

## Participation:

The symposium is open to MSU faculty, staff, graduate students and undergraduates, as well as members of neighboring institutions and the community. There is no registration fee or requirement for preregistration.

## Webinar:

The symposium will be broadcasted online for viewing. Register for the Webinar at <http://goo.gl/MZauMw> or by scanning the QR code:



## Poster Session:

### *Prizes for best posters!*

A poster session and open reception for the speakers will immediately follow the talks in the MPS atrium. Light refreshments will be served. Those who wish to present a research poster (4'X 4') are invited to do so. Graduate students and faculty associated with PBGB are particularly encouraged to participate. Please **register** for the poster session here: <http://goo.gl/6Ffa6X>



## Student Luncheon:

Plant Breeding, Genetics, and Biotechnology and Genetics Program graduate students who would like to participate in the luncheon with the speakers please **RSVP** by email to Shelly Redman at: [bakermi@msu.edu](mailto:bakermi@msu.edu)

## Sponsorship

The PBGB program wishes to acknowledge support for the symposium from Dow AgroSciences and MSU AgBioResearch.

## Contact Information:

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## Schedule:

**9:00 – 9:10**

Welcome – Dave Douches – Director PBGB

**9:10 – 10:00**

**Dr. Hiro Nonogaki** – Oregon State University

“Transcriptional and Post-transcriptional Regulation of Gene Expression Associated with Hormone Signaling in Seeds.”

**10:00 – 10:30**

Break

**10:30 – 10:40**

Welcome – Doug Buhler – Assoc. Director, AgBioResearch

**10:40 – 11:30**

**Dr. Kristin Mercer** – The Ohio State University

“Evolutionary Ecology Of Seeds In Crop-Wild Hybrid Zones.”

**11:30 – 1:30**

Lunch

**1:30 – 2:25**

**Dr. Chris Richards** – US National Center for Genetic Preservation

“Genetic Dynamics in Conservation Collections”

**2:30 – 3:20**

**Dr. Oswald Crasta** - Leader, Genomics Assisted Breeding, Dow AgroSciences

“Next-generation breeding”

**3:30 – 5:30**

Reception and Poster Session – MPS Atrium

## Interdepartmental Graduate Program in Plant Breeding, Genetics & Biotechnology

# *Symposium 2013*

# Genetics of Seed Quality, Germination & Evolution.

Friday December 13, 2013

Room 1200 Molecular Plant Sciences Building

9 AM to 4 PM



MICHIGAN STATE UNIVERSITY

## Invited Speakers:

### Dr. Kristin Mercer

Department of Horticulture and Crop Science  
Ohio State University

“Evolutionary ecology of seeds in crop-wild hybrid zones”

The study of gene flow and introgression between crops and compatible wild relatives deepens our understanding of how crop genetics influence the characteristics and evolution of wild populations. Although we might expect selection against various crop traits in hybrid zones, in some species or environments particular crop alleles will be advantageous and crop allele introgression is expected. We explored this process with crop and wild sunflower, which has a high chance of crop allele introgression since crop-wild hybrids can survive and reproduce. Differentiation between the crop and wild relatives for seed and early life history traits make them ripe for study due to their important effects on fitness. I will discuss a combination of laboratory and field studies that used a range of hybrid crosstypes. As a group, they help us discern how seed and early life history traits are influenced by the genetic contributions of both parents and by the unique maternal genetic effect and how these traits may influence lifetime fitness under field conditions.

### Dr. Chris Richards

US National Center for Genetic Preservation  
"Genetic Dynamics in Conservation Collections"

The National Center for Genetic Resource Preservation is charged to acquire, evaluate, preserve and provide a national collection of genetic resources in order to secure the biological diversity that underpins a sustainable U.S. agricultural economy. Through diligent stewardship, research, and communication, genetic resources for a wide range of plants of importance to U.S. agricultural production are housed and maintained in a network of facilities across the U.S., and integrated with other collection organizations across the world.

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The mission of the Plant Germplasm Preservation Unit is basic and applied research with the ultimate goal of improving the long-term preservation of all forms of plant germplasm, including developing basic information on deterioration/degeneration of plant germplasm, including longevity and genetic stability under various storage conditions. A number of considerations for germplasm preservation require precise genetic understanding, however much of the underlying genetic structure of populations in the collection are not well understood. Thus, much of my work involves characterization of genetic diversity and population structure in a number of key species where genetic inference can help to better select and manage collections efficiently.

### Dr. Oswald Crasta

Leader, Genomics Assisted Breeding, Dow AgroSciences  
"Next-generation Breeding"

Historical demands for food, fiber, and fuel continue to be satisfied by a wide range of public and private activities, however challenges in meeting future demands from increased population and climatic variability pressures require continued focus on traditional and new approaches in understanding and improving the delivery of germplasm that meets needs of consumers. In the private sector, integration of the tradition role of plant breeding with the necessity to produce populations and characterize phenotypes more efficiently has used developments of doubled haploids for the rapid construction of segregating populations in maize, expansion of capacity to phenotype these populations, and development of markers and now genome technologies to assist in the decision making process. Computational needs to process and analyze data are pressing, and some of the ways these can and are being addressed in a practical fashion to meet industry and society demands has been the focus of my work. The need for new scientists trained in these next-generation breeding technologies is growing, and their contributions to increased efficiencies in genetic improvement of crops will be required to meet future demands and challenges.

### Dr. Hiro Nonogaki

Department of Horticulture,  
Oregon State University

“Transcriptional and Posttranscriptional Regulation of Gene Expression Associated with Hormone Signaling in Seeds”

Seed germination is an essential event for the embryo to grow into a new plant. However, this event is often suppressed in mature seeds even under the conditions favorable for germination, which is known as seed dormancy. Plants have evolved multiple layers of physical, physiological and molecular repressions to prevent germination to ensure successful seed dispersal and timely germination under natural environments. The strategies of seeds include repression of gene expression at the transcriptional level, which is typical of ABA and GA metabolism genes. In contrast, key factors involved in hormone signaling are regulated at the posttranscriptional (mRNA destabilization by microRNA) or posttranslational level (protein degradation by the ubiquitin and the 26S proteasome pathways). In this Plant Breeding, Genetics and Biotechnology seminar, molecular repression and de-repression events associated with hormonal regulation of seed development and germination will be discussed. Discussion will also include potential translation of the basic knowledge into breeding and biotechnology programs.

