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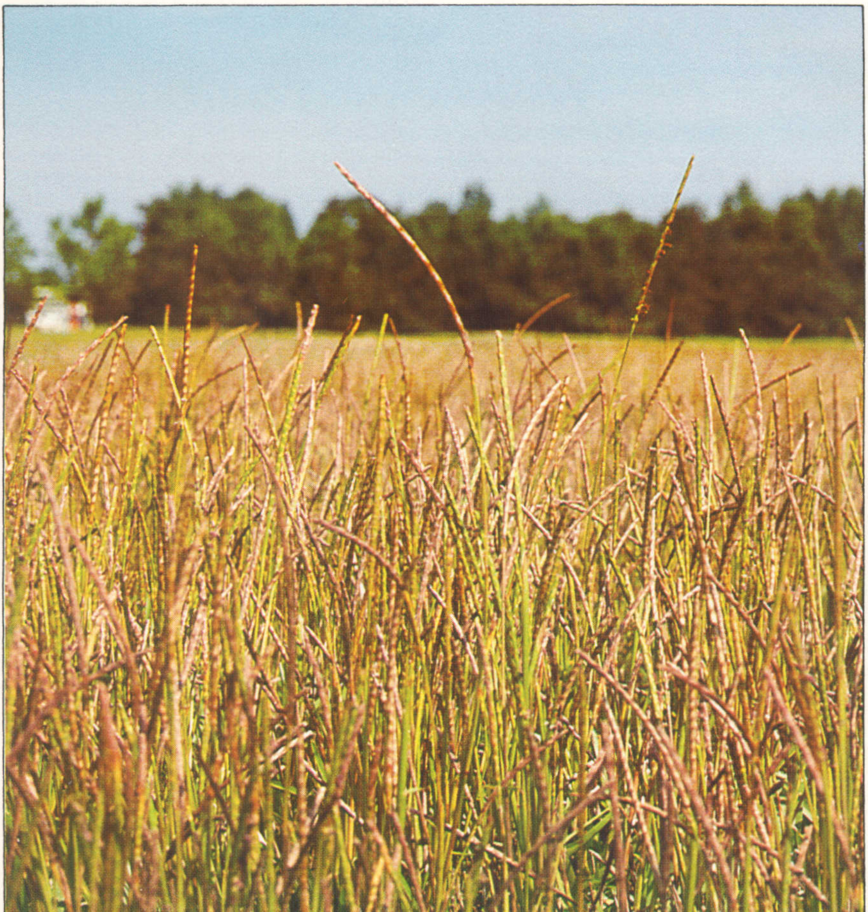
Centipedegrass Seed Production



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Centipedegrass Seed Production

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INTRODUCTION

CENTIPEDEGRASS is a popular turfgrass in the Southeastern United States. Reduced mowing and fertility requirements in comparison with other turf species make it desirable for home lawns and general purpose turf. Vegetative propagation by sod, sprigs, and stolons has been the principal means of establishment for this species. High seed prices generated by low seed yields and slow germination rate have made establishment by seed an infrequent practice.

Oaklawn, currently the only commercially available cultivar, has excellent heat and drought tolerance, but seed yield is no greater than that of common centipedegrass *(4)*. Irradiation of centipedegrass seed with gamma radiation resulted in seedlings with decreased seed production potential *(3)*.

Few researchers have examined the effects of management practices on seed production of centipedegrass. Burton's *(1,2)* investigations showed that application of 60 to 125 pounds per acre of nitrogen substantially increased seed production in this species. Pre-harvest mowing enhanced seed set in bermudagrass and centipedegrass in Georgia *(1)*.

The objective of this study was to determine if centipedegrass seed yield could be improved by controlling mowing height, N regime, and/or final clipping date.

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MATERIALS AND METHODS

Experiments were conducted on established turfs of common centipedegrass at two locations in Macon County, Alabama, during 1982 and 1983. Soil types were Gilead sandy loam in 1982 and Leaf silt loam in 1983. Initial soil tests at both sites indicated medium levels of available potassium (K) and high levels of available phosphorus (P), magnesium (Mg), and calcium (Ca). Soil pH was 5.3 at the 1982 location and 5.0 at the 1983 location. One ton of ground agricultural limestone and 80 pounds K_2O as KCl were applied to each area. All tests were replicated four times with individual plots measuring 9 by 12 feet.

EXPERIMENT 1. The experimental design was a split plot with main plots being mowing heights (1.0, 1.5, or 2.0 inches), while N rates (0 or 120 pounds per acre) and final clipping dates (July 15, July 30, or September 1) were subplots. The experiment was conducted in both 1982 and 1983.

