

TITLE: EFFECTS OF SOYBEAN INOCULATION COMBINED WITH SECONDARY METABOLITES OF *BRADYRHIZOBIUM JAPONIUM* ON NODULATION AND YIELD.

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ABSTRACT

Secondary metabolites are molecules related to adaptation and involve distinct functions of the primary microbial metabolism. Overall, secondary metabolites are composed by complex organic molecules, which synthesis requires a significant amount of specific enzymatic reactions. The species *Bradyrhizobium japonicum*, commercially used to produce soybean inoculants, is known to produce two types of acidic exopolysaccharides: type A and type B. Effects of these and other exopolysaccharides may include fast bacterial infection, better adaptation to the environment and increase of nodulation. The aim of this study was to evaluate the effects of spray application of *B. japonicum* secondary metabolites (a pre-commercial product named Total Nitro Molecular, produced by Total Biotecnologia) on nodulation, shoot nitrogen, yield and seed grain nitrogen of soybean. The experiment was carried on in Curitiba – SC during the 2016/2017 harvesting year in soil with an established *Bradyrhizobium* population. Soybean seeds were inoculated with one strain of *Bradyrhizobium* (SEMIA 5079/5080) at sowing. At V3 stage, different dosages of Total Nitro Molecular were applied on rows: 300 and 500 ml/ha. Means of total number of nodules, nodules larger than 2mm, number of viable nodules and soybean yield were not different among treatments. Regarding nodule dry biomass, means observed in the control treatment were 40% higher than the observed when applying 500 ml of Total Nitro Molecular/ha on rows and 62% higher compared to the use of 200kg N/ha. However, values from treatment with 300 ml of Total Nitro Molecular/ha and standard inoculation with *B. japonicum* on seeds were not different compared to the control treatment and also to application of 500 ml of Total Nitro Molecular/ha. Highest values of shoot dry weight were registered with nitrogen fertilization. Means of shoot nitrogen were higher in two treatments: control and 300 ml of Total Nitro/ha. Soybean yield was considered high for the experimental conditions and possibly was not different among treatments because the studied site may contain highly competitive and resistant rhizobacteria. According to our findings, no potential technique that may overcome traditional inoculation practices could be identified. Further research is needed on *B. japonicum* secondary metabolites in order to elucidate the efficiency of using these products in combination with inoculants.

Keywords: secondary metabolites, *Glycine max*, inoculation.

Development Agencies: Total Biotecnologia, FAPEU, UFSC.