



Native Species Breeder Seed Consortium Workshop Summary Report

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November 24, 2017

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EXECUTIVE SUMMARY

InnoTech Alberta is proposing development of a Native Breeder Seed Development Consortium, as part of the Native Plants Program to help support the native seed market and ensure that industry has access to locally-adapted ecological varieties of seed for revegetation projects.

This report summarizes the results of a stakeholder workshop held October 5, 2017 to explore the potential benefits, design and funding models for a Native Breeder Seed Development Consortium. Twelve stakeholders from provincial, federal and municipal government agencies, industry, consulting and the Foothills Restoration Forum attended the Workshop.

The objectives of the Workshop were:

- To bring users together to discuss needs and concerns related to availability and use of native seed varieties in Alberta.
- To explore development of a consortium focused on ensuring users have access to local ecological varieties of seed for revegetation projects.

Although one of the goals of the Workshop was to explore development of a breeder seed consortium two alternative solutions quickly emerged: a Native Species Seed Co-operative and an Enhanced Wild Harvest Program. These alternatives could be stand-alone solutions or merged into the mandate of a consortium.

The key learnings from the Workshop discussions included:

1. There is definite interest in, and demand for, locally-adapted native seed for reclamation and restoration projects. There is a need to better define/explain what *locally-adapted* means in terms of seed sourcing.
2. An organized and properly funded partnership is required to oversee the functions necessary to increase availability of locally-adapted native seed.
3. Cost to participate in the partnership must be reasonable and must be flexible to recognize the variety, interests and size of potential participants.
4. The key hurdle for the partnership to overcome is production (availability) of locally-adapted native seed.
5. Additional partnership functions are: development of new breeder seed species; increased knowledge sharing to assist growers, vendors and users; and, R&D to confirm the success of native species use.
6. Seed growers and distributors will require some form of price guarantee and/or insurance to offset risk of the long timeline to a marketable crop.

Participants felt that there may be some opportunity for implementation in 2018 but that a soft-start in 2018 with a full start in 2019 is more likely. However, funding requests should be developed as quickly as possible to take advantage of funding opportunities.

InnoTech Alberta will:

1. Contact other potential participants who were not able to attend the Workshop and get their views on the needs, issues and options.

2. Determine the best partnership option.
3. Develop a formal funding request that can be provided to potential participants.
4. Develop draft Terms of Reference for the selected option.
5. Review existing partnership models to identify best practices and learnings that could be incorporated into the proposal.
6. Document the capacity of InnoTech Alberta to continue developing breeder seed.
7. Promote the partnership concept in discussions with external parties and at various professional organization venues.

ACKNOWLEDGEMENTS

The authors would like to thank Jane Lancaster, Foothills Restoration Forum, for the presentation on Needs and Issues.

CITATION

This report may be cited as:

Small, C.C., M. McKenzie and C.B. Powter, 2017. Native Species Breeder Seed Consortium Workshop Summary Report. InnoTech Alberta, Edmonton, Alberta. 44 pp.

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1.0 INTRODUCTION

Currently, the greatest obstacle in using locally-adapted native plant materials in Alberta is the limited range and volume of commercially available native seed. High quality registered native seed must be available to achieve credibility in the seed market. Most seed companies and growers in Alberta lack the resources to develop their own native seed breeder stock. Growers struggle to survive when the demand cannot be predicted in advance (it can take 3 to 5 years for the production of quality breeder seed and subsequent multiplication/commercial seed). Without an adequate supply of native breeder seed, seed distributors and end users turn to alternative and more plentiful non-local ecological varieties of common seed. One of the main sources of common seed is the western United States. These concerns were discussed in a series of two InnoTech Alberta workshops last year (Small et al., 2016).

InnoTech Alberta is proposing development of a Native Breeder Seed Development Consortium, as part of the Native Plants Program to help support the native seed market and ensure that industry has access to locally-adapted ecological varieties of seed for revegetation projects. To date, the Native Plants Program has released 22 locally-adapted commercial native grass and forb varieties, contributing to the improvement of disturbed, degraded and/or impacted soils throughout Western Canada. Plant varieties are offered to growers as Canadian Seed Growers Association (CSGA) certified seed, a superior seed grade over common seed, providing greater assurance of seed purity and viability. By continuing to provide registered seed with proven performance for the native seed industry, the cost and risks to seed growers and suppliers associated with native seed production are reduced.

The InnoTech Alberta Native Plants Program aims to generate new Alberta native breeder seed varieties annually, with species selection informed through the new Consortium. Current thinking is the Program will continue to focus on grasses and forbs but we will seek the input of Consortium members to confirm the scope. It is expected that continued development of breeder seed varieties, and an increase in the accessibility of the seed, will reduce costs, increase demand, and dampen the sizable amount of non-local native seed that is currently imported from the United States and abroad.

Some of the potential benefits of Consortium participation include:

- The Consortium members would direct the varieties of native breeder seed developed;
- Participants would have the ability to influence the native seed market, with the ultimate goal being increased confidence that they will have seed supplies when needed;
- InnoTech Alberta would develop native species germination and propagation techniques and provide troubleshooting opportunities for seed growers to ensure the success of the InnoTech Alberta-specific breeder seed;
- Participants would receive an annual report on the results of the annual seed collections, germination trials, breeder seed certifications;
- Participants would be seen as directly supporting Alberta businesses and helping to diversify the provincial economy; and,

- Participants would have networking opportunities with regulators, seed growers, seed providers, and industry to obtain guidance on the use of native plant materials in revegetation plans, learn what varieties are being grown across the province, meet new seed growers and distributors, and learn where to purchase certified seed in Alberta.

To explore the potential benefits, design and funding models for a Native Breeder Seed Development Consortium, InnoTech Alberta held a half-day workshop in Calgary on October 5, 2017. Twelve stakeholders from provincial, federal and municipal government agencies, industry, consulting and the Foothills Restoration Forum attended the Workshop. Following the Workshop, a Draft Summary was circulated to the participants for comments; in addition, the participants agreed that InnoTech Alberta should circulate the draft to potential partners who did not attend the Workshop to obtain their input. This final report contains both the Workshop input and the follow-up input.

The objectives of the Workshop were:

- To bring users together to discuss needs and concerns related to availability and use of native seed varieties in Alberta.
- To explore development of a consortium focused on ensuring users have access to local ecological varieties of seed for revegetation projects.

1.1 Report Structure

Section 2 summarizes the presentation on the InnoTech Alberta native plants and breeder seed program.

Section 3 summarizes the presentation on native seed availability and use.

Section 4 summarizes the presentation on the Native Species Breeder Seed Consortium concept.

Section 5 describes the Workshop results and next steps.

The Appendices include:

- A list of the Workshop attendees (Appendix 1)
- The Workshop agenda (Appendix 2)
- The presentation slides (Appendix 3), and
- The notes from the group discussions (Appendices 4 and 5). As often happens in Workshops, the discussions in each session covered topics in the other session – the notes in the Appendices have been re-organized to reflect the subject rather than the session in which the comments appeared.
- Additional insights from potential partners who were contacted after the Workshop (Appendix 6).

