



James E. “Bud” Smith Plant Materials Center

2022 Progress Report of Activities

December 2022

The mission of the USDA – Natural Resource Conservation Service (NRCS) Plant Materials Program and the James E. “Bud” Smith Plant Materials Center (TXPMC) is to develop and transfer effective state-of-the-art plant science technology to meet customer and resource needs by conducting plantings, studies, and evaluations throughout the assigned conservation-resource areas.

The XPMC, established in 1965, is located 5.5 miles northwest of Knox City, Texas, in the Rolling Red Plains Major Land Resource Area (MLRA). Additionally, TXPMC is one of 25 federally funded Plant Materials Centers (PMC) strategically placed throughout the United States, and one of three PMCs in Texas.

The TXPMC develops conservation plants and cultural techniques for use within targeted MLRAs in Texas, Oklahoma, Kansas, Colorado, and New Mexico. Furthermore, TXPMC produces Breeder and Foundation seed of conservation plant releases for commercial production and promotes the plants for use in natural resource conservation efforts. The TXPMC serves 136 counties in Texas that comprises parts of 25 MLRAs, and 39 counties in southwestern Oklahoma comprising parts of 13 MLRAs. The TXPMC also serves seven counties in southwestern Kansas including parts of four MLRAs, one county in the southeastern corner of Colorado comprising parts of three MLRAs, and seven counties in eastern New Mexico comprising parts of seven MLRAs.

Plant and technology development objectives of the James E. “Bud” Smith Plant Materials Center.

Soil Health	Saline Site Restoration
Wind and Water Erosion Control	Range and Pasture Management
Wildlife Habitat Improvement	Water Quality Improvement on Agricultural Land
Support Climate Smart Agriculture Initiatives	Support and Train Local Field Office Staff

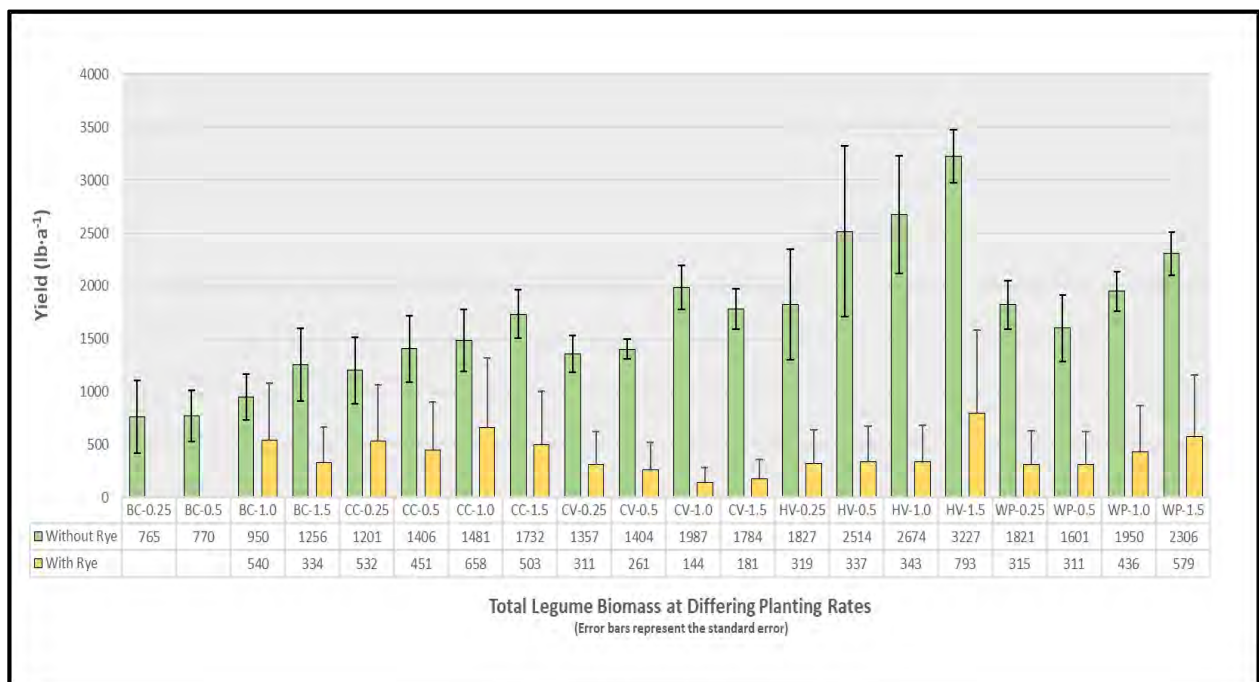
Studies:

Biomass evaluation of cool season legumes grown at differing seeding densities, with and without a rye cover, in the Texas Rolling Red Plains

