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Contrasting accessions of tropical forage *Urochloa*: Pioneering tool for the prediction of carbon-soil sequestration

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Abstract

Soil carbon deposition through biomass production as well as plant-soil interface exchange in tropical forage systems may represent huge contribution to ameliorate the increase of carbon dioxide concentration in the atmosphere and thus the climate change. Cattle farming in the tropics is predominantly dependent on pastures with tropical forages. Different accessions of tropical forages, such as *Urochloa humidicola* and its hybrids, display a variety of rooting strategies, root biomass production and suberin deposition, which is hypothesised to contribute to soil carbon deposition. Root morphological traits, such as secondary metabolite deposition in hypodermis and/or endodermis, may represent a versatile phenotyping tool to assess soil-carbon sequestration capacity of tropical forages. We used *Urochloa humidicola*, accession nr. 679, and *U. humidicola* hybrid Bh08 – nr. 1149 to assess root morphology. Root cross sections made from defined relative length revealed less secondary metabolite deposition in hypodermal layers and epidermis, which is coherent with decreased rooting depth, frequent branching, less soil compaction resistance, and thus may coincide with less soil-carbon deposition in 1149 hybrid compared to 679. Further, 1149 roots displayed lower parenchyma cell files number, lower main root thickness, poor aerenchyma development, increased lateral root thickness relative to the main root thickness when compared to 679. In conclusion, we have found two contrasting root morphology phenotypes that perform different rooting strategies. These contrasting genotypes are currently planted under field conditions in Colombia to test their impact upon soil carbon sequestration. Further, an extensive phenotyping will be performed with other numerous accessions, first from hydroponics and later on from natural soil conditions.

Keywords: Carbon sequestration, forage, phenotyping, root morphology

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