

Date:
March 2015

Resources for Better Seeding Decisions

Resources & Tools

- ◇ Soil maps: details about soil landscapes and slopes
Lord, T.M. and A.J. Green. 1986. Soils of the Fort St. John-Dawson Creek area, British Columbia. Land Resource Research Centre, Vancouver, B.C.
- ◇ Air photos: online through Google Earth or Bing
- ◇ Enhanced lidar images: negotiate with resource companies
- ◇ Power zone mapping: from Agritrend for their clients
- ◇ Drone flight imagery
- ◇ CLI maps: a very quick [large scale](#) overview of climate & soil limitations.

Quote from workshop

"Thank you for explaining the difference between CLI maps & soil maps."
Julie Robinson
Fort St John, BC

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Published by
P.R.F.A. of BC

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visit:

www.peaceforage.bc.ca

Introduction

What are the tools and resources for successful seeding in both forage and reclamation scenarios? This forage fact provides a starting point or 'appetizer' in answering that question by following the reader through a set of questions of where, why, what and how are you seeding. It attempts to summarize some of the lessons and key messages learned during the past 2 cycles of the Soils, Forages and Water Dynamics field days and workshops.

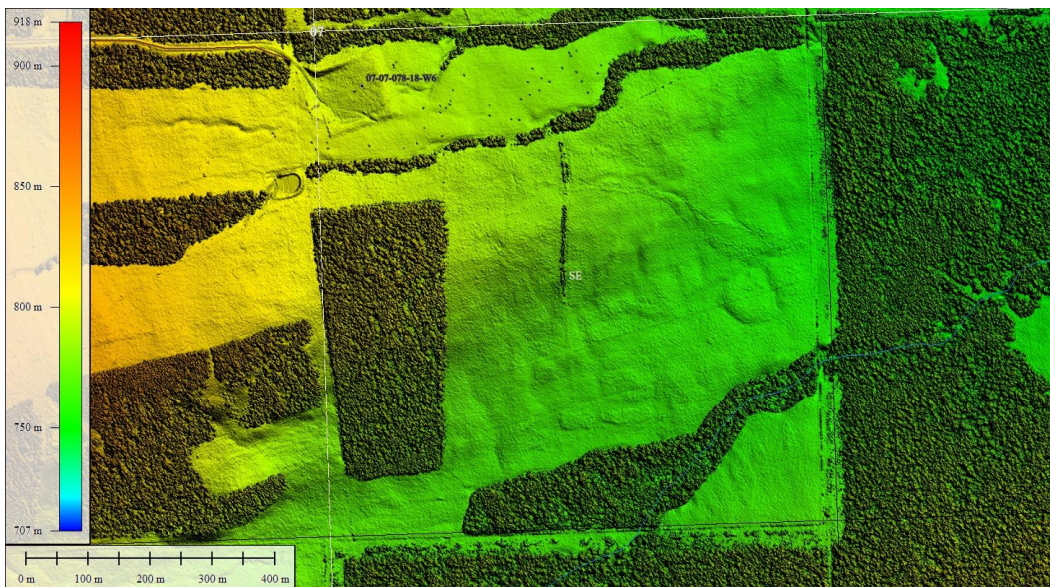
1. Where are you seeding?

Locating the site you wish to seed on maps or photos can provide important insights. Soils maps are great for detail about soil landscapes and slopes.



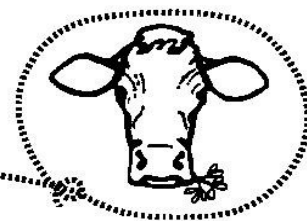
Forage producers and reclamation consultants discuss seeding decisions, soils & forages.

From air photos, you can get info about land, vegetation and drainage. Enhanced images (such as lidar, infrared air photos, power zone mapping or drone imagery) provide even more detail (*see example below*).



Enhanced lidar image at Hogberg case study showing detailed landscape & drainage features.

Peace River Forage Association
of British Columbia



Resources & Tools

Protecting soils from erosion:
 Soil erodibility map
 Clinometers: measuring slopes
 Field or lab infiltration tests
 Hand texturing to estimate soil water holding capacity
 Erosion risk matrix
 Erosion research resources

Controlling Weeds:
 Weed ID & cycle books,
 On line resources,
 Understanding weed control,
 Seed analysis

Enhancing Forage & Grazing:
 See www.peaceforage.bc.ca

Soil Books & Resources

Henry, L. 2003. Henry's Handbook of Soil and Water. Henry Perspective, Saskatoon, SK.

Paul, E.A. 12015. Soil Microbiology, Ecology & Biochemistry. 4th Ed. Academic Press, New York.

