

RosBREED

Combining Disease Resistance with Horticultural Quality
in New Rosaceous Cultivars



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RosBREED Welcomes New Extension Leader

Amy Iezzoni, Project Director, Michigan State University

On behalf of all of us in RosBREED, I want to thank Mercy Olmstead for all that she has contributed to our project, serving as Extension Team leader until August 15, 2016. Mercy has moved from Florida to California with her family, after her husband, Jim, accepted a new blueberry breeding position with Driscoll's Strawberry Associates. Mercy and her team's expertise and activities provided solid information, cohesively organized and accessible, thereby helping to connect our project with our breeding clientele, the research community, and industry stakeholders. But we have not lost Mercy! She will remain in the Rosaceae community, serving as Secretary on the U.S. RosEXEC (Vice Chair in 2017; see page 3 for an explanation of RosEXEC) and recently accepted a new position as the Senior Manager of Production, Research, and Education with the California Strawberry Commission. We look forward to continuing to interact with Mercy in this new role.

He currently also serves on the Advisory Panel of the Tree Fruit Genome Database for Rosaceae (tfGDR) project, is an elected member of U.S. RosEXEC, and is a regular contributor to *American/Western Fruit Grower* and *Good Fruit Grower*.



Jim McFerson, Extension Team Leader and Director of the Tree Fruit Research and Extension Center, Wenatchee, WA. Photo: TJ Mullinax, Good Fruit Grower

We are very pleased to announce that Jim McFerson will take over as RosBREED Extension Team Leader. Fortunately for RosBREED, the timing of Mercy's resignation coincided with Jim's move from the Washington Tree Fruit Research Commission, where he was the manager, to Washington State University, where he is transitioning to become full-time Director of the Wenatchee Research & Extension Center, effective March 2017. Jim has been an integral voice in RosBREED from the beginning, serving on the RosBREED 1 and RosBREED 2 (RB2) Executive Committees, and he will continue to provide constructive advice and expertise to our project from both industry and research perspectives.

Moving forward, the RosBREED Extension framework will continue. This newsletter will now be published every four months in order to better align with RB2 activity milestones, and Jim will continue to incorporate valuable input from our team and Advisory Panel members. With RB2 almost halfway completed(!), major thrusts going forward will be to increase engagement with RosBREED's internal stakeholders and reach out to allied scientists. Extension is only as meaningful as the outcomes that are enabled for our Rosaceae colleagues, and we have a lot to share. This is no time for complacency — RB2 is big and widely-flung — and Extension will play a key role in keeping us together.

Featured Team: Stone Fruit Breeding Team

Amy Iezzoni, Project Director, Michigan State University

I wish everyone could have eaten peaches like the ones I enjoyed this past August. I was at a meeting in North Carolina and Ksenija Gasic, the peach breeder/geneticist from Clemson University and RosBREED’s Stone Fruit Breeding Team Leader, brought a box of peaches from elite selections in her breeding program. Knife ready, I cut into one and admired the smooth, firm texture, noted the perfect amount of air space around the pit, and breathed in the delicious peach aroma. Yummmm! The yellow flesh had a wonderfully flavorful sugar/acid balance. I also enjoyed a white-fleshed peach that was pleasantly sweet but also had a hint of acid that helped the flavor “pop.”

Even though I quickly became full and unable to taste all of the peaches in the box, I was in for a surprise. Ksenija instructed me to wait several days to eat the remaining fruit, as they had a novel flesh type that would soften to reach the best eating quality after storage at room temperature. She was right. The peaches softened, were extremely juicy, and there wasn’t a hint of mealiness! I thought, for the peach consumer, this is the “next big thing!”

Here is where plant breeding and RB2 come in – combining excellent eating quality with attributes needed by producers: yield, disease resistance, and storability – in new cultivars.

The types of peaches that Ksenija shared with me are representative of the germplasm in the programs of RB2’s peach breeders. Tom Gradziel breeds clingstone non-melting (processing) peaches at UC-Davis, Dave Byrne breeds low- to medium-chill freestone (fresh market) peaches at Texas A&M, John Clark (and now Margaret Worthington, see pg. 3) breeds fresh market cling and freestone peaches at the University of Arkansas, and Ksenija Gasic breeds fresh market freestone peaches at Clemson University.

