



Enabling marker-assisted breeding in Rosaceae

Dedicated to the genetic improvement of U.S. rosaceous crops

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Enhancing the RosBREED network at professional meetings: International Fruit Tree Association (IFTA) Grand Rapids, MI

RosBREED project will use every opportunity to link with its Advisory Panel (AP) members and Rosaceae community breeders to enhance the network. While most of RosBREED's AP members met and interacted with project participants at RosBREED I in San Diego, California in January, not all of the AP members were able to attend. With strong participation of our AP members and Co-Project Directors (Co-PDs) at the 2010 International Fruit Tree Association (IFTA) meeting in Grand Rapids, Michigan, we received feedback from several AP members who were unable to attend RosBREED I. We met over dinner on March 1, 2010 and took this opportunity to discuss project activities and networking strategies.



Co-PD Jim McFerson and AP member Bill Dodd commenting on strategies to communicate science discoveries on fruit traits to industry representatives.



Because of the busy of IFTA schedule, the only time available to meet was over dinner. Pictured from left to right: Gennaro Fazio, Brian Sparks, Lailiang Cheng, Amy Iezzoni, Jim McFerson, Bill Dodd, Cholani Weebadde, and Audrey Sebolt.



Because not everyone was able to attend the dinner, we even talked as we were passing each other in the hallway between sessions at IFTA. Pictured from left to right: Greg Reighard, Brian Sparks, Amy Iezzoni, Audrey Sebolt, and Jim McFerson.

Inside this Issue

<i>RosBREED by the numbers</i>	2
<i>RosBREED's Extension Team</i>	3
<i>Who's Who in the Extension Team</i>	5
<i>Who's Who in the Administration Team</i>	6
<i>Advisory Panel Member profiles</i>	7
<i>Breeder profile: Chad Finn</i>	8
<i>Jewels in the genome</i>	10
<i>Calendar of events</i>	11



RosBREED by the numbers

146



Number of Rosaceae demonstration and community breeders and their allied scientists who will be asked to participate in a survey during June of this year. The survey was developed by Michael Coe of Cedar Lake Research Group LLC, the external evaluator for RosBREED. Survey responses will be used to better understand the views of breeders and scientists about marker informed breeding. The survey will be helpful for planning RosBREED education and extension activities. So, when you receive your email invitation, please follow the link and fill out your RosBREED surveys!



Michael Coe, Cedar Lake

405



Number of peach selections that Ksenija Gasic, RosBREED demonstration breeder, evaluated for bloom time this spring. This is a critical trait, as breeders want to select against early bloom time because these selections may be more likely to lose their crop if there is a late freeze.



Ksenija Gasic, Clemson University

10,000,000,000



Number of "information bits" that were generated from sequencing 20 peach ancestral cultivars. This information will be converted into a chart of important chromosomal regions for peach fruit quality and other valuable traits, which RosBREED demonstration breeders will use to quickly and efficiently produce peach cultivars with the traits they and the producers, processors, marketers, and consumers desire.



Nahla Bassil and Research Affiliate Dr. Barbara Gilmore, USDA-ARS

RosBREED definition



ALLIED SCIENTIST: a scientist whose work could impact a breeding program and would benefit from interaction with RosBREED. For example, Lailiang Cheng, one of RosBREED's Advisory Panel members, is an Allied Scientist working on nitrogen and carbon metabolism in apple. His cutting-edge metabolite profiling approach can help us understand how we can manipulate nitrogen supply and crop load to grow fruit of desired quality, not just in apple, but other RosBREED crops as well. We know the performance (phenotype) of a plant depends on the interaction of its individual genetic make-up (genotype) with its growing environment. Collaborations between breeders and physiologists like Lailiang enable synergistic inter-disciplinary approaches to better understand and manage this interaction and achieve the ultimate goal of superior fruit quality.

RosBREED's Extension Team - delivering RosBREED outcomes to the Rosaceae community

By RosBREED's Extension Team (Cholani Weebadde, Michael Coe, Carlos Crisosto, Gennaro Fazio, Karina Gallardo, Amy Iezzoni, Jim McFerson, Dorrie Main, Cameron Peace, Gregory Reighard, Audrey Sebolt, and Kenong Xu)

RosBREED's Extension Team is a diverse group based throughout the U.S., with expertise in various scientific disciplines and crops. Each of us is dedicated to enhancing the sustainability of cultivar development in public and private U.S. Rosaceae breeding programs and understands the challenges facing extension activities, in a project as large as RosBREED, the largest funded to date by the USDA Specialty Crop Research Initiative (\$14.4 million over four years). We are also tremendously excited about RosBREED's focus on fruit quality traits, and how advances in genetics and genomics will be translated to routine practical application in the Rosaceae crops. Furthermore, stakeholders expect research activities like RosBREED to contribute directly to human health and well-being, as well as to sustain the economic vitality of their own communities.

