Dilley Germplasm slender grama

Effects of Seeding Rate and Season of Seeding on Establishment of 10 Natives Grasses in the Rio Grande Plain of Texas

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Welder germplasm shortspike windmillgrass

Abstract Seeding rate and season of seeding were studied to determine the optimum planting strategies for restoration of 10 native warm season grasses in highly disturbed rangelands dominated by the exotic species buffelgrass (*Pennisetum ciliare*). Four 9.30 m2 (100 ft2) plots of each of 10 species were seeded a standard (20 pure live seeds (PLS)/ft2), low (10 PLS/ft2) and high seeding rates (30 PLS/ft2) at seeding dates in spring (May), summer (August) and fall (November) 2006, near Laredo, Texas. Canopy cover of seeded species was determined at 1 and 2 years following planting date for each plot. To date, Dilley Germplasm slender grama and Welder germplasm shortspike windmillgrass have demonstrated the best ability to establish in areas with extreme infestations of buffelgrass at all seasons and planting rates. Preliminary analysis completed to date suggest that seeding rates have no significant effect on percent cover at 1 or 2 years. Across all species, summer and fall plantings resulted in higher canopy cover than spring plantings1 year from seeding.; however at 2 years following seeding, planting date had has no significant effect on canopy cover of seeded species. A significant reduction in native species cover was recorded from 1 to 2 years after seeding, underscoring the fact that most of the native species planted were not resistant to reinvasion by buffelgrass following establishment. Our result indicate the need for aggressive early successional native grass species for restoration of buffelgrass dominated areas as well as subsequent maintenance treatments after initial emergence to prevent reinvasion by buffelgrass. Several species showed seasonal competitive ability with buffelgrass, but were outcompeted over time. We suggest that seed mixes comprised mainly of competitive species such as slender grama, and shortspike windmillgrass, and augmented by seasonally competitive species like hooded windmillgrass, multiflowered false rhodesgrass, Arizona cottontop, and pappusgrass may provide the best results in efforts to diversify and restore buffelgrass dominated rangelands by reseeding native grasses. Management strategies to prevent reinvasion of buffelgrass must be devised before successful restoration of these areas is possible.

Introduction An estimated 4-5 million acres of rangeland in south Texas are dominated by the exotic buffelgrass (Ocumpaugh and Rodriguez, 1999). Sites dominated by buffelgrass appear to be less suitable habitat for economically important birds such as bobwhite quail than sties dominated by native grasses (Flanders et. al. 2006). Due in large part to the economic value of fee and lease hunting for species like bobwhite quail, many landowners desire strategies to restore or diversify buffelgrass pastures and lands invaded by buffelgrass to vegetation consisting of native grasses. Research by Gonzalez and Dodd (1979) and Tjelmeland et. al. (2008) in south Texas has shown that buffelgrass frequently reinvades areas seeded to native grasses. Both of these studies focused on mid to late successional stage native grasses such as plains bristlegrass (*Setaria spp.)*, multiflowered false rhodesgrass *(Trichloris pluriflora)*, and green sprangletop (*Leptochloa dubia*) (Tjelmeland et. al., 2008) and Arizona cottontop (*Digitaria californica)*, plains bristlegrass, mulitflowered false rhodesgrass, false rhodesgrass *(Chloris pluriflora)*and pink pappusgrass (*Pappophorum bicolor)* (Gonzalez and Dodd ,1979). These studies documented reinvasion of buffelgrass in seeded areas within 1-4 years of native grass establishment. In this project, we attempted to further evaluate many of the species discussed above, as well as several early successional stage native grasses for diversification of buffelgrass dominated areas. Our goals were to identify competitive species for diversification of buffelgrass dominated rangelands and determine if increases or decreases in standard seeding rates, or the season of seeding (spring, summer, fall) effect establishment of ten native grasses for this use.

