

Cariboo Agricultural Research Alliance: Launch and Extension Resources Project

Final Report



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Acknowledgements

We would like to acknowledge the Steering Committee for their work in organizing and delivering the *Cariboo Agricultural Research Alliance (CARA) Launch and Extension Resources* project. In particular, we would like to acknowledge the time and energy provided by the Cariboo Cattlemen's Association in administering this project, as well as the guidance provided by the BC Agriculture and Food Climate Action Initiative; the support of these organizations was instrumental to the project's success.

Much of the content and the activities were based on previously completed projects, including the *Cariboo Regional Agriculture Research Alliance/Organization Project*, and materials provided by the Steering Committee, and their continual efforts to engage and support the Alliance is greatly appreciated. We would also like to thank all those who attended the Regional Applied Research Workshop, and to all of the researchers who contributed to the content of the workshop and the fact sheets developed in this project.

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The Governments of Canada and British Columbia are committed to working with industry partners. Opinions expressed in this document are those of Industrial Forestry Services Ltd. and not necessarily those of AAFC, the Ministry of Agriculture or the Investment Agriculture Foundation.

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1.0 Project Background

The increase in variability of conditions across the seasons that is projected to occur with climate change will increase the complexity of management for agriculture. Local research, including evaluation of technologies, practices and production systems, will support producers with managing through a range of conditions. Effective sharing of research results and knowledge transfer was identified as a high priority for Cariboo producers.

Completed in June of 2017, the *Cariboo Regional Agriculture Research Alliance/Organization* project resulted in a model for a sustainable regional research alliance to engage the Cariboo region's entire agriculture sector and partners in agricultural research. The model that was identified as the best fit for the Cariboo region is a university or college led and producer-directed alliance model. This project brought key groups together to identify their priorities and potential roles and contributions. This project also compiled and organized existing Cariboo-focused information and research.

The *CARA Launch and Extension Resources* project aimed to take the additional steps required to support the initial development phase of the Alliance, to solidify the partnerships and to put in place the "infrastructure" for the Alliance to achieve its mandate.

1.1 Project Objectives

The overarching goal of the project was to strengthen the capacity of agricultural operations to manage through variable conditions. As such, there were four objectives to this project:

1. To refine and promote the Cariboo Agriculture Research Database;
2. To share the findings of recently completed local applied research;
3. To formally launch the Cariboo Agricultural Research Alliance; and
4. To build local capacity and resources to maintain the Alliance.

These objectives were met by completing the following activities:

1. Database refinement, policy and promotion
 - a. Review compiled documents for relevance and quality
 - b. Digitize and/or add any relevant missing documents
 - c. Edit and categorize database materials
 - d. Develop criteria and policy for adding to the database.
 - e. Identify priority database resources for further knowledge transfer
 - f. Develop and promote a one-page user guide to explain how to access and use the database
 - g. Develop succinct outreach materials to explain the CARA vision, outcomes and near-term activities
 - h. Develop an outreach plan for additional mechanisms to promote the database (e.g. website, social media, via industry associations etc.)

2. Applied research fact sheets and/or summaries
 - a. Identify (and confirm with CARA Steering Committee) three specific topics for fact sheets
 - b. Develop three applied research fact sheets/summaries (including input from key experts and local partners).
 - c. Develop an outreach and distribution plan for the fact sheets
3. CARA Infrastructure
 - a. Develop a draft and final Joint Venture Agreement (including roles and responsibilities, mandate, contributions, terms for membership etc.)
 - b. Coordinate confirmation and signing of Agreement with partner groups
 - c. Confirm and establish any other specific committees such as the steering committee and a research and extension committee
 - d. Identify and apply for funding to sustain CARA and hire a coordinator.
4. Winter Workshop and Meeting
 - . Work with BC-ACARN (Agricultural Climate Adaptation Research Network) to co-coordinate a regional workshop to share local research.¹
 - . Tie the workshop presentations to the 3 fact sheets developed as a part of this project.
 - . Coordinate a winter CARA Steering Committee meeting to confirm CARA infrastructure, administration, fill volunteer roles, and to review and confirm work plans and funding plans.