EXPERIMENT 2. This experiment was conducted only in 1983, using a randomized complete block design to further evaluate the effects of final clipping dates and N rates. Five final clipping dates (July 1, July 15, July 30, August 18, and September 1) were included to obtain a more precise estimate of the best date for final clipping along with two N rates (0 or 120 pounds per acre). Mowing height was maintained at 1.5 inches throughout the test.

EXPERIMENT 3. A final study was conducted at the 1983 site as a split plot design to evaluate the effects of nitrogen regimes and clipping heights. Main plots were mowing height (1.0, 1.5, or 2.0 inches) with N regimes being subplots. Nitrogen regimes were increased (0, 40, 80, or 120 pounds per acre) to determine requirements for maximum seed yields. Final clipping date was July 30.

Experiments were irrigated with a center-pivot system in response to noticeable moisture stress. Plots were mowed at their respective mowing heights with a triplex reel-type mower and clippings were returned to the surface. Ammonium nitrate (NH_4NO_3) applications were made on May 15 ± 3, July 8 ± 1, and August 9 ± 1 in increments of 40 pounds N per acre. Treatments receiving 40 pounds N per acre were treated on May 15, those receiving 80 pounds N per acre were treated on May 15 and July 8, and plots requiring 120 pounds N per acre were treated on May 15, July 8, and August 9.

Seedhead counts were taken 45 days after final clipping and at harvest. Seed were harvested November 1 using a high vacuum rotary mower equipped with a cloth bag to collect plant material. A 60-square-foot area was mowed at a height of 2.0 inches for seed harvest. Harvested material was dried for 2 weeks at 95°F and threshed using a modified Wiley mill. Hand screening of samples to remove large debris was followed by processing through a Clipper[2] cleaner (Ferrell Ross Co., Saginaw, Michigan). A regulated air flow cleaner was utilized for final cleaning.

Data were subjected to an analysis of variance and Fishers LSD was used to separate means.

RESULTS AND DISCUSSION

Seedhead density at 45 days after final clipping showed little correlation to seed yield and will not be discussed. However, densities at harvest proved to be reliable indicators of seed yield with correlation coefficients of 0.85 and 0.60 for 1982 and 1983, respectively. Interactions among individual practices were not significant, therefore only main effects of treatments are included in this discussion.

In 1983, seed yields were much higher than in 1982, probably due to more favorable environmental conditions. Precipitation was greater during seed formation in 1983 than in 1982. Soil at the 1983 site was more favorable for turfgrass growth in that it contained larger clay and organic matter fractions, giving it increased water and nutrient holding capacity.

Experiment 1

Seed yields did not differ among plots cut at different heights in this experiment, table 1. In a subsequent experiment, however, plots maintained at 1.0 or 1.5 inches tended to produce more seed than those maintained at 2.0 inches, table 2. Also, more seedheads were produced when plots were clipped at the two lower mowing heights. Application of 120 pounds of N per acre increased both seed yields and seedhead numbers during 1982 and 1983. Seedhead numbers were similar both years on plots receiving 120 pounds of N per acre. However, seed yields were much lower in 1982 than in 1983. Temperature and relative humidity readings during time of pollination

[2] Mention of a trademark or proprietary product does not constitute a recommendation of the product by Auburn University and does not imply its approval to the exclusion of other products that may also be suitable.

TABLE 1. INFLUENCE OF MOWING HEIGHT, N RATE, AND FINAL CLIPPING DATE ON SEED PRODUCTION OF CENTIPEDEGRASS

Treatment	Seed yield/acre		Seedhead density/foot	
	1982	1983	1982	1983
	Lb.	*Lb.*	*No.*	*No.*
Mowing height, inches				
1.0	7	70	172	206
1.5	7	65	145	218
2.0	5	64	116	168
Significance, LSD (0.05)	ns	ns	20*	ns
N rate, lb./acre				
0	3	54	80	187
120	10	76	207	209
Significance, LSD (0.05)	2*	10*	12*	21*
Final clipping date				
July 15	10	93	188	232
July 30	9	73	172	216
Sept. 1	0	31	75	144
Significance, LSD (0.05)	2*	12*	14*	27*

* Statistical significance at the P=0.05 level; ns = not significant.

were similar both years. In 1982, the average temperature and relative humidity (RH) were 85°F and 83 percent, respectively; during 1983, the average temperature was 2°F higher and the RH was 5 percent less. This suggests that temperature and RH levels were not unfavorable for pollination. During the month of September, a critical period for seed maturation, rainfall was 4.5 inches less in 1982 than in 1983. Irrigation was supplied in 1982 to meet apparent needs of the plant, but seed yields could have been reduced without any apparent effect on the vegetative growth of the plant.

