RosBREED

Combining Disease Resistance with Horticultural Quality in New Rosaceous Cultivars

VOLUME 5 | NO. 3

In This Issue

Spring: Time for pollinating, planting... and DNA testing

Amy Iezzoni, Project Director, Michigan State University

Spring was arriving, leaves starting to push, and seedlings from last year's crosses beginning to germinate – time for breeders to finalize crossing plans and select seedlings for field planting. For many, this meant it was also time to collect leaf tissue and send it to a DNA testing center for genotyping. Thanks to the first RosBREED project ("RosBREED 1"), rosaceous crop breeders can now implement DNA tests to increase their effectiveness in producing cultivars with must-have attributes such as crisp and firm texture for apple, smooth, melting texture for peach, and large fruit size for cherry.

Spurred by Advisory Panel (AP) suggestions, the RosBREED team is developing a series of "DNA test cards" for the community of U.S. rosaceous crop breeders describing available DNA-based diagnostic assays and how to get into the swing of using them. These deliverables manifest RosBREED's intent to thoroughly engage and motivate our breeder and allied scientist clientele. We are also working on another AP suggestion: deliver crop-specific, easy-to-read one-pagers for industry stakeholders describing success stories from breeders who are modernizing their programs this spring with new DNA tests. We should be reporting on this set of deliverables in our next newsletter!

Featured Team: Extension Team

Lisa DeVetter, Extension Team Member, WSU and Mercy Olmstead, Extension Team Leader, UF

In the RosBREED project, the Extension team has the important task of engaging with industry stakeholders for the continued assessment of project outcomes and evaluation. Michael Coe, from Cedar Lake Research Group, LLC was a member of the first RosBREED project serving in project evaluation, and luckily, he has signed up for another five years with RosBREED. All of the evaluation is shared among the various RB2 teams and subsequently used to redefine and adjust elements of RB2 to better serve industry needs.

The Extension team also functions to support the other teams as they seek to extend important project information to stakeholders. Our team does this through various media outlets, including newsletters, direct communication with breeders, one-page summaries of project results for industry, and peer-reviewed publications. As a result, the extension team is involved with the entire project and all teams, making Extension a critical component encompassing RB2.

Our major goals for RosBREED are to ensure effective communication about the successes of this project, whether that is to fellow breeders, industry personnel, or members of the scientific community at large. Our team achieves this by communicating with our AP members and with other breeders, scientific personnel and industry supporters to deliver information that they will use.

Coming up in the near future, look for a new website design (www.rosbreed.org) that will have archived material from the first five years of the RosBREED project, as well as development of new content as we head into year 2 of our current project.

The following are members of the RB2 Extension team:

- Mercy Olmstead (Team Leader) - Assistant Professor of Horticulture and Extension Specialist, University of Florida
- Michael Coe - Cedar Lake Research Group, LLC
- Lisa DeVetter - Assistant Professor of Berry Horticulture, Washington State University
- Desmond Layne - Professor of Pomology and Tree Fruit Extension Program Leader, Washington State University
- Dorrie Main - Associate Professor, QTL Discovery Team Leader, Washington State University
- Jim McFerson - Washington Tree Fruit Research Commission *Photo: Good Fruit Grower*
- Cameron Peace - Associate Professor, Project Co-PI and DNA Informed Team Leader, Washington State University
- Julia Piaskowski - Postdoctoral Researcher, Washington State University
- Greg Reighard - Professor Emeritus, Clemson University

RosBREED on Facebook OR @rosbreed

RosBREED By the Numbers

9+
Crops covered in this project

$47 M
Value of U.S. blackberry industry

742.3 MB
Size of the sequenced apple genome

9
Number of DNA tests for peach

20
years to release a new cherry variety

Featured Team Member: Richard Bell

Audrey Sebolt, Project Manager, MSU

Pear fruit offers a delicious sweet, rich flavor and a juicy, buttery texture. Pear is native to Asia and Europe and more than 3,000 pear cultivars are grown around the world. The first pear tree was planted in 1620 in what was the Massachusetts Bay colony.

