TALL FESCUE AND PHALARIS ON DALLISGRASS SOD IN THE BLACK BELT

BULLETIN 514 JUNE 1979
AGRICULTURAL EXPERIMENT STATION AUBURN UNIVERSITY
R. DENNIS ROUSE, DIRECTOR AUBURN, ALABAMA

CONTENTS

First Printing 5M, June 1979

TALL FESCUE AND PHALARIS ON DALLISGRASS SOD IN THE BLACK BELT

C. S. HOVELAND, L.A. SMITH, and H.W. GRIMES*

DALLISGRASS *(Paspalum dilatatum)*, a warm season perennial grass with the potential for relatively good animal gains, is dormant and unproductive in Alabama from November to April. Sod-seeding of small grains or caleypeas *(Lathryus hirsutus)* will extend the productive season somewhat but this practice must be done annually.[1] Kentucky 31 tall fescue *(Festuca arundinacea)*, a perennial cool season grass, is semi-dormant in summer. It begins growth in September, grows little in mid-winter, and makes most of its production in spring until June. The two grasses in association should provide better forage over a longer grazing season than either one alone. AP-2 phalaris *(Phalaris aquatica)*, an experimental cool season perennial grass variety developed by the Auburn University Agricultural Experiment Station, makes more winter growth than Ky 31 tall fescue and should be desirable in a mixture with dallisgrass.

Results of previous work in Alabama[2] has shown that tall fescue can be grown in association with bahiagrass *(Paspalum notatum)*. However, high rates of N fertilization in winter and maintenance of a high stubble in summer were required to maintain tall fescue stands and prevent complete bahiagrass

*Professor, Department of Agronomy and Soils; Superintendent and Associate Superintendent, Black Belt Substation.

[1]HOVELAND, C. S., L. A. SMITH, AND H. W. GRIMES. 1961. Forage Production of Winter Annuals Sod-seeded on Dallisgrass-white Clover. Auburn Univ. (Ala.) Agr. Exp. Sta. Leaf. 66.

[2]HOVELAND, C. S., R. F. MCCORMICK, JR., E. L. CARDEN, R. RODRIGUEZ-KABANA, AND J. T. SHELTON. Maintaining Fescue in Bahia Mixtures. Auburn Univ. (Ala.) Agr. Exp. Sta. Bull. 503.

dominance on sandy soils. High nematode populations on these soils were probably a major reason for the demise of tall fescue in mixture with bahiagrass under drought stress and close summer defoliation.

This publication summarizes results of an experiment at the Black Belt Substation with overseeding tall fescue and phalaris on dallisgrass sod with and without ladino clover.

EXPERIMENTAL METHODS

Dallisgrass sod on Houston clay (Typic Chromudert very fine montmorillonitic, thermic) at the Black Belt Substation, Marion Junction, Alabama was disked and smoothed with a cultipacker in early September 1973 to reduce competition and make a seedbed. Some plots were treated with methyl bromide to kill the dallisgrass. Kentucky 31 tall fescue and AP-2 phalaris were seeded in rows 6 inches apart on September 26, 1973. Some treatments were also seeded with Regal ladino clover *(Trifolium repens).* Diazinon was broadcast at the rate of ½ lb. per acre active material to control insects. Nitrogen was applied to the all-grass plots in split applications as follows:

(a) dallisgrass alone—50 lb. N per acre in April and early July, totaling 100 lb. N.

(b) phalaris or tall fescue with dallisgrass—50 lb. N per acre in September, February, and April, totaling 150 lb. N.

(c) phalaris or tall fescue with dallisgrass—50 lb. per acre N in September, February, April, and July, totaling 200 lb. N.

(d) phalaris or tall fescue alone (treated with methyl bromide)—50 lb. N per acre in September, February, and April totaling 150 lb. N.

(e) phalaris or tall fescue alone (treated with methyl bromide)—no nitrogen fertilizer.

(f) all plots planted with Regal ladino clover—no nitrogen fertilizer.

Forage was harvested with a flail harvester whenever the tallest plants were about 10 inches tall, leaving a stubble of 2 inches. At each harvest, the percent dallisgrass, clover, and phalaris or tall fescue was estimated on each plot. Soil nematode populations were determined on methyl bromide—treated and non-treated plots in spring of the second and third years.