The TXPMC has been partnering with the Southern Cover Crop Council (SCCC) and North Carolina State University (NCSU) evaluating seeding rates and biomass production of legumes and cereal rye over the past few years. The purpose of this study was to evaluate biomass produced by five cool season legumes grown at differing seeding densities as a monoculture and as a component in a multispecies mix. “Frosty” berseem clover (*Trifolium alexandrinum*), “Dixie” crimson clover (*Trifolium incarnatum* L.), VNS common vetch (*Vicia sativa*), “AU Merit” hairy vetch (*Vicia villosa* Roth), and “Wyo” winter pea (*Pisum sativum* L.) were sown at

planting rates of 25, 50, 100, and 150% of the suggested Sustainable Agriculture Research and Education (SARE) planting rates as a monoculture and as a component of a cover crop mix with “Wrens Abruzzi” cereal rye (*Secale cereal* L.) planted at 30.0 lb·a⁻¹. Data were not statistically different; however, there were some notable observations. Berseem clover (540 lb·a⁻¹ versus 334 lb·a⁻¹) and crimson clover (658 lb·a⁻¹ versus 503 lb·a⁻¹) produced more biomass (when planted with a rye cover) at the 100% versus 150% planting rate, respectively. Common vetch (CV-1.0) produced 1987 lb·a⁻¹ compared to CV-1.5 (1784 lb·a⁻¹) when planted without a rye cover. Additionally, WP-0.25 yielded 1821 lb·a⁻¹, which was greater than WP-0.5 (1601 lb·a⁻¹) when planted without a rye cover. Hairy vetch (HV-1.5, 150%) produced the greatest biomass, with and without a rye cover, of 793 lb·a⁻¹ and 3227 lb·a⁻¹; respectively, of all species.

Increasing the seeding rate of the annual legumes evaluated in this study did not significantly increase biomass when planted with and without cereal rye. Cereal rye produced the most consistent biomass regardless of the legume species or legume seeding rate. These data suggest lower planting rates were as productive as full planting rates for these specific [annual] cool season cover crop species. Additional testing on different soils and under different climatic conditions in northwest Texas and southern Oklahoma are needed to verify these findings.



Graph showing biomass production (lb·a⁻¹) of five legume species at differing planting rates, with and without a rye, grown at the USDA - NRCS James E. “Bud” Smith Plant Materials Center.

Evaluation of hairy vetch and crimson clover varieties in the Texas Red Rolling Plains to increase germplasm resources

The TXPMC partnered with the USDA – Agricultural Research Service (ARS), numerous universities, and other USDA – NRCS PMCs across the U.S. to evaluate superior lines of hairy vetch (*Vicia villosa*), crimson clover (*Trifolium incarnatum*), and winter pea (*Pisum sativum*). The purpose of this collaborative project is to evaluate legume cover crop germplasm selections

from previous years’ breeding efforts to identify the top performers in differing climatic and agronomic environments. Once these legumes are released, NRCS will incorporate them into their cover crop practice standard (Code 340).

The TXPMC evaluated 21 hairy vetch lines and 13 individual crimson clover lines in 2022. These germplasms will be evaluated again in fiscal year (FY) 2023, and possibly FY 2024, to advance cover crop germplasm resources. All collected data were released to the USDA – ARS in Madison, Wisconsin, for further analysis.



Hairy vetch varieties (foreground) and crimson clover varieties (background). Each varietal line is separated by one or two rows of triticale’. These genetic lines are being evaluated at the James E. “Bud” Smith Plant Materials Center near Knox City, Texas.

Plant Development and Collections:

Plant Development

Blue salvia (*Salvia azurea*) and willowleaf sunflower (*Helianthus salicifolius*) are under additional years of comparative evaluations to document their performance within the Texas Rolling Red Plains. Fiscal Year 2022 was drier than normal during the growing season (April – September) and provided an opportunity to evaluate these plants under below normal precipitation condition. Total rainfall from April – September averages 15.22 inches, while 12.47 inches were received during the same timeframe in 2022. Furthermore, these collections will be evaluated an additional year at TXPMC before making selections and implementing off-center evaluations with regional cooperators.



Blue salvia (left) and willowleaf sunflower (right) under evaluation at the James E. “Bud” Smith Plant Materials Center during Fiscal Year 2022.

Plant Collections

The TXPMC relies heavily on field office staff to assist with plant collections used in our evaluations. These materials ensure that future plant releases represent a broad area of adaptation. Currently, the TXPMC is collecting the following native plant species for conservation use:

- Indian blanket (*Gaillardia pulchella*)
- Golden prairie clover / golden dalea (*Dalea aurea*)



*Indian blanket
(Credit: Norman G. Flaigg, Lady Bird Johnson Wildflower Center)*



*Golden dalea or golden prairie clover
(Credit: Campbell and Lynn Loughmiller, Lady Bird Johnson Wildflower Center)*

Seed Production:

The TXPMC is responsible for producing breeder seed of cultivar releases and first generation (G0) seed of pre-varietal germplasm releases. In 2022, new and larger breeder blocks were established to facilitate the increased demand for specific species in north-central and west Texas, southwestern Oklahoma, and eastern New Mexico ecoregions. One-quarter acre breeder



Combine harvest of Kerr Germplasm wright pavonia at the James E. “Bud” Smith Plant Materials Center.



blocks were established for Cuero Germplasm purple prairie clover (*Dalea purpurea*), Hondo Germplasm velvet bundleflower (*Desmanthus velutinus*), Plains Germplasm prairie acacia (*Acacia angustissima*), and “Haskell” sideoats grama (*Bouteloua curtipendula*). Currently, TXPMC maintains and supplies seed for twenty-seven conservation plant releases.



