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Molecular genetic analysis of *Bradyrhizobium elkanii* mutants with altered symbiotic compatibility with *Vigna radiata*

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The interaction between rhizobia and leguminous plants results in the formation of root nodules. In nodules, rhizobia fix atmospheric dinitrogen into ammonia, which is utilized by host legumes. The symbiosis is therefore of great importance in agriculture. *Vigna radiata* L. (mung bean) establishes symbiosis with some Bradyrhizobia and Sinorhizobia. However, we observed that *V. radiata* cv. KPS1 exhibited incompatibility with *B. elkanii* USDA61 resulting in the ineffective nodulation. The genetic factors and infectious properties which cause the incompatible nodulation have not been identified so far.
In this study, we isolated and characterized *B. elkanii* mutants with altered nodulation compatibility with KPS1. Firstly, we constructed transposon mutants of *B. elkanii* and inoculated KPS1. As a result, we isolated 4 transposon mutants named K21, NPH5, NPH53 and NPH85 that could nodulate efficiently KPS1. These mutants promoted growth of KPS1 drastically. We are currently identifying Tn5 insertion loci of the mutants by Y-linker PCR and sequencing. Secondly, the infectious property of the mutant K21 was investigated by using DsRED-tagged and gusA-tagged strains. Both wild-type USDA61 and K21 mutant infected KPS1 through the infection threads (ITs) and formed bumps. Nevertheless, not all bumps of wild-type and K21 mutant were infected, and the number of infected bumps induced by K21 mutant was much higher than those of USDA61 at 8 days post inoculation (dpi). Although the total amount of bumps induced by wild-type and K21 mutant was not significantly different at 8 dpi, the numbers of bump and young nodule were remarkably different between USDA61 and K21 mutant after 15 dpi. In addition, most of the bumps formed by USDA61 did not develop further while the bumps formed by K21 mostly developed matured nitrogen-fixing nodules. These results indicated that the nodulation restriction of KPS1 occurred at the developmental stage between bump and nodule.

keywords:Bradyrhizobium elkanii,Vigna radiata,nodulation incompatibility,infection ,symbiosis