

Department of Agriculture, Trade and Consumer Protection
Division of Agricultural Development
Agricultural Development & Diversification Program (ADD)

Grant Project Final Report

Contract Number: 16074

Grant Project Title: Plum Breeding - The Development of New Adapted Commercial Cultivars for the Wisconsin Grower

Project Beginning Date: 8/1/01 Project End Date: 8/1/02

Amount of Funding Awarded: \$11,000

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1. Brief Description of the Original Intent of the Project and the Perceived Benefit to Wisconsin Agriculture:

Most commercial plums are unable to grow and thrive in areas of the U.S. where temperatures fall below -16°C. Fruit quality of plums shipped from California is poor and available growing areas there are being drastically reduced by "urban sprawl".

Better quality plums could be grown commercially in Wisconsin if new adapted varieties (cultivars) could be developed. A plum breeding program was therefore initiated at the University of Wisconsin-River Falls in 1991 with the goal of introducing new, productive winter-hardy high quality Wisconsin-adapted plum cultivars. It is the only program of this type in an 11-state and 3-province area. New cultivars are currently being developed with quality traits superior to California cultivars and with the added benefits of adaptation to our winters, and short growing seasons.

The objectives and techniques involved in this ongoing breeding program are and will be as follows:

1. Employ interspecific and/or interploidy hybridization techniques in order to transfer desirable characteristics from wild to cultivated forms. Once crosses among species with the same or different chromosome numbers have been accomplished, valuable trait transfer such as winter hardiness will also be complete.
2. Continue to screen and identify wild species and specific cultivars with unique qualities such as specific and general combining abilities, winter hardiness or high fruit quality. Employ all means at hand to collect large amounts of stone fruit species and cultivars from all over the world to incorporate respective unique traits.
3. Test new hybrid seedlings from the UW-River Falls breeding program for performance under field conditions. This will be accomplished according to discipline-accepted guidelines. Seedlings grown from hybrid seed will be transplanted to the field, grown to fruiting maturity and evaluated. Superior seedlings will be kept for further testing and inferior seedlings will be rogued out. Characteristics to be evaluated will include yield potential, winter hardiness, pest tolerance, fruit quality and growth habits.
4. Identify superior Wisconsin-adapted seedling genotypes and thoroughly test for possible release as new cultivars and/or for use in further breeding. Five years of further testing will occur to ensure superior performance over several years. If results remain positive, a new cultivar introduction is possible. Final tests planned before introduction will include the use of a sensory evaluation panel, state experiment stations and growers.

New plum cultivars will expand the market variety of fresh market fruit available to consumers.

Additionally, these cultivars are targeted to improve the profitability of Wisconsin fruit enterprises and help growers maintain a competitive edge against imported products. This follows the ADD objectives to develop new agricultural products, diversify and expand production, improve the competitive position of Wisconsin's agricultural industry, provide a high return crop for efficient use of farmland and enhance economic returns to farmers. Estimated short (3-5 years) and long (up to 20 years) term economic benefits to Wisconsin fruit growers are very difficult to estimate, but based on the current respectable fruit industry size and accompanying infrastructure existing in Wisconsin, a range of \$200,000 and \$750,000 short and long term, respectively, are likely conservative.

2. Describe the Work Conducted in this Project

A. How did the grant funds assist you in this project:

The funds provided for this project allowed us to concentrate on making more hybridizations for producing adapted genotypes, maintaining existing seedlings for better evaluations, establishing replicated trials, propagating advanced selections, preparing promotional material for presentations and Field Days. All of the above was accomplished via sufficient funds for supplies, labor, plant materials, and equipment purchase/maintenance.

B. What successes did you achieve with this grant project?

1. Further educated growers regarding the potential to diversify into plums.
2. Identified and documented superior genotypes for future testing.
3. Made contact with appropriate private and state agencies in order to further solidify long term funding and plant material protection potential.

Further cooperation help from UW-Madison faculty was secured by expanding breeding program into related project designed to identify the best propagation methods and rootstock to be used in commercial plum production.

C. What challenge did you face with your grant Project 2?

The biggest challenge was the loss of large numbers of seedlings to disease in the greenhouse. A second challenge (but opportunity) was the severe frosts we encountered this spring that wiped out 90% of fruiting this summer. However, this allowed us to identify 2 clones with superior late bloom (yet early ripening) that produced a full crop this summer and will form the basis for much more reliable-cropping cultivars for the future industry.

3. Describe the Public Outreach Efforts of this Project.

A. What literature or educational materials were produced through this project?

Educational materials, and promotional fliers for field days. Descriptive slides were made for formal presentations at state grower meetings.

B. What presentations, field days or other events were given related to this project?

We presented programs describing the breeding to potential growers/Master Gardeners at 4 sites throughout the year. A program that included discussion on new plum cultivars was given at the annual Wisconsin Fresh Fruit and Vegetable Conference at Oconomowoc in early January 2002. A State Field Day was held at University of Wisconsin-River Falls (primarily berry growers) on August 23 and 115 growers attended and were exposed to the plum breeding and its commercial potential for them. In total, approximately 350 growers were exposed to plum production in the past year.

