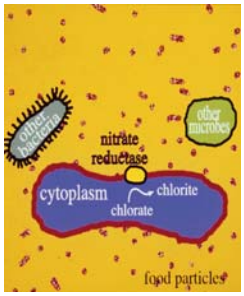
Texas



Food-producing animals can be carriers of harmful microorganisms such as *Salmonella* and *Escherichia coli* O157:H7, often harboring these pathogens within their digestive tracts. Researchers at the Food & Feed Safety Research Unit in College Station have developed a preharvest feed additive that selectively kills *Salmonella* and *E. coli* in the gut of cattle, sheep, swine, and poultry while not harming beneficial gut bacteria. This technology targets an enzyme called respiratory nitrate reductase which converts chlorate to chlorite. The chlorite then kills dangerous pathogens. A patent was awarded for this technology and licensed to industry. This important pathogen control technology is currently being commercialized.

ARS scientists in the Livestock Issues Research Unit at Lubbock examined the expression of bacterial genes of *Escherichia coli* O157:H7 that promote the infection and transmission between food-producing animals and humans. They found that when livestock are under stress *E. coli* O157:H7 goes into a positive adaptive state in which the bacteria have an enhanced ability to adapt during active growth. This research verifies that management strategies to minimize stress the animal's experience will improve not only animal health but also food safety.

In conjunction with the Dept. of Homeland Security – Science and Technology Directorate, Rio Grande Valley Water Districts, and the ARS Beneficial Insects Research Unit in Weslaco, a biological control program is being conducted to target the invasive weed *Arundo donax* L., also known as carrizo cane or giant reed. *Arundo donax* is an invasive weed of the Rio Grande River Basin. It dominates these habitats, which leads to catastrophic stream bank erosion and consumption of vital water resources. *Arundo donax* is a good target for biological control because it has no close relatives in North or South America and several of the plant-feeding insects from its native range in Europe are known to feed only on this one plant species. ARS is partnering with APHIS to mass rear and apply these insects at a pilot study site near Laredo, Texas.

Developing rice cultivars that have improved yield and that meet the cooking quality standards of rice end-users helps to provide consumers with food products that are inexpensive, nutritious, and of high quality. 'Sabine' is a new long-grain rice cultivar that has been developed by the Rice Research Unit at Beaumont for use by the parboiling and canning industries which supply rice for use by restaurants, in packaged seasoned rice products, and in canned rice products. Sabine has 15-20% higher yield potential that other cultivars with this cooking quality and will benefit farmers, millers, and processors.

The powered roll gin stand, developed by scientists at the Cotton Production and Processing Research Unit in Lubbock, and patented by ARS, was developed to remove the residual fibers from cottonseed. The powered roll gin stand can improve the efficiency and processing rate of ginning seed cotton without adversely affecting fiber properties. The technology was licensed to PRT Marketing, LLC. Currently, there are 26 powered roll gin stands operating in twelve cotton gins throughout the US.

The Riesel experimental watershed is part of the larger Brushy Creek watershed and is now part of the ARS Grassland Soil and Water Research Laboratory in Temple. These ARS scientists have used data from this watershed to develop computer models, including EPIC (Erosion Productivity Impact Calculator), APEX (Agricultural Policy/Environmental eXtender), and SWAT (Soil and Water Assessment Tool). These models are now used worldwide to manage field-, farm-, and basin-scale water quality.

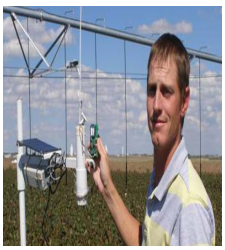
Millions of acres of crops are exposed to wind- blown sand damage each year and in many instances the harm is thought to be severe enough to require replanting. ARS scientists Wind Erosion and Water Conservation Unit in Lubbock and Big Springs conducted four sand damage treatment experiments on cotton seedlings. studies found that when the plants were recovering from the damage, the growth rate of treated plants was greater than that of untreated plants. These findings suggest that cotton breeders selecting for traits that lend resistance to and/or recovery from sand abrasion damage should focus on the ability of damaged plants to use the root to repair the damaged canopy.

Researchers at the Beneficial Insects Research Unit, in Weslaco have identified a strain of the fungi *Metarhizium anisopliae* that is highly pathogenic to honeybee mites. The fungus did not affect honeybee larvae and adults, or queen fecundity. This biological control for the honeybee mite will be a valuable tool in combating this destructive pest.

