

## YIELD AND NUTRIENT UPTAKE OF TROPICAL FORAGES RECEIVING BROILER LITTER

J. R. Saunders<sup>1</sup>, J. R. Johnson<sup>1</sup>, and J. L. Douglas<sup>2</sup>

<sup>1</sup>North Mississippi Branch Station; North Mississippi Research and Extension Center; Mississippi State University; Holly Springs, MS 38635

<sup>2</sup>Jamie L. Whitten Plant Material Center; Coffeeville MS 38922

**ABSTRACT:** Mississippi producers generating dry poultry litter or waste must obtain a permit for Confined Animal Operation. A part of this permit is a Nutrient Management Plan for waste disposal. The plan's main function is to determine the total amount of land needed to utilize nutrients generated by each animal unit. Application rates and required acreage are based on soil type and the nutrient removal capacity of the plant species receiving land applied poultry litter. Nutrient removal capacity is the product of nutrient concentration in the plant tissue and dry matter yield. Nine warm season grass varieties were planted April 27, 2000 at the North Mississippi Branch Experiment Station in Holly Springs. Varieties were separated into two classes based on nitrogen (N) requirements for maximum yield potential. Each forage variety received either 2.9 or 5.5 tons of litter per acre. Plots were machine harvested and weighed, and sub samples were taken for laboratory analyses. Dry matter yield, phosphorus (P) uptake, and N uptake were determined for each species. In this study there was no correlation between yield and litter rates among variety of forage. It did show that the N and P uptake increased as yield increased. There was a similar pattern in N and P uptake among cutting date and yield. There was a high coefficient of variation (CV) in the first cutting as well as significant yield differences among varieties

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**KEYWORDS:** Water Quality, N uptake, P uptake, Animal Waste

**MATERIALS AND METHODS:** The site selected for this study was on a Grenada Silt Loam soil with 0-2 % slope. In the spring of 2000 nine warm season grass species and one legume were planted at the North Mississippi Branch Station to evaluate yield response to surface applied poultry litter. The plot design was a randomized complete block with three replications. Each plot was twelve feet by six feet with an alley between adjacent plots. Forage varieties were established by seed, sprigs, or transplants. Three rows of Pensacola Bahiagrass (*Paspalum notatum* Fl, gge), Common Bermudagrass (*Cynodon dactylon* (L.) Pers.), Dallisgrass (*Paspalum dilatatum* Poir.), and Weeping Lovegrass (*Eragrostis curvula* (Schrad.) Nees var. *curvula* Nees) were established from seed planted on 3-ft centers. Bermudagrass cv. Sumrall 007 sprigs and transplants of Alamo switchgrass (*Panicum virgatum* L.), Eastern Gamagrass (*Tripsacum dactyloides*

(L.) L.), and Caucasian Bluestem (*Bothriochloa caucasica* (Trin) C.E. Hubb.) were planted in a grid pattern with fifteen plants per plot. The plot area was furrow-irrigated daily until all seeded plots had emerged and sprigs and transplants had propagated. Irrigation continued until soil moisture was adequate for plant survival. Plots were monitored regularly for weeds until adequate ground cover had been achieved. Broiler litter was surface applied in the spring of 2002 to each species according to nitrogen use rate for maximum yield. Two poultry litter rates of 2.9 and 5.5 tons per acre were used to achieve 160 and 302 lbs of nitrogen per acre. Nutrient analysis of the litter was a pH of 6.92, 26.44 % moisture, and 3.26 % N and 4.93% P<sub>2</sub>O<sub>5</sub>. This is equivalent to 55 lbs of N and 45 lbs P per ton wet-weight or as applied.

Plots were harvested twice during the summer of 2002. The first harvest was on 7/2/02 and the second harvest on 8/23/02. A three-foot swath in the center of each plot was removed with a mower equipped with a bagging system. Biomass from each plot was weighed in the field and grab-samples were taken and later lab analyzed for dry matter percent and N and P content of each variety.

**RESULTS AND DISCUSSION:** In this study there was no correlation between yield among variety of forage (Table 1). The results showed that N and P uptake increased with increasing yield. Coefficients of variation (cv) were high for the first cutting and there were yield differences among species, which might be explained by growth differences during establishment. The coefficient of variation was lower and there was no difference in yield among forage varieties.

Some of the tropical forage varieties yielded as well or better than the native forages. This study will be continued to evaluate stand persistence of the varieties.

**TABLES:**

**Table 1. Yield of Forages with Broiler Litter as a Nitrogen Source  
(Nitrogen application rate is confounded with species)**

Species and Cultivar	Tons of litter applied per acre	Dry matter yield (lbs. / acre)			Litter Content (lbs. / acre)		Uptake (lbs. / acre)	
		7/02/02	8/23/02	Total	N	P	P <sub>2</sub> O <sub>5</sub>	N
Common Bermudagrass	2.9	1354	3165	4519	160	217	23	43
Summerall 007 Bermudagrass	5.5	859	3430	4289	302	407	25	42
Pensacola Bahiagrass	2.9	1013	3629	4642	160	217	25	52
Alamo Switchgrass	5.5	2727	5129	7856	302	407	31	76
9062680 Eastern Gamagrass	5.5	1948	4437	6385	302	407	29	57
Weeping Lovegrass	2.9	1889	4046	5935	160	217	27	50
Johnsongrass	5.5	1350	3688	5038	302	407	24	42
Caucasian Bluestem	2.9	954	3763	4717	160	217	20	39
Dallisgrass	2.9	796	2641	3437	160	217	17	42
Mean		1432	3997				23	55
LSD		1066	NS				3.2	NS