

TITLE: NODULATION AND YIELD OF SOYBEAN COINOCULATED WITH *BRADYRHIZOBIUM JAPONICUM* AND DIFFERENT SPECIES OF *BACILLUS* SPP.

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#### ABSTRACT

Bacteria from the genus *Bacillus* in general, when seed-inoculated, may increase the symbiotic benefits of rhizobia through secretion of hormones and inhibition of plant pathogens. There are some studies about doses and rates of application of these bacteria in order to increase soybean yield. However, the effects of inoculation with several species remain to be explored. The goal of this study was to investigate the effects of soybean coinoculation using *Bradyrhizobium japonicum* and species of *Bacillus* on nodulation, shoot nitrogen, grain yield and seed nitrogen concentration. 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) and four strains of *Bacillus* (*B. subtilis*, *B. pumillus*, *B. licheniformis* and *B. amyloliquefaciens*) at sowing. Treatments with 200kg of N/ha and *B. japonicum* + *Bacillus licheniformis* had the highest means of shoot dry weight compared to the control and to inoculation with *B. amyloliquefaciens* by 21% on average. Regarding nodule dry biomass, means observed in control, standard inoculation and coinoculation with *B. japonicum* + *B. licheniformis* were higher than means from treatments with nitrogen fertilization and *B. subtilis* by 46%. On the other hand, total number of nodules, nodules larger than 2mm, viable nodules and shoot nitrogen were not different among the tested treatments. Standard inoculation and application of 50 mL *B. licheniformis* + *B. japonicum*/50 kg of seeds increased grain yield by 22% compared to application of *B. pumillus* + *B. japonicum* and *B. amyloliquefaciens* + *B. japonicum*. However, there was no difference between these treatments and neither application of nitrogen nor control. Reported findings indicate the potential of coinoculating soybean seeds, mainly with *B. licheniformis* + *B. japonicum*. This technique should be further tested in order to be registered and commercially applied with permission from government divisions. Whether approved, this tool may be explored to increase economic gain of soybean producers.

Keywords: coinoculation, bacteria, BNF, *Glycine max*.

Development Agencies: Total Biotecnologia, FAPEU, UFSC.