In comparison with some other RosBREED crops like apple, cherry, peach, and strawberry, little is known about pear's genetics for key horticultural traits, and therefore breeding is conducted based on breeder experience and instinct. However, pear is closely related to apple, as pear and apple diverged from each other approximately 5 million years ago. Both crops are afflicted with the same devastating bacterial disease, fire blight. Because of the shared ancestry, RosBREED is creating a bridge for genomics and pathology knowledge from apple and other Rosaceae crops to pear. RosBREED is excited to welcome Richard Bell, the pear breeder at the USDA-ARS Appalachian Fruit Research Station (AFRS), located in Kearneysville, WV.

Richard accepted the position at the USDA-ARS AFRS after serving as an Associate Horticulturist for the apple breeding program at the University of Illinois. In his current position, Richard manages 30 acres of germplasm, seedlings, and advanced selections, which were inherited from several predecessors, as the pear breeding program has been running strong since the 1960s.

Key breeding traits of interest include host resistance to fire blight and pear psylla, improved fruit quality and ripening characteristics, high productivity, early fruiting (precocity), and long postharvest storage life. Pear psylla is a very small sap-feeding insect which causes leaf wilting and premature leaf loss.

Currently, Richard has cooperator trials in California, Michigan, Oregon, and Washington to test several advanced selections. In order for him to consider releasing a new pear cultivar, the selection must be broadly adaptable. The advanced selections in the new trials mostly have 'Bartlett' type flavor, are fire blight resistant, bear precociously, and mature around the same time as 'Bartlett' (within two weeks before or after).

The cultivar 'Gem' was recently released jointly by the USDA-ARS AFRS, Michigan State University, Clemson University, and Oregon State University. Gem is fire blight resistant with a sweet flavor profile and good storability, It can be enjoyed as a crisp fresh pear or as a buttery-fleshed pear after cold storage.

Richard's program does not currently utilize DNA-informed breeding as DNA tests have yet to be developed for key target breeding traits. However, RosBREED is well on its way to developing such tests for fire blight resistance and fruit sweetness. To this end, a pear Crop Reference Set (n=240) was recently chosen to represent the allelic diversity in Richard's breeding program. Leaf tissue was sent to Nahla Bassil's lab (USDA-ARS Corvallis) for DNA extraction. Once extracted, DNA will be sent to Plant and Food Research, New Zealand for SNP genotyping. Stay tuned for future developments in pear!

Dr. Richard Bell holding his newest release, 'Gem' pear, a Bartlett-type variety.

Why did you choose to be involved with RosBREED?

Plant breeding, and especially tree fruit breeding, has special challenges due to the long breeding cycles and expense of maintaining large orchard collections of seedling populations. Like all plant breeding, parent and seedling phenotyping and selection is not 100% accurate. The incorporation of the modern molecular techniques of quantitative trait locus (QTL) discovery and utilization offers a way of

improving the accuracy and efficiency of pear breeding. I felt my participation would greatly benefit the breeding program and promote the introduction of improved pear cultivars to the industry. It is exciting to really work with the genotype in addition to the phenotype, and to elucidate the genetic basis of the fire blight resistance in my breeding populations. Furthermore, this is a tremendous opportunity to learn about marker-assisted breeding, and the RosBREED community is a valuable resource for learning and collaborating.

'Gem' is a Bartlett-type pear with a buttery texture and good storability. Photo: USDA-ARS

What successes do you hope to see from RosBREED?

I hope to validate a QTL for fire blight resistance derived from the old European pear cultivar Roi Charles de Wurtemberg and discover QTLs from 'Old Home' and a *Pyrus ussuriensis* source of resistance. I hope to determine the presence of resistance alleles for these QTLs in my breeding populations and apply marker-assisted breeding (MAB) to parent and seedling selection.

How have you benefited from RosBREED?

I have gained a better understanding of MAB, QTL genotyping, and other associated molecular and statistical tools.

What is one thing (or a few) that your colleagues don't know about you?

I have a great interest in traditional folk dance, and for 25 years was a member of a local group that performed English Morris dances from the Cotswold Hills in Oxfordshire. One year we travelled to England to dance with several English Morris "sides." I also became interested in agriculture and plant breeding as a Peace Corps volunteer in Ethiopia.

