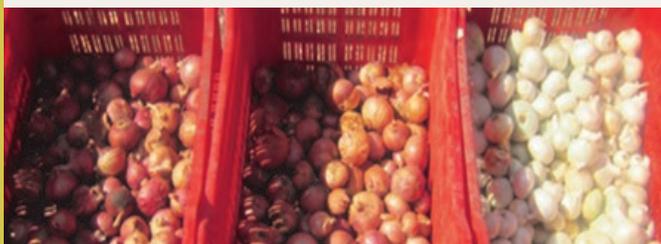


Our Competencies and Expertise

Michigan State University is recognized as a center of excellence in training and capacity building nationally and internationally. Course instructors are drawn from Michigan State University's Plant Breeding and Genetics Program. In addition, molecular plant breeding specialists from private seed companies, government research institutes, and international agricultural research centers will be invited as resource faculty.

Our training team has strong expertise and practical experience in all aspects of biosafety and biotechnology. Members of our training team have participated and conducted a number of training programs in both local and international settings.



Organized by

World Technology Access Program (WorldTAP)
in collaboration with
Plant Breeding, Genetics and Biotechnology Program
at Michigan State University



World Technology Access Program

<http://worldtap.msu.edu/>



For Registration and Information

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Application Deadline:
July 15, 2014

Course Fees per Participant

Registration Fee: \$ 250
(non-Refundable)

Course Fee: \$ 3,750

Course fee includes:
instruction fee, course materials, local transportation,
meals, and lodging in East Lansing, Michigan, USA.

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Michigan State University

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MICHIGAN STATE
UNIVERSITY



Marker-assisted Breeding

Using DNA Information to
Improve Crops

August 17-22, 2014

Course Rationale >>>

With a world population projected to be over 9 billion in 2050, there is an urgent need for enhancing agricultural production to ensure food security and increase income of the rural poor. Due to a variety of abiotic and biotic stresses such as drought, insect pests and disease problems as well as weeds and poor plant nutritional conditions, most crops do not reach their full potential in the farmers' fields. Plant breeders can play a significant role in developing newer varieties that can combat the various biotic and abiotic limitations. To the resource poor farmers especially in the developing world who depend on rain-fed cultivation and cannot afford chemical pesticides or fertilizers to increase the yield potential of their crops, access to newer and better yielding varieties may remain the only available option.

However, in order to develop newer and higher yielding varieties faster, it is important that a plant breeder has the skill set and access to existing and new biotechnological tools such as marker assisted breeding approaches, which are currently being used extensively by breeders in the developed world to increase the efficiency of breeding programs. Often in the developing world, however, these new tools of biotechnology fail to reach plant breeders and so fewer technological advances are applied in the farmers' fields. We believe that this gap can be bridged through awareness and education.

>>> Course Description

Marker assisted breeding (MAB) is an approach where genetic markers (usually DNA based markers) are used to monitor the presence of desirable and undesirable genes in breeding plants. Therefore, based on the information provided by the genetic markers, breeders will only need to field test those breeding plants that are most likely to have desirable traits, a great cost saving especially when breeding perennial crops.

The use and integration of genetic markers need well-trained human resources with practical experiences in various aspects of molecular plant breeding. This requires training and skill development in conventional plant breeding, genetics of the inheritance of qualitative and quantitative traits, developing DNA markers for traits of interest, analyzing complex data sets using computer software programs as well as performing marker assisted selection in the field based on the results of genetic tests performed; often involving a team of experts in the various areas to assist breeders in their decision-making process. However, for a plant breeder to reap the benefits of the marker technology,



he/she should understand the various steps involved in MAB. For this, short-term awareness and educational programs can be effectively utilized.

Therefore, the Marker-assisted Breeding short course is designed to not only cover the marker technologies available to a plant breeder for crop improvement but also to provide hands-on experience in the use of computer software programs for developing markers for traits of interest. Through a participatory approach, the course also fosters linkages and opportunities for networking among participants often leading to collaborative projects.



Course Components

- ◆ History of plant breeding and classical plant breeding systems
- ◆ Fundamental molecular biology techniques and marker assisted breeding
- ◆ Principles of linkage mapping
- ◆ Marker trait associations analyses for qualitative and quantitative traits
- ◆ Hands-on experience with linkage mapping software
- ◆ DNA sequencing, SNP markers and genomics guided breeding
- ◆ Principles of QTL mapping
- ◆ Hands-on experience with QTL mapping software
- ◆ Visits to plant breeding programs at MSU
- ◆ What DNA markers can do for plant breeders – examples of marker assisted breeding applications
- ◆ New tools for molecular breeding
- ◆ What it takes to move QTLs from publications to applications