When final clipping dates were July 15 or July 30, the number of seed produced was greater than when the final clipping occurred on September 1. No differences in seed yield were observed for plots last clipped July 15 and July 30 in 1982 when yields were low, but in 1983 the July 15 date produced superior yields.

Experiment 2

Applying 120 pounds of N per acre resulted in a more vigorous turf during the growing season and increased both seedhead production and seed yield in a manner similar to that observed in Experiment 1, table 2. Differences in seedhead density and seed yield occurred among final clipping dates with the highest yields obtained from the July 15 final clipping. Highest seedhead densities were also obtained from July final clipping dates. Delaying final clipping to August 8 or September 1 resulted in lower yields and fewer seedheads. Seed yields were reduced in greater proportion than were seedhead densities. Some of the loss in seed yields was probably the result of the inability of the seed to mature prior to the first killing frost. Also, most warm-season grasses, such as bahiagrass, dallisgrass, and carpetgrass, have been shown to reach maximum flowering when the day length is greater than 12 hours and temperatures are above 52°F *(5)*. Centipedegrass appears to behave similarly, which may explain the lower seed yields from plots with late final clipping dates. A July 1 final clipping appeared to be a premature date for maximizing yield. Contributing factors may have been the reduction of flowering culms resulting from a shorter mowing season and seed loss due to shattering and excess foliage.

Regression analysis of the effects of clipping dates on seed yield in Experiment 1 showed that yields decreased linearly when final clipping date was delayed past July 15, see figure. In Experiment 2, the addition of the July 1 final clipping date resulted in a distribution of yield values best described by a curvilinear equation. When the equation of the line was differentiated to obtain the maximum point, a July 16 final clipping was determined to be the best date. Again yields decreased substantially and linearly as the final clipping was delayed past this date.

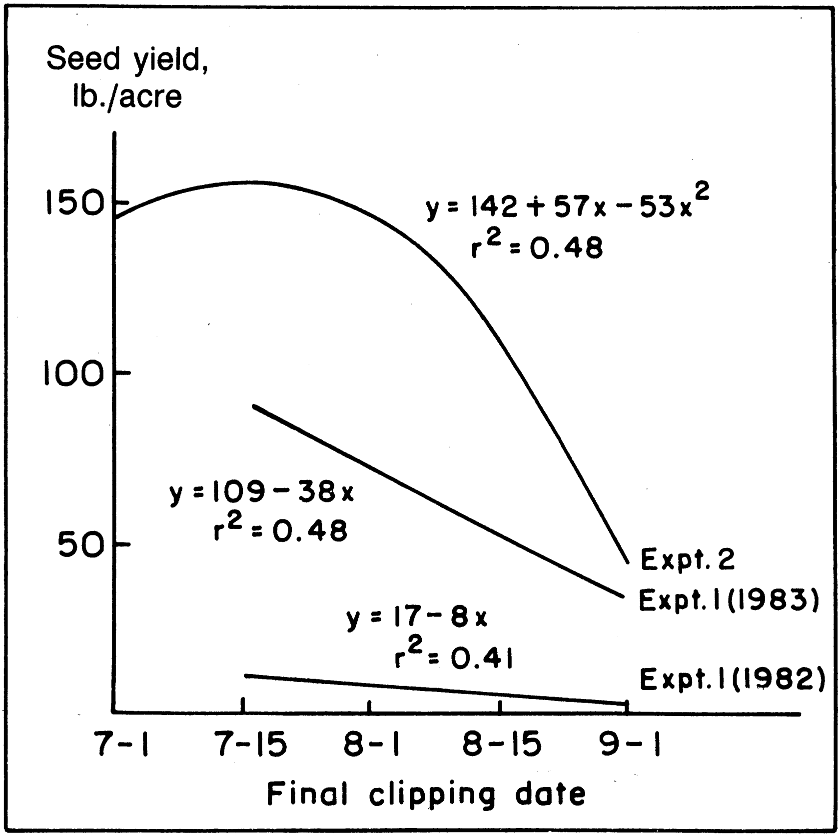
Experiment 3

When final clipping date was July 30 there were no differences due to N rates among either seed yields or seedhead

TABLE 2. EFFECTS OF N RATE AND FINAL CLIPPING DATE ON SEED PRODUCTION OF CENTIPEDEGRASS MOWED AT 1.5 INCHES

Treatment	Seed yield/acre	Seedhead density/foot
	Lb.	*No.*
N rate, lb./acre		
0	89	232
120	137	389
Significance, LSD (0.05)	20*	24*
Final clipping date		
July 1	136	290
July 15	171	292
July 30	141	317
Aug. 18	87	211
Sept. 1	52	194
Significance, LSD (0.05)	31*	39*

*Statistical significance at the P=0.05 level.