In RB2, the search is on for major-effect loci that contribute to improved postharvest peach fruit quality. Using a phenotyping protocol designed by Carlos Crisosto, a UC-Davis postharvest physiologist and RosBREED Co-PI, the peach breeding team phenotyped for as many as 12 postharvest traits on more than 741 peach individuals. These individuals represent advanced selections



Ksenija Gasic, Stone Fruit Team Leader, explaining the diversity in her peach seedlings.

and their parents as well as any ancestors which were available; the rest were carefully chosen seedlings in small families derived from the most important breeding parents. The project’s peach breeding team now has 71,782 new data points! The next steps, scheduled for this winter, will be to scan the genome of these accessions and analyze the combined genetic and phenotypic data sets to identify loci contributing to the desired postharvest quality.

At the same time, RB2 is also focused on identifying genetic factors that contribute to resistance to two major peach diseases, bacterial spot and fruit brown rot, so that they can be used in breeding programs to combine resistance with fruit quality. Fortunately, major-effect loci have already been identified that control the resistances for

these two diseases (1, 2, 3, 4). However, we must first ensure these loci are useful in the RosBREED peach breeding programs. Once again, intensive efforts have provided staggering new datasets: 19,296 data points for bacterial spot just in 2016, and 33,258 data points for brown rot from both the 2015 and 2016 seasons. Analysis of these data will likely support the presence of the previously detected resistance loci or lead to the identification of new loci important in U.S. peach breeding germplasm. With these building blocks in place, breeders will be able to use DNA-based tests to more efficiently combine excellent fruit quality with disease resistance in the next series of cultivars – our central RB2 goal. Based on the selections I got to sample this past August, that may not be too far away!

(Cont.)



RosBREED by the Numbers

14

of one-on-one visits with breeders to advise on DNA use



71,782

of new data points found by the RB peach breeding team



11

"RosBREEDlings" pursuing M.S. or Ph.D. degrees

(Cont. prev. page)

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Good to Know: U.S. Rosaceae Executive Committee (USRosEXEC)

The U.S. Rosaceae Executive Committee (RosEXEC) was established in 2007 to serve as a communication and coordination focal point for the U.S. Rosaceae genomics, genetics and breeding community. With 15 members based in the U.S. and 4 international members, all elected via community voting, RosEXEC defines and promotes research priorities based on input from industry and research stakeholders. Further, it facilitates scientific interaction, fosters dynamic research teams and coordinates educational efforts. Finally, the group is the official steering committee for the Genome Database for Rosaceae project. RB2's Ksenija Gasic currently serves as chair for 2017.



Margaret Worthington, Univ. of Arkansas, examines a new peach selection in the field.

RosBREED Welcomes Margaret Worthington

Amy Iezzoni, Project Team Leader, MSU

Margaret Worthington, welcome to the Peach and Blackberry Breeding Teams and RosBREED! Margaret joined the University of Arkansas in August and is working closely with John Clark on fruit breeding and genetics research. Margaret has taken over all RosBREED activities, including coordinating DNA-informed breeding activities for the peach/nectarine and blackberry breeding programs.

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(Cont. from pg. 3)

Margaret earned her Ph.D. in wheat breeding at North Carolina State University. After graduation, she worked as a tropical forage breeder at the International Center for Tropical Agriculture in Cali, Colombia for three years.

Margaret looks forward to joining the fruit breeding community and applying DNA tests for traits, including bacterial spot resistance and flesh texture in the University of Arkansas peach breeding program. She also expects effective interactions with the rest of the RosBREED team to build upon the work conducted in RB1 to develop useful breeding tools in peach and blackberry.

Featured Team Member: Chris Saski

Jim McFerson, Extension Team Leader



Chris Saski, Director of the Genomics and Computational Biology Facility at Clemson University. Photo: Wells Fargo

Chris Saski is the Director of Clemson's Genomics and Computational Biology Facility and a Research Professor in the Department of Genetics and Biochemistry at Clemson University. As Director, Chris leads his team to maintain an international reputation for providing genomic and bioinformatics services directed toward the discovery and functional analysis of important genes, networks, and genomic regions from plants, animals, fungi, microbes, and humans, using an integrated suite of specialized biological tools.