2.0 BACKGROUND PRESENTATION AND DISCUSSIONS

Christina Small presented information on InnoTech Alberta's native plants and breeder seed program ([Appendix 3](#)). The key points were:

- The program started in 1983 in response to industry's need to find sustainable revegetation materials and alternatives for reclaiming disturbances. The Breeder Seed Program is one component of the larger Native Plants Program.
- The Breeder Seed Program has released 22 commercial varieties for use in the Foothills, Mountains, Parkland, and Boreal regions.
- Seed is registered with the Canadian Seed Growers Association (CSGA)
- Breeder seed plots are maintained to Canada Food Inspection Agency (CFIA) standards, registered with the CSGA, inspected and certified annually.
- Seed has been provided directly to seed distributors for multiplication and resale.
- There are other entities that help form the native plants business ecosystem (including growers, distributors, seed banks and researchers).
- A market assessment conducted in 2000 identified key aspects of the market and impediments to native seed use (Woosaree, 2000).
- Participants in the 2016 InnoTech Alberta native species workshop (Small et al., 2016) identified some key issues related to the breeder seed program:
 - Native species production is time and labor intensive.
 - Private sector companies do not always have the skill, designation, equipment, land or experience to develop new registered ecological varieties.
 - Developing new ecological varieties can be uneconomical.
- Regulatory guidelines encourage the use of native seed, and various users have expressed interest in purchasing and using native plant materials.
- A strategic program is required to help make native species more affordable to end users, increasing demand.



The following questions were raised during the discussion:

- Have you considered expanding the mandate beyond breeder seed? We also do reclamation and remediation research and extension work related to native plants; we don't want to compete with the private sector so, for example, seed production would not be something we would look at.
- You described the quality assurance/quality control (QA/QC) for the breeder seed development stage but how do you assure QA/QC for the production phase? Is there certified native seed? How do we ensure that what we buy is what we want? We are getting lots of weeds in common seed lots. The InnoTech Alberta plots are CFIA inspected and the breeder seed is registered with CSGA. We provide source information with the GSGA submissions and the breeder seed even though it isn't a requirement. CSGA-approved seed growers must meet certain requirements. But, we agree there is more that can be done to improve the downstream seed production and sales system.

3.0 NEEDS AND ISSUES AROUND NATIVE SEED AVAILABILITY AND USE

Jane Lancaster provided some background on needs and issues for the southern region ([Appendix 3](#)):

- The South Saskatchewan Regional Plan (Government of Alberta, 2017) sets out some goals that will require the use of native plants.
- It isn't good enough to have seed for a few core species if your goal is to re-establish a community.
- There is breeder seed of the 22 InnoTech Alberta varieties but it is difficult if not impossible to get seed from suppliers which is very frustrating (e.g., *Festuca hallii*).
- When we look into the origin of common seed we receive we are finding it comes not just from the States but places like Iceland (e.g., June grass) and New Zealand (e.g., brome)! But there aren't a lot of alternatives. The Ducks Unlimited Ecovars are no longer being developed or available (personal communication from Native Plant Solutions to Chris Powter, October 2017) so that removes a further source of native seed.
- We are seeing new pressures in the south (e.g., renewable energy projects) on areas not previously disturbed by industry. This will increase demand for locally-adapted seed in these areas.
- Current seed analysis methodology is based on agriculture needs and does not provide the information necessary to judge suitability of native seed for revegetation projects.

Discussion notes from this session are provided in [Appendix 4](#).

4.0 NATIVE SPECIES BREEDER SEED CONSORTIUM

Christina Small provided some background on the Consortium Concept ([Appendix 3](#)):

- A *consortium* is a collaborative approach to coordinating, driving, and funding initiatives comprised of several organizations, each of which is responsible for its own priorities and investment mandates, but interested in similar end goals.
- InnoTech Alberta (and its predecessor organizations) have experience establishing managing multi-stakeholder consortia (e.g., Materials and Reliability in Oil Sands (MARIOS)¹ and Pipeline Integrity and Corrosion Management (PiCOM)²).
- The potential benefits of consortium participation are listed in Table 1.

Table 1. Potential Benefits of Consortium Participation.

Synergy	<ul style="list-style-type: none">• Joint gains and greater member achievements, as a whole.
Shared Resources	<ul style="list-style-type: none">• The sharing of knowledge and expertise, increasing the manageability and feasibility of the work. There are also opportunities to provide a forum for information sharing and problem solving.
Confidentiality	<ul style="list-style-type: none">• Information shared between members is held confidential. Access to confidential research results and innovative technologies.
Access to Funding Sources	<ul style="list-style-type: none">• A means to leverage research and development investments to achieve greater gains.
Accelerated Commercialization	<ul style="list-style-type: none">• Collaborative partners may include early adopters/investors for novel approaches, technologies, etc. developed through the Native Plants Program, accelerating the path to commercialization.
Drive the Program	<ul style="list-style-type: none">• Members benefit by setting priorities and providing direction that has direct value to their business.

¹ See <http://www.innotechalberta.ca/Partnerships/MARIOS.aspx>

² See <http://picom-aitf.com/>

Discussion notes from this session are provided in [Appendix 5](#).

5.0 SUMMARY AND NEXT STEPS

Although one of the goals of the Workshop was to explore development of a consortium focused on ensuring users have access to local ecological varieties of seed for revegetation projects two alternative solutions quickly emerged: a Native Species Seed Co-operative and an Enhanced Wild Harvest Program. These alternatives could be stand-alone solutions or be merged into the mandate of a consortium.

5.1 Summary

The key learnings from the Workshop discussions included:

1. There is definite interest in, and demand for, locally-adapted native seed for reclamation and restoration projects. There is a need to better define/explain what *locally-adapted* means in terms of seed sourcing.
2. An organized and properly funded partnership³ is required to oversee the functions necessary to increase availability of locally-adapted native seed.
3. Cost to participate in the partnership must be reasonable and must be flexible to recognize the variety, interests and size of potential participants.
4. The key hurdle for the partnership to overcome is production (availability) of native seed.
5. Additional key partnership functions are: development of new breeder seed species; increased knowledge sharing to assist growers, vendors and users; and, R&D to confirm the success of native species use.
6. Seed growers and distributors will require some form of price guarantee and/or insurance to offset risk of the long timeline to a marketable crop.

5.2 Next Steps

Participants felt that there may be some opportunity for implementation in 2018 but that a soft-start in 2018 with a full start in 2019 is more likely. However, funding requests should be developed as quickly as possible to take advantage of funding opportunities.

InnoTech Alberta will:

1. *Contact other potential participants who were not able to attend the Workshop and get their views on the needs, issues and options.*

The results of those discussions will be incorporated into this Draft Workshop Summary to create a final report.

2. *Determine the best partnership option.*

Based on the discussions to date it appears that an umbrella organization that has a mandate for breeder seed development, a seed co-op and a wild harvest program would increase the chances of meeting the objective of increased availability of quality native

³ *Partnership* is used here as a generic term to cover any of the identified options or a combination of two or all of them.

seed in Alberta. How this would be structured and whether or not to develop separate funding requests for each of the three functions needs to be determined.

