Native Seed Quality and Supply within Canada's Supply System

Tannas Conservation Services Ltd.

February 2020

Outline

- Introduction
- Background Information
- Why the Need
- Project Overview
- Results
- Implications
- Recommended Substitutions
- Alternate Sourcing Options
- Conclusions

Introduction

- With the increasing concern over the damage caused to natural ecosystems, restoration ecology is a growing science worldwide
- When designing seed mixes with the goal of restoration, it is critical that we understand that every project is different and requires a unique plan
- True restoration requires a wide variety of native species, of which, many have differing reproduction strategies, life cycles, environmental requirements, and fit within different successional stages.

Background: Types of Authentication

- Seed Certificate
- Purity Test:
    - Analysis that determines the composition of a seed lot
    - Completed Manually by specialists
    - Each category is manually separated by hand
  - The Percentage Test:
    - Components broken into: pure seed, other crops, weed seeds, inert matter, ergot or sclerotinia bodies
    - Used in creating seed mixes in combination with germination tests
    - 2500 seed units examined
    - Expressed as a percentage

Background: Types of Authentication

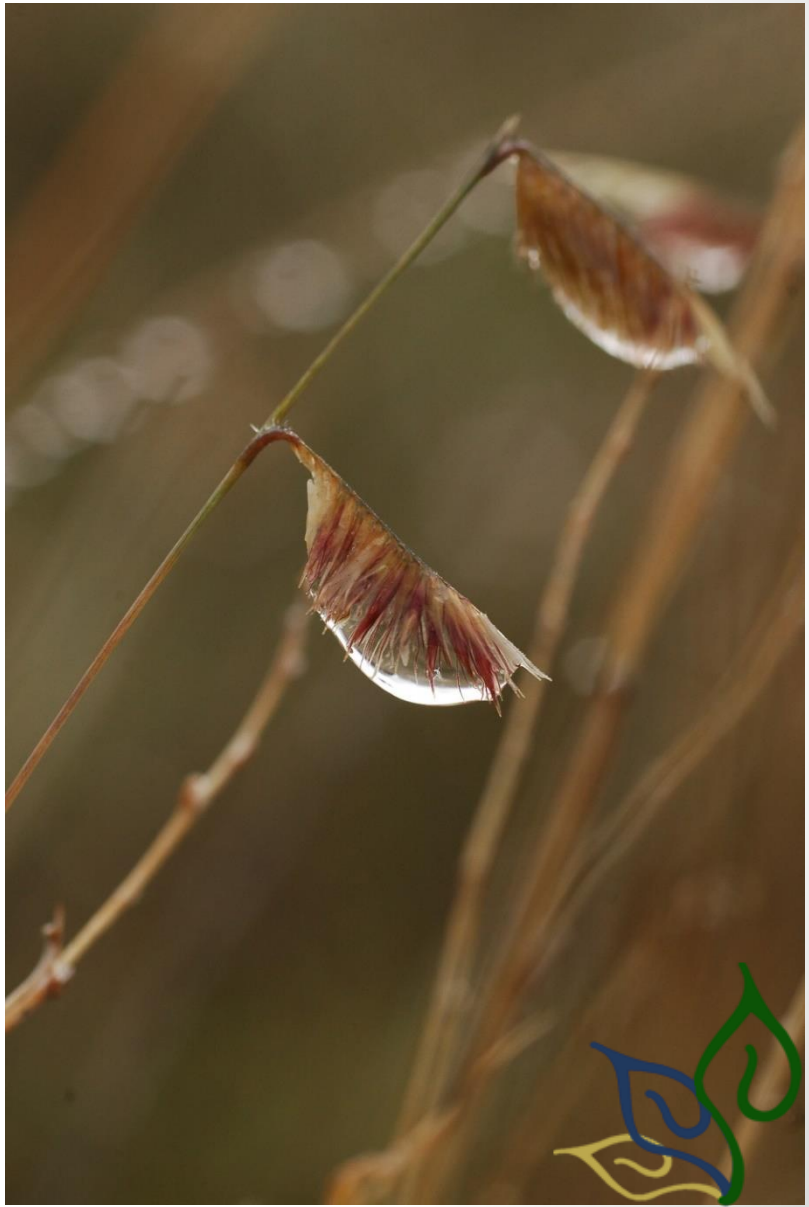
- Seed Certificate
  - This does not provide a confirmed identification of the crop, but weed analysis and germination information
  - Many species are not identifiable within a weed analysis and so the crop identification becomes the information supplied to the lab as they cannot confirm from seed the conclusive species in question.

