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BERMUDAGRASS VARIETIES, HYBRIDS AND BLENDS FOR TEXAS

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Bermudagrass (*Cynodon dactylon*) is native to southeast Africa. The earliest mention of bermudagrass comes from the diary of Thomas Spalding, owner of Sapeloe Island, Georgia and a prominent antebellum agriculturalist. Found in his diary was the following entry: "*Bermudagrass was brought to Savannah in 1751 by Governor Henry Ellis*." He went on to say that "*If ever this becomes a grazing country it must be through the instrumentality of this grass*." Writers as early as 1807 referred to bermudagrass as one of the most important grasses in the South at the time. Thus, bermudagrass has been a part of southern agriculture for at least 250 years. Hybrid bermudagrass with improved productive capability and nutritive value has played an important role in livestock production across the southern US for nearly 60 years with the introduction of 'Coastal' in 1943.

Bermudagrass is a warm-season perennial grass that spreads by rhizomes (underground stems) and/or stolons (horizontal aboveground stems). The grass tolerates a wide range of soil types and soil pH values, thus it is adapted to most of the southern US. Limited cold tolerance in early common and hybrid cultivars of bermudagrass led to the release of several cold-tolerant varieties. These cold tolerant varieties are useful for the warm- and cool-season transition areas of the US, including Oklahoma, Arkansas, Missouri, and Tennessee. Although capable of high production, bermudagrass must be well-fertilized to reach maximum production capability (Table 1 and 2). Given adequate moisture, nitrogen (N) is usually the most limiting factor to forage production, but appropriate levels of phosphorus (P) and potassium (K) are critical to yield and persistence. Adequate pH (5.8-6.5) is also important in maintaining a vigorous stand of bermudagrass.

Table 1. Coastal bermudagrass dry matter (DM) yield as affected by fertilizer and broiler litter application rate.[1]

Application rate (lbs/ac)	DM 1992 (lbs/ac)	DM 1993 (lbs/ac)
N-P_2O_5-K_2O (lbs/ac)		
0-0-0	4780	4050
100-33-67	7140	6450
200-67-134	8680	8290
400-134-268	9640	10460
Poultry litter (tons/ac)		
2 SPR + 2 SUM[2]	7580	6930
4 SPR	8320	7450
4 SPR + 4 SUM	8850	7840
8 SPR	9810	9270

[1] Evers, 1998

[2] SPR is late spring and SUM is mid-summer.

Table 2. Warm-season perennial grass yields from 1997 through 2001.

Entry	1997	1998	1999	2000	2001	Average
	----------lb dry matter/ac----------					
Tifton 85 bermuda[1]	5044 a[2]	8064 a	12915 a	12032 a	15680 a	10747 a
CD 90160 bermuda	2737 b	3550 d	9696 bc	10347 b	13395 a-c	7945 b
Texas Tough bermuda	2480 bc	5262 b	11749 ab	7956 e-g	10993 cd	7688 b
Ranchero Frio bermuda	1943 cd	2912 de	8984 c	9991 bc	12428 b-d	7251 bc
Terra Verde bermuda	2085 cd	4885 bc	9054 c	8318 d-f	11748 b-d	7218 bc
Coastal bermuda[1]	1611 d	3739 cd	8507 cd	9440 b-d	11549 b-d	6969 bc
Cheyenne bermuda	2408 bc	3430 de	6640 d-f	8928 c-e	13431 ab	6967 bc
KF CD 194 bermuda	1914 cd	3664 cd	7407 c-e	7525 fg	10075 de	6117 c
Pensacola bahia	583 e	2167 e	4771 f	6809 gh	7682 ef	4402 d
Tifton 9 bahia	767 e	2203 e	5470 ef	5967 h	7398 f	4361 d
Common bermuda[3]			383	7445 fg	11352 b-d	6393
Giant bermuda[3]			836	7356 fg	6643 f	4945
Wrangler bermuda[3]			188	6744 gh	7550 f	4827
Kikuyugrass[3]			0	7620 e-g	5539 f	4386

[1]Bermudagrass varieties established from sprigs.
[2]Entries planted in 1999. All other entries planted in 1997.

Inadequate levels of N not only limit bermudagrass dry matter production, but also reduce crude protein levels. Less than optimum bermudagrass growth can also allows weed infestation, which reduces carrying capacity and increases input costs. Bermudagrass is highly responsive to N fertilization, but regardless of N input low levels of K can lead to reduced yields, poor stands and winter-kill. Phosphorus is important for many plant growth functions, including root growth and development. Careful attention to soil fertility, beginning with an annual soil test to determine the soil nutrient status is necessary to ensure maximum bermudagrass growth, disease resistance, and cold tolerance.

