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Integrated Weed and Water Management as Water Saving Practices in Rain-fed Crops in Tanzania and Germany

SCHAPPERT ALEXANDRA¹, ANGELA SCHAFFERT², GERHARDS ROLAND³, FOLKARD ASCH⁴

¹ *University of Hohenheim, Institute of Phytomedicine, Germany*

² *University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany*

³ *University of Hohenheim, Institute of Phytomedicine,*

⁴ *University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany*

Abstract

In semi-arid regions in Tanzania smallholder low input crop production systems do often suffer from drought induced yield losses. In Southwest-Germany, where the rainfall amount and distribution is usually not severe, producers are concerned about weed induced yield limitations. In both geographical regions evaporation and water use of weeds might show different impacts on the water supply of crops. This study aims at estimating the effect of weed and water management practices on soil moisture and crop development. The management practices were adapted to the local conditions and suitability's. Therefore, a field trial in Central-Tanzania was initialized from January until May 2015 with sunflower and maize including treatments with low and high weeding frequencies (i) and soil surface modifications called tied-ridges (ii), which collect water during rainfall events. In Southwest-Germany, different winter cover crops (iii) were established between August and December 2016 to reduce weed infestation and water loss during maize cropping from May until September 2017. Soil moisture was measured frequently in different depths. Weed and crop development were determined at regular intervals and yield components were measured at harvest.

Low or high weed infestation (i and ii) had minor effects on the soil moisture at the field trial in Tanzania. The impact of weed biomass in cover crop treatments (iii) in Southwest-Germany had no significant effect on soil moisture and yield. In summary, at both field trials, probably due to generally low weed infestation, weed management did not increase soil water and yield significantly. The results had shown that the impact of water management (i-iii) whether at the field trials in semi-arid Central-Tanzania (321 mm from January until May 2015) or humid Southwest-Germany (309 mm from May until September 2017) had a greater effect on yield than weed management. In seasons with high weed infestation weeds largely compete for resources or in contrast conserve water by reduced evaporation, which might result in significantly decreased or increased soil moisture contents and yield.

Keywords: Competition, green manure, plant protection, soil moisture, tied-ridges