NC STATE UNIVERSITY

Department of Crop Science
College of Agriculture & Life Sciences

Forage Facts

Prairiegrass Management

Also called Rescue Grass and "Matua"

Introduction

Prairiegrass (also called Rescuegrass or Matua) is a *Bromus* species. It was introduced to the USA about 150 years ago from South America and can be found in pastures, hay meadows, field edges and along roadsides in many areas. It is officially classified as *Bromus wildenowii,* Kunth, but historically it has also been called *Bromus catharticus,* Vahl, and *Bromus. unioloides*, H.B.K. It is often referred to as "Matua grass". Actually Matua is a "named variety" just as Kentucky 31 is a named variety of tall fescue and "Coastal" is a named variety of hybrid bermudagrass. The variety Grasslands Matua was the official name given to it by the New Zealand Research Division of AgResearch in 1973.

In the 1950's there was a local selection of rescuegrass, which is very slightly different, named Chapel Hill; it was especially subject to the disease called powdery mildew, which is still a problem in some years and environmental conditions.

Plant Characteristics

Prairiegrass is cool-season, erect, **bunch grass** that grows up to 3 feet tall when seed heads are present. Prairiegrass canopies are generally very dense from fall through early spring, but become more "open" during the summer. It is a **perennial** plant, but most plants perform like an annual in the Southeast USA. The seedhead is an open, drooping panicle with flat spikelets, each containing 6 to 12 florets (seeds). It will produce seedheads during each regrowth period of three to eight weeks from April through October.

The leaf sheaths are rolled in an oval shape and are covered with many fine hairs, especially in the basal area. The sheaths are not as "flattened" as orchardgrass or dallisgrass but are much more flattened than fescue. The leaves are flat or slightly folded and are 1/4 to 1/2 inch wide and may be up to 18 inches long. The leaves often have a characteristic "M" or "W" mark near the outer 1/3 of the leaf. Leaf margins are smooth. Prairiegrass does not have auricles, but the ligule is long (1/4 inch), membranous, and fringed. In the vegetative stage it can be distinguished from orchardgrass and dallisgrass because of its hairy basal sheath and the M imprint near the leaf tip. It is distinguished from tall fescue, annual ryegrass, and smallgrains by its hairy basal sheath and flattened leaf sheath.

Prairiegrass, unlike tall fescue and orchardgrass, will always produce seedheads after three to six weeks of regrowth. Fescue and orchardgrass will not have seedheads after the spring growth is harvested.

Possible Uses

Prairiegrass is highly palatable and may be used for **grazing, hay, or silage**. Cattle, goats, horses, sheep, and wildlife will graze it and potential animal performance is good to excellent. In pasture mixtures containing fescue, orchardgrass, or bermudagrass cattle tend to select prairiegrass over the others.

Adaptation and Performance Characteristics

Soils... Prairiegrass is best adapted to well drained soils, however it will grow well on sandy loams and loamy or fine-textured soils that are well drained. On soils where both fescue and prairiegrass are well adapted, the yields of prairiegrass may be similar to fescue or 50% greater than fescue. On sandy, well drained to excessively drained soils, prairiegrass may yield 1.5 to 3 times more than tall fescue. On wet or poorly drained soils, prairiegrass yields may be equal to fescue yields and as much as 50% less than fescue yield. It is less productive than bahia and bermuda on droughty soils, but better adapted than fescue, orchardgrass, or annual ryegrass. Yield estimates for various soils may be found at the following web site: http://www.soil.ncsu.edu/nmp/

Realistic Yield Expectations... Annual yields of pure prairiegrass stands usually range from 3 to 5 tons dry matter per acre, but may be higher when dense stands receive favorable moisture and nutrients.

Pure stands of Prairiegrass... There are limited comparisons of pure stands of prairiegrass with other species, especially when the prairiegrass was allowed to naturally reseed. The data in Tables 3, 4, 5, and 6 at the end of this factsheet reveal how it compares with other cool season grasses in tests on Cecil-Appling soil association without irrigation and when reseeding was not allowed. Annual fertilizer rates and application times are listed within each table, but ranged from 150 to 225 lbs/acre. First year yields of prairiegrass were equal to tall fescue to as much as 1.6 times the fescue cultivars. Yields in the second and third year were significantly reduced and was attributed to lack of volunteer reseeding.

