

Effect of Inoculation Mycorrhiza and Rhizobium on the Growth and Productivity of Some Soybean Cultivars in Rainfed Soil from Gunungkidul Region

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ABSTRACT

The research aims to determine the effect of biofertilizer inoculation and watering frequency on the growth and productivity of two soybean varieties, namely Demas 1 and Dering 2 on rainfed soil from Gunung Kidul region. The research also aims to determine the level of close relationship based on the RAPD molecular markers of these two varieties to other superior soybean varieties that have been cultivated or socialized to farmers.

The research was conducted experimentally with a completely randomized factorial design. The variables studied include (a) frequency of watering F2 (1x/2 days) & F4 (1x/4 days), and biofertilizer inoculation (M0, without Mycorrhiza; M1, with Mycorrhiza; M1R, Mycorrhiza and Rhizobium), and treatment was given to 2 varieties of soybeans (Demas 1 & Dering 2), with 6 replications each. Planting media consisted of rainfed soil, manure, husks (2:1:1) in polybags (20x20 cm), volume 5 kg, each planted with 2 plants. Apart from plant growth and productivity variables, intervening variables were also measured including chlorophyll, proline, MDA and H₂O₂ content, as well as SOD, POD and catalase enzyme activities, N, P, K, Mg and Cu content and detection of the genetic position of the two soybean cultivars. The data obtained were analyzed using factorial ANOVA (2x2x3) and continued with partial testing by DMRT.

From the research results it was shown that soybean growth was determined more by the frequency of watering, where conditions of lack of water (watered 1x/4 days) caused growth to decrease. The biofertilizer factor determines more SOD and POD activity and P nutrient uptake. The cultivar factor determines more uptake of N, K, Mg and Cu, while the biofertilizer factor and watering frequency determine more P uptake. The three factors even have no a significant interaction effect on almost all parameters. researched. The contents of chlorophyll, MDA and H₂O₂ are more influenced by cultivar factors, while proline is more influenced by watering factors (dryness level). The MDA and SOD contents were also influenced by interactions between cultivar factors and biofertilizer administration. The two cultivars had productivity levels that were not significantly different. This shows that both Demas 1 and Dering 2 soybeans are cultivars that relatively have almost the same level of tolerance to drought. The content of N (%), K (%), Mg (%) and Cu (%) of tissue is more determined by cultivar factors (genetics) where nutrient uptake in Demas 1 soybeans is higher than Dering 2, while P uptake (%) is more determined by watering factors and biofertilizer inoculation. Results RAPD analysis shows that Demas 1 and Dering 2 are two soybean varieties that have very strong similarities (are closely related) compared to other superior soybean varieties.

Kata Kunci: Soybean varieties, biofertilizer, drought stress, growth and productivity, rainfed soils