

RosBREED: Transferring Marker Assisted Breeding Capabilities to the Public and Private Community of U.S. Rosaceae Breeders

Cholani Weebadde, Extension Team Leader, MSU



Outline of Presentation

- Currently available community resources through RosBREED
 - Standard phenotyping protocols
 - Pedimap
- Ways to connect with RosBREED







Standard Phenotyping protocols

Why we think Standardizing Phenotypic Protocols is important

- Phenotypic data is associated with Genotypic data for identifying Marker Trait Locations for MAB
- Associations can only be made if same protocol was used for phenotyping
- A lot of thought have been given to develop these protocols

CKK

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RosBREED

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Resources

RosBREED: Enabling markerassisted breeding in Rosaceae

RosBREED will create a national,

dynamic, sustained ... [Read More...]

Slideshow Enabling marker-assisted breeding in Rosaceae Click ... [Read More...]

Project Description

Integration of modern genomics tools with traditional breeding approaches will transform crop improvement in Rosaceae, significantly improving ... [Read More...]

Marker-Locus-Trait Associations

A marker-locus-trait (M-L-T) association is a predictive genetic marker developed for specific locus that contribute to genetic variation for ... [Read More...]

News

RosBREED releases the May issue of their newsletter (05/26/10)

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) ... [Read More...]

ASHS RosBREED Workshop has been scheduled for August 4th, 2010

RosBREED will be hosting a workshop at the 2010 ASHS Annual Conference in Palm Desert, CA. The workshop will be Wednesday, August 4th 8-10 am. For more information please visit the ASHS RosBREED ... [Read More...]

Peach genome sequence has been released!! (04/01/2010)

On 1 April 2010 at 9 pm PST, the peach genome sequence was released on GDR. Please visit this website for more information. ... [Read More...]

Welcome to the RosBREED Project

SEARCH

Funded by the 2009 USDA NIFA Specialty Crops Research Initiative, RosBREED will create a national, dynamic, sustained effort in research, infrastructure establishment, training, and extension for applying marker-assisted breeding (MAB) to deliver improved plant materials more efficiently and rapidly. The Rosaceae family (including apple, peach, sweet and tart cherries, and strawberry) provides vital contributions to human health and well-being, and collectively constitutes the economic backbone of many U.S. rural communities. Rosaceae genetics and genomics are developing rapidly but have not been translated to routine practical application. [Read More...]

Highlights



▶ 00:00 00:00 ••••••••••• 53 Amy lezzoni presents at the ...

Upcoming Events

> August 4, 2010 ASHS RosBREED Workshop has been scheduled for August 4th, 2010 Palm Dessert More Info View All Events You can access these standardized phenotyping protocols by logging into our website:



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Phenotyping in Sweet Cher Videos Coming Nideos An example.... Soon.... By Blessing Athanson Associate in Research Addie Dahl Associate in-Research Nnadozie Oraguzie – PD

Amy lezzoni and Cameron Peace-Collaborators



Pedimap





www.rosbreed.org

- What is Pedimap?
- What does Pedimap Do?
- How to access Pedimap?





www.plantbreeding.wur.nl/UK/ software_pedimap.html



United States Department of Agriculture National Institute of Food and Agriculture

What is Pedimap?

- Software for exploring and visualizing the "flow" of phenotypes and alleles through pedigrees
- Developed by Roeland E. Voorrips at Wageningen UR – Plant Breeding, The Netherlands
- Freely available!

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What does Pedimap Do?

What does Pedimap Do?

- Can be used to present genetic information such as:
 - phenotypic traits
 - scored marker alleles
 - Identity-By-Descent probabilities
 - QTL functional allele probabilities



Visualizing Phenotypic Data

P Legend × Golden D Trait colors LG map IBD colors Trait: Length 23.9 High value Elstar Septer Elise Note the ****** background Missing values color 81015-045 WAGENINGENUR Rosbrei

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Identity-By-Descent (IBD)



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Visualizing Genotypic Data



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Visualizing Genotypic Data



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- Pedimap allows breeders to visualize distribution of desirable alleles for important traits across their germplasm
- →To support decisions in parent selection and crossing





Thoughts from a RosBREED Peach breeder: Ksenija Gasic....

"I put in to pedimap pedigree information (for those that I could find) of all genotypes that we have in our germplasm collection. I also created the separate file with all of the crosses I performed in last 3 years with all of their pedigree information to track what genotypes I'm using and how are they connected through pedigree. Additionally, I'm working on genes involved in drought resistance/tolerance in peach and I used pedimap to select most distant genotypes for discovery of allelic differences in promoter region"







Thoughts from a RosBREED Peach breeder Ksenija Gasic cont'd....

