Production and Persistence of Wild Annual Peanuts in Bahia and Bermudagrass Sods[1]

E. R. Beaty, John D. Powell, and Robert L. Stanley

Associate Professor of Agronomy, The University of Georgia, Athens; Supt. of the Americus Plant Materials Center, Americus; and Graduate Student, Athens, respectively.

Highlight

A wild annual forage peanut was seeded in Pensacola bahiagrass and Coastal bermudagrass sods and found to persist for at least 3 years and showed indications of persisting for a much longer time. The peanut can be established by either preparation of a seed bed and planting or by seeding directly into the undisturbed sod. Preparation of a seed bed before planting improved peanut establishment but reduced total forage yields for at least one season. The total forage yield of the grass and peanut was not higher than that of the grass alone. Adding P and K fertilizers did not increase forage yields of either the peanut or grass over a 3-year period. A 50 lb/acre application of N increased total forage production but reduced the amount of peanut forage produced.

In range areas of the Southeast and probably throughout much of Latin America where little N is applied, the forage peanut is one of the first tropical legumes to show promise in grass-legume mixtures.

Legume use as either food or feed probably antedates written records. McKee (1948) concluded the early use of legume crops suggests that the superiority of legumes was recognized early in recorded history. The importance of legumes in temperate pastures is well established and cultural practices necessary to keep legumes in such swards are rather well known.

It can be reasoned that legumes should be equally as important in tropical pastures as in temperate climate swards. However, in spite of the vast acreages of tropical grasslands, relatively little is known about tropical legumes; even less is known about the relationships between tropical grasses and legumes.

The purpose of this investigation was to determine the ability of a wild annual peanut, *Arachis monticola* (Pi 263393), probably of Brazilian origin, (Hermann, 1954) to establish and persist in sods of Pensacola bahiagrass *Paspalum notatum* (Flugge) and Coastal bermudagrass *Cynodon dactylon* (L) Pers.). A second objective was to establish the forage contribution of the peanuts when grown with the grasses.

Procedure

The experiment was initiated on established sods of Pensacola bahiagrass and Coastal bermudagrass at the Americus Plant Materials Center near Americus, Georgia. The sods were approximately 0.25 mile apart and are not directly comparable. Both sods were well fertilized and productive. Soil type was Eustis loamy sand. Treat-

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Table 1. Established peanut plants per square foot by treatment four years after initial seeding (May 17, 1966).

Fertilizer rate (lb/acre NPK)	Sod type					
	Bahiagrass			Coastal bermudagrass		
	Plowed	Planted	Grass	Plowed	Planted	Grass
1. None	1.92	1.28	0.22	1.43	0.58	0.03
2. 0–31–58	1.47	0.95	0.18	0.88	0.62	0.00
3. 50–31–58	0.67	0.38	0.10	0.26	0.37	0.03
4. 0–31–58[1]	1.60	0.88	0.19	1.21	0.43	0.03

[1] One ton of agricultural lime and 250 lb of gypsum in addition.

ments were replicated three times in a split-plot randomized complete block design. Whole plot treatments were established at the beginning of the experiment on April 9, 1963, and in 1964 and 1965 the peanuts were allowed to re-establish without preparation or seedling.

Whole plot treatments consisted of (A) complete seedbed preparation and peanuts seeded in rows 2.5 ft apart, (B) narrow furrows opened 2.5 ft apart in the established sod and peanuts seeded, and (C) no seedbed preparation and no peanuts planted. Split plot treatments were fertilizer rates of: (a) none, (b) 0–31–58 lb/acre of NPK, (c) 50–31–58 lb/acre of NPK and, (d) 0–31–58 lb/acre of NPK and one ton of agricultural lime with 250 lb/acre of gypsum ($CaSO_4$ $2H_2O$).

At planting, hulled peanuts were seeded 5 inches apart in the drill. The initial fertilizer application was made on April 17, 1963, and in late March or early April in later years. Plots were clipped three times per season using a sickle bar mower. The first harvest was made between June 9 and 18. The second harvest was made between August 1 and 12 and the third harvest between September 25 and October 10.

The clipped forage was separated into grass and peanuts while green and dried in a forced-air dryer. Split plots were six feet square and plots were separated by 6-inch plowed furrows. At harvest the entire plot was clipped. On May 17, 1966, a final stand count of established peanuts growing inside the plowed furrows was made.

Results and Discussion

Persistence of the peanuts in the sod is shown by the data in Table 1. At the initial planting, peanut emergence averaged 2 plants/ft^2. The spread of peanuts into adjoining plots was limited. The bahiagrass plots where peanuts had not been seeded adjacent to plots where peanuts had been seeded has less than 0.22 plants/ft^2. The Coastal plots similarly treated had only .03 plants/ft^2.

Plots where no fertilizer had been applied were consistently higher in number of peanut plants per square foot than those where fertilizer was applied. The application of 50 lb N reduced the number of peanut plants by an average of more than 50% as compared to plots where N was not applied. Therefore, peanut persistence was actually reduced by fertilizer application.

The failure of the peanuts to respond to fertilization applied could be attributed to their origin in Brazil on soils low in most nutrients, with grasses offering only limited competition under natural conditions. The fertility level of the soil on which this investigation was conducted was probably much higher than that of the soil on which the peanuts evolved and the peanuts were incapable of responding to the added nutrients. Thus, it would appear that this peanut is likely to persist on lower fertility soils but will probably not persist where increased competition is caused by the addition of N to either of the grasses and the peanuts are not likely to respond to applications to P, K, and Ca. Close utilization could be expected to favor persistance of the peanut (Jamison, 1963).