Mixed stands with bermudagrass..
The annual yield of prairiegrass mixed with bermuda or other warm season grasses growing on adapted soils will not be additive of each species grown alone. In general, when bermuda is overseeded with cool season grasses the yields of the respective components of the mixture can be reduced by 10-50% compared to the respective crops grown alone in the same soil and environmental conditions. The extent of the reductions and the subsequent yield of the mixture is strongly dependent on harvest and fertilizer timing management. However, a general guide is that a mixture will have as much yield as bermuda with possibility of 50% greater yield than bermuda grown alone. Yield may range from 4 to 8 tons/acre on productive soils receiving adequate moisture, nutrients, and timely harvest management

There is limited information on mixtures of prairiegrass and bermuda, but the results from a 4-year experiment with fescue and bermuda provides some insight. When an established stand of bermuda was overseeded with fescue in 7-inch rows tall fescue made up about 60% of the yield in year one and about 80% in year four. Over the four year period the mixture yielded about 1.2 times bermuda growing alone. The mixture was fertilized with 50 lbs N/acre on February 15, April 15, June 1, and August 15 for annual total nitrogen (N) application of 200 lbs/acre; the mixture was harvested in mid-April, mid-May, and two to three additional times during the

summer-autumn period (Chamblee and Mueller. 1999 Technical Bulletin 315).

Seasonal growth pattern…The seasonal growth pattern for prairiegrass is similar to tall fescue and annual ryegrass (Figure 1) with more than half of the annual yield produced in the March through June period. During December through February it produces slightly more than tall fescue and annual ryegrass. Summer production of prairiegrass seems to be more productive than tall fescue and orchardgrass when moisture is available.

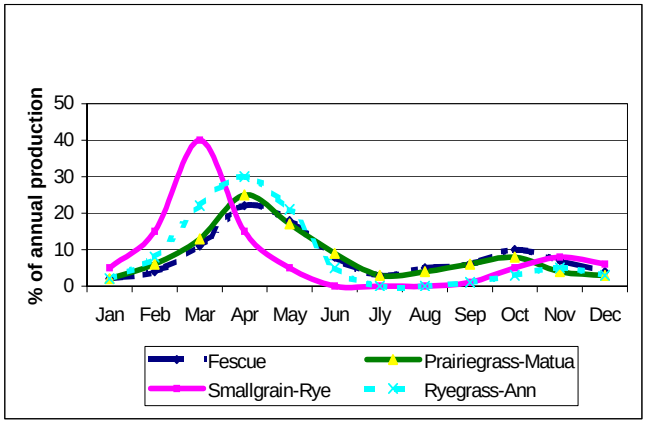

Figure 1. Seasonal growth of tall fescue, prairiegrass, cereal rye, and annual ryegrass expressed as a percent of annual production in each month.

Summer production is much less than bermudagrass, crabgrass, sudangrass, millet, bluestems, switchgrass, or gamagrass. When mixed with bermuda and compared to annual ryegrass or smallgrain, it has a more uniform seasonal production (Figure 2).

Nutrient composition…The chemical composition and nutritive value of the forage is strongly related to prior fertilization, the stage of growth at time of harvest or grazing and presence of disease such as powdery mildew and head smut. Nitrogen composition of plant tissue appears to be more similar to ryegrass than tall fescue or orchardgrass, therefore

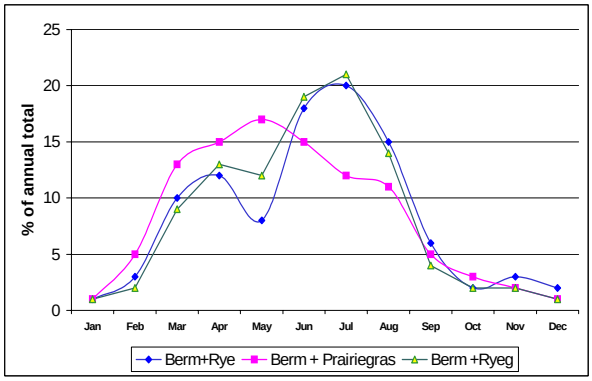

Figure 2. Seasonal growth of prairiegrass, cereal rye, and annual ryegrass mixtures with bermudagrass expressed as a percent of annual production in each month.

it may contain about 40 to 60 lbs N/ton dry matter. When harvested at vegetative to early heading stage of growth, prairiegrass may range from 12 to 18 % crude protein and 60 to 75 % TDN. The nutritive value of prairiegrass stems and seedheads tends to decline more slowly than other cool season grasses, and animals tend to prefer prairiegrass seedheads over those of other cool season grasses.

