Kika de la Garza Plant Materials Center

Kingsville, TX

Vol. 1 No. 4 Technical Note August 1998

FORAGE PRODUCTION STUDY OF WILDRYE ACCESSIONS IN SOUTH TEXAS

INTRODUCTION

Virginia wildrye *(Elymus virginicus*) and Canada wildrye (*Elymus canadensis*) are both native, cool season, perennial bunchgrasses which grow two to three feet in height. Both species reproduce by tillering and seed. Virginia wildrye can be found throughout the United States except for Nevada, California, and Oregon; whereas Canada wildrye is distributed throughout the United States except for Alabama, Georgia, Louisiana, South Carolina, and Tennessee (Hitchcock, 1971). Both species can be found scattered on shaded banks, along fencerows and in open woodlands (Gould, 1975). Virginia wildrye prefers moister soils, higher soil fertility, heavier soil textures, and is more shade tolerant than Canada wildrye (Phillips Petroleum Company, 1963). Virginia wildrye is very palatable and nutritious, and is readily eaten by all classes of livestock in the spring and fall when it is green (Phillips Petroleum Company, 1963). In the spring when it is green, Canada wildrye also has good forage value for cattle and horses; however, the forage value for sheep and wildlife is reported to be only fair. (Stubbendiek, Hatch, and Kjar, 1980). Stubbendiek, et al. also note that the forage value of Canada Wildrye decreases sharply when the plant matures. Both species self-fertilize (Dewey, 1979), but have been known to hybridize and introgress (Brown & Pratt, 1960). The objective of this study is to evaluate the potential of specific wildrye accessions for a cool-season forage for South Texas.

The two plots were planted in December 1997 and January 1998 at the Kika de la Garza Plant Material Center in Kingsville, Texas. One plot was seeded, and one utilized transplants set into bedded rows. The seeded planting (Wildrye Small Field Planting) consists of two accessions of Virginia wildrye and one accession of Canada wildrye currently being studied at the Kika de la Garza Plant Materials Center. The transplanted plot (Wildrye/Melic Plot) used the same three wildrye accessions from the seeded plot, and also included two wildrye accessions currently being studied by the East Texas Plant Materials Center in Nacogdoches, Texas, and two accessions of *Melic*

nitens. In addition, 'Beefbuilder' ryegrass, a commercial variety of annual ryegrass, was used as a comparison standard.

MATERIALS AND METHODS

The Seeded Plot

The small field planting consisted of 16 plots that were six feet by twenty feet, surrounded by a ryegrass border to prevent an edge effect. Each plot was separated by a six-foot alley way. The plot was divided into four blocks of four plots each. Block order was randomized. Block 1 contained the four plots in the southeast corner. Block 2 was made up of the four plots in the northeast corner. Block 3 fell in the southwest corner, and Block 4 was in the northwest corner. The wildrye accessions and the ryegrass were randomized within each block. The seeds were broadcast into prepared beds by hand, and then pressed into the soil with a 5-foot cultipacker. Seeding rate for the wildryes was 40 pure live seed per square foot. The actual seed amount was calculated by multiplying the number of seed required for one plot (120 sq. ft.) by the percent of pure live seed for the particular accession. The ryegrass was seeded at a rate of 10 lbs. per acre. The soil type was Victoria Clay.

On June 10, 1998, ten 1 foot by 1 foot samples were clipped from each of the four plots within the four blocks of the Wildrye Small Field Planting located in Block E of the Kika de la Garza PMC in Kingsville, Texas. There were two accessions of Virginia wildrye (#763 and #845), one accession of Canada wildrye (#285), and 'Beefbuilder' ryegrass (BB) included in this study. All plots were broadcast seeded in December of 1997.

The ten sample locations were randomly selected by choosing grid locations with the help of a random numbers table and numbers picked from a hat. Samples sites were located within each plot and a 1 foot by 1 foot frame was placed in the designated location. Then percent of cover within the frame was estimated and all vegetation within the frame was clipped to a standard height of 4 inches using grass shears. Each sample was weighed and the green weight recorded. One sample from each plot was saved and dried in a drying room for ten days. Dry weight was then recorded, and the percentage of dry weight to green weight was calculated. An adjusted dry weight was calculated for each of the clippings taken. Seed heads were removed from the sample, and forage weight was calculated as well.

