



April
May
June
2017

The Department of Plant and Soil Science NEWSLETTER

this issue

Top Story **P.1**

Research & Grant Update **P.2-3**

Student & Staff News **P.3**

PSS Faculty News **P.4**



PSS Greenhouse and Gardens Renovation Project

The Department of Plant and Soil Science is in the process of renovating the Horticultural Gardens at the university Greenhouse and Gardens Complex.

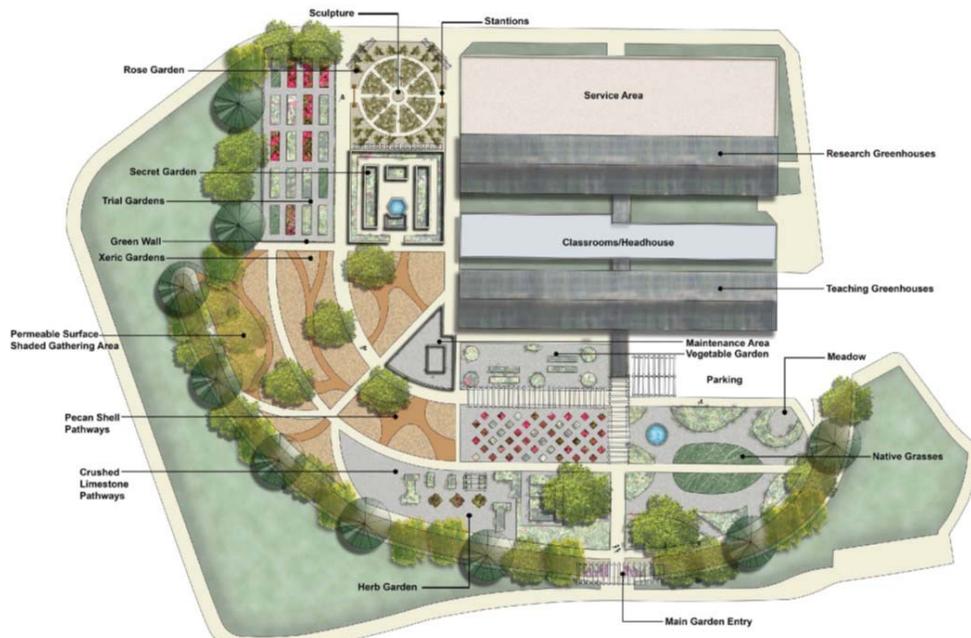
Currently, the garden is heavily utilized to provide a laboratory for our plant materials classes, as a garden resource for research trials, and as a public demonstration garden for the community. Every year, young and old alike tour our seasonal displays. The garden is also a popular place for photos on campus and scenic walks in the spring.

The renovation will include the creation of a walled "secret garden," an expanded perennials collection, a water conservation garden / xeriscape area, an outdoor wedding venue, and increased planting trial beds.

The vegetable garden, herb collection, "Earth Kind" rose collection, and annual display beds have had some upgrades over the years but still await the addition of pergolas, seating areas, upgraded walks, garden art, drip irrigation improvements and a low volume water feature. A new entrance sign, welcome area, expanded parking and windbreak enhancement round out the new garden enhancements.

You can be a part of this exciting opportunity to make the Texas Tech Greenhouse and Gardens Complex renovation dream a reality. Tax deductible donation can be made out to: Texas Tech Foundation (with PSS Gardens Renovation Project" in the memo). Or give online: www.Give2Tech.com (designate PSS Gardens Renovation Project).

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Grant & Research Update

In January, Drs. **JD Booker** and **Terry McLendon** received a research grant for \$ 199,970 from the San Antonio River Authority to continue their work on modeling the ecosystems of the San Antonio Bay and surrounding areas. This is a continuation of a project that began in 2011 and is expected to continue at least through 2018. Funding for the project has totaled \$ 982,127. The purpose of the project is to develop an EDYS ecological simulation model of the San Antonio Bay area (Fig. 1), with an emphasis on marsh and adjacent upland ecosystems. Faculty from the Departments of Natural Resources Management, Landscape Architecture, and Civil, Environmental, and Construction Engineering are also involved.

