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J. W. Odom
University of Nebraska-Lincoln

Jeffrey F. Pedersen
University of Nebraska-Lincoln, jpedersen1@unl.edu

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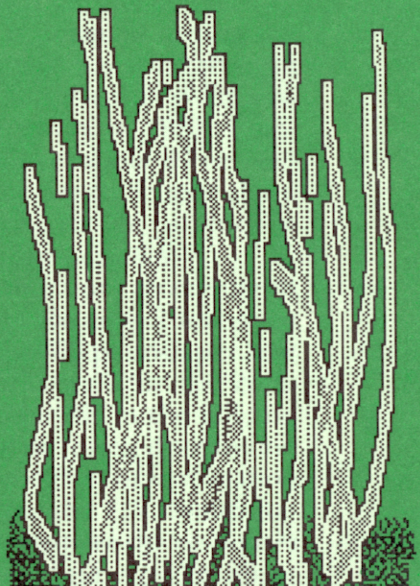

Alabama Agricultural Experiment Station
Auburn University
Lowell T. Frobish, Director
Auburn University, Alabama

Levels and Timing of Nitrogen Fertilizer Applications for Tall Fescue in Central Alabama

J. W. ODOM AND J. F. PEDERSEN[1]

INTRODUCTION

TALL FESCUE (*Festuca arundinacea* Schreb.), the most important cool season perennial pasture grass in the United States, is generally well adapted to the northern two-thirds of Alabama. Unfortunately, the most commonly grown tall fescue cultivar, Kentucky 31, is of northern origin and is dormant during the winter. To reduce this problem, AU Triumph was selected from Mediterranean germplasm. The Alabama Agricultural Experiment Station released this cultivar to growers in 1981. Compared to Kentucky 31, AU Triumph produces about 80 percent more forage during the winter and produces mature seed about 2 weeks earlier in the spring. Total annual forage production for the two cultivars is usually about the same.

The Auburn University Soil Testing Laboratory recommends applying 60 pounds per acre of nitrogen (N) to tall fescue by September 1 and following this with another 60 pounds per acre in February. This recommendation works well for the commonly grown Kentucky 31, which grows mostly in the fall and spring, but it was not known whether the differing distribution of growth of AU Triumph would justify a different fertilization regime. Thus, a field test was established at the E.V. Smith Research Center near Shorter, Alabama, to compare the responses of AU Triumph and Kentucky 31 to levels of nitrogen fertilizer considered appropriate for grazing systems and to determine if the new cultivar would effectively utilize winter applied N.

[1]Associate Professor and former Assistant Professor of Agronomy and Soils.

MATERIALS AND METHODS

The field test was established on Norfolk sandy loam soil to compare the N responses of AU Triumph and Kentucky 31 using the nitrogen treatments detailed in table 1. The experimental design was a randomized complete block with four replications. The soil tested Very High in phosphorus and Low in potassium and had an initial pH of 5.8. Therefore, 2 tons per acre of limestone, 150 pounds per acre muriate of potash, and 50 pounds per acre gypsum (sulfur source) were applied and incorporated before planting. The potash and gypsum treatments were repeated each fall during the test.

The forage was clipped one to three times each growing season, weighed for yield, and subsampled for moisture content.

TABLE 1. NITROGEN TREATMENTS APPLIED TO AU TRIUMPH AND KENTUCKY 31, E.V. SMITH RESEARCH CENTER

N fertilizer/acre/year		
Sept. 1	Nov. 15	Feb. 1
Lb.	*Lb.*	*Lb.*
	Establishment year[1]	
27	0	0
27	27	0
27	54	0
27	80	0
27	0	27
27	27	27
27	54	27
27	80	27
27	0	54
27	27	54
27	54	54
27	80	54
27	0	80
27	27	80
27	54	80
27	80	80
	Established stand	
0	0	0
0	27	0
0	54	0
0	80	0
27	0	27
27	27	27
27	54	27
27	80	27
54	0	54
54	27	54
54	54	54
54	80	54
80	0	80
80	27	80
80	54	80
80	80	80

[1]Since the grass died the summer of the first year and was replanted that fall, these establishment-year treatments were used two successive years.