The phosphorous (P) and potassium (K) composition in tissue is similar to other grasses, however when high rates are being applied to land, all grasses will take up high amounts of K. The K composition is usually similar to N composition in most forage grasses. According to reports from Pennsylvania, prairiegrass may contain lower levels of certain trace elements such as magnesium and iodine than other cool season grasses

When grown in mixtures with bermudagrass, the composition of the mixture will be dependent upon botanical composition. In general, quality of bermuda will be lower than the prairiegrass.

Disease... Prairiegrass will often be infected with **powdery mildew,** especially during the spring. You can minimize the impact of this fungal disease by immediately mowing or grazing the affected growth to a 3 to 4 inch stubble. Often the mildew is more pronounced on old vegetation. Currently there are no pesticides registered in the USA to control this disease on forage crops.

There is another fungal seed disease called **"head smut"** which is indicated by blackened seeds within the seed head Seed that is fungicide treated before planting is less likely to develop head smut.

Establishment

Planting dates.. The optimum time to plant is September, but it is possible to get good stands from October and November plantings; its more risky to plant in November and March. Planting on a prepared seedbed in early September will usually result in more fall growth than planting later or planting into sod

Even though bermudagrass may not be growing rapidly during September, the evapotranspiration rate reduces available soil moisture for young seedlings. To minimize this effect, one can plant in October when bermuda is not as competitive. It is possible to plant into bermuda sod in September if moisture is not limiting or if bermuda top growth is temporarily killed with a contact herbicide such as Gramoxone.

Planting depth... The optimum planting depth is 1/4 to 1/2 inch. Many non-uniform and sparse stands have resulted from planting the seeds too deep.

Planting method... Drilling seeds to the proper depth generally improves the odds of obtaining good stands. However, broadcast seeding onto completely prepared seedbed, followed by rolling with a cultipacker has given satisfactory stands. Seedling development and early growth rates will be better from prepared seedbeds compared to no-till planting into sod, especially into bermudagrass sod.

When planting into sod, it is essential that the existing sod be less than 3 inches tall with very little surface thatch that can prevent seed contact with the soil. If sod planting into actively growing bermuda, it is necessary to temporarily stunt the bermuda with a herbicide or light cultivation to reduce competition for light and moisture. This option adds a level of risk into the survival of the bermuda, especially if late summer N and K management are out of balance or an insect attack occurs. Planting after the bermuda has been “frosted" or slowed due to cool nights will usually result in little growth of prairiegrass before spring.

Planting rates... Seeds are large (35,000 to 50,000 seeds/lb), compared to tall fescue or ryegrass (225,000 to 250,000 seeds/lb) but seedling vigor is not proportionally better. Plant 30 to 35 lbs/acre when drilling, or 35 to 40 when broadcasting on surface and rolling. If conditions such as planting date, soil contact, depth, moisture are not optimum, consider increasing seeding rates 50 percent.

Volunteer reseeding... Even though prairiegrass is a perennial, it behaves as an annual. To maintain productive stands for several years it is necessary to manage at least one growth cycle each year for seed production and natural reseeding. Seed-set may be allowed anytime from May through August, however mid-summer (June to August) seed production tends to minimize the amount of loss in forage yield and quality since it is a time when the plant naturally grows less actively.

According to Rumball (the researcher who developed Matua) ten mature seed heads/ yd^2 will provide a reseeding rate of 50 to 100 lbs/acre. Obtaining successful volunteer stands will depend on seed viability and control of competition from other established grasses during the September through October period. Germinating seeds and developing seedlings need to receive sunlight and moisture to survive. If prairiegrass is being grown with bermudagrass it is necessary to graze or mow the bermuda to less than three inches in September to minimize competition. There is some advantage to lightly disturbing the soil surface to enhance soil:seed contact and to slow the bermuda growth and evapotranspiration in some years.

When prairiegrass seed-set is desired, harvest or graze the crop after seeds have fully formed and are brown and easy to shatter as one walks through the field. Usually it takes 40 to 50 days for new growth to produce viable seeds, depending on temperature and moisture. Seeds produced in spring are usually larger and more vigorous than those produced in late summer, but seeds formed in the summer should provide satisfactory stands.

Fertilization

There are undocumented reports that prairiegrass can utilize very high rates of N (up to 800 lbs/acre), however the efficiency of N recovery and yield responses indicate much more moderate rates. When considering a realistic yield expectation (RYE) that can be expected in NC, it is likely that such rates would result in significant losses of N to the environment. In controlled greenhouse trials in Texas, 'Matua' prairiegrass survived rates of N greater than 1000 lbs/acre, however the N recovery efficiencies were unacceptable when annual N applications were above 250 to 400 lbs/acre. Nutrient uptake is strongly related to yields and generally the tissue will contain between 1.5 and 3% N, depending on harvest frequency, yields and nutrient application management.