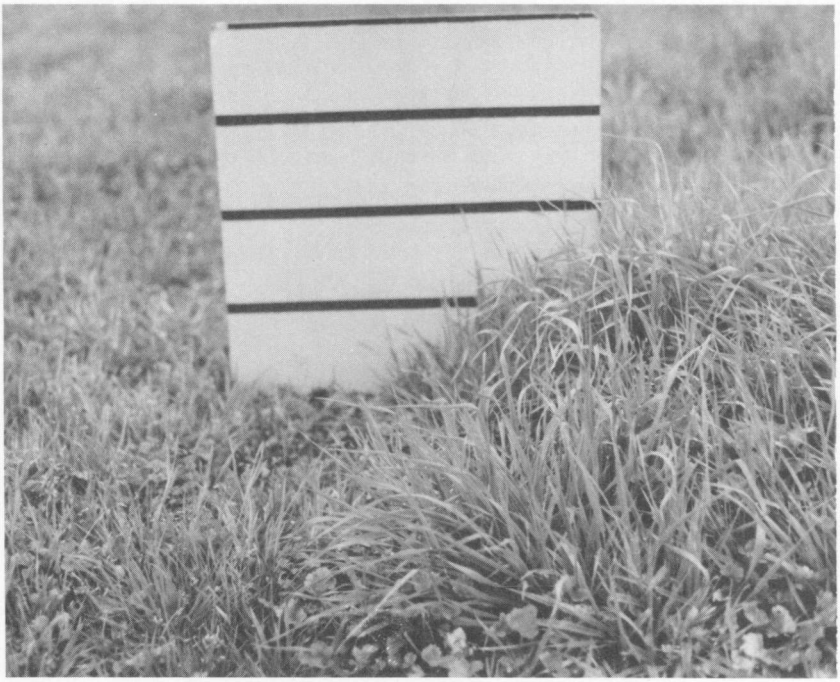


FIG. 1. Rapid establishment of phalaris (right) as compared to tall fescue (left), both seeded in dallisgrass sod in September 1973. Photographed March 28, 1974.

Plots were 5 x 20 feet with four replications arranged in a randomized complete block design.

RESULTS

Total Forage Yields

Good stands of phalaris, tall fescue, and ladino clover were obtained in the dallisgrass sod. Phalaris growth was especially rapid, figure 1, and the first harvest was obtained on February 13, 1974. Tall fescue growth was much slower than phalaris until late spring of the first year.

Overseeding tall fescue or phalaris substantially increased total forage yields over that of dallisgrass alone fertilized with N, table 1. Dallisgrass alone fertilized with N yielded about 60 percent that of dallisgrass overseeded with tall fescue or phalaris and fertilized with N. Summer application of N to dallisgrass (200 lb. N vs 150 lb. N) had little effect on the total yield of forage where phalaris or tall fescue was overseeded on the sod.

TABLE 1. TOTAL FORAGE YIELD OF PHALARIS AND TALL FESCUE PLANTED ON DALLISGRASS SOD AT BLACK BELT SUBSTATION OVER 3-YEAR PERIOD

Species	Nitrogen lb./acre	Soil treatment	Pounds per acre oven dry forage		
			1974	1975	1976
Dallis-clover	0	—	4,430 c*	6,790 b	3,840 def
Dallis-phalaris-clover	0	—	5,090 c	6,660 b	4,480 de
Dallis-fescue-clover	0	—	5,040 c	6,900 b	3,720 def
Phalaris-clover	0	Methyl bromide	6,250 b	5,510 c	2,900 fg
Fescue-clover	0	Methyl bromide	6,070	7,590 ab	3,050 cd
Dallisgrass	100	—	4,050 cd	3,670 e	3,370 ef
Dallis-phalaris	150	—	6,430 ab	5,640 c	6,130 bc
Dallis-fescue	150	—	5,060 c	7,570 ab	7,200 ab
Dallis-phalaris	200	—	6,420 ab	6,130 bc	6,420 ab
Dallis-fescue	200	—	5,020 c	8,120 a	7,540 a
Phalaris	0	Methyl bromide	4,860 c	2,960 e	1,860 g
Fescue	0	Methyl bromide	3,390 e	4,510 d	3,410 ef
Phalaris	150	Methyl bromide	7,510 a	5,620 c	4,630 de
Fescue	150	Methyl bromide	6,130 b	8,610 a	7,220 ab

*Any two yield entries within a column marked with the same letter are not significantly different at 5% level of probability.