Based on existing genetic variation in a crop, marker-assisted breeding (MAB) is a promising modern breeding tool for developing new cultivars. As it does not require the use of transgenic techniques, new cultivars developed with MAB do not need to undergo lengthy and costly regulatory processes and avoid any marketplace issues associated with GMOs. MAB can make breeding much more efficient for crops of the Rosaceae family. Rosaceous crops are clonally propagated and require expensive and extensive field testing, thus greatly slowing breeding progress compared to annual field crops and vegetables, especially for complex traits like fruit quality. However, MAB has not been applied in Rosaceae as it has in other crops, due to long generation time, costs, lack of training, and a small genomics knowledge base.



Karina Gallardo (RosBREED SE Team) interviewing Jim Hancock (RosBREED demonstration breeder) at RosBREED I.

An important activity of the Extension Team is to analyze and understand both the technical and socio-economic issues of the MAB approach and communicate effectively among project participants, stakeholders and the public. Through coordinated extension, training, and outreach activities we will work directly with RosBREED's 12 demonstration breeders, who focus on apple, peach, sweet cherry, tart cherry, and strawberry, to demonstrate the MAB approach as well as train this and the next generation of Rosaceae breeders. We will also work directly with the project's Socio-economics (SE) Team as they systematically analyze the value and preference for various fruit quality traits held by the research, production, processing, market intermediary, and consumer components of the supply chain.

Our approach: We will use a multi-faceted approach to deliver RosBREED outcomes to the Rosaceae community, including traditional meetings, workshops, short courses, and hands-on computer training sessions. We will emphasize web-based communication and networking to engage the broader community of Rosaceae breeders; scientists outside of genomics, genetics, and breeding; and stakeholders.

Progress assessment at annual meetings: We will have four annual meetings (RosBREED I-IV) for our project participants, collaborators, and AP members to critically assess project progress, discuss work to be completed, provide technical training, incorporate feedback from participants and stakeholders, and network. RosBREED I took place at the Plant & Animal Genome XVIII conference in San Diego, California, 7–8 January 2010. Twenty-seven scientists from the U.S., 10 scientists from five other countries, and 21 AP members gained fuller appreciation of the scope and potential impact of RosBREED (see www.rosbreed.org/about/project-management/meetings/rosbreed-i/). The major focus of RosBREED II and III will be the training of our 12 demonstration breeders and their breeding trainees in the use of MAB Pipeline software programs. RosBREED IV will include a thorough assessment of progress, ensure project deliverables are completed, and plan research and extension activities building on the RosBREED foundation.



Amy Iezzoni speaking to AP Members, Co-PDs, and project associates at RosBREED I.

RosBREED's Extension Team cont.

Enhancing the RosBREED network at professional meetings: Through existing platforms, we hope to enhance our network of community breeders and share RosBREED's successes and failures. In August 2010, we will host an introductory workshop at the American Society for Horticultural Science annual conference in Palm Desert, California, to introduce RosBREED to a broader research and extension audience. In addition, our Co-PDs will present five talks/posters at the 2010 International Horticultural Congress in Lisbon, Portugal, to involve an international scientific community in RosBREED's activities.



Technical training for RosBREED breeders and breeder trainees at RosBREED I.

Technology transfer to regional breeding programs: Using RosBREED case studies, we will conduct regional and participatory workshops in years 2012 and 2013 to facilitate transfer of MAB technologies to our community breeders and to engage our industry stakeholders and allied scientists. Nine participatory workshops in New York, Michigan, South Carolina, Arkansas, Texas, California, Washington, Minnesota, and New Hampshire will be integrated within annual local industry meetings and hosted by the breeding programs of our demonstration breeders in the region.

We will also coordinate regional workshops in 2013 in New York, South Carolina, Washington, and California, hosted by four of our Extension Team members: Kenong Xu, Greg Reighard, Karina Gallardo, and Carlos Crisosto, respectively. Taking a "train-the-trainer" approach, we will provide regional extension specialists with useful educational materials on DNA-informed breeding in general and RosBREED outcomes in particular.

