

WISCONSIN CRANBERRY BOARD, INC.

2007 PROGRESS REPORT SUMMARIES

The following progress reports were provided to the Wisconsin Cranberry Board, Inc. by the individuals and groups that received project funding during the 2006-07 fiscal year. These reports were presented to the WCB at or prior to the Budget Meeting on March 27, 2008. Copies of the full reports can be obtained from the authors or from the Wisconsin Cranberry Board, Inc. office.

Crop Research

Pesticide Screening for Cranberries

Principal Investigator: Patricia McManus, UW Madison, Department of Plant Pathology

Cooperators: Dan Mahr, UW Madison, Jed Colquhoun, UW Madison, Jack Perry, UW Madison

Objectives: (1) Evaluate efficacy and test use patterns of new and existing pesticides; (2) Collect residue data according to IR-4 standards; (3) Pursue special registrations (e.g. Section 18, Section 24c) when justified.

Summary: The screening program conducted trials on 7 different fungicides for control of fruit rot; a number of candidate insecticides for control of tipworm, fruitworm, Fireworm, spanworm, flea beetle and both pre and post emergence herbicides. Two IR4 insecticide residue trials were completed and a Section 18 for Callisto was approved along with further data collection to support a Section 3 registration.

Breeding Cranberry for High Yields and Ease of Culture When Grown Under Wisconsin Conditions

Principal Investigators: Brent H. McCown, Department of Horticulture, UW-Madison; Eric Zeldin, Researcher

Cooperators: Wisconsin cranberry growers, Ocean Spray Cranberries, Inc.

Objectives: Whole project: (1) To develop cranberry cultivars that have a consistently higher fruit yield per acre than "Stevens" when grown in Wisconsin. (2) To reduce the sensitivity of the yield of high color "Ben Lear" types to flooding/late winter injury. (3) To isolate some of the genetically determined components of yield, pest resistance and ease-of-culture of cranberry by a detailed study of carefully designed populations of seedlings from highly focused crosses. (4) To determine the inheritance of herbicide tolerance genes previously inserted into cranberry and then integrate such genetic engineering successes into the conventional breeding program.

2007-08 year: (1) Provide support and monitoring of 'HyRed' growers and propagators. (2) Further scale up and evaluation of the A-X15 selection. (3) Evaluation of second generation selections. (4) Evaluation and initial selection of third generation progeny. (5) Establishment and evaluation of a new tetraploid mini bed planting and continued evaluation of existing tetraploid plots.

Summary: (1) Commercial scale up of HyRed continued in 2007 both from mowed vines and transplants. Several nurse plantings are scheduled for mowing in 2008. WARF has issued propagators' licenses to both vine and transplant propagators. (2) A-X15 is sibling of HyRed selected for large berry size. This selection was scaled up to a 3/4 acre nurse bed and then into 2 acres of a renovated bed. Another partial bed planting is planned in 2008. Plots were evaluated for fruiting in 2007 which showed good yield but better performance was shown by Grygleski Hybrid which shares the same bed. (3) Second generation selections replanted in performance plots were selected based on heavy fruiting and fruit set. These plots were still not ready for good evaluations in 2007. At one site a new planting opportunity became available and the selections were mowed and planted into 900 sq ft plots for further scale up and evaluation. (4) Two sets of third generation progeny were planted; one for early flowering and late maturing and another for increased berries per upright. The plantings will continue to be evaluated and selections made in coming years. (5) In 2006 two tetraploid progeny were planted in a 7,000 sq. ft. mini bed designed to be a better test for fertility. Hail damage limited the usefulness of the evaluation in 2007.

Inexpensive tools for quantifying irrigation water replacement of fertilizer requirements in upland beds.

Principal Investigator: Kevin R. Kosola, UW Madison, Department of Horticulture

Cooperators: Beth Workmaster, UW Madison, Sarah Stackpoole, UW Madison, various Wisconsin cranberry growers.