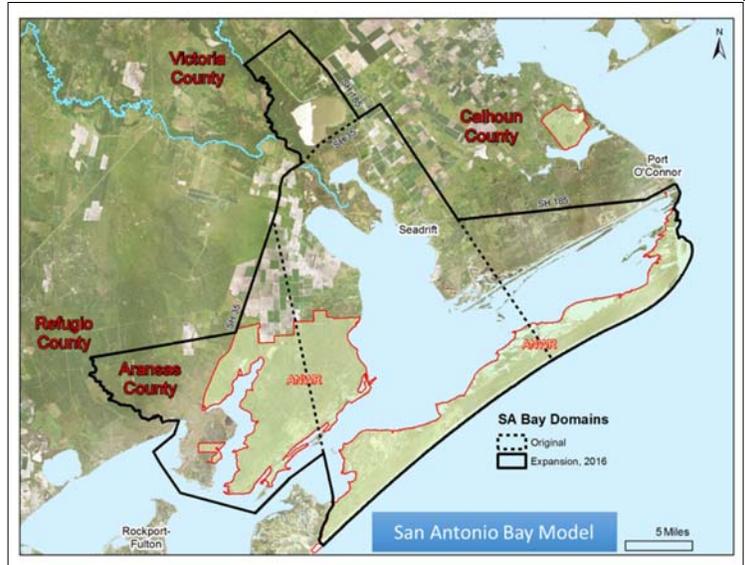
San Antonio Bay is one of six major bays along the Texas coast and is an important area for commercial and recreational fishing, birding and other environmental interests, and for coastal protection. Included in the model domain is the Aransas National Wildlife Refuge (ANWR), wintering home to the whooping crane.

The spatial domain of the model covers 417,000 acres on the central coast of Texas. This area is divided in the model into over 1 million cells, each 40 m x 40 m in size. Each cell has specific topographic, soil, and vegetation (by plant species) data. The model simulates changes in hydrology, vegetation, and animal responses based on natural and human-induced environmental changes (e.g., rainfall, tidal and storm actions, bay salinity fluctuations, fire, livestock grazing, wildlife management, succession, brush management) across this landscape.

Of particular interest to the sponsors and other model users are the dynamics of the marshes surrounding the edges of San Antonio Bay and adjacent areas (Fig. 2). Marshes are critical interfaces between the upland systems and the open bay ecosystems. They are highly productive plant communities that supply nutrients to open water systems and serve as habitats for many estuarine animals and nurseries for many open bay and gulf organisms. As part of the San Antonio Bay project, 120 permanent study plots have been established at four locations in marshes around San Antonio Bay (Fig. 3). Data are being collected annually from these plots to better understand the dynamics of these marshes and to validate the model simulations.

A major management concern for San Antonio Bay is determination of critical levels of freshwater inputs. The bay ecosystems, both marsh and open bay systems, are sensitive to salinity balances across the bay. The major freshwater input into the bay is the discharge from the Guadalupe River. However, increased water demands all along the watersheds of the Guadalupe and San Antonio Rivers can potentially decrease these freshwater flows into the bay, thereby negatively affecting the ecological balances in the bay. The model will give managers a tool which they can use to quantify the effects of increasing or decreasing freshwater flows and simulating what these effects might be on marsh and open bay organisms (Fig. 4), and thereby make better informed decisions as to water supply to the bay. The model can also be used to estimate potential impacts on the marsh ecosystems resulting from projected future climate, urbanization/development, and tidal fluctuations.

The model can be used as a management tool for a number of other tasks. One example that is included in the 2017 funding is to assist ANWR in the development of a restoration plan for a marsh ecosystem along the northwestern edge of the Refuge. The EDYS model will be used to evaluate a number of alternative scenarios including redistribution of overland water flow, re-contouring of the marsh substrate, and selection of plant species. ANWR is also interested in using the model as a decision-making tool for their prescribed fire program and to evaluate potential impacts from oil and gas development in the area.



