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Soybean Development as Affected by Beneficial Microorganisms

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Abstract

Soybean is the main oil crop in the world, with a production of 336.699 million tons worldwide. In the current scenario, the emphases is on reducing or banning the use of agrochemicals and fertilisers, as well as provide reduction on production costs without losses in grain yield, to make the activity sustainable. The use of plant growth promoting microorganisms is indicated as one of the most promising technological alternatives, since it promotes beneficial effects on plant growth with functional effects on grain yield. These microorganisms act directly and indirectly in the promotion of plant growth. Direct effects are characterised by the production of plant hormones, phosphorus solubilisation and siderophores production. Among the indirect effects, we can mention the relationship of antagonism to other microorganisms, such as phytopathogens and the result of interaction between them and host plant, which results in an induction of resistance, leading plant to a prime state. The objective of this work was to determine the effect of single or mixed microorganism species on the biomass production, gas exchange and nutrient content in shoots and roots of soybean plants. The experimental design was a completely randomised with 30 treatments and three replicates. Treatments consisted of the application of rhizobacteria BRM 32109, BRM 32110 and 1301 (*Bacillus* sp.), BRM 32111 and BRM 32112 (*Pseudomonas* sp.), BRM 32113 (*Burkholderia* sp.), BRM32114 (*Serratia* sp.), Ab-V5 (*Azospirillum brasilense*) and 1381 (*Azospirillum* sp.); fungus *Trichoderma asperellum* (mix of isolates UFRA.T06, UFRA.T09, UFRA.T12 and UFRA.T52); plus 19 mix of these microorganisms, and the control (no microorganisms). At sowing time, the soil was treated with *Rhizobium*, and then soybean seeds were microbiolized and were applied microorganisms suspension at 7 days after planting (DAP) in the soil and to the 21 DAP in the seedlings, according to each treatment. *Trichoderma* pool, Ab-V5, 1301 + 32110, 1301 + 32114, 1301 + Ab-V5 and 32 110 + Ab-V5 provided more significant accumulation of total biomass in soybean plants with values, on average, 25 % higher than the control treatment. Our results allow inferring that the use of beneficial microorganism is very promising to include in the cropping systems.

Keywords: Bioagent, biomass, *Glycine max*, growth promotion