All yields are presented as total dry forage yield for the growing season. The SAS RSREG procedure was used to fit a quadratic response surface to the yield by total and winter N data. The establishment year was analyzed separately since tall fescue is usually not vigorous the first year. Two establishment years are reported since the stands of both cultivars died the first summer and were replanted that fall. Once the grass was established, 3 years of additional data were taken.

RESULTS AND DISCUSSION

Forage production where the N treatments did not include a winter N application is graphed in figures 1 and 2. In both the establishment year and for established stands, AU Triumph made better use of applied N than did Kentucky 31. If N had not been limiting, there likely would have been little or no difference in forage yield between the cultivars; with limited applied N, however, AU Triumph yielded better than Kentucky

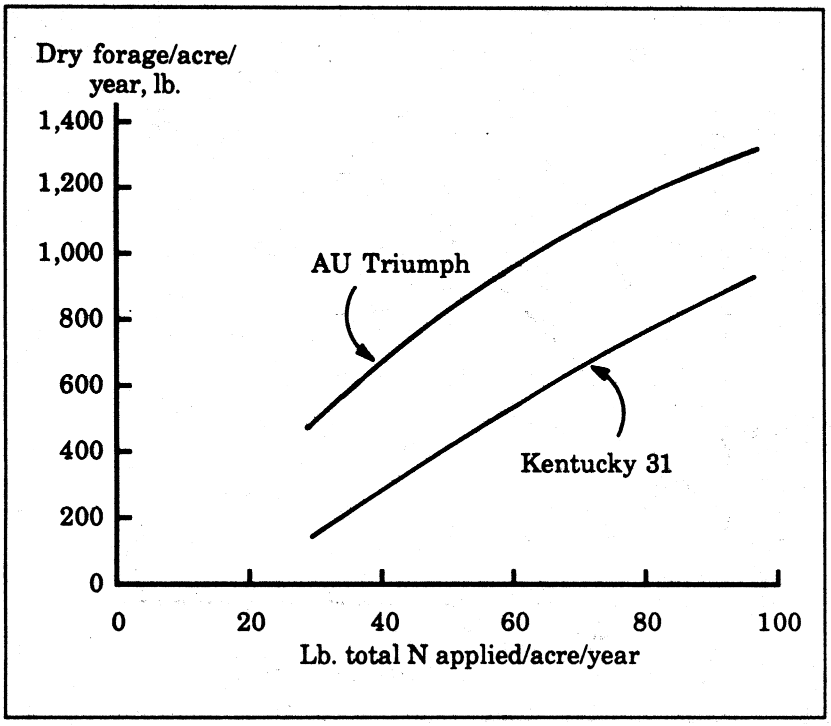

FIG. 1. Annual dry forage yield of tall fescue (average of 2 establishment years). The total annual nitrogen was split between a fall application of 27 pounds per acre and a spring application.

31 at this location. As expected, the established stands of both cultivars made better use of the applied N than did the establishment-year stands.

Toward the end of the test period, a loss of stand was noted in the plots which did not receive N fertilizer, table 2. This suggests that tall fescue is not tolerant of poor nitrogen fertilizer management in marginal production areas, such as this test location.

For the total nitrogen rates used, applying part of the N fertilizer during the winter did not improve the yield of either cul-