Industry Perspectives

Spring Comes Earlier Than Ever

Jim McFerson, Industry Liaison, WA Tree Fruit Research Comm.

Industry stakeholders have been dealing with exactly the same phenological phenomena as the scientists involved with RosBREED this year. In many locations, spring arrived two or even three weeks early, so all of us are feeling the pressure of getting our time-sensitive early season operations under way. An early spring means an early bloom – and all the possible downsides of cold events damaging bloom, fruit, or plants themselves.

It means disease management starts early, too. Scouting, spraying, and praying are routine operations made more difficult by the unpredictability of weather conditions and a million crises to manage. A mistake early on can make the difference between a profit and a loss for industry stakeholders, whether it is fire blight or scab on apple or pear, bacterial spot on peach, black spot on rose, powdery mildew on sweet cherry, leaf spot on tart cherry, or angular leaf spot on strawberry.

Wouldn't it be sweet if producers could effectively and sustainably mitigate some of that risk from disease nemeses? That would immediately translate into economic gain and psychological relief. There are plenty of other risks every producer will face before harvest, but making it through spring with a minimum of damage from disease is an obvious benefit.

Mitigating that producer risk from disease is exactly what RosBREED 2 is all about, and exactly what our industry stakeholders requested RosBREED do in its second incarnation. The DNA tests developed in the preceding project provide amazing new tools to breeders to accelerate the development of superior new cultivars. RosBREED 1 focused on fruit quality traits, but RosBREED 2 adds durable disease resistance to the traits for which breeding programs will have accurate and reliable DNA markers. The project also adds an outstanding team of plant pathologists assisting breeders to identify sources of resistance and incorporate favorable alleles into their programs.

While getting from an exotic germplasm source to a DNA test to a disease-resistant cultivar with superior horticultural quality is just as difficult as producing a successful crop every year, this new RosBREED team is making progress every week. Check out this newsletter to learn more about that progress and imagine the day when genetic resistance to important diseases makes spring a little bit easier for U.S. producers.

After DNA tests were conducted, David Bedford and Ken Mullin happily discard seedlings that didn't result in a shiny jewel. Photo: J. Luby

Rosaceae Nemesis:

Bacterial Spot in Peach

Ksenija Gasic, Stone Fruit Team Leader, Clemson University and Mercy Olmstead, Extension Team Leader, UF

One of the most serious diseases affecting peach production worldwide is bacterial spot, caused by *Xanthomonas arboricola* pv. *pruni* (Xap). Bacterial diseases are particularly difficult to control, because unlike infections in humans, which can be quickly quelled with antibiotics, in stone fruit antibacterial sprays are only effective in years with low to medium disease pressure.

Bacterial spot affects all stone fruit crops and can cause severe economic losses. Symptoms can appear on leaves, twigs, or fruit (Figure 1). Spots typically show up on leaves initially and as they grow larger they can become necrotic, giving a "shot-hole" appearance. Severe infestations can lead to premature defoliation, weakening the trees and depleting carbohydrate reserves. Lesions on fruit render it unmarketable, resulting in severe economic losses.

Traditional methods of control included antibacterial sprays such as oxytetracycline or copper-based compounds. However, concern with excessive antibiotic use, increasing heavy metals in the environment, and weak efficacy have led to growers to seek alternative control methods. Growers rely primarily on:

- Tested and certified nursery material (such as through the Clean Plant Network)
- Growing cultivars with a high degree of tolerance and/or resistance
- Breeding efforts to incorporate tolerance and/or resistance characteristics

Thus, bacterial spot is a major focus for the peach breeding team in RosBREED, led by Ksenija Gasic. She has been working on the incorporation of bacterial spot tolerance and/or resistance into her breeding program at Clemson University. In addition, Dr. Gasic is attempting to find DNA markers that correlate with this tolerance and/or resistance. Previous research at North Carolina State University by Denny Werner and David Ritchie identified peach cultivars with exceptional tolerance and/or resistance, particularly in 'Clayton'.

