UNIVERSITY OF FLORIDA
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DS56

Bermudagrass Varieties for Top Quality and Yields[1]

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Bermudagrass is a crop that can reduce feed costs and increase the overall efficiency of a Florida dairy farm. One large dairy in north central Florida, milking over 1000 cows, is producing "cheap milk" with heavily fertilized bermudagrass overseeded with cereal, rye, or oats. They are using anhydrous ammonia, cutting the forage every 30-35 days and making quality bunker type silage without wilting.

For much of the South, we think the hybrid bermudas top the list of forages that may be grown. Properly managed, they are more dependable and produce more forage per unit of fertilizer and other inputs than any forage I know. They contain more dry matter (25 to 30%) and cure faster when cut for hay than other forages. They, particularly Coastal bermudagrass and its hybrids, top the list in drought tolerance and the ability to produce forage during droughts. In a 3-year experiment with as little as 77% of average growing season rainfall, applying irrigation water to heavily fertilized Coastal bermudagrass failed to increase annual forage yields.

The six bermudagrass hybrids listed in Table 1 will yield about twice as much dry matter as most common bermudas. In our tests, only our new Tifton 78 has yielded more. But they are different and before I can tell which one I would plant, I must know where you want to grow them. The winter survival column in Table 1 will help me answer your question. In the northern part of the bermudagrass belt, Tifton 44 is your best choice. Coastcross-1 and Callie will only be very dependable when grown in the tropics and most of Florida. The other four bermudas can be grown there and in the rest of the South.

Rust is a foliage disease that reduces yield and the quality of the forage produced. Because Callie is very susceptible to this disease, it would be a poor choice among the six hybrids listed in Table 1.

I must also ask you, "What do you plan to do with the bermudagrass you plant?" A grower of Alicia told us recently that he can sell all the hay he can produce to dairy farmers. When we asked him how they used it, he answered, "They use it for bedding." Certainly its susceptibility to rust plus its poor digestibility compared even with Coastal, makes it a poor choice for anything else.

If you plan to use the bermuda hybrid only for dry pregnant mature cows, Coastal with more than 40 years of success to its credit will be as good a source as any. You can make good quality forage out of Coastal with proper management but why plant

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Coastal now when hybrids with better quality are available?

COASTCROSS-1 BERMUDAGRASS

If I were a dairyman in the tropics or in most of Florida, and wanted a bermudagrass for growing animals and milking cows, I think I'd plant Coastcross-1, even though Tifton 78 might be a little easier to establish and might yield a little more. Cuba's success with Coastcross-1 for milk production certainly influences my decision.

Milk From Coastcross-1 in Cuba

In June, 1979 when I visited Cuba's Animal Research Station, Dr. Fernando Funes proudly told me, "We can produce 10,000 lbs. of milk per lactation with your Coastcross-1 without any concentrate." He showed me the replicated test pastures and the Holstein cows used to obtain the data and said it was the best of several grasses tested. Later, one of their scientists gave me the data in Table 2 from a test just completed.

Twenty milking cows and 10 dry cows and replacements grazed 20 acres of Coastcross-1 fertilized with 400 lbs/A of N + P&K/yr in each treatment. These pastures were divided into four 5-acre units that were grazed rotationally as follows: the 20 milking cows received the fresh, leafy grass the first 7 days. The 10 dry cows and replacements cleaned up what was left during the next 7 days and each 5-acre unit was given 14 days to recover and complete the rotation. Fortunately, Cuba's climate permits year-around grazing.

While in Cuba I visited two dairy enterprises using the 4-pasture 7-day rotation and was told that Cuba had a half-million acres planted to Coastcross-1. The manager of one of the Enterprises told me, "Milk production drops noticeably when the cows are moved from Coastcross-1 to a pasture for Star bermudagrass."

Coastcross-1 bermudagrass is a sterile F_1 hybrid between Coastal bermudagrass and a highly digestible, cold susceptible bermudagrass from Kenya. Compared with Coastal, it grows taller, has broader, softer leaves, and spreads faster with above ground stolons (it has no rhizomes). In repeated tests, it has been 12% more digestible, has given 30% better average daily gains (ADG) when fed as hay and 40% better ADG and live weight gains (LWG)/A when grazed.

Coastcross-1 bermudagrass is an F_1 hybrid between Coastal bermuda (*Cynodon dactylon*) and a *C. nlemfuensis* introduction from Kenya. Like most species hybrids, it is sterile and heads that form occasionally never produce seed. Like its Kenya parent, it produces no rhizomes (underground stems) and spreads by above ground stolons. The sterile, non-rhizomatous characteristics of Coastcross-1 make it much easier to control and eradicate than seed producing bermudagrasses. It is the seed producing characteristics of grasses like *Panicum maximum*, *Paspalum notatum*, and *Chloris gayana* that scatter them where they are not wanted and permit them to persist as weeds after they are replaced with other crops.

TIFTON 44 BERMUDAGRASS

Vance Watson, coordinator of Forage Programs in Mississippi, has just shared with me the first year's results of an evaluation of Tifton 44 bermudagrass as a forage for lactating dairy cows. At the Coastal Plain Branch Station, Newton, Mississippi, E. J. Murphey and W. A. Brock compared Tifton 44 with corn silage and pearl millet for 8 weeks in the summer of 1985. Their description of the test and its results follow.

