

# TEXAS A&M AGRI LIFE RESEARCH | EXTENSION

## Texas A&M AgriLife Research and Extension Center at Lubbock



Established in 1909, the Lubbock Center, in the Texas Southern Great Plains, serves a semi-arid agricultural region with over six million acres of dryland and irrigated crops. Additional research farms associated with the center, at Halfway, Helms, Lamesa, and Pecos, play a vital role in improving regional crops (including cotton, corn, grain sorghum, peanuts, and potatoes) and in technology and management systems to enhance irrigation efficiency and reduce water use. Special initiatives include cotton germplasm screening, cropping systems, algae biofuels research, irrigation efficiency, and water conservation for the Ogallala Aquifer.

The center's researchers work with their counterparts at Texas Tech University (14 joint appointments) and the U.S. Department of Agriculture's Agricultural Research Service to meet the needs of the region and its people. Since 1947, the center has collaborated with the USDA, the Texas Department of Agriculture, and Plains Cotton Growers to eradicate the boll weevil. Their success, along with integrated pest management and pest-resistant cotton varieties, has lowered the use of insecticides in High Plains cotton by more than 70%. Other collaborators include Texas A&M AgriLife Extension Service District 2 offices, Agricultural Complex for Advanced Research and Extension Systems (AG-CARES), Lamesa Cotton Growers and other commodity associations, and corporate partners.

### Current Research

#### *Improving crops through long-established research*

Crop-breeding and genetics programs at the Lubbock Center are focused on cotton, corn, oil seed, potatoes, peanuts, and sorghum. The programs are internationally recognized for their development of hybrids, stay-green characteristics and greenbug resistance in sorghum, multi-trait cotton germplasm screening and quality improvement in cotton, and high-yielding potato varieties. Center researchers have also developed corn germplasm that is resistant to mites and earworms as well as hybrids requiring less water than commercial hybrids. Lubbock Center scientists have conducted sorghum research for nearly a century, including studies on the genetics of height, maturity, lodging resistance, drought and insect resistance, and other important qualities.

One of the center's major contributions was the development of stormproof cotton and the mechanical cotton stripper in the 1930s. These improvements changed the Southern High Plains from a ranching to a farming region, contributing to a population increase and influencing cotton production worldwide. Researchers continue to develop new cotton germplasm with improved qualities, including resistance to diseases and pests. More than 3.5 million acres of cotton are grown on the Southern High Plains, and the textile industry values this cotton for its superior fiber quality.

Current crop research at the Lubbock Center includes cotton entomology, cotton and peanut pathology, cropping systems, horticulture, viticulture, and weed science. Other studies are being conducted in silage performance testing, seed cotton handling and storage, urban vegetable gardening on the High Plains, spindle and stripper cotton harvesting, soil fertility testing, wheat varieties, and alternative crops (such as growing guayule for rubber).



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### ***Studying algae as a potential feedstock for biofuels***

Scientists at the Pecos Algae Research and Development Facility at the Texas A&M AgriLife Research Station at Pecos, in partnership with General Atomics, are working to develop and demonstrate algae growth and harvesting techniques and bio-oil extraction processes that can be commercially scaled and economically replicated in the Desert Southwest for industrial production of biofuels. Revolutionary changes in algae growth efficiency and separation technology could create an algae biofuels industry that is economically competitive with current fuel prices. If a successful system can be demonstrated, 2,000-acre production systems may be a reality for the Permian Basin of Texas and the southwestern United States.

### ***Developing water-saving irrigation systems***

Center researchers at Halfway developed the low energy precision application (LEPA) center pivot irrigation system, which makes the most of limited water supplies by applying water directly to plants. With more than 5,000 systems in use by 2011, this irrigation method has revolutionized crop production in water-scarce regions. Current work on subsurface drip irrigation (SDI), LEPA systems, and low energy spray application (LESA) center pivot technologies, have significantly improved both water and energy efficiency in agricultural irrigation across the Southern High Plains.

