

## Responding to climate fluctuations: Development of a Rhizobium collection

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Co-funders	Total Project Cost
\$84,881.00	Completed	May 2014 – June 2017	Western Grains Research Foundation	\$169,762.00

### Project Description

To collect and identify Rhizobium species and strains from native legume hosts from different regions of Saskatchewan; to collect and identify Rhizobium species and strains from native legume hosts in Saskatchewan at different times, representing contrasting climatic conditions; to evaluate Rhizobium species and strains for effective nodulation of major pulse crop species.

A collection of bacteria isolated from nodules on native legume plants was established. Fifty-four individual legume plants were collected from across Saskatchewan, a site in Minnesota, and three sites in the Yukon. All of these sites have prolonged extremely cold winter periods to which the bacteria must adapt. Thirty-eight bacterial isolates from 23 different legume species, from 12 genera were collected. Most of the isolates were Rhizobium sp. that form nodules in legumes and fix atmospheric nitrogen, but a few were endophytic bacteria, that is bacteria that live inside plant tissues, that may have co-existed with the rhizobia in the nodules, or occupied the nodules after the rhizobia died. All of the bacterial isolates were purified and pure cultures used to inoculate pea, lentil, and chickpea. Nodulation was measured after six weeks of growth, along with increases in shoot nitrogen (N) due to inoculation with the bacteria.

### Outcome

Nodulation was difficult to score accurately, probably because the few nodules that developed had a tendency to break off when the root systems of the test legumes were being washed. Instead shoot N proved to be a better indicator of successful inoculation. All but two of the isolates increased shoot N relative to control plants, in at least one of the crop species. We will continue to add to the collection and in the future will use the collection as a resource for identifying rhizobia that are adapted to the extreme weather conditions experienced in Saskatchewan. Other legume plants (annuals and perennials) will be evaluated. The collection also provides a resource for examining the functioning of rhizobia under different climate conditions. As our climate changes and precipitation and temperature patterns change, in order for farmers to remain profitable, it will be necessary for agricultural practices to adjust to these changing conditions. Collections such as this rhizobia collection provide important resources for us to be able to adapt to these changes.

### Research Objective

#### OBJECTIVE 1

To collect and identify Rhizobium species and strains from native legume hosts from different regions of Saskatchewan.

#### OBJECTIVE 2

To collect and identify Rhizobium species and strains from native legume hosts in Saskatchewan at different times, representing contrasting climatic conditions.

#### OBJECTIVE 3

To evaluate Rhizobium species and strains for effective nodulation of major pulse crop species.