Sociology and Agriculture Interwoven (or Nonwoven?)

Vegetable growers depend on plastic mulches to control weeds, conserve moisture, warm soil and improve crop yield and quality. However, the costs and environmental concerns surrounding their disposal have led to greater interest in biodegradable options that will disappear in the field when the season is finished.

Funded by a USDA grant, 20 researchers and 6 graduate students from the diverse disciplines of horticulture, plant pathology, agricultural economics, soil science, material science and sociology have come together for an in-depth, 3-year study on biodegradable mulches (BDMs) in Washington, Texas and Tennessee. The objective of the project is to compare tomato production and mulch biodegradability among two cornstarch-based mulches and an experimental polylactic acid-based mulch, along with the standard black plastic and a biodegradable paper mulch. UT materials scientists, Doug Hayes and Larry Wadsworth, have worked on creating a new spun-bonded polylactic acid nonwoven fabric and are measuring the degradation of this mulch and the commercially available materials down to the molecular level. The soil scientists, including Jaehoon Lee from UT, are studying how the soil ecology is affected as these mulches breakdown and how the soil environment (temperature and moisture) changes beneath the mulches. The horticulturalists and pathologists are comparing plant growth, yield and disease resistance, while the economists are creating budgets to determine if production with these mulches pays. But where do the sociologists fit in?

Ideally, the BDMs will remain intact while the crop is in the ground and then at the end of the season, the grower can till it into the field, where soil microbes will break it down into water and carbon dioxide. In the past, many BDMs did not last the entire season, allowing weeds to take over the crop. Alternatively, other mulches did not biodegrade, leaving pieces of mulch strewn about the field. Both scenarios have made growers leery of giving these mulches another try.

As agricultural researchers, we strive to improve production systems to maximize quality and yield. However, often some of the greatest ideas are never put into practice due to barriers to adoption somewhere between the idea and the grower. UT’s Bobby Jones leads the sociology group to help identify these barriers and provide bridges for adoption of the new generation of biodegradable mulches. The barriers and bridges are the biophysical, social, cultural, economic, and technical factors that may significantly hinder or help in the successful design, adoption and dissemination of BDMs in agricultural systems.

In April, Dr. Jones conducted focus groups with growers and Extension professionals to understand the norms, beliefs, and attitudes associated with these new mulches. The objectives of the focus groups were to determine the participant perceptions as to whether BDMs: (1) provide services of similar quality to conventional plastic products, (2) are commercially viable, (3) have potential for sustainable high tunnel environments, (4) are better for the environment, and (5) have sufficient attributes to serve as prototypes for the next generation of BDMs.

Barriers that were mentioned included costs (Will the BDMs cost significantly more than black plastic?), lack of trust due to previous use of early generation BDMs, performance concerns (How fast will BDMs
breakdown? Can the BDMs be organically certified? Will they hold up to sun and wind?) and fear of change (Black plastic has worked well for me, why change?). The bridges to adoption of this technology included creating networks to improve information flow (trainings, websites, demonstrations), design BDMs that truly biodegrade across all environments, thereby eliminating the need for labor and disposal costs, and tapping into community, health and environmental values.

These results give our team direction for our future education and outreach efforts. This study esd showcased at the 2012 UT Organic Crops Field Tour, with a demonstration of the BDMs and results from 2 years of field studies. With time, hopefully, we can make both grower apprehension and the BDMs completely disappear.