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Multi-Locational Agronomic Evaluation of Four Forage Legumes Adapted to Degraded Soils of the Patía Valley in Cauca, Colombia

Mauricio Efren Sotelo Cabrera[1], Nelson José Vivas Quila[2], Jesús Gerardo Galindez[2], Rolando Barahona[3], Sandra Morales Velasco[2], Noe Alban Lopez[2], Jacobo Arango[1], Michael Peters[1]

[1] *International Center for Tropical Agriculture (CIAT), Colombia*
[2] *University of Cauca, Dept. of Agricultural Sciences, Colombia*
[3] *National University of Colombia, Dept. of Animal Production, Colombia*

Abstract

Climate vulnerability is affecting livestock production in the tropics. In addition, poor management practices such as overgrazing, overstocking and deforestation are converting livestock production in one of the main drivers of soil degradation, resulting in expansion of the agriculture frontier looking for fertile lands. An alternative to reverse soil degradation is the use of improved forages (i.e., legumes and grasses) with the ability to grow in degraded soils and recuperate them rapidly.

Aiming at evaluating the agronomic performance of hebaceous forage legumes under the conditions of Patía Valley-Cauca/Colombia, four species were stablished under dry sub-humid climate and low fertility soils of various stages of degradation. The species tested were: *Canavalia brasiliensis* CIAT 17009, *Centrosema molle* CIAT 15160, *Stylosanthes guianensis* CIAT 11995 and *Desmodium heterocarpon* CIAT 13651. Previous studies have shown a broad adaptation of these species to marginal/ stressed environments and the production of high nutritious forage. As control a naturalized forage grass was included (*Dichanthium aristatum*). The field sites were cleared using glyphosate (Roundup^{TM} 1.5 L ha^{-1}) and fertilised with P, K, Mg and S (22, 41.5, 20 and 20 kg ha^{-1}). Legumes were sown in 2016 at three locations with different levels of degradation (high to low) Piedra Sentada, Mercaderes and Patía, under the following conditions: average rainfall 1616 mm year^{-1} mean temperature 32°C, at an altitude of 800 m asl for Mercaderes and 500 m asl for the two other sites. A complete randomised block design with 3 repetitions was used. Each plot was 100 m^2 with a sowing density per hectare of 25 kg for *C. brasiliensis*, 2 kg for *C. molle*, 3 kg for *S. guianensis* and 1 kg for *D. heterocarpon*. Once established (2017), forage dry matter productivity (DM ton/ha/42 days) was assessed in the wet season. Results showed that *S. guianensis* hat the highest productivity at all 3 locations (3.2, 2.2 and 4.8 DM ton/ha/42 Day, respectively) compared to *C. brasiliensis* (2.1, 0.8, 3.9), *D. heterocarpon* (3.0, 2.2, 1.8) and *C. molle* (2.5, 1.6, 2.6 respectively). Productivity during the dry season will be measured to valuate performance under drought conditions, anticipating a higher drought tolerance of the deep rooted legumes.

Keywords: Adaptation, forage legumes, livestock production, soil degradation

Contact Address: Mauricio Efren Sotelo Cabrera, International Center for Tropical Agriculture (CIAT), km 17 recta Cali-Palmira, Cali, Colombia, e-mail: m.sotelo@cgiar.org