Chris leads a research program that applies cutting-edge computational and genomic sciences for crop improvement and solving real world problems in agriculture. He focuses on investigating and exploiting genetic diversity to reveal gene function and contribute to development of desired phenotypes. His research incorporates computational tools, data resources, and algorithmic innovations to elucidate how organisms function, and how genomics and computational sciences can be used for healthier foods, more sustainable agriculture, and environmental systems that support agriculture. He has spent the last few years understanding the mysteries of polyploidy using upland cotton as a model. This research has led to many

interesting findings that can be applied to rosaceous crops, and also to a major award from the NSF to sequence and assemble the first allopolyploid crop genome to a reference-grade quality, which is a critical foundation to advancing crop genomics.

Chris has participated in many genome sequencing projects across an array of organisms: rice, maize, cacao, sorghum, switchgrass, yam, and even several insect species. Besides rosaceous crops and cotton, Chris also works on oilseeds and protein crops (peanut and soybean), feed grains (sorghum and maize), and weedy and invasive species (*Amaranthus* and *Kochia*) to elucidate adaptive mechanisms of evolution. All of this brings a wealth of perspective for achieving RosBREED's objectives.

Chris was not involved in RB1, but became interested in the opportunity to engage and be a moving part in RB2, in which he is the leader of the peach and other *Prunus* (other than cherry) DNA testing services. Chris's DNA testing group offers a comprehensive, high throughput suite of services such as DNA extraction and normalization for genotyping for DNA-informed breeding, and discovery genomics for the development of new markers with trait-prognostic utility.

For Chris, one of the primary benefits thus far in being a part of RB2 was the opportunity to build. Chris quickly became integrated with Clemson's peach team (Ksenija Gasic, Greg Reighard, Juan Carlos Melgar, and Guido Schnabel) and recognized an urgent demand by stakeholders for a solution to peach orchard decline caused by *Armillaria* Root Rot – the number one issue facing growers in the Southeast. Chris and his team were recently successful in obtaining a \$150,000 grant from the East Coast National Food and Agribusiness group to identify genes associated with *Armillaria* resistance in exotic germplasm such as chokecherry and plum progenitors. This project is particularly exciting because of the multidisciplinary nature of the team and approach. The research team includes a sophisticated blend of experts in genomics, genetics, computational biology, population and quantitative genetics, fruit tree breeding, plant pathology, plant physiology, molecular breeding, rootstocks, and high-performance computing. The extant and emerging technology is also in place to make large strides. More information and a short video can be found here: <https://stories.wf.com/disease-spreads-researchers-hope-give-peaches-chance/>

Chris was recently elected for a 3-year term as secretary of RosEXEC, starting in 2017, with promotion to RosEXEC chair in 2020. In this capacity, Chris will supply thoughtful insight.



Rosaceae Nemesis: Cherry Powdery Mildew

*Claudia Probst, Research Associate, WSU
Prosser Research & Extension Center*

*Jim McFerson, Extension Team Leader, WSU
Wenatchee Research & Extension Center*

Cherry powdery mildew is a major problem in sweet cherry growing regions in the U.S. Pacific Northwest (PNW), but much less so in the eastern part of the country. Management of foliar infection has been identified as a top priority for PNW stakeholders because nearly all commercially important scion cultivars are susceptible, and fruit infection is also increasing in importance. The disease has been routinely controlled by a range of chemical sprays; however, development of resistance in the pathogen is an increasing problem.

International reports of cherry powdery mildew date back to the 1800s, although these exclusively describe foliar infections. The first report of sweet cherry fruit infection originated from Harley English, a USDA researcher based in Corvallis, Oregon, in 1947. He confirmed the first powdery mildew outbreak on sweet cherry fruit grown in Squilchuck Canyon near Wenatchee in 1944 (1). Together the foliar and fruit phases of powdery mildew are now considered a disease nemesis for sweet cherry in the PNW, and this pathogen is one of RosBREED's targets.

The disease is caused by the fungus *Podosphaera clandestina*. Due to its obligate biotrophic (from the Greek: bios = life, trophy = feeding) nature, the life cycle of the pathogen is well aligned to the development pattern of its plant host (2). The fungus overwinters as chasmothecia – sexually produced fruiting bodies found in the bark, tree crotches, and decaying leaves on the orchard floor.

