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SUMMARY

In Myanmar, soybean is one of the important cash crops and can assimilate nitrogen from the atmosphere through symbiotic biological N$_2$ fixation with bradyrhizobia. To reduce the increasing cost of fertilizers and their impact on the environment, root nodule bacteria play a role as alternate source of plant nutrients. The aim of this study on the effect of coinoculation of Myanmar bradyrhizobia with *Streptomyces griseoflavus* P4 on nodulation, nitrogen fixation and seed yield of Myanmar soybean cultivars was described. Firstly, the effects of P4 and two *Bradyrhizobium japonicum* strains on growth, nodulation, nitrogen fixation and seed weight of different soybeans was investigated. The dual inoculation with P4 was increased the nodulation, nitrogen fixation and seed yield of Hinthada and SJ5 soybeans. Secondly, the diversity of indigenous 43 isolate from different soybean growing regions in Myanmar was evaluated. The sequence analysis based on 16S-23S rRNA internal transcribed spacer (ITS) region confirmed that the all isolates were identified as *Bradyrhizobium* strains. The collected soybean cultivars were two Rj-genotypes as Rj- and non-Rj-genotypes. Thirdly, the evaluation of effective Myanmar *Bradyrhizobium* strains from isolated 43 strains and effects of coinoculation with P4 for nitrogen fixation was carried out by using four soybean varieties; Yezin-3, Yezin-6, Hinthada and Shan Sein. The synergistic effects of the dual inoculation of P4 and Myanmar bradyrhizobia were found. Fourthly, the field experiment was conducted to verify the coinoculation of Myanmar *B. yuanmingense* MAS34 and P4 to enhance nodulation, nitrogen fixation and seed yield of two (Yezin-3 and Yezin-6) soybean varieties. Nodule number on tap root was significantly higher in Yezin-3 than Yezin-6. The single inoculation of P4 did not show significant effects on dry matter production, N$_2$ fixation and seed yield of all soybean varieties. The dry matter production, relative ureide index, percentage of N derived from atmosphere N$_2$ and seed yield were significantly ($P<0.01$) enhanced by single inoculation of MAS34 in Yezin-3 but dual inoculation of P4+MAS34 in Yezin-6. This finding proved that low inoculum concentration (10$^5$ cells seed$^{-1}$) increased N$_2$ fixation and seed yield of soybean varieties under open field. Lastly, the *S. griseoflavus* P4 was evaluated to identify its compatibility with different crops, and investigated its ability to produce plant growth promoting phytohormones in term of indole acetic acid (IAA). It was found that all crops inoculated by P4 were improved in dry weight and produced IAA with increasing incubated days. This work pointed out the characteristics the synergistic effects of P4 coinoculation with Myanmar
Bradyrhizobium strains were found in some soybean varieties. I hope that the selected Bradyrhizobium strains and P4 will use as biofertilizer for soybean production in Myanmar in future.