Objectives: (1) To analyze irrigation water N inputs and their spatial pattern. (2) To determine if draining irrigation pipe after irrigation reduces excess vine growth. (3) To write up a standard protocol for ion exchange resin column tests for cranberry irrigation water N inputs, suitable for analytical labs working with growers

Summary: Upright growth was significantly greater adjacent to joints and sprinkler heads than compared to other sites along irrigation pipe. Yields were also significantly different among sampling locations and between beds with different water sources. Line drains arrived too late in the season to conduct this analysis. A manuscript is in preparation which contains the full protocol for ion exchange resin trapping of cranberry irrigation water.

Determining the correct phosphorous rate for productive cranberries

Principal Investigators: Carolyn DeMoranville, UMass–Amherst Cranberry Research Station, Teryl R. Roper, U W Madison, Department of Horticulture, Joan Davenport, Washington State University-Prosser

Objectives: (1) Establish plots in MA and WI to determine P rates needed for sustainable cranberry production. Compare slow release to traditional P sources. (2) Evaluate promising soil testing procedures for plant available P using cranberry soils from test plots. Evaluate relationship among soil test result, tissue P and yield.

Summary: Two plots comparing P rates and slow release were established in WI and two replicated plots in MA. In addition 3 plots comparing triple super phosphate (TSP) rates have been established in MA. The final report on the project is scheduled to be completed yet this spring.

Cranberry Weeds of Wisconsin

Principal Investigators: Teryl R. Roper, Department of Horticulture, UW Madison; Jed Colquhoun, Department of Horticulture, UW Madison

Objectives: To create a weed identification handbook for Wisconsin Cranberry Growers.

Summary: During the 2007 growing season the investigators took hundreds of digital photographs of weeds in the field as well as in the laboratory. A botany graduate student is identifying the specimens and writing simple botanical descriptions. A list of photographs and specimens that need to be collected in 2008 is being developed. The goal is to have the material ready to print in 2009.

Soil Moisture Management – ESI Gro Point Sensors

Principal Investigator: Leroy Kummer, Ocean Spray Cranberries, Inc.

Objectives: Compare new soil moisture monitoring technology along side previous field researched soil moisture devices to determine potential application uses within commercial cranberry production,

Summary: The project was conducted on several cooperator marshes in 2007 including the host site for the WSCGA Summer Meeting and Field Day. Growers were given the opportunity to see instruments in place and attend a marsh side presentation highlighting the devices. A detailed presentation was given at the 2008 Wisconsin Cranberry School.

Annual Projects

Wisconsin Cranberry Crop Management Newsletter – Volume XX

Project Coordinator: Teryl R. Roper, Department of Horticulture, UW-Madison

Cooperators: University faculty and staff, private cranberry consultants, Ocean Spray Cranberries, Inc., Cliffstar Corp.

Summary: Ten issues of the CCM Newsletter were published between May and September of 2007. Copies were sent at no charge to managers of all known cranberry marshes in the state. The newsletter was also made available on the internet and the text was distributed via the cranberry e-mail list as well.

Wisconsin Cranberry Insect Pest Identification Pocket Guide

Project Coordinator: Leroy Kummer, Ocean Spray Cranberries, Inc.

Objectives: Print and distribute a pocket insect guide.

Summary: The funds were used to print and distribute copies of the pest Identification guide. Copies were sent to all growers in Wisconsin and distributed to growers as requested. An inventory is maintained at the WCB office in Wisconsin Rapids.

Taste Test Kitchen Promotions – Wisconsin Cranberry Discovery Center

Project Coordinator: Lorry Erickson, Director, Wisconsin Cranberry Discovery Center

Objectives: To conduct promotional programs on the use of cranberries and cranberry products.

Summary: The funds from the grant provided in 2005 have been used for six “Cooking with Cranberries” recipe demonstration programs. Two more will be held in 2008. The grant was also used to print recipe cards that are distributed at the Discovery Center. Demonstrations were also given on WEAU TV in Eau Claire.

Wetherby Cranberry Library Project

Project Coordinator: Lorry Erickson, Director, Wisconsin Cranberry Discovery Center

Objectives: Organize and catalog current material housed in the Wetherby Cranberry Library, develop a searchable database via internet and actively seek the addition of new materials to the collection.

Summary: A library student with the necessary expertise has been hired for the project and will begin work on the project this spring.

