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Screening of the dominant rhizosphere bacteria and their effects of the tolerant and sensitive soybeans to Al stress in the acidic soil

*Yong-Hua Yang\**, School of Life Sciences, Nanjing University, Nanjing, China

*Shu-Juan Chu*, School of Life Sciences, Nanjing University, Nanjing, China

*Gui-Hua Lu*, School of Life Sciences, Nanjing University, Nanjing, China

Acid red soil is a typical soil type in south China, which is one of the important factors limiting the growth and yield of soybeans. This study adopted a typical acid soil, with two soybean genotypes BX10 (Al tolerant) and BD2 (Al sensitive) as the materials, screened the rhizobia of effective nodulation from the nodules of the two soybeans, identified them belonging to the genus *Rhizobium* by nodulation test and 16s rDNA amplification, and carried on the experiment of aluminum stress, and finally obtained an Al tolerant nitrogen-fixing strain (R.T-1), which could grow well in the Al concentration of 250  $\mu\text{mol/L}$ , and identified its physiological and biochemical characterization and measured the related indicators of quorum sensing. With the addition of the strain, the quorum-sensing seemed more obvious in soybean growth, thus, it might provide a basis for the follow-up study on mechanism of Al tolerance and the effect on increasing yield of soybean in acid soils. Further, the rhizosphere soils were collected, the V4 region of the soil 16S rDNA was analyzed by ILLUMINA MISEQ platform. The results showed some significant differences between the two soils with soybean BX10 and BD2 and the different layers of rhizosphere soil. The soil bacteria were annotated and analyzed based on the phylum, class, order, family, genus and species, the main dominant bacteria in the soils were identified as *Proteobacteria*, *Actinobacteria*, *Firmicutes*, *Bacteroidetes*, *Verrucomicrobia*. In the BX10 rhizosphere soil, *Janthinobacterium* and *Burkholderia* were enriched, which seems to be important for promoting the growth and acid tolerance of soybean.