2.0 Project Outcomes

2.1 Cariboo Agriculture Research Database

One of the priorities of the Cariboo Agricultural Research Alliance is developing a publicly accessible database of previous agriculture research conducted in the region. Having a collection of these documents centralized will help inform producers, will provide needed context for future projects, and will ensure that valuable information is not lost and research is not repeated unnecessarily.

Database Refinement

The Mendeley Database had a substantial number of documents (500+) uploaded at the start of the project. Through this project, the documents were organized into folders (cross-referenced into multiple categories, if applicable) and provided with 'tags' (e.g. keywords) to make it easier for users to search

¹ This is connected to the ACARN workplan activity to *Develop a series of regional level workshops and field days to bring together researchers and agricultural producers*

the database and find relevant documents. Documents were analyzed for utility, and any broken files, replicated files or files that did not match the criteria were deleted throughout this process. Other online libraries (e.g. Climate Action Initiative) were consulted when developing the categories for the database. The database is sorted into 10 overarching categories (listed below), each with numerous sub-categories for ease of locating resources.

- Agroforestry and Native Plants
- Extension Resources
- Forage and Rangeland
- Livestock, Poultry and Bees
- Management Practices
- Policy, Planning and Economics
- Research Documents
- Research Summary Reports
- Vegetables, Greenhouses and Novelty Crops
- Wildfire Preparedness and Mitigation

Database Policy and Outreach Development

A User-Guide to use the database was also developed (Appendix A), and provided to the CARA Steering Committee (SC) for beta-testing. While the Mendeley system was selected (prior to this project) because it was free of cost, several challenges appeared during the beta-testing, which led the SC to question the utility of the Mendeley platform. The primary concern is that a maximum of 25 people can join a private group on Mendeley (which is the type of account that the CARA Database was organized under originally), and while there is a group type that allows unlimited participants, it is not currently possible to switch group types. Therefore, to make the Database broadly accessible, a new group would need to be created and the documents would need to be re-uploaded. Transferring to a new Mendeley group is a labour-intensive process and has thus been postponed until a thorough analysis of alternatives to Mendeley are considered by the Steering Committee.

During the planning of the Applied Research Workshop and the development of the Factsheets, numerous new documents were added to the Database (e.g. full reports for the tomato variety study, the heritage potato study, soil quality test kit, Cariboo Priority Pest Project documents, etc.).

A draft outline of the criteria for documents to be added to the Database has been developed, but not approved by the SC. It has been acknowledged that criteria will include: 1) allowance for historically relevant commodities, such as Dairy; 2) agriculture research conducted within the Cariboo Regional District; 3) agriculture research conducted in neighbouring regions *if* the region exhibits similar climatic condition and/or commodities; and 4) the document has been published from a reputable source.

A 20-minute presentation was given at the Applied Research Workshop on the Database, to showcase the number of documents that have been collected and the potential use of the tool. It was demonstrated how to use the online-format of the Database, as well as the Desktop Application, and how to search for documents and use various features of the database. The current challenges of the Database were pointed out, but there was still enthusiasm from the participants about the concept and indicating that there will be a high level of interest once the technical issues have been resolved. After the workshop, six participants requested to join the group, making a total of 12 members currently accessing the database. Please see the text box (below) for Next Steps Identified.

CARA Identity Development

A brochure outlining CARA's vision, outcomes and short-term activities was developed in draft (Appendix 2). The printing and distribution of the brochure has been delayed until a final logo, a dedicated website, and long-term coordinator email contact can be developed, and final approval from the Steering Committee received at the spring SC meeting (to be scheduled for April 2018). Once completed, the brochure will be provided to each partnering organization to have on hand for distribution at their future events.

