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IMPACT OF DIFFERENT LEVELS OF DROUGHT STRESS ON THE INTERACTION OF SOYBEAN (*Glycine max* L.) WITH BENEFICIAL SOIL MICROORGANISMS

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Soybean is the most widely cultivated legume in the world, with Argentina being one of the main producers. Its products are used for both food and industry. A quarter of the soybean planted area of Argentina is concentrated in Córdoba province. Drought stress is one of the conditions that most affects agricultural productivity in the south of Córdoba along with the low availability of macronutrients, particularly phosphorus and nitrogen. An ecologically friendly alternative to solve these stresses is the inoculation of soybean with drought tolerant phosphate solubilizing bacteria (PSB) and its microsymbiont of the genus *Bradyrhizobium* that carry out biological nitrogen fixation (BNF). The aim of this work was to study the impact of different levels of water deficit on the capacity of soybean plants to interact with different beneficial soil microorganisms, particularly with PSB, arbuscular mycorrhizal fungi (AMF) and diazotrophs responsible for BNF. Soybean plants of the DM 4620 IPRO STS cultivar were grown in 1.8 kg pots containing non-sterile soil mixed with perlite in a 2:1 (v/v) ratio. The trial was carried out in growth chambers under controlled light and temperature conditions. Three different water conditions were applied (80, 50 and 20% of field capacity (FC)). The irrigation levels were combined with four treatments: non inoculated plants (SI), plants inoculated with *B. japonicum* E109 (Br), plants inoculated with the PSB *Enterobacter* sp. J49 (J49), and plants inoculated with both bacteria (BrJ). Irrigation was done with water alternating every 7 days with N and P free Hoagland nutrient solution (BrJ). The SI plants were watered with Hoagland with a source of soluble N and P, the J49 plants without a P source and those in the Br treatment without N. The plants were harvested at 40 and 70 days after sowing (DAS) and the following parameters were determined: relative water content (RWC), chlorophyll content, root length (RL), shoot dry weight (SDW), shoot P concentration, number (N°) and dry weight of nodules (NDW), and root colonization by AMF. At 40 DAS, plants of Br-80%-FC treatment had the highest value of RWC, LR, N° of nodules and NDW. The treatments SI-80%-50% and 20%-FC showed the lowest values of root colonization. At 70 DAS, the N° of nodules and NDW were higher in the 50% FC condition. In this FC, the BrJ plants had significantly higher values of N° of nodules and NDW over J49. Br presented higher values of chlorophyll a and total chlorophyll in the conditions 80 and 20% FC over SI and J49 respectively. The

treatments J49, Br and BrJ in 50% FC had a significantly higher SDW than the same treatments at 20% FC. In conclusion, the inoculation and interaction of the studied microorganisms, in plants under conditions of abiotic stress, achieved to maintain or increase most of the parameters analyzed over SI soybeans plants (that had the addition of soluble N and P).

Palabras clave: Soybean - drought stress - Bradyrhizobium - phosphate solubilizing bacteria - arbuscular mycorrhizal fungi