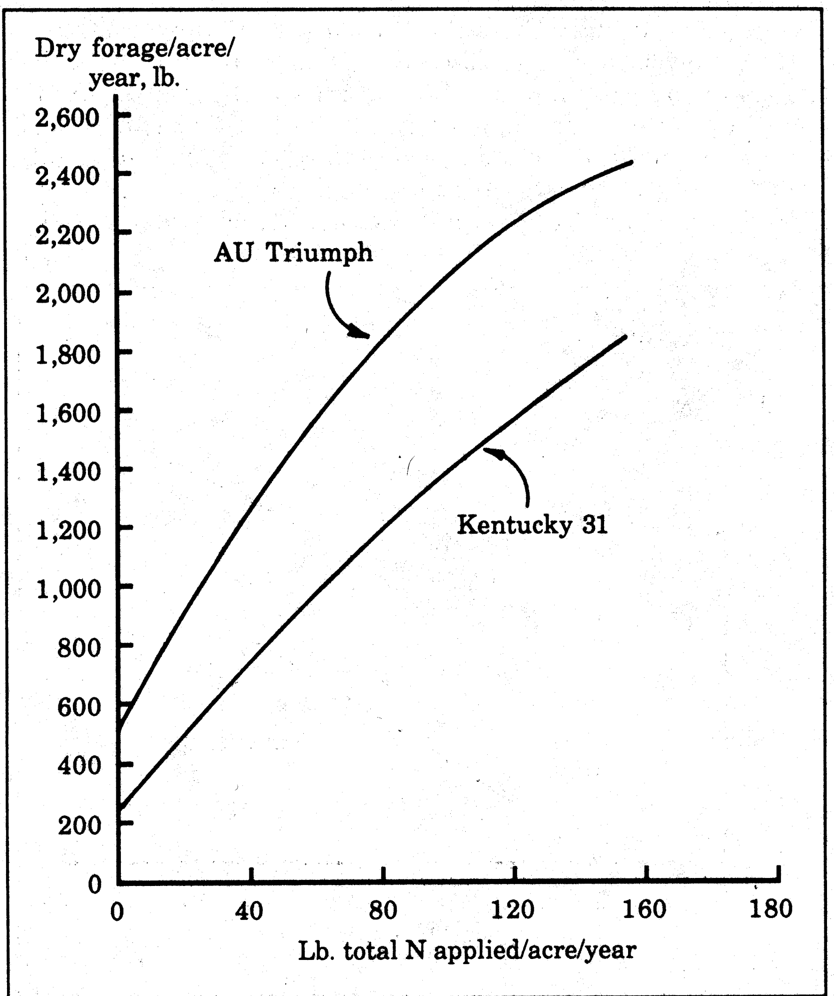

FIG. 2. Annual dry forage yield of tall fescue (average of an established stand over 3 years). The total annual nitrogen was split equally between a fall and a spring application.

TABLE 2. STANDS OF KENTUCKY 31 AND AU TRIUMPH TALL FESCUE AFTER FOUR GROWING SEASONS, BY NITROGEN TREATMENTS, E.V. SMITH RESEARCH CENTER

Total N applied/ acre/year, lb.	Visual stand rating[1]	
	AU Triumph	Kentucky 31
	Pct.	*Pct.*
0	4	12
27	13	38
54	28	22
80	40	50
107	25	53
134	31	41
161	23	63
188	33	48
214	30	63
241	30	73

[1]The visual stand rating is a percent of what the authors consider an optimum stand of tall fescue.

