

PROPOSAL

Title: Apogee™ for Management of Vegetative Growth and Fruit Quality in Apple & Pear

Year Initiated: 1999-2000 Current Year: 2000-2001 Terminating Year: 2002-2003

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JUSTIFICATION:

Maintenance of proper vegetative vigor, annual cropping and preservation of fruit quality at and following harvest are economically critical issues for all growers. All too often, alternate bearing or other factors stimulate excessive vegetative growth. Retention of fruit firmness and quality at and following harvest is critical for scheduling fruit harvest and for maximizing marketing options for that fruit during the postharvest storage season. Reduction or prevention of postharvest quality deterioration in storage can represent a significant improvement to the grower's bottom line.

Chemical control of vegetative growth, flowering and fruit quality offers the advantages of flexibility, ease of application and the opportunity to tailor treatments to specific needs and circumstances. For vegetative growth control, the new bioregulator Apogee™ shows considerable promise for use in apple orchards to manage vegetative vigor in strongly growing trees. Possible interactions with cropping level, inherent vigor of the trees, varietal differences in sensitivity, environmental factors such as temperature, water availability and nutritional status, and the inherently short life of Apogee in the tree will complicate grower decisions about Apogee application amounts and timings. Although preliminary positive results have been obtained, much more work is needed to develop a better understanding of how these factors and others influence the tree's response to Apogee application.

Effective products for stopping fruit drop and maintaining fruit quality at and following harvest would be useful tools for the apple grower. We have conducted initial tests to determine if Apogee has any such properties; results with 'Bartlett' pear are particularly promising. Additional trials will help to clarify the potential for beneficial uses on apple and pear.

OBJECTIVES (APPLE):

1. Evaluate effects of multiple-application timings, concentrations and time intervals on vegetative growth of important apple cultivars such as 'Gala', 'Fuji', 'Cameo', 'Delicious', 'Pink Lady', 'Honeycrisp' and others as appropriate.
2. Focus on strategies that minimize product use while maintaining control of growth.

3. Evaluate timings and concentrations for suppressing renewed growth flushes following loss of control from previous Apogee applications.
4. Make final evaluations of the potential of Apogee for modification of apple fruit behavior at and following harvest. Incorporate evaluations of other bioregulators, such as ReTain™ and Ethrel®, for possible interactive effects on apple fruit quality.
5. Continue studies to assess the possible beneficial effects of Apogee for stimulation of flowering in vigorous apple trees.

OBJECTIVES (PEAR):

1. Examine the relative efficacies of combinations of frequent low concentrations vs. fewer high concentration applications of Apogee on the pattern of shoot growth and duration of the growth inhibition effect in major pear cultivars such as 'Bartlett', 'd'Anjou', and possibly others.
2. Evaluate timings and concentrations of Apogee for suppression of renewed growth flushes following loss of control from previous applications.
2. Explore the possible benefits, if any, of Apogee with or without ethephon for control of growth and stimulation of flowering in young pear trees.
3. If suitable equipment is available, carry out follow-up studies using low-volume, targeted Apogee applications for growth control in the tops of vigorous pear trees.
4. Assess effects of Apogee-mediated growth control on light distribution in pear canopies
5. Assess the degree to which spring Apogee applications affect fruit size in 'Bartlett' and other pear cultivars and determine whether this effect is economically significant.
6. Determine whether Apogee applications near harvest can permit delayed harvest of 'Bartlett' pears with minimal or no loss of fruit quality.
7. Evaluate Apogee for improvement of storage life and poststorage fruit quality in 'Bartlett' pear.

PROCEDURES:

Trials will be carried out in commercial apple and pear orchards in Washington where vegetative vigor, lack of fruitfulness, biennial bearing, or other problems present themselves. Cultivars to be tested include, but may not be limited to, 'Cameo', 'Fuji', 'Gala', 'Delicious', and 'Pink Lady', 'Bartlett', 'd'Anjou', and 'Bosc'. The final number and location of trials depends on the availability of grower-cooperators and of funding. Collaborative projects will be established in cooperation with interested colleagues in other research/extension units. Applications will be carried out with commercial or experimental airblast equipment or with hand applicators, as

appropriate. Single- or multiple-tree plots will be chosen as appropriate and treatments will be arranged in randomized complete-block designs.

In all Apogee trials, an effort will be made to collect shoot growth data twice weekly from the start of the growing season or the inception of treatments until the cessation of shoot growth. This intense data collection is needed to relate treatment responses to the dynamics of shoot growth, which appear to vary with cultivar, from year to year and which are very responsive to environmental cues. Much of the assistance requested in this proposal is directed at providing support for the acquisition of these essential data.

ANTICIPATED BENEFITS AND INFORMATION TRANSFER:

The trials described here should produce a much clearer understanding of the potential of Apogee for beneficial use in Washington apple orchards. The development of suitable recommendations for concentration/application timing strategies will help apple growers to more effectively use this product and avoid costly errors. Interaction trials will help to demonstrate whether Apogee and other bioregulators can be effectively combined for added benefits. The studies on fruit physiology and control of flowering will help to determine whether these approaches have any promise for improving the economic well-being of apple growers through the use of more efficient bioregulator technology.

The information developed from these studies will be communicated to Washington apple growers via the following means; industry meetings, meetings of scientific associations, in journal and industry trade publications, through presentations at the Washington State Horticultural Association annual meeting and other grower meetings, at field days and grower tours, through colleagues in Cooperative Extension, and through articles published in the *Good Fruit Grower* and other trade and scientific journals.

BUDGET: (Apple 70% Pear 30%)

1. Amount allocated by the Commission in FY 1999-2000:

\$0

2. Request for FY 2000-2001:

\$11,800

	<u>Apple</u>	<u>Pear</u>
01 Salaries (Time slip) ¹	5,600	2,400
03 Goods and Services ²	560	240
04 Travel ³	<u>2,100</u>	<u>900</u>
Total	\$8,260	3,540

¹Time-slip help is essential to collect the volume of data needed to evaluate fruit-tree growth responses to Apogee™. The collection of shoot growth data at frequent intervals enables us to determine the efficacy of applications and to design better application strategies for growers. We also fully harvest our plots to obtain accurate information on both production and fruit size, plus collecting fruit samples for laboratory analyses, storage analyses, etc. We also collect other data as needed.

²This category includes a variety of miscellaneous supplies, non-capital equipment, consumables, etc. that are needed to carry out the research project.

³Travel to distant research sites is expensive. The data collection requirements for this project require significant travel 2-3 times per week. These funds will be used to defray costs of vehicular operation, maintenance, and personnel travel costs for travel for Dr. Faubion and the employees to research plots in grower-cooperator orchards throughout the south-central Washington production area.