Grant & Research Update Cont.

Drs. **Dean Ethridge** and **Noureddine Abidi**, both with the Fiber and Biopolymer Research Institute, received a new grant of \$274,999 from the Walmart Foundation. This was in addition to previous grant funding from the Walmart Foundation of \$472,564, all for the project “Foam Indigo Dyeing of Cotton Yarns: Machine Design and Process Control”. Also, Dr. Ethridge secured an additional grant in the amount of \$41,700 for this project from the VF Corporation, making total funding to date for the project \$789,263.

Indigo is the single most dominant dye used on cotton and is among the most utilized dyes throughout the world, with the greatest single use being to dye yarns for denim jeans. Motivation to fund this project is explained by the fact that it promises to greatly reduce the water, contaminants, time, labor, floor space, and expense of applying indigo dye to yarns. Therefore, it would greatly enhance the efficiency and sustainability of the largest cost component of denim fabric manufacture. Results to date indicate feasibility of a three-fold increase in throughput for the dyeing stage and a reduction in water required by more than 90%. Energy cost savings would be commensurate with the reduced water use and increased throughput.

The challenge is to determine the machine design parameters and process controls necessary for the foam application of pre-reduced indigo on yarns. Foam application of dyes to fabrics is proven in many applications, but has not been developed for indigo dyeing of yarns. Foam application of dye to yarns is distinctly different from fabrics and is technically more difficult. Of paramount importance is the unique requirement of indigo dye to achieve a soluble state only under anaerobic (oxygen-free) conditions, with the absorbed dye then being set by adequate oxidization of the indigo. Therefore, air cannot be used as the gas for generating the foam, as it is with virtually all other dyes. The project must determine the required purity of the dyeing process, the time required for adequate oxidization, the number of dyeing passes and oxidization stages for achieving desired color shading, the design and required pressure inside the foam chamber, and a multitude of other outcomes that will determine the commercial potential of foam dyeing of yarns with indigo.



PSS Upcoming Event

The **Turf Field Days** will be held on July 7th, for professionals, and July 8th for homeowners. The Field Days will be held at the Quaker Farm, look for more information and a schedule to come soon!



Faculty News

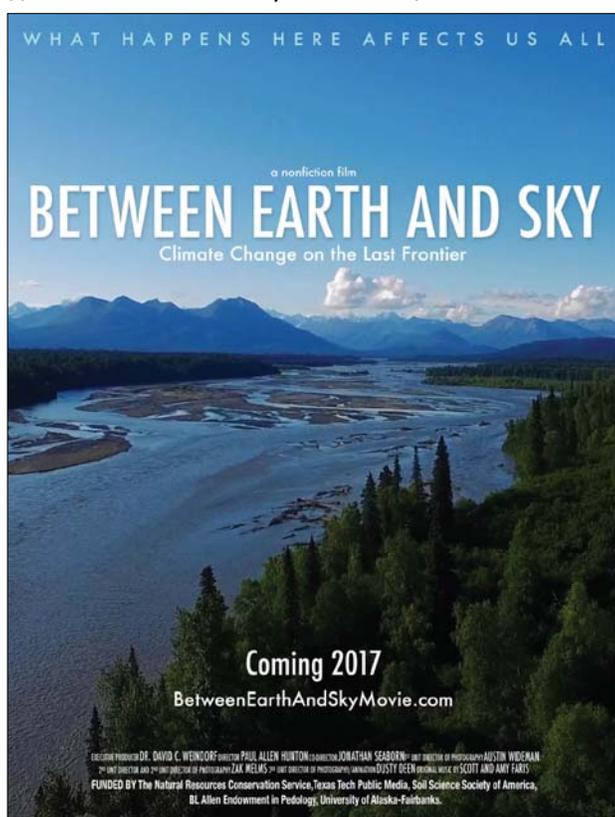
Russ Plowman delivered a paper entitled, "Efficacy of Using Pre-lab Quizzes to Improve Laboratory Performance in an Undergraduate Horticulture class," at the American Society for Horticultural Science Southern Regional Convention in Mobile, AL



Dr. **Thayne Montague** received the Miller Distinguished Teaching Award at the American Society for Horticultural Science Southern Regional Convention in Mobile, AL.