Besides providing good nutrition for cows during the growing season, bermudagrass is used extensively in hay production for winter feeding. Although this practice is generally an expensive way to winter cattle, it is a popular practice across most of the South. Other uses of bermudagrass for winter feeding may help reduce costs. These uses include standing or "stockpiled" bermudagrass for fall and early winter grazing or overseeding bermudagrass swards with cool-season annual forages such as small grains, ryegrass, clovers or medics to provide late winter and spring grazing. The combined use of stockpiled bermudagrass and overseeded ryegrass can reduce winter feeding costs by up to $100 per cow through the winter.

Warm-season perennial grasses such as bermudagrass generally have lower nutritive value compared to warm-season annuals or cool-season forages. However, good fertility practice (Table 3) and careful attention to stage of maturity at harvest (Table 4) can provide forage of good to excellent nutritive value.

Table 3. Coastal bermudagrass crude protein (CP) content as affected by fertilizer and broiler litter application rate.[1]

	----------CP---------- (% DM)									
	----------1992----------					----------1993----------				
Application rate (lbs/ac)	June1 1	July 9	Aug 6	Sept 8	Oct 7	May 7	June 17	July 19	Aug 23	Sept 22
N-P_2O_5-K_2O (lbs/ac)										
0-0-0	11.2	9.4	9.8	10.0	8.9	11.5	9.4	6.6	8.9	8.1
100-33-67	13.2	10.1	13.1	11.8	9.0	19.8	8.5	9.3	9.5	9.3
200-67-134	14.2	11.2	15.0	14.6	11.5	20.3	9.8	11.7	10.0	10.3

400-134-268	16.8	13.1	16.9	16.4	14.3	21.8	14.3	12.8	11.1	12.9
Poultry litter (tons/ac)										
2 SPR + 2 SUM[2]	13.0	10.4	13.0	11.9	9.4	13.7	10.4	7.8	10.1	10.0
4 SPR	13.4	10.5	10.2	10.7	8.8	18.1	10.0	7.0	9.8	10.3
4 SPR + 4 SUM	13.8	11.3	15.5	14.2	9.6	17.0	11.7	10.1	10.9	11.8
8 SPR	15.9	13.8	13.1	12.5	10.1	22.3	14.3	9.5	9.5	10.6

[1] Evers, 1998
[2] SPR is late spring and SUM is mid-summer.

Table 4. Effect of clipping frequency on yield and nutritive value of 'Coastal' bermudagrass hay.[1]

Clipping Interval (wk)	DM Yield (tons/ac)	Leaf (%)	Crude Protein (%)	Lignin (%)
1	6.3	---	21.4	…
2	7.8	87.6	20.8	9.4
3	8.6	81.3	18.8	9.6
4	9.7	74.8	17.0	10.3
6	12.6	57.7	13.8	11.2
8	12.5	51.4	12.2	12.0

[1] Burton and Hanna, 1995

Bermudagrass has many uses other than pasture and hay, such as lawns, general-purpose turf, and erosion control. The following are descriptions of the various cultivars and collections of bermudagrass grown in East Texas:

SEEDED BERMUDAGRASSES

Seeded varieties can be used on small acreages that are not economical to sprig and on steep slopes and cut-over timberland where good seedbed preparation necessary for sprigging is not feasible. Most seeded bermudagrass on the market are blends that contain 2 to 4 lines and frequently contain Giant (NK 37) and common. Components of some of the blends on the market are reported in Table 5. A comparison of DM yield of several seeded varieties at Overton, TX are reported in Table 6. The percentage of each line in the blend may vary from year to year depending on seed availability and cost.

CHEYENNE

Cheyenne is a cross between a bermudagrass from an old turf site in the Pacific Northwest and another plant from former Yugoslavia. Jacklin Seed Company and Pennington Seed developed and released this cultivar in 1989. It was originally released as a turfgrass but was promoted as a pasture variety by the mid-90's. Like common bermudagrass, Cheyenne establishes quickly. Cheyenne produced the least dry matter yield of the seeded bermudagrasses in a 5-year evaluation trial at Overton (Table 2).