Tisdale, S.L., W. L. Nelson & J.D. Beaton 4th Ed.2013. Soil Fertility and Fertilizers. Pearson, New York, NY

Watson, K. Soils Illustrated Field Descriptions 1st Ed. 2007. International Remote Sensing Surveys Ltd., Kamloops, B.C.

Whalen, J. & L. Sampedro. 2010. Soil Ecology & Management. CABI, Cambridge MA.

2. Why are you seeding?

There are many reasons to seed, but during the Soils, Forages & Water Dynamics course we focussed our discussions on these 3 main objectives (and sub objectives) below:

- **Protecting soils & water**
 - Controlling soil erosion
 - Improving soil
- **Suppressing invasive plants**
 - Establishing desirable species
 - Maintaining native plant communities
 - Controlling vegetation or influencing plant succession
- **Enhancing forage growth**
 - Increasing hay production
 - Extending grazing season
 - Increasing silage production
 - Enhancing rangeland forage

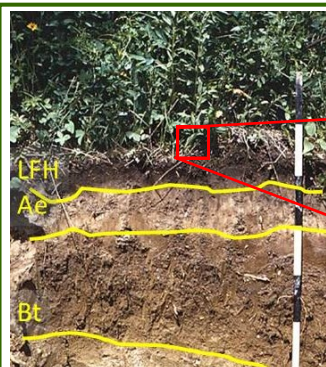
These are also the objectives that the seeding web tool focusses on. For a more complete discussion of seeding objectives see the BC Rangeland Seeding Manual.



3. What are the site conditions? What are the drainage & moisture status? How about the soil nutrients & biology?

The key to understanding the site conditions for the seed, roots or seedling is to examine the dynamics from a biological view point. Organic matter, microorganisms and microbial activity have a profound effect on soil nutrient status and the water dynamics within the soil. The photographs and thin sections for microscope viewing below give glimpses to the important underworld below.

Understanding Soil Dynamics Under Increasing Magnification

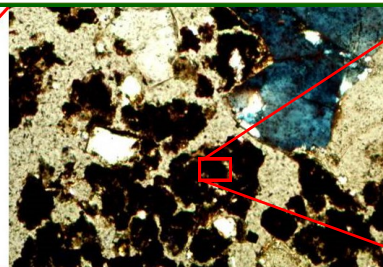


Soil profile of an orthic gray luvisol typical in the Peace.

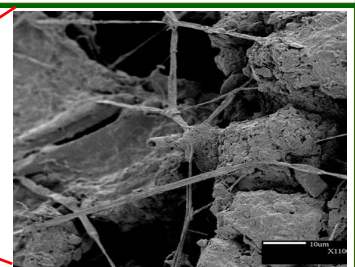
Source:
 Bill McGill, UNBC



Soil sample showing roots, soil aggregates and surface litter.



With magnification, we can see sand grains (blue), soil aggregates coated with humus (black) and pores between and within aggregate (white).



Looking even closer, we see fungi growing across open dry spaces between wet spots; they decompose plant material when it's too dry for plants to grow.

4. What species are best suited?

Before this question can be answered we first have to understand what plants, both desirable and undesirable, are already on the site, and why they are there. *(For excellent plant identification tools, see the references to the right, especially the last 5 on the list.)*

By digging up plants, and we can more closely examine their leaves, stems, seed heads and roots. Through discussions with resource people in our midst, we can become more sensitized to what stories the plants are trying to tell us.

A key tool at this point in the discussions, are using test results from soil, tissue or feed analysis.

Plant species have all different adaptive advantages for specific site conditions. Examples of this are drought tolerance, winter hardiness, flooding tolerance, ability to survive in saline, acid or alkaline soils.

Species will also have different adaptive advantages to how the seed is placed. For example, there are species such as timothy and clover that can be broadcast; while other larger seeds like many of the larger grass seeds are better suited to sites where they can be seeded or placed with good soil to seed contact.

Several references are good tools for deciding which species are best suited. The Alberta Forage Manual rates each of the species for many adaptations. The BC Rangeland Seeding Manual summarizes the ratings for 47 agronomic and native species in tables on pages 112 to 115. *(see the photos of the covers of these 2 favorite references below and the citations to the right).*

Plant Books & Resources

Aasen, A. & M. Bjorge. 2009. Alberta Forage Manual. Alberta Agriculture & Rural Development, Edmonton, AB.

Dobb, A., S. Burton. 2013. Rangeland Seeding Manual for British Columbia. B.C. Min. Agri., Sust. Agric. Mgmt. Branch, Abbotsford, B.C.

Gerling, H.S. et al. 1996. A guide to Using Native Plants on Disturbed Lands. Alberta Agric., Food & Rural Dev., Edmonton, AB.

Johnson, D., L. Kershaw, A. MacKinnon, J. Pojar. 1995. Plants of the western boreal forest and aspen parkland. Lone Pine Publishing, Vancouver, B.C.

