

Factor analysis of yield and yield components of bean affected by organic acids and water superabsorbent

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In order to determine factors affecting water use efficiencies of common bean, a split plots experiment based on RCBD design with three replications was conducted during 2015-16 growing season, at Research Farm of Ferdowsi University of Mashhad, Iran. Irrigation levels (50 and 100% of water requirement) and nutritional treatments (1- 75 kg.ha⁻¹ Nitrogen+80 kg.ha⁻¹ Superabsorbent, 2- 80 kg.ha⁻¹ Superabsorbent+6 kg.ha⁻¹ Humic acid+1 Mm Salicylic acid, 3- 6 kg.ha⁻¹ Humic acid+1 Mm Salicylic acid+75 kg.ha⁻¹ Nitrogen, 4- 6 kg.ha⁻¹ Humic acid+1 Mm Salicylic acid+75 kg.ha⁻¹ Nitrogen+80 kg.ha⁻¹ Superabsorbent and 5- Control) assigned to main and subplots, respectively. The result showed that all of the nutritional treatments effected on water use efficiency, but in both conditions of 50 and 100% of water requirement, the highest water use efficiency was obtained in a combined treatment of Humic acid, Salicylic acid and Nitrogen and Superabsorbent. Factor analysis results showed that variables analyzed to two factors. The first factor included 52% of variables variance, respectively. Variables of seed yield, plant height, leaf area index, crop growth rate, soil nitrogen, phosphorous, EC, and pH were assigned in first factor and variables of biological yield, seed weight per plant and water use efficiency were assigned in the second factor. The results of factor analysis showed that variables such as soil nitrogen, phosphorous and pH, were in the first factor, therefore it seems that the first factor is the index of soil conditions and the second factor indicate traits related to water use efficiency (high load of water use efficiency variable on this factor). In general, it seems simultaneous application of nitrogen and ecological inputs can improve yield, growth characteristics, and water use efficiency. Factor analysis and high correlation between variables in the same group showed that with a change of variables that are in the same group of water use efficiency, an increase water use efficiency and decreased damages of drought stress.

Keywords: Crop growth rate, Plant height, Superabsorbent hydrogel, Water stress, Water requirement

The evaluate of tolerance threshold of *Agaricus bisporus* to different concentrations of various heavy metals

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Improving soil microbial activity and using synergistic relations including Ectomycorrhizal fungi (ECM) are profitable and have economic significance for plant growth in soils with heavy metals contamination. *Agaricus bisporus* (J. Lange), an edible mushroom has been observed to grow under pistachio trees (*Pistacia vera* L.) plantations in orchards of Rafsanjan, Kerman and it forms ectomycorrhiza with the tree. In order to evaluate the fungus tolerance, the effect of different concentrations (0, 15, 30, 45, 60 mg/L) of various heavy metals Nickel (Ni), Manganese (Mn) on fungal colony diameters and mycelial dry weights, heavy metals accumulation was studied in *A. bisporus*. The result showed there was a strong variation in metal tolerance, so that *A. bisporus* was more tolerant to Mn than other metals, so that the fungus had an increased growth in the presence of low concentrations of Mn, but Ni greatly inhibited increase in biomass and colony diameter even at concentrations as low as 15 mg/L. With the increase in the concentrations these heavy metals, the amount of metals in mycelium were increased too.

Keywords: *Agaricus bisporus*, Tolerance threshold, Mn²⁺, Ni²⁺, MMN medium