COMMON

A highly variable variety in appearance and that responds favorably to good management in East Texas. Common may be found growing under almost every conceivable condition throughout the bermudagrass-growing region. It can be considered a forage grass, a turf grass or a noxious weed. Because of the long experience with common, it is often used as a standard for evaluating new material. Common dry matter yields are generally about 1/3 lower than Coastal with the forage nutritive value and forage quality being about the same. It is generally more winter hardy than the hybrids.

GUYMON

Guymon is a synthetic cultivar developed from parental lines found in Yugoslavia and growing near Guymon, Oklahoma. The Oklahoma Ag Experiment Station and USDA-ARS released Guymon in 1982. Guymon is very winter hardy and has large stems. It has great winter tolerance, which allows it to be successfully grown in the northern portion of the bermudagrass growing region. Guymon dry matter yield is less than Midland or Hardie in Oklahoma and less than common bermudagrass in Texas.

GIANT (NK-37)

NK-37 is a diploid strain of common bermudagrass that was increased by the Northrup Seed Company. Compared to common bermudagrass, NK-37 grows more upright with fewer tendencies to form a sod, has longer leaves, finer stems, fewer rhizomes and stolons, and has no pubescence. NK-37 begins growth later in the spring than common bermudagrass and it is not as cold tolerant as common. In severe winters, damage may be high. However, loss appears associated with disease damage and low fertility rather than a direct result of low temperatures. NK-37 is susceptible to leaf spot disease and dry matter yield declines in two to three years due to cold weather and diseases. The plantings will typically become a common bermudagrass stand. NK-37 does well in lower humidity climates.

WRANGLER

Wrangler was released by Johnston Seed Company from a germplasm developed by Oklahoma State University. It has good cold hardiness and has good cover during the establishment season. Forage yields of Wrangler are potentially higher than yields of Guymon.

The following are descriptions of commercial blends of hulled and unhulled seed:

PASTO RICO

Pasto Rico Brand is a seed blend marketed by Northrup, King and Company. It is a blend of Giant (NK-37) and common bermudagrass that contains both hulled and unhulled seed.

RANCHERO FRIO

Ranchero Frio is a mixture of Giant (NK-37) bermudagrass and Cheyenne. Over the course of three years, Ranchero Frio has placed near the bottom in the seeded bermudagrass evaluation trial. Ranchero Frio has averaged 4613 lbs dry matter/ac over a 3-year trial (Table 2).

SUNGRAZER

Sungrazer is a mixture of KF 194 and Wrangler. It is blended and sold by MBS Seed, Ltd. of Denton, TX.

SUNGRAZER PLUS

Sungrazer Plus is a mixture of Giant, KF 194, and CD 90160 bermudagrass. It is blended and sold by MBS Seed, Ltd. of Denton, TX.

TEXAS TOUGH

Texas Tough is a mixture of seeded bermudagrass that is blended and sold by East Texas Seed Company of Tyler, TX. The blend consists of 1/3 Giant and 2/3 common bermudagrass, one-half of which is hulled and the other one-half unhulled. At Overton, a 5-year variety evaluation trial has indicated Texas Tough to be the most productive of the seeded varieties in the trial, averaging 7,496 lbs DM/ac over the 5-year period (Table 2).

TEXAS TOUGH +

Texas Tough Plus is a mixture of Common, Giant, Majestic seeded bermudagrasses that is blended and sold by East Texas Seed Company of Tyler, TX. Texas Tough + can be utilized for grazing or hay production.

TIERRA VERDE

Tierra Verde, like Texas Tough, is a mixture of Giant and common bermudagrass. The Tierra Verde blend is 50% hulled and unhulled Giant and 50% hulled and unhulled common. Data obtained from a 5-year variety

evaluation trial at Overton indicates Tierra Verde has averaged 6,967 lbs DM/ac, which placed it third among the seeded varieties (Table 2).

Table 5. Blends of seeded bermudagrasses.

Trade name	Components
Pasto Rico	Common, Giant
Pasture Supreme	Common, Giant
Primero	CD 90160, Mirage, Giant, Panama
Ranchero Frio	Cheyenne, Cheyenne 2, Mohawk, Giant
Sungrazer	KF 194, Wrangler
Sungrazer 777	KF 194, Jackpot, CD 90160
Sungrazer Plus	KF 194, CD 90160, Giant
Texas Tough	Common, Giant
Texas Tough Plus	Common, Giant, Majestic
Tierra Verde	Common, Giant
Vaquero	CD 90160, Mirage, Pyramid

Table 6. Three-year yields of several seeded and hybrid bermudagrass lines at Overton, Texas.

