



Tropentag, September 16-18, 2015, Berlin, Germany

“Management of land use systems for enhanced food security:
conflicts, controversies and resolutions”

Soil Amendment Impact on Root and Root-Tuber Development of Umbu Trees

JAN MERTENS¹, SONJA GERMER², JÖRN GERMER¹

¹*University of Hohenheim, Inst. of Plant Production and Agroecology in the Tropics and Subtropics, Germany*

²*Leibniz Institute for Agricultural Engineering Potsdam-Bornim, Bioengineering, Germany*

Abstract

The Caatinga in northeastern Brazil is a semiarid ecosystem that comprises with 850,000 km² almost 10% of the Brazilian territory. With 20 million inhabitants it is the most densely populated semi-arid region of the world. It is a highly endangered ecosystem mainly through deforestation, fires, and pasture establishment. The umbu tree (*Spondias tuberosa* Arr.) is one of the native Caatinga trees that can survive the high temporal and spatial variability of water supply. The umbu fruit is an important nutrition source for humans and the wild life in the Caatinga. Humans use the Umbu fruit to produce juice, sweets, licorices, and others. The high pressure on this ecosystem by humans together with water scarcity, however, impede the emergence of new young trees. Therefore this study investigates how different soil amendments as biochar, goat manure, and mineral fertiliser added to planting holes can influence the rooting system of young umbu trees to potentially increase water uptake during infrequent and small rainfall events. This includes the development of root tubers which are essential for the survival of the tree during dry seasons, since they are able to store water, minerals, and organic solutes. The qualitative description of the root-system of three year old seedlings of *S. tuberosa* will include the vertical and horizontal extent of primary and secondary roots, as well as the number and size of root-tubers. To harvest the root-tubers the entire rootstock was manual excavated and the root-tubers are collected and the total number, fresh weight, and size of tubers are recorded. Root length density of fine roots and fine root biomass within the planting hole are measured in manual washed samples out of a volumetric soil sample taken in two different depths (0 – 300 mm and 300 – 600 mm). Finally the comparison of root systems with above-ground biomass might help to understand underlying processes that favour young umbu tree survival.

Keywords: Biochar, root length density, soil amendment, umbu