Delaware State University SINCE 1891 | College of Agriculture and Related Sciences

DSU Scientists begin work on $7 million EPSCoR grant

Funds for study of potential bioenergy crops and the health of DE waterways

Researchers at Delaware State University (DSU) received $7 million from NSF and the State of Delaware to study potential, non-food bioenergy crops and ways to protect regional waterways. The project is part of the $24 million *Meeting Delaware's 21st Century Water and Energy Challenges through Research, Education, and Innovation* grant awarded to Delaware 's Experimental Program to Stimulate Competitive Research (EPSCoR) from the National Science Foundation (NSF) and the state of Delaware. The grant supports research performed by DSU and its partner institutions University of Delaware, Delaware Technical and Community College (DTCC) and Wesley College.

Dr. Venu Kalavacharla, associate professor in the Department of Agriculture and Natural Resources at DSU, is co-principal investigator of the larger NSF grant and principal investigator for grant research conducted at DSU.

Since 2005, Delaware State University has received EPSCoR funds to support research and training opportunities for undergraduate and graduate students. Previous EPSCoR Research Infrastructure Improvement program awards (RII-1 and RII-2) funded biotechnology and environmental science studies, and created the Center for Integrated Biological and Environmental Research (CIBER)—a regional research hub (led by Kalavacharla and housed at DSU) for Delaware's EPSCoR faculty and students.

The current EPSCoR project, RII-3, was awarded in June 2013. This $7 million grant funds the investigation of advanced molecular genetic and epigenomic studies on perennial grasses as potential non-food sources of fuel, and the effects of non-agricultural land use and climate on the Chesapeake and Delaware bays. The funds cover core grant research, training undergraduate and graduate students, outreach to K – 12 schools and developing capacity for new faculty and more research at DSU.

"This new round of funding," said Kalavacharla, "signals the first time DSU has had a direct role to play in (EPSCoR) research themes."

Of the project's four themes, Kalavacharla leads the bioenergy section of Theme 4 (*Innovations in Renewable Energy*) for the overall project and Dr. Gulnihal Ozbay, professor in the Department of Agriculture and Natural Resources, leads DSU's research efforts for Theme 2 (*Coupled Land Use and Climate Change Impacts on Water and Natural Ecosystems*).

For Theme 4, Kalavacharla and his colleagues are studying genomics, transcriptomics and epigenomics of the bioenergy crops. They seek to identify how environmental forces affect gene expression in the crops. His colleagues include DSU researchers Drs. Sathya Elavarthi, Mingxin Guo and Bertrand Hankoua from the College of Agriculture and Related Sciences, and Dr. Tomasz Smolinski from the College of Mathematics, Natural Science and Technology. Other collaborators include Dr. Malay Saha, molecular breeder at the NOBLE Foundation in Oklahoma; Dr. Jose Gonzalez-Hernandez, from South Dakota State University; and Dr. Jyothi Thimmapuram, Purdue University bioinformatician. CIBER Researcher Dr. Vasudevan Ayyappan leads the implementation of epigenomic methods—developed by the Kalavacharla laboratory in crops such as common bean—in the proposed study of switchgrass and prairie cordgrass.

"We hope that this cutting-edge research will help reveal the role of epigenomics on bioenergy crops," said Kalavacharla. "This project unites DSU scientists with colleagues who are (plant) breeders and geneticists. This collaboration will help students and researchers gain a clearer understanding of the big picture (plant genetics)."

For Theme 2, Ozbay and her team collaborate with colleagues at the University of Delaware to conduct fieldwork at the Blackbird Creek Reserve in Townsend, Delaware.

"We are looking at how land use affects aquatic health and changes in marsh grass ecology in relation to changes in coastal habitat," said Ozbay. "We have been monitoring water, soil, and pore water quality in soil; plant growth and persistence; and aquatic species diversity in relation to the marsh grass habitat."

Training undergraduate and graduate students in field and lab research is part of the mission for Team 2. Besides Dr. Karuna Chintapenta, post-doctoral research fellow, Ozbay's team includes Brian Reckenbeil, former student and now research technician; Kris Roeske, graduate student; and three undergraduate students.

Dr. Stephen Taylor, associate professor in the College of Arts, Humanities, and Social Sciences, directs the Ethics Resource Site at DSU. He will provide ethics training to undergraduate and graduate students, and research staff from DSU, Wesley College, DTCC, and the University of Delaware.

This latest EPSCoR project will also help focus CIBER efforts as a research resource for more faculty, and undergraduate and graduate students throughout southern Delaware through DSU's partnerships with Wesley College and DTCC. The goal is to assist more faculty with competitive grant writing and to train more students in best research practices.

A greater effort will be made, Kalavacharla said, to reach and train K – 12 teachers in STEM areas. Also, for the first time, undergraduate and graduate students trained through CIBER will be required to mentor K – 12 students in STEM subjects. This student training and cross-learning initiative is led by Dr. Clytrice Watson, associate professor in the College of Mathematics, Natural Sciences, and Technology at DSU, and by Dr. Kalpalatha Melmaiee, CIBER research scientist.

It will help undergraduate and graduate students command the research knowledge they have acquired as they 'teach' younger elementary and secondary students about STEM careers from their perspectives. Collaborations among DSU scientists involved in EPSCoR themes 2 and 4 are forging new areas of discovery that are important to the state of Delaware.

For more information on this research project, contact Dr. Venu Kalavacharla, director of CIBER: vkalavacharla@desu.edu or (302) 857-6453 (CIBER office).

The College of Agriculture and Related Sciences at Delaware State University adheres to the 1890 land grant mission of teaching, research and extension. Through its departments of Agriculture and Natural Resources, and Human Ecology, the College offers undergraduate and graduate degrees in agriculture, natural resources, food science, and textiles and apparel studies. Contact us online at www.desu.edu/cars, or by phone at (302) 857-6400 for more information.