

**FINAL PROJECT REPORT**

**WTFRC Project Number:** AH-05-511

**Project Title:** Consulting for the Washington Apple Breeding Project  
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**Cooperators:** Bruce Barritt, Yanmin Zhu, Jim McFerson.

**Budget History:**

<b>Item</b>	<b>Year 1:</b>	<b>Year 2:</b>	<b>Year 3:</b>
<b>Salaries</b>			
<b>Benefits</b>			
<b>Wages</b>			
<b>Benefits</b>			
<b>Equipment</b>			
<b>Supplies</b>			
<b>Travel</b>	\$ 5,280.		
<b>Miscellaneous</b>	\$ 7,680.		
<b>Total</b>	\$12,960.		

### Significant Activities and Findings:

Presented ideas and plans for integrating molecular marker opportunities into the apple breeding program.

- Developed a decision tree showing where molecular markers can be used effectively in an apple breeding program.
- Led assembly of a comprehensive list of apple traits for setting genetic and breeding priorities.
- Developed the document - Apple Trait Decision Tree for Implementing Marker Assisted Selection to guide decisions about potential for marker-assisted selection in apple.
- Coordinated monthly teleconferences at which important traits were discussed to determine feasibility of MAS. Traits discussed were: fruit acidity, fruit firmness, fruit crispness, fruit juiciness, fruit sweetness, mildew reaction, tree juvenility, lenticel breakdown, and skin overcolor.

Conducted literature reviews and prepared reports for the consulting work.

- Reviewed literature related to apple breeding and genetics for use by Bruce Barritt, Yanmin Zhu and Jim McFerson.

Traveled to meeting in Washington to evaluate project and participate in program activities.

- January 18 – 20, 2006. Traveled to Pasco, WA to participate in the Apple Research Meeting. Met with Bruce Barritt, Jim McFerson and industry members from Washington to discuss activities and progress in the apple breeding program. Reviewed research proposals and reports to become more familiar with activities related to apple improvement.

Submitted invoices for expenditures on a quarterly basis.

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|-------------------------------------------------|------------------|
| • Quarter one (Oct.1, 2005 – Dec. 31, 2005):    | \$ 720.00        |
| • Quarter two ((Jan. 1, 2006 –Mar. 31, 2006):   | \$3,096.70       |
| • Quarter three (Apr. 1, 2006 – June 30, 2006): | \$ 440.00        |
| • Quarter four (July 1, 2006 – Sept.30, 2006):  | <u>\$ 240.00</u> |
| ▪ Total                                         | \$4,496.70       |

### Results and Discussion:

A priority recommendation from the review of the WTFRC Apple Breeding Program conducted Oct. 10-12, 2004 was, “Incorporation of molecular tools – Tools for practical DNA-marker aided selection are nearly ready for routine incorporation in apple breeding programs. They may be useful for selection of certain traits. ... It will be important to identify a researcher with the interest and capability to add this dimension to the program. This capability could be developed at WSU or contracted at another institution or the private sector” (From the Committee Report to the Board).

During the course of the year I initiated a series of monthly discussions among Bruce Barritt, Jim McFerson, Yanmin Zhu and myself to identify apple traits most amenable to enhanced improvement using MAS. I developed the document - Apple Trait Decision Tree for Implementing Marker Assisted Selection to guide decisions about potential for marker-assisted selection in apple. This decision tree includes scientific and economic factors that are evaluated for each trait in order to determine feasibility and commercial potential for improving these traits leading to new cultivars and whether MAS can be employed cost effectively to improve efficiency

The traits discussed were: fruit acidity, fruit firmness, fruit crispness, fruit juiciness, fruit sweetness, mildew reaction, tree juvenility, lenticel breakdown, and skin overcolor. This discussion and ranking provided guidance for Bruce and Yanmin to begin developing screens for priority traits. Also, the critique and ranking of the traits provide a basis of the newly hired scientists, Amit Dhingra and Cameron Peace to develop research proposals relevant to the needs of the apple industry.

Addition of these new scientists and their enthusiasm to work with apple improvement addresses the priority recommendation of the Committee Report of 2004.

I conducted literature reviews that identified new research findings and resources relevant to the breeding program. These were provided to the collaborators during the monthly conference calls and via email correspondence.