

## MILLET-BASED INTERCROPPING SYSTEMS FACILITATED BY BENEFICIAL MICROBES FOR CLIMATE-RESILIENT, SUSTAINABLE FARMING IN TROPICS

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### Introduction

According to the FAO, an increasing number of people are going to bed hungry, and more than a billion people are known to be nutritionally poor (Swaminathan 2010). Agroecology-based intercropping – growing more than one crop at the same time on a given piece of land – is now regarded as a promising approach for addressing food security in an environmentally and socially sustainable way (Brooker et al. 2015; Duchene et al. 2017). Many studies have shown that intercropping provides greater resource use-efficiency, reduced soil erosion and nutrient losses, and improved soil moisture (Maitra 2020; Triveni et al. 2017). Water is arguably the single most important factor that limits crop production in agriculture, particularly in rainfed or dryland ecosystems, and a consideration of plant hydraulic lift of soil water may help in designing a sustainable intercropping system (Liste and White 2008).

Soil microbes such as arbuscular mycorrhizal fungi (AMF) and plant-growth-promoting rhizobacteria (PGPR) may be beneficial as well, particularly the former with their capability to form a common mycorrhizal network (CMN) that extends beyond plant root systems, facilitating long-distance nutrient mobilization and water transfer (Aroca and Ruiz-Lozano 2009). Sustainable intensification through intercropping may be achieved with many different crops but requires the integration of various sciences such as agronomy, soil, microbial and social sciences (Brooker et al. 2015). This chapter deals with millet-based intercropping systems as an example. Specifically, we show results from our recent studies, revealing the contribution of CMN in mediating “bioirrigation”, a process where the hydraulically lifted water by a deep-rooted legume such as