Saskatchewan Alfalfa Seed Producers
Development Commission
(SASPDC)

Current SASPDC strategic research & development initiatives - May 2026

1. Improving parasite control and pollinator health in alfalfa leafcutting bee management systems

The alfalfa leafcutting bee (*Megachile rotundata*) is an essential pollinator of alfalfa and hybrid canola grown for seed production. Each year, over 4 billion alfalfa leafcutting bees are utilized in the pollination of the alfalfa and hybrid canola seed crops grown in western Canada. *Pteromalus venustus* is a chalcid wasp that parasitizes the alfalfa leafcutting bee, causing serious economic losses. There are currently limited options for controlling this parasite. The most common control method has traditionally been utilization of dichlorvos resin strips; however, registration of the dichlorvos resin strip for use in Canada was recently cancelled by the Pest Management Regulatory Agency (PMRA). There is thus a pressing need to develop an alternative to use of the dichlorvos resin strip for parasite control, such as utilization of components within plant-based essential oils, which contain bioactive compounds capable of acting as insecticidal fumigants, repellants, and reproductive antagonists; these have the potential to significantly reduce chalcid parasite populations. One of the of the objectives of this alfalfa leafcutting bee research project, which is co-funded by ADF, SCAP, the SASPDC, the Alfalfa Seed Commission (AB), and the Manitoba Forage Seed Association, is to identify, evaluate, and register use of a bioactive compound which will be formulated to provide effective insecticidal activity against adult *P. venustus* without adversely effecting developing and adult alfalfa leafcutting bees.

2. Enhancing the productivity & sustainability of alfalfa through development of high yielding and high nitrogen fixing cultivars

The rising cost of nitrogen fertilizers has become an operational burden for many producers. Certain common fertilizer practices in perennial crops, such as broadcasting N fertilizer in the fall, are associated with environmental challenges such as N volatilization, nitrogen runoff, and nitrate leaching. Biological Nitrogen Fixation (BNF) by legumes like alfalfa offers a viable alternative, reducing the reliance on N fertilizers in forage systems while enhancing sustainability of dairy, beef, and alfalfa industries. Alfalfa is commonly grown along with grass species in western Canada; the primary benefit of high N fixing by alfalfa is enhancing the productivity of companion grasses in mixed pastures. Legumes can transfer their biologically fixed nitrogen to inter-cropped non-legume crops within a growing season. In monoculture alfalfa, longer term yield response from high BNF can provide net farm profit from a low rate of N fertilizer application while reducing N-related greenhouse gas emission. High genetic variation in BNF has been observed in alfalfa and other legumes, which is critical for plant selection and breeding. Different rhizobia strains can also influence alfalfa productivity; commercial rhizobia strains are not always as well adapted to perform in cold climates as are native strains. A cold tolerant, native rhizobia strain has been identified which shows promising results in increasing alfalfa yield, and this will be tested in selected cultivars. Molecular markers will also be developed for selecting high N fixing genotypes. This project provides a unique opportunity to develop new alfalfa cultivars and rhizobia strains which meet industry demands by balancing forage yield and BNF.

3. Diagnostic tools in support of alfalfa weevil, *Hypera postica*, management in alfalfa seed production fields

Alfalfa seed fields generally face increasing insect pressure over several years of production before being terminated. With limited control products available and increasing insecticide resistance issues, producers may face declining yields and choose early termination of alfalfa seed fields. Alfalfa seed producers rely on alfalfa leafcutting bees for pollination and seed production; it is therefore critical that insecticide applications during flowering periods are avoided when possible. For effective insect pest management, alfalfa seed producers require appropriate solutions to consider both acceptable levels of insect pest control and protection of pollinators, along with beneficial insects. This research project, undertaken by University of Alberta / AAFC scientists and co-funded through Results Driven Agriculture Research (RDAR), the Alfalfa Seed Commission (AB), and the SASPDC, aims to update insect pest economic thresholds and improve diagnostic methods for detecting parasitism and insecticide resistance in target insect pest populations. An integrated pest management objective is part of the project, which includes monitoring of beneficial insects (natural enemies of target insect pests) and examining environmental factors that may impact insect pests in alfalfa seed crops. Commercial alfalfa seed fields are set up with insecticide treated and control untreated strips to assess the impact of these measures on insect pest and beneficial insect abundance, as well as alfalfa plant damage. This project also involves the transfer of knowledge regarding the impacts of insect pest management practices, in order to inform producer decision-making.

