University of Tennessee Knoxville and Tennessee State University
Combined Research and Extension Plan of Work
2022-2026

Status: Final
Date: 09/27/2022

I. Plan Overview

1. Executive Summary

Tennessee's two land-grant institutions comprise the Tennessee Agricultural Research and Extension System. They work independently and collaboratively to conduct Research and Extension programs in all 95 counties and to serve the state's 6.9 million people. The University of Tennessee is based in Knoxville and serves as the state's 1862 institution. It includes the University of Tennessee Extension (UT Extension) and the Tennessee Agricultural Experiment Station (UT AgResearch). Based in Nashville, Tennessee State University is the state's 1890 institution; it includes the Tennessee State University (TSU) Cooperative Extension Program and the TSU Institute for Food, Agriculture and Environmental Research. The TSU Cooperative Extension Program has county agents in 50 counties, co-located with UT Extension in local county extension offices. This 2022-2026 Plan of Work represents the combined efforts of UT Extension, UT AgResearch, TSU Cooperative Extension Program, and the TSU Institute for Food, Agriculture and Environmental Research.

Agriculture is integral to Tennessee's economy and culture. Almost one of every eight to nine dollars generated in the state is associated with agriculture or an industry that generates products from a natural resource - more than $79.3 billion annually. In addition, nearly 339,000 Tennesseans are directly employed by agricultural or natural resource industries, making effective research and Extension programs critical. Tennessee's land-grant institutions conduct research and provide Extension outreach in five key areas to address critical issues affecting the state: supporting food, fiber, and energy systems; enhancing biodiversity and environmental quality; enriching our economy; developing our workforce; and strengthening our health. Research projects provide new knowledge to help stakeholders address issues that affect them. Extension and education activities share that knowledge with stakeholders ultimately to result in a change in action or condition.

The COVID-19 pandemic has impacted Tennessee's agricultural and forest-based industries in a variety of ways. The state's agricultural and related exports were $1.9 billion in 2020, down $143 million or 7% from 2019. In fact, Tennessee experienced declines in all major commodity categories (cattle and calves, soybeans, broilers, horticultural products, corn, cotton, dairy products, and tobacco) in 2020. The range of these impacts include downward pressure on commodity prices that have reduced farm incomes; a loss of food and fiber processing and retailing sales; and one in 10 families in Tennessee revealing they were food insufficient during the peak months of the pandemic.

Tennessee's land-grant system also has felt the impact of the COVID-19 pandemic. Both UT and TSU have experienced significant disruptions in the execution of our planned programs in research and Extension. Even though our Extension professionals have done an admirable job of utilizing alternative means to fulfill needs for outreach, and our research scientists have gone through extraordinary measures to keep research projects (especially field experiments) alive and on track, full capacity will not be achieved until the country has the virus contained.

UT Extension conducted a far-reaching strategic planning effort in 2010 to map the future for the coming years. This extensive strategic planning effort informed this Plan of Work. The process of conducting an updated strategic plan for UT Extension began in 2019 and continued into 2020. With the challenges of the COVID-19 pandemic the strategic planning process will extend into 2021.This planning process has been guided by a diverse leadership team representing a cross-section of employees from across the state, including TSU Extension, and this team has been instrumental in collecting and analyzing data. As part of this process, the opinions from many Tennesseans, including decision-makers, clientele, partners and volunteers were considered. More than 120 stakeholders and 490 UT Extension employees participated in the regional and campus listening sessions. The planning effort also included an online survey component.

During this reporting year, Extension will continue to provide programs to address the needs of the state. Health issues

continue to be top concerns for residents. Extension will strengthen health programming by offering the CDC Diabetes Prevention Program and provide programs for improving dietary and physical activity for limited-resource Tennesseans. In an effort to strengthen our Extension and research for the state's beef cattle producers, researchers and Extension personnel will jointly implement research and outreach in hay schools, late gestation nutrition, marketing, forage testing, and stockpiled forages. The dairy industry in Tennessee has suffered heavy losses in recent years due to the inability to market their products. Tennessee Extension has developed programs to strengthen the dairy industry and provide value-added opportunities for producers. Workforce development programs for youth and adults will continue to be of top priority for Tennessee Extension. Workforce development programs such as Skill Up Tennessee and Tennessee 4-H Workforce Preparation – Achieving Goals and Communicating will be conducted. Skill Up Tennessee assists eligible SNAP participants in gaining skills, training, work or experience that will increase their ability to obtain regular employment. The ultimate goal of the program is self-sufficiency.Tennessee 4-H Workforce Preparation programs help youth to acquire new skills and increase aspirations regarding the life skills of achieving goals and communicate effectively.