With the rise of temperatures in the spring, use of orchard irrigation, dormant chasmothecia burst and release ascospores that readily infect newly

emerging leaves (3). These primary foliar infections typically appear as a white powder on leaf surfaces and, while not fatal, can discolor and/or kill leaves and distort shoots.

Cherry leaves increase their level of resistance to powdery mildew as they mature. This is referred to as ontogenic resistance, in which young leaves are highly susceptible and older leaves highly resistant to pathogen infection. Hence, foliar infections are spread via young leaf tissue (Fig. 1) and can explode into devastating epidemics, especially under favorable conditions of high relative humidity, often caused by irrigation, and air temperatures of 68 to 72°F (4).



Figure 1. Powdery mildew foliar infection on a cherry leaf. Photo: C. Probst.

In contrast to foliar infection, fruit infection is a slow and nearly invisible process. Onsets of fruit infections occur later in the growing season, usually mid to late June, and often seem to happen “overnight.” The pathogen remains quiescent and viable on the fruit surface for a long period, with a maximum reported latent period of 56 days. Because incidences of foliar infections are not necessarily indicative of fruit infection, outbreaks of fruit infection are extremely unpredictable. Usually, early-season cherry cultivars escape fruit infection even if foliar epidemics are ongoing. On the other hand, and of great commercial significance, popular late season cultivars like ‘Sweetheart’ and ‘Skeena’ can display very little foliar infection yet suffer extensive fruit damage by harvest time.

Damage from the fruit phase can be limited to barely detectable superficial fungal strands, but in severe cases causes scarring and surface pitting that render fruit unmarketable and potentially lead to export rejection of entire lots (Fig. 2).



Figure 2. Powdery mildew on cherry fruit. Photo: C. Probst.

To date, fungicide applications remain effective means of controlling powdery mildew. However, growers must consider both the foliar and fruit phases of the disease, so management is a season-long challenge. Careful foliar powdery mildew management can keep disease pressure low, and subsequently reduce the amount of spores later in the season, and thus reduce the inoculum load that could lead to subsequent fruit and foliar infection. Additionally, full-season spray regimes can limit the amount of chasmothecia produced by the fungus, reducing overwintering potential and next season's primary inoculum sources.

However, protecting developing fruit from in-season airborne spores remains a challenge. Because most fungicides are only protective, fruit coverage needs to be complete, which is particularly difficult for tight fruit clusters. Further, as fruit rapidly grow, the protective fungicide layer becomes interrupted quickly, leaving unprotected areas of the fruit vulnerable to infection. Once infections have established, fungicide treatments can only be used for damage control.

Controlling powdery mildew through cultural practices also contributes to overall disease management. Thorough removal of root suckers, a powdery mildew-preferred food source due to its succulent young leaf tissue, and timely spring pruning practices will reduce powdery mildew spread throughout

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(Cont. from pg. 5)

the season. General orchard sanitation and removing fallen leaves from the orchard floor will also reduce the number of overwintering chasmothecia. Postharvest applications of oil and lime sulfur can suppress fungal proliferation and overwintering potential, but do not provide protection during the growing season. Kaligreen, an organically acceptable contact-type fungicide containing microencapsulated potassium bicarbonate can provide limited control. Similarly, training system and rootstock are additional management options that provides some control of foliar powdery mildew incidence (5).

Given the limited tools available to manage powdery mildew, especially in organic farming systems, incorporation of host plant resistance into commercially acceptable cultivars is an obvious approach. Utilizing a rigorous standardized phenotyping protocol at WSU-Prosser, resistance to the foliar phase of cherry powdery mildew has been found, and a major-effect locus conferring this resistance was identified.

Cameron Peace and Paul Sandefur, RosBREED scientists at Washington State University, have developed and are deploying a new DNA test for this foliar powdery mildew resistance locus to make breeding resistant commercial cultivars more efficient and effective. The next goal is the development of one or more DNA tests that are predictive of fruit infection. With such tests eventually in place, the RB2 goal of combining horticultural quality with disease resistance to produce superior commercial cultivars will be enabled. A win for sweet cherry consumers and sweet cherry growers alike!