Moisey, D., C. Hincz, C. Stone and D. Lawrence. 2010. Guide to Common Northern Rangeland Plant Communities and Their Management. Rangeland Management Branch, Land Division, Alberta Sustainable Resource Dev., AB.

Note: Additional guides for upland and slope grassland/shrub communities are available through: <http://esrd.alberta.ca/lands-forests/grazing-range-management/range-plant-community-guides-stocking-rates.aspx>

Northeast Invasive Plant Committee. 2010. Peace Liard Re-vegetation Manual. Dawson Creek, BC.

Stone, C. and D. Lawrence. 2000. Northern Range Plants. Alberta Agric. Food & Rural Dev., Edmonton, AB.

Stone, Colin, M. Willoughby, & A. Rosendal. 2007. Guide to Range Plant Community Types and Carrying Capacity for the Peace River Parkland Subregion in Alberta. Edmonton. Alberta Sustainable Resource Development and Agriculture and Agri-Food Canada.

Tannas, K. 2001. Common Plants of Western Rangelands. Alberta Agric., Food & Rural Dev., Edmonton, AB.



Part of a Series: This forage fact is one of a series produced during the Soils & Forages Courses Project .

Weed Websites

Peace River Regional District:
<http://prrd.bc.ca/services/invasive-plants/>
 Invasive Species Council of BC:
www.bcinvasives.ca/

Field Guide to Noxious and Other Selected Weeds of BC:
www.agf.gov.bc.ca/cropprot/weedguid/weedguid.htm

Seed Analysis Labs

Seed Check Technologies Inc.
http://www.seedcheck.net/seedcheck_contact.htm

Bio Vision Seed Labs
<http://www.biovision.ca/>

Foster's Feed and Seed
<http://www.fosterseed.com/>

5. Are the selected species available in the Peace?

The next step in successful seeding is sourcing the desired species that you want to seed. The best choice is to check if these seeds are available in the Peace. Seed grown, processed and graded in our region is likely to be best suited for the local climate, drainage and soil conditions. Weed tolerances and grading will also more closely align with our priorities. The Forage Seeding Webtool listed below helps the user choose the appropriate species, build a mix and find out which seed suppliers in our region have the selections in stock.

6. What tools are online?

There are many online tools to assist in better seeding decisions. Soils maps (*discussed on pg 1*) are available on line. It is possible to study soil properties and classification through UBC Virtual Soils Courses. If weeds are an issue there are many websites available (*with a few favorites to the left*). Getting a seed analysis to ensure its purity, grade, germination is current and to know what weeds are present in the batch. The list at the left provides a great starting point for our region. When you get to the stage of making up a seed mix, there are several calculators on line through our webtool or AB Agric.'s Ropin' the Web.

Authors' On Line Favorites

Soil Maps for Peace Region Available: <http://sis.agr.gc.ca/cansis/publications/surveys/bc/index.html> OR www.env.gov.bc.ca/soils/sift.html
 Managing Grey Wooded Soils by W. Pettapiece, J. Robertson & D. Anderson: www.prairiesoilsandcrops.ca/articles/volume-3-10-print.pdf
 Fertilizer Management for Forages by S.S.Malhi, K.S. Gill, D.H.McCartney & R.Malmgren: [www.foragebeef.ca/\\$foragebeef/frgebeef.nsf](http://www.foragebeef.ca/$foragebeef/frgebeef.nsf)
 Good Treatment of Rhizosphere Including Photos: www.nature.com/scitable/knowledge/library/the-rhizosphere-roots-soil-and-67500617
 Microbe-Plant Root Interactions: <http://web.science.uu.nl/pmi/publications/PDF/2012/TiPS-Berendsen-2012.pdf>

Forage Seeding Webtool: www.peaceforagetool.ca

UBC Virtual Soils Courses: <http://soilweb.landfood.ubc.ca/>

www.peaceforagetool.ca

soilweb.landfood.ubc.ca/processes/GSP.htm

Quote from workshop

"I liked the excellent tools at the workshop today. There were both 'old school' and 'cutting edge' choices. "
Matthias Loeseken,
Blackbird Environmental

Key Messages

During the field days and workshops, repeatedly the key take home messages were what we learned from each other. The power of the diverse perspectives during the interactions among forage producers, researchers, reclamation consultants, teachers, students and agrologists was the most important tool for more successful seeding. We discovered "true experts in our midst".

Compiled by: Sandra Burton, Bill McGill & Vicki Moser in March 2015.
With Contributions from: Bill Wilson, Julie Robinson & Richard Kabzems & Keith Carroll & all station masters, mentors, participants of the soils & forages courses.
Interactive Soils, Forages & Water Dynamics Courses Project Funded by:
 Shell Canada, UNBC, Peace River Agriculture Development Fund