Background: Types of Authentication

- Quality and Expectations of a Test
  - Qualifications and ability of the Testing Professional
    - Experience with native seed, collection of samples, quality of samples, training (no academic training exists),
  - Was the Test collected properly (pooling samples from all over a lot)
    - Was the sample screened by hand or properly collected randomly
  - Submitted sample 50-200g of thousands of kg
    - It is considered a rough estimate only

Background: Types of Authentication

- Certificates of Authenticity
  - Obtain a Certificate of Authenticity
    - This can only be supplied by a qualified plant taxonomist and represents a confirmation with some legal backing
    - The experience and qualification of the certification agent is critical and they should be a registered member of a profession
    - This is extremely hard to obtain as most taxonomists do not know of this protocol or the legal ramifications of mistakes make them unwilling to sign a document.



Background: Types of Authentication

- Visual Confirmations
  - Obtain mature sample plant
    - Submit to a professional for confirmation
  - Grow out samples of the seed
    - Grow out in controlled lab conditions the plants and have a qualified specialist identify the species using herbarium samples and taxonomic keys.

Background: Types of Authentication

- Visual Confirmations
  - Obtain a registered variety
    - This used to be the standard method for confirmation of seed lots but few registered varieties are available
    - Mistakes have been found in some registered varieties, just because the foundation collection was correct does not mean the seed you buy is correct.

Why The Need

- There are few rules on the Native Seed Industry
  - Only a few species fall under the Seed act as crop species, the rest are considered weeds species
  - There are generally no provincial rules regulating seed supply standards

- Registered Varieties are not common place
  - Historical releases are not necessarily still in production.
  - Most seed is considered common seed and has no official paperwork to authenticate it
  - Registered varieties are held by only a hand full of companies and many are not seed growers but suppliers.

- Few seed growers are actually native plant specialists or plant taxonomists
  - Growers are generally not capable or qualified to identify the species they are growing
  - Collections may not have been made by qualified personnel
  - Those supplying growers with seed may not be qualified to identify the seed they are supplying

Why The Need

- Only Six native species fall under the grade tables in the Seed Act and are therefore addressed by the Seed Act and Regulations and seed testing rules
  - Northern Wheatgrass/ Thickspike (*Elymus lanceolatus/Agropyron dasystachyum*)
  - Western wheatgrass (*Pascopyrum smithii/Agropyron smithii*)
  - Slender wheatgrass (*Elymus trachycaulum/Agropyron trachycaulum*)
  - Streambank Wheatgrass (*Elymus lanceolatus var riparius/Agropyron riparius*)
  - Fowl Bluegrass (*Poa palustris*)
  - Creeping bentgrass (*Agrostis stolonifera*)