TSU Extension also conducted internal needs assessment and SWOT analysis in 2019-2020 by collecting the input from its county Extension agent and campus-based Extension faculty. As a result, action plan was prepared to make TSU Extension more relevant and impactful to the people we serve. TSU Extension has appointed Program Leaders in family and consumer sciences, 4-H youth development, and agriculture and natural resources to provide linkage with program areas between UT and TSU Extension. These appointees also serve on the TSU Extension Programming Council to coordinate integrated and interdisciplinary programming efforts. TSU Extension faculty was provided with goals and expectations to prepare and distribute research based teaching material to our TSU agents. They were also given the expectation to strengthen educational ties with our Extension stakeholders.

UT AgResearch conducts research within its eight academic departments and seven physical centers (in addition to several virtual centers), and at ten AgResearch and Education Centers located throughout the state. These units help drive planned research programs and facilitate the faculty’s research projects. In addition to “A Decade of Excellence: Ten-Year Strategic Plan for UTIA, 2018-2028,” AgResearch operates under the guidance of its “2021-2024 AgResearch Strategic Action Plan” (ASAP) with the objectives to balance a portfolio of integrated, inter-disciplinary programs, cultivate teams to approach complex problems, advance concepts with structured support, and to ensure research and development capacity with targeted investment. An ASAP Director oversees implementation of the plan in concert with a newly established Faculty Innovation Council.

Under the ASAP, AgResearch will focus on four main identified programmatic themes to establish integrated programs to accelerate new solutions to complex problems. The UT One Health Initiative is a UTIA-led collaborative involving UT Knoxville and Oak Ridge National Laboratory to identify and define the complex relationships between ecosystem health and human health, and to build research strategies that effectively utilize team skills to provide solutions to pressing issues. The emerging Digital Agriculture program builds on the diverse skills of researchers across UTIA, UTK and ORNL to establish a transdisciplinary approach to accelerate digital, or precision, agriculture technology. It includes both plant and animal management projects addressing aspects of sensor development and ultimately will contribute information to refine strategies for carbon reductions over today’s agriculture systems. The transformational Agricultural Genomics and Synthetic Biology program will advance animal and plant-based productivity and resilience. Although early in its development, the initiative engages faculty across UTIA to advance state-of-the-art science to design crops for new functions under challenging issues associated with climate change. The BioEconomy Advancement initiative is an established interdisciplinary, multi-departmental program focused on sustainable fuels, chemicals, and materials from stranded resources. It has highlighted the potential for team research to accelerate progress and have greater impact. Opportunities to move in new directions to meet shifting priorities are available, including the need for R&D in sustainable aviation fuels. In addition to these programmatic themes, AgResearch will look ahead to idenifty the next critical areas that may emerge in the forseeable future.

Through the Institute of Agricultural and Environmental Research, the of goal of agriculture research at Tennessee State University is to create and communicate new knowledge in the agricultural and environmental sciences. Through our innovative research, we address the needs of humankind, focusing on finding solutions to challenges faced by socially and economically disadvantaged groups, and contributing to the prosperity of the citizens of Tennessee, the nation, and the world. Utilizing faculty in the in the Department of Agricultural and Environmental Sciences and the Department of Human Sciences, our research is coordinated through 10 focus groups in the plant, animal, food, and human sciences. These faculty-led groups facilitate the identification of critical research priorities of importance to stakeholder groups and the pursuit of collaborative approaches to address those priorities. This approach and emphasis on relevance has led to

Tennessee State University consistently being the top 1890 institution in NIFA competitive grant funding.

Despite the challenges imposed by COVID, TSU IFAgER continues to expand research capabilities through the addition of new faculty in biotechnology, hemp production, and agricultural economics. We are also moving forward with the construction phase of a new stand-alone Food Science and Technology Building that will support our expanding expertise in food technology and food safety. In addition to our network of campus-based laboratory and research facilities, our faculty utilize three Agricultural Research and Education centers across the state to support their research. The Agricultural Research and Extension Center associated with the TSU main campus was heavily damaged by a tornado in the spring of 2020. Although field operations have partially resumed, all greenhouse, shadehouse, and indoor activities at the facility have ceased. The timeline for rebuilding dictates that research that requires these facilities will be significantly delayed for at least another year.

