

Introduction of exogenous AMF species alters the biological diversity and functionality of AMF communities associated with cowpea

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The salinity in arid and semi-arid areas of the world is rapidly expanding due to climate change and anthropogenic activities. The use of inoculants containing beneficial microbes (e.g. arbuscular mycorrhizal fungi (AMF) and rhizobia) is a promising alternative to improve plant production in these regions. Here, we investigated the effect of common agricultural practices such as the use of beneficial microbes as inoculum and crop rotation on cowpea growth and on its association with soil microbes under non- and salt-stressed conditions. Plant experiments were carried out using non-sterilized soil (supplemented or not with NaCl) under greenhouse conditions. *Bradyrhizobium yuanmingense* BR 3267 strain and a commercial mixture of AMF (Endoplant Riego) were used as inoculants. In parallel, we assessed cowpea growth following succession of buffelgrass (*Cenchrus ciliaris*) with or without prior soil disturbance. Plant and symbiotic parameters, nutrient content in leaves and AMF and root nodule communities through DNA metabarcoding were evaluated. Under non-stressed conditions, inoculation with AMF and/or BR 3267 strain led to significant increase of cowpea biomass production and higher N or P content in leaves. The imposed saline condition affected the cowpea growth although without significantly affecting the symbiotic parameters. Moreover, the increase of AMF propagules available in the soil at buffelgrass sowing through the inoculation of commercial AMF was a determining factor to mitigate the effects of soil tillage and salinity on cowpea growth. The bacterial communities in the root nodules were affected by AMF communities rather by rhizobia inoculation. Benefits of commercial AMF could be explained by changes in the biological and functionality of the AMF communities associated with cowpea. This study reveals that microbial inoculation and crop rotation are effective practices for improvement of cowpea growth and on mitigating the harmful effects of salt.

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