Mentoring future Rosaceae breeders: Training the next generation of plant breeders is vital and a direct requirement for sustainability. Our demonstration breeders are fully committed to this activity and are involving graduate students in RosBREED's activities as breeding trainees. Newsletters will contain up-close and personal features on all breeding teams. Breeding trainees will receive significant travel support and a head start on developing professional networks and liaisons with stakeholders.

RosBREED stakeholder interaction: RosBREED's three Advisory Panels constitute our initial communication portal with stakeholders to enhance engagement with important sectors. Our Industry AP represents different crops, production regions, fresh and processed products, and linkages with key trade associations while our Scientific AP represents a multidisciplinary array of talented researchers working on Rosaceae and non-Rosaceae crops. Our Extension AP similarly comprises an array of active scientists based in all important Rosaceae production and processing areas of the U.S.

For providing convenient, reliable access to timely, clear information on RosBREED's activities to all stakeholders and project participants, we are using the power and reach of internet-based extension, delivering science-based knowledge in a cost- and time-effective manner. Our website (www.rosbreed.org), a centralized and regularly updated resource for RosBREED participants and the entire Rosaceae community, currently provides access to the project calendar, newsletters, and workshop information, including downloads of the project description and PowerPoint presentations. In addition, we produce quarterly newsletters and a RosBREED brochure providing general information on the project, and we rely on our AP members as our active communication channels for information exchanges.



Stakeholder interactions: Cameron Peace, RosBREED Co-PD, speaking to producers and industry at an annual field day in Wenatchee, WA.

Ensuring we serve you better: We want to ensure that our extension efforts are effective. Cedar Lake Research Group LLC, an independent research and evaluation firm, is providing external evaluation services to RosBREED, gathering feedback from various participant groups and extension audiences about the quality, relevance, and utility of our extension activities. This information will be used for ongoing quality improvement of our efforts.

It is both a grand challenge and grand opportunity to be the extension and outreach platform for RosBREED. We look forward to working with all of you along the way.

Who's Who in the Extension Team



Cholani Weebadde
Michigan State University
Area of interest: Outreach
Role: Extension Team Leader



Michael Coe
Cedar Lake Research LLC
Role: External evaluator



Carlos Crisosto
UC Davis
Area of interest: Peach extension
Role: 2013 CA regional meeting host



Gennaro Fazio
USDA-ARS, Cornell University
Area of interest: Apple extension
Role: Coordination with other RosBREED Teams



Karina Gallardo
Washington State University
Area of interest: Agricultural economics
Role: 2013 WA regional meeting host



Amy Iezzoni
Michigan State University
Area of interest: Cherry breeding and genetics
Role: Project Director



Jim McFerson
Washington Tree Fruit Research Commission
Area of interest: Industry research
Role: Industry liaison



Dorrie Main
Washington State University
Area of interest: Bioinformatics
Role: RosBREED website development



Cameron Peace
Washington State Univ.
Area of interest: Apple & cherry fruit quality
Role: Coordination with other RosBREED Teams



Greg Reighard
Clemson University
Area of interest: Peach extension
Role: 2013 SC regional meeting host



Audrey Sebolt
Michigan State University
Area of interest: Cherry breeding and genetics
Role: Extension Team Leader's assistant



Alexandra Stone
Oregon State University
Area of interest: Vegetable extension
Role: PBG Works website administrator



Kenong Xu
Cornell University
Area of interest: Genomics of fruit trees
Role: 2013 NY regional meeting host

Who's Who in the Administration Team



Amy Iezzoni

When she's not conducting RosBREED business, she can be found in the orchard under a cherry tree.



Audrey Sebolt



Joan Schneider

Amy Iezzoni (Michigan State University), project director, was chosen to lead RosBREED because she successfully led the Rosaceae Community in the writing of our White Paper when she was Chair of the U.S. Rosaceae Genetics, Genomics, and Breeding Executive Committee in 2006. Amy has been a tart cherry breeder for more than 20 years, a mentor to more than 12 graduate students, and has published more than 80 peer-reviewed journal articles. In addition, with prior and ongoing USDA-AFRI funding, she was the first specialty crop breeder in the U.S. to begin to utilize Pedigree-Based Analysis. This effort led to her group identifying a major fruit size gene region in cherry that is this newsletter's featured "Jewel in the Genome" (page 10). Amy has also developed with her collaborator at Ohio State University, Dr. Esther van der Knaap, a set of Rosaceae markers that are being used as Rosaceae-wide anchor markers.

