

TEXAS A&M PLANT BREEDING BULLETIN

April 2017

**TEXAS A&M UNIVERSITY--EDUCATING AND DEVELOPING PLANT BREEDERS
WORLDWIDE TO ALLEVIATE HUNGER AND POVERTY THROUGH GENETIC
IMPROVEMENT OF PLANTS**

It's a pleasure to feature one of our former PhD students who has demonstrated already considerable success in the plant breeding world. Jenny Clement Koebernick joined the cotton breeding project led by Dr. Steve Hague in 2006 and received her PhD in Agronomy in 2010 (with considerable course work and research in the area of plant breeding). Dr. Koebernick then accepted a post doctoral position in cotton breeding with Dr. Greg Constable with the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Narrabri, Australia. Jenny worked in the area of variety development, concentrating on yield potential with improved fiber quality. Dr. Koebernick accepted a position as Assistant Professor, cotton and soybean breeding, at Auburn University in 2016.



I asked Dr. Koebernick to share with us what she considered keys to her success. Her response below is insightful and reflects proven soft skills from which all students and career professionals of all ages can profit.

“Things I consider contributed to my success...

First, would be recognizing opportunities and not letting failures define me. I was rejected from pharmacy school after my Bachelor's degree and that rejection led to an opportunity to pursue a Master's degree in a discipline that I knew little about, cotton physiology. I went to my first Beltwide Cotton Conference in 2006, and realized that to be at the researcher level I had to obtain a PhD. While I enjoyed physiology, I became interested in plant breeding because it gave a tangible output for the grower. I was rejected by three universities for PhD assistantships before landing on my feet at Texas A&M. I struggled in the conversion from physiology to breeding, as my previous degrees were in general biology and physiology with no plant breeding or genetics classes. Thus, my major shifted to Agronomy although I managed to include a number of breeding related courses. Along the way, an opportunity presented itself in Australia with Dr. Greg Constable. I knew nothing of the program other than that I had cited Dr. Constable in my Master's thesis and had met him at the World Cotton Conference early in my PhD career. However, it was Australia, and being the adventurous type, I accepted the opportunity to move across the world, away from friends and family, to learn more about cotton breeding, and in the end, gain confidence in my breeding abilities. I loved my work at CSIRO and would have remained in Australia but that opportunity did not materialize. Instead, a position opened up at Auburn University in a program that would give me the opportunity to diversify and focus on not only cotton but also soybean. I believe my diversity in disciplines, production systems on two continents, along with my proven adaptability, got me an interview and so here I am, eight months in, preparing field trials for this year and gaining experience in another crop.

The second item that contributed to my success would be my mentors. I guess it all started with my Dad who instilled my work ethic and the belief that you only achieve success by hard work. He told me once, “not to settle but to be the one in charge” and that advice has stuck with me through the years. My Masters professor, Owen Gwathmey, taught me how to do good science. He helped me develop my own writing style and got me started on my professional path. I knew I wanted more after my Masters and Owen encouraged me every step of the way. My PhD advisor, Steve Hague, gave me the opportunity to obtain a PhD, he taught me to work hard and to believe in myself. Both Owen and Steve came to visit me in Australia, which was super cool and I still call them with questions. The last mentor and probably the most influential in terms of cotton breeding was Greg Constable. I knew that he was a physiologist by trade and had switched over to breeding during his career, just as I had done. After meeting him in 2007, I told Steve Hague that if I had the opportunity for a post doc then my ideal one would be with Dr. Constable and in 2010, that goal came true. My experiences working with Greg were fun and fascinating; he taught me not only cotton breeding but also how to treat people. He took the time to answer my questions even when they were silly and he was a true mentor. Greg taught me to approach research questions differently and to think outside the box. He also made me write about my research, which contributed to being hired at Auburn. I published ten papers and had two children within a four-year span; it took a lot of hard work.

I want to finish with one more item that I’ve learned along the way and will be applying to my breeding program. Open communication is so important with not only your technician and your work colleagues but also fellow breeders and others in the industry.

This evolves into teamwork and synergy; one person cannot solve the breeding issues that the US commodities face. So if you are starting a new project, give another breeder or faculty member a call. See if they have the equipment or protocol already worked out that you need. There is no need for the both of you to be working on the exact same problem; collaborate and make it mutually beneficial. As a team, we can work together, gather resources, face problems head on, and make improvements at a more rapid pace. With that being said, consider this fair warning that you may hear from me one day; several cotton and soybean breeders already have. And at the end of the day, it's about the grower; with me I have always had their best interest at heart."



Welcome to the professorial ranks Dr. Koebernick. It's obvious that cotton has become a part of your moral fiber and we look forward to watching a terrific and productive career unfold. Thank you for sharing these valuable insights.

Meetings of Interest
Meetings of Interest

National Association of Plant Breeders, NAPB

will hold their annual meeting at the UC Davis Activities and Recreation Center August 7 – 10, 2017. More information will be available soon at <https://www.plantbreeding.org>.

American Society of America, Crop Science Society of America, and Soil Science Society

of America will host more than 4,000 scientists, professionals, educators, and students at the 2017 International Annual Meeting, "Managing Global Resources for Secure Future," October 22 – 25, 2017 in Tampa Florida. Additional information at <https://www.acsmeetings.org/>.

Dupont Plant Sciences Symposia events for 2017.