The coordinator gave presentations about CARA at two events: 1) at the Kersley Farmers' Institute AGM (~20 people) in November 2017, and 2) at the Cariboo Cattlemen's Association AGM (~50 people) in February 2018. CARA was also discussed at the BC Agricultural Climate Adaptation Research Workshop in December 2017, by a partnering organization (BC Forage Council) during the Industry Research Priorities Panel.

In order to develop CARA's identity, a promotional plan has been outlined. The first step will be to develop a dedicated website for CARA that would host all the critical information and activities for the Alliance, including pages dedicated to the Database, a future Events Calendar, contact information, and more. It may be possible to utilize a platform that would incorporate the database directly onto the website, which will be explored further in the near future (see below, 'Next Steps'). Through the website and a URL, a permanent email for the CARA Coordinator will be developed (e.g. coordinator@cara.ca), to ensure consistency with how to contact the organization in the future. A set of potential logos was developed during this project, and one was chosen to move forward with, but will require refinement (Appendix 3).

Next Steps Identified

With some of the challenges experienced with using Mendeley as a Database, it was decided that a more in-depth analysis is needed to determine which platform would be best suited (e.g. user-friendly, affordable, and easy to maintain) for the database. Therefore, a more detailed assessment of potential platforms to host the database will be conducted and reported upon, allowing SC to determine the best way to move forward. This analysis also relates to the question of where to host the Alliance's future website.

2.2 Applied Research Factsheets

There have been several recent research projects throughout the Cariboo Region, and beyond, that did not have the capacity to engage with the broader agriculture community. Developing detailed, concise summaries in the form of Factsheets or Research Summaries will help the results of local and relevant research to reach more producers.

Potential factsheet topics were developed by evaluating existing topics covered in the database, by reviewing *Cariboo Regional Agriculture Research Alliance/Organization* project report, and by discussing topics with the Steering Committee (SC) members. These topics were narrowed down based on 1) access to the research documents (e.g. some archived documents were difficult to secure, or new projects lacked published results), 2) commodity representation and 3) relevance to the Cariboo region. The three topics selected for factsheets were (Appendix 4):

- Soil Quality Test Kit: An applied tool to assess soil physical, chemical and biological health on the farm.
- Yield, pH and sugar content of tomato varieties grown in unheated greenhouses in the North Cariboo
- Cariboo-Chilcotin forage variety trials (2009-2012)

Fact sheets were printed and distributed at the CARA Launch and Applied Regional Workshop, as well as the Cariboo Cattlemen's Association AGM (Feb. 16, 2018). The factsheets have been uploaded onto the CARA Database and will eventually form part of a larger set of knowledge transfer resources.

Next Steps Identified

The next steps for distributing the Factsheets will be to have them available online (CAI's website, CARA's future website), promoted on social media (through all partner organizations), and to be physically available at future research and extension activities of partner organizations, and promoted through e-mail list-serves of partner organizations. In addition, the work plan for the next phase of CARA activity included developing of approximately 3 more fact sheets per year to extend out relevant and engaging research results.

2.3 CARA Infrastructure

Based on the proposed set of stakeholders identified through the previous project, letters requesting representation for the Steering Committee (SC) were sent to nine organizations. Over the duration of this project, we successfully gained seven new SC members (Table 1).

Table 1. List of CARA’s Steering Committee members, as of Feb. 15, 2018. (Alternate representatives listed in italics.)

Agriculture Industry Associations	
Rob Borsato	District H Farmers’ Institute
David Zirnhelt	Cariboo Cattlemen’s Association
Cordy Cox	Cariboo Cattlemen’s Association
Lynda Atkinson	Kersley Farmers’ Institute
Wylie Bysted	Central Interior Poultry Producers Association
Sheri Schweb (<i>Mike Doherty</i>)	Sheep Federation
Sheri Schweb (<i>David Clarke</i>)	BC Forage Council
Emily MacNair	BC Agriculture and Food Climate Action Initiative
Samantha Charlton	BC Agriculture and Food Climate Action Initiative
Government Agencies	
Nicole Pressey	BC Ministry of Agriculture
Erica Nitchie	BC Ministry of Agriculture
Joan Sorley	Cariboo Regional District
Universities	
Gillian Watt	Thompson Rivers University
Mark Barnes	University of Northern British Columbia
Sorin Pascal	College of New Caledonia

