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Mycorrhizal inoculation enhances growth and development of rice (*Oryza sativa* L.)

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Application of inorganic fertilizer enhances plant growth and yield since inorganic fertilizer is absorbed quickly by soil and plants. Therefore, farmers apply the maximum amount of inorganic fertilizer to their crops to obtain a higher yield. As a result of excessive application, inorganic fertilizer leaches to the ground and pollutes water. To minimize this situation it may be more advisable to use a combination of inorganic fertilizer with mycorrizae in crop cultivation. The aim of the study was to determine the influence of mixtures of inorganic fertilizer and mycorrizae) on the growth and yields of traditional rice (*Oryza sativa* L.) varieties Bathkiriel and Sinnanayam and to compare the soil microbial activity of the field and treated soils.

A greenhouse experiment was conducted to determine the influence of mycorrhizae as a substitute for inorganic fertilizer on growth and yield of rice and soil microbial activity. Four doses of inorganic fertilizer [recommended dose (basal dressing; urea:TSP:MOP = 50:625:50 kg/ha and top dressing urea = 87.5 kg/ha), 1/2 and 1/4 of recommended dose and 0] were applied to soil with standard dose of mycorrhizae (2 g / 5 L water). The above four treatments were tested in a completely randomized design (CRD) with five replicates.

The results indicated that there was no significant difference in all the parameters tested on plants treated with the recommended dose and 1/2 the recommended dose of inorganic fertilizer with standard dose of mycorrhizae. The highest weight of 100 seeds (3.2 g) in rice variety Bathkiriel and 3.9 g in rice variety Sinnanayam was obtained with the recommended dose of inorganic fertilizer and the lowest was obtained in plants treated with the standard dose of mycorrhizae without inorganic fertilizer (variety Bathkiriel; 2.0 g and variety Sinnanayam; 2.5 g). The highest grain number (70.7/panicel) and number of panicles (2.3/plant) was observed in the rice variety Bathkiriel and was 92.7/panicel and 3.5/plant in rice variety Sinnanayam respectively with the recommended dose of inorganic fertilizer with standard dose of mycorrhizae. The highest soil microbial activity was recorded in soil treated with the standard dose of mycorrhizae without inorganic fertilizer (5660 CO_2 mg/kg of soil) and the lowest value was observed in soil treated with the recommended dose of inorganic fertilizer (4662 CO_2 mg/kg of soil) after 4 months of inoculation. The activities of soil micro-organisms were lower in soils treated with inorganic fertilizers. It is concluded that 1/2 of the recommended dose of inorganic fertilizer with the standard dose of mycorrhizae is the best fertilizer mixture for rice varieties Bathkiriel and Sinnanayam.

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