Seed yield of a centipedegrass turf mowed at 1.5 inches as influenced by final clipping dates.

TABLE 3. INFLUENCE OF MOWING HEIGHT AND N RATE ON SEED PRODUCTION OF CENTIPEDEGRASS UTILIZING A FINAL CLIPPING DATE OF JULY 30.

Treatment	Seed yield/acre	Seedhead density/foot
	Lb.	*No.*
Mowing height, inches		
1.0	90	251
1.5	94	235
2.0	73	210
Significance, LSD (0.05)	13*	21*
N rate, lb./acre		
0	79	215
40	89	223
80	89	251
120	84	221
Significance, LSD (0.05)	ns	ns

*Statistical significance at the P=0.05 level; ns = not significant.

densities, table 3, although plots receiving additional N tended to produce more seed. These results are not consistent with those from previous experiments where the application of N increased both seed yields and seedhead densities. It is believed that the area on which this test was conducted contained sufficiently high soil N to allow good seed production on areas not receiving N. Centipedegrass has a low N requirement for vegetative growth. It appears that the N requirement for optimum seed production may also be relatively low.

Mowing at 1.0 or 1.5 inches resulted in higher seed yields and seedhead densities when compared to the 2.0-inch mowing height. Thus, it appears higher numbers of potential seed-producing culms result from lower clipping levels. In this experiment final clipping date did not coincide with the optimum, July 15; therefore, maximum differences likely did not occur.

SUMMARY

Results of field experiments indicate that final clipping date prior to seed harvesting is an influential management practice in determining seed yields in centipedegrass. Final clipping about July 15 can be expected to produce maximum seed yields in central Alabama. Mowing at 1.0 or 1.5 inches increased seed production compared to mowing at 2.0 inches ($P=0.05$) in only one of three experiments; however, this trend was also evident in the remaining two experiments. This suggests that mowing heights of less than 2.0 inches would result in higher seed yields in most situations. On soils with adequate levels of residual N, application of fertilizer nitrogen will not increase seed yields. In soils that do not readily retain N, an additional 40-80 pounds per acre should optimize seed production without unduly increasing the risk of winter injury. Seedhead counts taken immediately prior to harvest more accurately indicate potential seed yield than counts taken earlier in the season.

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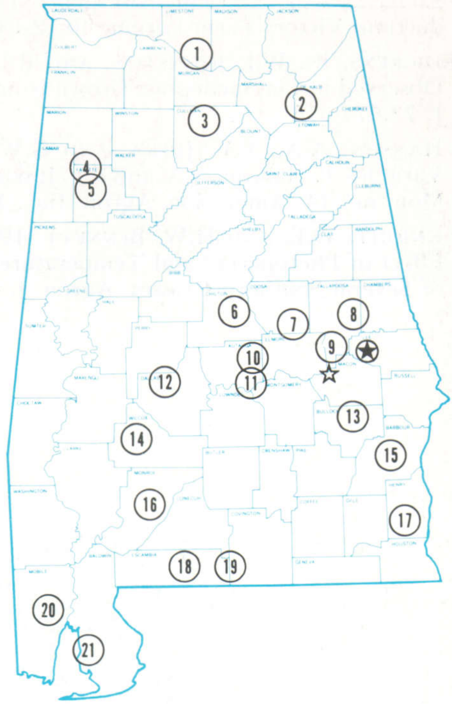

Research Unit Identification

★ 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. Chilton Area Horticulture Substation, Clanton.
7. Forestry Unit, Coosa County.
8. Piedmont Substation, Camp Hill.
9. Plant Breeding Unit, Tallassee.
10. Forestry Unit, Autauga County.
11. Prattville Experiment Field, Prattville.
12. Black Belt Substation, Marion Junction.
13. The Turnipseed-Ikenberry Place, Union Springs.
14. Lower Coastal Plain Substation, Camden.
15. Forestry Unit, Barbour County.
16. Monroeville Experiment Field, Monroeville.
17. Wiregrass Substation, Headland.
18. Brewton Experiment Field, Brewton.
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20. Ornamental Horticulture Substation, Spring Hill.
21. Gulf Coast Substation, Fairhope.