Despite various communications efforts, representation from two agriculture industry groups is still lacking and desired (Cariboo Growers Co-op, and the South Cariboo Agri-Culture Enterprise Centre), as well as First Nation representation. Meaningful engagement of the local First Nations, including the Carrier Chilcotin Tribal Council, the Southern Dakelh Nation Alliance, the Tsilhqo’in National Government and the North Shuswap Tribal Council, and their associated Bands, is required in order to ensure inclusive representation within the Alliance. Therefore, this engagement and outreach was identified by the Steering Committee as an essential priority in the next stage of CARA’s development.

The Terms of Reference for the Steering Committee was updated and expanded upon during the project. Additionally, a proposed organizational structure (Appendix 5) and a draft Memorandum of Understanding (MOU) (Appendix 6) were developed and presented at the in-person Winter SC Meeting on Feb. 14, 2018. Both documents were reviewed and agreed upon in principle, but due to the absence of four SC members, the documents were not officially approved, and were therefore tabled for the next meeting.

2.4 Winter Workshop and Meeting

The CARA Launch and Regional Applied Workshop was held on February 14, 2018 at the Pioneer Complex in Williams Lake, BC (Appendix 7). The workshop included concurrent sessions for ranching and farming, with additional presentations on the Cariboo Agricultural Research Alliance, the BC Agriculture Climate Adaptation Research Network, an update on the Cariboo Priority Pests Project and a demonstration of the Cariboo Agriculture Research Database (Appendix 8). The workshop also included interactive engagement sessions, where participants were encouraged to discuss how to build upon the research already completed, and other research needs for the region. A total of 52 people participated in the workshop, which included 35 producers, 5 First Nations representatives, 5 government representatives (regional and provincial) and 7 researchers. The concurrent sessions had relatively similar number of participants (~24-26), with some participants moving between the two rooms.

Figure 1. Workshop participants learning about BC Agriculture Climate Adaptation Research Network from coordinator Jason Lussier, and the possible collaborative opportunities between CARA and BC ACARN.



Workshop Promotion

Key to the success of the workshop, and to the initiation of Cariboo Agricultural Research Alliance, was ensuring a high level of producer attendance to the event. The Cariboo Region has experienced exceptionally high numbers of information and engagement sessions over the winter of 2017-2018, due to the severe impacts of the 2017 wildfire season. A poster advertising the event (Appendix 7) was sent electronically through a distribution list developed from earlier CARA work, as well as through partnering organization's mailing list. Additionally, a Facebook Event was created by the Climate Action Initiative, and the event was mentioned in three editions of the Williams Lake Tribune.

Workshop Presentations

The Ranching Session included the following three presentations:

1. "On-farm Soil Quality Test Kit: Applicability for the Cariboo Region," by Serena Black, University of Northern BC. Abstract: In agriculture, soil quality is assessed through its capacity to support strong, sustainable yields. Producers have a strong understanding of the chemical aspect to soil health (e.g. nutrients, pH, CEC, etc.), but measuring physical and biological traits of soils can provide the big picture, and potentially explain plant growth issues or concerns. The Soil Quality Test Kit can provide that link; the USDA first developed the kit for annual cropping systems in Iowa. To determine which aspects of the kit would be most valuable to local producers, UNBC researchers partnered with producer associations to test the kit in predominantly perennial systems throughout the Bulkley Valley (2015) and in the Peace River (2015-2017). This presentation provides an overview of the Bulkley Valley Project, including detailing the utility of the test kit, and how it might be adapted for use in the Cariboo-Chilcotin Region.
2. "Cariboo Silvopasture Demonstrations: Planning for Silvopasture Applications on Private Land," by Allen Dobb, Allen Dobb Consulting. Abstract: The Cariboo Silvopasture Demonstrations were initiated by cooperating landowners and the BC Ministry of Agriculture to build and transfer knowledge about silvopasture applications among agriculture producers, private landowners and natural resource professionals. This presentation will describe the demonstrations and highlight some considerations for planning silvopasture applications on private land that were identified through the demonstration experience.
3. "Management Intensive Grazing," by Dr. Lauchlan Fraser, Thompson Rivers University. Abstract: Land management can impact whether soils are carbon sources or sinks. Rangelands provide us with necessary ecological goods and services, which can be affected by grazing management practices. We compare soil carbon between intensively managed (IM) and extensively managed (EM) pastures at several different ranch locations throughout the British Columbia Interior. Total carbon (TC) was found to be 28% greater under IM and organic carbon (SOC) averaged 13%

