

**FINAL PROJECT REPORT**

(2014)

**Project Title:** Consulting to the WTFRC for Apple Improvement

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**Cooperators:** Jim McFerson, Kate Evans, Cameron Peace, Amit Dhingra, Yan Min Zhu, Dorrie Main

**Total Project Funding:****Budget History:**

<b>Item</b>	<b>2014</b>
<b>Salaries</b>	
<b>Benefits</b>	
<b>Wages</b>	
<b>Benefits</b>	
<b>Equipment</b>	
<b>Supplies</b>	
<b>Travel</b>	\$4,000
<b>Plot Fees</b>	
<b>Miscellaneous</b>	3,500
<b>Total</b>	\$7,500

## **ORIGINAL OBJECTIVES:**

1. Provide analysis and critique of technical aspects of proposals and reports for competitive funding of research and development activities related to apple improvement.
2. Provide ideas and analysis of approaches and methods to facilitate adoption of new apple cultivars by clientele groups in the apple production and delivery pipeline.
3. Facilitate adoption and use of technology and materials from the RosBREED project and other R&D programs to support apple improvement.
4. Interact with WSU and ARS scientists and PNW growers on scientific matters related to apple improvement for the region.

## **SIGNIFICANT ACTIVITIES**

- Provided analysis and critique of proposals and reports to the WTFRC
  - Evaluate technical aspects of proposals and reports for competitive funding of research and development activities.
  - Review program plans, documents and reports, proposals etc. for the Commission and Team members as needed throughout the year.
- Provided ideas and analysis of approaches and methods to facilitate adoption of new apple cultivars
  - Participated in the Apple GGB workshop prior to the Apple Research Review in Yakima, WA
- Facilitated adoption and use of technology and materials from the RosBREED project and other R&D programs
  - Participated in discussions with members of the guiding committee and reviewed drafts of the new RosBREED2 proposal
- Interacted with WSU and ARS scientists and PNW growers on scientific matters related to apple improvement
  - Participated in the annual Apple Research Review in Yakima, Jan. 28-31, 2014.
  - Attend Fruit and Nutcrop workshop at the Plant and Animal Genome Conference in San Diego, CA Jan. 10-11, 2014.
  - Interacted with faculty and students about graduate education and training for fruit breeders.
- Submitted invoices for consulting on a quarterly basis and provided final annual report of activities.

## **RESULTS & DISCUSSION:**

I reviewed and critiqued reports of continuing and finished projects and proposals submitted to the WTFRC for funding. I provided review and input of proposals being prepared by members of the GGB team.

Much of the new genetic and genomic information that is becoming available to fruit breeders and researchers is a consequence of competitive grants that are federally-funded through USDA programs. The willingness of the WTFRC to provide matching funds for some grants such as the

RosBREED project completed last year, fund apple research proposals from WSU, ARS and other public scientists and support a world class apple improvement program continues to maximize the use of that information for solving problems and seizing opportunities to strengthen the Washington apple industry. That the apple breeding program was well underway when the molecular information and tools began to gain momentum was crucial, but equally important has been the seamless integration of molecular breeding into the practical program to position it for continued success.

The federally-funded RosBREED project was successfully completed and most of the activities, milestones and goals achieved. Scientists associated with apple improvement have played key roles in the success of RosBREED and the functional Genome Database for Rosaceae (GDR), both critical for success of DNA-facilitated breeding, genetics and genomics. There are a significant number of excellent apple breeding programs in the public and private sectors throughout the world which continue to produce new cultivars that compete with Washington apples. The availability of collaborative, community wide projects has been important for and will have a continuing impact on the ultimate success of the apple breeding program, measured by development and release of outstanding new cultivars. The WTFRC and WSU have been key supporters of these initiatives. It is a win-win situation wherein provision of matching funds leverages several times more federal funding for programs important to continuing profitability for the apple industry.

A new project, 'RosBREED: Combining disease resistance with horticultural quality in new rosaceous cultivars' will be funded by the USDA-NIFA Specialty Crop Research Initiative. The \$10 million grant means five more years of research and innovation in rosaceous crop breeding programs across the country." Amy, Jim and Cameron were key members of the steering committee developing this project, with contributions from many others. I had the opportunity to participate during development and will serve as a member of the Scientific Advisory Committee. It will be a critical resource for the WSU apple breeding program.