Eliminating dallisgrass competition with methyl bromide resulted in total yields of phalaris or tall fescue similar to that of the dallisgrass mixtures when fertilized with 150 lb. N per acre. As expected, yields of both phalaris and tall fescue were low when no N fertilizer was applied to methyl bromide-treated plots. The declining yields of phalaris by the third year were a result of reduced stands and productivity of this grass species. In contrast, tall fescue stands and productivity remained high.

Ladino clover stands were excellent during the first 2 years and poor the third year. With good ladino clover, total forage yields of the mixtures equalled that of mixtures fertilized with 150 lb. N per acre. During the third year when ladino clover stands were poor, phalaris or tall fescue in association with dallisgrass yielded substantially more when fertilized with 150 lb. N per acre. Ladino clover, in association with dallisgrass alone, resulted in total yields equal or superior to that of grass fertilized with 100 lb. per acre N.

Botanical Composition of Forage

The tall fescue component of mixtures with dallisgrass increased over the 3-year period when fertilized with 150 lb. N per acre, table 2. In contrast, the phalaris component of the mixture declined each year. Fertilizing dallisgrass with N in summer (200 lb. N) increased the yield of both phalaris and tall fescue the second year. By the third year, phalaris production declined while that of tall fescue remained high. Tall fescue apparently was highly competitive with dallisgrass.

Ladino clover production in the mixtures was high the first 2 years. Phalaris, with greater winter production the first year, reduced clover growth as compared with the tall fescue in association with dallisgrass. By the second and third years, tall fescue competition resulted in less ladino clover as compared with phalaris. Dallisgrass, in these mixtures, was less productive in association with tall fescue than with phalaris. Where dallisgrass was absent on the methyl-bromide treated sod, rapid phalaris growth the first year reduced clover growth as compared to the effect of tall fescue. In subsequent years, clover growth was better on phalaris than on tall fescue, probably a result of weakened phalaris stands. Ladino clover production was better on dallisgrass alone than when phalaris or

TABLE 2. BOTANICAL COMPOSITION OF FORAGE FROM PHALARIS AND TALL FESCUE PLANTED ON DALLISGRASS SOD AT BLACK BELT SUBSTATION OVER 3-YEAR PERIOD

Species	Nitrogen lb. acre	Soil treatment	Pounds per acre oven dry forage								
			1974			1975			1976		
			Dallis	Phalaris or fescue	Clover	Dallis	Phalaris or fescue	Clover	Dallis	Phalaris or fescue	Clover
Dallis-clover	0	—	860	—	3,570	2,710	—	4,080	3,200	—	640
Dallis-phalaris-clover	0	—	480	1,570	3,040	1,400	2,220	3,040	2,720	1,340	420
Dallis-fescue-clover	0	—	730	400	3,910	1,150	3,580	2,170	840	2,720	160
Phalaris-clover	0	MB*	—	5,100	1,120	—	3,330	2,180	0	1,980	920
Fescue-clover	0	MB	—	3,400	2,670	—	5,650	1,940	0	4,580	480
Dallisgrass	100	—	4,050	—	—	3,670	—	—	3,370	—	—
Dallis-phalaris	150	—	1,700	4,720	—	1,740	3,890	—	2,950	3,180	—
Dallis-fescue	150	—	1,180	3,880	—	690	6,880	—	370	6,830	—
Dallis-phalaris	200	—	2,040	4,380	—	1,510	4,620	—	3,700	2,720	—
Dallis-fescue	200	—	800	4,210	—	860	7,260	—	440	7,100	—
Phalaris	0	MB	—	4,860	—	—	2,960	—	—	1,860	—
Fescue	0	MB	—	3,390	—	—	4,510	—	—	3,410	—
Phalaris	150	MB	—	7,510	—	—	5,620	—	—	4,630	—
Fescue	150	MB	—	6,130	—	—	8,610	—	—	7,220	—

*MB = methyl bromide.

