



## TEXAS A&M AGRILIFE RESEARCH AND EXTENSION CENTER AT UVALDE

**T**he Uvalde Center, established in 1972, serves the Texas Wintergarden region, known for its rechargeable water sources and irrigated agriculture, with crops such as spinach, cabbage, onion, carrot, melon, watermelon, pepper, potato, cotton, wheat, corn, sorghum, and sesame. Uvalde Center research focuses on vegetable crop improvement under stress conditions, cropping systems, stress physiology, irrigation strategies, genotype adaptation, and high-throughput phenotyping for crop improvement and diversity. Other programs include the development of cultivars for organic vegetable farming and hydroponic systems for production of leafy greens.

### CURRENT RESEARCH

#### DEVELOPING BETTER CROPPING AND IRRIGATION STRATEGIES FOR SPECIALTY CROPS



The center's Vegetable Physiology Team has developed integrated strategies — from transplanting to harvest — for artichoke, a new specialty crop for Texas. The team is also researching hydroponic management strategies by manipulating

the nutrient solution, monitoring the environmental conditions to reduce tip-burn and bolting, and by screening Bibb and romaine lettuce cultivars that are better adapted to protected environments. Working with faculty at the Weslaco Center, Uvalde researchers are investigating an innovative commercial lignite soil amendment for effectiveness in improving nutrient and water uptake, soil biological activity, and nutritional status of bell pepper under sandy and clay soils.

#### RESEARCHING THE ROLE OF PLANT MOLECULAR COMPOUNDS IN CROP IMPROVEMENT

The Genomics and Metabolomics Team is studying the regulation of amino acid metabolism and genetic variability in selected watermelon parental DNA. Using the facilities at Texas A&M AgriLife Genomics and Bioinformatics Service, the team is studying the genetic information in sesame to understand the molecular mechanisms of drought-stress tolerance. To develop a sustainable resistance to sugarcane aphids in sorghum, the team is collaborating on a project to characterize defense-related genetic and metabolic cues using Nested Association Mapping (NAM) populations.

## IMPROVING WATER-USE EFFICIENCY THROUGH PHENOTYPING



The Agronomy Program Team is collaborating with researchers at College Station, Lubbock, and Amarillo in developing phenotyping tools to identify crop shoot/root traits with improved water-use efficiency under different management regimes. Researchers collaborated with USDA scientists to build a multisensory cart for high-throughput phenotyping and crop traits monitoring. This innovative tool will facilitate screening and selection of improved genotypes with drought- and heat-stress tolerance and high productivity. The team is collaborating with Texas A&M Engineering Experiment Station researchers to develop a crop growth model for integration into a precision irrigation control platform. They are also working in a multi-year crop rotation program on cotton, corn, wheat, sesame, and millet growth responses to irrigation regimes in southwestern Texas.

## RESEARCH IMPACTS

- The recirculating hydroponic system showed more than 90% water savings over field conditions for growing leafy greens.
- Deficit irrigation applied with subsurface drip systems yielded 36% and 25% water savings in specialty melons and hot peppers.
- A three-year study showed that integrating strip tillage into a cropping system increased watermelon yields by 15%.
- The Vegetable Physiology Team helped develop a new high-quality tomato cultivar, 'TAM Hot-Ty', which is heat and virus resistant and produces high yields on a small plant, saving both space and water.
- Screening efficient sources of organic fertilizers can enhance soil microbial activities, physical and chemical properties, and plant performance, improving profitability.
- Following field trials, three elite TAMU pepper hybrids were identified for commercial licensing by a seed company.
- The vegetable team evaluated 34 experimental TAMU hybrids, 29 elite inbred lines, and 21 commercial cultivars of large, specialty cantaloupe with high sugars and resistance to powdery mildew. Five hybrids were identified for larger commercial trials.

## UVALDE CENTER FACILITIES

**Uvalde** — 50 acres of irrigated land with 2 greenhouses, 2 hoop houses, and a certified organic field; a permanent drip and LEPA irrigation system with seven lysimeters; 143 acres of leased irrigated land with two center pivot irrigation systems. The center houses a new Waters' UltraPerformance LC technology system and mass spectrometer for research and analysis of plant metabolites.

## 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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