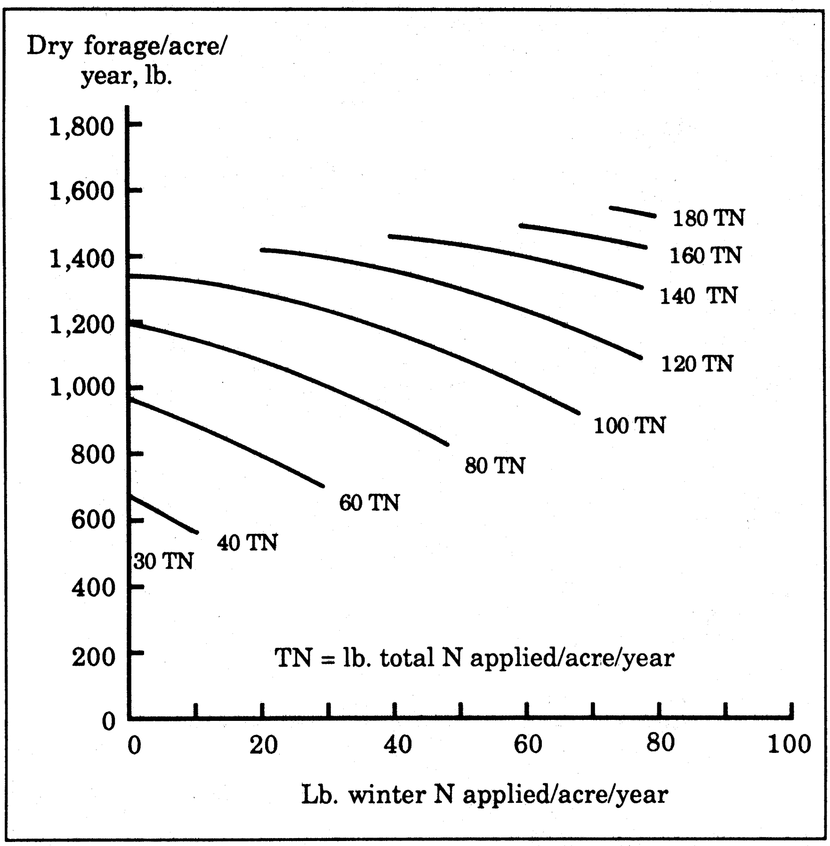

FIG. 3. Annual dry forage yield of AU Triumph tall fescue (average of 2 establishment years) when part of the nitrogen fertilizer was applied in the winter. All points on a curve received the same total annual nitrogen during the year. The part of the total annual nitrogen not applied during the winter was split between a fall application of 27 pounds per acre and a spring application.

tivar during the establishment year, figures 3 and 4. On the established stands, the yield of Kentucky 31 was not improved by applying part of the total N during the winter, figure 5; however, at high rates of total applied N, AU Triumph was able to efficiently use some winter-applied N, figure 6. For the rates of total applied N used in this test, the slight increase in efficiency with three applications of nitrogen to AU Triumph would not justify the increased cost.

None of the N treatments used in this test maximized forage production. Nitrogen recommendations are based partly on grazing studies where more forage is wasted than in clipping studies and, therefore, where less N can be effectively utilized. Additionally, the climate and soil are marginal for tall fescue at this location, which may increase the amount of N fertilizer needed.

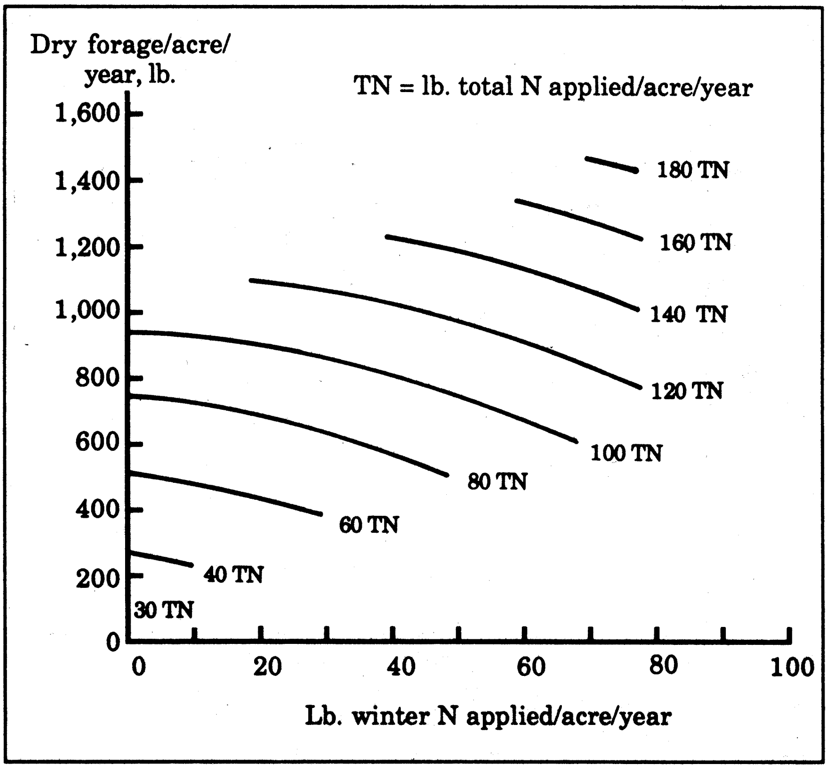

FIG. 4. Annual dry forage yield of Kentucky 31 tall fescue (average of 2 establishment years) when part of the nitrogen fertilizer was applied in the winter. All points on a curve received the same total annual nitrogen during the year. The part of the total annual nitrogen not applied during the winter was split between a fall application of 27 pounds per acre and a spring application.