In the first year of the study, 60 mature Holstein cows in mid to late lactation were randomly allotted to each of the three treatments. Each treatment was fed the same amount of supplemental dairy concentrate.

Results from the first year of the study show that average daily production of 4% fat-corrected milk (FCM) per cow was highest for the Tifton 44 bermudagrass treatment (50.1 pounds), followed by the corn silage treatment (49.7 pounds), and lowest for the millet treatment (47.6 pounds).

The forage analyses showed that the energy level (TDN) of Tifton 44 bermudagrass was 65.97% while pearl millet and corn silage were higher in TDN (69.20 and 72.34%, respectively).

Although the energy level of Tifton 44 was somewhat less than that of corn silage, it maintained a production level similar to corn silage for the eight week course of this initial trial. Further work with Tifton 44 and other hybrid bermudas are planned to determine how they will perform as warm season grazing crops for lactating dairy cattle.

Tifton 44 is the best of several thousand F_1 hybrids between Coastal bermudagrass and a common bermudagrass that had survived for 15 years in Berlin, Germany before I collected it in 1966. Compared with Coastal, Tifton 44 is much more winter hardy, starts growth earlier in the spring, has more rhizomes, and has finer stems that cure faster when cut for hay. It is 5% more digestible and usually gives higher ADGs and LWG/A when grazed or fed as hay.

TIFTON 68 BERMUDAGRASS

Tifton 68 is the best of many F_1 hybrids between PI255450 and PI293606, the two most digestible bermudagrasses in our collection of 500 introductions from various parts of the world. It is a giant type with large stems, long stolons, and no rhizomes. It spreads rapidly when planted vegetatively and has usually outyielded everything in the test the 1st year partly because of its rapid spread and establishment. In a clipping test comparing 81 hybrids from 1974 to 1976 (mild winters), average annual dry matter yields for Tifton 68, Coastal, and all entries were 14,000, 13,000, and 12,200 kg/ha, respectively. Respective *in vitro* dry matter digestibilities for the dry matter harvested were 64.3, 54.9, and 57.3%. In a 24-week clipping test with replicated plots cut at 1, 2, 4, and 8-week intervals, Tifton 68 gave higher in vitro dry matter digestibility (IVDMD) values than either Coastal or Coastcross-1.

In an animal feeding trial at Tifton, steers gained 10% faster on Tifton 68 pellets than on Coastal bermudagrass pellets. Pastures we had hoped to graze in 1977 suffered such heavy winter damage in 1976-1977 that the test was abandoned. Tifton 68 looked good the first year in plantings in Alabama and Homer, Louisiana, but suffered greatly from winter injury in 1976-1977.

Several cattlemen in Mexico report outstanding production and animal performance on Tifton 68 bermudagrass.

TIFTON 78 BERMUDAGRASS

For much of the South, Tifton 78 is the best bermudagrass hybrid release from the forage grass breeding program at Tifton.

It is the best of a number of F_1 hybrids between Tifton 44 and Callie bermudagrasses made in 1975. It is sterile and must be propagated vegetatively. Compared with Coastal, it is taller, has similar rhizomes, spreads much faster by above ground stolons, establishes easier and starts growth earlier in the spring.

In a 3-year replicated clipping trial planted in 1978, Tifton 78 produced 25% more dry matter and was 7.4% higher in digestibility (IVDMD) than Coastal. When compared with Coastal bermudagrass in a 4-year grazing trial, 1982-1985, conducted by animal scientists Gary M. Hill and Philip R. Utley, Tifton 78 produced 27% more steer days, 36% more liveweight gain and 13.5% better average daily gains than Coastal. In 1984 when fertilized with 150 lb of N per acre plus adequate P and K, Tifton 78 produced 1024 lb of liveweight gain per acre. Steers on Tifton 78 averaged 1.7 lb/day from April 10 to October 3. In 1984, well established Tifton 78 burned in late February and fertilized with 100 lbs/A of N plus adequate P and K on March 15 produced 2 tons per acre of hay when cut on May 7.

The northern limit for Tifton 78 is yet to be established. In 2-year old clipped plots, it survived the severe 1983-84 winter at Crossville, Alabama; Overton, Texas; and Bryan, Texas. Tifton 78 in 2-year old grazed pastures survived 0 degrees F at Tifton in 1984-85 without loss of stand. Because Callie lacks winterhardiness and half of the genes in Tifton 78 are from Callie, Tifton 78 should not be as winterhardy as Tifton 44 and will not replace it in the northern part of the bermudagrass belt.

OTHER BERMUDAGRASS HYBRIDS

There are other bermudagrass hybrids. Brazos, bred by Charles Taliaferro in Oklahoma, was good

enough to warrant release in Oklahoma, Texas, and Louisiana in 1982. In our tests, it was not as good as Tifton 78 and several other hybrids.

Grazer was bred at Tifton and was tested as 72-84 in clipped plots and grazed pastures. It was highly digestible but started growth later in the spring and yielded less than Tifton 78. It was named Grazer and released in Louisiana for grazing, particularly late in the season.