4.Development of salt tolerant alfalfa cultivar adapted to western Canada

Alfalfa is the most important forage legume, highly valued in the Canadian prairies for its high nutritional value, high yield, perennial growth habit, and nitrogen fixing capabilities. Since excessive soil salinity adversely affects the productivity of more than 15 million acres of agricultural land in the prairies, the expansion of alfalfa production areas to include high salinity regions will positively impact overall forage production and increase farm profitability in areas where annual crop production is not economical. There is thus a need to develop a salt tolerant alfalfa cultivar with improved tolerance from seedling to mature growth stage, without reducing the winter hardiness in western Canada. This research project undertaken by the U of S Crop Development Centre (CDC) and co-funded by the SASPDC, the Saskatchewan Cattlemen's Association (SCA), the SMA Agriculture Development Fund (ADF), and the Natural Sciences & Engineering Council (NSERC) will evaluate, develop, and select alfalfa breeding lines under salt stress in the greenhouse and in the field in order to develop new breeding lines with superior salt tolerance. The project will also evaluate major salt tolerant genes to identify molecular markers for salt tolerant selection in alfalfa. A controlled environment study will be conducted to determine water-logging resistance of the salt tolerant alfalfa breeding lines, an important trait for survival of plants in saline regions.

5.Developing alfalfa cultivar blends for forage production based on sub-species, fall dormancy, and root type

Alfalfa (Medicago sativa L.) is one of the most important forage crops in Canada. In the Canadian prairies alone, approximately 4.5 million ha of alfalfa are in production either in alfalfa or grass-alfalfa mixed stands, accounting for 76% of the total national alfalfa production area. Alfalfa is a high yielding, high quality perennial legume. Considerable progress has been made in alfalfa breeding for specific traits such as disease resistance and improved winter hardiness in Canada. However, yield improvement in alfalfa has been slow. The yield increase of newer alfalfa cultivars is attributed to greater regrowth in the spring and fall for the less dormant types of alfalfa. However, the majority of alfalfa cultivars grown in western Canada have been dormant types, as greater fall dormancy is positively correlated to improved winter-hardiness. Alfalfa cultivars with different root types, such as tap-rooted or creeping-rooted, have been commercialized in Canada. Creeping-rooted alfalfa is reported to have improved persistence under grazing, along with superior cold-hardiness and winter survival as compared to the tap-rooted alfalfa. There is still a knowledge gap on forage performance of tap-rooted alfalfa, creeping-rooted alfalfa, and the potential to include less dormant alfalfa in cultivar blends. This research project, undertaken by the U of S Crop Development Centre (CDC) and co-funded by the SASPDC and the SMA Agriculture Development Fund (ADF), involves work to determine forage yield and nutritive values of alfalfa cultivar blends with:

1) different fall dormancy rating (1 - 5 rating with 1 being dormant and 5 being less dormant).
2) different root type (tap-rooted alfalfa, creeping-rooted alfalfa) and flower colour.

6. Monitoring of parasites and disease in Saskatchewan alfalfa leafcutting bee populations

Saskatchewan alfalfa seed producers are committed to insuring that the province's alfalfa leafcutting bee populations are free of parasites and disease. The SASPDC supports the Canadian Cocoon Testing Centre (CCTC - Brooks), which evaluates SK - AB - MB alfalfa leafcutting bee samples; the SASPDC encourages Saskatchewan producers to submit samples to the CCTC for determination of bee quality, including testing for parasites and disease, in order to assist producers in maintaining high quality bee populations. Data collected from Saskatchewan alfalfa leafcutting bee samples evaluated by the CCTC is carefully analysed to assist in alfalfa leafcutting bee quality control.

