

Biological N₂-fixation, Belowground Biomass, and Forage Potential of Rhizoma Peanut (*Arachis glabrata* Benth) Varieties



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Introduction

- ✓ Rhizoma peanut (*Arachis glabrata* Benth) is a warm-season perennial legume adapted to Southeast USA. Rhizoma peanut (RP) is mostly used as a hay crop in North Florida, but it can also be managed under grazing.
- ✓ Symbiotic association between forage legumes and N₂-fixing microorganisms reduces the need for pasture N fertilization and increases forage N concentration.
- ✓ Although RP has been extensively used, there are limited data on biological N₂-fixation (BNF) for this species
- ✓ Root and rhizome mass is an important trait associated to grazing and cold tolerances.
- ✓ Recently released varieties of RP have not been evaluated for BNF and root and rhizome mass in North Florida.

Objectives

- ✓ The overall objective of this project was to assess the biological N₂-fixation (BNF), belowground biomass and forage potential (crude protein – CP and in vitro organic matter digestibility – IVOMD) of seven rhizoma peanut varieties.



Figure 1. Rhizoma peanut varieties; NFREC-Marianna, FL.

Results

Table 2. Annual dry matter yield (sum of 3 harvests) and root/rhizome biomass of rhizoma peanut varieties; NFREC-Marianna, FL.

Cultivar	Annual DM Yield (kg/ha)	Root + Rhizome mass (kg DM/ha)
Arblick	7500 abc	16450 ab
Arbrook	10240 a	17380 ab
Ecoturf	7180 bc	22920 a
Florigraze	6000 c	10730 b
Latitude 34	6270 c	21410 ab
UF Peace	9240 ab	17500 ab
UF Tito	9560 ab	15900 ab
SE	650	2650



Figure 2. Root and rhizome mass sampling of rhizoma peanut

Methods

- ✓ Rhizoma peanut varieties included Arblick, Arbrook, Ecoturf, Florigraze, Latitude 34, UF Peace, and UF Tito.
- ✓ Complete randomized block design with four replications per treatment.
- ✓ Response variables included total dry matter yield (DMY), N concentration, N Yield, %N derived from atmosphere (%Ndfa), biological N₂-fixation, IVOMD, and root + rhizome mass.
- ✓ Harvests occurred in 6 June, 13 August, and 14 October 2014.
- ✓ BNF evaluated using natural abundance ¹⁵N technique.
- ✓ Data analyzed using proc mixed from SAS and LSMEANS compared using PDIFF adjusted by Tukey (*P* < 0.05)

Results

Table 1. Crude protein and In Vitro Organic Matter Digestibility (IVOMD) of rhizoma peanut varieties; NFREC-Marianna, FL.

Cultivar	CP (%)	IVOMD (%)
Arblick	17 a	74 a
Arbrook	13 e	67 b
Ecoturf	17 ab	74 a
Florigraze	14 de	73 a
Latitude 34	15 bcd	74 a
UF Peace	16 abc	73 a
UF Tito	14 cde	73 a
SE	0.4	1

Table 3. Annual shoot N yield (sum of 3 harvests), %Ndfa, and annual shoot BNF of rhizoma peanut varieties; NFREC-Marianna, FL.

Cultivar	Annual shoot N yield (kg N/ha)	%Ndfa	Annual shoot BNF (kg N/ha)
Arblick	213 ab	86 a	180 ab
Arbrook	209 ab	73 b	150 abc
Ecoturf	189 abc	81 ab	160 abc
Florigraze	136 c	81 ab	110 c
Latitude 34	151 bc	84 ab	130 bc
UF Peace	237 a	83 ab	200 a
UF Tito	222 a	87 a	190 a
SE	6	2	15

Conclusions

Rhizoma peanut varieties differ in their above- and belowground biomass production, biological N₂-fixation, and forage potential. Belowground biomass represents a larger pool compared to aboveground biomass. In general, the results indicated the ability of rhizoma peanut to add N and increase forage nutritive value in livestock production systems.