Prairiegrass, like most other cool season grasses, performs best when soil pH is above 6.0 and P and K are medium or higher.

Nitrogen application suggestions for pure stands ...Prairiegrass responds to high fertility, especially when moisture is available. It should receive most of its N during the February through May and September through October months. Table 1 the associated footnotes provide guidelines on timing and rates of N application. The annual level of N will depend on Realistic Yield Expectations (RYE) for the sites. The guidelines assume that satisfactory stands of the crops are present..

Nitrogen Application suggestions for mixtures of bermuda oversown with Prairiegrass… Managing mixtures of bermudagrass with oversown winter crops such as prairiegrass, smallgrain, or ryegrass can be a challenge. Table 2 and the associated footnotes provide guidelines for stands that are successfully established during the autumn period. In the case of prairiegrass and bermudagrass it is expected that at least half of the winter crop is from surviving plants from previous year. Regardless of the level of management, there will be situations where the stands will not be sufficient to produce at full capacity. The following situations require an altered N management program.

Situation 1.
On sites where prairiegrass was not successfully established in the autumn plantings, but the site was successfully replanted with smallgrains in February.

1. When prairiegrass stands are poor in January, and it is evident that replanting is needed, it is best to plant another crop (cereal rye and / or oats) in February rather than to replant the prairiegrass. Prairiegrass plantings in February and March will not provide much growth potential before the bermuda starts to grow. However, the smallgrains can provide some nutrient uptake.

2. Application at replanting in February should not exceed 30 lbs plant available nitrogen (PAN) /acre for the February through April period.

3. Any of the original February through April PAN not applied at "replanting" can be applied in the May through August period, not to exceed 60% of original PAN for the period. An example for a site with 300 lbs/acre of annual PAN: Assume that 80 lbs PAN/acre was applied in the fall and 30 lbs PAN/acre at replanting in February; This site could receive 180 lbs PAN/acre (60% of 300) in the May through August period.

Situation 2.
On sites where neither the autumn planted crop nor the February replanting successfully established (assumes that the maximum allowable PAN was applied at both planting periods).

1. Determine a new PAN rate for the resulting pure bermuda crop by subtracting 50% of PAN applied previous September through November period and 100% of PAN applied during the February replanting period from the PAN rate for **bermuda grown alone** on this site.

2. Most of this adjustment should come out of the March through May allowable PAN for bermuda.

Situation 3.
On Sites where the previous autumn planted crop did not successfully establish and was not replanted the subsequent February (assuming that the maximum allowable PAN was applied during the September through November period and no PAN was applied in February).

1. If there was an unsatisfactory stand of winter crop in February and no replanting was made, then determine a new PAN rate for this site by subtracting 50% of PAN applied the previous September through November period from the PAN rate for bermuda grown alone on this site.

2. At least part of this PAN adjustment should be taken from the March through May period allowable PAN for bermuda growing alone.

Table 1. N application for cool season grasses (prairiegrass, tall fescue and orchardgrass) grown alone.

PAN, lbs	Sept- Nov [1,6]	Feb-May [2,3]	June-Aug [4,5]
Annual based on RYE [1]	Maximum	Residual	Maximum
	lbs	lbs	lbs
150	75	30	45
200	80	60	60
250	85	105	60
300	85	155	60
350	85	205	60

1. Realistic Yield Expectation

2. If planting new stands, apply 50 to 70 lbs PAN/acre; it would be best to apply some of this in November after plants are growing actively. On established stands apply 50 to 85 lbs PAN/acre depending on RYE of site. Consider splitting if >60 lbs PAN in a period, and do not exceed 30 lbs in November, preferably in early November.

   Do not apply PAN in December through January unless did not apply allowable PAN in the September through November, then consider up to 20 lbs/acre if less than 30 lbs was applied in early November. Before applying, consider signs of N deficiency and soil water conditions.

3. Do not exceed 70 lbs PAN/acre in February. Ideally the February PAN should be split about equally between first and last half of the month.

4. The amount of PAN applied during this period is dependent upon whether or not the maximum amounts are used in the autumn and summer periods. PAN during this period should not exceed 55-60% of annual PAN. Do not exceed 75 lbs PAN per application or 75 lbs PAN within any 30-day period.

