

## FINAL PROJECT REPORT

**WTFRC Project Number: AP-05-502A (WSU Project 13C-3655-5260)**

**Project Title:** Apple scion breeding

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**Cooperators:** Larry Pusey, USDA-ARS, Wenatchee; Yanmin Zhu, USDA-ARS, Wenatchee; Cameron Peace, Amit Dhingra and Dorrie Main, WSU Pullman.

**Total Project Funding:** 2005: \$98,056 2006: \$102,045 2007: \$126,644

### Budget History:

Item	Year 1: 2005	Year 2: 2006	Year 3: 2007
Salaries	42,766	44,477	56,055
Benefits	14,540	15,122	19,059
Supplies	34,500	35,946	43,500
Travel	6,250	6,500	8,050
<b>Total</b>	<b>98,056</b>	<b>102,045</b>	<b>126,644</b>

**Significant findings:**

1. The WSU Apple Breeding Program (WABP) continues each year with new crosses, newly established seedling orchards for selection and the identification of new promising selections. The parents for new crosses are frequently the best selections from earlier breeding cycles.
2. Promising selections (approx. 100) from seedling plantings have been propagated and placed in replicated trials (5 trees/selection) at three diverse sites in Central Washington. Data on productivity and fruit quality suggested that several selections should move to the next evaluation stage, the third stage orchard trials.
3. Elite selections (25 to 150 trees of each) have been placed in third stage orchard trials at four Central Washington sites. Four elite selections were planted in 2007 and six will be planted in 2008. Virus tested certified bud wood is being produced for each selection.
4. Parent cultivars and promising selections have been genotyped, in cooperation with Dr. Zhu, USDA-ARS, Wenatchee, for two major ethylene production genes, Md ACS1 and Md ACO1.

**Results and discussion:**

Four elite selections planted in grower trials range in harvest date from late August to early October, have average or better productivity, have medium or larger fruit size, are bicolored, and have good texture and balanced flavor. One or more of these elite selections, or of six additional elite selections planted in 2008, have the potential to be commercial cultivars and have a positive impact on the Washington apple industry.

In cooperation with Dr. Zhu (USDA-ARS, Wenatchee), over 90 cultivars and promising WSU selections have been genotyped for two genes conferring low ethylene production and, therefore, good shelf life. Cultivars with the most desirable genotype (Md ACS1-2 and Md ACO1-1) include Fuji, Tentation, Sciearly and Sabina. Four WSU selections also have this very desirable genotype. Cultivars with the desirable genotype for Md ACS1-1 (the most effective gene) and intermediate genotype for the Md ACO1-1/2 (a less effective gene) include Ambrosia, Aurora, CrimsonCrisp, GoldRush, Scired, Sciros, Splendour and Zestar. Seventeen WSU selections also have these desirable genotypes. This pool of cultivars and WSU selections will be excellent parents for producing seedlings with fruit with low ethylene production and good storage and shelf life. Using any of these cultivars and WSU selections as parents means that all seedlings will have the desirable Md ACS1-2 genotype and making Marker Assisted Selection for this gene unnecessary; however, for many cultivars/selections, which lack the desirable alleles for low ethylene productions (eg. Braeburn, Honeycrisp, Golden Delicious, Granny Smith, Cripps Pink and Scifresh) Marker Assisted Selection will be a useful tool for early elimination of high ethylene production seedlings.