3. Develop a formal funding request that can be provided to potential participants.

The funding proposal will need to identify types and levels of fees associated with participation and what each fee level provides in terms of ability to influence decisions and rights to seed. It would be best to provide pricing options in the initial round of financing discussions.

Workshop participants indicated an interest in reviewing drafts and providing advice. They also indicated they could help move the final version of the proposal through their respective organizations.

One of the participants agreed to look into potential funding to help InnoTech Alberta prepare the funding proposal.

4. Develop draft Terms of Reference for the selected option.

The Terms of Reference will define scope and objectives of the partnership, an appropriate management structure, and roles for participants.

5. Review existing partnership models to identify best practices and learnings that could be incorporated into the proposal.

Examples include: the Oil Sands Vegetation Cooperative and Cold Lake Vegetation Cooperative; and, the City of Calgary contracted grower model.

6. Document the capacity of InnoTech Alberta to continue developing breeder seed.

Capacity includes space on the Vegreville facility for breeder seed plots, manpower, and budget.

7. Promote the partnership concept in discussions with external parties and at various professional organization venues.

Examples include the upcoming Foothills Restoration Forum conference and the Alberta Chapter Canadian Land Reclamation Association conference.

Workshop participants also indicated a willingness to discuss the concept within their work and professional circles (e.g., government departments, Canadian Association of Petroleum Producers, Canada's Oil Sands Innovation Alliance, Petroleum Technology Alliance of Canada).

Additional actions include:

- Conduct a survey of practitioners to identify priority species for breeder seed development and production of existing varieties.
- Explore and test various names (and associated acronyms) for the partnership with potential participants.
- Contact CSGA to better understand the Source-Identified seed certification class and how it differs from other registered seed classes.

6.0 REFERENCES

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7.0 GLOSSARY OF TERMS AND ACRONYMS

7.1 Terms

Breeder Seed

Seed recognized by the CSGA as being seed of a variety (cultivar) that has been produced by a recognized plant breeder, or a plant breeder responsible for the maintenance of the variety, under conditions which have ensured that the specific traits of the variety have been maintained. It is the source for the initial and recurring increases of seed for the pedigreed classes.

Certified Seed

The approved progeny of Breeder, Select, Foundation or Registered seed produced by seed growers and so managed to maintain varietal identity and purity. It is the class of seed recommended for commercial crop production.

Common Seed

Non-pedigreed seed whose varietal origin or purity is uncertain.

Co-operative (Co-op)

Organization owned, controlled, and operated by a group of users for their own benefit.

Consortium

A collaborative approach to coordinating, driving, and funding initiatives comprised of several organizations, each of which is responsible for its own priorities and investment mandates, but interested in similar end goals.

Ecovar TM (ecological variety)

A seed source of a plant species that can be licensed and that is the result of merging plant collections from a diversity of populations and environments within an ecozone with the objective of providing a diverse commercial seed source.

Foundation Seed

The approved progeny of Breeder or Select seed produced by seed growers authorized by the CSGA for the production of seed of this class, and which has been so managed to maintain its specific varietal identity and purity. The seed is graded by a person authorized by the CFIA. Foundation is the highest official pedigreed class of seed of commerce.

Native Plant Certification (NPC)

A voluntary quality control process provided by the CSGA for native plant seed identification. Although legally separate from pedigreed seed crop certification, similar CSGA documents and procedures are used to verify the origin, of collection or production, of native plant reproductive materials which have not been released as a variety. The CSGA's NPC program documents the identity of plant material and verifies that it is from a designated geographic location (Source Identified class) or selected for specific characteristics (Selected class).

Registration

The process, formerly known as licensing, whereby CFIA under the authority of the federal Seeds Act and Regulations and recommendations from committees established to make judgements on the acceptability of new varieties, prescribes which varieties are registered for sale in Canada.

Selected

The seed certification class of pre-variety germplasm which provides third party assurance of identity, usually for perennial native forage grasses, legumes and forbs produced from selected parent populations with distinctive, identifiable characteristics or potential genetic improvement. Selected class seed labels, issued by the CSGA, identify the name assigned to the selection by the responsible Plant Breeder.

Source Identified

The seed certification class of pre-variety germplasm which provides third party assurance of geographic origin, usually for perennial native forage grasses, legumes and forbs produced from parent populations which have not been selected. Source Identified class seed labels, issued by the CSGA, identify the original geographic location of the collection or production, that has been declared by the responsible Plant Breeder.

Variety

Denotes an assemblage of cultivated individual plants which is distinguished by characteristics (morphological, physiological, cytological, chemical or other) significant for the intended purpose and which retains its distinguishing characteristics when reproduced is uniform, stable and reproducible.

Wild Harvest

Collection of seed directly from native species populations in the wild.

7.2 Acronyms

ANPC	Alberta Native Plant Council
BPIC	Bio Processing Innovation Centre
CFIA	Canada Food Inspection Agency
CSGA	Canadian Seed Growers Association
ENGO	Environmental Non-Government Organization
MARIOS	Materials and Reliability in Oil Sands
NPC	Native Plant Certification
PiCOM	Pipeline Integrity and Corrosion Management
QA/QC	Quality Assurance / Quality Control
R&D	Research and Development

APPENDIX 1. List of Attendees

Twelve people participated in the Workshop in-person or by phone. Three InnoTech Alberta staff participated (Christina Small, Marshall McKenzie and Shauna-Lee Chai). The Workshop was facilitated by Chris Powter, Enviro Q&A Services.

Name	Organization	Attendance
Juanita Andres	Parks Canada	Phone
Aaron Balfour	Parks Canada	In-person
Joel Conrad	Salix Environmental	In-person
Tracey Etwell	City of Calgary	In-person
Simone Hagens	Canadian Natural Resources Limited	In-person
Jane Lancaster	Foothills Restoration Forum	In-person
Cameron Lockerbie	Alberta Environment and Parks (Parks)	Phone
Shannon McConnel	Parks Canada	In-person
Debbie Tainton	Canadian Natural Resources Limited	In-person
Leanna Tefry	Imperial Oil	In-person
Brian Yakiwchuk	Parks Canada	Phone

APPENDIX 2. Agenda

1:00 – 1:30 – Introductions and Welcome

1:30 – 2:00 – InnoTech Alberta Native Breeder Seed Focus Area and Background on Alberta Seed Programs and the Native Seed Market

2:00 – 3:00 – Session 1: Needs and Issues around Native Seed Availability and Use

3:00 – 3:20 – Break

3:20 – 4:20 – Session 2: Native Seed Consortium

4:20 – 4:30 – Wrap up and next steps

APPENDIX 3. Presentations

Two sets of presentations were made during the Workshop:

[Background information on the InnoTech Alberta Native Plants and Breeder Seed Program](#) – Christina Small

[Native Seed Availability and Use: Goals and Issues](#) – Jane Lancaster

[Guiding Questions for the two working sessions and background information on the Consortium Concept](#) – Christina Small

InnoTech Alberta Increasing the Supply of Native Seed for Reclamation and Restoration Projects in Alberta

Background Information
October 5, 2017



1

Outline

- History of the Native Plants and Breeder Seed Program
- Alberta Seed Programs
- Native Seed Market
- Questions