Operations and Promotions - Wisconsin Cranberry Discovery Center

Project Coordinator: Lorry Erickson, Director, Wisconsin Cranberry Discovery Center

Objectives: Educate the public about Wisconsin's role as the nation's leading producer of cranberries.

Summary: The Cranberry Museum, Incorporated utilized the grant to support activities at the Wisconsin Cranberry Discovery Center in Warrens, Wisconsin. The funds were allocated toward general operations and promotion efforts. Over 50,000 visitors came to the Discovery Center in the 2007 season.

Wisconsin Cranberry School - 2008

Project Coordinators: Wisconsin Cranberry Research and Education Foundation; WSCGA Education Committee; Teryl R. Roper, UW Extension.

Objective: To conduct a 2 day grower educational program for all Wisconsin cranberry growers focusing on improved farm management and business practices.

Summary: The WSCGA Education Committee met with UW Extension Faculty to evaluate previous schools and identify topics and speakers for 2008. The Wisconsin Cranberry School was held January 15-16 at the Stevens Point Holiday Inn Hotel and Convention Center. During the two day session topics relating to all aspects of cranberry production were presented with an emphasis on water use and conservation. Packets with relevant information were distributed to all attendees. Proceedings from the School are sent to all participants. The 2008 Wisconsin Cranberry School attracted over 450 growers and industry people. The evaluations by the participants were extremely positive and indicated that the quality of the program was "the best in years".

Cranberry Weather Forecasts

Project Coordinator: Wisconsin State Cranberry Growers Association

Objective: To provide Wisconsin cranberry growers with accurate, regional weather forecasts.

Summary: The WSCGA worked with a private weather forecasting consultant to develop regional cranberry weather forecasts. These forecasts were available to growers via a toll-free number and online at the WSCGA website www.wiscran.org. Service was available from April 15 through October 31.

Brochure Printing

Project Coordinator: Wisconsin State Cranberry Growers Association

Objective: Provide members of the general public with information on cranberries through high-quality, professionally produced brochures.

Summary: The grant was used to print and distribute 15,000 copies of the 2007 Fall Harvest brochure, printing of 16,000 copies of the new recipe brochure and 10,000 copies of the Cranberry Activity Books.

Product Sample Products

Project Coordinator: Tom Lochner, Executive Director, WSCGA

Objective: Provide promotional samples of cranberry products for distribution.

Summary: WSCGA worked with cranberry handlers to secure sweetened dried cranberries which were then packaged into sample packets by the ODC in Wisconsin Rapids.

Website Update and Redesign

Project Coordinator: Tom Lochner, Executive Director, WSCGA

Objective: Provide the Wisconsin cranberry industry with state of the art presence on the world wide web.

Summary; A subcommittee of growers has been working with a site designer and Zeppos and Associates to completely redesign the website. The new site will debut in the spring of 2008. It will include video and audio capabilities along with a slide show and a password protected section for growers.

State Fair Booth Renovation Phase II New Marsh Model

Project Coordinator: Tom Lochner, Executive Director, WSCGA

Objective: Create professional exhibits on cranberries to be used at the Wisconsin State Fair, cranberry festivals and other trade shows.

Summary: A subcommittee from the WSCGA worked with Triad Creative Group to design and build a new model cranberry marsh for debut at the 2007 State Fair. The new model was also set up at cranberry festivals in Warrens and Eagle River.

Wisconsin State Fair Promotion Program

Project Coordinator: Wisconsin State Cranberry Growers Association

Objectives: (1) To provide information on cranberries and cranberry growing to visitors to the Wisconsin State Fair. (2) Promote consumption and sales of cranberry products at the Wisconsin State Fair. (3) Increase overall awareness of cranberries and their economic, environmental and cultural importance to the state. (4) Educate the public on the health benefits of cranberry consumption. (5) Educate the public on the many cranberry products available and their uses.

Summary: WSCGA contracted with the Wisconsin State Fair Park for space in the Wisconsin Products Pavilion. The booth space (10'x30") was divided into two components: the first being an educational display, the second a sales area for cranberry products. The grant was used for promotion activities at the fair including media drops of products, interviews on air, daily cranberry cooking demonstrations, appearance by the cranberry mascot daily at the fair.

