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Cover Crops and Beneficial Microorganisms as Affecting the Development of Upland Rice

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Abstract

The cultivation of cover crops in the off-season and the use of multifunctional microorganisms in the crop fields can contribute to increase grain yield upland rice and provide greater sustainability in the cultivation environment. The objective of this work was to determine the effect of cover crop mixes grown in the off-season and the application of multifunctional microorganisms on rice seeds and plants, on soil attributes and on the development of upland rice cultivated in the summer under no-tillage system. The experimental design was a randomised blocks in a 6×2 factorial scheme, with four replications. The treatments consisted of a combination of six vegetable coverings (1. Fallow (control); 2. millet (*Pennisetum glaucum*) with crotalaria (*Crotalaria juncea*, *C. spectabilis* and *C. ochroleuca*); 3. millet with pigeon pea (*Cajanus cajan*); 4. millet with *Urochoa ruziziensis*; 5. Millet with *U. ruziziensis* and with pigeon pea; and 6. millet with buckwheat (*Fagopyrum esculentum*)), with or without the application of the multifunctional microorganisms mixture isolate 1301 (*Bacillus* sp.) + *Azospirillum brasiliensis* isolate AbV5. Our results allow inferring that mixes of the cover crops millet with *U. ruziziensis* and millet with *U. ruziziensis* and with pigeon pea showed the highest production of dry matter and the availability of the largest amounts of nutrients in their straws. The treatment millet with pigeon pea provided the highest transpiratory rates and stomatal conductance in rice plants, and the use of multifunctional microorganisms provided a 29 % increase in the photosynthetic rate of rice plants. The mixture of millet with crotalaria provided the highest grain yield in rice plants and the application of multifunctional microorganisms contributed to the increase in the mass of 1,000 upland rice grains.

Keywords: *Azospirillum*, *Bacillus*, *Cajanus cajan*, *Crotalaria* sp., *Fagopyrum esculentum*, *Oryza sativa*, *Pennisetum glaucum*, *Urochoa ruziziensis*