	2002	2003	2004	Average
Variety	Yield (lb dry matter/acre)			
Coastal	6383	11,618	14,966	10,989
Tifton 85	8878	13,810	13,716	12,135
Common†	7557	10,624	12,908	10,363
Giant†	5675	9,062	10,230	8,322
Cheyenne†	6370	10,438	13,183	9,997
Wrangler†	4966	10,123	9,713	8,267
Seed lines	3532-9691	5119-15,619	7962-16,121	6879-13,402

†Seeded.

Table 7. Comparison of seeded bermudagrass varieties at TAMU-Overton Center.[1]

Variety	1997		1998	1999	2000	2001	AVG
	Grass	Weeds					
				DM (lbs/ac)			
Texas Tough	2480	523	5262	11749	6997	10993	7496
Ranchero Frio	1943	291	2912	8984	9116	12428	7077
Tierra Verde	2085	159	4885	9054	7065	11748	6967
Cheyenne	2408	268	3430	6640	8159	13431	6814
Common					6666	11352	9009
Wrangler					6239	7550	6895
Giant					6591	6443	6617

[1] Evers, 2001.

HYBRID BERMUDAGRASSES

Bermudagrass hybrids are essentially sterile. They may produce seed heads but produce little viable seed. Therefore, they must be propagated vegetatively (sprigs and/or green tops). Properly managed hybrids generally

provide increased dry matter yield (Table 7), better forage nutritive value, greater drought tolerance, and/or greater cold tolerance than with common bermudagrass or many of the other seeded varieties.

ALICIA

Alicia was developed by Cecil Greer of Edna, TX. It was reportedly selected from bermudagrass collected in Africa in 1955 and released in 1967. Franchise growers sold cuttings of aboveground material (tops) for the establishing of Alicia. It spreads primarily by stolons and has fewer rhizomes than Coastal. However, it spreads and becomes established more rapidly than Coastal. It is usually propagated by cuttings rather than by sprigs. Under moderate to heavy grazing and fairly severe winters it's recovery in the spring has been slow. Forage production is generally considered to be approximately equal in yield compared with Coastal; however, the forage nutritive value of Alicia is lower. Alicia is not as winter-hardy as Coastal and is more susceptible to rust and other diseases.

BRAZOS

Brazos is a hybrid between materials of African origin and was released in 1982 by the Texas Ag Experiment Station, USDA-ARS, USDA-SCS, and the Louisiana Ag Experiment Station. Compared with Coastal, Brazos has wider leaves, thicker stems and rhizomes. It creates a more open sod than Coastal does. It has constantly been two to four percentage points higher than Coastal in digestibility. Brazos produces dry matter yields equal to Coastal on heavy soils, but up to 20% less on sandy soils. It establishes slower than Coastal, but is equal to or superior to Coastal in stand density persistence under grazing and winter hardiness. This cultivar is best used as a grazing due to the larger stems requiring more drying time.

CALLIE

Callie was selected as an aberrant plant in an old plot of bermudagrass plant introductions at Mississippi State University in 1966 from a plant introduced from Africa and released in 1974. Callie is a robust grass with large stolons, wide leaves and a tall growth habit that establishes rapidly the first year. It produces dry matter yields equivalent to Coastal and provides good animal gains. Callie produces a ground cover consisting of an open type sod; therefore, spring recovery may be slower than Coastal. Callie is not as cold tolerant as Coastal and is extremely susceptible to rust, which reduces forage yield and nutritive value.

COASTAL

A hybrid between Tift bermudagrass, a vigorous growing bermudagrass found in an old field near Tifton, Georgia, and an introduction from South Africa. Coastal is a result of an extensive breeding program by Glen Burton, USDA-ARS, Georgia Coastal Plains Experiment Station at Tifton, GA, and was released as a cultivar in 1943. Coastal is a highly productive bermudagrass producing both rhizomes and stolons and is adapted to a wide range of climatic conditions. It has exceptional longevity, readily responds to fertility and irrigation, and possesses better drought tolerance than common. Coastal is also tolerant of heavy grazing pressure or frequent and close defoliation. Coastal is the most widely planted bermudagrass in the southern US and Texas.