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4. Grove, G.G. 1998. Meteorological factors affecting airborne conidia concentrations and the latent period of *Podosphaera clandestina* on sweet cherry. *Plant Dis.* 82:741-746.
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Community Events

American Society for Horticultural Science (ASHS) Annual Conference

Hilton Waikoloa Resort, Waikoloa, HI
September 19-22, 2017

For more information: www.ashs.org/?page=GeneralConference

IV ISHS International Symposium on Molecular Markers

Napier, New Zealand

March 7-10, 2017

For more information: <http://scienceevents.co.nz/molecularmarkers2017>

Jewels in the Genome:

Pc-1 for Phytophthora Resistance in Strawberry

Amy Iezzoni, Project Director, Michigan State University



Photo: <http://bit.ly/2gQtXz1>

Phytophthora crown rot of strawberry, caused by *Phytophthora cactorum*, is a major contributor to root and crown rot on strawberries in wet and humid production regions, such as the major strawberry production area in central

Florida. The fungus produces zoospores dispersed by water that can enter the strawberry root and crown tissues, leading to decay, leaf wilt, whole plant collapse, and death. No effective cultural practices are available to mitigate losses and the most effective chemical control — soil fumigation with methyl bromide — is no longer allowed.

Developing cultivars with reduced susceptibility to Phytophthora crown rot is a high priority for the University of Florida strawberry breeding program. Fortunately, there is genetic variation in susceptibility to this disease within the breeding program's elite germplasm; however, phenotyping for the pathogen is a labor-intensive, lengthy process. Good news again: a genetic study undertaken by the University of Florida strawberry team revealed the presence of a locus named *Pc-1*, located on strawberry linkage group 7D, position 63 cM, that explained 20% of the phenotypic variation disease susceptibility (1, submitted). Two particular alleles at this locus conferred reduced susceptibility. These alleles acted in a partially dominant manner, whereby individuals carrying even one allele had a significantly slower rate of pathogen infection and colonization. Development of DNA tests to detect the presence of these desirable alleles is currently underway.

Therefore, because knowledge of this genetic region will lead to the more effective breeding of strawberry cultivars, it is a RosBREED "Jewel in the Genome".

Reference:

1. Mangandi J, Verma S, Osorio L, Peres NA, van de Weg E, Whitaker V. 201x. Pedigree-based discovery and validation of a major QTL for resistance to crown rot caused by *Phytophthora cactorum* in octoploid strawberry. *Theoretical and Applied Genetics* (submitted).

Community Breeders' Page:

Assessing Your Program's Opportunities and How DNA Information Can Help – an Events Article

Cameron Peace, DNA-Informed Breeding Team Leader, WSU

2017 is the year in which RosBREED is shifting attention to each of you specifically, rather than all of you in general. You, of course, are creative and industry-sustaining U.S.-based breeders of rosaceous crops. Rather than relying on workshops at conferences, which some of you attend, and articles such as this one, which some of you read, we are talking to and hearing from each of you. On-site visits are increasing in frequency, as are phone calls, emails, and other follow-ups. A webinar series and online training modules, both interactive, will be launched soon.

It takes a village – or at least a team – to effectively engage with the 80-odd breeding programs across the country (read about our Team in the March 2016 RosBREED Newsletter: <https://www.rosbreed.org/sites/default/files/March%202016.pdf>).