"I am also planning on including many of 'nuisance' or as we call it usefull data into pedimap file so I can use coloring system to visualize published data on disease resistance and some other traits of interest in my germplasm to help me decide in creating next year breeding plan."





Thoughts from a strawberry breeder: Jim Hancock



"I will find Pedimap most useful in parent selection. Not only can I pick out the individuals with the most complementary traits but also the ones that are the most diverse. Currently, I stare at spread sheets for hours making these decisions."

We hope you will also benefit from the use of Pedimap







How Can You Get Pedimap?

How Can I Get Pedimap?

• Step 1: Go to website

www.plantbreeding.wur.nl/UK/software_pedimap.html

- Step 2: Read webpage – interesting stuff!
- Step 3: See below first paragraph —

ROSBRI

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Pedimap

Software for the visualization of genetic and phenotypic data in pedigrees

Roeland E. Voorrips, Wageningen UR – Plant Breeding

Pedimap is a tool for exploring and visualizing the flow of phenotypes and alleles (observed or based on Identity-by-Descent calculations) through pedigrees. It has tools for the manual and automatic selection of parts of the pedigree based on criteria such as ancestors and/or progeny to a specified number of generations, along the maternal, paternal or both lines, sibs etc. For each selection multiple views can be generated to display different linkage groups, phenotypic traits etc. Once a view is created for one selection, it can be automatically recreated for any other selection. Pedimap can deal with numeric as well as textual phenotypic scores, and with polyploids as well as diploids. The genetic information can be displayed according to genetic linkage maps, hence the name.

Pedimap is available for the Windows platform (all 32-bit or 64-bit versions, Windows98 up to Windows7). Pedimap can be downloaded here.

"Pedimap can be downloaded here"





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How Can I Get Pedimap? cont'd Pedimap

Software for visualization of genetic and phenotypic data in pedigrees

Download & Installation instructions

You can download Pedimap by clicking this link. Installation is simple: just copy all files from the downloaded zip file to any directory on your PC.

How to obtain a licence

Pedimap can be used, with limitations, without a license. However, a free, personal license can be obtained here. The license file will be send to you by email. To unlock all Pedimap features, simply copy the license file to the same directory where you installed Pedimap and restart the program.

Step 7 (final) -

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www.plantbreeding.wur.nl/UK/software_pedimap.html



Rosbreed

Community breeders under the "Breeding" menu item that will also take you to the Pedimap software.

We do have a link for

Community Breeders

About -

Welcome to Community Breeders: the community of Rosaceae breeders (publ

Socio-economics

<u>Software</u>

Home

An introduction to PediMap software, used to visualize breeding data across pedigrees, will be provided at the 2010 American Society for introductural Science annual conference. Currently, RosBREED's 12 demonstration breeders are using PediMap (click here for more information regarding this software and to request a free copy). Further details coming soon.

News

Resources -

Marker-assisted breeding (MAB) information

RosBREED's Project Director, Dr. Amy lezzoni, has starte

Breeding -

- Her first feature piece describes a gene that influence
- Sweet cherry fruit size and firmness

Molecular short course announcements

Title: Molecular Plant Breeding - An International Short

Course Dates: August 29-September 3, 2010

Organized by: Michigan State University Plant Biotechne and the Plant Breeding and Genetics Program and Dr. C outreach team leader.



We also have Dr. Umesh Rosayro who will be able to answer your questions on any statistical issues and software

ure

What other new features are coming up in RosBREED years 3 and 4?

- Participatory workshops (year 3 & 4)
- Regional workshops (year 4)

To learn what MAB applications and databases are working well for us, you are welcome to participate in these workshops that will happen near you....





RosBREED Extension Outreach Team



Cholani Weebadde Role: Extension Team Leader



Michael Coe Cedar Lake Research LLC Role: External evaluator





Dorrie Main Area of interest: Bioinformatics Role: RosBREED website



Greg Reighard

lexandra Stone : PBG Works websit













Who we are:

Cholani Weebadde, Michigan State Univ. Michael Coe, Cedar Lake Research LLC Carlos Crososto, UC Davis Gennaro Fazio, USDA-ARS (Cornell Univ.) Karina Gallardo, Washington State Univ. Amy lezzoni, Michigan State Univ. Jim McFerson, Washington Tree Fruit Commission **Dorrie Main**, Washington State Univ. **Cameron Peace**, Washington State Univ. Greg Reighard, Clemson Univ. Audrey Sebolt, Michigan State Univ. Alexandra Stone, Oregon State Univ. Kenong Xu, Cornell Univ.

