World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:8, No:08, 2014

Effects of Drought on Microbial Activity in Rhizosphere, Soil Hydrophobicity and Leaching of Mineral Nitrogen from Arable Soil Depending on Method of Fertilization

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Abstract : This work presents the first results from the long-term laboratory experiment dealing with impact of drought on soil properties. Three groups of the treatment (A, B and C) with different regime of irrigation were prepared. The soil water content was maintained at 70 % of soil water holding capacity in group A, at 40 % in group B. In group C, soil water regime was maintained in the range of wilting point. Each group of the experiment was divided into three variants (A1 = B1, C1; A2 = B2, C2 etc.) with three repetitions: Variants A1 (B1, C1) were controls without addition of another fertilizer. Variants A2 (B2, C2) were fertilized with mineral nitrogen fertilizer DAM 390 (0.140 Mg of N per ha) and variants A3 (B3, C3) contained 45 g of Cp per a pot. The significant differences (ANOVA, $P<0.05$) in the leaching of mineral nitrogen and values of saturated hydraulic conductivity (Ksat) were found. The highest values of Ksat were found in variants (within each group) with addition of compost (A3, B3, C3). Conversely, the lowest values of Ksat were found in variants with addition of mineral nitrogen. Low values of Ksat indicate an increased level of hydrophobicity in individual groups of the experiment. Moreover, all variants with compost addition showed lower amount of mineral nitrogen leaching and high level of microbial activity than variants without. This decrease of mineral nitrogen leaching was about 200 % in comparison with the control variant and about 300 % with variant, where mineral nitrogen was added. Based on these results, we can conclude that changes of soil water content directly have impact on microbial activity, soil hydrophobicity and loss of mineral nitrogen from the soil.

Keywords : drought, microbial activity, mineral nitrogen, soil hydrophobicity
Conference Title : ICAE 2014 : International Conference on Agricultural Engineering
Conference Location : Kuala Lumpur, Malaysia
Conference Dates : August 25-26, 2014

Open Science Index, Agricultural and Biosystems Engineering Vol:8, No:08, 2014 publications.waset.org/abstracts/7657/pdf