Water Use of Old World Bluestems in the Texas High Plains: SSARE research summary, 2001-2003

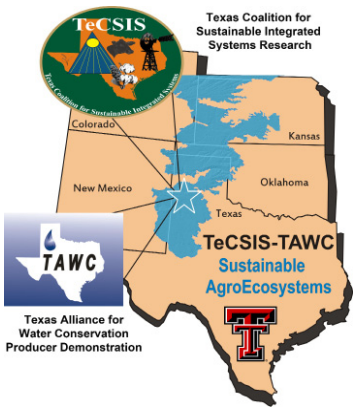
One can't talk about agriculture in the Texas High Plains without including "water" in the same sentence. The Ogallala Aquifer, which has kept ag production humming for nearly a century, is running low. Agriculture in the Texas Panhandle and Southern Plains is adapting to decreased water availability.

For nearly two decades, researchers and producers across the Texas High Plains have been developing integrated crop/livestock production systems that address the growing need for water conservation, while keeping soils fertile, crop yields profitable, cattle production thriving, and surrounding communities viable.

Funded through nearly $1.5 million in Southern SARE Research & Education, Large Systems and Graduate Student grants, the results showcase long-term alternative production systems, and how those results are being translated into practical field production practices and sustainable agriculture applications.

This model of sustainable agroecosystems in the Texas High Plains is changing the face of agriculture in the region and helping to conserve water, improve soil health, boost ag profits and keep the High Plains region thriving for generations to come.

This bulletin highlights SSARE-funded work from 2001-2003 (**GS02-012**, *"Optimizing Water Use for Three Old World Bluestems in the Texas High Plains"*.)



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Introduction:

Declining water reserves in the Ogallala Aquifer across the Texas High Plains require research efforts to find solutions for alternative agricultural systems that reduce overall water use. Old world bluestem grass species are widely grown in the Texas High Plains as they offer opportunities for livestock grazing, hay, and seed production. However, little information is available on their water use efficiencies.

In a Southern SARE-funded Graduate Student Grant (**GS02-012**), "*Optimizing Water Use for Three Old World Bluestems in the Texas High Plains*," Texas Tech University researchers evaluated three old world bluestem species under dryland, and low, medium and high irrigation levels to determine water use efficiency, yield and nutritive value over a three-year period.

Research Summary:

'Caucasian' bluestem, WW-Spar bluestem, and WW-B.Dahl bluestem were evaluated. Results indicated that 'Caucasian' and 'Dahl' bluestem species were superior to 'Spar' bluestem. With superior cold tolerance, 'Caucasian' bluestem may have greater application than 'Dahl' in more northern areas of the Texas High Plains, but 'Dahl' is more widely adopted by farmers in the region.

Research Objectives:

The overall objective of the research project was to determine forage growth and nutrient yield per unit of added water for the three warm-season perennial grasses in the southern Texas High Plains.

Research Results:

Results from all three years of the study indicated that 'Dahl' bluestem and 'Caucasian' bluestem were similar in water use efficiency, and both outperformed 'Spar' bluestem in each year by about 30 percent. Data indicated that either 'Dahl' or 'Caucasian' provided more biomass and higher nutrient yield than 'Spar' under any moisture regime, but particularly under limited or no irrigation. Dry matter production per dollar invested in irrigation water was greater for 'Caucasian' than for 'Spar' bluestem across all levels of irrigation, but results were inconsistent for 'Dahl' bluestem.

For a more detailed analyses of the research results, visit the national SARE projects database and search by project number **GS02-012**, "*Optimizing Water Use for Three Old World Bluestems in the Texas High Plains*."

Published papers: Philipp, D., V.G. Allen, R.B. Mitchell, C.P. Brown, and D.B. Wester. 2005. Forage Nutritive Value and Morphology of Three Old World Bluestems Under a Range of Irrigation Levels. *Crop Sci. Soc. Amer.* 45:2258-2268.

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Dirk Philipp, PhD student at Texas Tech University, sprays weeds as part of the SSARE-funded research project. Photo credit: Philip Brown, Texas Tech University

High Plains Water Conservation Resources

General Information

Texas Coalition for Sustainable Integrated Systems (TeCSIS)
http://www.orgs.ttu.edu/forageresearch/

Texas Alliance for Water Conservation
http://www.depts.ttu.edu/tawc/

TAWC Solutions
http://www.tawcsolutions.org/

Texas Water Development Board
http://www.twdb.texas.gov/groundwater/aquifer/majors/ogallala.asp

Texas High Plains Water District
http://www.hpwd.org/

USDA-ARS Ogallala Aquifer
http://ogallala.ars.usda.gov/

Publications

High Plains Water Conservation Bulletin No. 1: Water Conservation in the Texas High Plains

High Plains Water Conservation Bulletin No. 2 : Sustainable Crop/Livestock Systems in the Texas High Plains Phase I

High Plains Water Conservation Bulletin No. 3: Sustainable Crop/Livestock Systems in the Texas High Plains Phase II

High Plains Water Conservation Bulletin No. 4: Sustainable Crop/Livestock Systems in the Texas High Plains Phase III

High Plains Water Conservation Bulletin No. 5: Diversifying in the Texas High Plains

High Plains Water Conservation Bulletin No. 6: Agroecosystems Economics in the Texas High Plains

High Plains Water Conservation Bulletin No. 7: Soil Quality of Integrated Crop/Livestock Systems

High Plains Water Conservation Bulletin No. 8: Texas Alliance for Water Conservation

High Plains Water Conservation Bulletin No. 10: Cover Crops and Cotton in the Texas High Plains

High Plains Water Conservation Bulletin No. 11: Agroecosystems Research in the Texas High Plains

Grant Projects

GS15-152 Evaluation of Winter Annual Cover Crops Under Multiple Residue Managements: Impacts on Land Management, Soil Water Depletion, and Cash Crop Productivity

LS14-261 Long-term Agroecoystems Research and Adoption in the Texas Southern High Plains: Phase II

LS11-238 Long-term Agroecosystems Research and Adoption in the Texas Southern High Plains: Phase I

LS10-229 Integrated Crop and Livestock Systems for Enhanced Soil Carbon Sequestration and Microbial Diversity in the Semiarid Texas High Plains

LS08-202 Crop-livestock Systems for Sustainable High Plains Agriculture

LS02-131 Forage and Livestock Systems for Sustainable High Plains Agriculture

GS07-056 Allelopathic effects of small grain cover crops on cotton plant growth and yields

GS02-012 Optimizing Water Use for Three Old World Bluestems in the Texas High Plains

LS97-082 Sustainable Crop/Livestock Systems in the Texas High Plains

Journal Articles

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Allen, V.G., M.T. Baker, E. Segarra, and C.P. Brown. 2007. Integrated Irrigated Crop-Livestock Systems in Dry Climates. *Agronomy Journal* 99:346-360.

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