COASTCROSS-1

Coastcross-1 was developed by crossing Coastal and a plant introduction from Kenya, Africa and released by the USDA and Georgia Coastal Plains Experiment Station in 1967 from the breeding program of Dr. Glen Burton. Coastcross-1 produces more stolons than Coastal and has few small rhizomes that create an open sod that makes it more susceptible to invasion by weedy species. Coastcross-1 grows taller and has broader, softer leaves than Coastal. It is highly resistant foliage diseases. Coastcross-1 produces about the same dry matter yield as Coastal, but is 11-12% higher in digestibility. Although Coastcross-1 produces more fall growth, it does not have the winter tolerance of Coastal. Its lack of cold tolerance limits it to the more southern bermudagrass growing region.

GRAZER

The Louisiana Ag Experiment Station and the USDA-ARS released Grazer bermudagrass in 1985 after it had been previously released from Tifton, GA as Tifton 72-84. This cultivar is a cross between a bermudagrass found growing in the Alps of northern Italy and an introduction from Kenya, Africa. It is used for pasture and/or moderate production of hay that is high in forage nutritive value. Grazer produces a few rhizomes but is highly stoloniferous. The dry matter yield is less than that of Coastal, but the forage nutritive value is higher through the

summer months. Therefore, the average daily gain and gain per acre are comparable to or higher than those obtained from Coastal. The drought, disease and cold tolerance is equal to Coastal. Grazer establishes faster than Coastal and forms a dense sod.

HARDIE

Hardie is an infertile hybrid derived from plants native to Turkey and Afghanistan that was released by the Oklahoma Ag Experiment Station in 1974. Hardie is established by planting sprigs. It is cold hardy and has larger rhizomes and longer, broader leaves than Midland bermudagrass, yields somewhat more dry matter than Midland, and produces greater gain per acre due to increased digestibility. Hardie is less disease tolerant than Midland or Coastal and dry matter yields are less than Coastal in Texas and Louisiana. It is generally grown north of Texas.

JIGGS

A Mr. Riggs selected the bermudagrass that would be known as Jiggs from a field in East Texas. Sprigs and tops are available and being planted by a few producers. Jiggs establishes rapidly from sprigs or tops and has produced dry matter yields equal to Coastal and Tifton 85. Anecdotal evidence suggests that Jiggs demonstrates its greatest advantage on sites that are tight and poorly drained. This variety, however, has problems with rust and may not be as cold tolerant as Coastal.

LA GRANGE

A collection made by the Extension County Agricultural Agent near LaGrange, Texas. LaGrange is similar in growth characteristics and digestibility to Coastal.

LANCASTER

Max W. Lancaster of Rienz, Mississippi released Lancaster bermudagrass in 1985. The cold hardiness, dry matter yield, and forage nutritive value are supposedly equal to Coastal, but there is very little data on this variety.

LULING

A deep green, broad-leafed bermudagrass with short, dense growth obtained from the Luling Foundation at Luling, Texas. Forage production is similar to that of common but significantly less than Coastal.

MIDLAND

Midland is a hybrid between Coastal and a winter hardy variety from Indiana released cooperatively by the Oklahoma Ag Experiment Station and USDA-ARS at Tifton, GA in 1953. Midland is leafier, darker green, and tends to produce a more open sod than Coastal. It is very cold tolerant and is grown north of regions where Coastal will not persist. It has about the same forage nutritive value as Coastal however yields are usually lower where winterkill is not a factor. It is established primarily using sprigs.

NAISER

W. J. Naiser collected the grass from the Colorado River bottom near El Campo, Texas. Naiser is a very short, coarse plant with a compact growth habit that produces a rather dense ground cover. Naiser has consistently produced less forage than Coastal but has maintained a slightly higher digestibility. Because of its dense ground cover characteristic, the grass has some interest for use in stabilizing waterways.

ROCKDALE SERIES

C. W. Lewis of Rockdale, Texas made the original collection of this grass from a droughty site near Albuquerque, New Mexico. Rockdale-1 is a fine-leaved, dense-growing bermudagrass of medium height. Forage dry matter yields have been about like common but of slightly higher digestibility. Rockdale-2 is a selection out of the original collection. It was produced from one of the two growth types present in Rockdale-2. Neither collection offers any promise, as both produce less dry matter than Coastal. Rockdale-1 is slightly superior to Coastal in IVDMD, but the decreased dry matter production more than offsets that slight advantage.

RUSSELL

Russell appeared in a field that was originally planted to Callie in Russell County, Alabama. It is believed to be either a mutation of Callie or a natural hybrid between Callie and an ecotype of common bermudagrass.

