Texas Agricultural Extension Service
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BUFFELGRASS

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The buffelgrass *(Cenchrus ciliaris* L.) varieties discussed in this leaflet include Common, Blue, Higgins, Llano and Nueces.

Taxonomic Description

Buffelgrass is a tufted perennial with stems erect or spreading from a branched and "knotty" base 50 to 100 centimeters tall. Sheaths are laterally compressed and keeled and hairless to sparsely covered with soft, straight hairs. Blades are thin, usually flat, rough or slightly soft-haired and mostly 8 to 30 centimeters long and 2.5 to 8 millimeters wide. Inflorescences are dense, cylindrical panicles mostly 4 to 10 centimeters long and 1 to 2 centimeters thick.

Spikelets are enclosed in burs formed together at the base. Bristles are 4 to 10 millimeters long and retorsely barbed; burs are on a short, angular, unbranched rachis. Burs contain two to four spikelets, readily breaking off at the base of the minute, soft-haired stalk at maturity. Spikelets are 2.5 to 5.6 millimeters long. The grain swollen ovoid is 1.4 to 1.9 millimeters long and about 1 millimeter in diameter. Plants set seed from early spring until late autumn under favorable growing conditions.

Origin

Buffelgrass is native to Africa and India. Common buffelgrass was introduced into Texas from South Africa in the mid 1940s through the plant introduction center in Washington, D.C. Essentially all of the present buffelgrass in South Texas and Northern Mexico descended from this accession number T-4464. Previous test plantings of buffelgrass in Texas took place at Angleton in 1917, Temple in 1918, Chillicothe in 1928 and Tyler in 1932 but failed because these locations were too cold for buffelgrass survival; at Angleton soil adaptation was a problem. The potential of buffelgrass in Texas was not realized until plantings were made at San Antonio around 1940.

Another cultivar, "Blue," was introduced in South Texas at about the same time as Common. Blue grows well, but erratic and limited seed production has prevented its use in the commercial seed trade. A few scattered acreages exist in South Texas. In 1977, two buffelgrass hybrids were released by the Texas Agricultural Experiment Station, USDA-ARS and the Soil Conservation Service. The Nueces and Llano varieties resulted from the work of E.C. Bashaw, USDA-TAMU. In 1978 commercial seed for both these varieties became available in limited supply.

Descriptions

A comparison of distinguishing characteristics of Common, Nueces and Llano is shown in table 1.

Table 1. Distinguishing vegetative characteristics of buffelgrasses.

	Common	Nueces	Llano
Foliage color	Bright green	Bluish-green	Bluish-green
Seed head color	Brown to purple	Tan to faint wine	Light tan
Seed head length		40 to 50% longer than Common or Llano	
Rhizomes	None	Yes	Yes, more vigorous than Nueces
Seed per bur	Multiple	Multiple	Single
Early spring and late fall growth	Fair	Good	Good
Seed production	Good	Good	Poor

Foliage color of both Nueces and Llano is bluish-green and mature inflorescences (heads) are tan to light brown. Mature plants have prominent rhizomes that spread to form dense broad crowns at

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the soil surface. The most prominent visual difference between Nueces and Llano is the inflorescence length. Nueces inflorescences are about 50 percent longer than those of Llano. When grown under the same conditions, Nueces foliage is greener and its leaves are wider and grow less erect than those of Llano. Nueces and Llano may be readily distinguished from Common and Higgins by the foliage and inflorescence color.

Adaptation

Buffelgrass has a wide soil adaptation; however, it will not tolerate poor soil drainage. In general, flat coastal prairies with high water tables, slow surface drainage and high salt contents are not suited for buffelgrass production. Saline soils even in the well-drained soils of Starr, Zapata and Webb counties will not support buffelgrass because of its low salt tolerance. The "watermelon" sands of Hidalgo, Brooks, Jim Hogg, Duval and Jim Wells counties present a special problem because of the low phosphorus content of these soils.

Evidence from Australian studies indicates that a minimum phosphorus requirement exists below which buffelgrass will not survive. Recent phosphorus fertilizer tests in South Texas indicate that buffelgrass stands may be established and maintained on deep sands only with the addition of phosphorus.

