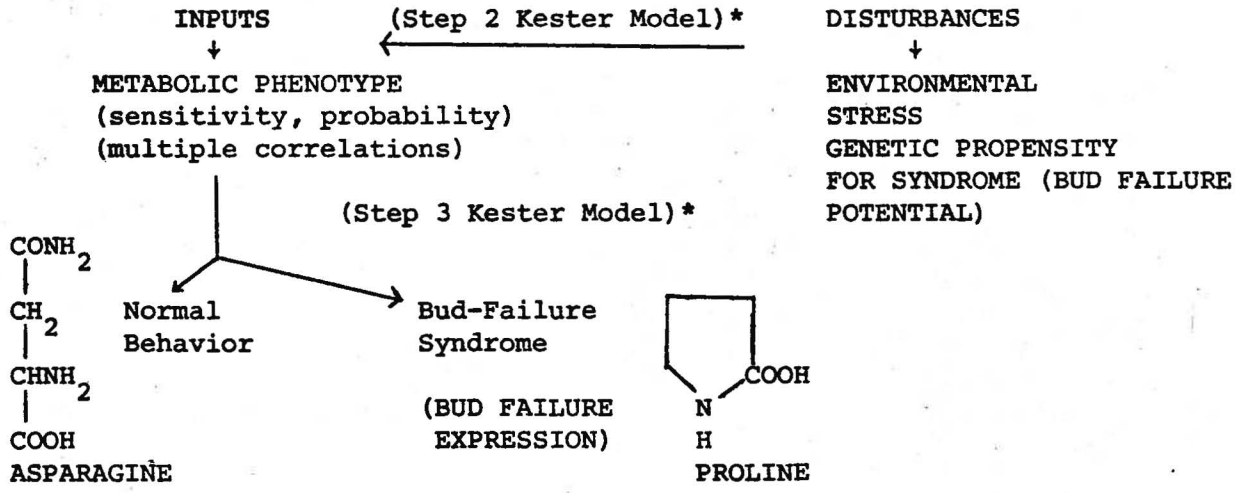
   Results for estimation of chlorophyll, tetrazolium reactivity are nearly completed and will provide several basis for correlations with amino acid data to enhance the quality of indicators of the BF syndrome.

   From the amino acid analyses 3-dimensional metabolic spreadsheets that characterize N tissues and BF syndomes will be described according to the relations in Figure 1.

2. Preliminary results with callus derived from N and BF tissues indicate disproportionate levels of proline and asparagine not unlike those found in trees under field conditions. This is a very encouraging observation because if symptoms can be defined and maintained in the laboratory then 1) the origin of the syndrome can be studied all year around, 2) tissues can be scaled-up to improve search for indicators and 3) interactions (disturbances) that constitute to BF can be enhanced and sorted out to reaffirm the hypothesis developed by Dr. Kester's research and 4) the biochemical data can be integrated with other computer-assisted technologies and models currently under development by researchers supported by the Almond Board.

   From the above we should obtain (in spite of unusual weather conditions for 1986) the first numerical criteria for acceptable (normal) bud and leaf development for the almond. Second, aberrations from this normal behavior, as seen by disproportionate synthesis of compounds induced by disturbances, will be identified in a) time, b)

strategy that the tree uses the survive grow and crop and c) in discreet chemical terms. Third, the behavior of each system N and BF can be defined in terms of overall system behavior and this information fitted to current models aimed at predicting tree performance, weather and crop yield.



*See Annual Report 1986 (Project 86-KA13)

Figure 1. General framework for the development of diagnostic indicators using amino acid metabolism as this relates to Dr. Kester's model for bud failure.

Recommendation

This project will not seek additional funds for 1987 pending the completion of analytical work already proposed. It should be recognized that the unusual weather conditions for 1986 required that additional samples be analyzed for which funds are not available. Nevertheless, the objective of future work on this project will be to evaluate the potential of the proposed method and to integrate and provide support for Dr. Kester's continuing project on noninfectious bud failure (86-KA13). Our expectation is the useful information derived from our current effort will be considered as a useful future component to the bud failure project.

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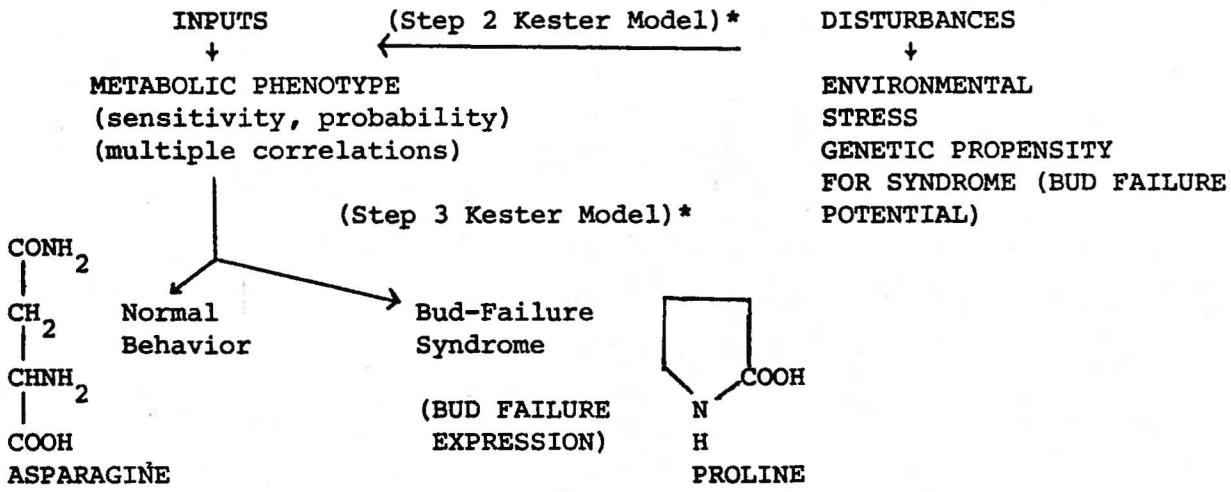

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