



TEXAS A&M AGRILIFE RESEARCH AND EXTENSION CENTER AT WESLACO

The Weslaco Center is located in the Lower Rio Grande Valley (LRGV), where agriculture has played a major role in the region's tremendous economic and population growth. With the arrival of rail transportation and the development of a vast irrigation system in the early 1900s, the valley's fertile delta soils formed the foundation of a bountiful South Texas agricultural industry. In 1923, the state legislature approved the purchase of 60 acres of land east of Weslaco for an agricultural experiment station. Another 60 acres were bought with local donations, and the center was established. Research began primarily on citrus, but by 1925 it had expanded to local crops, including pecans, grain sorghum, soybeans, cotton, sugarcane, and a wide variety of vegetables.

Among the early achievements of the Weslaco Center were the development of red-fleshed grapefruit; the release of mildew-resistant melon varieties in the 1950s and 1960s; virus-resistant peppers, tomatoes, and melons; improved tomato varieties released in the 1960s and still grown worldwide; the first commercially successful spinach hybrids; commercial onion releases that resulted in the sweet onion releases of the 1980s; sugarcane studies that helped revive the industry in the early 1970s; water-use efficiency and soil studies that improved per-acre income; and improved harvesting methods for onions, potatoes, sugarcane, and other crops.

CURRENT RESEARCH

IMPROVING VEGETABLE PRODUCTION IN SOUTH TEXAS

The Vegetable Research Program, headquartered at the Weslaco Center, is composed of a multi-disciplinary team of scientists who are developing technologies and generating knowledge to address critical issues affecting the vegetable industry in the LRGV, the state of Texas, and beyond. Ongoing efforts from the team include the following:

- Identifying and characterizing resistance mechanisms that protect against insect-transmitted diseases in solanaceous crops (including tomatoes, peppers, eggplant, and potatoes). The research team focuses on the tomato and potato psyllid, which transmits the bacterium (*Candidatus Liberibacter solanacearum*, or Lso) that causes zebra chip disease in potatoes; the western flower thrip, which transmits tomato spotted wilt virus; whitefly, which transmits tomato yellow leaf curl virus; and the potato aphid, which transmits potato virus Y vector disease complexes. This research serves as a model to study plant insect-transmitted disease interactions for other pest and pathogen complexes of economic importance for South Texas.
- Assessing the feasibility of covered structures as an alternative to open field production to reduce yield losses caused by insect-transmitted diseases and to extend the tomato growing season to improve crop quality and availability in the LRGV.
- Evaluating disease incidence in solanaceous crops using remote-sensing technology to monitor disease-related symptoms and their impacts on plant growth and yields.
- Using the latest “-omics” molecular and genetic approaches to advance fundamental and applied research in agricultural crop stresses. Using high-throughput next-generation sequencing and phenotyping technologies, we are establishing genotype-to-phenotype knowledge bases for many different living and non-living stress factors.

COMBATING CITRUS AND SUGARCANE DISEASES THROUGH GENETICS



Current research involves first identifying the causes of disease and then incorporating resistance genes into crops important to South Texas agriculture, using technologies that were pioneered at the Weslaco Center. We have also used pathogen-derived resistance approaches to create transgenic citrus and sugarcane plants that are resistant to the viruses causing economic losses in these crops. Ongoing efforts from the team include the following:

- Using spinach defensins (natural antimicrobial peptides that are part of the immune system) to strengthen resistance to citrus greening, or Huanglongbing (HLB).
- Working closely with Southern Gardens Citrus, the world's largest supplier of Florida orange juice, to introduce spinach defensins into the most commonly grown orange, grapefruit, and lemon varieties in Texas and Florida. So far, these defensins have made many trees resistant to citrus greening and others more tolerant to it.

RESEARCH IMPACTS

- Vegetable producers will increase production and profitability by growing heat-tolerant, disease-resistant, high-yielding, flavorful cultivars in Texas.
- Increased production and consumption of Texas-grown vegetables will improve the local economy by reducing vegetable imports.
- The use of spinach defensins to strengthen citrus resistance to citrus greening will allow millions of trees to stay productive longer. This will save thousands of jobs, keep juice plants from going out of business, and save the U.S. citrus industry millions of dollars per year.

WESLACO CENTER FACILITIES

Weslaco — 55,000 square feet in faculty and staff offices, laboratories, a 256-square-foot, fully-equipped conference room, and a 2,094-square-foot auditorium, located in the main building. 74,000 square feet of greenhouses, workshops, storerooms, and outbuildings. Approximately 360 acres in croplands at the research station, annex farm, and Hiler farm. 21,800 square feet in the Vegetable Research and Education Building, equipped with offices, laboratories, work areas, a conference room/kitchen, and an auditorium.

ABOUT TEXAS A&M AGRILIFE RESEARCH

A member of The Texas A&M University System

Established in 1888, Texas A&M AgriLife Research is the state's premier research and technology development agency in agriculture, natural resources, and the life sciences. Headquartered in College Station, AgriLife Research has a statewide presence, with scientists and research staff on other Texas A&M University System campuses and at the 13 regional Texas A&M AgriLife Research and Extension Centers. The agency conducts basic and applied research to improve the productivity, efficiency, and profitability of agriculture, with a parallel focus on conserving natural resources and protecting the environment. AgriLife Research has 550 doctoral-level scientists, many of whom are internationally recognized for their work. They conduct hundreds of projects spanning many scientific disciplines, from genetics and genomics to air and water quality. The annual economic gains from investments in Texas's public agricultural research are estimated at more than \$1 billion. Through collaborations with other institutions and agencies, commodity groups, and private industry, AgriLife Research is helping to strengthen the state's position in the global marketplace by meeting modern challenges through innovative solutions.

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