Breeder blocks of native plant releases grown at the James E. “Bud” Smith Plant Materials Center.

Prominent native plant releases maintained at the James E. “Bud” Smith Plant Materials Center. Visit our website for more information on these and other conservation plants released by TXPMC and its cooperators.

“Eldorado” Engelmann’s daisy (<i>Engelmannia peristenia</i>)	“Sabine” Illinois bundleflower (<i>Desmanthus illinoensis</i>)
“Aztec” maximilian sunflower (<i>Helianthus maximiliani</i>)	“Alamo” switchgrass (<i>Panicum virgatum</i>)
OK Select Germplasm little bluestem (<i>Schizachyrium scoparium</i>)	Plains Germplasm prairie acacia (<i>Acacia angustissima</i>)
Cuero Germplasm purple prairie clover (<i>Dalea purpurea</i>)	“Comanche” partridge pea (<i>Chamaecrista fasciculata</i>)



Aerial view of the James E. “Bud” Smith Plant Materials Center near Knox City, Texas. Photo courtesy of Google Maps (copyright).



Contact information for TXPMC

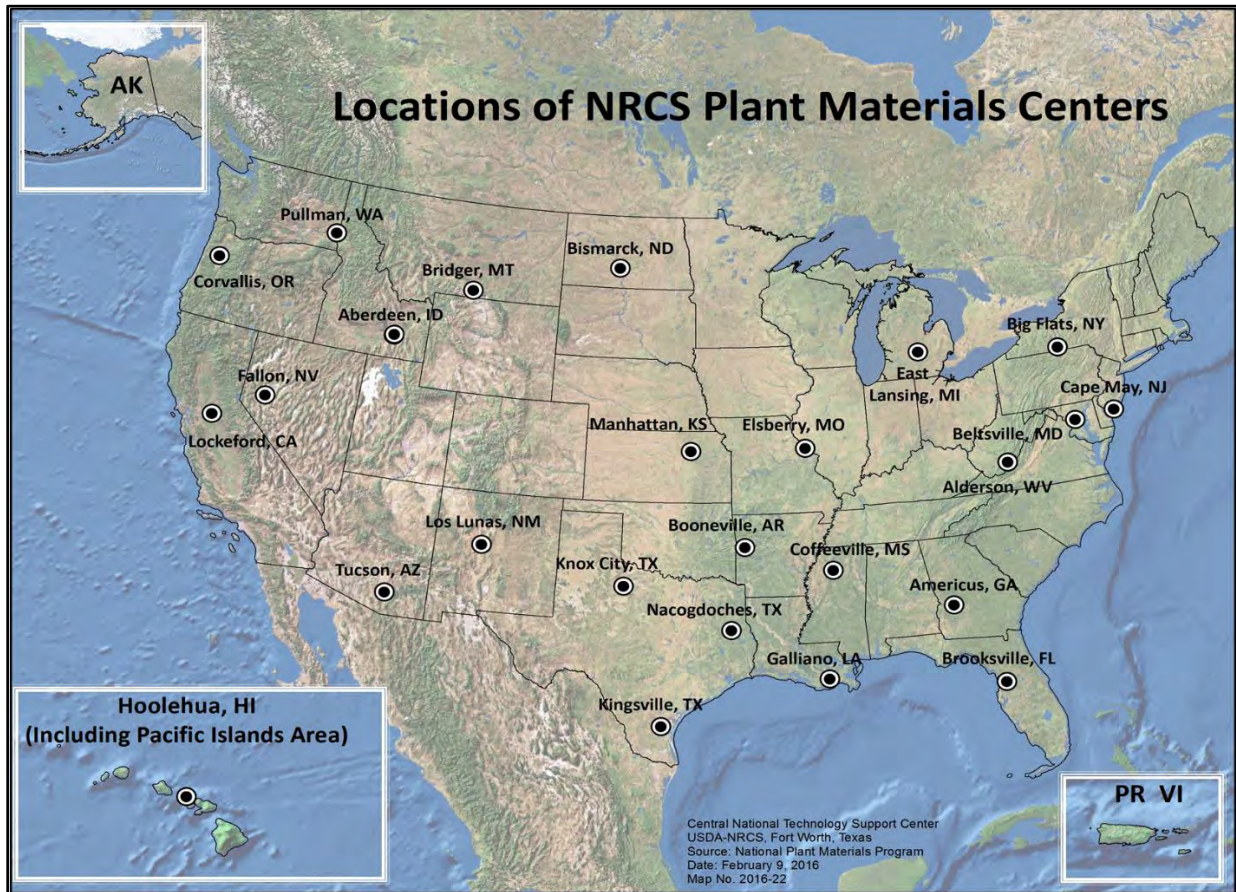
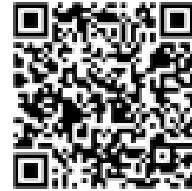
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Locations of the 25 USDA - NRCS Plant Materials Centers throughout the United States of America.



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