ROOT SYSTEM OF FORAGE PEANUT GENOTYPES UNDER TWO LEVELS OF WATER AVAILABILITY

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Introduction

- Forage peanut (*Arachis pintoi* and *Arachis repens*) has a great number of favorable attributes for establishing grass-legume mixtures, which guarantee the persistence and high yields of high quality forage in cultivated pastures (Figure 1);
- Forage peanut is cultivated in regions of the humid tropics, subject to four months of drought, when forage yield decreases;
- Field studies have shown that there is genetic variability for drought tolerance in forage peanut;
- However, morphophysiological responses of different genotypes are poorly understood under water deficit conditions.

Objective

- Evaluate the root system of different genotypes of forage peanut under two levels of water availability.

Figure 1. Mixed pasture of *Brachiaria humidicola* and *Arachis pintoi* cv. BRS Mandobi cultivated in Western Brazilian Amazon, Acre, Brazil.

Material and Methods

- Nine genotypes of forage peanut, with different dry matter yield in the dry season of Rio Branco, AC, Brazil, were evaluated in a greenhouse at two levels of water availability;
- The design was completely randomized, with treatments arranged in a 9x2 factorial, with four replications;
- Rooted stolons were transplanted into acetate tubes of 95 cm in length by 9.5 cm in diameter (Figure 1);
- At the irrigated level, 95% of field capacity was maintained and in the non-irrigated level, irrigation was suspended 10 days after transplanting;
- When 50% of the genotypes were under 50% of the field capacity (25 days after the irrigation suspension), the experiment was interrupted;
- Shoot dry mass (SDM), root dry mass (RDM), root system length (RSL) and root system density (RSD) were evaluated;
- RSD was measured at depths of 0-15; 15-30; 30-45; 45-60; 60-75; and 75-90 cm, considering a split plot design;
- Data were submitted to analysis of variance, Scott Knott and Tukey tests, at 5% of probability.

Results and Discussion

- No significant interaction (p>0.05) between genotypes and water availability was observed;
- The effect of genotypes was significant (p<0.05) for RSL (Table 1);
- RDM and RSL showed higher mean values (p<0.01) for the non-irrigated level (**1.26 g** and **60.6 cm**) when compared to the irrigated one (**0.91 g** and **33.7 cm**);
- For RSD, significant interaction (p<0.01) between depth and water availability was observed;
- RSD was higher for the irrigated level only at depth of 0-15 cm (Table 2);
- At the irrigated level, 86.2% and 96.5% of the roots were concentrated in the first 15 and 30 cm, respectively, and roots did not reach the deeper layers;
- At the non-irrigated level, 53.4% and 93.6% of the roots were allocated up to 15 and 60 cm deep, respectively;

Table 1. Root system length (RSL, cm) of forage peanut.

Genotype	RSL (cm)
Hybrid V1(59)	62.8 a
Cultivar BRS Mandobi	53.1 a
BRA 015253	48.8 b
BRA 034100	48.3 b
Hybrid E5	47.1 b
BRA 040894	44.9 b
BRA 042242	42.7 b
BRA 042170	39.3 b
Cultivar Belmonte	37.2 b

Means followed by equal letters belong to the same group by Scott-Knott test at 5% of probability.

Table 2. Root system density (RSD, mg.cm^{-3}) of forage peanut.

Depth (cm)	Irrigated	Non-irrigated
0-15	788.1 a	677.8 b
15-30	94.5 b	208.1 a
30-45	24.1 b	184.4 a
45-60	7.3 b	117.0 a
60-75	0.7 a	62.8 a
75-90	0.0 a	18.6 a

Means followed by the same letter in the line do not differ by the Tukey's test at 5% of probability.

Figure 1. Root system of forage peanut evaluated in acetate tubes .

Conclusion

- Root system of forage peanut can be adequately study using long acetate tubes;
- However, to identify more drought tolerant genotypes, it is necessary to impose a more severe water deficit;
- BRS Mandobi and V1(59), classified as less drought tolerant in the field, have higher growth of root system, regardless of water availability;
- Forage peanut presents plasticity of the root system, whose growth is stimulated under moderate water availability.

References

- KAHLE; ROBERT; CADISCHI, G. RAO, I. M. Responses of different tropical forage legumes under stress factors of acid and drought. In: CONFERENCE ON INTERNATIONAL RESEARCH ON FOOD SECURITY, Gottingen. **Proceedings…** Gottingen: George-August-Universitat Gottingen, 2012.
- SANTOS, C. F. Genetic evaluation of forage peanut for agronomic and bromatological characters as a function of water availability. 2018. 201 p. **Thesis** (PhD in Agronomy: Plant Sciences) – Postgraduate Program in Agronomy. Federal University of Acre, Rio Branco.