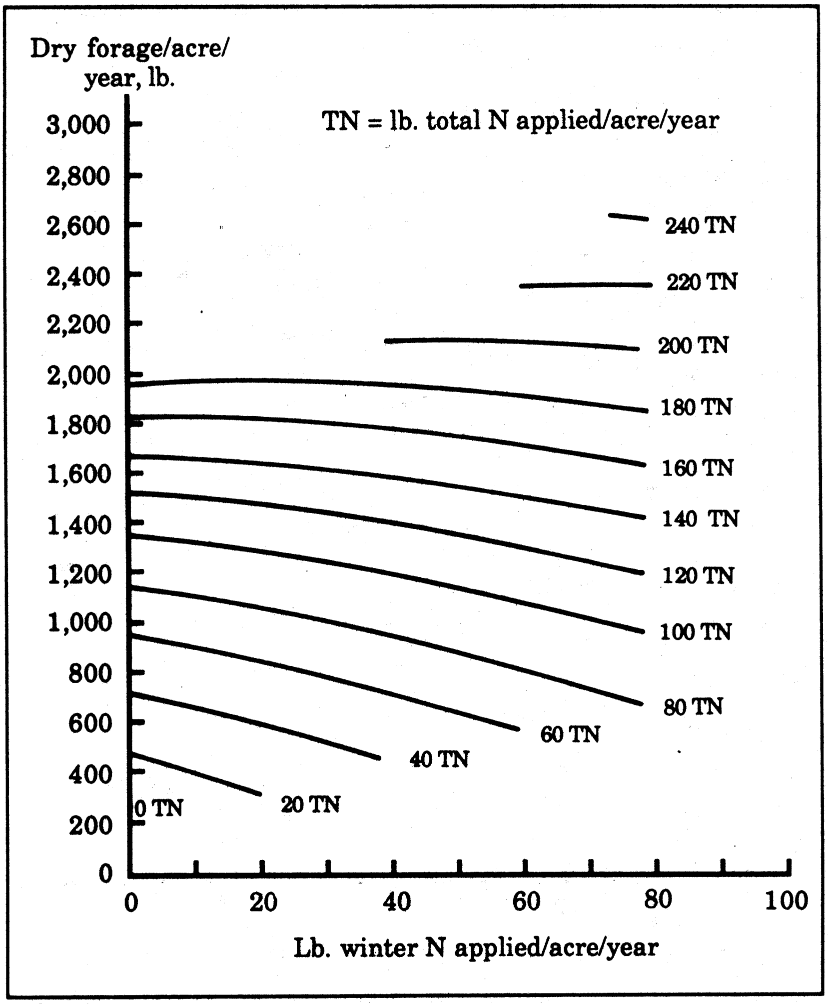

FIG. 5. Annual dry forage yield of Kentucky 31 tall fescue (average of an established stand over 3 years) when part of the nitrogen fertilizer was applied in the winter. All points on a curve received the same total annual nitrogen during the year. The part of the total annual nitrogen not applied in the winter was split equally between a fall and a spring application.