Currently the exact soil requirements of the new varieties are not known. Just assume that they are adapted only to the same soils and drainage conditions required by Common buffelgrass.

Common, Nueces and Llano differ greatly in their cold tolerance. The northern limit of Common is generally accepted as being Highway 90 (San Antonio to Del Rio) although it may suffer winter kill during severe winters from 50 to 75 miles south of that line. Nueces survives winters as far as 75 miles north of Highway 90, and Llano, with even greater cold tolerance, will survive winters as far as 125 miles north of Highway 90.

The chief advantages of Nueces and Llano in deep South Texas, where winter kill is seldom a problem, are higher yields, earlier spring growth and later fall growth than Common.

Establishment

Soil preparation for buffelgrass planting is the same as for any other crop with the added precaution of insuring a well-settled or mechanically firmed seedbed. Relatively shallow tillage to reduce soil aggregates to medium texture, to incorporate organic matter residues and to eliminate weeds is all that is required. Loose seedbeds should be rolled or "cultipacked."

Seeding rates. One and one half to 2 pounds of pure live seed per acre assure good stands where seedbed preparation is adequate and good planting techniques are used. Do not plant freshly harvested seed because of the presence of a germination inhibitor that disappears with storage. Therefore, utilize only seed which have been stored for 6 months and have a germination percentage greater than 60 percent and a foreign matter content of less than 40 percent.

The rougher the seedbed, the greater the amount of pure live seed required to get a stand. Strive for one plant per square foot as a good plant population. In root plowed land seeded with no further preparation, 4 to 6 pounds of pure live seed may be required to obtain a stand. Because seed of Nueces and Llano are still in short supply and expensive, good seedbed preparation is recommended for these varieties.

Planters. Many types of planters have been used successfully in establishing buffelgrass. For very rough ground, track-type tractor exhaust stack seeders are used, in which case the seed is broadcast unevenly on the surface. Broadcast seeders of the "EZ-FLOW"® fertilizer distributor type with press wheels following the seed drop tubes, distribute the seed uniformly over the surface and maximize germination by improving seed-soil contact. Most range improvement plantings are made in dry soil in anticipation of rainfall peaks in May to June and again in late August during the hurricane season. Modified cotton planters of the picker-wheel type have been used to plant buffelgrass in 30- to 40-inch rows. The priniciple problem of bridging in the hopper has been overcome by using weighted plates on top of the seed. Stoppage in the spiral drop tubes is solved by replacing them with smooth polyethylene pipe about 2 1/2 inches in diameter.

There are as many planting methods as there are individuals and all may give satisfactory results. Observe the principles of grass seed planting by having a firm seedbed, adequate numbers of seed and good seed-to-soil contact. Do not plant buffelgrass at depths greater than 1/2 to 3/4 of an inch since seedling emergence is reduced at deeper planting depths.

Management

Do not graze buffelgrass or cut for hay before it has matured its first seed crop in its establishment year. Observation and experience indicate that Common buffelgrass reaches its productive peak about the second or third year after establishment. However, plantings made in the 1950s and 1960s are still productive. It is doubtful though that individual plants live longer than 6 to 8 years but are continually replaced with new seedlings; however, this observation has not been documented.

There is a shortage of data on buffelgrass in terms of grazing and clipping studies. Historically, buffelgrass has been considered a typical bunch grass, and the recommendation has been made to

follow the SCS instructions of "take half and leave half." However, observations by producers indicate that buffelgrass tolerates fairly close grazing.

When moving north in the buffelgrass growing area, leave more of the plant standing in the late fall to protect basal buds from possible winter injury. In areas north of a line from Laredo to Corpus Christi, do not cut or graze closely between October 15 and the first killing frost, after which grazing or cutting has less effect on cold weather survival.

Buffelgrass is a native of the South African Plains and as such evolved under periodic burning. A study in Webb County indicates that prescribed burning of buffelgrass is an effective management tool to increase grass quality and suppress brush growth. However, exercise care in timing burns to coincide with years of normal or above-average preburn rainfall because of the increased water demand imposed by luxuriant buffelgrass growth following burning. In the Webb County study, an area was burned in February 1977 and by May of that year had approximately 4,000 pounds per acre of new growth compared to an adjacent non-burned area which had a little less than 2,000 pounds per acre. Note, however, that this was in a year with above average rainfall (nearly 12 inches from February through May). Observations have been made on roadside stands of buffelgrass which burn accidentally in July or August. These stands are usually thinned and damaged by the burning under hot, dry conditions. Burning is a tool, so obtain experienced professional help when considering this technique.