Amy's responsibilities as project director include budget oversight and keeping the cogs of the RosBREED wheels well greased. Amy leads monthly teleconference calls with the nine RosBREED Team Leaders to monitor activities and provide input. She also attends numerous conferences to maintain relationships with RosBREED's Advisory Panel Members, allied scientists, matching partners, and collaborators. At these meetings, she informs the community of RosBREED's objectives and progress. Amy is assisted by her two project assistants, who are partially funded through RosBREED. Audrey Sebolt is the project assistant for communications and Joan Schneider is the project assistant for budgets.

Audrey Sebolt has been Amy's research assistant for 10 years and is involved in the field aspects of RosBREED, as Amy is also one of the 12 RosBREED demonstration breeders. Audrey's project assistant responsibilities include assisting with the organization of conferences and workshops, proofing project reports, recording meeting minutes, and editing presentations. She also assists the Extension Team leader Cholani Weebadde with newsletters, attending local conferences, and the development of handouts and brochures.

Joan Schneider comes to the project from MSU's Contract and Grants Office, where she worked for 25 years. Her experience has already proved to be invaluable as RosBREED has 11 subawards and must meet and document 1:1 matching funding requirements. Joan states, "After working with research funding solely from the contractual angle for so many years, it is really enlightening to be involved in such a vast and far-reaching program. Since I am not a scientist, I appreciate the opportunity to be that much closer to the science of RosBREED and know that I can contribute to the success of the program."

Advisory Panel Member Profile Page

The success of RosBREED will be determined in large part by the people behind it. Because of this, we wanted to give you some insight into these individuals, whether they represent university extension, the scientific community, or industry - who are at the core of Rosaceae. Panel members were asked about their background and what they want to accomplish as part of the RosBREED project. Here is what the first three had to say.

Extension



JESSICA A. GOLDBERGER

Assistant Professor of Rural Sociology
Department of Crop and Soil Sciences, Washington State University
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What work do you do? My current research includes: (1) survey-based research on the experiences and perspectives of certified organic producers (especially dryland producers) in the Northwest; (2) project focused on the transition to more environmentally and socially sustainable pest management practices by Washington apple growers and professional consultants; (3) interdisciplinary research/outreach project focused on improving the long-term sustainability of the apple, pear, and walnut industries in the western U.S. by enhancing biological control of insect pests; and (4) participatory research on the social, economic, and environmental impacts of Washington farmers' markets.

Why you are interested in RosBREED? RosBREED is an unprecedented multi-state, multi-institutional alliance among a range of Rosaceae research and stakeholder communities. As a rural sociologist working with Rosaceae stakeholders in the Northwest, I am very excited to serve on the project's Advisory Panel. I am particularly interested in the project's efforts to integrate genomics and socio-economic information into breeding programs, as well as improve the sustainability of U.S. Rosaceae crop industries.

How you feel you can contribute to RosBREED? With 15 years of survey research experience, I look forward to helping the Socio-Economic and Extension Teams develop solid survey instruments for breeders, producers, marketing groups, trade organizations, and other groups. Moreover, given my interests and skills, I can assist with the development of methods to identify consumer preferences, increase grower adoption of new cultivars, and measure social, economic, and environmental sustainability.

Industry



JAMES S. ALLEN

President, New York Apple Association (NYAA), Inc.
Past Director, US Apple Association
United Fresh Produce Council, serving on the Government Affairs Committee
Produce Marketing Association
jimallen@nyapplecountry.com

What work do you do? President of the NYAA, a grower supported promotional marketing board, supporting profitable apple farming in New York State.

Why you are interested in RosBREED? The scope of the project is dedicated to providing our industries with cutting edge research, by tapping into the wealth of knowledge from around the world in plant genomics and genetic breeding.

How you feel you can contribute to RosBREED? As an advisor I can only hope that I can contribute some grass roots information about our industry and the markets that we compete in.