Figure 1. Bacterial spot effects on peach trees (left) and fruit (right). Photo: D. Ritchie.

Cultivars such as 'O'Henry' introduced into the Southeast from California are most susceptible. Different genes are involved in the resistance for leaves and the fruit separately and together, but it was not known if resistance alleles from different genes were inherited separately or together in seedling progeny. However, as a result of the first RosBREED project, alleles associated with different levels of peach fruit resistance to bacterial spot were identified (Gasic et al., in press), and DNA tests with 80% accuracy in predicting fruit resistance are now available for routine screening.

The new project's efforts of peach breeders Gasic (Clemson University) and Clark (University of Arkansas) together with the Pathology Team are focused on identifying and combining new genetic sources of both fruit and leaf resistance as well as developing reliable DNA tests for leaf resistance to bacterial spot for accurate and efficient evaluation of genetic potential in breeding germplasm.

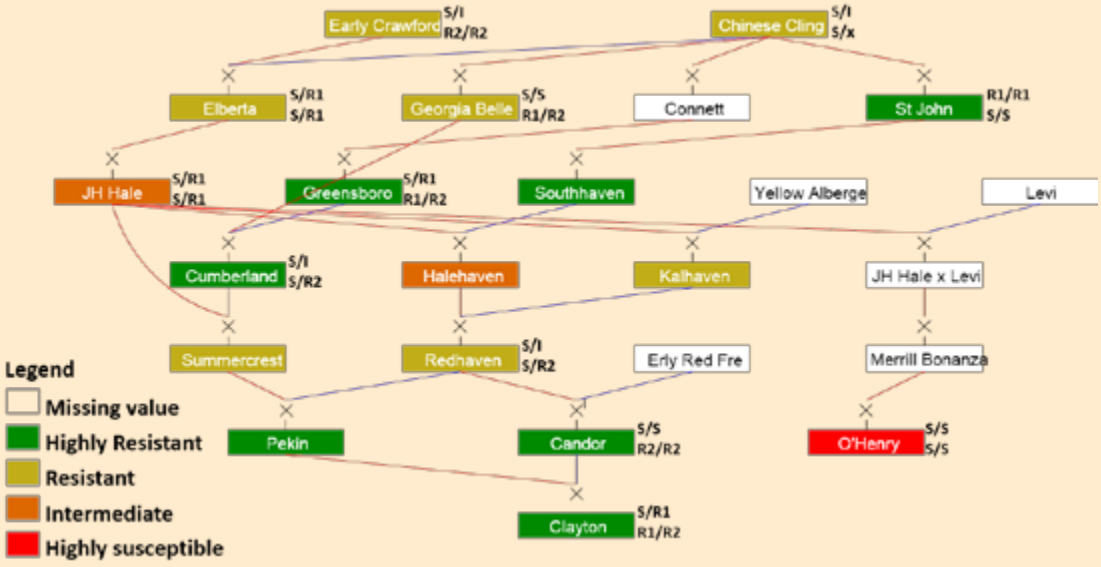

Figure 2. Pedigree of 'Clayton' (Okie, 1998) and the inheritance of fruit bacterial spot resistance and susceptibility. Color legend based on literature data for overall performance against bacterial spot (Okie, 1998). Functional alleles: S, susceptible; R1 and R2, resistant; I, intermediate; x, unknown fruit response to Xap. Top, locus on chromosome 1, G1XapF, and bottom, locus on chromosome 6, G6XapF. Red line, seed parent; blue line, pollen parent. Figure generated with Pedimap 1.2 (Voorrips et al. 2012).

References (cont'd from p. 5)

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Jewels in the Genome

Primocane Fruiting in Blackberries

Amy Iezzoni, Project Director, Michigan State University

Blackberry canes typically have a biennial life span. Primocanes are first-year canes that normally do not bear fruit. Instead, fruit is produced in the early summer on second-year canes known as floricanes.

However, primocane fruiting is possible, in cultivars that carry the right alleles. Primocane fruiting in the late summer and fall is valuable as it allows growers to plant cultivars that target the late-season fruit market, increase the mechanization of their operation as the primocanes can be mowed down in the fall, and avoid winter injury as the canes are not overwintered (Clark 2008).

