



Research Highlights

Lacombe • Beaverlodge • Fort Vermilion

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In the Spotlight

Fodder Galega- The New Kid on the Block

Fodder galega has been selected and grown in northern Europe and Nordic countries for a number of years where it has been fed to livestock as greenfeed or conserved as silage, hay or dehydrated meal.

There are a number of features of the crop that have peaked interest in testing this crop in Canada as an alternative to alfalfa. Forage galega was reported (Nõmmsalu et al 1996) to have high yield (8-11 tons dry matter/ha), good winter hardiness, high drought tolerance and stable seed production under climatic conditions that didn't favour the production of alfalfa seed. It was reported to be persistent, with fast regrowth after cutting in Estonia. The crude protein content ranged from 28% at the bud stage to 16% at the beginning of flowering while the *in vitro* dry matter digestibility was 66-71% at flowering and declined to 58-64% at flowering primarily because the crude fibre content was high (27-30%). Forage galega has the capability of improving soil structure, increasing soil fertility and resisting erosion because of its deep nitrogen-

Facts About Goat's Rue

Galega originated in the Mediterranean region but is well adapted to more northern climates. While it was appreciated as a honey source in Russia in the 19th century, domestication didn't really commence until the 1920's.

While *Galega orientalis* is relatively new to North America, it has been grown in Scandinavia and Estonia for many years.

Plants can be 60-150 cm tall with a number of branched stems. It has compound leaves and bright lilac-coloured flowers.

This perennial legume may persist 7 to 15 years.

Goat's rue needs to be inoculated with *Rhizobium galegae* to form nitrogen-fixing nodules. This *Rhizobium* tolerates soil pH as low as 4.5.

The root system of Goat's rue can reach 100 cm. The plants can propagate vegetatively by underground stolons.

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Point of Interest

"Alfalfa was the outstanding forage crop grown in 1930. In spite of the fact that 1929 and 1930 were two of the driest years on record, the alfalfa seeded in 1928 without a nurse crop produced phenomenal yields. Apparently, the alfalfa roots were able to draw from subsoil moisture stored previous to this dry period. These high yields substantiate the assumption that it is advisable to seed alfalfa without a cereal nurse crop" *Lacombe Experimental Station Report of the Superintendent, 1930.*

A second species (*Galega officinalis*) is also known as Goat's rue or French Lilac. This species is used for ornamental and medicinal purposes. It has also become a weed in many parts of the world where it has been introduced.

There is also a third plant, frequently called Goat's rue, that is native to North America known as *Tephrosia virginiana*.



Tephrosia virginiana is also a legume, belonging to the Fabaceae family. *Galega orientalis*, *G. officinalis* and *Tephrosia virginiana* contain alkaloids.

The levels of alkaloids in *G. orientalis* (the fodder species) are not high enough to be toxic to ruminant livestock.

The medicinal *Galega (officinalis)* is reported to reduce blood sugar levels and increase milk output. However, it is known to be toxic to ruminant livestock.

Tephrosia virginiana is listed as a poisonous plant in some publications, but historically it was used to treat typhoid fever, thus the genus name *Tephrosia*.

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fixing root system. It is usually harvested for stored feed, but can be grazed. The crop didn't appear to have any serious fungal, viral or bacterial diseases or insect or nematode pests. Who wouldn't be interested in a forage like this?

The fodder galega variety 'Gale' co-developed by institutes in Estonia and Russia was compared to bird's-foot trefoil ('Leo'), standard-type alfalfa ('Apica' and 'Beaver'), Siberian alfalfa ('Anik') alsike clover ('Dawn') and red clover ('Altaswede') in studies at nine sites across Canada. The latitudes of the sites ranged from 45 to 56° north, and included four locations in the Peace region and locations in Saskatchewan, Quebec, Nova Scotia, PEI and Newfoundland.

The establishment and vigour of Gale fodder galega was comparable to the standard-type alfalfa and clover varieties tested. It was superior to the bird's-foot trefoil and Anik Siberian alfalfa which is very slow to establish. Fodder galega appeared to be more uniform and vigorous in the western Canadian sites compared to those in central and eastern Canada.

Considering various years, multiple sites and climates fodder galega was as productive as other legumes traditionally grown in Canada. Averaged over the nine sites, fodder galega ranked third out of the seven legumes tested and produced 5545 kg dry matter/ha compared to the lowest producing legume, Dawn alsike clover (3931 kg/ha) and the highest producing legume, Apica alfalfa at 6673 kg/ha.

Over the 2 or 3 years of production the cumulative dry matter production of Gale fodder galega indicates it is as well adapted to the Canadian climate as any legume tested. The cumulative production tended to be higher in the eastern sites where precipitation was more plentiful. However, stands in these sites didn't generally persist as long as those in the west.