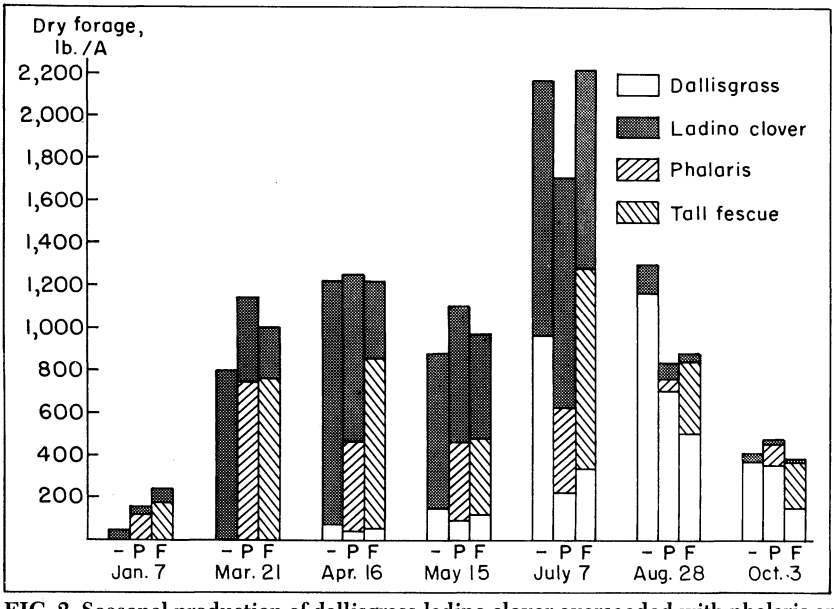


FIG. 2. Seasonal production of dallisgrass-ladino clover overseeded with phalaris or tall fescue, no N fertilizer, 1975.

tall fescue was present, a result of less competition during the late winter and spring period.

Seasonal Forage Production

Overseeding dallisgrass sod with cool season perennial species generally furnished forage nearly 3 months ahead of the normal dallisgrass production season beginning in mid April. Ladino clover on dallisgrass alone produced well beginning in March and continued through early summer, figure 2. Phalaris and tall fescue, in association with ladino clover, made somewhat more early production than clover alone and had the advantage of less bloat potential in a pasture. Under conditions of this test, dallisgrass growth in summer was reduced by the cool season grasses. This probably would not be a problem in a well grazed pasture.

Tall fescue, in association with dallisgrass and fertilized with 150 lb. N per acre, yielded substantially more late winter forage than the grass-clover system, figure 3. Phalaris, more productive than tall fescue the first year, made less early growth in the two subsequent years. Tall fescue and phalaris suppressed dallisgrass production in late spring, but the extended length of the grazing season should more than make up for this handicap.

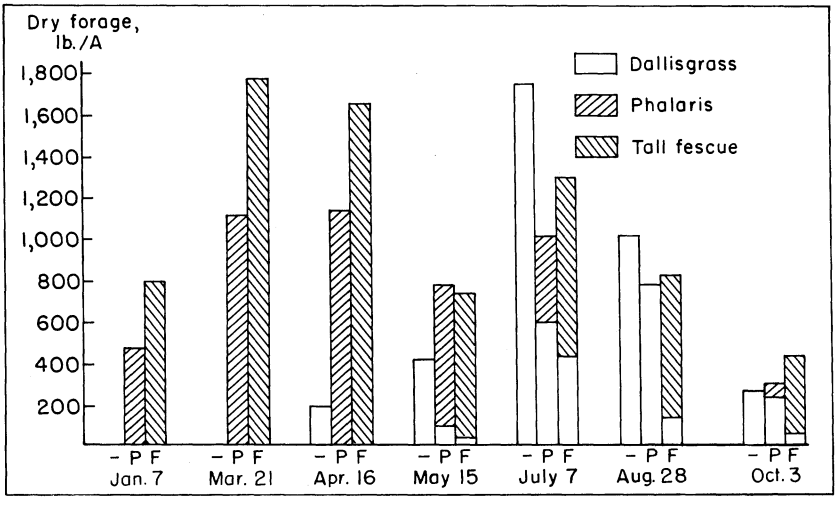


FIG. 3. Seasonal production of dallisgrass (100 lb. N per acre) compared with phalaris or tall fescue overseeded on dallisgrass (150 lb. N per acre), 1975.