This Plan of Work includes estimated FTEs, merit/peer review processes, methods to obtain and utilize stakeholder input, and the critical issues that drive research and Extension priorities at the University of Tennessee and Tennessee State University. Stakeholder input and statewide needs assessments may result in a shift of allocations and FTE assignments between and among critical issues from year to year.

2. FTE Estimates

Year	1862 Extension	1890 Extension	1862 Research	1890 Research
2022	452.1	90.0	250.0	80.0
2023	452.1	90.0	250.0	80.0
2024	452.1	90.0	250.0	80.0
2025	452.1	90.0	250.0	80.0
2026	452.1	90.0	250.0	80.0

II. Merit / Peer Review Process

Tennessee Extension programs funded by Smith-Lever or NARETPA Section 1444 and 1445 require a merit review process. A panel of Extension administrators, program leaders and scholars from four states reviewed and approved the Tennessee Extension merit review criteria. Criteria includes assessing needs, delivery methods, implementation steps, evaluation, ensuring diversity and defined outcomes. UT and TSU coordinate merit review processes. State Extension specialists propose planned programs. All proposed programs are reviewed and approved by a review team of UT and TSU Extension administrators and specialists.

UT AgResearch Hatch regular and Hatch/Multi-state research projects also undergo a review process for merit and scientific soundness, and to ensure that they align with established research priorities. The review process for Hatch regular research projects begins informally with discussions between the project director, colleagues, the department head, and, if applicable, AgResearch and Education Center administrators where any work may take place. A review panel of three scientists evaluates the proposal for clarity and scientific merit (that should lead to publishable data). The project director makes any necessary changes then submits the proposal to the department head. If approved, the Dean/Director of AgResearch then conducts a final review and approves the proposal for submission to NIFA.

Hatch/Multi-state projects go through a comparatively more complex review at the regional level, so the internal review process is abbreviated. The faculty member officially joins a multi-state project after consulting with colleagues and, if applicable, the AgResearch and Education Center administrators where work may take place. He/she then submits a project proposal reflecting the UT component directly to the Associate Dean/Associate Director of AgResearch. The researcher may submit the project to NIFA once the review is complete and any necessary changes are made.

As per NIFA recommendations, each proposed TSU research program is peer-reviewed for relevancy and practicality. The review is performed by subject-specific faculty focus groups and the college administration. Our newly-appointed Associate Dean for Research is implanting a plan to facilitate additional reviews by external subject matter experts in the

1890 and 1862 Land-grant system. Faculty proposals within the Critical Issues are evaluated for relevance, scientific soundness, and appropriateness of planned outcomes. Following evaluation and recommended modification, only those proposed programs that successfully meet all criteria are developed into executable outcome objectives.

The TSU College of Agriculture continues to provide dedicated time and monetary support for focus group members to hold off-campus retreats to discuss, evaluate, and plan program objectives without the distractions of campus life. Also, the Associate Deans of the college continue to hold regularly scheduled group and individual meetings with faculty members to review research priorities, Extension work plans and progress. These meetings facilitate an almost continual avenue for monitoring of progress and problem resolution. The above procedures contribute significantly to ensuring that projects under the Critical Issues are executed efficiently and with maximum benefit to stakeholders.

III. Stakeholder Input

1. Actions to Seek

UT and TSU Extension pursued multiple data collections for this Plan of Work. All 95 counties have local Extension advisory groups that provide ongoing stakeholder input. The UT-TSU Extension State Advisory Council reviews and updates plans bi-annually. Extensive strategic plan activities also informed this plan. Employees, community members and state agency leaders participated in surveys, listening sessions and focus groups to identify critical issues affecting their communities and how Extension could address these concerns. Based on this input, the State Extension Advisory Council identified plan priorities. New state action agendas were created to address priorities. Plans are reviewed annually to determine progress and make changes.

UT AgResearch continues to seek stakeholder feedback through several means. The UT Commission on Agriculture holds public meetings twice per year to provide valuable feedback to UT leadership. Three UTIA Regional Advisory Councils meet twice per year to discuss agricultural and natural resources issues, UTIA program priorities, and how UTIA, including UT AgResearch and UT Extension, may respond to these issues. Successful partnerships with commodity and industry groups, the Tennessee Farm Bureau, and several departments within the Tennessee state government are beneficial to the advancment of of common research interests. Advocacy/advisory groups serve the UT AgResearch academic departments and the ten AgResearch and Education Centers at the invitation of the department head and Center director, respectively, to provide stakeholder feedback and to guide future research priorities. Faculty help drive the UT AgResearch agenda by remaining abreast of emerging research and actively engaging with the scientific community, program leaders with state and federal funding agencies, the general public, and agricultural and natural resources commodity and industry groups.

