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Sorghum Root Architecture Subjected to Biogas-Digestate Application

Plants obtain water and mineral nutrients from the soil due their capacity to develop extensive root systems. To achieve greater sustainability within agriculture new strategies that will either reduce the nutrient demand of the crop or promote greater root recovery of the added fertilizer are required. Genetic variation for nutrient uptake can be exploited in breeding programs to improve sustainable production. In the present study, two genotypes of *Sorghum bicolor* subsp. *bicolor* (line 083 and line 134) from the sorghum diversity panel were used. These two sorghum genotypes differ mainly in relation to root system architecture, P uptake and grain yield. Thus, we aimed to assess which sorghum genotype shows higher biomass and nutrient uptake under organic and mineral fertilizer addition and the differences in root system architecture and rhizosphere pH using non-invasive methods. In a rhizotron experiment we evaluated the effects of the biogas-digestate (40 Mg ha^{-1}) applied as a fertilizer on root architecture, rhizosphere pH, nutrient uptake and biomass development of two sorghum genotypes in comparison to NPK fertilizer (five replicates). The biogas-digestate was composed of maize silage as the major feedstock, and minor amounts of chicken manure. Fertilizers were applied into the peat substrate. Plants were grown for 21 days. The measurements include: shoot and root dry mass; shoot nutrients content (C, N, P and K); leaf area; chlorophyll content (SPAD); root architecture; and soil elemental analyses. Rhizosphere pH was measured with planar optodes along the experimental period. Data are currently under analyses. We believe that this pilot study for sorghum can be scaled up to characterize a meaningful number of genotypes for breeding purposes.