Fertilization

Well-fertilized buffelgrass remains productive with up to six or seven harvests per year provided it is not overgrazed. Buffelgrass, like most other grasses, responds well to fertilizer applications. Fertilizer plots in Willacy, Webb, Starr, Zapata, McMullen and Jim Wells counties indicate that production may be greatly increased by fertilization with a corresponding increase in protein content. Before establishing a fertility program take a soil sample and have it analyzed. Very seldom in buffelgrass areas is there a need for potassium, because most of the soils are very high in native potassium. Observation and preliminary work indicate that 20 to 30 pounds of phosphorus per acre is sufficient in most dry land range situations. There is a plant response to higher rates, given good moisture, but it is typically not economical. It would appear that 50 to 60 pounds of nitrogen applied in the early spring, along with the phosphorus, give good results. Any further nitrogen fertilization should be at the discretion of the producer depending on moisture availability. If further nitrogen applications are made, do not add less than 50 pounds per acre per application. Quite often with lower amounts, there is minimal or no increase in production.

Seed Production

Some ranchers have harvested buffelgrass seed for years. Development of the "Laredo" (Modern Machine Shop, Laredo, TX) harvester, as well as other types adapted by ranchers, makes the harvest of Common buffelgrass seed a profitable ranch sideline. Yields of Common buffelgrass vary, but 20 pounds of seed per acre per harvest is about average for dryland. Two peak crops of seed are set each year when growing conditions and rainfall permit. Thus, an average of 40 pounds of seed per acre per year often exceeds the income from grazing buffelgrass.

Common buffelgrass normally sets its peak seed crops in the short days of spring and fall. Mature Common buffelgrass seed fields resemble wheat fields in that plant height is fairly uniform. Horizontal brush-suction machines or reel-suction machines harvest satisfactorily with acceptable efficiency and foreign material content. Subsequent drying and cleaning may be accomplished within economic limits. New buffelgrass hybrids present a challenge in seed harvest. These plants are more indeterminate in growth habit than Common buffelgrass and do not set their seed at a uniform height. Early seed set may occur at knee level which is later overgrown by subsequent taller seed production stems which interfere with the harvest of seed and prolong the harvest season. Horizontal conventional machines will harvest some seed, but because of height variations, these also collect a great deal of plant trash with the seed. Seed yields under dryland conditions have not been accurately determined. Under irrigation, both Nueces and Llano are reported to produce "commercial" amounts of seed with the yield of Nueces about double that of Llano.

Performance

Nueces and Llano have been consistently superior to Common and Higgins in forage production tests. Comparative forage yield tests have been made at College Station, Beeville and Weslaco. At Weslaco, without irrigation, average annual dry matter production of Nueces and Llano for 3 years was 1,000 pounds greater than Common. With irrigation they produced more than 2,500 pounds above Common. Yields in the third year at Weslaco illustrate the advantage of rhizomatous varieties—earliness and increased stand density. In 1979 Nueces and Llano produced 2,000 pounds more forage than Common without irrigation and, with irrigation, outyielded Common by 5,800 and 3,400 pounds of dry matter per acre, respectively. At Beeville where the growing season is shorter, yield differences average about 1,000 pounds in favor of Nueces and Llano over Common or Higgins. At College Station the new varieties also produced approximately 1,000 pounds more than Higgins. Common is not

included in tests at College Station because it lacks winter hardiness.

Quality

Nueces and Llano produce nutritious high quality forage when grazed or harvested before maturity. Nueces is higher in dry matter digestibility (66 percent) than Common (62 percent) or Llano (60 percent). Even though Llano is the lowest in digestibility, it is well within the range of acceptable quality for warm-season grasses.

Advantages and Limitations

Drought tolerance, rapid response to moisture, good fertilizer response and quick establishment are all advantages of buffelgrass. Meanwhile, limitations include a high threshold requirement for phosphorus, a need for well-drained soils, low salt tolerance and limited cold tolerance.

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