### **Research Impacts**

- For each 2,000-acre unit of algae biofuels production, Texas A&M economists predict about \$190 million per year in local economic impact.
- Center pivot irrigation systems have improved water-use efficiency by 40%–50% in the Southern High Plains.
- Water and energy efficiency increased 1.36% per year over the past seven years when combining low energy precision application and subsurface drip irrigation technologies.
- Crop-breeding programs have developed drought- and disease-resistant cotton and corn germplasm, superior-yielding potato varieties, stress-resistant peanuts, and greenbug-resistant sorghum.

### **Lubbock Center Facilities**

- Lubbock — 356 acres, with facilities including offices, laboratories, greenhouses, and shops
- Pecos — 508 acres
- Halfway/Helms — 296 and 307 acres, respectively
- Lamesa (AG-CARES) — 253 leased acres

### **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.



## FY 2016 & 2017 EXCEPTIONAL ITEM

Insect- and tick-transmitted pathogens can infect humans, animals, and plants. Diseases caused by these pathogens result in hundreds of millions of dollars in increased health care costs, increased veterinary costs for livestock and companion animals and lost agricultural productivity.

### PROGRAM DESCRIPTION

This program is designed to:

- Protect human, animal, and plant health
- Expand agricultural sustainability and profitability, and environmental stewardship



Significant research initiatives include:

- Improve detection methods for disease pathogens and vectors to predict and prevent epidemics
- Define the insect- and tick-transmitted disease cycles and find ways to eliminate or reduce transmission risk
- Develop better control tactics and management strategies
- Develop and manufacture vaccines to protect people, animals and plants against pathogens through corporate research collaborations.

Texas A&M AgriLife Research is uniquely positioned to develop solutions, including pest surveillance, public education, vaccine production, and resistant plant varieties.

Funds would be used for the following:

- Internal grants to stimulate research and provide seed money to enhance competition for federal, state and/or corporate funding, including equipment upgrades and operating funds
- An internal grants program for facilities upgrades statewide and new facilities for advanced-technology equipment
- New faculty, graduate student, and staff support
- A West Nile virus expert in the Department of Entomology
- A Plant Microbiomics faculty member in the Department of Plant Pathology and Microbiology
- Graduate/post-doc students in Plant Pathology and the interdepartmental Vector Biology Research Group
- A greenhouse for containing exotic plant pathogens to bring the current Biosafety Level 2-Ag laboratory in Weslaco up to Biosafety Level 3-Ag

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**REQUESTED AMOUNT**  
**(BIENNIAL):**  
**\$6 MILLION**

### OBJECTIVE

Disrupt the spread of insect- and tick-transmitted diseases that infect humans, animals, and/or plants in Texas.

High-impact, insect- and tick-transmitted diseases in Texas include:

West Nile virus  
Lyme disease  
Chikunguna  
Dengue hemorrhagic fever  
Chagas disease in canines  
Texas cattle fever  
St. Louis encephalitis  
Equine encephalitis  
Citrus greening  
Zebra chip disease in potatoes  
Pierce's disease in grapevines  
Wheat streak mosaic virus  
Citrus leprosis virus  
Oak wilt

Revised 12/01/14



# PATHOGEN LIFE CYCLE

Controlling invasive insect and tick transmitted diseases comes from eliminating one of the three points of the "disease triangle." By understanding the entire pathogen life cycle, it makes it easier to focus on which point to disrupt/eliminate.



Because the varied landscapes and climates at our 13 regional research centers are comparable to conditions in many other parts of the world, Texas A&M AgriLife Research is the premier agency for research in the control and prevention of insect-related diseases. With the American South's longest international border, Texas is often the first state to experience insect-borne pathogens from other parts of the world; a rapid response here can safeguard human and animal health and the flow of agricultural and other commercial trade.

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## TEXAS A&M AGRILIFE

What is AgriLife? It's a simple word for a diverse organization. With teaching, research, extension education, laboratory, and forestry facilities throughout Texas, we serve people of all ages and backgrounds. Led by Acting Vice Chancellor Dr. Bill Dugas, Texas A&M AgriLife includes the Texas A&M AgriLife Extension Service, Texas A&M AgriLife Research, Texas A&M Forest Service, and the Texas A&M Veterinary Medical Diagnostic Laboratory.



