Identification of *Urochloa humidicola* hybrids with waterlogging tolerance and Biological Nitrification Inhibition (BNI) capability

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**Introduction**

Soil waterlogging (flooding of the soil) is a major limitation to pasture productivity due to the slow diffusion of gases in water that reduces plant growth, as O₂ availability in the root zone decreases (Cardoso et al., 2014). Biological nitrification inhibition (BNI) is a process where roots exude organic substances that inhibit the activity of soil nitrifiers - nitrification (Subbarao et al., 2009, Nunez et al., 2017).

*Urochloa humidicola* (Uh) is an important forage grass in humid lowland tropics that has been identified and characterized for having good waterlogging tolerance (Keller-Grein et al. 1996; Calisto et al. 2008; Cardoso et al., 2013) and high soil nitrification inhibitory potential (Subbarao et al, 2007; Gopalakrishnan et al., 2007).

**Objective**

To evaluate the variation in waterlogging tolerance and BNI of twenty seven hybrids of *Urochloa humidicola* developed by the *Urochloa* breeding program of CIAT. Two commercial cultivars of *Urochloa humidicola* ( cvs. Tully and Llanero) were included for comparison purposes (checks).

**Materials and Methods**

**Waterlogging tolerance test**

Shoot growth (pixels) was measured in plants growing in a top Oxisol which was mixed with river sand in a proportion of 2:1 (w/w) and fertilized to avoid nutrient deficiencies. Plants were planted into PVC pipes of 80 cm high and 7.5 cm diameter in a factorial combination of two drainage conditions: drained (field capacity) and waterlogged.

The trial was established in a four replicate randomized complete block, for 23 days under greenhouse conditions. Shoot growth was estimated as in Jiménez et al (2017).

**Potential nitrification**

Soil nitrification potential was measured to evaluate BNI capacity from top soil samples taken in plots of 1m² using a modified shaken slurry procedure (Hart et al., 1994, L. He et al. 2018) One g of soil (air-dried) was mixed with 10mL assay solution (30mM KH₂PO₄; 0.7mM K₂HPO₄ and 0.75mM ammonium sulfate, pH = 7.2) in a 50 mL covered flask. Then, incubated at 120 rpm at 25 °C. Potential nitrification rates were determined at 0h, 24h, until 96h to calculate the slope of a linear regression of (NO₃⁻−N) production versus time.

**Results**

Two hybrids were identified as promising based on similar biomass to that of Brachiaria cv. Tully and Llanero (Figure 1).

**Conclusions**

We identified one *Urochloa humidicola* hybrid (Uh16-1351) with both waterlogging tolerance and high BNI capacity. This promising hybrid needs to be further tested under field conditions.

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