Scientific



ALBERT G. ABBOTT

Professor of Genetics and Biochemistry
Coker Endowed Research Chair in Plant Molecular Genetics
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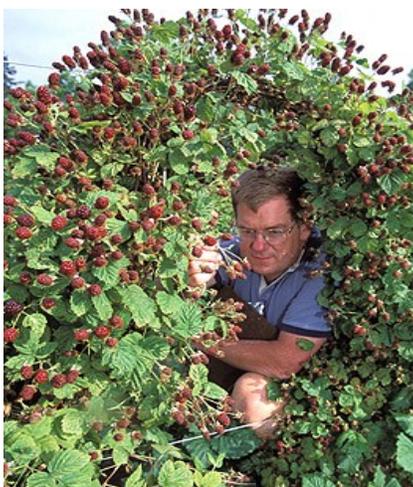
What work do you do? Expertise: *Prunus* genomics and genetics with emphasis on identifying and characterizing genes controlling important aspects of growth, development, and resistance to disease.

Why you are interested in RosBREED? My interest is to work with the *Prunus* breeding community to provide new tree varieties optimized for specific character states.

How you feel you can contribute to RosBREED? I would like to provide the marked genes to assist in the breeding programs selection process. In this regard, researchers worldwide are already utilizing gene and marker information developed collaboratively between my group and that of others to track and select for Plum Pox Virus resistant materials in apricot germplasm.

Breeder profile: Chad Finn

By Audrey M. Sebolt, project assistant



Chad Finn
Photo courtesy of USDA-ARS

Strawberry was first introduced to the Pacific Northwest (PNW) in 1846 when Henderson Luelling traveled from Iowa to Oregon with his family by wagon. Luelling brought with him the cultivar 'Wilson', developed by James Wilson of New York, and this cultivar flourished in the fertile soils of the Willamette Valley, which is located along Oregon's Pacific coast. With the success of this cultivar, Luelling opened a nursery in Milwaukie, Oregon in 1850 and helped to establish the emerging strawberry industry in the PNW. Afterwards, with the development of fruit preservation by freezing and the transportation of frozen fruit in barrels to the East via railway, the PNW became known as the largest production area for quality processed strawberries.

The Oregon Agricultural Experiment Station's (OAES) breeding program began in 1911 and started cooperating with the USDA in 1928. Over the course of the U.S. Department of Agriculture-Agriculture Research Service (USDA-ARS) program's history, it has had six breeders; the current breeder is Chad Finn. While the program operates out of the USDA's Horticultural Crops Research Unit in Corvallis, OR, the program has been run cooperatively with Oregon State University for the last 90 years.

In addition to breeding strawberries, Chad breeds blackberries, red and black raspberries, and blueberries. The strawberry breeding program's primary objectives are geared toward the processed strawberry industry. The PNW industry's fruit is processed primarily as individually quick frozen (IQF) fruit, sugared and sliced fruit puree, juice, and as dried fruit. From these basic products, innumerable products throughout the grocery store are made; from premium ice cream, yogurt, and cereals to strawberry shampoo.

Therefore, the traits of interest that Chad must focus on for an exceptional cultivar include: uniform fruit size, intense internal and external color, intense flavors, high soluble solids, low pH (as anthocyanins are more stable when the pH is low and thus the reds stay red in processed products), firmness, and low drip loss (how much moisture is retained after the fruit is frozen and thawed; see pictures at right). Since strawberries are hand picked, in addition to high quality fruit, Chad must choose selections that are efficient and economically viable to harvest; these plants must bear large fruits that cap easily (see pictures at right) when picked and an open plant canopy so that the fruit can be easily seen. The PNW relies on a perennial matted row production system, so all selections must be virus tolerant and remain viable over multiple growing seasons.

Chad oversees two to three acres of strawberries and evaluates 6-8,000 seedlings each year and a substantial germplasm collection. He makes 60 to 80 crosses each spring using advanced selections and wild germplasm as breeding parents. Chad enjoys making crosses and evaluating selections in the field. He enjoys breeding strawberry because it is just a few generations from the wild and therefore it is relatively easy to introgress traits from the wild strawberry (*Fragaria virginiana* and *F. chiloensis*) into the domesticated strawberry (*F. ×ananassa*).

Frozen fruit that has thawed and is not desirable! High drip loss!



An OSU-USDA advanced selection. Low drip loss! Notice no juice!



Poor capping will not work for processing!



This cultivar caps easily!