## ADVANCED REMOTE SENSING AND PRECISION MANAGEMENT OF NATURAL RESOURCES

FY 2016 & 2017 Exceptional Item

Texas A&M AgriLife Research and the Texas A&M Engineering Experiment Station (TEES) are partnering to advance capabilities and applications across natural resources and agriculture, which annually contribute more than \$100 billion to the Texas economy. These agencies will coordinate efforts with other state, federal and corporate entities to advance research, development and commercialization of low-altitude and ground-based, high-resolution remote sensing platforms.



### PROGRAM DESCRIPTION

Advanced remote sensing and precision systems can greatly improve the accuracy of existing crop and economic models in urban and rural settings. Such uses include but are not limited to management of water, minerals, crops, livestock and wildlife.

Advances in remote sensing and precision systems will provide real-time data and rapid response for the following applications:

- Wildlife density and distribution
- Rangeland forage production and livestock density
- Forest timber volumes and wildfire fuel loads/prescribed burning
- Optimum timing and quantities of nutrients, irrigation, and agrochemicals on crops, pastures and turf
- Spread of invasive insects and plants
- Plant stressors such as drought and disease

**REQUESTED AMOUNT**  
**(BIENNIAL):**  
**\$6 MILLION**

### OBJECTIVE

To revolutionize management of natural resources by integrating advanced remote sensing and precision systems to improve crop yields, livestock production and wildlife management.





These improvements will help grow the Texas economy and enhance quality of life for the state's increasing population.

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- Reservoir capacity and volumes, ensuring clean and plentiful water for urban populations
- Greenhouse-gas emission "hot spots" and incorporating air and water quality protection measures

The funds requested will be used to rapidly advance remote sensing and precision systems, attract world-class talent in a competitive environment, and offset the rising cost of advanced equipment and infrastructure. In addition, we will develop and purchase cutting-edge technology, and deploy these resources and practices in support of multiple and diverse constituent groups across numerous applications.



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## FY 2016 & 2017 EXCEPTIONAL ITEM

Rapid advancements in crop genetics, genomics, and plant breeding are due to improvements in genome technology, DNA markers, and knowledge of the genes that produce specific traits. Using the latest in high-throughput sequencing technology, AgriLife Research can generate DNA-based information at a remarkable pace. Marker-assisted breeding is not the same as genetic engineering, in which one organism receives genes from another. Instead, it quickly reveals the genetic potential of individual plants to find those that hold the greatest promise for continued research. To meet increasing food demands, we must continue to support our genomics capabilities and make this data available to plant breeders.



### PROGRAM DESCRIPTION

Research funding is needed for the following:

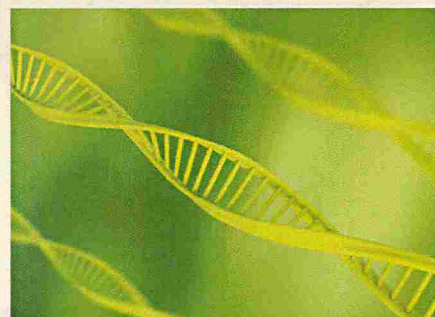
- Marker-assisted breeding programs for economically important crops and turf
- Identification of genes and associated phenotypes for complex traits related to disease resistance, drought stress tolerance, increased yield, improved flavor and nutrient content, and other desirable traits
- Improvement in field-based high-throughput phenotyping across all crops
- Development of genetic and production technologies that will double the potential rate of genetic gain in 20 years

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**REQUESTED AMOUNT  
(BIENNIAL):  
\$10 MILLION**

### OBJECTIVE

Increase food and feed  
production using  
marker-assisted breeding  
programs for economically  
important crops and plants





The crops these marker-assisted breeding programs will focus on contribute more than \$6 billion per year to the Texas GDP.