Study site Our study site is located in southern Webb County Texas, at Rancho Blanco. The study site is a homogeneous flood plain of the Rio Grande River, with a La Gloria silt loam soil type. The study site was used for irrigated vegetable production prior to 1960, abandoned and either seeded to, or invaded by buffelgrass since that time. Buffelgrass cover prior to this project was visually estimated at near 95%. Little to no other vegetation was present, except for scattered occurrences of other exotic grasses such as Kleberg bluestem *(Dichanthium annulatum*), bermudagrass *(Cynodon spp.)*, and blue panicum *(Panicum antidotale*), and scattered huisache shrubs (*Acacia smallii).*

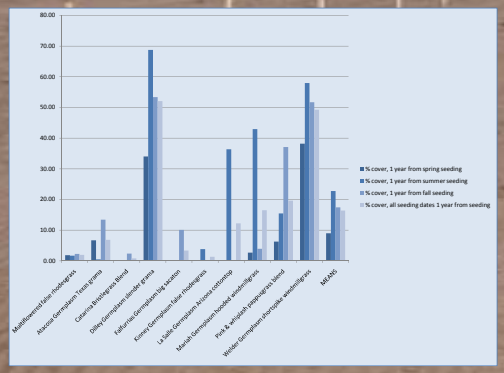

Figure 1. Mean canopy cover by species and seeding rate, 1 year from planting.

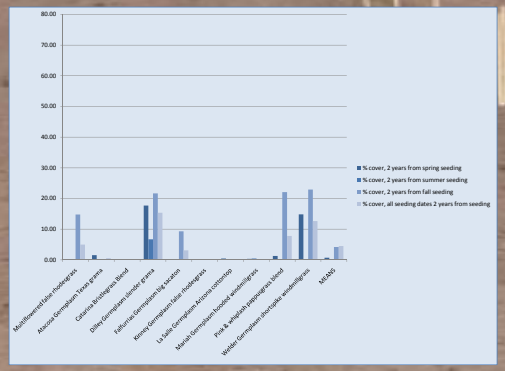

Figure 2. Mean canopy cover by species and seeding rate, 2 years from planting.

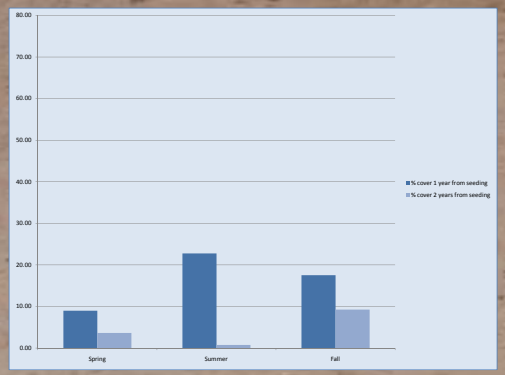

Figure 3. Mean canopy cover by planting date, all species.

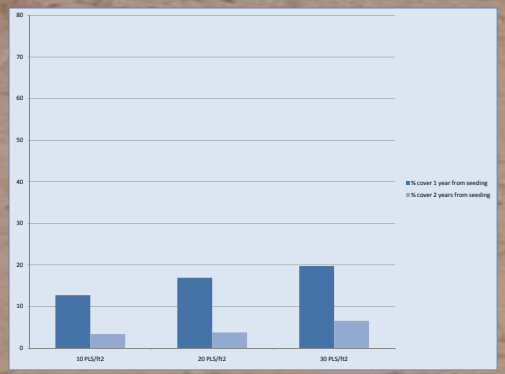

Figure 4. Mean canopy cover by seeding rate, all species.

Methods Whole plot treatments consisted of season of seeding (spring, summer, fall), and subplot treatments consisted of seeded species (multiflowered false rhodesgrass, Atascosa Germplasm Texas grama (*Bouteloua rigidiseta)*, Catarina Bristlegrass Blend (*Setaria spp.)*, Dilley Germplasm slender grama (*Bouteloua repens*), Falfurrias Germplasm big sacaton (*Sporobolus wrightii*), Kinney Germplasm false rhodesgrass (*Chloris crinita)*, La Salle Germplasm Arizona cottontop, Mariah Germplasm hooded windmillgrass (*Chloris cucullata*), Pappusgrass blend (*Pappophorum bicolor, vaginatum*), and Welder Germplasm shortspike windmillgrass (*Chloris subdolistachya*)) and seeding rate treatments: (high, standard, low). Whole plots were disked twice prior to planting to prepare the seedbed. Four 9.30 m2 plots of each species at each planting rate were broadcast seeded by hand, and covered by use of a tractor pulled roller packer. Each whole plot was sprinkler irrigated for one month after the planting date to simulate optimum conditions for emergence, and shredded once following irrigation to reduce competition from annual sunflower (*Helianthus annuus*). Seeded plots were evaluated at one and two years after seeding. Data collected and presented here is canopy cover (estimated by use of 0.25 m2 frames), Analysis of variance was used to compare means of overall canopy cover for each species (across seeding rate and planting date), each planting date (all species combined), and seeding rate (all species combined).

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Pink pappusgrass

Multiflowered false rhodesgrass

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