C. What media outreach did you conduct through this project? Please identify specific papers or stations.

“The Great Lakes Fruit Grower” contacted us and wrote an article about fruit breeding in general at University of Wisconsin-River Falls. The article included plum breeding and was sent to commercial growers and multiple state extension and research personnel across the nation.

We also contacted the Minneapolis Star Tribune, St Paul Pioneer Press newspapers (that have wide circulation into Wisconsin) to do an article on our plum breeding and the potential for commercial production. We hope they will do a feature article.

4. Describe the Results of This Project

The second year of the ADD Plum Breeding Project has been characterized by some encouraging progress toward our goal of new commercial plum cultivars.

Seedlings (complex interspecific hybrids) resulting from year 2001 crosses were field-planted in late July. These seedlings will fruit some time between 2004 and 2008.

A few trees already started fruiting in the replicated performance trial that was established last July. We anticipate some potential usable data that can be collected this coming year regarding winter injury, frost tolerance, disease resistance and cropping reliability.

This past growing season was a very difficult one for many fruit crops due to the multiple hard frosts during bloom and the widely fluctuating moisture and temperature conditions. However, these extremes afforded an opportunity to select for tolerance/resistance and a few notable selections were made, including one very early, heavy cropping frost tolerant one listed first:

1. 02-97-9-10 Interspecific hybrid of two wild species. Blue-purple perfectly round 2.5 cm fruit, unusually large for cross. Sweet with good solid texture. Skin is tough and thick but not as astringent as expected semi-freestone. Tree is 6'H x 8'W and very symmetrical.

Perhaps the best selection for reliable cropping and disease resistance yet. Blooms approximately 15 days after most Prunus. Extremely productive, Ripens 8/18.

2. 02-98-21-3 4.5 cm W x 5 cm H x 4 cm thick at suture. Purple w/yellow flesh, thin skin Very good salicina flavor, clingstone. Moderate productivity. Tree is 10'H x 6' W. Ripens 9/15.

3. 02-98-19-1 (1/8 apricot) Fruit 4.5cm H x 4 cm W x 4 cm thick at suture. Beautiful translucent yellow fruit with rose/pink dappled blush over 75% of fruit. Excellent, rich, sweet flavor, clingstone. Flesh texture of good meaty consistency. Tree 10'H x 8"W. Ripens 9/18.

4. 02-99-9-5 5cmH x 4.5cmW x 4.25 thick at suture. Yellow base with 50 – 75% rose-red blush. Sweet, rich, full 'Superior'-like flavor. Tree 6' x 5' Ripens 9/3.

5. 02-98-12-3 4.5cmW x 4.5H x 4cm thick at suture. 'Superior' shape. Semi-freestone, deep purple, with purple-black sweet but somewhat bland flavor. Good source of hardiness and productivity. Vigorous grower; displays sand- cherry characteristics. Tree 10'H x 10'W. Ripens 8/9.

6. 98-95-38-1 Diploid x hexaploid hybrid fruit. 5cm H x 4.25cm W x 4 cm thick at suture with typical prune shape and prominent suture. Green base color with 85-90% purple blush. Sweet, refined domestica flavor with a hint of "cherry-plum" in green-yellow flesh. Very winter-hardy. Excellent source for transfer of traits between species. Ripens 9/7.

7. 02-99-40-11 2.5cm H x 2.3cm W x 2cm thick Outstanding P. americana selection. Only average size, but yellow, thin non-astringent skin with rose blush; yellow flesh. Semi-freestone with excellent sweet, rich plumcot-like flavor and meaty-textured flesh.

We have distributed a few trees of earlier advanced selections to growers in the state and hope to have many more propagated by next year for much larger trials.

A separate University of Wisconsin-System Consortium project was initiated this year to add another dimension to the ADD project. Dr. Brent McCown, University of Wisconsin-Madison is a co-investigator on the project. Our objectives are to determine the best, most efficient method (including micropropagation) to propagate impending plum cultivar releases and to investigate which rootstocks are the most appropriate for use in propagation. This project will add to our applied knowledge and allow us to make recommendations to growers and nurseries that will become involved as we progress in development of a commercial plum industry in Wisconsin.

Progress has been steady for the second year of the ADD project and we remain excited about commercial plum production in Wisconsin. We have a large number of hybridizations planned for Winter/Spring 2003. Our greatest efforts, however, will concentrate on evaluating our current superior selections in an effort to get them into grower fields and obtain testing feedback.

The grant project results did not fully meet our expectations due to multiple severe frosts this Spring that limited the amount of seedling and selection evaluations we could make. The positive aspect was that we identified several reliable-cropping types that either avoided or tolerated frost. As a comparison, much of the stone fruit commercial industry in the Great Lakes Region also experienced a 90% or greater loss from frost, so these University of Wisconsin-River Falls frost-resistant selections will be critical to Wisconsin growers. New plum and plum-apricot hybrids developed throughout the ADD grant represent an entirely new crop available for commercial growers. Wisconsin Family Farms will have a potentially high value crop available for diversification that could allow growers to sustain profitability levels in rapidly changing times and yet also provide one more healthy food crop for the diets of Wisconsin consumers.