5. If it is necessary to apply PAN during this period do not exceed 30% of annual PAN or about 60 lbs/acre. Do not exceed 30 lbs PAN/acre per 30 day period, especially during June and July. Applying PAN during June and July is advisable only if soil moisture is sufficient to allow reasonable plant growth. If little crop growth has occurred since last application of PAN, do not apply additional PAN, during the period

6. Prairiegrass (Matua) may use slightly more N in the summer than fescue and orchardgrass.

7. In Piedmont this date range is about two weeks earlier.

Table 2. N application for bermudagrass overseeded with winter crops of prairiegrass "matua", smallgrains, and annual ryegrass (assumes successful stands established from September to October 20 plantings or volunteer reseeding.

PAN, lbs	Sept-Nov [2]	Feb-April [3,4]	May-Aug [5,6]
Annual based on RYE [1]	Maximum lbs	Maximum lbs	Residual lbs
150	50	50	50
200	60	80	60
250	70	100	80
300	80	120	100
350	80	125	145
400	80	125	195
450	80	125	245
500	80	125	295

1. Realistic Yield Expectation

2. Apply 50 to 80 lbs PAN/acre in the September through November period. Do not exceed 30 lbs in November and preferably in early November. Consider splitting PAN if >60 lbs to be applied in the September through November period.

   On sites where prairiegrass in the mixture is more than one year of age, and it makes up more than 50% of the soil cover in October, one could increase the fall PAN by 15%. However, this should not increase the annual PAN level.

   Strive not to apply PAN during the December through January period. However if the allowable PAN for September through November was not applied and less than 30 lbs PAN was applied in early November, one could consider applying up to 20 lbs PAN/acre during December if the plants are nutrient deficient. This assumes satisfactory stand of actively growing winter crop and satisfactory soil moisture conditions.

3. Do not exceed 60 lbs PAN in February, preferably not more than 30 lbs in early February.

4. Do not exceed 125 lbs PAN or about 40% of annual PAN in the February through April period.

5. In the May through August period apply a minimum of 50 lbs PAN/acre but not more than 55 to 60% of annual PAN. The amount applied during this period will depend on whether or not the maximums were applied previous periods.

6. Do not exceed 75 lbs PAN/acre in any 30 day period during the May through August period.

Harvest Management

Hay or silage Prairiegrass should be cut in the late boot to early heading stage to provide rapid regrowth and relatively high forage nutritive value. It should be cut leaving a 3 to 4-inch stubble because the lower stem base contains the energy for regrowth. New tiller buds are also located just above the soil surface in the stem base. The 3 to 4-inch stubble is essential during the summer months (June-August).

Maintaining a mixture of prairiegrass and bermudagrass will depend on the timing of N applications, harvest schedules, and the harvest height. Managing the mixture requires favoring the prairiegrass cutting or grazing height, since it is much less tolerant of close cutting than bermuda.

Minimize the shading effects on the emerging spring bermuda growth in April by harvesting prairiegrass at boot to first signs of head emergence during April and again in May. During the summer, prairiegrass stands are usually "open" enough that bermuda does not receive significant shading.

Grazing... When prairiegrass reaches a height of 8 to 12 inches it is best to graze to a stubble height of 3 to 4 inches. To minimize trampling and "spotty" grazing, consider using all of the available forage in a paddock within 1 to 3 days. Depending on the temperature and soil moisture Prairiegrass may be ready to regraze every 21 (early spring) to 45^{+} days (summer and winter).

Grazing a mixture of prairiegrass and bermuda during the summer months presents a challenge; bermuda quality is best when it is grazed between 2 and 8 inches height, but prairiegrass will not persist at this grazing pressure. What often happens is that the bermuda is slightly advanced in age and stem content by the time prairiegrass is ready to graze; this can negatively impact animal performance and utilization efficiency.

Summary Precautions

Many factors can impact the productivity and persistence of pure stands or mixtures of prairiegrass. The manager is responsible for ensuring that crop performance meets the nutrient uptake goals for the site. Successful stands involve careful consideration of the following factors: moisture variation, temperature variation, timing of nutrient applications, balance of applied nutrients, amount of applied nutrients, disease, insect feeding, cutting times, cutting heights, and soil characteristics. A good record log of management activities and observations can be valuable in solving problems and documenting efficiency of the system.

Management requirements for prairiegrass are much higher than for other cool season grasses grown in the Southeastern USA. Maintaining pure stands or mixtures with bermudagrass will require managers to pay close attention to favoring prairiegrass.