The Transplanted Plot

The Wildrye/ Melic Plot consisted of four replications of eight 15-foot sections of bedded rows, each containing 15 plants of a different accession. Locations of each accession within a replication were randomly selected. There was a

five-foot wide alley between each replication, and a border row of seeded annual ryegrass on either side of the plot to control for an edge effect. Plants for this plot were grown individually in the greenhouse in seeded cones. They were transplanted by hand into their randomly assigned locations at one-foot intervals. They were irrigated immediately following planting and as needed throughout the growing season.

On June 8, 1998, ten plants plus one sample were clipped from each row in each replication of the Wildrye/Melic Plot located in Block D of the Kika de la Garza PMC in Kingsville, Texas. Plant accessions located in this plot included: two accessions of melic (#904 and #905), 'Beefbuilder' ryegrass, two accessions of Virginia wildrye (#763 and #845) and one accession of Canada wildrye (#285) being studied by the Kika de la Garza PMC, and two accessions of *Elymus spp*. that are being studied by the East Texas PMC (#957 and #971).

The ten plants were clipped at a standard height of four inches using hedge trimmers from either the north or south end of the row, excluding the end plant. The decision to clip either the north or south end of the row was made using a coin flip to ensure random selection. A representative plant was chosen from the remaining plants (excluding the end plants) to be the sample. The ten plants were bagged together and weighed green as one unit. The sample plant was kept separate and weighed green. It was then taken to a drying room for a period of two weeks, and then reweighed to establish a dry weight. The percentage of dry weight in relation to green weight was also calculated. Finally, an adjusted dry weight was computed for the ten plants bagged together. This adjusted bag weight was achieved by multiplying the original green weight for each bag by the percentage of dry weight for the sample.

RESULTS AND DISCUSSION

The Seeded Plot

Statistics were run using SPSS 8.0 for Windows. One-way ANOVAs were run using Block as the grouping variable and percentage of cover (Cvr), green weight (Grn), dry weight (Dry), and dry weight with the seed heads removed (Nohd). The process was repeated with accession (Acc) substituted as the grouping variable (Table 1). In addition, descriptives tables were run for all combinations of variables, and Tukey's Test for Honestly Significant Differences (Tukey's HSD) was run to pinpoint specific differences.

Block

A one-way ANOVA found no significant differences between blocks for any of the dependent variables.

Accession

Percent of Cover

The results of a one-way ANOVA revealed that there was a significant difference between accessions in the percent of cover per square foot. Tukey's HSD found that the 'Beefbuilder' ryegrass provided significantly more cover than any of the wildrye accessions. This difference was expected based on ocular estimation of plot cover.

Green Weight

Significant differences in green weight between accessions were also found with the use of a one-way ANOVA. Tukey's HSD showed that there was a significant difference in green weight between Virginia wildrye #763 and the 'Beefbuilder' rye grass, with the #763 having a significantly lower green weight than the ryegrass.

Dry Weight

A one-way ANOVA showed no significant differences in dry weights between the wildrye accessions. However, the ryegrass was found to have a significantly higher dry weight than all the wildrye accessions.

Forage Weight

The results of a one-way ANOVA revealed no significant differences in forage weight (dry weight with the seed heads removed) between wildrye accessions. However, the ryegrass was found to have a significantly higher forage weight than all the wildrye accessions.

Discussion

Although the wildryes showed significantly poorer cover at this point in time, it is expected that no significant differences will be found at the end of the next growing season. It is believed, based on our experience with the wildryes, that they become bushier once they are established and that first growing season data is an unreliable indicator of what the plants will produce when they regrow. In addition, the wildryes are prolific seed producers and have extremely good germination; therefore, many new plants can be expected the second year and beyond. Ryegrass, on the other hand, is an annual and must be reseeded each year, so the percent of cover tends to remain fairly consistent.

There were differences in green weight between the wildryes and the ryegrass (although only the #763 was significantly different), and there were significant differences in dry weight and forage weight between the wildryes and the ryegrass.

However, it is important to remember that this is only first season data. Once the wildryes establish themselves, plant production, and therefore forage weight, is expected to improve. The plot was seeded late in the planting season, and therefore

the plants had less time to fully establish themselves. Furthermore, there is a lag time on growth potential for the wildryes versus the ryegrass while they establish a good root system.