2

Native Plants Program

- Started in 1983 in response to industry's need to find sustainable revegetation materials and alternatives for reclaiming disturbances
- Vision:
 - To facilitate the return of disturbed land to former and/or productive uses through the development and deployment of native species
 - Included the improvement of ecological function across disturbed specified lands; rangeland rehabilitation; reconstruction of wildlife habitat; developing fire smart landscapes and sustainable urban environments



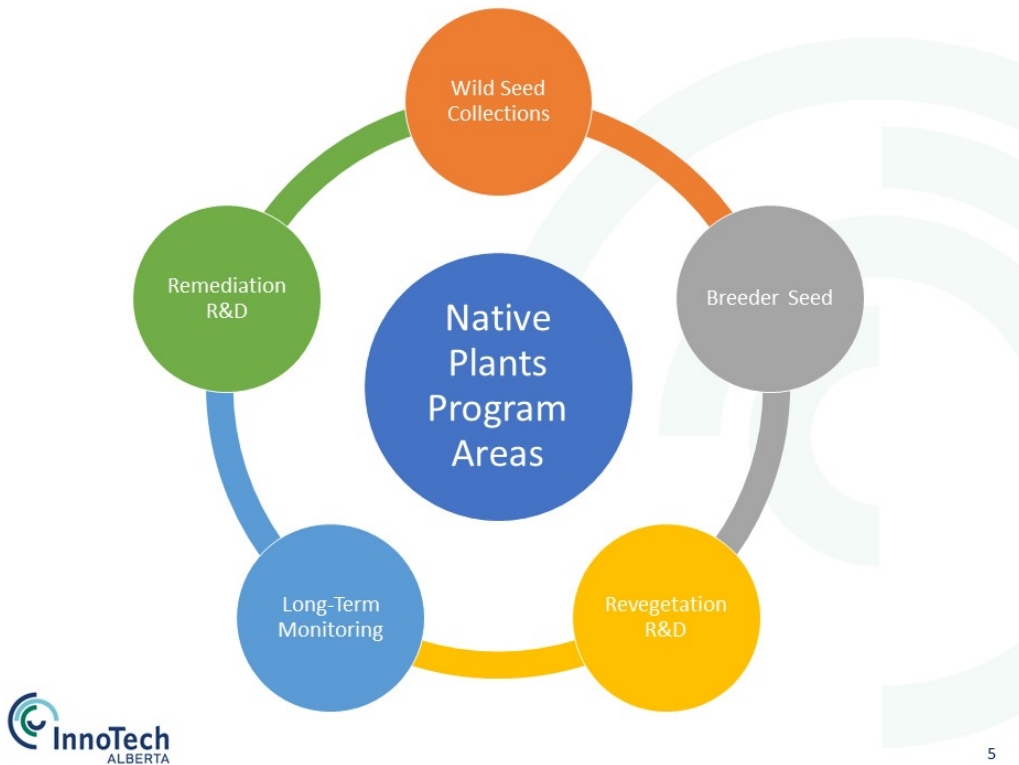
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Desired Outcomes

- Availability of native seed is increased
- A proven production base is established
- Production technologies are improved
- Costs and risks associated with producing native seed are reduced
- Reclamation and revegetation have higher success rates
- Lost marginal lands are regained
- Rangelands are improved
- New industries are developed within Alberta



4



5

Breeder Seed Focus Area

- Foundation seed provided to commercial growers to help meet various sector-specific needs
 - Initiated with over 2,000 wild seed collections and seed increases for Parks Canada
 - Projects transitioned into developing varieties that performed well in high-stress environments



Spike Trisetum



Junegrass



Slender Wheatgrass



Alpine Bluegrass

6

Breeder Seed Focus Area (cont'd.)

- The Program has released 22 commercial varieties
 - Foothills, Mountains, Parkland, Boreal
- Seed is registered with the CSGA
 - Breeder seed plots are maintained to CFIA standards, registered with the CSGA, inspected and certified annually
- Seed was provided directly to seed distributors for multiplication and resale
 - Prairie Seeds Inc., Pick Seeds Ltd., and Brett-Young Seeds Ltd.

Registered Seed

Proven Performance



Varietal Release	Soils Adaptation	Origin
"AEC Highlander" slender wheatgrass	Black chernozem, Brown, Dark brown	Rocky Mountains of Alberta
"AEC Hillcrest" awned wheatgrass	Black chernozem, Brown, Dark brown	Crownest Pass
"AEC Mountaineer" broad-glumed wheatgrass	Mountain soils, nutrient poor soils	Rocky Mountains of Alberta
"AEC Glacier" alpine bluegrass	Black chernozem, Brown, Dark brown	Lower elevation in the Rocky Mountains of Alberta
"AEC Blueridge" alpine bluegrass	Black chernozem, Brown, Dark brown	Rocky Mountains of Alberta
"ARC Sentinel" spike trisetum	Black chernozem, Brown, Dark Brown	Rocky Mountains of Alberta
"ARC Plateau" Rocky Mountain fescue	Black chernozem, Brown	Rocky Mountains of Alberta
"ARC Mountain View" June grass	Black chernozem, Brown	Crownest Pass
"ARC Vista" alpine fescue	Black chernozem, Brown	Rocky Mountains of Alberta
"ARC Grouse" green needle grass	Black chernozem, Brown	Wainwright area
"ARC Metisko" awned wheatgrass	Sandy, Brown, Dark brown	Metiskow
"ARC" Porter' Indian rice grass	Sandy, Dark brown	Wainwright – Ribstone Creek
"ARC Prairie" June grass	Black chernozem, brown, sandy	Crownest Pass
"ARC Centennial" Canada wild rye	Sandy	Wainwright area
"ARC Hillbilly" nodding brome grass	Sandy' Parkland	Wainwright area
"ARC Butte" Rocky Mountain fescue	Sandy	Near Waterton Lake National Park
"ARC Aspen" Canada milk vetch (legume)	Sandy/Parkland	Vegreville
"AITF Bison" Plains rough fescue	Black Chernozem, Brown	Northern fescue region
"AITF Badlands" blue grama grass	Brown soil	Hand Hills, Hanna
'AITF Battle bend " tufted hair grass	Sandy/Parkland, stabilisation of tailings sand	Wainwright area
"AITF Painted Skies" Rocky Mountain fescue	Sandy/Parkland	Wainwright area
"AITF Cascade" Hairy wild rye	Mountains/Upper Foothills	Jasper/Hinton



Breeder Seed Focus Area (cont'd.)



Breeder Seed Production Tasks:

- Species selection and wild seed collection
- Seed cleaning
- Land preparation and sterilization (must be weed free)
- Plot lay-out and seeding
- Plot maintenance over the growing season
- Preparation and filing for CSGA inspection of field plots
- CSGA inspection of field plots
- Seed harvest
- Seed cleaning
- Preparation and submission of samples for CSGA certification
- Seed germination trials
- Seed inventory and storage of collections



9

Other Seed Programs in Alberta

- Nurseries and Plant Producers/Distributors
 - Provide native plant materials to end users
 - Alberta Native Plant Council Database (anpc.ab.ca)
 - Microsoft Excel spreadsheet containing the following information:
 1. Company Name
 2. Contact Information
 3. Availability of seed or plants
 4. Plant types available (e.g., trees, shrubs, forbs, wetland plants, grasses)
- Seed Distributors
 - Companies that source seed from breeders/growers to sell to end users

10

Other Seed Programs in Alberta (cont'd.)

