Uneven Distribution of nosZ Genotype in *Bradyrhizobium japonicum* Populations Indigenous to Field soils in Japan

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*Bradyrhizobium japonicum* is a symbiotic nitrogen-fixing bacterium that has ability to form root nodule on soybeans. On the other hand, *B. japonicum* has denitrifying ability. *B. japonicum* shows two denitrification phenotypes: (1) complete denitrification that reduces NO$_3^-$ to N$_2$, (2) incomplete denitrification that reduces NO$_3^-$ to N$_2$O. The difference was due to the existence of nosZ gene that encodes N$_2$O reductase. N$_2$O is a key atmospheric greenhouse gas that contributes to global climate through radiative warming and depletion of stratospheric ozone. N$_2$O was emitted from the nodules of field-grown soybeans during the late growth stage. Surprisingly, the N$_2$O emission from soybean nodules occurred exclusively from nodules formed with nosZ- strains of *B. japonicum*. However, nosZ distribution in *B. japonicum* populations indigenous to field soils remains unknown. Thus, we used a PCR-based diagnostic method by nosZ and nodC genes of *B. japonicum*, and regarded as *B. japonicum* when nodC PCR product was detected. Totally, 821 isolates showing positive *B. japonicum nodC* PCR were obtained from root nodules on soybean (*Glycine max. Merr. cv. Enrei*) using twenty-three field soils of 6 regions (10 sites in Hokkaido, 3 sites in Yamagata, 2 sites in Miyagi, 5 sites in Tsukuba: one site in Niigata, 2 sites in Kumamoto) in Japan. These isolates were subjected to the nosZ PCR. As a result, we detected uneven distribution of nos genotype of the indigenous *B. japonicum* according to field soil locations. nosZ+ isolates were dominant in field soils of Yamagata, Miyagi, Tsukuba, Niigata and Kumamoto. On the other hand, nosZ- isolates were dominant in field soils of Tsukuba and Hokkaido. When the soil properties were compared with the incidence of nosZ genotype, high frequencies of nosZ- genotype were observed in Andisol. On the other hand, nosZ+ isolates were dominated in Inceptisol or Entisol. These results indicate that soil properties were markedly correlated with the incidence of nosZ genotype of indigenous *B. japonicum* populations. We want to discuss the reasons for such correlations, and strategies to reduce N$_2$O emission from soybean rhizosphere.