

Byron L. Burson

Research Geneticist, USDA-ARS, Southern Plains Agricultural Research Center and
Adjunct Professor, Dept. of Soil & Crop Sciences, Texas A&M University, College Station, Texas

Education/Training

1967 Ph.D. Plant Breeding and Cytogenetics, Texas A&M University
1965 M.S. Plant Breeding and Cytogenetics, Texas A&M University
1962 B.S. Agronomy, Oklahoma State University

Positions and Employment

2000-present Member, Molecular and Environmental Plant Sciences Faculty, Texas A&M University
1994-present Adjunct Professor, Dept. of Soil & Crop Sciences, Texas A&M University
1993-present Research Geneticist, USDA-ARS, Southern Plains Agricultural Research Center, College Station, Texas
1975-1993 Research Geneticist, USDA-ARS, Grassland, Soil & Water Research Laboratory, Temple, Texas
1967-1975 Assistant & Associate Professor, Dept. of Agronomy, Mississippi State University
1965-1967 Research Assistant, Dept. of Soil & Crop Sciences, Texas A&M University
1962-1965 NDEA Fellow, Dept. of Soil & Crop Sciences, Texas A&M University

Program Overview

Research activities are focused on the breeding of perennial, warm-season grass species for the eventual development of improved germplasm and cultivars to be used for forage and bioenergy purposes. Because most of these grasses are apomictic and cytologically complex, this research includes investigating the cytogenetics and reproductive biology of the germplasm used in the breeding program as well as interspecific hybrids produced in the program. This includes: determining the cytogenetic behavior of complex polyploid grass species and hybrids; establishing phylogenetic relationships among different species in agamic complexes; identifying and circumventing incompatibility barriers that prevent hybridization between distantly related species; determining the method of reproduction of various grasses, including apomictic mechanisms; and using this fundamental information to develop novel breeding approaches to develop true breeding apomictic cultivars. Recent research activities have included using molecular tools to identify hybrids, map economically important genes, and determine and characterize the genetic diversity within different species. Much of this research has been conducted in collaboration with the perennial grass breeder in the Department of Soil & Crop Sciences

Significant 5 Year Accomplishments

The DNA content of 568 buffelgrass accessions in the National Plant Germplasm System (NPGS) was determined and this information was used to establish their ploidy levels and chromosome numbers. This information is available for each accession in the NPGS which greatly benefits grass breeders requesting germplasm from the system. Research investigating the genetic diversity of 86 pentaploid accessions in the NPGS collection revealed they are genetically diverse, have polyphyletic origins, and differ for winter hardiness. Paternal specific molecular markers for pearl millet and napiergrass were developed and used to identify true hybrids when these two species are crossed with one another. Being able to correctly identify the true hybrids significantly increases the efficiency of a breeding program hybridizing these two species. Research on the relationship between winter hardiness and different metabolites in rhizomes of *Sorghum halepense* genotypes was conducted and the findings were used to screen rhizomatous *Sorghum* species for winter hardiness and to predict their ability to survive winters in Texas. A previously reported rhizome QTL in *Sorghum* was fine mapped and the physical distance was reduced by 75% and the number of putative genes in the locus was reduced by 53%. This research is beneficial in developing winter hardy perennial *Sorghum* germplasm that will survive the winters in Texas and produce

feed stocks for bioenergy and forage purposes. Two advanced synthetic varieties of kleingrass (*Panicum coloratum*) were developed and evaluated at multiple locations over the past three years and plans are to release one as a new forage cultivar.

Publications

Ten most recent publications (121total)

- Hojsgaard, D. H., B.L. Burson, C.L. Quarin, and E.J. Martínez. 2016. Unravelling the ambiguous reproductive biology of *Paspalum malacophyllum*: A decades old story clarified. *Genet. Resour. Crop Evol.* 63: (In Press).
- Burson, B. L., K. Renganayaki, C.D. Dowling, L.L. Hinze, and R.W. Jessup. 2015. Genetic diversity among pentaploid buffelgrass accessions. *Crop Sci.* 55:1637-1645.
- Dowling, C. D., B.L. Burson, and R.W. Jessup. 2014. Marker-assisted verification of kinggrass (*Pennisetum purpureum* Schumach. x *Pennisetum glaucum* [L.] R. Br.). *Plant Omics J.* 7:72-79.
- Washburn, J. D., S.C. Murray, B.L. Burson, R.R. Klein, and R.W. Jessup. 2013. Targeted mapping of quantitative trait locus regions for rhizomatousness in chromosome SBI-01 and analysis of overwintering in a *Sorghum bicolor* x *S. propinquum* population. *Mol. Breeding* 31:153-162.
- Washburn, J. D., D.K. Whitmire, S.C. Murray, B.L. Burson, T.A. Wickersham, J. Heitholt, and R.W. Jessup. 2013. Estimation of rhizome composition and over-wintering ability in perennial *Sorghum* spp. using near infrared spectroscopy (NIRS). *BioEnergy Res.* 6:822-829.
- Dowling, C. D., B.L. Burson, J.L. Foster, L. Tarpley, and R.W. Jessup. 2013. Confirmation of pearl millet-napiergrass hybrids using EST-derived simple sequence repeat (SSR) markers. *Am. J. Plant Sci.* 4:1004-1012.
- Burson, B. L., J. Actkinson, M.A. Hussey, and R.W. Jessup. 2012. Ploidy determination of buffel grass accessions in the USDA National Plant Germplasm System collection by flow cytometry. *S. Afr. J. Bot.* 79:91-95.
- Bartek, M. S., G.L. Hodnett, B.L. Burson, D.M. Stelly, and W.L. Rooney. 2012. Pollen tube growth after intergeneric pollinations of iap-homozygous *Sorghum*. *Crop Sci.* 52:1553-1560.
- Jessup, R. W., D.K. Whitmire, Z.L. Farrow, and B.L. Burson. 2012. Molecular characterization of non-flowering perennial *Sorghum* spp. hybrids. *Am. J. Exp. Agric.* 2:9-20.
- Jessup, R.W., K. Renganayaki, J.A. Reinert, A.D. Genovesi, M.C. Engelke, A.H. Paterson, T.L. Kamps, S. Schulze, A.N. Howard, B. Giliberto, and B.L. Burson. 2011. Genetic mapping of fall armyworm resistance in zoysiagrass. *Crop Sci.* 51:1774-1783.

Awards and Honors

- Fellow, American Society of Agronomy
- Fellow, Crop Science Society of America
- Fellow, American Association for the Advancement of Science
- Merit Award, American Forage and Grassland Council

Professional Experience

- Recognized as an authority on apomixis and the breeding of apomictic species. (Gave invited presentations in Argentina, Brazil, Philippines, China, France and Mexico. Consulted with and advised scientists with three CGIAR research centers [IRRI, CIAT, and IITA] and with different universities and organizations in Brazil, Argentina, Uruguay, France, China, and Mexico.)
- Advised /co-advised 6 post-doctoral research associates, 2 Ph.D. students, and 3 M.S. students.
- Advised visiting scientists from Argentina, China, Mexico, and Porto Rico regarding apomixis, cytogenetics, and wide hybridization.