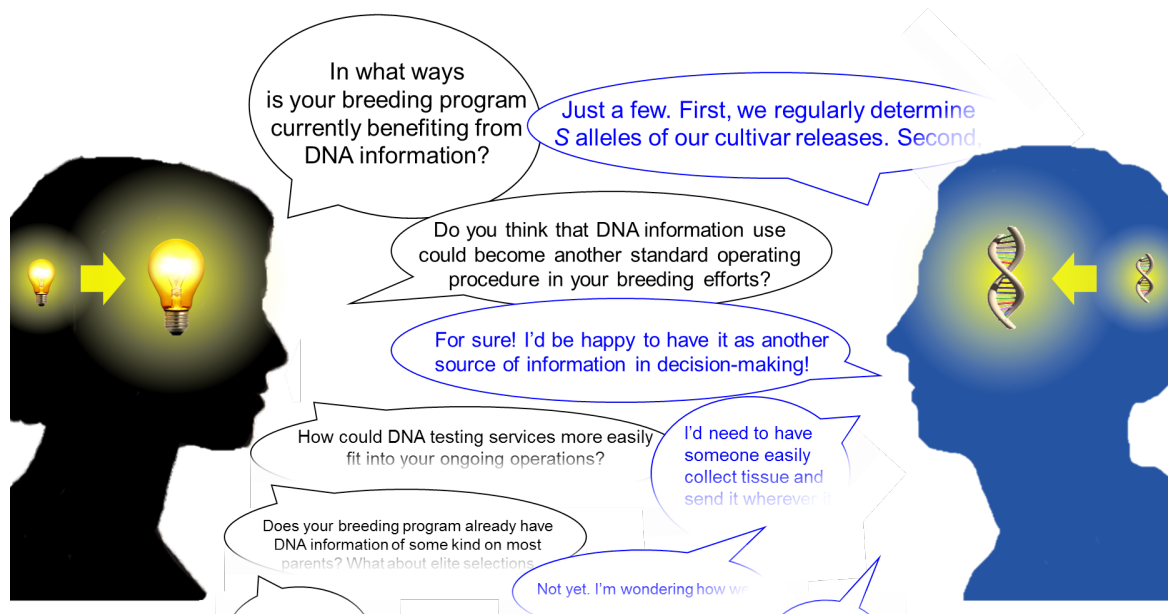
A systematic approach was recently developed to equip multiple team members, as well as interested breeding personnel and future professionals, with the skills to understand a program's situation and needs. During an Australian sabbatical during the previous U.S. winter, I developed an "assessment instrument" for identifying the capacity, needs, preferences, challenges, and opportunities of any given breeding program via a series of in-depth questions. According to answers from the breeder and staff, compelling next steps become apparent in which DNA information might be helpfully integrated. I began its use with some Australian fruit breeding programs, and it formed the basis of this past summer's visits to Californian stone fruit and berry fruit breeding programs. As a team, we are now better able to help in tailoring DNA-informed solutions to the idiosyncrasies of your program.

One size does not fit all! However, a recurring opportunity to be had is **parentage verification**. Breeding needs are directly targeted by crosses if parentage is correct. In contrast, breeding hunches and statistics fall apart if parentage is wrong. Perhaps the next most beneficial application of DNA information is **identity confirmation** prior to trial planting or in mass propagation, to provide peace of mind and avoid uncommon disasters.

Some warm-up questions of the assessment instrument procedure include:

- What is a key challenge currently faced by your breeding program and how are you trying to tackle it?
- In what ways is your breeding program currently benefiting from DNA information? Are those benefits routine?
- What is your current understanding of the pros and the cons of DNA-informed breeding for your program?
- Three to 10 years from now, what breakthroughs do you envision for your breeding program? What will it take to achieve them?

Expect to be contacted soon if you haven't already heard from us, and get ready to engage! If you'd like to discuss opportunities for your program sooner rather than later over the phone, or are looking forward to an in-person visit, or have a webinar or online training module topic to suggest, please contact me (cpeace@wsu.edu) and/or Julia Piaskowski (jpiaskowski@wsu.edu). Breed on!



From Rosaceae to Ericaceae



Congratulations to Paul Sandefur for accepting a position as a blueberry breeder for Fall Creek Farm and Nursery in Lowell, OR. Fall Creek is an international blueberry breeding and nursery company delivering genetics, plants, horticulture support, and market intelligence to the global fruit industry. Paul will lead the mid- and high-chill blueberry breeding program in OR and collaborate closely with Fall Creek's breeding teams in Mexico and Europe.

Paul is one of the original RosBREEDlings, graduate students trained as part of RB1; he completed his Masters in 2011 with Dr. John Clark, University of Arkansas, and continued in RosBREED by conducting his PhD with Dr. Cameron Peace, Washington State University, graduating in 2016.

RosBREED wishes Paul the best of luck in his new position with a new crop family!



Kristen and her advisor, Amy Iezzoni posing by the famous MSU poinsettia tree in the greenhouse.

Masterfully Succeeded!

Congratulations to Kristen Andersen, graduate student and RosBREED research associate, who has completed her M.S. in Plant Breeding and Genetics at Michigan State University.