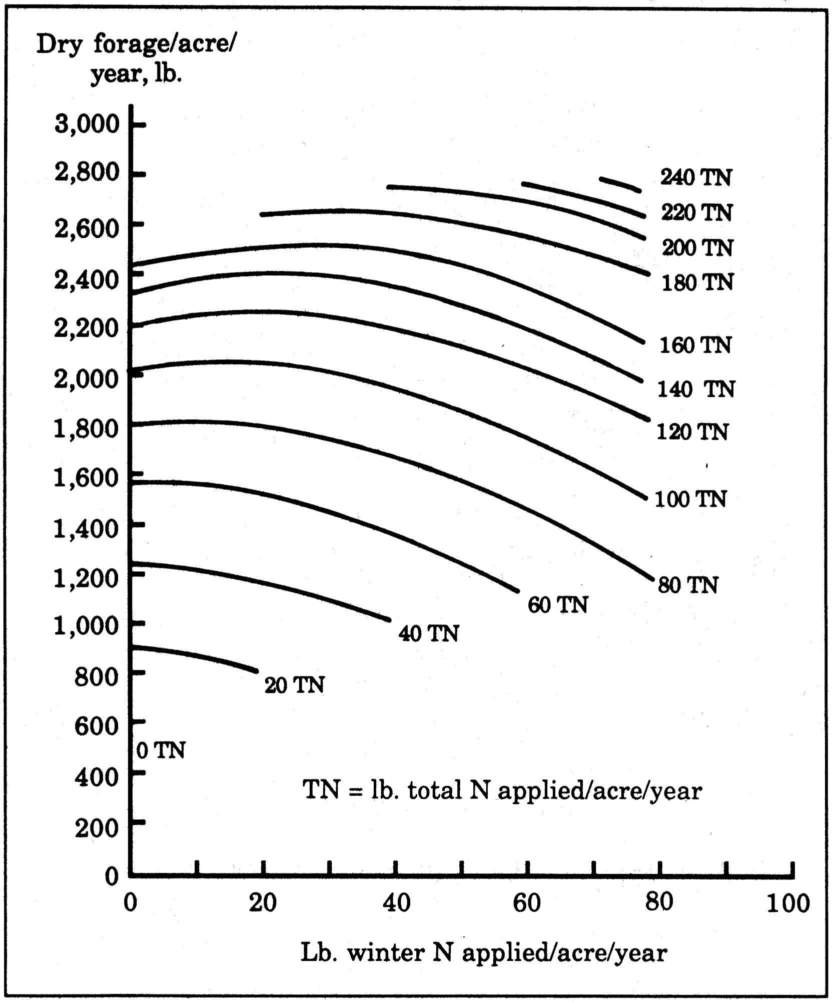

FIG. 6. Annual dry forage yield of AU Triumph tall fescue (average of an established stand over 3 years) when part of the nitrogen fertilizer was applied in the winter. All points on a curve received the same total annual nitrogen during the year. The part of the total annual nitrogen not applied in the winter was split equally between a fall and a spring application.

SUMMARY

The following conclusions were drawn from a comparison of the nitrogen responses of AU Triumph and Kentucky 31 tall fescues at the E.V. Smith Research Center where the climate and soil, Norfolk sandy loam, are marginal for tall fescue:

- AU Triumph made better use of small amounts of N fertilizer than did Kentucky 31.
- Stand loss was a problem for both cultivars where no N fertilizer was applied.
- Established stands of the winter productive tall fescue variety, AU Triumph, were able to efficiently utilize some winter-applied N. However, the slight increase in efficiency would probably not justify the cost of an additional fertilizer application.

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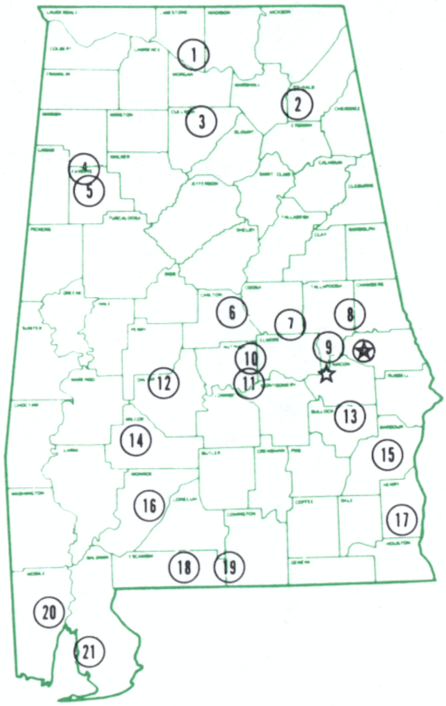
With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical 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. 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.
19. Solon Dixon Forestry Education Center, Covington and Escambia counties.
20. Ornamental Horticulture Substation, Spring Hill.
21. Gulf Coast Substation, Fairhope.