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Participatory workshops in 2012 and 2013

 We will have a total of 9 Participatory workshops to share the successful MAB applications of our Demonstration Breeders

> Locations: New York, Michigan, South Carolina, Arkanzas, Texas, California, Washington, Minnesota, and New Hampshire





Regional Workshops in 2013

- We will also have **4 Regional workshops** organized by four of or regional extension specialists to provide training on MAB:
 - Carlos Crisosto California (Univ. of Calif. Davis)
 - Karina Gallardo Washington (Wash. State Univ.)
 - Greg Reighard South Carolina (Clemson Univ.)
 - Kenong Xu New York (Cornell Univ.)

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

May 28, 2010

Volume 1 Issue 2

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 we were fortunate to meet and interact with 21 of our AP members in San Diego in January at RosBREED I, some of our AP members were not able to attend this meeting. Considering the participation of our AP members and Co-PDs at the 2010 International Fruit Tree Association (IFTA) meeting in Grand Rapids, Michigan, we met over dinner on to interact with our AP members who were not in San Diego and visit again with those who were present at 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.



After carefully reviewing the IFTA schedule, we realized the only time available to meet was over dinner. Pictured from left to right Gennaro Fazio, Brian Sparks, Lailing Cheng, Amy lezzoni, Jim McFerson, Bill Dodd, Cholani Weebadde, and Audrey Sebolt.



We even taked as we were passing each other in the hall way between sessions at IFTA. Pictured from left to right: Greg Reighard, Brian Sparks, Amy lezzoni, Audrey Sebolt, and Jim McFerson.

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RosBREED Quarterly Newsletter

The easiest way to find out the latest information on RosBREED and what is happening near you.

<u>Acknowledge two of</u> <u>our AP members:</u>

David Karp Brian Sparks

For their interest and time in reviewing the Newsletters

Summary

We hope RosBREED's outcomes will benefit you

RosBREED Newsletter - Latest success stories and what applications are ready for testing

If you'd like to receive the RosBREED newsletter, please meet me after this talk and provide your email address





Acknowledgements



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For quality of life

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United States Department of Agriculture National Institute of Food and Agriculture This project is supported by the Specialty Crops Research Initiative of USDA's National Institute of Food and Agriculture





Project meetings and workshops

Timeline	Meeting	Location	Target Audience	Theme
YR 1	RosBREED I	San Diego, CA Jan 7™ – Jan 8™, 2010	RosBREED Participants, Advisory Panel Members, & Collaborators	RosBREED Orientation & Planning
	SNP Summit	Seattle, WA May 2010	RosBREED Genomics team participants & Collaborators	Design genotyping platforms in coordination with international partners.
	ASHS	Palm Springs, CA August 2010	Non-core breeders & local AP Members	RosBREED Introduction to non-core Rosaceous crop breeders
YR 2	RosBREED II	East Lansing, MI Week of March 3 rd , 2011	RosBREED Participants, Advisory Panel Members, & Collaborators	 Breeding teams perform data analysis. Overview of RosBREED goals, accomplishments, deliverables to date. •Feedback from AP Members & Collaborators
YR 3	RosBREED III	East Lansing, MI Week of March 5 th , 2012	RosBREED Participants, Advisory Panel Members, & Collaborators	 Breeding teams perform data analysis. Overview of RosBREED goals, accomplishments, deliverables to date. Feedback from AP Members & Collaborators
	Participatory Workshops	4 locations* 2012	Core and non-core breeders Local Advisory Panel Members	Assist in MAB adoption by breeders Stakeholder education
YR 4	RosBREED IV	TBD 2013	RosBREED Participants, Advisory Panel Members, & Collaborators	 Breeding teams perform data analysis. Overview of RosBREED goals, accomplishments, deliverables to date. Feedback from AP Members & Collaborators Final recommendations and program evaluation
	Participatory Workshops	5 locations* 2013	Core and non-core breeders Local Advisory Panel Members	Assist in MAB adoption by breeders Stakeholder education
	Regional Workshops	NY, SC, WA, CA 2013	Regional extension specialists. Non-core breeders Industry representatives	MAB training Technology transfer Engage stakeholder community

* Participatory workshops will be located in NY, MI, SC, AR, TX, CA, WA, MN, and NH.