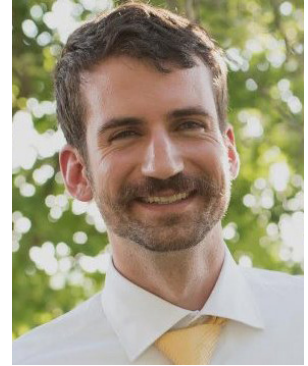
Kristen's advisor was Amy Iezzoni and her thesis title is "Comparison of Resistant, Tolerant, and Susceptible Host Responses to Cherry Leaf Spot and Assessment of Trait

Inheritance." After enjoying a much-deserved vacation, Kristen will seek a job in horticultural seed production and pathology.

Student Poster Competition Award

Congratulations to Nicholas Howard, RosBREED PhD student at the University of Minnesota, for winning first place in the poster contest at the 8th International Rosaceae Genome Conference in Angers, France.

Nicholas' poster title was "Two Large Effect QTL Identified and Characterized for Soft Scald Incidence in Apple."



Meet our Advisory Panel Members

Our advisory panel members are a critical part of our success in RosBREED, as they verify from their experience the impact of our research and guide our priorities. They dedicate not only a day (plus two for travel) to our advisory panel meetings in January, but they also are called upon during the year to provide feedback to questions that our project members have.

Thanks to all our advisory panel members that have helped us throughout the year – see you next month in San Diego!

Pere Arus Scientific Advisory Panel

What is your job description? How do you help the Rosaceae community?

I am a researcher at the Institute for Food and Agricultural Research and Technology (IRTA) in Catalonia, Spain. My job consists of understanding the genetics of important agricultural traits in several crop species (peach, almond, strawberry, melon), and based on this knowledge, developing new tools – markers, plant genetic resources, breeding methods – that facilitate breeders' tasks to efficiently create new varieties with innovative characteristics of interest for consumers.



Why are you interested in RosBREED?

RosBREED is an excellent opportunity to interact with U.S. researchers and breeders who are engaged in the same areas of research and technological transfer as I am, and who have similar and complementary views on how to identify and approach the most relevant problems. This is very useful for my own research, and a source of new ideas, first-hand information, and partners for possible joint research projects or activities.

How do you feel that you can contribute to RosBREED?

My scientific background is in genetics, genomics, crop evolution, and breeding of some of the main crops in which RosBREED is involved. I also have experience in the coordination of European research projects involving a large and diverse partnership. A substantial part of my research has been done in collaboration with breeding companies. A smooth and efficient translation of research resulting in practical application is a complex task and is one of the critical aspects for the success of RosBREED; this is where my experience from the European side may be helpful.

Bob Curtis

Stakeholder Advisory Panel

What is your job description? How do you help the Rosaceae community?

I administer the Almond Board of California (ABC) production research program. The ABC funds research in horticulture, entomology, plant pathology, nematology, aflatoxin and almond quality field studies, integrated pest management, and pollination and honey bee health issues. This long-term commitment to research has resulted in increased production efficiency, improved quality, and environmentally responsible orchard and pest management practices.

I work to assure research addresses both production and production-related issues and to assure implementation of research findings. As such, I interact closely with the University of California (UC) and other universities, the U.S. Department of Agriculture, UC Cooperative Extension, ag and ag-related organizations, and state and federal agencies.

Additionally, I have worked for the California Strawberry Advisory Board and Campbell Soup Company in the areas of technical and research program administration and implementation. All of these activities have direct bearing on the production of important rosaceous crops.



Photo: Almond Board of CA

Why are you interested in RosBREED?

The current two-pronged goal of RosBREED is combining disease resistance with horticultural quality in selected stone fruit, pome fruit, berries, and roses. These goals are a plus both at the field level and for consumers.

How do you feel that you can contribute to RosBREED?

I am currently serving on the Stakeholder Advisory Panel for the RosBREED Project. I am also a committee member of the U.S. RosEXEC, where I foster communication and coordination among the Rosaceae community, particularly representing stakeholder perspectives. Key to this is breeding priorities that have commercial application and can be extended to and implemented by industry.

Chris Watkins

Extension Advisory Panel

What is your job description? How do you help the Rosaceae community?