Why The Need

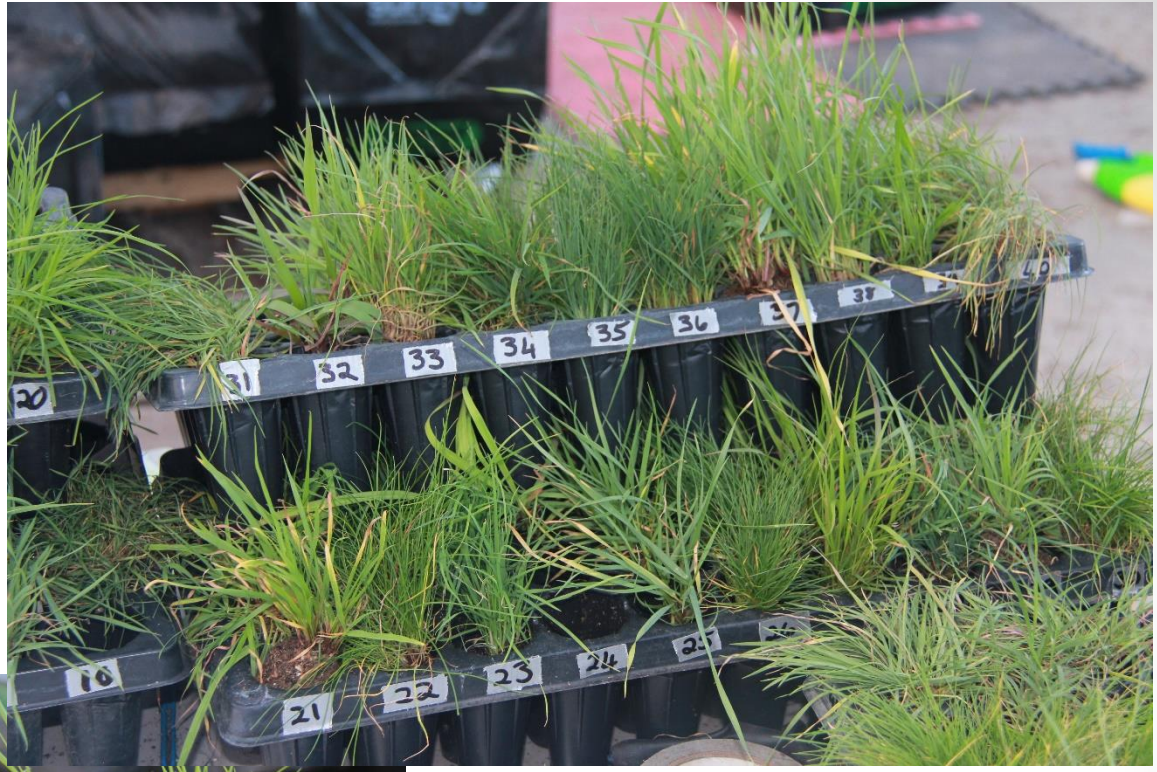
- We have seen past issues in seed supply
  - Are Seed Sources Reliable
    - Fescues species have had numerous complaints regarding species correctness
    - Rocky Mountain Fescue is Generally Sheep Fescue (Much larger and more aggressive)
    - Idaho Fescue is sometimes Sheep Fescue
      - In numerous establishments a green fescue shows up instead of the blue Idaho fescue. This would be some form of sheep fescue or hard fescue as there is a clear color
    - Rough Fescue can be Sheep Fescue
      - Rough fescue sets seed once every 4-8 years, there has never been a proven establishment that produces seed annually. If your supplier is getting seed annually from crop production it is not rough fescue
    - Hairy Wild Rye is sometimes *Elymus virgatum* (not native here)
      - This is a mix up of names. Two unrelated species have the same common name

Project Overview

- TCS was asked to source and verify seed for a reclamation project
- Grass species list was as follows.
  - *Beckmannia syzigachne*
  - *Bromus carinatus*
  - *Calamagrostis canadensis*
  - *Deschampsia cespitosa*
  - *Elymus glaucus*
  - *Pascopyrum smithii*
  - *Elymus lanceolatus*
  - *Elymus innovatus*
  - *Elymus spicatus*
  - *Elymus trachycaulus var unilaterale*
  - *Festuca idahoensis*
  - *Festuca saximontanta*
  - *Koeleria macrantha*
  - *Poa alpina*
  - *Poa palustris*
  - *Poa secunda*
  - *Sporobolus cryptandrus*
- *Elymus innovatus* sample was not requested as no verified sources are known