7. SASPDC alfalfa seed production disease control / agrology monitoring initiative

The SASPDC alfalfa disease research project was initiated in 2001, with producer-cooperators establishing large-scale fungicide treatment plots in alfalfa seed fields at locations throughout the province. The research project was subsequently expanded to include the collection of weather data. The objectives of this project have been to develop fungicide application recommendations and to utilize weather data in order to predict disease potential. Saskatchewan alfalfa seed producers have utilized this information in making fungicide application decisions. The current SASPDC disease control / agrology monitoring initiative has involved evaluating alfalfa disease risk and providing recommendations for disease control in alfalfa seed fields to producers throughout Saskatchewan.

8. Alfalfa seed industry initiative in support of the registration of crop protection products

In order to facilitate minor use registration of crop protection products required by the alfalfa seed industry, the SASPDC is a member of the Prairie Pesticide Minor Use Consortium (PPMUC), which works to obtain user-requested minor use label expansions (URMULE) for crop protection products currently registered in Canada on other crops, as well as minor use registration of crop protection products registered in the USA or OECD countries, and emergency crop protection product registrations.

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Recent SASPDC strategic research & development initiatives

1. Alfalfa leafcutting bee parasite and disease control research
The alfalfa leafcutting bee is an important pollinator of alfalfa grown for seed production, used by Saskatchewan alfalfa seed producers as a dependable pollinator for over forty years. Factors limiting alfalfa leafcutting bee reproduction include infestations of chalcid parasites and incidence of fungal pathogens. Since these factors have the potential to damage Saskatchewan alfalfa leafcutting bee populations, the objective of research undertaken by the SASPDC has been to develop parasite and disease control strategies to assist Saskatchewan alfalfa seed producers in maintaining high quality alfalfa leafcutting bee populations, enhancing bee reproduction and alfalfa seed production. Parasite control research has involved investigation into the use of essential oil / volatile organic compounds, along with evaluation of a potential parasite male-killing bacterium. Disease control research has involved work with anti-microbial compounds and evaluation of pollinator bio-control vector technology. Utilization of newly-developed parasite and disease control strategies by producers increases the value of Saskatchewan alfalfa leafcutting bees as pollinators in the hybrid canola seed production and blueberry production sectors, and in conventional alfalfa seed production export markets. The SASPDC alfalfa leafcutting bee research project "Development of new strategies for control of parasites and disease in alfalfa leafcutting bee populations" was co-funded by the SASPDC, the SMA Agriculture Development Fund (ADF), and the Western Grains Research Foundation (WGRF Endowment Fund).

2. Seasonal distribution of economic pests occurring in alfalfa seed production on the Canadian prairies
The SASPDC provided funding and in-kind support for a five-year research project undertaken by AAFC, in collaboration with university researchers in Saskatchewan and Alberta, to determine seasonal distribution of economic pests occurring in alfalfa seed production on the Canadian prairies. This research work involved monitoring of alfalfa seed fields to determine the presence and abundance of important economic pests and their natural enemies; the project also involved the characterization of insecticide resistance mechanisms in western Canada alfalfa weevil populations and the development of a single-step multiplex PCR diagnostic assay to determine levels of parasitism in alfalfa weevil populations.

3. Development of locally adapted alfalfa cultivars in Saskatchewan
The objective of this alfalfa breeding project, undertaken by the U of S Crop Development Centre (CDC), is to create new alfalfa populations by intercrossing alfalfa plants collected from long-term alfalfa seed production and alfalfa grazing sites. Research involves assessment of alfalfa cultivar gene expression in response to grazing, identification of top-yielding alfalfa cultivars and top-performing creeping-rooted alfalfa cultivars, and evaluation of alfalfa cultivar performance in Saskatchewan. Work also includes intercrossing of the genotypes from top-performing alfalfa cultivars to create new alfalfa breeding lines, along with testing of the performance and forage yield of these new lines in replicated field plots. This alfalfa breeding project is supported by the SASPDC and co-funded by the SMA Agriculture Development Fund (ADF) and the Western Grains Research Foundation (WGRF).