I am the Director of Cornell Cooperative Extension and Associate Dean in the College of Agriculture and Life Sciences and the College of Human Ecology. In my spare time, I am also a postharvest physiologist in the Horticulture Section of the School of Integrative Plant Science, Cornell University, in Ithaca, New York. My primary research and extension efforts are focused on apple fruit, and I maintain active programs researching quality of new and traditional apple cultivars in relation to storage technologies.



Photo: Cornell University

Why are you interested in RosBREED?

As a scientist, I am interested in RosBREED because development of new cultivars inevitably results in the postharvest scientist investigating an important role in their ripening physiology and storage potential. One of the most exciting apple cultivars in recent years has been 'Honeycrisp', but this is an apple with many challenges as it is grown in a wide range of geographical locations.

How do you feel that you can contribute to RosBREED?

As a representative of RosBREED's Advisory Panel's (AP) Extension Team, I hope that I can contribute ideas and direction to improve outreach for this project. I was a member of the AP Extension Team during the first project, and it was exciting to see the development of extension efforts in breadth and depth, in an area of research endeavor that is not always easy for the general public to understand.

Cultivar Corner

This issue we highlight the newest blackberry from Dr. Chad Finn's USDA-ARS blackberry breeding program in Corvallis, OR. This blackberry has to be the largest berry that we have ever seen, earning its name as a "giant"!

'COLUMBIA GIANT' BLACKBERRY

INVENTOR: Chad Finn, USDA-ARS, HCRU Corvallis

Collaborators: Bernadine Strik, Oregon State University (OSU) Department of Horticulture; Brian Yorgey, OSU Department of Food Science; Mary Peterson, USDA-ARS Corvallis; Jungmin Lee, USDA-ARS Parma; Robert Martin, USDA-ARS Corvallis

What makes 'Columbia Giant' special?

It has extremely large (>12 g; Fig. 1), attractive fruit that are good to eat. While it will likely be mostly handpicked for the fresh market, the fruit is machine harvestable and the plants are thornless.

When was the cross made?

2005

What is the pedigree of 'Columbia Giant'?

NZ 9629-1 and ORUS 1350-2 ('Black Butte' × ORUS 828-43). 'Columbia Star' was also selected from this cross.

What is the size of the family from which 'Columbia Giant' was selected, and are there other siblings from this cross that have commercial potential?

55, a moderate size. Tried for 100. Four selections were made in this family, with the 2012 release 'Columbia Star' also coming from this family. It shares a maternal parent with the very early ripening ORUS 3448-2, which is being released this year.

Has this or will this cultivar be used in RosBREED, and how?

Its sibling 'Columbia Star', which should have much in common genetically, was the parent of crosses that were phenotyped, and will be genome-scanned with the goal of identifying loci controlling fruit sweetness. Because 'Columbia Giant' has been used as a breeding parent for flavor, the information gleaned from the RosBREED analysis should be able to be applied to these families also.

When will this cultivar be in the market?

A substantial number of plants will be established in 2017 for harvest in 2018.



Figure 1. 'Columbia Giant' fruit are extremely large. Photo: USDA-ARS

Any other interesting notes about 'Columbia Giant'?

As with its sibling 'Columbia Star', collaboration between the New Zealand Plant and Food Research, the Oregon State University Horticulture and Food Science and Technology Departments, the USDA-ARS, HCRU clean plant program, commercial propagators, and growers was essential to getting 'Columbia Giant' to the market.

'Columbia Giant' is the largest trailing blackberry cultivar we are aware of, and there are no other blackberries that are as large and uniformly shaped. The size comes from ORUS 1350-2, which in turn got its size from 'Black Butte' blackberry. There are concerns that the fruit is too big for clamshell packing; packers might need to develop special packaging, or it might be limited to farmers markets and pick-your-own sales.

Why should growers want to grow 'Columbia Giant'?

'Columbia Giant' is FUN and tastes good!!!!

Coming up in the next issue:

- Meet more members of our Advisory Panel
- Progress and updates from key teams from the first third of the year
- Our next “Jewel in the Genome” focuses on disease resistance
- What will be the next Rosaceae Nemesis? It might be one important for your Rosaceae crop!

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