

Evaluating rhizobia strains for nitrogen fixation in faba

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Co-funders	Total Project Cost
\$88,906.00	Completed	April 2013 – June 2016	Saskatchewan Ministry of Agriculture – Agriculture Development Fund (ADF)	\$169,476.00

Project Description

To evaluate faba bean Rhizobia strains from the USDA collection for effective nodulation of selected cultivars; to compare the nitrogen (N) fixation ability of the best selected faba bean strains to three commercial pea/lentil inoculants.

Faba bean is a relatively newly emerging crop in Saskatchewan agriculture. It is reported to be an excellent nitrogen (N) fixing pulse crop, able to fix 70% to more than 90% of its N from biological nitrogen fixation. Despite its excellent N-fixation abilities, there is not currently a commercial Rhizobium inoculant available for this crop. This study screened 42 strains of Rhizobium, originally isolated from faba bean nodules, for their ability to nodulate and fix N in two varieties of faba bean. The two faba bean varieties included a large seeded variety (FB9-4) and a small-seeded variety (FB34-2; CDC Snowdrop). Faba bean inoculated with the different strains were measured for nodulation, productivity, and N content. The five Rhizobium strains that were ranked the best for these parameters for both faba bean varieties were selected for more extensive study in a greenhouse study. In addition, the three Rhizobium strains that performed well with FB9-4 (but not FB34-2) and the two Rhizobium strains that performed well with FB34-2 (but not FB9-4) were also selected for the greenhouse study.

Outcome

All but one of the original 42 strains improved nodulation, biomass production, and N content in the faba bean varieties to different extents. Inoculating the faba bean seed with the ten strains of Rhizobium approximately doubled the percentage of N-fixation which increased the overall biomass production by an average of 33%. Percentages of N derived from fixation averaged about 60% in the greenhouse. This study demonstrates the large improvements in productivity and biological N-fixation that can be achieved by inoculating faba bean at seeding. In addition, the two top performing Rhizobium strains for the FB34-2 variety were identified and are currently being evaluated in field studies. The small, fairly uniform seed size of the FB34-2 variety (CDC Snowdrop) makes it much easier to seed with traditional seeders and more likely to be adopted by producers in Saskatchewan.

Research Objective

OBJECTIVE 1

To evaluate faba bean Rhizobia strains from the USDA collection for effective nodulation of selected cultivars.

OBJECTIVE 2

To compare the nitrogen (N) fixation ability of the best selected faba bean strains to three commercial pea/lentil inoculants.