Cranberry Marketing Program – Paid Advertising

Project Coordinator: Wisconsin State Cranberry Growers Association

Cooperators: Milwaukee Brewer Radio Network

Objectives: (1) Conduct a paid advertising campaign to communicate health, environmental, tradition and economic messages on a regional basis. (2) Establish relationship between healthy sporting activities and cranberries. (3) Link cranberry growing tradition with other major state traditions. (4) Improve image of industry throughout the state.

Summary: Wisconsin's cranberry growers were again sponsors of an in game feature of each Milwaukee Brewer Baseball Radio broadcast on the statewide network. The feature "On Your Plate", the introduction of the umpires for each game was presented by Wisconsin's cranberry growers. The promotion also featured in game and post game mentions and Cranberry Night at Miller Park promotion.

Harvest Communications Program

Project Coordinator: Wisconsin State Cranberry Growers Association

Objectives: (1) To provide targeted media with information on cranberries, cranberry products and information on the results of health related research on cranberry consumption. (2) Conduct fall harvest media campaign to educate the consuming public on the cranberry industry in Wisconsin.

Summary: The harvest communications program entailed working with a public relations firm to develop key messages and themes, strategies, a plan and execution of the planned activities.

The initial effort was a news release on crop projections to peak media interest in the annual harvest. The second release focused on harvest getting underway across the state. WSCGA conducted a two Media Day on the marsh event. The events offered reporters, photographers and videographers an opportunity to see harvest first hand and experience it from the air in a helicopter. Growers and a UW Extension health expert were available for interviews. WSCGA worked with Mr. Food, a national syndicated program, to feature two segments on cranberries during Thanksgiving week. General harvest story pitches resulted in numerous local, state, regional and national stories. CNBC, a cable business news network, covered harvest throughout a day with live reports from a Wisconsin marsh. The fall communications efforts resulted in an estimated 13,000,000 impressions with an advertising value estimated at more than \$2,800,000.

Stock Photos

Project Coordinator: Wisconsin State Cranberry Growers Association

Objective: Acquire professional photographs and images to be used by media, researchers, in brochures and exhibits featuring cranberries.

Summary: WSCGA retained a photographer who shot photos of wildlife and cranberry blossom. The photos were added to the industry collection, been catalogued and assembled in an electronic format.

Support for Cranberry Research Panel at the IFT conference

Project Coordinator: Jere Downing, Executive Director, Cranberry Institute

Objective: Provide travel and related funds for 5 selected cranberry health researchers to participate in the Institute of Food technologists Annual Meeting and Food Expo Symposium of Cranberry Health Properties and for CI's health contractor to attend and leverage media attention.

Summary: The event attracted more than 125 people at the convention in July. Media were contacted before and after the session. An ad was taken in the July issue of Food and Technology and Prepared Foods magazines to reach those who did not attend the symposium. The attendance and session were deemed a success. Follow up reports on media will be provided at a later date.

**WISCONSIN CRANBERRY BOARD, INC. – CRANBERRY INSTITUTE
HEALTH RELATED RESEARCH - PROJECT REPORT SUMMARIES**

The Wisconsin Cranberry Board, Inc. and Cranberry Institute have partnered for the past five years to fund a variety of research projects related to the health benefits of cranberry consumption. Under this partnership the organizations issue a joint request for proposals. Researchers submit applications to the Cranberry Institute. The applications are reviewed by a Health Advisory Committee of the Cranberry Institute which makes recommendations for projects deserving funds. Those projects deemed worthy of funding are then jointly funded by Wisconsin Cranberry Board, Inc., the Cranberry Institute and other grower funding organizations. The Cranberry Institute then manages the research projects. In 2007 projects totaling \$61,283 were funded by the WCB through the CI. The following are summaries of the reports of the projects funded by the partnership in 2007.

Bioassay to Detect Anti-adhesive Properties of Cranberry Compounds.

Principal Investigator: Terri Camesano, Worcester Polytechnic Institute

Summary: Their work has already confirmed existing results regarding the anti-adhesive effect of cranberry juice cocktail. Currently, they are trying to detect an anti-adhesive compound in the urine of a volunteer who has consumed cranberry juice cocktail. Thus far they have not found an effect on the non-pathogenic E. coli strains tested, but they have recently seen an effect on a pathogenic strain of this organism and are now attempting to repeat this finding with additional pathogenic strains. Their results thus far were recently presented at the UMASS-Dartmouth Cranberry Symposium last month.