Through the development of relationships with the leadership and members of stakeholder-related organizations, TSU research obtains valuable stakeholder input concerning research priorities. TSU research and Extension places a very strong emphasis on our faculty to partner with the industry, trade, commodity, or professional organizations associated with their respective program areas. In addition to interacting with industry, trade, commodity and professional organizations, faculty are encouraged to assume leadership roles in the organizations. Examples of associations in which our faculty have enhanced roles of engagement are the: Entomological Society of America, American Phytopathology Society, American Society of Agronomy, Southern Nursery Association, Tennessee Soybean Board, Tennessee Cattlemen's Association, Amaranth Institute, Tennessee Organic Growers Association, Tennessee Nursery and Landscape Association, SE Branch-Entomological Society of America, International Plant Propagator's Society, Tennessee Goat Producers Association, and the Tennessee Urban Forestry Council.

In addition to private groups, TSU faculty regularly engage public agencies to provide guidance and feedback about our programs. Agencies include USDA/NIFA, USDA/APHIS, USDA/ARS, USDA/FSA, USDA/FS, USDA/NRCS, USDA/ERS, USDA RMA, Tennessee Department of Agriculture, Tennessee Department of Forestry, Tennessee Plant Material Advisory Committee, Tennessee Wildlife Resources Agency, and the Tennessee Department of Environment and Conservation. A number of different programs maintain an active presence on social media and utilize feedback gained from those sources in their programs.

2. Methods to Identify

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3. Methods to Collect

Tennessee Extension (UT/TSU) Agents and Specialists are trained in needs assessment strategies and how to select

individuals for Advisory Committees. Community leaders selected for Advisory Committees are chosen to represent the diversities (i.e.,gender, age, racial/ethnic, socio-economic, political, educational, etc.) of the county or area served. The UT Commission on Agriculture conducts public meetings twice per year (specific to UT Extension). Extension Agents recruit individuals who have participated in past and current Extension programs; and they recruit individuals who have not used Extension to serve on local advisory committees and participate in open listening sessions. Extension Agents also conduct surveys on planned program areas.

UT AgResearch collects input through regular contact with stakeholders. The UT Commission on Agriculture and the UTIA Regional Advisory Councils meet twice per year. The UT Senior Vice President for Agriculture responds to any issues raised, and, as appropriate, may delegate action to the Deans/Directors of UT AgResearch and UT Extension. UT AgResearch administrators meet with external stakeholders throughout the year. They have face-to-face meetings with the academic department heads and virtual meetings with the AgResearch and Education Center directors monthly; collectively they meet once per year. The academic departments and AgResearch and Education Centers meet with their advocacy/advisory groups annually, and share stakeholder feedback with AgResearch administrators and faculty as appropriate. Faculty attend professional meetings and read scientific journals and popular press articles throughout the year. Departments hold monthly faculty meetings where individuals have the opportunity to share their insights with peers and their department head.

TSU research collects input from stakeholders by interactions with commodity groups via survey instruments or face-to-face discussions. Survey instruments are a useful tool to assess information from broader groups of stakeholders. The face-to-face discussions are often held with individual stakeholders, community group representatives or trade association representatives, or with individual stakeholders in a group setting. These interactions allow for questions and answers to direct and stimulate discussion of areas important to stakeholders. Many research programs regularly employ surveys of stakeholders to solicit feedback on important issues; surveys for feedback on individual topics are also used following informational talks at educational programs, field days, etc. While some stakeholders prefer the anonymity and brevity of a survey instrument (often resulting in increased level of input gained), it does not always allow for discussion of previously unrecognized areas of concern. The increased acceptance of social media presents opportunities for stakeholder input. Many programs maintain an active presence on social media; these platforms serve as a source of information on stakeholder needs and concerns. Research presentations to non-academic stakeholders solicit feedback via evaluations; information gained is incorporated into program focus areas.

Also, as previously discussed, TSU College of Agriculture is the process of creating a Strategic Advisory Board of individuals representing decision-makers from industry, government, and commodity groups. This board will provide invaluable coordinated, stakeholder-based input and programmatic direction to our research and Extension programs.