- Seed Banks (AB)
 - Store native plant materials and provide them to end users upon request (large quantities may not be available)
 - Bedrock Seed Bank
 - Canadian Native Plant Material Exchange
 - Major focus area: Enable exchange of information between producers and consumers on availability of native plant materials
 - Oil Sands Vegetation Coop
 - Major focus area: harvest seed prior to development to increase resources for reclamation
 - Red Deer Community Seed Bank
 - Major focus area: citizen science, open-source collections
 - Alberta Tree Improvement and Seed Centre
 - Stores over 53,000 kg of native tree, shrub and grass seed
 - Major focus areas: genetic health of forest tree species, viability and seed longevity



11

Other Seed Programs in Alberta (cont'd.)

- Researchers
 - Conduct research into numerous areas related to native plants and their application in reclamation
 - InnoTech Alberta
 - Aurora Research Council
 - Lakeland College
 - Medicine Hat College
 - Northern Alberta Institute of Technology (NAIT)
 - University of Alberta
 - Alberta Centre for Reclamation and Restoration Ecology
 - Canadian Forestry Services (CFS)
 - Independent researchers



12

Native Seed Market

Market Assessment of the Native Plant Industry in Western Canada (Woosaree, 2000)

- Reasons for not using native species
 - High cost of seeds, lack of available species, lack of quality species, lack of information, and lack of regulatory requirements
- Desire to use native species
 - Improved performance, aesthetic value, ability to conserve natural ecosystems
- Demand in the United States for native seed has increased exponentially due to stringent legislation around conserving and protecting plant heritage
 - E.g., cost of slender wheatgrass: US\$3/kg to US\$22/kg
 - Increased pressure on Canadian supplies, reducing availability
 - Increased availability of seed grown in the US
 - Different localities

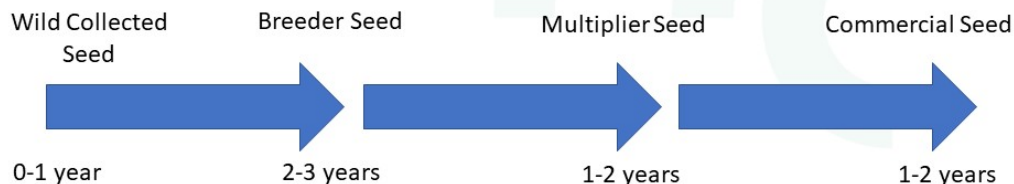


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Native Seed Market (cont'd.)

Comments from Native Species Workshop (2016)

- Native species production is time and labor intensive
- Private sector companies do not always have the skill, equipment, land or experience to develop new registered ecological varieties
- Developing new ecological varieties is deemed uneconomical



Total Time: 4 to 7 years

Large Risk, Limited Initial Profit



Native Seed Market (cont'd.)

- At present, native plant materials cost more than non-native species
- Regulatory guidelines encourage the use of native seed
- Public and private industry has expressed interest in purchasing and using native plant materials
- A strategic program is required to help make native species more affordable to end users, increasing demand



15

Questions?



16

Native Seed Availability and Use Goals and Issues



Land-use Framework Key Environmental Outcomes

Maintain Native Prairie and Manage Footprint

- Maintain large patches of native landscape
- Maintain the health and function of native plant communities
- Conserve connecting corridors
- Reduce impact of invasive species
- Sustain disconnected native habitat

South Saskatchewan Regional Plan

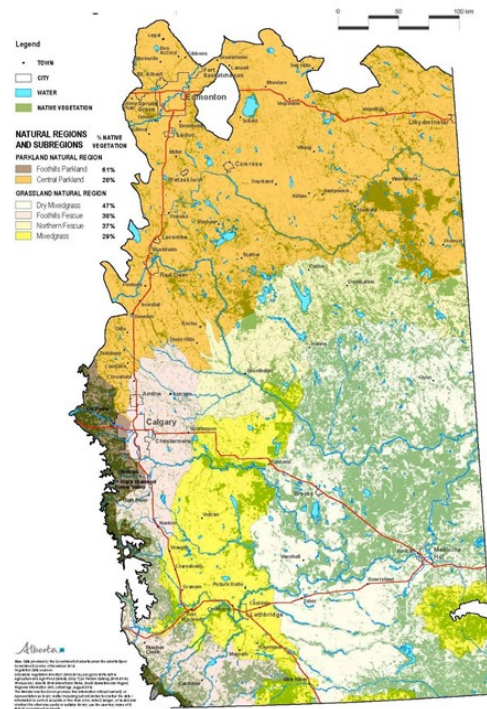
- ◉ Defines the means of achieving the targets through:
 - establishment of conservation areas,
 - controlling human disturbance footprints,
 - developing strategies to manage motorized use of the footprints
 - setting footprint reclamation objectives and reclamation rates.

Intent

- Reclamation with a view to restoration is a necessary part of maintaining large grassland landscapes in a multiple use environment.
- Current reclamation practices are not consistently achieving this result.

Prairie and Parkland Alberta Natural Regions and Native Prairie Remaining

Prairie and Parkland Alberta:
Natural Regions and Native Prairie



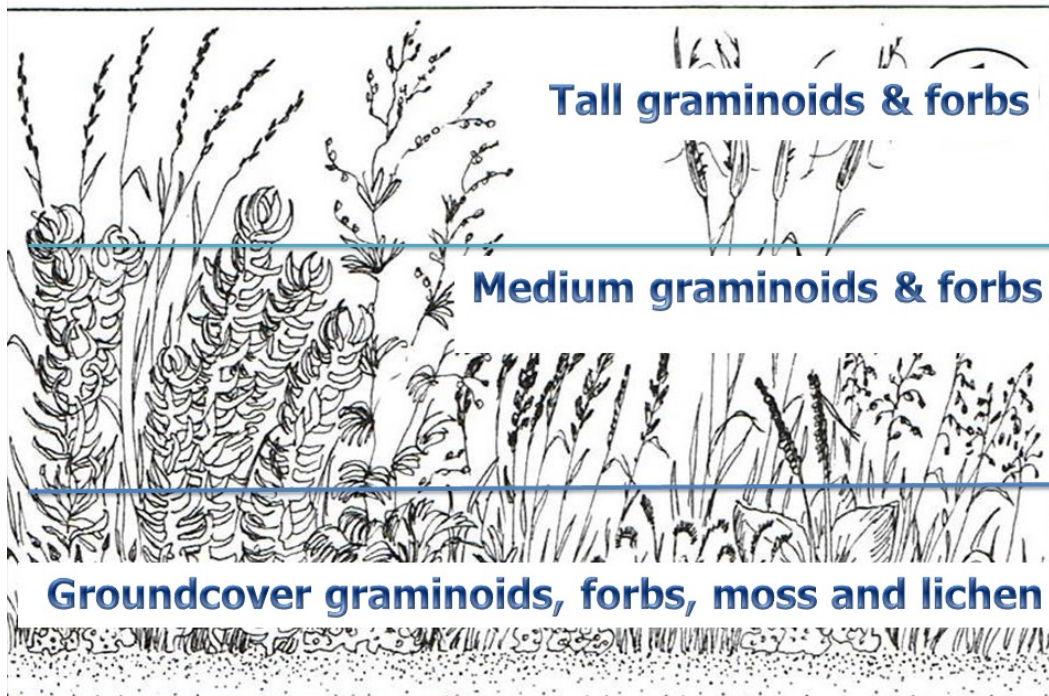
- Native grassland communities vary in species composition based on their location within a Natural Region and Subregion.
- Plant community composition is linked to environmental variables including: ecological range site, soils, elevation, soil drainage, slope and aspect