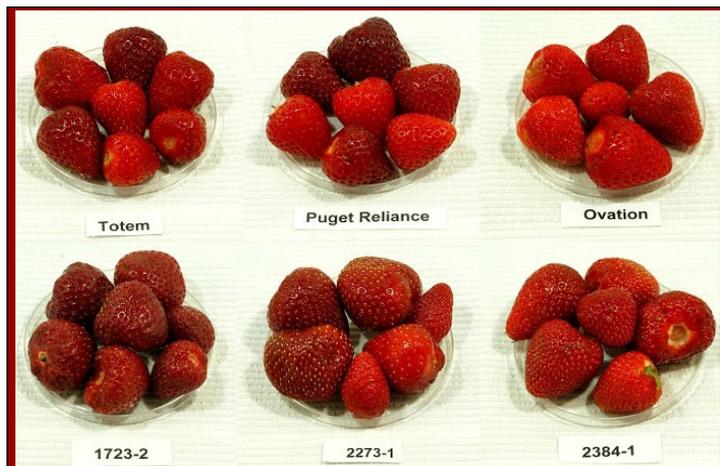


Breeder profile cont.

Chad has released a total of 30 cultivars across the crops he breeds. For strawberry he has released 'Valley Red', 'Tillamook', 'Pinnacle', 'Firecracker', and 'Independence', and helped to develop a release from Washington State University, 'Puget Summer,' and Agriculture and AgriFoods Canada's 'Stolo'. 'Tillamook', 'Firecracker', and 'Puget Summer' have been the most successful releases so far. 'Tillamook's' success has been due to its exceptional fruit quality and, as Chad states, overall it being "just about everything you would want a processing strawberry to be;" the plants have an open canopy, are high yielding, and the fruit caps easily. This cultivar has good virus tolerance and therefore a grower can potentially harvest a planting for up to four seasons. The fruit have a bright internal color, firmness, and good flavor. Fruit from 'Tillamook' are most commonly processed for IQF and polybags. 'Firecracker' is planted by growers who primarily sell at or to growers markets. This cultivar has been successful as it is late ripening and has high fruit quality.



Strawberry canopy that is ideal for hand harvesting.



A range of fruit colors in cultivars and selections; 'Totem' is ideal while 'Ovation' is too light and "orange" for processing.

Of the five crops included in RosBREED, strawberry has the shortest generation time (after the initial cross, plants bear fruit in the first or second year versus year three or four for the other crops) and is the most easily propagated. The RosBREED strawberry demonstration breeders will clonally propagate the cultivars, selections, and genotypes that will be included in their Crop Reference Set (CRS) so that the CRS can be replicated in three environments: Oregon, Michigan (Jim Hancock, RosBREED demonstration breeder), and California. The California replication will be planted and evaluated by Driscoll Strawberry Associates. Chad in the past has had an excellent collaboration with Driscoll's, but RosBREED will be taking this collaboration to a much higher level. Driscoll's and their strawberry breeder Philip Stewart have agreed to evaluate plants in the RosBREED strawberry CRS and give critical feedback.

Currently, Chad's breeding program is not using DNA markers but is working towards developing such markers so that in the future he will be able to consider selections based on marker-assisted selection (MAS). The wild diploid strawberry (*F. vesca*) is currently being sequenced with results expected to be released in 2010 by researchers in the U.S. However, the overwhelming majority of commercially grown strawberry cultivars are *F. ×ananassa*, which is an octoploid (it has eight complete sets of its chromosomes, the highest ploidy level of the RosBREED crops). Despite the ploidy and species differences, it is expected that the genome sequence of *F. vesca* in conjunction with RosBREED sequencing can be used to develop markers for commercial strawberry. Tom Davis (RosBREED strawberry demonstration breeder; University of New Hampshire) will be instrumental in making this happen. Tom is a member of the International Strawberry Genome Sequencing Consortium and a leading researcher in strawberry molecular evolution and genetics.

Chad is excited about RosBREED and states that it will make rosaceous breeders more efficient as less time and resources will be spent on inferior seedlings. Instead, these selections will have been eliminated using DNA markers. The RosBREED demonstration breeders have been introduced to the software PediMap and Chad is currently considering how this software will benefit his program and feels this software can be a powerful tool once its capabilities are fully implemented.

Jewels in the genome

By Amy lezzoni, project director

What is a “Jewel in the Genome?”