Fodder galega herbage quality was similar to alfalfa, and apparently has a lower bloat-inducing potential. The upright growth habit suggests it would be more useful as a conserved forage or silage rather than pasture. Its use for the dehydrated forage industry is yet to be established, as are the agronomic practices required to optimized seed yield.

This preliminary investigation does indicate that the crop does have merit as a legume for use across Canada although fodder galega seed is not widely available in Canada. Hannas Seeds of Lacombe, Alberta is the Licensee for the variety Gale.

Reference

Nõmmsalu, H.; Meripõld, H.; Metlitskaja, J. and Raig, H. 1996. Fodder galega (*Galega orientalis* Lam.): a promising new leguminous forage plant. *Seed Sci. Technol.* 24:359-364.

Written by Nigel Fairey & Ann de St. Remy. Further information can be found in the Canadian Journal of Plant Science 2000, Volume 80, Pages 793-800.

Assay Detects Leaf Scald in Barley Seed

Leaf scald, caused by the fungus *Rhynchosporium secalis*, is one of the major barley diseases in the cooler, moister areas of the prairies. Canada is the third largest barley producer in the world. Half of the barley acreage is in Alberta where the climate is conducive to scald and this disease can be a problem.

The disease can survive in barley stubble, but it is also seedborne. When the scald pathogen is carried on seed it can result in early epidemics, when conditions are favourable, and introduce more virulent races of the leaf scald pathogen into new areas.

Visual disease assessment of seed and a cultural method that required 10 days for incubation have been the procedures typically used to identify infected seeds.

Recently, researchers at the University of Alberta, in collaboration with researchers at Lacombe, developed a PCR-based assay that is very sensitive, and can be completed in 1 day.

The procedure requires more research to make it a quantitative



Photo by K. Turkington

Contaminated barley seed

assay. However, because it is based on the presence or absence of a molecular marker, it can be used for rapid identification of scald-infected seed.

Written by J.P. Tewari, Kelly Turkington and Ann de St. Remy. Further information can be found in Plant Disease 2001, Volume 85, Pages 220-225.

Tillage Affects Weed Populations in Continuous Barley

Research conducted at three locations in northeastern Alberta has showed that tillage can influence weed population dynamics in barley.

The effects of four levels of tillage (intensive, moderate, minimum and zero) on weed seedling populations and the soil seed bank were investigated.

The major differences occurred between zero tillage and the other three tillage systems. Annual dicot weeds, especially winter annuals, increased in the soil seed bank under zero tillage. However, a high number of seeds in the soil seed bank didn't always translate into more weeds emerging in the spring.

Seeds very close to the soil surface may not have germinated because they were dry, or they had lost viability due to microbial or insect predation. While seeds that were deeper in the soil profile, especially small ones such as shepherd's-purse

(*Capsella bursa-pastoris* (L.) Medic.), may not have had sufficient food reserves to emerge.

Emerged seedlings of stinkweed (*Thlaspi arvense* L.), common lamb's quarters (*Chenopodium album* L.) and ball mustard (*Neslia paniculata* (L.) Desv.) were lower under zero tillage than the other tillage systems at the time of sampling in the spring, while both emerged and seed bank populations of green foxtail (*Setaria viridis* (L.) Beauv.) declined as tillage was reduced.

These results suggest that as management practices move towards reduced tillage, producers need to monitor weed populations as the type and amount of herbicide may need to be adjusted.

Written by John O'Donovan and Ann de St. Remy. Further information can be found in Weed Technology 2000, Volume 14, Pages 726-733.

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In the Spotlight

Dr. Charlie Arshad was made a Fellow of the Soil Science Society of America (SSSA). The award was presented at the SSSA Annual Meeting, on November 7, 2000 in Minneapolis, Minnesota.

This most significant recognition is the highest award that this Society can bestow on its member scientists. Criteria of this award include outstanding achievements in research, education, leadership and service to the professional societies.

Dr. Arshad was honoured for his distinguished contribution to the field of agronomy and soils for his work in conservation tillage, soil organic matter, organo-mineral complexes, liming and crop production, assessment methods for soil quality, and international agriculture.

Dr. Neil Harker received the "Excellence in Weed Science Award" at the Annual Meeting of the Expert Committee on Weeds, Nov. 26-29, 2000 in Banff, Alberta. The award is presented annually "in recognition of exceptional contributions to Weed Science in Canada".

Dr. Don Nelson received the Freddie Rathje Memorial Award at the Canadian Honey Council Annual Meeting, February 2, 2001.

This award, given since 1984, was established in honour of Freddie Rathje who was a honey buyer, plant manager and Secretary of the Canadian Honey Council for many years.

The award was given to Dr. Nelson for "outstanding positive innovative and creative contributions resulting in the betterment of the Canadian bee industry".

Dr. Nelson's research program focuses on honey bee management and bee diseases.