Maximizing the yield of prairiegrass in mixture with bermudagrass will result in a 10 to 50% reduction of the bermuda component when compared to growing bermuda alone. Treating prairiegrass or mixtures with it with high summer N rates and close cutting or grazing heights, without regard to reseeding will most likely result in almost complete loss of stands in a single year.

Table 3. Annual dry matter yields (lbs/acre) of several grasses for two seasons growing on Cecil-Appling Soil Association. Raleigh, N.C. Forage Variety Test #217

Cultivars/Species	1985	1986
	tons/acre	
Forager/Triumph/Kenhy Tall Fescue	2.2	2.6
Kentucky 31 Tall Fescue	1.8	2.3
Bellgrade/ISI-79-1 Prairiegrass	3.6	2.0
Tetralite/Bison Perennial ryegrass	2.8	2.3
Hallmark Orchardgrass	1.5	2.1

Planted in 9-inch rows Oct. 23, 1984. pH=6.5; PI=59; KI=60;
Fertilizer applied: at planting...50-50-100; 75N on Feb 25,1985; 50N on May 13; 75N on Aug 8, 1985; 75N on April 9, 1986 and Aug 14 1986.
Harvested on April 2, May 13, July 8, Aug 9, Nov 6, 1985. Harvested May 1, Jun 18, 1986; no fall 1986 growth due to drought.

Table 4. Annual dry matter yields (tons/acre) of several grasses for three seasons growing on Cecil-Appling Soil Association. Raleigh, N.C. Forage Variety Test #239-241(These tests were planted in adjacent blocks).

Cultivars/Species	1991	1992	1993
	tons/acre		
Triumph/Cajun/Forager/Cattle Club Tall Fescue	4.7	3.5	3.5
Kentucky 31 Fescue	4.4	3.2	3.5
Boone/Hallmark/Benchmark/Shiloh Orchardgrass	3.1	3.5	2.2
Tetralite/Bison/Super NU1 Perennial Ryegrass	3.7	2.3	2.2
Puna Chicory	4.4	3.2	1.4
Matua Prairiegrass	4.8	3.2	2.0

Planted in 9-inch rows on Sept. 10, 1990. pH= 5.6-6.2; PI=56-142; KI=32-81;
Fertilizer applied: at planting...50-50-50; 75N on Feb. 28 and Aug 27, 1991; 75-50-50 on Feb 4, 1992; 75N on Sept. 9, 1992; 75-50-50 on Feb. 16, 1993; 75N on Aug 19, 1993.
Matua harvested on Oct., 1990, Mar., 1991, Apr., May, Aug., Oct., 1991.

Table 5. Annual dry matter yields (tons/acre) of several grasses for three seasons growing on Cecil-Appling Soil Association. Raleigh, N.C. Forage Variety Test #228.

Cultivars/Species	1988	1989	1990
	tons/acre		
Cajun/Triumph/Forager Tall Fescue	4.7	3.9	4.2
Kentucky 31 Tall Fescue	4.5	3.7	4.0
Shiloh/Boone/Hallmark Orchardgrass	4.6	3.5	3.4
Tetralite/Bison/Citadel/Bastion Perennial Ryegrass (no growth to harvest after June 7, 1990)	5.3	2.7	2.7
Matua/Bellgrade Prairiegrass; no growth after June 7,1990	6.4	3.2	3.1

Planted in 9-inch rows Sept. 24, 1987. Soil test at planting: pH= 6.4; PI=78; KI=52;
Fertilizer applied: at planting...40-80-80; 75N on March 7, 1988 and Aug 18, 1988; 75N on March 7, 1989 and Sept 4,1989 and 50 N on Oct 11, 1989; 75N on March 14 and Sept 14, 1990.
Harvested in 1988 on Mar 31, May 2, May 31, July 28, Sep 27.

Table 6. Annual Dry matter yields of several grasses for one season growing on Cecil-Appling Soil Association. Raleigh, NC. Forage Variety Test # 262. 1996-97.

Cultivar/Species	1997[1]
	tons/Acre
Highest yielding Annual Ryegrass Line	3.9
Marshall/Jackson (avg.)	3.7
Matua Prairiegrass	3.1
Stocker Bromegrass	3.0
LSD	0.4

[1] Planted in 9-inch rows Sept. 24, 1987. 75 lbs N/acre at planting and on March 7, 1997.
Total DM from five harvests starting February 25 and ending June 19, 1997.

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