Recovery Strategies for Industrial Development in Native Prairie

Native plant communities are complex assemblages of species that provide:

- plant structure for the low, medium and tall vegetation layers,
- diversity in below ground structure (fibrous and rhizomatous grasses),
- early and late season growth,
- resilience to herbivory and climate events.
- Resistance to noxious weeds and agronomic invaders.

Structural diversity contributes to range health



GOALS

- Revegetate disturbances with locally sourced and adapted species that will establish a resilient mid- to late-seral plant community.
- Develop a reliable supply of plant materials of the dominant species in each Natural Subregion.

ISSUES

- Appropriate native seed can be difficult to source or simply not available:
 - Foothills rough fescue
 - Parry oat grass
 - Plains rough fescue
 - Western porcupine grass
 - Needle and thread
 - Bluebunch wheatgrass



ISSUES

- Cultivars developed elsewhere are often
 - structurally much taller than local material
 - More persistent and aggressive
- Common seed does not identify the source

Seeded Cultivars Still Prominent



Recovery Strategies for Industrial Development in Native Prairie

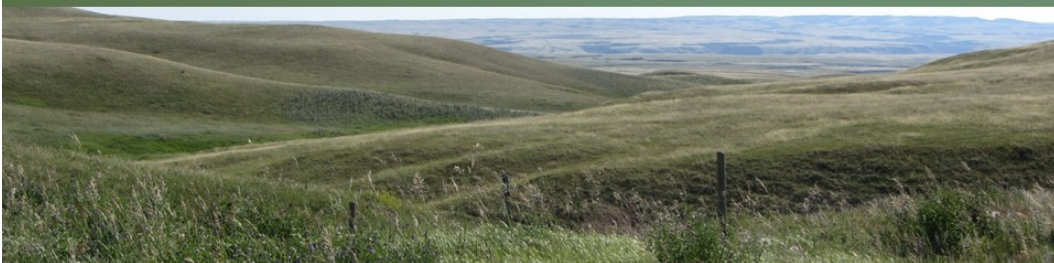
ISSUES

- Substitutions! Commercially available rough fescue seed is particularly prone to substitutions with inappropriate species such as Rocky Mountain fescue, hard fescue or sheep fescue.
- Current specifications for native seed lot analysis are unsuitable.

Recovery Strategies for Industrial Development in Native Prairie

GAPS and CHALLENGES

- Key species are unavailable as varieties
- Currently developed local varieties are unavailable in market volumes





InnoTech Alberta Increasing the Supply of Native Seed for Reclamation and Restoration Projects in Alberta

Discussions
October 5, 2017



1

Session 1: Goals and Issues around Native Seed Availability and Use

Speaker – Jane Lancaster, Foothills Restoration Forum



2

Guiding Questions: Goals and Issues around Native Seed Availability and Use

- What are your current reclamation/restoration end goals?
- Do you have challenges in locating and purchasing native seed for your projects? Which species?
- What other challenges have you experienced in obtaining and using seed?
 - For example, the quality of the seed? Resiliency of the species?
- Where do you see the major stumbling blocks to successfully acquiring and deploying native seed in reclamation/restoration projects?
- Is the solution company/project-specific or would it benefit from a collective effort?
- Do you have access to Alberta seed growers?
- Do you readily have the opportunity to communicate with Alberta seed growers and distributors about the upcoming seed requirements for new projects?
- Do you feel that Alberta seed growers and distributors have a good understanding of reclamation end goals within the Province?



3

Session 2: Native Seed Consortium

Consortium:

- A collaborative approach to coordinating, driving, and funding initiatives
- Stimulates private/public sector participation
- Comprised of several organizations, each of which is responsible for its own priorities and investment mandates, but interested in similar end goals



4

Benefits of Consortium Participation:

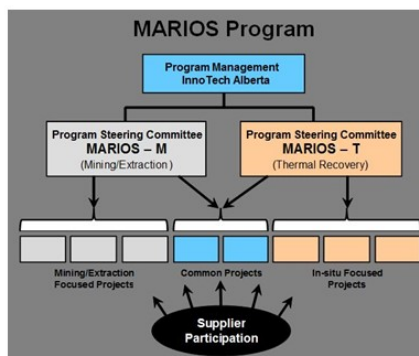
Synergy	Joint gains and greater member achievements, as a whole.
Shared Resources	The sharing of knowledge and expertise, increasing the manageability and feasibility of the work. There are also opportunities to provide a forum for information sharing and problem solving.
Confidentiality	Information shared between members is held confidential. Access to confidential research results and innovative technologies.
Access to Funding Sources	A means to leverage research and development investments to achieve greater gains.
Accelerated Commercialization	Collaborative partners may include early adopters/investors for novel approaches, technologies, etc. developed through the Native Plants Program, accelerating the path to commercialization.
Drive the Program	Members benefit by setting priorities and providing direction that has direct value to their business.



5

InnoTech Alberta Consortia

Materials and Reliability in Oil Sands (MARIOS)



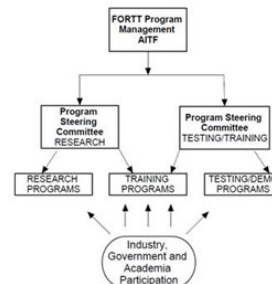
- Established in 2009
- 29 members



Pipeline Integrity and Corrosion Management (PiCOM)

- Industry-led working group that facilitates collaborative R&D
- Established in 2008
- 13 members

Facility for Oil Field Research Testing and Training (FORTT)



- In-development

6

Native Breeder Seed Consortium

Initial Ideas

Membership	Consortium
Fee Structure	Annual Membership Fee
Membership Term	3 years (initial contract) – New contract thereafter
Annual Operation Budget (Maintenance)	\$80,000 (total)



7

Guiding Questions: Native Breeder Seed Consortium

- What would you like to see in a consortium?
 - Annual/Bi-annual meetings, progress updates
 - Industry-led presentations
 - Stakeholder interactions, networking events
 - Tours, sessions, speakers
 - Collaboration in seed collection
 - Out-planting/seeding support
- What input would you like to provide?
 - Seed collection (species, localities, volumes)
 - Breeder seed varieties
 - Research needs
- How would you like to see the priorities set?
- What potential funding models do you think would be successful?
- What stakeholders would you like to see involved?
- Would you participate in a consortium?
 - What level of involvement would your organization be able to provide?
 - What level of involvement would you like to see from other consortium members?