Parasitic Nematodes

Plant parasitic nematode populations in the soil planted to both phalaris and tall fescue were relatively high during the second year but declined during the third year of the study, table 3. Spiral *(Helicotylenchus dihystera)* nematodes were the only species found. Since phalaris roots are highly susceptible to nematode damage, it is possible that nematodes may be a factor in stand losses and declining productivity. Although tall fescue production may be reduced by nematodes, stands persisted better than those of phalaris. Stubby root *(Trichodous christiei)* and lance *(Hoplolaimus galeatus)* nematodes, shown to cause the most damage in these grasses[3], were not found in this experiment.

[3]HOVELAND, C. S., R. RODRIGUEZ-KABANA, and C. D. BERRY. 1975. Phalaris and Tall Fescue Production as Affected by Nematodes in the Field. Agron. J. 67:714-717.

TABLE 3. SPIRAL NEMATODE SOIL POPULATION ON PHALARIS AND TALL FESCUE ON DALLISGRASS SOD AS AFFECTED BY METHYL BROMIDE AT BLACK BELT SUBSTATION

Grass species	Soil treatment	Spiral nematodes per 50cc soil	
		April 4, 1975	June 28, 1976
Phalaris	Methyl bromide	3	4
	None	39	10
Tall fescue	Methyl bromide	4	5
	None	37	6

SUMMARY AND CONCLUSIONS

1. An experiment was conducted at the Black Belt Substation in west central Alabama over a 3-year period to study the compatibility of tall fescue or phalaris overseeded on dallisgrass in combination with and without ladino clover.

2. Overseeding tall fescue or phalaris almost doubled total forage yield and lengthened the productive season by 3 months over that of dallisgrass alone fertilized with N.

3. Summer application of N to dallisgrass overseeded with phalaris or tall fescue had little effect on total forage yield.

4. Good ladino clover with dallisgrass-tall fescue or dallisgrass-phalaris during the first 2 years of the study furnished total forage yields equal to that of grass mixtures fertilized with 150 lb. N per acre.

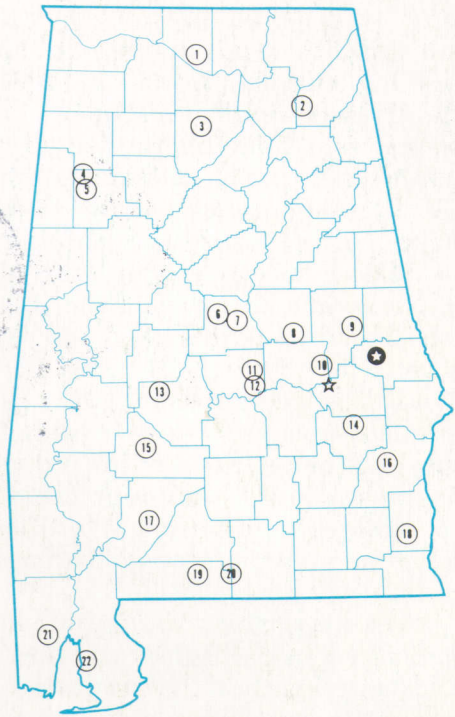
5. Tall fescue persisted and was productive in association with dallisgrass all 3 years while phalaris stands and productivity declined each year. The reduced productivity of phalaris may be a result of summer cutting and nematodes.

6. Tall fescue-dallisgrass, fertilized with 150 lb. N per acre, yielded more winter forage than tall fescue-dallisgrass-ladino clover.

7. Results of this experiment show that tall fescue can be established in dallisgrass sod and will increase total forage yields and lengthen the productive season either with N fertilizer or in association with ladino clover.

Alabama's Agricultural Experiment Station System
AUBURN UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Foundation Seed Stocks Farm, Thorsby.
7. Chilton Area Horticulture Substation, Clanton.
8. Forestry Unit, Coosa County.
9. Piedmont Substation, Camp Hill.
10. Plant Breeding Unit, Tallassee.
11. Forestry Unit, Autauga County.
12. Prattville Experiment Field, Prattville.
13. Black Belt Substation, Marion Junction.
14. The Turnipseed-Ikenberry Place, Union Springs.
15. Lower Coastal Plain Substation, Camden.
16. Forestry Unit, Barbour County.
17. Monroeville Experiment Field, Monroeville.
18. Wiregrass Substation, Headland.
19. Brewton Experiment Field, Brewton.
20. Solon Dixon Forestry Education Center, Covington and Escambia counties.
21. Ornamental Horticulture Field Station, Spring Hill.
22. Gulf Coast Substation, Fairhope.