- *An individual’s genome is the full complement of genetic information that it inherited from its parents. Within this vast repertoire of genetic information, individual genes are being discovered that control critical production and fruit quality traits. As these valuable rosaceous gene discoveries are made and put into breeding applications, we will describe them in this column as “Jewels in the Genome.”*

Fruit size is a critical fruit quality trait in which a difference of only 2 mm diameter for fresh market sweet cherries can make the financial difference between profit and loss. Therefore, although other fruit quality parameters are also important, adequate fruit size is absolutely essential. A genetic region that controls cherry fruit size has been identified near the middle of sweet cherry’s 2nd chromosome (Zhang et al. 2010). More than seven DNA types were identified for this genetic region, and those types associated with large, medium, and small fruit were identified. Unfortunately, large-fruited trees tended to be soft-fruited and firm-fruited trees tended to be small-fruited. However, using data from seedlings in the Washington State University sweet cherry breeding program, one DNA type was discovered that was associated with fruit that were large *and* firm, as well as sweet and delicious! With this valuable genetic insight, breeders can design crosses that will yield a large proportion of seedlings predicted to have large fruit while minimizing the number of seedlings that will have soft fruit. Additionally, those offspring carrying the undesirable DNA types can be weeded out at the very young seedling stage so that breeders avoid wasting resources producing and growing trees that will eventually bear small fruit.

This genetic region is very important for tart cherry breeding also as parents that are being used as donors of cherry leaf spot (CLS, see picture bottom right) resistance unfortunately also have extremely small fruit (~ 1-2 grams). With this DNA diagnostic tool, those tart cherry offspring carrying the undesirable DNA types can be weeded out at the very young seedling stage so that breeders can more efficiently combine disease resistance and large fruit size into commercial cultivar candidates. Therefore, because this cherry genetic region will lead to the more efficient breeding of large delicious cherries, it is selected as our second featured “Jewel in the Genome.”

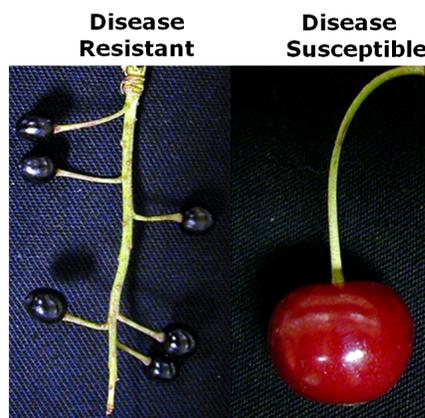
Zhang G, Sebolt AM, Sooriyapathirana SS, Wang D, Bink MCAM, Olmstead JW, lezzoni AF. 2010. Fruit size QTL analysis in an F₁ population derived from a cross between a domesticated sweet cherry cultivar and a wild forest sweet cherry. *Tree Genetics and Genomes* 6:25-36.



Amy lezzoni evaluating a sweet cherry cultivar from Eastern Europe.



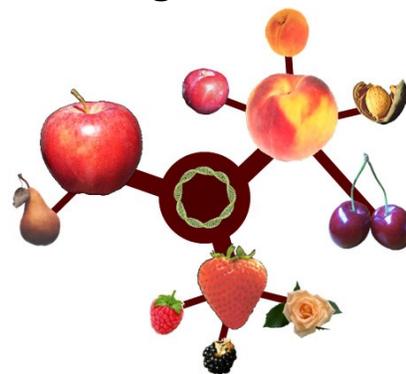
Photo courtesy of Greg Lang, Michigan State University. Pictured is his daughter Kate with a sweet cherry from the PNW.



RosBREED: Enabling marker-assisted breeding in Rosaceae

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Visit us at
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Gennaro Fazio	Breeding information management system	USDA-ARS, Cornell University
James Luby	Breeding	University of Minnesota
Jim McFerson	Stakeholder	Washington Tree Fruit Research Commission
Dorrie Main	Genomics	Washington State University
Cameron Peace	Marker-assisted breeding pipeline	Washington State University
Eric van de Weg	Pedigree-based analysis	Plant Research International, The Netherlands
Cholani Weebadde	Extension Outreach	Michigan State University
Chengyan Yue	Socio-economics	University of Minnesota

Calendar of events

- **August 2-5: American Society for Horticultural Science annual meeting, Palm Springs, California. RosBREED workshop, introduction to the U.S. Rosaceae community breeders.**
- **August 22-27: XXVIII International Horticultural Congress, Lisbon, Portugal. Series of RosBREED presentations in various colloquia and workshops.**