8

APPENDIX 4. Needs and Issues Discussion Notes

As often happens in Workshops the discussions in each session covered topics in the other session – this Appendix contains notes that focus on needs and issues.

Objectives

We want faster/cheaper/more efficient reclamation – *faster* means we need seed to be available; *more efficient* could mean locally-adapted seed (if it performs as expected). Note, delayed reclamation = weeds = increased cost.

Roadblocks

Seed production (availability) is the main roadblock now.

Other roadblocks include cost and limited mandatory requirement for use of natives.

Success

Need to know if local seed does better than non-local (e.g., Oklahoma). Would help reinforce the need for local seed and, perhaps, justify the added expense. There are multiple examples of this noted by the Foothills Restoration Forum.

Monitoring of seed deployment projects and sharing of results would be helpful.

Mandatory Use of Natives

Mandatory use of native species could help but only if enforced; wellsite criteria, especially for grasslands, is a good start but they don't apply to other industrial disturbance types.

Acknowledged there are a variety of mandatory use rules (e.g., Transportation, City of Edmonton, Special Areas Board). InnoTech Alberta is preparing an inventory of native grass seed mixes in Alberta.

Caution is needed to ensure the required species/mixes are suitable – some examples discussed where this isn't the case.

Definition of Local

This is a hotly debated issue. The desire for *local* is genetics-based, for both adaptation and to restrict genetic pollution. This is well established for many types of sexual reproduction and seed dissemination.

Is nearby ecoregion better than US sources? Not necessarily if climate is different.

Doesn't necessarily have to be local to be effective BUT don't want to go so far afield that we dilute the key message that local is better.

More latitude in terms of East-West distance than North-South but don't know the exact numbers.

Priority Species

It takes about three years to produce and register a variety; InnoTech Alberta is producing about one new variety each year on average. It then can take up to four years to get commercial seed.

Foothills rough fescue, plains rough fescue, parry oat grass and western porcupine grass are key needs in southern Alberta.

It doesn't appear that any of the 22 varieties are from the dry mixed-grass or mixed-grass areas. We have multiple varieties from Special Areas/Wainwright in the central parkland but correct, no mixedgrass sub region representation. We could develop some varieties for these areas if the demand was there.

Need access to more forbs. InnoTech Alberta has done some work with forbs and shrubs, especially on the R&D side – less on the breeder seed side. There are lots of forbs that are easy to work with so we tend to focus on those.

Fireweed, hairy wild rye and Canada milkvetch are desirable for temporary reclamation areas (e.g., stockpiles). InnoTech Alberta has breeder seed for hairy wild rye but not enough volume yet for production.

Native annuals that can be used as cover crops are desirable (e.g., flixweed and stinkweed).

Many forbs are wind disseminated and make their own way into reclamation sites.

Some native forbs are not good for grazing (e.g., *Oxytropis*) so there has been less emphasis on them however these could be very useful for temporary reclamation projects or in areas where grazing is a problem for establishing plants.

Awareness

Eighteen of the 22 InnoTech Alberta varieties are available now for production – just need to identify partners to grow them.

There isn't enough awareness of the InnoTech Alberta varieties and how to get them so people aren't asking for them.

The ANPC list of suppliers is fairly good but requires constant updating as producers go out of business or shift emphasis. Currently the list is updated by volunteers.

Variety names should reflect the ecological zone they are sourced from to allow for more appropriate ordering/deployment.

Demand

Do we need to update the market survey from 2000 to get a better understanding of demand and availability?

Would like to use local seed but it isn't available.

Looking at some large-scale reclamation/restoration projects in coming years.

We buy a lot of seed (e.g., about 1,500 to 2,000 lb/yr) so there is demand but we have to get it from Manitoba or Oklahoma.

Seed vendors have noted an increase in sales when there is increased communication about the value and importance of native species use (i.e., marketing needs to be done by government, industry, ENGO's, etc. to drive demand).

Do we know if the availability/use of the InnoTech Alberta varieties has changed over time?

At least two native seed producers have abandoned the role due to costs.

Cost

There is a willingness to pay more for locally-sourced native species (compared to common seed) but not an unreasonable amount. There was no consensus on what *reasonable* would be.

It is important to note that a wellsite can cost about \$2K/year rental plus maintenance and monitoring so delayed reclamation = increased cost.

Want to use needle and thread grass but at upwards of \$100/lb we tend to reduce the amount from the desired level in the mix. Good news is it establishes well.

Need some form of financial incentive and/or insurance for growers so they will take the multi-year risk to produce seed. Perhaps a guaranteed market price?

Other Issues

Original mix designs are often changed as the order moves through various stages. Substitutions, by suppliers or mix designers, are a real problem (e.g., *Festuca* species are often different than specified). Lots of practitioners can't tell the difference so even when planted out the problem isn't known.

We are finding that common seed produces plants that are taller than the local counterparts thus changing the vegetation structure – this can affect wildlife suitability.

Traditional agricultural equipment isn't suited for native species (e.g., seed cleaners, especially for species with awns – we can lose up to 50% of seed when cleaning needle and thread; others skip the de-awning process which may lead to seeding problems).

Breeder seed has a shelf life – some of the InnoTech Alberta varieties are so old they are losing viability. If the demand for these varieties still exists we will need to start from scratch to build a new variety.

Seed production is highly variable year-to-year therefore hard to guarantee supplies.

The year-to-year seed ordering approach isn't working – need a different model that identifies longer term markets.

Sources of Information

Find out what Native Plant Society of Saskatchewan⁴ is doing – relevant to SE part of province.

Grassland National Park staff have lots of experience we can learn from.

Look to US to see how they can produce needle and thread at a reasonable cost.

⁴ See <https://www.npss.sk.ca/>

APPENDIX 5: Potential Solutions (Including a Native Seed Consortium) Discussion Notes

As often happens in Workshops the discussions in each session covered topics in the other session – this Appendix contains notes that focus on potential solutions.

General

This is a long-term problem that needs a long-term solution. However we also need short-term solutions for the period during which the partnership gets established and up to speed.

General sense is partnership would have more traction if not identified as an industry initiative.

Mandate of organization could be broader than breeder seed development and production.

Size and scope of organization affects cost/participant and manageability.

Marketing (increased awareness) will be critical to success of any of the partnership options. It will also help encourage participation.

Consider regional partnerships to allow more focused efforts on regionally-important species.

Operating rules will have to be developed for the partnership to ensure all parties understand mandate, scope and acceptable practices.

Funding

Is the current InnoTech Alberta funding for the breeder seed program stable? Not guaranteed.

Need a flexible funding model that allows for various fee levels and accommodates new participants over time.

Current funding of vegetation co-operatives is based on the amount of seed to be collected and stored for each participant – varies over time.

Need to explore what in-kind contributions might be considered in-lieu of dollars.

Participants

Seed growers / harvesters must be involved.

Government agencies need to be involved – especially those setting mandatory usage and those who will be purchasing/using seed.

Industry beyond oil and gas and oil sands needs to be involved.

Some participants could provide seed, others would be buyers and some both.

Name

Make sure the name for the partnership is distinguishable from existing organizations/co-operatives and speaks to the objective.