Researchers in the Integrated Farming and Natural Resources Research Unit in Weslaco found that two amino acids, cystine and methionine, might be critical amino acids in cotton for promoting boll weevil egg production. This work could be a major boon for cotton breeders for developing varieties that enable relatively low levels of boll weevil egg production, thereby eliminating population surges associated with large square production in the field.

In conjunction with an industry partner, the Areawide Pest Management Research Unit in College Station developed and tested an attracticide bait (mixture of a feeding attractant, feeding stimulant, and insecticide) for control of adult corn earworm and other destructive noctuid pests in corn, cotton, and other crops. This bait reduces insecticide use by up to 90% relative to conventional pesticide application. Once this attracticide is approved by the EPA, producers will have another tool for managing these pests.

Scientists in the Cotton Pathology Research Unit, College Station, have identified a gene for reniform nematode resistance in *Gossypium longicalyx* and bred this trait into conventional cotton germplasm. This germplasm is now available to cotton breeders in the US and worldwide, who can use it to breed nematode resistance into commercial cotton varieties.



ARS scientists at the Soil and Water Management Research Unit in Bushland are developing wireless sensor networks to facilitate data collection from field experiments. Wireless technology is increasingly becoming a mainstay of precision farming research. It is being used to monitor irrigation and fertigation as well as in collection of field mapping data. These data will allow farmers to monitor crop development, variability, crop quality, crop water deficits, and to maximize productivity throughout a growing season, thereby increasing profitability while minimizing environmental impact.

Researchers at the Knipling-Bushland U.S. Livestock Insects Research Laboratory in Kerrville have developed a system for the application of tick-controlling chemicals to deer. The '4-Poster' Deer Treatment Bait Station is a simple, feeder-like device that is readily used by deer. It has been proven efficacious in controlling both parasitic ticks feeding on white-tailed deer and free-living ticks in the environment, including lone star ticks that transmit human monocytic ehrlichiosis and blacklegged ticks that transmit Lyme disease to humans. The ARS patent for this technology has been licensed to C.R. Daniels, Inc.

ARS engineers in the Renewable Energy and Manure Research Unit in Bushland have been testing solar photovoltaic water-pumping systems to determine if their performance could meet the needs for livestock and irrigation in remote locations around the U.S. Their results demonstrated that these solar photovoltaic water-pumping systems have low maintenance and result in a highly reliable system for remote water pumping.

One of the goals of the Children's Nutrition Research Center (CNRC) in Houston is to identify childhood dietary habits that contribute to long-term health. Recently, scientists at CNRC assessed the impact of the Texas Public School Nutrition Policy on student lunch consumption, in response to concerns about childhood obesity and school meals. Following implementation of the Texas policy, student lunch consumption of protein, fiber, vitamins A and C, calcium, sodium, vegetables, energy, and milk increased, while consumption of sweetened beverages, snack chips, and percent calories from fat decreased. Most of the desired nutrients and foods (vegetables and milk) were obtained from the National School Lunch Program meal. Overall, this study documents that school nutrition policies can improve student nutrition.

Scientists within the Plant Stress and Germplasm Development Unit in Lubbock, in collaboration with Agilent Technologies, have developed the first publicly available microarray for gene expression profiling in peanut. The array represents approximately 10,000 unique genes from leaf, root, stem, and pod under a variety of growth conditions including drought, pathogen infection, and heat stress in addition to genes from wild-species. The scientists have completed two expression-profiling studies. The first study demonstrates the utility of the array with both vegetative and reproductive tissues, while the second represents a significant part of ongoing studies toward the elucidation of molecular and physiological responses to water-deficit and heat stress.

In 2007 the Crop Germplasm Research Unit in College Station released the pecan cultivar ‘Lakota’. Lakota produces an abundance of early-maturing, easily shelled pecans of very high quality, is very resistant to scab disease, and should perform well in all commercial pecan production areas of the world. Lakota is the 26th cultivar release of a highly successful breeding project that is unique in being the sole national pecan improvement project worldwide.

Keeping Mexican Fruit Flies out of the US and away from US citrus crops is one of the missions of the Crop Quality & Fruit Insects Research Unit in Weslaco. Researchers there developed a novel insecticide bait under a cooperative agreement with Dow AgroSciences, LLC. Successful trials on an outbreak of the Mexican fruit fly in California demonstrated that the formulation could aid the Rio Grande Valley program. Deployment of this technology resulted in only a single fly being detected in 2007. Cooperative teams of USDA regulatory and research groups, State of Texas, and citrus industry members, have implemented this and other new technologies to ensure US crops are not damaged by fruit flies.