

Use of plant growth promoting rhizobacteria (PGPR) to improve effectiveness of chemical fertilizer on spring wheat and barley in the field condition

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Summary

In 2010, a demonstration field trail was conducted in order to investigate seed inoculation of spring wheat (*Triticum aestivum* spp. *vulgare* var. Kırık) and barley (*Hordeum vulgare* cv. Tokak), with plant growth-promoting rhizobacteria in single and three PGPR strains combinations in comparison to control and mineral fertilizer application in the field condition at Ataturk University Experimental field in Erzurum, Turkey. The treatments included control (no inoculation and fertilizer), Nitrogen (40 kg N ha⁻¹), Nitrogen (80 kg N ha⁻¹), *Bacillus* OSU-142, (5) *Bacillus* M3, *Azospirillum* sp.245, Mixed (OSU-142 + M3 + *Azospirillum* sp.245) and Mixed + 40 kg N ha⁻¹ and Mixed + 20 kg N ha⁻¹. Field demonstration results showed that seed inoculation with PGPR strains significantly affected yield, yield components, and quality parameters both in wheat and barley. All treatments significantly increased grain protein, grain and straw N content of wheat and barley plants when compared with control. In terms of seed yield, single application of OSU142, Sp245 or M3 has similar or better yield than 40 kg N application alone. The best results were obtained from mix inoculation (OSU142+M3+Sp245) with 40 kg which was better than even 80 kg N application on both barley and wheat varieties. In conclusion, seed coating with PGPR strains like OSU-142, Sp 245 and mixed inoculation may satisfy nitrogen requirements of wheat and barley under field conditions. Seed coating of PGPR strains can reduce at least 50% of N input in soil without effecting yield.

Key words: PGPR, organic agriculture, seed coating, biofertilizer