Russell was jointly released by Auburn University and Louisiana State University in 1994. Russell has higher yields, more rapid spread and greater winter hardiness than Coastal. However, forage quality appears to be equivalent to Coastal. Russell produces both rhizomes and stolons creating a dense sod that is tolerant to grazing and is effective in preventing erosion.

SCHEFFIELD

A. L. Scheffield found this selection of bermudagrass growing in a field previously planted to African Stargrass in Tyler County near Woodville, Texas. Scheffield is an intermediate-textured plant tending to produce a somewhat denser stand of grass than Coastal. Forage production has been quite similar to that of Coastal; however, digestibility has been less than that of Coastal.

TIFTON 44

Dr. G. W. Burton released Tifton 44 in 1978 at the Georgia Coastal Plains Experiment Station as a cross between of Coastal and a winter-hardy plant surviving in Berlin, Germany for 15 years. Tifton 44 dry matter yield and disease resistance is similar to Coastal, but Tifton 44 has a slightly higher forage nutritive value and a greater cold tolerance than Coastal. The higher nutritive value of Tifton 44 has resulted in 15 to 20 percent higher average daily gains for cattle grazing during summer. Tifton 44 generally greens up a week to ten days earlier in the spring and remains green a week to ten days longer in the fall. Tifton 44 is slow to establish, taking as much as three years to establish. Therefore, it needs to be planted in soils that are relatively free of common bermudagrass and other weedy species. Tifton 44 is utilized more in North and Northeast Texas because of its cold tolerance.

TIFTON 78

The Georgia Coastal Plains Experiment Station and USDA-ARS released Tifton 78 in 1984. Tifton 78 is a hybrid cross between Tifton 44 and Callie bermudagrass. It can be established either from top cuttings or sprigs, but the use of tops for establishment increases susceptibility to winterkill. Tifton 78 is similar to Callie except that it is slightly more winter hardy and is resistant to rust. Compared to Coastal, Tifton 78 is taller, spreads more rapidly, establishes easier, is higher yielding and more digestible. The higher digestibility allows for improved animal gains. Tifton 78 plantings at the Overton Experiment Station were killed by hard freezes two years in a row, while Coastal planting were not harmed. Tifton 78 appears to be adapted only to the most southern areas of the state.

TIFTON 85

Tifton 85 was developed and released by the USDA-ARS in cooperation with the University of Georgia Coastal Plain Experiment Station, Tifton, GA in 1993. Tifton 85 is a hybrid between a plant introduction from South Africa and Tifton 68. Tifton 85 has large stems, long stolons and large rhizomes (though fewer than Coastal and Tifton 44). Tifton 85 is established by either planting sprigs or tops. In a 3-year trial in GA, Tifton 85 produced 26% more dry matter and was 11% more digestible than Coastal. Animal gains are approximately 10% better than Coastal due to the higher digestibility. At Overton, Tifton 85 has greened up earlier and remained green longer than Coastal. Tifton 85 is not highly winter hardy.

WHEELOCK SERIES

Several collections identified and obtained near Wheelock, Texas. Wheelock-1 and 3 were inferior to Coastal and did not show any real promise as potential new cultivars. Whealock-2 is a more vigorous-growing bermudagrass, intermediate in height between Coastal and common but is somewhat denser than Coastal. Forage dry matter yield and digestibility are similar to Coastal.

WORLD FEEDER

World Feeder bermudagrass was offered for sale in 1991 by Louis Gordon, president of Bethany-based Agricultural Enterprises Corporation at Bethany, Oklahoma. World Feeder bermudagrass has rhizomes and stolons and grows rapidly. It also has good winter hardiness. Data from both Oklahoma State University and Texas A&M University indicate World Feeder is less productive than most of the commonly used hybrid bermudagrasses, similar in forage nutritive value, and very expensive to establish.

ZIMMERLY SELECT

Zimmerly Select is an introduction from Northern Rhodesia, Africa from the USDA Plant Introduction Program in 1955. Zimmerly Select produces both stolons and rhizomes. Forage production has been below that obtained from Coastal. Digestibility also tends to be slightly lower than Coastal during the growing season.

AFRICAN STARGRASS

African Stargrass (*Cynodon nlemfluensis*) was introduced to the US around 1955 from introductions brought from Africa. It is the same genus as bermudagrass but a different species. African Stargrass has few, if any rhizomes, and has a coarser leaf than Coastal. It is a very vigorous and aggressive grass with little cold tolerance. It is grown in South Texas under irrigation and in many parts of northern Mexico.

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