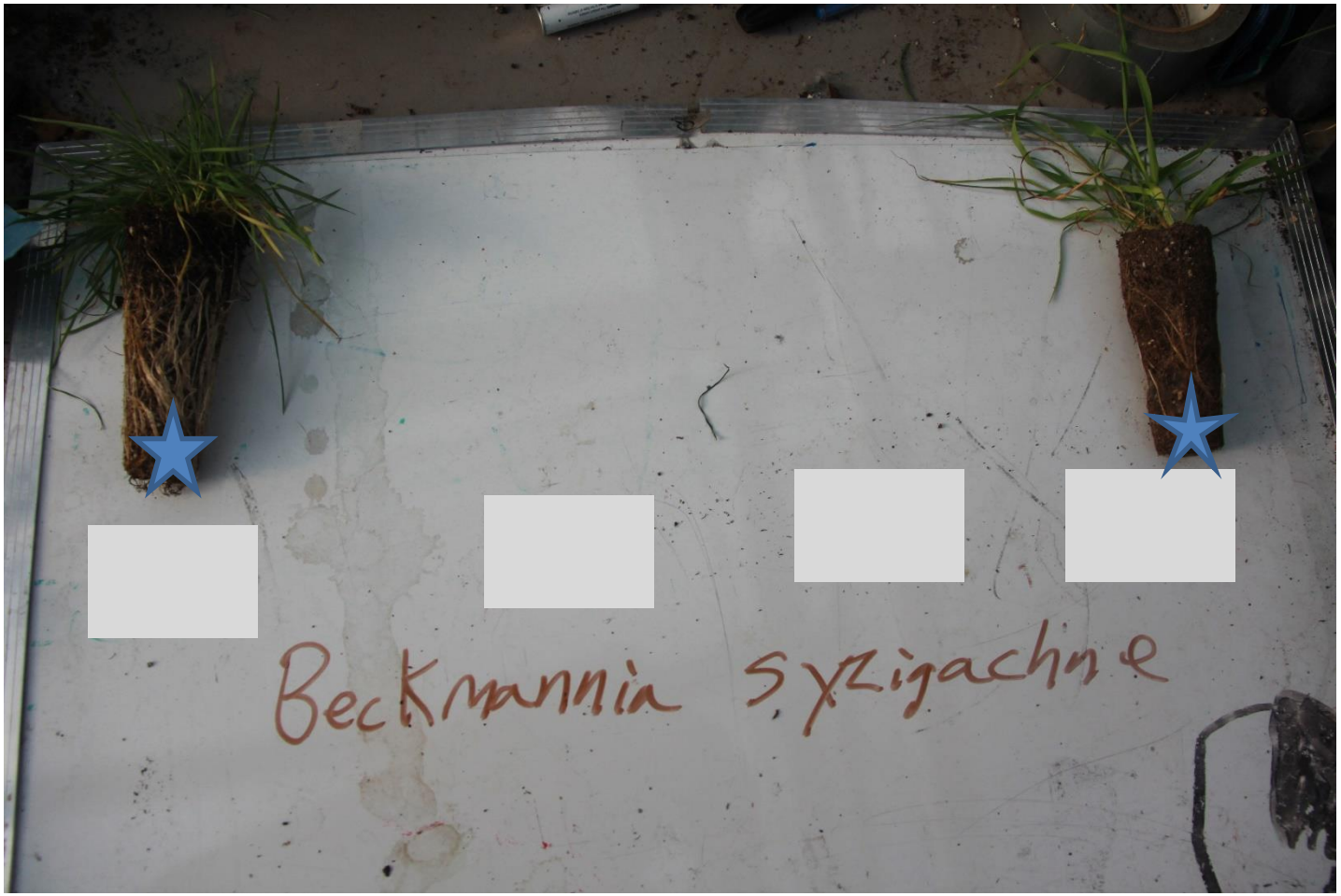
Project Overview

- Prior to requesting samples, information about source location was requested, those species that had sources deemed too far from the project location were eliminated.
- Requested samples of each species from four major North American suppliers that met the source location criteria
- Grew out samples in the ESRS greenhouse
- Samples were subject to a blind identification test by 3 experienced plant taxonomists
  - Test was completed using vegetative keys as not all samples were mature


20
31
32
33
34
35
36
37
10
21
22
23
24


12
13
15
16
20
1
2
3
4
5
6
7
8
9
10

Beckmannia syzigachne



Bromus carinatus

Calamagrostis canadensis

Deschampsia cespitosa

Elymus glacus

Pascopyrum lanceolatum

Elymus spicatus

Pascopyrum smithii

Elymus trachycaulus

Festuca idahoensis

Festuca saximontana

Koeleria macrantha

Poa alpina

Poa palustris

Poa secunda

Results

- For all species that had samples requested, all but 3 ended up with at least 2 suppliers with seed that keyed out correctly
- *Festuca idahoensis, Festuca saximontana* and *Poa alpina* all only had 1 source that keyed out correctly or potentially correct.
- For the fescues, samples that did not key out to the species claimed and keyed out to the non native *Festuca ovina* which can be highly invasive.
- The *Poa alpina* sample that did not key out correctly was hypothesized to be under the *Poa secunda* group of bluegrasses

Implications

- Without grow out sample verification by an experienced taxonomist, seed being supplied for certain species is not what is being claimed on the seed certificate.
- The species in question, especially for the native fescues, these may not in call cases be able to be identified by seed alone.
- Once these species have been seeded it is very difficult to control them to allow for the native species to establish

Recommended Substitutions

- For *Festuca saximontana* and *Festuca idahoensis,* if no verified seed can be found, *Koeleria macrantha* is best suited to fill that ecological niche and seed is widely available
- For *Festuca campestris* and *Festuca hallii* if no verified seed can be found, or is in limited supply, live plugs may be a viable option
- For *Elymus innovatus,* can use *Elymus canadensis* depending on site conditions

Alternate Sourcing Options

- If commercial seed is not available for a particular species there are options for sourcing
- If the specific details about seed maturity and collection time are available then wild harvesting and seed cleaning is a useful option
- If the quantity of seed from wild harvesting does not meet the requirements of a specific project, then there are growers who will contract grow wild harvested seed to meet quantity requirements

Conclusions

- For species where authenticity may be in question, they should be either substituted with a known species or if it is required to use, must a lot sample must be grown out and verified by a qualified taxonomist

Questions?