Forage yields of the peanuts are given in Table 2. Yield data shown represent only that harvested and are conservative relative to that grown. Peanut leaves are produced on long runners located near the soil surface. During dry weather the peanuts tended to drop many of the older leaves while the stems remained vegetable. In seasons of favorable rainfall more leaves will be retained and a higher yield will result. In dry season, leaf growth occurs after rains and unless forage harvests are made before the onset of dry weather, yields of peanut forage are likely to be underestimated relative to production.

Peanut forage production for the first season showed an average of approximately 620 lb/acre when grown with bahiagrass and approximately 1,650 lb/acre when grown with Coastal. In the second season, peanut forage yield on bahia sod tended to be 100 to 200 lb/acre lower as compared to the first year but on Coastal sod the

Table 2. Yield of dry peanut forage per acre by treatments 1963–1965.

Fertilizer (lb/acre NPK)	Yield lb/acre dry forage					
	Bahiagrass			Coastal bermudagrass		
	1963	1964	1965	1963	1964	1965
Plowed seedbed						
a 0–0–0	602	962	116	1708	565	287
b 0–31–58	893	634	203	1783	460	189
c 50–31–58	854	447	95	1325	243	108
d+ 0–31–58	890	685	183	1779	558	272
Seeded direct						
a 0–0–0	479	470	171	1823	287	225
b 0–31–58	500	596	172	1798	225	211
c 50–31–58	404	231	103	1133	60	145
d+ 0–31–58	606	490	174	1882	165	220
Grass						
a 0–0–0		31	44		48	43
b 0–31–58		48	48		38	40
c 50–31–58		33	74		39	27
d+ 0–31–58		37	47		34	67

+ Lime and gypsum in addition.

Table 3. Yield of Pensacola bahiagrass and Coastal bermudagrass and peanut forage by treatments 1963–1965.

Fertilizer (lb/acre NPK)	Yield (lb/acre dry forage)							
	Bahiagrass				Bermudagrass			
	1963	1964	1965	Avg.	1963	1964	1965	Avg.
Plowed seedbed								
a 0–0–0	1850	3543	2102	2498	5127	2529	2513	3390
b 0–31–58	2977	4297	2700	3325	5380	3208	2514	3701
c 50–31–58	3594	4388	4912	4298	7647	4606	4490	5581
d+ 0–31–58	2616	3907	2510	3011	5935	2966	2580	3827
Average	2759	4034	3056	3283	6022	3327	3024	4125
Direct planted								
a 0–0–0	2828	3387	2804	3006	6813	3845	2725	4461
b 0–31–58	3323	3942	2485	3250	6577	4183	3066	4609
c 50–31–58	5706	5425	4466	5199	9215	4245	4919	6126
d+ 0–31–58	3486	4016	2704	3402	6000	3872	2776	4216
Average	3836	4193	3115	3715	7151	4036	3372	4853
Grass alone								
a 0–0–0	2763	3676	2249	2896	4458	3576	2941	3658
b 0–31–58	3438	4012	3110	3520	5110	4853	3001	4321
c 50–31–58	5914	6438	4849	5734	8009	5157	5426	6197
d+ 0–31–58	3100	3417	2292	2936	4616	4153	3054	3941
Average	3804	4386	3125	3772	5548	4435	3606	4530

+ Lime and gypsum in addition.

peanut forage yield was reduced 1,200 to 1,400 lb (Table 2). The third season's peanut forage production was approximately 200 lb/acre on both grasses. The year to year variation is thought to be due primarily to dry weather causing the leaves to drop. After the low forage production of 1965, peanut plant establishment in 1966 (Table 1) showed enough plants to maintain the population at approximately its original level.

The addition of 50 lb N reduced peanut forage production relative to that of the no N treatment. It is probable that when N is applied to a peanut-bahiagrass or peanut-Coastal bermudagrass sward, the value of the peanuts in the mixture will be reduced with the possibility of the peanuts being eliminated entirely. It appears the peanuts have their maximum potential in range or extensive operations, where high forage production per acre is not needed.

The higher peanut forage production on bahiagrass sod in 1964 as compared to the production on the bermudagrass was probably due to the higher water holding capacity of the bahiagrass soil.

Total forage yields by treatments and years are given in Table 3. While forage production of the two areas are not comparable an explanation for the difference in production is available. Coastal bermudagrass averaged approximately 1,000 lb more dry forage per year than Pensacola bahiagrass. The higher yield of the Coastal was due to the higher yield during the first year of the experiment and probably represents residual fertility. During the same year, peanut forage production on the Coastal plots exceeded that on the bahia plots (Table 2), probably due to reduced competition early in the season. During the second and third years of the experiment, total forage production between the grass species did not vary apprcciably.

Forage production on the plowed seed bed averaged approximately 515 lb less forage per year than did the direct seeded plots or the grass without peanuts. The reduced yield on the plowed plots was due to grass stand reductions by plowing that required time to re-establish. At the low level of N fertility used in this experiment more time was required for grass to re-establish than had a more adequate N supply been available. Preparing a seed bed for peanut seedlings in grass sods will reduce the grass production for one to 3 years but will increase peanut forage production.

Applying P and K increased grass forage production up to 300 lb/acre of dry forage, but did not increase peanut production. Applying 50 lb/acre of N increased total forage production by approximately one ton/acre but reduced the percentage forage contributed by the peanuts.

LITERATURE CITED

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