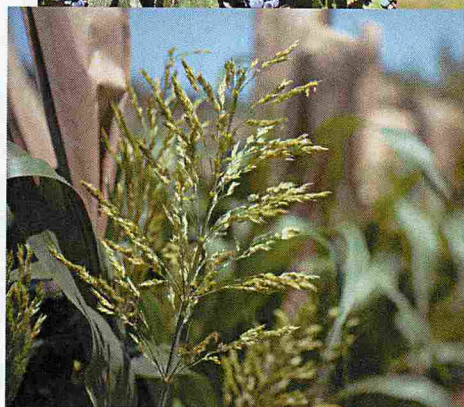
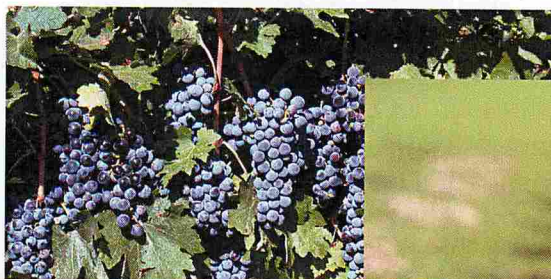
These programs are focused on sorghum, wheat, sugarcane, corn, cotton, rice, peanut, citrus, vegetables, turf, ornamentals, timber, and many other economically important rural and urban crops.

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Funds would be used for the following:

- Internal grants to stimulate research and provide seed money to enhance competition for federal, state, and/or corporate funding, and for equipment upgrades and operating funds
- An internal grants program for facilities upgrades statewide and new facilities for advanced-technology equipment
- New faculty, graduate student, and staff support



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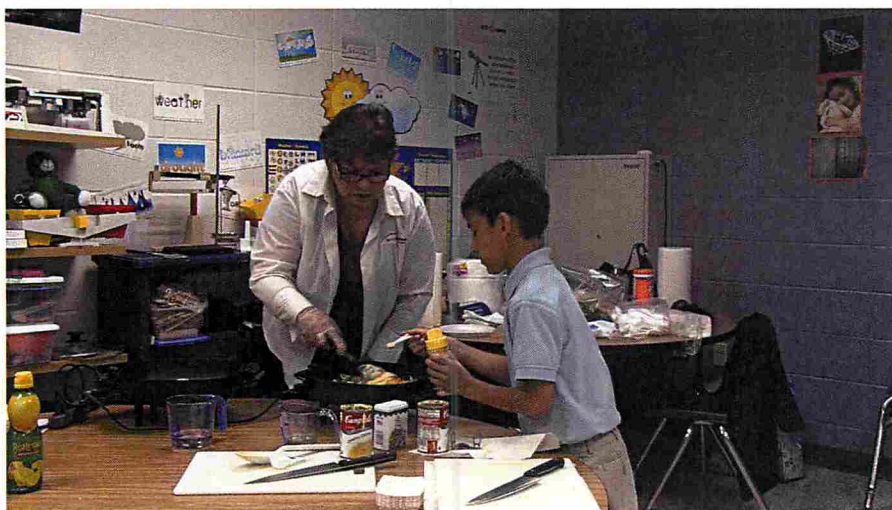


# HEALTHY SOUTH TEXAS 2025

FY 2016 &amp; 2017 Exceptional Item

## OVERVIEW

Texas A&M Health Science Center will lead a comprehensive, regional effort in collaboration with Texas A&M AgriLife Extension and other A&M assets to reduce preventable diseases and their consequences in South Texas by 25 percent by the year 2025.



This unprecedented initiative will organize evidence-based education, monitoring and interventions to prevent disease and improve public health through an integrated Texas A&M Institute for Public Health Improvement (IPHI). The A&M IPHI will focus initially on the highest impact diseases in the region, including diabetes, asthma, and infectious disease, with the potential to save the state tens of millions in health care costs annually. Through Texas A&M's one-of-a-kind statewide county extension presence and the establishment of long-term partnerships with the region's hospital systems, providers and Medicaid Managed Care Payors, the Texas A&M IPHI will reduce Medicaid expenditures associated with preventable diseases. In the future, the Institute will seek to expand the program to improve the health of communities across the state.

## BENEFIT TO TEXANS

- **Diabetes Prevention and Control:** Empower patients via access to evidence-based education and monitoring in areas including prenatal care, weight management, and nutrition.