Dr. **Wenwei Xu** was elected as the Division C-8 Chair Elect for the Crop Science Society of American. His term will include chair-elect in 2018, Chair in 2019, and Past Chair in 2020.

Between Earth and Sky film has several screening dates set for 2017. You can find a list of screening dates here: <http://betweenearthandskymovie.com/>



The following presentation and publication were made during the last quarter:

- **Deb, S.**, S. Chakraborty, **D.C. Weindorf**, A. Murmu, P. Banik, M.K. Debnath, and A. Choudhury. 2016. Dynamics of organic carbon in deep soils under rice and non-rice cropping systems. Geoderma Regional 7:388-394.
- Chakraborty, S., B. Li, **S. Deb**, S. Paul, **D.C. Weindorf**, and B.S. Das. 2017. Predicting soil arsenic pools by visible near infrared diffuse reflectance spectroscopy. Geoderma 296:30-37.
- **Singh, S.**, K. J. Boote, S. V. Angadi and K. Grover (2017). Estimating water balance, evapotranspiration and water use efficiency of spring safflower using the CROPGRO model. Agricultural Water Management. 185: 137-144. doi.org/10.1016/j.agwat.2017.02.015.
- **Duda, B.M.**, **D.C. Weindorf**, S. Chakraborty, B. Li, T. Man, L. Paulette, and **S. Deb**. 2017. Soil characterization across catenas via advanced proximal sensors. Geoderma 298:78-91.



Important Dates

April:

6-25: Advance Registration

17: No classes

26: Open registration

May:

4: Last day to withdraw

9: Last day of classes

10: Individual study day

11-16: Final Exams

19-20: Commencement Ceremonies

29: University Holiday, TTU Offices Closed

June:

6: Summer 1 Classes Begin

7: Last day to add a course

9: Last day to drop a course without penalty

If you have questions or comments regarding any information on this newsletter, or to be removed from the PSS distribution database, please contact Christi Chadwell, Communications and Recruiting Coordinator, Christi.chadwell@ttu.edu

PSS Student News

At the Beltwide Cotton Conference in January, two graduate students won poster awards:

- M.S. Poster Award: **Ray White** with poster titled: "Effects of Conservation Management Practices on Cotton Yield and Soil Quality"
- Ph.D. Poster Award: **Joao Paulo Sariva Morias**, with poster titled "Relationship Between Seed Coat Fragments Count and Fiber Attachment Force in Cottonseeds"

At the Southern Branch of the American Society of Agronomy meeting in Mobile, AL, two graduate students won oral presentation awards:

- First Place Ph.D. Oral Presentation Award: **Lisa Baxter** with presentation titled "Comparing Productivity and Efficiency of Grass-only and Grass-legume Beef Stocker Grazing Systems in the Southern High Plains"
- Second Place Master's Oral Presentation: **Jake Sanchez** with presentation titled "Selection for Seedling Cold Vigor in Grain Sorghum"



Josh Molligan, PSS undergraduate student, won Second Place in vegetable judging at the American Society for Horticultural Science Southern Regional Meeting in Mobile, AL.

Nathan Turner, PSS undergraduate student, presented his CALUE Research Project at the American Society for Horticultural Science Southern Regional Meeting in Mobile, AL.



Several graduate students presented their research at the Texas Tech Graduate School Grad Student Poster Competition in March. Among those that presented, three students won awards in the Agricultural Science Category:

- Second Place: **Joseph Burke**
- Tied for Third Place: **Sam Discua** and **Niwanthi Dissanayake**