Along with the breeding, research and extension, RosBREED projects provided opportunities to train and prepare the next generation of breeders and genetic support scientists. Grad students and post doctoral researchers have key roles in the programs. I continue to work with faculty to review curriculum, courses and program components of plant breeder education and training. This past September, 2014, two grad students from WSU, one of whom is working on a RosBREED projects were students in the 2 ½ day course I co-teach in Davis, CA titled, "Program Management for Plant Breeders".

The Breeder Information Management System (BIMS) tools being developed for collecting, storing and using information about parents and breeding populations, and identifying market-leading cultivars in target markets for use as standards or checks for comparison is a crucial resource for the breeding program. That along with the Breeders' Toolbox will allow effective use of the large amount of data being collected in the breeding program and other public research and improvement efforts.

DNA-based information and technology are critical plant breeding capacity elements for successful cultivar development. Diagnostic marker-locus-trait (M-L-T) associations are available for an increasing number of fruit quality traits and physiological disorders. Molecular genotyping provides the opportunity for marker assisted selection of parents and preferred new

genotypes along with genetic verification of selected phenotypes, and genetic fingerprinting of elite selections for intellectual property protection.

New methods, tools and materials are being incorporated effectively into the WABP to enhance standard breeding practices and promising elite selections in the pipeline are being evaluated for commercial potential. MAB is being implemented for parental selection and seedling selection with use of markers for sweetness, storability, crispness & juiciness, acidity, skin color, and bitter pit incidence. Use of genomics-enhanced breeding will continue to gain momentum for breeding and cultivar development and evaluation. The WABP is using new genomics and genetics resources to enhance selection efficiency and effective evaluation for release of new materials to benefit the Washington apple industry.

I am working with Cameron on critical issues related to DNA-informed breeding. There is considerable work on identifying the most important target traits for breeder selection using combined phenotypic evaluation and MAS so the breeding program can integrate marker-locus-trait targets into selection protocols for cultivar development. The information gained from different segments of the industry about valuable traits is should provide additional insight into selection strategies that breeders and researchers should employ for effective apple improvement.

Advancement of promising new selections into pre-commercial testing, evaluation and commercialization (e.g., Cosmic Crisp™ ‘WA38’) is progressing very well, so an effective and efficient procedure for evaluating elite selections for commercialization is critical. New elite selections are being identified each year in the breeding cycle. A strategy to utilize phenotypic and molecular marker information along with grower evaluations and feedback from various stage trials to decide whether to either discard/discontinue selections or introduce and release them as new commercial cultivars is critical.

## **EXECUTIVE SUMMARY**

**Title: Consulting to the WTFRC for Apple Improvement**

**PI: Fredrick A. Bliss**

**WTFRC Funding: \$7,500.**

My objectives were to; 1) provide analysis and critique of technical aspects of proposals and reports for competitive funding of research and development activities, 2) provide ideas and analysis of approaches and methods to facilitate adoption of new apple cultivars, 3) facilitate adoption and use of technology and materials from the RosBREED project and other R&D programs, and 4) interact with WSU and ARS scientists and PNW growers on scientific matters related to apple improvement.

I attended Fruit and Nutcrop workshop at the Plant and Animal Genome Conference in San Diego, CA Jan. 10-11, 2014 and participated in the annual Apple Research Review and the Apple GGB workshop prior to the Apple Research Review in Yakima, Jan. 28-31, 2014. I reviewed and critiqued reports of continuing and finished projects and proposals submitted to the WTFRC for funding. I provided review and input of proposals being prepared by members of the GGB team.

I participated in the development of a new project, 'RosBREED: Combining disease resistance with horticultural quality in new rosaceous cultivars' will be funded by the USDA-NIFA Specialty Crop Research Initiative and will serve as a member of the Scientific Advisory Committee . The \$10 million grant means five more years of research and innovation in rosaceous crop breeding programs across the country.

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Much of the new genetic and genomic information that is becoming available to fruit breeders and researchers is a consequence of competitive grants that are federally-funded through USDA programs. The willingness of the WTFRC to provide matching funds for grants such as the RosBREED project completed last year, fund apple research proposals from public scientists and support a world class apple improvement program continues to maximize the use of that information for solving problems and seizing opportunities to strengthen the Washington apple industry.

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