4. Evaluating AAC Trueman alfalfa in Saskatchewan
The SASPDC, in partnership with the SMA Agriculture Development Fund (ADF), is co-funding an AAFC research project to assess the potential of AAC Trueman alfalfa in Saskatchewan. Alfalfa is an important feed source for livestock in Western Canada, with characteristics including high yield per hectare and high nutritional quality. Under changing climatic conditions, there is a need for forage cultivars which can withstand the possible adverse effects of climate change. For example, flooding can be a major limitation to alfalfa production; the development of alfalfa varieties tolerant to water-logging will provide producers with additional cropping options in wetter soil conditions. AAC Trueman is characterized by its unique rhizomatous growth, late flowering habit, winter hardiness, mid-summer drought tolerance, tolerance to spring / fall water-logging and tolerance to frequent grazing. The large root system of AAC Trueman alfalfa can act to limit soil and nutrient loss, increase soil carbon deposition, and improve soil quality traits. This research project will assist in building a resilient, stable, and productive forage system in a changing climate.

5. Improving the vigour of forage legumes using automated image analysis technology

The SASPDC collaborated with the SMA Agriculture Development Fund (ADF) in co-funding an AAFC research project to develop and evaluate new methodology for increasing seedling vigour in forage legumes using *"Raspberry pi"* technology for plant breeding and genetic mapping applications. The availability of appropriately adapted forage legumes such as alfalfa may be limited due to challenges posed by a lack of genetic improvement for traits which facilitate stand establishment. Seedling vigour is a critical trait for stand establishment in forage legumes and is a common target in forage breeding programs for improving productivity. In species such as alfalfa, seedling vigour is often assessed using methods such as timing of seedling emergence from different depths, measurement of plant growth, or subjective visual rating; all of these methods require labour intensive evaluation of a large number of seedlings. Development of appropriate tools to increase the throughput of plant selections is a key component in plant breeding efforts. Automation of plant phenotyping using digital image analysis will reduce costs and increase efficiency in forage legume breeding programs.

6. Demonstration project - Soil nitrogen content following inclusion of alfalfa in crop rotation

This project evaluated the benefits of including alfalfa grown for seed in a cropping rotation on soil nitrogen content and subsequent annual cropping. The results of this demonstration project indicated that seed alfalfa in a crop rotation increases available soil nitrogen, soil organic matter, and nitrogen in the crop biomass. This project was undertaken by Prairie Agriculture Machinery Institute (PAMI), with SMA and SASPDC support.

7. Demonstration project - sod seeding of forage legumes

This project evaluated cost-effective pasture rejuvenation by sod-seeding forage legumes (alfalfa / alfalfa - sainfoin mixture) into grass pastures. The project was undertaken to demonstrate that alfalfa can be sod-seeded into grass pastures to improve forage quality and yield. Sainfoin was included in this demonstration project, since it is a bloat-safe legume which works well for pasture seeding in a mixture with alfalfa. This project was undertaken by the Prairie Agriculture Machinery Institute (PAMI), with SMA and SASPDC support.

8. Promotion of alfalfa as a forage crop in North America

The SASPDC, with co-funding from Canadian Adaptation and Rural Development Saskatchewan (CARDS), worked to develop a publication for promotion of alfalfa as a perennial forage legume crop throughout North America. This promotional publication outlines the dependability of alfalfa as a valuable forage legume crop and also highlights the nutritional, economic, and conservation advantages associated with growing and utilizing alfalfa as a forage legume crop in dairy and beef operations. By targeting groups including dairy and beef producers throughout Canada and the midwestern United States, many of whom currently grow corn or other crops for silage feed, increased sales of Canadian alfalfa seed into new Canadian and U.S. markets will serve to enhance the value of Canadian alfalfa seed and stabilize alfalfa seed prices over a long-term period.

9. Understanding changes in alfalfa seed and forage markets

In order to better understand the role of alfalfa seed in North American forage markets, the SASPDC contracted agricultural economists in the U of S Department of Agricultural Economics to undertake a market research initiative entitled "Understanding changes in the alfalfa seed and forage market". This project was co-funded by the SASPDC, the Alfalfa Seed Commission (Alberta) and the Manitoba Forage Seed Association (MFSA) and is of importance to all western Canadian alfalfa seed producers in that it provided an understanding of factors involved in changing alfalfa seed market conditions. This key information will assist alfalfa seed producer organizations in the development of strategic planning which will ensure the future of the western Canadian alfalfa seed industry.