REQUESTED AMOUNT  
(BIENNIAL):  
**\$15 MILLION**

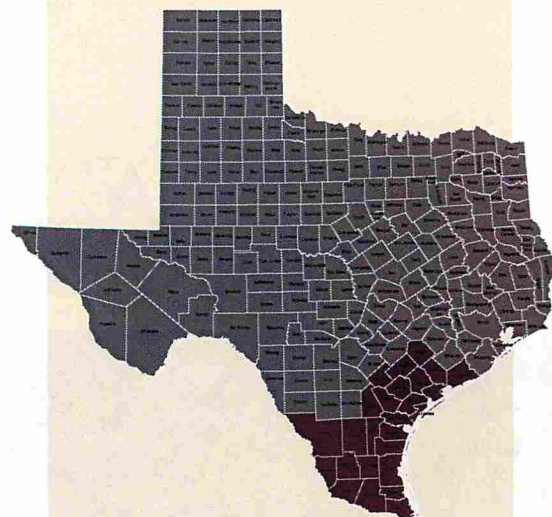
## OBJECTIVE

To reduce preventable diseases and their consequences in South Texas by 25 percent by the year 2025.



## REGION

26 counties in South Texas,  
with plans to expand after  
initial 2-year pilot





**FOCUSING ON HIGH-IMPACT DISEASES COULD SAVE THE STATE TENS OF MILLIONS IN HEALTH CARE COSTS ANNUALLY.**



- **Asthma Prevention and Control:** Engage individuals and families via education, environmental control and integration of services for the purpose of preventing and reducing the consequences of asthma.
- **Infectious Diseases Elimination:** Implement initiatives to reduce the burden of selected infectious diseases, including childhood parasites, with an emphasis on prevention and vaccination.

## **OUTCOMES**

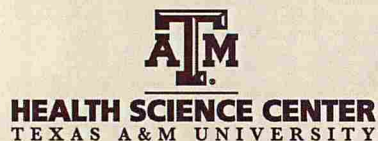
- Reduce health care costs for the state, payors and employers
- Reduce emergency department visits and hospitalizations related to preventable diseases
- Reduce diabetic-related complications including kidney failure, amputations, and blindness
- Reduce costs and lost productivity related to uncontrolled asthma, infectious disease and other conditions

## **TWO-YEAR GOALS**

- Establish an integrated model and expand programs and partnerships
- Prove tangible outcome benefits in reduced health care utilization and costs
- Double the number of patients served by programs to address uncontrolled diseases
- Increase by four times the number of people reached by educational and preventative programs
- Develop a plan to scale to 10 times the current population served in years 3-4

Focusing on the highest impact diseases in the region, including diabetes, asthma and infectious disease, Texas A&M IPHI will bring together experts from medicine, nursing, pharmacy, biomedical science, public health, and extension to engage families, enhance education, promote behavior change, and improve quality of medical care and disease outcomes in the region.

The underserved health needs of South Texans, combined with the proximity to the border and the vibrant cultural and economic fabric of the region, create an opportunity to launch this innovative approach designed to address critical needs, while developing tools, technologies and strategies that can be applied to public health challenges around the state and nation.



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## **TEXAS A&M UNIVERSITY SYSTEM**

The A&M System is one of the largest systems of higher education in the nation. Through a statewide network of 11 universities, seven state agencies, two service units and a comprehensive health science center, the A&M System educates more than 131,000 students and makes more than 22 million additional educational contacts through service and outreach programs each year. Externally funded research expenditures exceed \$820 million and help drive the state's economy.



## FY 2016 & 2017 EXCEPTIONAL ITEM

An estimated two-thirds of Texas citizens reside in urban or suburban population centers. While the Texas A&M AgriLife Extension Service has a presence in these communities, the ratio of 4-H professionals to total youth does not allow for the type of engagement needed to reach urban youth. Studies from Tufts University reveal that youth involved in 4-H are more likely than their peers to engage in science; nearly four times more likely to contribute to their communities; and two times more likely to make healthier choices.\*



### BENEFITS TO TEXANS

- Develop youth to be the future leaders of Texas, America and the world
- Improve knowledge and abilities of present and potential leaders needed to effectively support the development of their communities
- Develop and utilize volunteers to lead educational programming directly for youth in communities

### PROGRAM DESCRIPTION

Funding will be utilized to deploy 28 County Extension Agents and three 4-H Specialists to provide educational programming at new, sustainable 4-H club models in Texas population centers.

