TEXAS A&M AGRILIFE RESEARCH | EXTENSION

TEXAS A&M UNIVERSITY

TEXAS A&M PLANT BREEDING BULLETIN

February 2016

Our Mission: Educate and develop Plant Breeders worldwide

Our Vision: Alleviate hunger and poverty through genetic improvement of plants

Dr. Dariusz Malinowski, Professor of Forage Agronomy, converted passion for hibiscus into part of his professional portfolio by breeding new and novel flower colors in this winter-hardy species. Although Dr. Malinowski's primary responsibilities are to develop forage systems for the semiarid environments of the Southern Great Plains, he has taken a rather unconventional professional path to the delight of flower lovers in Texas and across the globe. While introducing a new type of cool-season perennial grasses with a summer-dormancy trait in the early 2000s, he eventually converted from plant physiologist to plant breeder, successfully developing a number of breeding lines of summer-dormant tall fescue, orchardgrass, and perennial ryegrass in collaboration with Grasslands Innovation of New Zealand.

Meanwhile, he decided to create new colors in winter-hardy hibiscus plants because these beautiful, tropical-looking plants were only offered in red, pink or white, in contrast to countless colors and their combinations in the distant relative, the tropical hibiscus. Dr. Malinowski started hybridizing winter-hardy hibiscus as a hobby in 2007. His hibiscus breeding program became a part of the Strategic Program of the Texas AgriLife Research and Extension Center at Vernon in 2010. In 2012, he and his colleagues, William Pinchak

(Texas AgriLife Research) and Steve Brown (Texas Foundation Seed Service) released the first ever blue-flowering winter-hardy hibiscus, Blue Angel, creating a lot of interest from leading industry partners. Soon thereafter, they released their second cultivar, Robert Brown, the first chimera among winter-hardy hibiscuses with variable pattern of white speckles on magenta-background petals. Within the past five years, Dariusz created a number of new colors in this species, including the Aggie color – maroon, dual-colored flowers, and the newest breakthrough – the salmon color. The salmon, or light coral color is the first step in his new goal to create an orange-colored flower. He and his colleagues have disclosed over 180 winter-hardy hibiscus breeding lines to TAMUS Office of Technology Commercialization. About 60 of them are being currently evaluated by industry partners. Within 5 years, Dr. Malinowski has become one of the leading breeders of winter-hardy hibiscus. He uses traditional breeding methods based on creating as much genetic variability among the lines as possible. This has been achieved by inter-specific hybridization of four most common winter-hardy hibiscus species and/or inducing mutations. To date, the team has created and evaluated over 8,000 hybrids. You can read more about Dr. Malinowski's hibiscus breeding success at http://www.greenhousemag.com/article/blue-in-town-january-2016.

The newest winter-hardy hibiscus color, defined as salmon or light coral, was created by Dr. Malinowski in 2015.

Distance Plant Breeding Program and Continuing Education courses available for Spring 2015 (https://scsdistance.tamu.edu/available-courses/).

Continuing Education Available Courses

Spring Courses: February22 – May 11, 2016

To fully participate in our continuing education courses, students should have:

- High speed internet connection and updated browsers, including Internet Explorer and either Chrome of Firefox
- Common plug-ins (e.g. Adobe Reader, Flash Player, Virus Protection, Java, etc.)
- Speakers and Webcam with microphone
- Skype
- Ability to either scan or fax course documents to the instructor

Spring 2016

Basic Plant Breeding - Full Course (3 Units) - Cost - $679.65

January 19-May 11, 2016

Basic Plant Breeding can be taken as an entire course (all three units) or each unit can be taken individually. For participants in our Professional Certificate in Plant Breeding and Genetics, completion of all three units is required.

Unit 1 - Introduction to Basic Plant Breeding *Cost - $226.55*

January 19 – February 19, 2016 ***[CLOSED]***

Introduction to Basic Plant Breeding provides a review of plant reproduction, genetic variation, gene banks, germplasm preservation, gene segregation, the power of selection and its role in plant breeding, and an introduction to intellectual property and its role in the life of a plant breeder. This unit is designed to prepare the participant to explore the genetics and methodologies employed by plant breeders of self and cross pollinated crop species in units two and three of Basic Plant Breeding.

Unit 2 - Breeding Self Pollinated Crops *Cost - $226.55*

February 22 – April 1, 2016

The frequency of any specific heterozygous locus will be reduced by 50% for every generation of selfing, resulting in a mixture of homozygous lines within any natural population. Phenotypic selection within heterozygous generations will lead to homozygous or near homozygous germplasm lines or cultivars under self-pollination. This unit is designed to communicate plant breeding methodologies that take advantage of the genetic consequences of natural or forced self-pollination in agronomic crops. Topics will include: [1] the basics of segregation, [2] breeding methodologies, [3] the grain sorghum conversion program-an example of backcrossing in a different direction, [4] review of a commercial soybean cultivar development program, and [5] a review of the types of genetic releases from Texas A&M AgriLife Research.

