Rhizosphere soil properties after soybean seed inoculation by levan-producing strain Pseudomonas aureofaciens

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Flow and retention of soil water is a function of soil structure. This research was designed to evaluate the hypothesis that a sustained improvement of soil aggregate structure in the rhizosphere is attained through inoculation of soybean seeds with exopolysaccharide producing Pseudomonas spp. The effect of inoculation of soybean seeds with levan-producing Pseudomonas aureofaciens on rhizosphere soil structure, water infiltration rate, soil bulk density, and water stable aggregate production was evaluated in greenhouse and field studies. Soils in the field were water stressed by a severe drought experienced in Moldova in the summer of 2007. Water infiltration, measured with a Mini-Disc Infiltrometer at a suction 2 cm, was faster ($P<0.05$) in soils planted with inoculated seeds than soils that received noninoculated seeds. Also, at the end of field experiment, the inoculated soils had significantly lower bulk densities at 0-10 cm and 10-20 cm depths than did the non-inoculated soils. A water-stable aggregate index of soil sampled from 10-20 cm depth was 13% greater at the grain forming phase, but returned to the control level to the end of vegetative growth, when root exudates ceased. Inoculated soils contained more of agronomic valuable meso-aggregates (size 0.25-7 mm) than the control throughout the top 30 cm of soil, with the largest difference recorded within the 20-30 cm depth interval. Thus, inoculation of soybean rhizosphere soil by the levan-producing pseudomonad improved soil physical parameters under drought conditions.