4. How Considered

Created from stakeholder input, the State Extension Strategic Plan for 2010-2020 identified emerging issues, redirected Extension programs, built state action agendas and set program priorities. Based on stakeholder input, the performance measures at local, regional, and statewide level are monitored and adjustments to the deployment of the strategic plan are considered. UT Extension will develop and expland program areas based on the needs of the state and address the five critical issues outlined in this Plan of Work.

Stakeholder input is an active part of setting UT AgResearch budget priorities and redirecting allocations as critical needs emerge, are addressed, and wane. Stakeholder input directly impacts hiring patterns, faculty equipment budgets, scientific communication efforts, forward-looking action plans, and grant-writing directions.

TSU Extension will continue to use extensive stakeholder input to determine what extension faculty positions and extension agent positions are needed for the state of Tennessee. TSU Extension will also continue to partner with UT Extension, county extension offices and extension advisory councils to determine staffing needs, emerging issues and determine priority areas for Tennessee.

Based on a needs assessment, TSU Extension implemented a program called, "Tennessee New Farmer Academy" for farmers, ranchers and returning veterans, to address the need of shortage of production farmers due to aging farm population. We have also expanded the locations to each region of the state. TSU Extension small and minority farms outreach program has been supporting minority and small farmers in Tennessee. It offers several two-day outreach conferences across the state to serve small, minority and women farmers.

As previously stated, TSU research utilizes stakeholder input during the planning and execution of research programs. Information gained through this process did not result in any overt changes in research direction or scope this past year. Rather, it provided information on additional facets for research exploration. For example, discussions with nursery growers and regulatory agencies has led to a major emphasis being placed on education and research in an emerging disease affecting our nursery industry, Boxwood Blight. Continued concerns over consumer health and food safety issues drives our emphasis in research in these areas. these areas of research. These new, or additional information changes, are examples of stakeholder-inspired modifications we encounter most frequently.

IV. Critical Issues

1 Supporting Food, Fiber, and Energy Systems

Description:

Safe, sustainable agricultural systems that are socially, economically, and environmentally responsible are key to enhancing the lives of Tennesseans and supporting a growing global population. We are exploring ways to deliver discoveries using a systems approach to agriculture productivity that will provide customizable solutions for producers.

Term: Long

Science Emphasis Areas

Agroclimate Science
Bioeconomy, Bioenergy, and Bioproducts
Environmental Systems
Family & Consumer Sciences
Food Safety
Human Nutrition
Sustainable Agricultural Production Systems

2 Enhancing Biodiversity and Environmental Quality

Description:

Safeguarding and enhancing the natural resource environment has become increasingly complex within environmental, social, resource and personal contexts. Through collaboration among researchers, industry, producers, environmental groups, and government, we are helping preserve a diverse and resilient environment for future generations.

Term: Long

Science Emphasis Areas

Agroclimate Science
Bioeconomy, Bioenergy, and Bioproducts
Environmental Systems
Sustainable Agricultural Production Systems

3 Enriching Our Economy

Description:

Helping farms and agriculture businesses become more profitable and individuals become financially secure boosts the local, state, and national economies. Our programs strive to strengthen the economic viability of all facets of agribusiness, and improve the financial literacy of Tennesseans and beyond so they may build and protect wealth for themselves and future generations.

Term: Long

Science Emphasis Areas
Family & Consumer Sciences
Food Safety
Sustainable Agricultural Production Systems
Youth Development

4 Developing Our Workforce

Description:
A key component for thriving communities is a strong workforce in rural and urban areas. Tennessee's programs for youth and adults provide the skills, experience, and confidence necessary to move into a competitive workforce and solve present and upcoming challenges. Through outreach and engagement, we also educate youth to better understand the vital role that agriculture and animal industries play in people's lives and the career opportunities these industries provide.

Term: Long

Science Emphasis Areas
Education and Multicultural Alliances
Family & Consumer Sciences
Food Safety
Sustainable Agricultural Production Systems
Youth Development

5 Strengthening Our Health

Description:
Making healthy choices is important for humans, animals, and even our planet. As a leader in nutrition, animal welfare, and environmental education, we are working to understand how food, physical activity, and social connections affect overall health (i.e. One Health). From food safety to disease prevention and maintenance to the state of our environment, these efforts will help Americans and the rest of the world lead healthier lives for generations to come.

Term: Long

Science Emphasis Areas
Environmental Systems
Family & Consumer Sciences
Food Safety
Human Nutrition
Sustainable Agricultural Production Systems
Youth Development