Star bermudagrass that has been used successfully in Puerto Rico was inferior to our best bermuda hybrids.

The two bermudagrasses released from the Ona, Florida Experiment Station have not shown promise in preliminary evaluation at Tifton.

PLANTING THE BERMUDAGRASS HYBRIDS

Planted properly, the hybrid bermudagrasses can become well established in 2 to 3 months and provide grazing or hay in the first season. A description of the steps required for success follows:

1. Choose a reasonably well drained soil and destroy common bermudagrass and weeds by fallowing the soil.

2. Plant only in moist soil that has received 500 lbs/A of a complete fertilizer such as a 10-10-10.

3. Turn the soil with a mold board plow and smooth with a disk harrow to destroy germinating grass seeds the same day you plant.

4. Plant fresh, pure, live sprigs or freshly cut tops (6 weeks old or older) so a part of the stem will be deep but tips will be above ground. Four bushels will plant an acre on 2 to 3 foot centers if sprigs are pushed into the soil with a pointed stick. Broadcast 25 to 30 bushels of sprigs or tops per acre and push them into the soil with a disk harrow.

5. Pack the soil well with a heavy roller or by driving the tractor over the planting to establish the capillarity in the soil necessary to keep the soil moist around the sprigs.

6. Spray immediately with 2 lbs/acre of 2,4-D to control both the grass and broadleafed weeds. It is an excellent preemergent herbicide for both grass and broadleafed weeds if applied the same day the grass is planted. A second application will usually be required in 30 days.

7. Complete steps 3 through 6 the same day to hold the soil moisture once the soil is disturbed and to control the weeds.

Fertilization

1. (Winter) Test soil and lime to keep pH above 5.5 and correct severe deficiencies. Use dolomitic lime to supply essential magnesium and calcium as well as to correct the soil pH.

2. (February) Burn when first shoots emerge to hasten spring growth, increase first cut hay yields one-half ton, and control weeds, spittlebug, and other pests.

3. (Mid-March) Broadcast first application of N-P-K to fully utilize spring growing conditions.

4. Fertilize only enough to produce the grazing (30 to 200 lbs. N/A) or forage for hay or silage (200 to 400 lbs.)N/A) needed.

5. Pound for pound of N, ammonium nitrate and nitrate of soda are best. Ammonium sulfate requires 3 times as much lime to correct its acid residue. Urea N is only about 80% as good per pound of N because of N loss to the air from urease activity. Apply ammonium nitrate (50 lbs. N/A) to overcome the lag in response to anhydrous ammonia that can cut first hay yields a half ton or more. P and K are essential. A 4-1-2 ratio of N-P_2O_5-K_2O usually supplies adequate amounts of P and K for grazing if the ratio is used every time the grass is fertilized. If all the P & K is applied in the spring, the grass will take up more than it needs and may be short late in the season. A 16-4-8 or similar blend will make a very efficient fertilizer for bermudagrass.

6. Sulfur is an essential nutrient for all plants. Blending a small part of the N from ammonium sulfate will supply the sulfur needed.

7. Minor elements are rarely needed.

The effect of fertilizer on the yield of 16% moisture hay cut every 4 weeks in two extremely different seasons is shown in Table 3. In average growing seasons with about 26 inches of rainfall, production will be similar to that obtained in 1953.

Table 1.

Grass	Winter survival	Forage yield*	Short day yield	Seed yield	Rhizomes	Rel ADGs with cattle				
						Grazed	Hay			
Coastal	3	1.0	3	Trace	Some	100	100	6	3	0
Alicia	4	1.0	3	Little	Many	80**		9	3	5
Coastcross-1	9	1.0	1	None	None	140	130	1	1	0
Callie	9	1.0	1	Some	Few	118		2	2	9
Tifton 44	1	1.0	3	Little	Many+	119	120	4	3	0
Tifton 78	3?	1.0+	1	None	Many	136	135	2	2	0

Ratings: 1 = best, 9 = poorest, 0 = no rust. *Following mild winters, **Estimated from EVDMD data.

Table 2.

Treatment concentrate supplements	Total Liters/cow	Peak production liters/day
0.5 kg/liter of milk above 10 liters/day	4558	19.8
0.5 kg/liter of milk above 5 liters/day	4555	19.8
0.5 kg/liter of milk for the 1st 10 wks.	4374	20.4
No concentrate	4444	18.6

Table 3.

Lbs. of fertilizer applied per acre		Tons of hay produced/A per year		Crude protein in the dry hay		Pounds of protein produced/A per year	
N	**0-10-20**	**1958**	**1954**	**1953**	**1954**	**1953**	**1954**
0	0	1.2	.5	9.2	10.9	188	88
100	250	4.4	2.0	11.2	11.0	827	374
300	750	7.9	4.2	15.2	15.4	2016	1111
600	1500	9.7	5.0	17.0	18.1	2761	1514
900	2250	10.5	5.1	19.6	18.7	3464	1612

Rainfall from April 1 to November 1 was 39.66 inches in 1953 and 13.68 inches in 1954.