In blackberry, an important primocane-fruiting locus, named F, was identified on blackberry linkage group 7, where the recessive allele confers primocane fruiting (Castro et al. 2013).

With genetic knowledge of which blackberry parents are carriers for the desirable alleles and which seedlings will exhibit primocane fruiting, breeders can plan crosses to maximize the probability of obtaining cultivars that have this fruiting habit and select seedlings with this desired attribute before field planting. Such an approach helps redirect resources to other critically important consumer-related traits.

Therefore, because knowledge of the genetic region of the F locus will lead to more effective breeding of blackberry cultivars, it is chosen as one of RosBREED's "Jewels in the Genome."

Figure 1. Anne Geyer on her farm in Virginia with blackberry fruit harvested in the fall from primocanes. Photo: J. Clark

Figure. 2. Primocane inflorescences (left) developing on a primocane-fruiting plant, with fruit (right) on floricanes from the same plant, in the Arkansas blackberry breeding program. Photo: J. Clark

References

Castro P, Stafne ET, Clark JR, Lewers KS. 2013. Genetic map of the primocane-fruiting and thornless traits of tetraploid blackberry. Theor Appl Genet 126 (10): 2521 – 2532.

Clark JR. 2008. Primocane-fruiting in blackberry breeding. HortScience 43: 1637 – 1639.

Cultivar Corner

Mercy Olmstead, Extension Team Leader, UF and
Desmond Layne, Extension Team Member, WSU

For those that love blackberries, we are featuring a new blackberry with a bonus song from Dr. John Clark, and a new "snappy" apple cultivar from Cornell University. If you have any questions about these new varieties, please send us a note!

PRIME-ARK® TRAVELER

Inventor: John Clark, University of Arkansas, Fayetteville, AR

What makes 'Prime-Ark® Traveler' special?

'Prime-Ark® Traveler' is the world's first commercial, shipping-quality, thornless and primocane-fruiting blackberry cultivar. The primocane-fruiting attribute, which allows production on current-season canes (see Jewels in the Genome article), will broaden options for season of production and management strategies in world blackberry production.

When was the cross made?

The cross was made in 2004 at the University of Arkansas Fruit Research Station, Clarksville, Arkansas.

What is the pedigree of 'Prime-Ark® Traveler' ?

'Prime-Ark® Traveler' resulted from a cross of A-2293T × APF-49T, two Arkansas breeding program selections. Pedigree records go back as far as seven more generations. A-2293T was derived from 'Prime-Jan®' and another A-series selection, both with similar ancestry involving named cultivars Arapaho, Brazos, Cherokee, Comanche, Darrow, Hillquist, Navajo, Rosborough, Shaffer Tree, Well's Beauty, and Thornfree. APF-49T has 'Prime-Jim®' and another A-series selection as its parents, with a very similar ancestry to A-2293T. Inbreeding was exploited in this pedigree to obtain the recessive attributes of primocane fruiting and thornlessness in this tetraploid crop. The double recessives took time to achieve, coupled with the quantitatively expressed attributes of postharvest storage potential, good fruit quality, and productive plants. The female parent, A2293T had two alleles for primocane fruiting and also had quality derived from floricane-fruiting parents. The male parent, APF-49T was thornless and primocane-fruiting but had small fruit size and limited yield potential.

What is the size of the family from which 'Prime-Ark® Traveler' was selected?

The original plant was selected in June 2008 from a population of 619 plants in a seedling field during evaluation of floricane fruits. The large population size was needed to achieve the combination of targeted attributes from the two parents. 'Prime-Ark® Traveler' is the only commercial release from this population.

Will this cultivar be used in RosBREED and how?

It is a parent of one of the populations targeted for use in the blackberry research for fruit quality in the current RosBREED project.

When will this cultivar be in the market?

Released in late 2014, it will begin being sold and planted in the fall of 2015.

Are there other primocane-fruiting cultivars?