Programs will target students from grades 9-12, and focus on:

- Science, technology, engineering and mathematics (STEM) through experience with robotics, energy development, veterinary and agricultural sciences and gardening
- Health and nutrition through programs like 4-H Food Challenge
- Citizenship development through programs like Keys to the Courthouse
- Leadership and personal life skill development

\* Lerner, R., Lerner, J., & Colleagues (2009). Waves of the Future. Medford, MA: Tufts University

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**REQUESTED AMOUNT  
(BIENNIAL):  
\$3 MILLION**

### OBJECTIVE

To increase the number of youth served in population centers by adding professionals with expertise in working with youth in urban areas, including Dallas, Tarrant, Travis, Bexar, Harris, Hidalgo and Cameron counties.



Revised 12/01/14

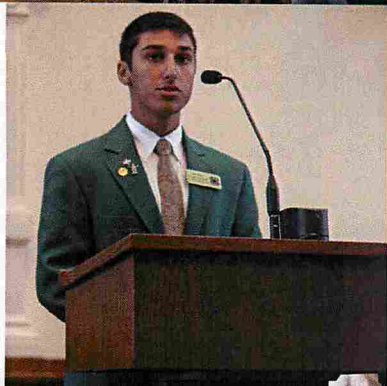




4-H is best known for engaging youth in hands-on learning projects, leadership development and community service—all geared to equip youth for a positive, productive future. As the only youth-serving organization backed nationwide by land-grant universities, 4-H also provides a strong path for youth to explore college and career opportunities, particularly in science, technology, engineering and math (STEM) fields.

According to the previously referenced study from Tufts, 4-H youth are:

- Less likely to use drugs
- Scoring higher in contribution, civic identity and civic engagement and have higher grades than comparison youth
- More likely to pursue careers in science, engineering, or computer technology
- Less likely to engage in delinquent behaviors
- More engaged in schools and expect to go to college
- More likely to make contributions to their communities



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## FY 2016 & 2017 EXCEPTIONAL ITEM

Eight of the last 15 years have delivered crippling droughts to the state, causing more than \$20.7 billion in direct losses to agricultural producers, while residents in hundreds of towns and cities have struggled with water supply and the resultant damage to lawns, gardens, plants and trees. The green industry in Texas has an annual economic value of more than \$8 billion and is of immeasurable value to Texans.



### BENEFITS TO TEXANS

- Ensure a sustainable, profitable and competitive food, fiber, and green industry in Texas
- Protect and conserve the natural resources of the State through educational programs

### PROGRAM DESCRIPTION

Funding will be used to support an equivalent of 10 specialists in water, production management and risk analysis. Operations will include multi-lingual educational materials, online development, and travel.

Programs will focus on:

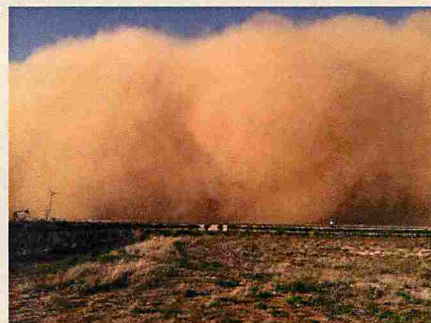
- Education for ranchers and landowners on better stocking and destocking strategies for livestock and the assessment of drought affected forage resources to reduce economic loss and prevent irreversible damage to rangeland and pastures.

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REQUESTED AMOUNT  
(BIENNIAL):  
**\$2 MILLION**

### OBJECTIVE

Enhance drought response and preparedness in both rural and urban settings to improve management of livestock, crops, forages, rangelands and urban green spaces.





Eight of the last 15 years have delivered crippling droughts to the state

Extension specialists will assist by developing multi-lingual educational materials, web-based resources, and in-person training.

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- Community education related to conservation, and education for individual water well-owners.
- Strategies to reduce damaging effects of wind erosion, including high residue tillage systems, rotational systems, cover crops, and other management strategies.
- Tactics for new and small landowners to more efficiently utilize their land and water resources to be more drought resilient.
- Proper selection, utilization and care of drought resistant turfgrass and landscape plants in cities.
- Rainwater harvesting and water reuse to reduce the use of critical water resources for municipal water supply.
- Irrigation training and CEUs for commercial irrigators/installers in urban areas.

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