The Transplanted Plot

Statistics were run using SPSS 8.0 for Windows. One-way ANOVAs were run using replication (Rep) as the factor variable with the two dependent variables: plant green weight (Bag) and adjusted bag dry weight (Bgw). In addition, a table of descriptives was run for each combination of variables. Tukey's Test for Honestly Significant Differences (Tukey's HSD) was run to pinpoint specific differences between accessions. The same tests were repeated using accession (ACC) as the factor variable (table 2.).

Replication

The one-way ANOVAs revealed no significant differences between replications for any of the dependent variables.

Accession

Bag

A one-way ANOVA found significant differences between accessions when Bag or total green weight was used as the dependent variable. Tukey's HSD showed the two accessions of melic had significantly less production than all other accessions in the plot. This was clearly evident in the field, as the melics have shown much less growth than the wildryes and the ryegrass. Also, #763 and #845 Virginia wildryes showed significantly poorer production than the #285 Canada wildrye and the #971 wildrye. In addition, the #957 wildrye and the 'Beefbuilder' ryegrass showed significantly poorer production than the #971 wildrye.

Bgw

A one-way ANOVA using Bgw or total dry weight as the dependent variable revealed that there were significant differences in adjusted bag weight between accessions. Tukey's HSD showed that the two melic accessions, #904 and #905, had significantly lower adjusted bag weights than all other accessions. In addition, #957 wildrye was found to have a significantly lower adjusted bag weight than #971 wildrye, 'Beefbuilder' ryegrass, and #285 Canada wildrye. Finally, #763 and #845 Virginia wildryes showed significantly lower adjusted dry weights than #285 Canada wildrye.

Conclusion

The differences in forage weight may be due at least partially to genus or species differences, rather than accession differences. For example, based on field observations, the melic species appear to have less leaf and stem growth, and the Canada wildrye appears to have more stem weight than the Virginia wildryes. In addition, differences in plant phenology may have an influence on the findings, since the accessions were at different stages of seed development. Added seed weight may be a factor in weight differences. The accessions from Kika de la Garza PMC were at full maturity, whereas the East Texas PMC accessions were only at boot or early seed head development stages.

Future evaluations will be based on winter (December) forage production and early spring (March) forage production to assess cool-season forage availability before warm-season forage is available.

TABLE 1.

MEAN CLIPPING DATA BY ACCESSION FOR THE WILDRYE SMALL FIELD PLANTING PLOT*

Accession	Green Wt. Plot Avg. (g)	Adj. Dry Wt. Plot (g)	Forage Weight Plot (g)
285	39.58[ab]	21.3705[a]	13.9288[a]
763	22.38[a]	13.3704[a]	8.6255[a]
845	33.63[ab]	21.3527[a]	13.7190[a]
BB	53.50[b]	37.7176[b]	29.7990[b]

* Means in columns followed by the same letter are not significantly different at the 5% probability level

TABLE 2.

MEAN CLIPPING DATA BY ACCESSION FOR THE WILDRYE/MELIC ADVANCED EVALUATION PLOT

Accession	Green Wt. Bag (lbs)	Dry Wt. Bag (lbs)
285	6.825[cd]	3.925[d]
763	4.200[b]	2.625[bc]
845	4.325[b]	2.650[bc]
904	.400[a]	.130[a]
905	.650[a]	.268[a]

957	5.850[bc]	2.175[b]
971	8.200[d]	3.550[cd]
BB	6.100[bc]	3.575[cd]

* Means in columns followed by the same letter are not significantly different at the 5% probability level.

REFERENCES

Brown, W.V., and Pratt, G.A. (1957). " Hybridization and introgression in the grass genus Elymus. *American Journal of Botany, v.47* p. 669-676.

Dewey, D.R. (1979). "Genomic and phylogenetic relationships among North American perennial Triticaceae", p 51-88. In *Grasses and Grasslands, P*roceedings of the American Society of Taxonomy Symposium, August 1979.

Gould, F. W. (1975). *The Grasses of Texas*. College Station, TX. Texas A&M University Press.

Hitchcock, A. S. (1971). *Manual of the Grasses of the United States, Volumes 1&2, 2nd Edition*. Revised by Agnes Chase. New York: Dover Publications.

Phillips Petroleum (1963). *Pasture and Range Plants*. Bartlesville, OK: Phillips Petroleum Company.

Stubbendiek, Hatch, and Kjar (1980). *North American Range Plants.* Lincoln, NE: Natural Resources Enterprise, Inc.