Yes, this is the fifth public release from the University of Arkansas of the primocane-fruiting type plant. The most popular is 'Prime-Ark® 45', due to its high productivity, large berry, and high quality; it is thorny, however – a disadvantage in production.

Is it true you have dedicated a song to 'Prime-Ark® Traveler'?

Yes! If you want to listen, you can click on the box below:

BLACKBERRY TRAVELER
JOHN CLARK, COMPOSER

SNAPDRAGON™- NY 1

Inventors: Susan K. Brown and Kevin E. Maloney, Horticulture Section, School of Integrative Plant Science, Cornell University, New York State Agricultural Experiment Station, Geneva, NY

What makes 'SnapDragon' special?

'SnapDragon' is a very precocious, productive tree. Fruits have exceptional quality, with crisp texture, good juiciness, high soluble solids concentration, and pleasant aromatic flavors. It has had excellent consumer response.

When was the cross made?

The cross was made in 1998. The seedling first fruited four years later and trees were immediately propagated for both testing at Cornell and then for grower trials. Fast-tracking this selection enabled us to go from cross to negotiating commercialization rights in 11 years – one of the fastest times for an apple cultivar to be commercialized.

What is the pedigree of 'SnapDragon™'?

'Honeycrisp' × a NY advanced selection that has quality similar to 'Jonagold' but is diploid. This advanced selection is from 'Starkspur Golden Delicious' × another NY advanced selection from 'Monroe' × 'Melrose'.

What is the size of the family from which 'SnapDragon™' was selected?

This cultivar was from a cross of 381 seedlings, which is a small family size. There are several more selections from this cross that have commercial potential.

Will this cultivar be used in RosBREED and how?

This cultivar has been phenotyped and genotyped, along with its ancestors and some of its sister seedlings. These evaluations will help identify and validate the genetic factors responsible for the various exceptional characteristics of 'SnapDragon' that enabled it to be commercially viable. Knowing the origin and tracking the inheritance of these factors will aid the development of increasingly exceptional cultivars.

Other interesting notes…

This cultivar was the first tree in a long row and when we sampled it at the start of our evaluations I teased my assistant that we couldn't select the first tree in the row. We noted it, went back again, and quickly decided that it was special and it would be propagated on a fairly large scale the first year of testing, (which is unusual). The highest compliments I received about this apple were from a 90-year old apple grower who declared it "the best apple I have ever eaten" and a four-year old who declared it the "bestest apple ever!" High praise indeed, from both ends of the age and experience spectrum.

'SnapDragon™ ' in the box highlighting its crisp texture. Consumers particularly liked its flavor and aromas. Photo: S. Brown

Meet Our Advisory Panel Members

Our advisory panel members are a critical part of our success in RosBREED, as they "ground-truth" 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.

Dan Legard
Industry Advisory Panel

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

I am the VP of Research and Education for the California Strawberry Commission. I run a grant-funding program for production research as well as an in-house research program. We also run an extensive grower education program that focuses on training farm employees as well as growers.

Why are you interested in RosBREED?

I would like to see new tools developed to help improve the development of commercial strawberry cultivars for my industry.

How do you feel that you can contribute to RosBREED?

I have an understanding of the research needs and production issues of the industry and can provide a scientific interpretation of those needs.

Ronald Perry
Extension Advisory Panel

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

I am a Professor of Horticulture at Michigan State University with responsibilities in teaching, research, and extension in tree fruit. I also teach a wine appreciation course for the University and conduct some extension programs in viticulture as needed, associated with grape rootstocks, site selection, and state wine grape regions. I have been at MSU since 1980 and conducted research and extension work in my career focused on stone and pome fruit rootstocks, high density systems, and root and soil dynamics. I assist RosBREED via extension advising with nearly 50 years' experience in fruit science and production.

Why are you interested in RosBREED?

Keeping up to date regarding advances in genetics and breeding related to variety improvement.

How do you feel that you can contribute to RosBREED?

I try to contribute from my viewpoint of industry needs and practical application of new technology.