Co-op may be easier to promote than *consortium*.

Functions

Getting seed is only first step – has to be cleaned, stored and distributed.

Prioritizing species for breeder seed development.

Networking and knowledge sharing were described as key benefits to any form of partnership.

Advice on growing and deploying seed.

R&D related to native species (e.g., look at uses of straw following harvest).

Wild Harvest Option

Can get seed from wild harvest if local native seed isn't available for purchase.

Can do targeted and opportunistic seed collection.

Wild harvest success depends on weather and growing conditions.

Maybe one solution is to commission large-scale wild harvest of seed. There are big tracts of land in the Special Areas that could be used (still dependent on good growing/harvest conditions).

Ensuring quality of wild harvest materials requires up-front work to characterize the site vegetation so the "lot" can be described properly. However, it is still hard to not contaminate with weed seeds.

Labelling (naming) of wild harvest seed may determine acceptability (likely would be called common seed). Look at options for "certifying" wild harvest seed.

We have struck deals with private landowners (e.g., Waldron Ranch in the MD of Ranchlands has been wild harvesting/ selling native seed for years).

Once big landowners participate others will join in – may require publicizing participation.

Will require funding to buy seed from landowners.

Co-op Approach

Maybe establish a co-op to purchase seed directly from growers (guaranteed customer). The Co-op then stores the seed and provides seed to Co-op members (based on funding level). This would be a variation on the Oil Sands Vegetation Cooperative model⁵.

Growers should have option to sell excess production to Co-op or other users.

Existing oil sands vegetation co-operatives store seed collected by/for each participant. They have the option of using externally-sourced seed, their own seed or purchasing/sharing seed from other participants.

The Co-op would be best run by a multi-stakeholder group.

⁵ See <http://www.cosia.ca/oil-sands-vegetation-cooperative>

Co-op should go directly to growers to commission seed production (out-sourcing this function to a commercial vendor did not work).

Co-op could put out call for proposals (tenders) to produce X pounds of seed of species Y by year Z (see City of Calgary model below).

Big seed companies could be partners to help forge the link with growers.

Breeder Seed Consortium Approach

Development of breeder seed is still important. Can be done through a consortium approach or by individual contracts with end users.

Other Models

The City of Calgary contracts a seed vendor for five (5) years with prices locked in unless they submit a price update sheet which we can then choose to approve or not. The contractor may then collect seed or use pre-collected seed, grow it out, harvest, clean and provide the resulting seed to the City. The City has to approve the source of the collections.

Origin-labelling rules would help increase awareness of native seed sources. Although the seed certificate should indicate this some of the participants have been unsuccessful in the past getting certificates from vendors.

The CSGA has a *source-identified seed class* that provides third party assurance of geographic origin, usually for perennial native forage grasses, legumes and forbs produced from parent populations which have not been selected. However there is limited understanding of if or where this has been used.

Canadian Native Plant Materials Exchange⁶ allows users and producers of native plant materials to exchange wants and offerings with the use of listings.

⁶ See <https://hardgrass.ca/>

APPENDIX 6:Post-Workshop Input

Following the Workshop InnoTech Alberta circulated the Draft Summary report to participants and other potential partners for additional input. Comments were received from the following people:

Donna Fluery Alberta Agriculture and Forestry

Dallas Johnson Alberta Innovates

Cameron Lockerbie Alberta Environment and Parks

In addition, Jenna Cross provided a correction to the draft text in Appendix 5 regarding the City of Calgary model.

The comments have been organized under subject headings.

General

I think this consortium/co-op ideas is a great idea!

The Program concept and proposal looks great and is much needed. Hopefully there will be a funding model to support InnoTech and collaborating partners to move this forward.

Scope

Would the Consortium consider taking a broader, longer-term view of its operation and objectives? More specifically, I mean consider the implications of climate change and what this might mean for native seed requirements? My feeling is that the resiliency of reclaimed/restored communities will very much be in question as the climate warms and it will be important to have seed that is adapted to changing/changed conditions. While this might largely be an exercise in collecting seed sourced across latitudes/altitudes to ensure a sufficient range of genotypes is represented in the program, I think it will require R&D, too. I don't believe it is a foregone conclusion that southern ecotypes will be easily grown in northern climes (for example) just because the temperature/precipitation patterns is expected to be superficially similar. I believe we'll also see novel environmental conditions emerge. If that is the case, we might have to explore taking a more active hand in breeding.

I also think that more emphasis might be given to shrubs and woody plants – is there a reason why this hasn't been a major part of the program to date? Are there other organizations that are shouldering this?

As mentioned my main issue with native seed varieties is that there are hardly any that have been sourced from the Dry Mixedgrass and Mixedgrass Natural Subregion. Most of the previous ARC varieties are all from the Eastern Slopes, Crowsnest Pass, Banff, or Central Parkland. There is loads and loads of need for good quality and dependable native varieties in the south-eastern and south-central portions of Alberta that are grossly under represented.

Participants mentioned R&D related to native species (e.g., look at uses of straw following harvest) – this may be an area Alberta Agriculture and Forestry can provide expertise – for example, the Biomaterials Program is doing a lot of related work with hemp and other biomass. There is also a clean tech and waste utilization program and of course our new pilot facility the

Bio Processing Innovation Centre (BPIC) in Edmonton may be able to look at other extraction/fractionation value added in the future.

In the future, perhaps along with regulatory tools, the Consortium could pursue some sort of incentive or reward for companies who use native plantings in their projects; e.g., a lower carbon tax or some other credit type program recognizing leadership in this area?

Collaboration

There may be an opportunity for collaboration with Alberta Innovates in establishing the Consortium and supporting further development of native breeder seeds due to strong ties with their reclamation targets.

Any involvement from the Universities/colleges, possibly for additional trials or student assistance for projects? For example, Medicine Hat College (Cathy Linowski leads the biology/environmental technology courses) or Olds College's Horticulture Program.

Information Sources

For new growers/harvesters: The national industry group Canadian Herb, Spice and Specialty Agriculture Coalition⁷ (Executive Director is Connie Kehler in Saskatchewan) has a training program recognized by CFIA – Good Agriculture and Collection Practices⁸ – that covers cultivated and wild harvested materials from field to shelf. It is a risk-based and outcome-based flexible program and set of tools delivered through training and has sections that may assist with best practices for plant identification and harvest/collection/shipping that may be of interest particularly to new harvesters. We have trained several growers/harvesters/processors in Alberta (and across Canada) including over the last couple of years several hemp producers in Alberta. We have worked with growers/wild harvesters including First Nations, some who are working in the native plant/seed areas.

One of the areas that is very important is the Certificate of Authenticity or Declaration of Identity – the program has tools to assist with that including the Plant Identification practice developed with national and international input several years ago that is very useful and publicly available⁹.

The Pest Management Regulatory Agency Minor Use Program may also be useful to support native species growers¹⁰.

⁷ See <https://www.saskherbspice.org/>

⁸ See <https://www.saskherbspice.org/gacp-overview.html>

⁹ See <http://saskherbspice.org/documents/Good%20Practices%20for%20plant%20identification.pdf>

¹⁰ See <http://www.agr.gc.ca/eng/?id=1286197216280>