Additional information can be found at

<https://www.pioneer.com/home/site/about/research/PlantSciSymposiaSeries/>.

[University of Missouri, February 2](#)

[Texas A&M University, February 16](#)

[University of Minnesota Production Agriculture Symposium, Feb 22](#)

[Iowa State University, March 3](#)

[Cornell University, March 10](#)

[University of Nebraska - Lincoln, March 14](#)

[Washington State University, March 17](#)

[University of Minnesota, March 23-24](#)

[University of Saskatchewan, March 31-April 1](#)

[*Kansas State University, April 7](#)

[University of Florida, April 13](#)

Huazhong Agricultural University (China), April 17

University of California - Davis, April 21

University of Georgia, May 9

University of California - Berkeley, June 2

*** Event receives sponsorship support but is not officially part of the series**

Distance Plant Breeding at Texas A&M

Distance Plant Breeding at Texas A&M

Distance Plant Breeding Program and Continuing Education courses available for Fall 2017

(<https://scsdistance.tamu.edu/available-courses>)

Continuing Education

Available Courses

Summer Courses: May 22 – September 1, 2017

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

- High speed internet connection and updated browsers, including Internet Explorer and either Chrome or Firefox
- Google Chrome or Mozilla 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

Summer 2017

Plant Breeding Fundamentals – Full Course (3 Units) – Cost \$679.65

May 22 – September 1, 2017

Introduction to the field of plant breeding for students without a plant breeding background.

Includes common plant breeding terminology and introduction of concepts. Genetic improvement of crops by hybridization and selection; special breeding methods and techniques applicable to naturally self-pollinated, cross-pollinated and asexually reproduced plants. Course topics: Botany and genetics; Evaluation of Populations; Manipulation of Populations; and Plant Breeding Systems.

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

May 22 – September 1, 2017

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

May 22 – June 23, 2017

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*

June 26 - July 28, 2017

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*

July 31 - September 1, 2017

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 info

Fall Courses: August 28 – December 15, 2017

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

- High speed internet connection and updated browsers, including Internet Explorer and either Chrome or Firefox
- Google Chrome or Mozilla 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.

Fall 2017

Plant Breeding Fundamentals – Full Course (3 Units) – Cost \$679.65

August 28 - December 15, 2017

Introduction to the field of plant breeding for students without a plant breeding background.

Includes common plant breeding terminology and introduction of concepts. Genetic improvement of crops by hybridization and selection; special breeding methods and techniques applicable to naturally self-pollinated, cross-pollinated and asexually reproduced plants.

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

August 28 - December 15, 2017

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

August 28 – September 29, 2017

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*
October 2 – November 3, 2017

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*
November 6 – December 15, 2017

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.

Advanced Plant Breeding - Full Course (3 Units) - Cost - \$679.65
August 28 - December 15, 2017

Expectations of genetic improvement for different plant breeding methods; relative efficiency for crops of different reproductive mechanisms; genetic variances, covariances and genotype-environment interaction components of variance used in planning selection procedures. Advanced 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 - Advanced Genetic Principles in Plant Breeding

August 28 – September 29, 2017

Topics covered include: Hardy Weinberg, means and variances, covariances and heritability, mating designs, genetic diversity.

Cost - \$226.55

Unit 2 - Selection: Theory and Practice in Advanced Plant Breeding

October 2 – November 3, 2017

Topics covered include: recurrent selection, inbred line selection and testcrossing, selection environments, indirect selection, multiple trait selection, QTL MAS, heterosis and hybrid prediction.

Cost - \$226.55

Unit 3 - Statistical Tools in Advanced Plant Breeding

November 6 – December 15, 2017

Topics covered include: statistical concepts review, expected mean squares and combined analysis, GxE interactions and stability analysis, polyploidy.

Cost - \$226.55

Experimental Designs in Agronomic Research - Full Course (3 Units) - Cost - \$679.65

August 28 - December 15, 2017

Teaches fundamental principles and procedures of experimental designs in agricultural sciences. Emphasis includes factorial designs, predicting outputs, use of covariance, and balanced and unbalanced experimental designs as related to common agricultural research projects under field, greenhouse or growth chamber culture. Students will become familiarized with computer programming of common statistical software. Experimental Designs in Agronomic Research 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 - Factorial Experimental Designs in Agronomic Research

August 28 – September 29, 2017

Topics covered include: Fundamentals of agricultural research methodology and methodology, basic statistical concepts for testing of hypothesis, introduction to simple computer statistical software programs and applications, complete randomized design, randomized complete block design, and Latin square design.

Cost - \$226.55

Unit 2 - Factorial and Unbalanced Designs in Agronomic Research

October 2 – November 3, 2017

Topics covered include: Split-plot and split-split plot designs, nested designs, variance analyses, interactions with years and locations, comparisons of paired and grouped mean, estimation of missing values, the general linear model, and planned incomplete block design.

Cost - \$226.55

Unit 3 - Correlation, Regression, Covariance, and Biplot Analysis in Agronomic Research

November 6 – December 15, 2017

Topics covered include: Correlation, regression, path coefficient analysis, covariance analysis, nearest neighbor analysis, augmented designs and moving means and analysis, database management, biplot analyses.

Cost - \$226.55

This is a "self-paced" course and is available for viewing for a limited time. Time commitment is individual student driven. 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 voiced over PowerPoint video lectures.

Distance Degrees in 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.