Jen Baugher
Industry Advisory Panel

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

Over the past 10 years I've worked in several different branches of our company, Adams County Nursery – mostly roles in marketing and sales. But I've done a lot of work with variety evaluation as well, and I've most recently been focused on product development, nurturing relationships with plant breeders, etc. As a commercial nursery, we support the tree fruit community by supplying growers a quality product. We offer a wide array of varieties for the diverse markets in the Eastern and Midwest U.S., as well as Eastern Canada. We grow predominantly apple and peach trees, but work with pear, cherry, plum, and apricot as well.

Why are you interested in RosBREED?

I have a genuine interest in new cultivar development and I'm generally fascinated by the work RosBREED is doing. It's exciting to see all the collaborative work taking place to advance breeding and, ultimately, the fruit growing industry. I won't pretend to understand all the science, but as an industry stakeholder, I can certainly recognize the end goals. This work is important. If findings from this project can allow breeding programs to turn out high quality selections more efficiently, I support that.

How do you feel that you can contribute to RosBREED?

Having worked closely with growers over a number of years, I've become familiar with some of their challenges and successes – both of which are important to consider. As is the case for most parts of the fruit growing world, the growers in the region we serve have their own set of unique challenges. My contributions will come mostly from representing their needs and interests. I've also worked closely with a few breeding programs that are focused on establishing disease resistance in cultivars. Hopefully this exposure will help me provide the group with meaningful contributions. I'm excited to be a part of it.

RosBREED Personnel Updates

Masterfully Succeeded!

Congratulations to Fransiska Basundari, graduate student and RosBREED research associate, who has completed her M.S. in Plant Breeding and Genetics at Michigan State University. Fransiska's advisor was Amy Iezzoni. In tart cherry, Fransiska evaluated the gains from selection for cherry leaf spot resistance and dark flesh color with the use of DNA tests. Best of luck to Fransiska in her home country of Indonesia, to which she has recently returned.

Community Breeders' Page

Breeding Creativity – a Technology Interfacing article

Cameron Peace, DNA-Informed Breeding Team Leader, WSU

What do you get if you cross ... a stellar parent with an interesting interspecific hybrid, and then self (or backcross) some offspring? With sufficient DNA information on traits, parents, and seedlings, you could predict the outcome. RosBREED is assembling that information to support accurate predictions and efficient mobilization of resources to rapidly achieve intended outcomes. But RosBREED is also encouraging breeders to ask the question in the first place: "What would I get if I crossed…?" To be intrigued with newly revealed possibilities and to take the risk of exploring.

We often say in RosBREED that use of DNA information enhances efficiency, accuracy, speed, and creativity of breeding. What do we mean here by "creativity?" How do breeders like you regard creativity? This article explores the idea of rosaceous crop breeding as a fundamentally creative enterprise and that breeding creativity can be enhanced with DNA-based diagnostic tools and knowledge.

Read more at: www.rosbreed.org/breeding

Community Events

National Association of Plant Breeders

Pullman, WA

27-30 July 2015

Conference website: *http://bit.ly/1xnL0Qp*

ASHS Symposium

From Wild Germplasm to Molecular Tools for Applied Breeding: Black Raspberry as a Case Study

New Orleans, LA,

3 August 2015, 9 am - 4:30 pm

Contact: Jill Bushakra (*Jill.Bushakra@ars.usda.gov*) or Nahla Bassil (*Nahla.Bassil@ars.usda.gov*) with any questions.

ASHS Annual Meeting

New Orleans, LA

4-7 August 2015

For more information: *http://bit.ly/1IsVXnx*

Southeast Fruit Professional Workers' Meeting

Montgomery, AL

6-8 October 2015

For more information contact Elina Coneva (edc0001@auburn.edu).

Coming up in the next issue:

- Meet new members of the Advisory Panel
- Jewels in the Genome focus on more Rosaceae crops
- New DNA Test Cards
- Meet project members: DNA-Informed Breeding Team
- What will be the next Rosaceae Nemesis? Read next quarter's Newsletter to find out!

RosBREED Newsletter Staff:

Editor-in-chief: Mercy Olmstead, RosBREED Extension Team Leader

Design: UF-IFAS, Gainesville, FL

Contributing editors: David Karp, David Eddy, and Cameron Peace

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