**Action of Cranberry Proanthocyanidins Against Bacterial Adhesion to Biomaterials and Mammalian Cells:
Implications for Mitigation of Urinary Tract Infection, Prostatitis, and Endocarditis.**

Principal Investigator: Nathalie Tufenkji, McGill University, Canada.

Summary: Their first objective was to quantify the effectiveness of cranberry derived PACs in preventing attachment of pathogenic bacteria to selected biomaterials used in medical devices. This work has now been completed, and involved two of the materials commonly used in the manufacture of urinary catheters. Not only did they find an effect against Gram-negative bacteria (as had been seen previously), but they also found an effect on Gram-positive bacteria as well, and is the first research to do so. The manuscript for this work is being submitted to the journal Biomaterials, and has been presented in a total of five conferences.

Their second objective involves the investigation of anti-adhesive and anti-invasive activities of PACs against bacterial pathogens interacting with endocardial, uroepithelial, and prostate epithelial cells. This work is now underway with the cooperation of Dr. Amy Howell of Rutgers University, with completion expected by September.

The third objective is to establish the metabolic response of Gram-negative bacteria with completion expected by June.

Utilizing Cranberry's Antimicrobial Effect to Protect Human Health Against Food Poisoning.

Principal Investigator: Vivian Wu, U. of Maine.

Summary; Against their first objective, they investigated the antimicrobial activity of cranberry concentrate on several pathogenic bacteria, including E. coli O157:H7, Listeria, Salmonella, and Staph aureus. They demonstrated that low concentrations of cranberry concentrate resulted in significant physical cell damage to these bacteria, including loss of integrity of the cell wall, membrane, and matrix. This work has received significant media coverage following publication of the work in the March 2007 issue of Microbiology, including an interview by the Wall Street Journal. Since that time, they have focused on the second objective, which involves looking into the effect of cranberry concentrate on gene expression of these pathogenic organisms. Their results to date suggest that cranberry concentrate inhibits growth-related genes. They project completion of this project by June 1, 2008, and three additional manuscripts based on this work are currently in press.

Therapeutic Potential of Cranberry for Oral Candidosis.

Principal Investigator: Daniel Grenier, University of Laval, Canada

Summary: Candidosis is an opportunistic infection of the oral cavity caused by an overgrowth of Candida species. At this point they are finding a dramatic inhibition in the presence of the cranberry fraction, suggesting that cranberry polyphenols may offer an opportunity for the development of a new therapeutic approach for the prevention and treatment of oral candidosis. This work is nearly complete, and a final report is expected by September of 2008. A new study will be proposed, based on this work, which will be clinical in nature and will investigate the incidence of oral candidosis in denture wearers.

Cranberries and Cancer: Do Cranberry Phytochemicals Promote Apoptosis in Breast Tumors.

Principal Investigator: Cathy Neto, UMASS-Dartmouth

Summary: They have found that several compounds in cranberry, including PACs, ursolic acid, and quercetin glycosides inhibit the growth and proliferation of breast and colon tumor cells and induce their programmed cell death. Thus far, these results have been presented at two conferences in 2007, including the ACS National Meeting, and several poster presentations were made as well. One additional manuscript has been submitted, and another is in preparation. A final report will be submitted when the results have been published.

How do Cranberry Constituents Regulate Apoptosis and Proliferation in Models of Prostate Cancer.

Principal Investigator: Cathy Neto, UMASS-Dartmouth.

Summary: Results from this work have been incorporated into a manuscript recently submitted to the Journal of Agriculture and Food Chemistry. In connection with these projects, there have been a total of five publications and five presentations.

Effects of Cranberry Juice Constituents of the Antibody Response to Influenza Vaccine in the Elderly: A Randomized Placebo-Controlled Double-Blind Pilot Study.

Principal Investigator: Carlo Selmi, UC Davis.

Summary: This work was postponed from last year due to logistical problems and is underway at this time, with completion expected shortly.