What lies beneath
Texas A&M program drills deep for earth's history

- UNTHSC unlocks doors with DNA technology
- Budget cuts threaten research

INSIDE: Energy Spotlight • UT studies hydraulic fracturing
Mulching it over

Texas Tech takes part in $2 million biodegradable study

Mulch plays an important role in growing crops, and researchers at Texas Tech University are participating in a $2 million project funded by the U.S. Department of Agriculture’s National Institute of Food and Specialty Crops Research Initiative (SCRI) to test biodegradable mulches that could provide an alternative to nonbiodegradable plastic.

One of the study’s goals is to help farmers maintain high yields and conserve irrigation water while reducing the negative environmental consequences of using nonrenewable and nondegradable products, said Jennifer Moore-Kucera, assistant professor of soil and environmental microbiology at Texas Tech University.

The program will investigate the use of biodegradable mulches (BDM) in horticultural crop production systems that use protective high tunnels (HT), which are plastic-covered, framed structures similar to greenhouses but without electricity. Kucera said the HT are passively heated, three- or four-season field structures that are widely used as a way to extend the growing season, make use of limited farmland, and grow crops organically.

Polyethylene plastic mulches made primarily from petroleum are commonly used to reduce weeds and control weeds, and water loss in specialty crops grown in HT and open fields (OF), but they have drawbacks ranging from costs to labor and disposal. There are also negative consequences to the environment from using nonrenewable and nondegradable products, she said.

As part of the project, the main plot uses a cropping system (HT or OF) and the sub-plot uses mulch. Issues addressed by the agricultural research team include crop productivity, production efficiency, pest disease identification and management, and system profitability, Kucera said.

She and her graduate students, along with Russ Wallace, a Texas AgriLife vegetable specialist, are examining how biodegradable mulch affects the health and quality of soil. Under the best of circumstances, biodegradable mulch should leave no toxic residue in the soil and would improve soil quality and decrease soil-borne plant diseases, she said.

The SCRI is a three-year field experiment that is already in its second year in Mount Vernon, Wash.; Knoxville, Tenn.; and Lubbock studying BDMs using tomato crops. Kucera said using the three geographically disparate regions in the study should provide farmers with sound scientific information to help make good choices on the products they use to grow food.

Scientists will evaluate the tomatoes grown in HT versus OF settings with four different BDM treatments plus black plastic and a nonmulch control. They will also study BDMs in greenhouse and field settings for the impacts on soil ecology and root health as well as for meeting particular standards for biodegradability while ultimately determining the economic costs and benefits of HT and BDM use.

The products used include two compostable mulches, a nonwoven polylactic acid mulch, black plastic, a paper mulch and a control group of bare ground. Kucera’s role in the study is to determine how these materials respond during the growing season while they are above ground in three very different geographical regions. The results will be used to propel the development of a new variety of products that may be used in field conditions across the United States.

“We hope to help consumers and farmers by publishing fact sheets and extension bulletins on the meanings of words such as biodegradable, compostable, mulch, etc,” Kucera said. “We are also contributing to the production of new materials. The experimental nonwoven material developed by researchers with this project has already been reformulated and improved based on data from the first year.”

The potential benefits of the study are many, Kucera said. She hopes to help the farmers who will use these products by giving them sound scientific information that will aid in making informed choices on the products they use. Ultimately, the goal is to identify a product that performs well during the growing season by combating weeds, maintaining or improving yields and quality, and conserving valuable resources such as soil and water with less evaporation. In West Texas, with the high winds, this can be important in protecting the topsoil, she said. Finally, the hope is that the mulch can be incorporated into the soil and biodegrade beyond visible assessment without measurable negative effects on soil quality.

Other goals of the project include helping consumers understand the labels on these products so they can make informed decisions about what they’re using. Also, with the amount of plastic going into landfills, Kucera said, helping the agricultural community reduce some of that waste stream in an economically and environmentally sustainable manner helps everyone win.

The SCRI project is a collaboration among an inter-disciplinary team of 19 scientists at Washington State University, University of Tennessee, Texas A&M University, Texas Tech University, Western Washington University and Montana State University who specialize in textiles, horticulture, soil microbiology, plant pathology, weed science, agricultural economics, biosystems engineering and rural sociology.
We hope to help consumers and farmers by publishing fact sheets and extension bulletins on the meanings of words such as biodegradable, compostable, mulch, etc.

- Jennifer Moore-Kucera, assistant professor of soil and environmental microbiology, Texas Tech University