

Tropentag, September 9-11, 2020, virtual conference

"Food and nutrition security and its resilience to global crises"

Mix of Multifunctional Microorganisms as Affecting Upland Rice Physio-Agronomic Characterisation

Adriano Stephan Nascente¹, Joao Pedro Tavares Fernandes², Marta Cristina Corsi $$\rm Filippi^3$$

¹Brazilian Agricultural Research Corporation (EMBRAPA), Rice and Beans, Brazil ²Federal University of Goias State, Brazil ³Brazilian Agricultural Research Corporation (EMBRAPA), Brazil

Abstract

Rice producer will need sustainable inputs to reach the world and economics demands. In this sense, the use of beneficial microorganisms that can contribute to crop growth and health consist in a good strategy for a sustainable agriculture. Plant Growth Promoting Rhizobacteria (PGPR) and Trichoderma spp. fungus are beneficial microorganisms that interact with root plants and can promote plant development. The effects of these beneficial microorganisms can be direct, such as hormones and siderophores production, phosphate solubilisation and nutrient mobilisation; or indirectly, by suppressing various pathogens in the forms of biocontrol agents, and by providing greater efficiency in the gas exchange process. In addition, these microorganisms could provide protection against biotic stress, such as the induction of resistance and direct antagonism. The objective of this study was to determine the effect of bioagents applied alone or in mix on the performance of upland rice. The experiment was conducted in a greenhouse in a completely randomised design with four replications. The 26 treatments consisted of the rhizobacteria Bacillus sp. (BRM 32109, BRM 32110 and 1301), Azospirillum sp. (1381), Azospirillum brasilense (Ab-V5), Pseudomonas sp. (BRM 32111), Pseudomonas fluorescens (BRM 32112), Burkholderia pyrrocinia (BRM 32113), Serratia sp. (BRM 32114), and a fungal genus formed by a pool of Trichoderma asperellum (T-06, T-09, T-12, and T-52), alone or in mix, plus a control treatment without microorganism application. The most effective treatments were the mixes of microorganisms 1301 + Ab-V5 and BRM 32114 + pool of Trichoderma asperellum, as they provided an average increase of 123 and 88% in the number of panicles and 206 and 167% in the grain yield of upland rice plants, respectively. Mixes of 1301 + Ab-V5, BRM 32114 + Trichoderma asperellum pool, BRM 32110 + BRM 32114, BRM 32110 + Ab-V5, 1301 + BRM 32110 and 1381 + Trichoderma asperellum pool also provided better morphophysiological performance in rice plants (photosynthetic rate, carboxylation efficiency, number of tillers, shoot dry biomass and nutrient content in shoot and root). Therefore, the use of multifunctional microorganisms in the management of upland rice was efficient in its ability to improve plant performance.

Keywords: Bioagents, growth promoters, inoculation, Oryza sativa

Contact Address: Adriano Stephan Nascente, Brazilian Agricultural Research Corporation (EMBRAPA), Rice and Beans, P.O. Box 179, Highway 462, km 12, 75375000 Santo Antônio de Goiás, Brazil, e-mail: adriano.nascente@embrapa.br