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Development of upland rice plants as affected by potassium fertilization and diazotrophic bacteria strain of *Serratia* spp.

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The proper use of nutrients is a key for increasing sustainable agricultural production. Potassium is the second most uptake nutrient by rice crops. Rhizobacteria can be used to stimulate plant development and could allow for increasing nutrient uptake. However, there are no virtual studies about the use of bacteria and K fertilization in the development of upland rice. The objective is to determine the effect of the rhizobacteria *Serratia* spp. strain R-235 and doses of K at sowing fertilization on the production of biomass, gas exchange, nutrient content in leaves and grain, yield components and grain yield of upland rice. The field experiments were conducted in two growing seasons, 2015/16 and 2016/17, under no-tillage systems in the Brazilian region of Cerrado. The experimental design was a complete randomized block in a factorial 4x2 scheme, with four replications. The treatments consisted of four K₂O doses (0, 20, 40 and 60 kg ha⁻¹) with or without rhizobacteria seed inoculation and plant/soil spray pulverization. The use of Rhizobacterium *Serratia* spp. strain R-235 in soil with high levels of K, allowed not to use K fertilization in rice crop. The use of Rhizobacterium *Serratia* spp. strain R-235 provided increases in content of P, Ca, Mg, Fe and Zn in rice leaves; plant biomass, number of panicles per plant, number of grains per panicle and grain yield of upland rice. Grain yield of rice treated with Rhizobacterium *Serratia* spp. isolated R-235 was 16.3% higher than no treated plants. The use of bioagent was effective to provide better plant upland rice development under field conditions and showed promising to be incorporated into crop systems.

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