Unit 3 - Breeding Cross Pollinated Crops *Cost - $226.55*

April 1 – May 11, 2016

Topics covered include: quantitative genetics and plant breeding, effects of selection on Hardy Weinberg Equilibrium, mating designs with cross pollinated crops, breeding methods for cross pollinated crops, deviations from Mendelian ratios, genetic male sterility and hybrid seed production, seed certification and types of release.

Recommended textbooks are “Breeding Field Crops” by J.M. Poehlman and D.A. Sleper, and “Principles of Cultivar Development” by W.F. Fehr. A final exam will allow the participant to assess their grasp of topics covered. Participants in the Plant Breeding and Genetic Certificate Program must score 70% on the final exam for each unit.

This is a "self-paced" course and is available for viewing for a limited time. Time commitment is individual student driven. Few outside assignments are made. Students should view each lecture, review all previous lectures and be prepared to discuss any issues that are unclear. Each unit has a printable note set and most units have a set of review questions that can be used as a tool to check your comprehension and grasp of unit concepts. Feel free to contact the instructor, Dr. Wayne Smith, by e-mail (cwsmith@tamu.edu) or phone (979-845-3450) with any questions you have or if you need additional information.

Analysis of Complex Genomes – Full Course (3 Units) – Cost - $679.65
January 19-May 11, 2016

Genome structure, organization and function of model organisms and higher eukaryotes; theory and methodology of genetic and physical mapping, comparative genomics, sequencing, sequence analysis and annotation; emphasis on understanding the function of complex genomes, genome-wide expression analysis, genetic and epigenetic mechanisms; X-inactivation, imprinting, gene silencing, transposons, genome duplication and evaluation. Requires an in-depth and working knowledge of basic and advanced plant breeding concepts.

Unit 1 – DNA Marker Technology and Genetic Mapping *Cost - $226.55*
January 19 – February 19, 2016 ***[CLOSED]***

Unit 2 – Recombinant DNA and Cloning *Cost - $226.55*
February 22 – April 1, 2016

Unit 3 – Sequencing Genomes and Other Genomic Tools *Cost - $226.55*
April 1 – May 11, 2016

Intellectual Properties in the Plant Sciences - Full Course (3 Units) - Cost - $679.65
January 19-May 11, 2016

This course introduces the major foci of intellectual property (IP) impacting plant sciences, including: 1) traditional vs. emerging knowledge economies, 2) governing U.S. statutes and international treaties, 3) forms of IP protection, and 4) IP asset identification, valuation, capture, and deployment towards an understanding of best practices for the development of effective IP strategies and management of IP portfolios.

Unit I - Introduction to Intellectual Property, International Treaties and Patents *Cost - $226.55*
January 19 – February 19, 2016 ***[CLOSED]***
Unit I of the Intellectual Properties in the Plant Sciences Course. Topics covered include: IP Culture and the Knowledge Economy, Traditional Knowledge vs. Biopiracy, Sui generis Systems, International Treaties, Overview of Patentability, Utility Patents, and Plant Variety Patents.

Unit II - Intellectual Property Documentation *Cost - $226.55*
February 22 – April 1, 2016
Unit II of the Intellectual Properties in the Plant Sciences Course. Topics covered include: Trademarks, Copyrights, & Trade Secrets; USPTO; Inventorship, Ownership, Compensation, IP Training; Confidential Information; IP Audit; IP Value; Competitive Intelligence; Cyberspace – IP and IT Cooperation.

Unit III - Intellectual Property Transfer and Enforcement *Cost - $226.55*
April 1 – May 11, 2016

Unit III of the Intellectual Properties in the Plant Sciences Course. Topics covered include: Intellectual Property Transfer and Enforcement, IP Case Studies, IP Portfolio, IP Strategy and Leveraging IP Value.

Other Academic and Continuing Education courses in plant breeding and related disciplines that will be available during other semesters include Host Plant Resistance; Crop Production; Selection Theory; Marker Assisted Selection; Genomic Analysis; Field Crop Diseases; Field Insects; Essential Nutrients in Crop Growth; and others. For more information visit https://scsdistance.tamu.edu/ or contact LeAnn Hague, Distance Education Coordinator in Soil and Crop Sciences at leann.hague@tamu.edu or (979)845-6148.

Distance Plant Breeding

M.S. and Ph.D. degree programs at Texas A&M.

Visit https://scsdistance.tamu.edu/plant-breeding-distance-education/ for details.

Please direct comments concerning this bulletin to Wayne Smith, cwsmith@tamu.edu or 979.845.3450.