greater when compared to EM. Soil carbon varied significantly by depth and management, with greatest TC and SOC levels occurring closest to the soil surface (0-10 cm). TC was found to be significantly greater under IM practices in deeper soil depths (10-30cm) when compared to EM suggesting a greater carbon sequestration potential under IM. Research suggests that IM is a viable strategy for climate change mitigation if land use changes occur on a large scale.

The Farming Session included the following three sessions:

1. “Using plastic film mulches and low tunnels for crop protection and season extension in the Cariboo Region of BC,” by Hughie Jones, PhD Candidate, University of British Columbia. Abstract: Crop producers worldwide are facing challenges and opportunities associated with climate change and variability. In Canada, increased temperatures may provide opportunities for new types of crops, increased growing-season length, and increased crop productivity due to the generally low mean annual temperatures, but water deficits may offset potential crop productivity gains in some regions. With the support of the Farm Adaptation Innovator Program our team at the Biometeorology and Soil Physics Group, UBC aim to evaluate commercially available plastic films for their ability to enable crop producers to adapt to regional climate variability and change (e.g., soil moisture preservation, soil and atmospheric temperature alteration, and increased crop production). The field research for this project was performed at three certified organic farms: UBC Farm (Vancouver, BC), Mackin Creek Farm (Near Soda Creek, BC) and Crophorne Farm (Westham Island, BC).
2. “Crop-Climate Project: Heritage Potato Field Trials for Climate Change,” by Dr. Richard Hebda, University of Victoria; Valerie Huff, Botanist & Plant Ecologist, Nelson, BC. Abstract: Climate change is underway and threatens Canadian and global food security. Future climates in central BC will likely support a wider diversity of crops. The Crop-Climate Project uses farmer-scientists in different regions of Canada to observe the growth of heritage varieties of potatoes different climatic conditions. Using in-field instruments and climate stations we recorded weather data while observing the growth and yield of heritage and conventional potato varieties. Several little-known heritage varieties performed as well or better than commercial types. A unique BC potato from Likely in the Cariboo was “uncovered” and is now available disease-free from the Fredericton Research and Development Centre of Agriculture and Agri-Food Canada. This project promotes Dispersed Adaptation to climate change. It takes advantage of the power of the “many eggs in many baskets” approach.
3. “Tomato Varieties Grown in Unheated Greenhouses in Northern BC,” by Jennifer Catherall, College of New Caledonia. Abstract: Horticulture and agriculture are becoming increasingly viable and important in our region due to strong consumer demand for locally grown foods and a focus on economic diversification in our communities. There is currently a lack of scientific

research specific to northern regions around best practices and viability of commercial tomato production in unheated greenhouses. The project set out to determine i) the best varieties tomatoes to grow in unheated greenhouses in the north, ii) whether consumers actually prefer the taste of heirloom over greenhouse hybrids varieties, and iii) whether tomato quality/yield ratios differ between plants grown above ground in pots or those grown in the ground. Four different types of tomatoes were tested: greenhouse hybrid, heirloom, paste and cherry. Sugar content (Brix %), pH, yield, pest/pathogen occurrence and taste data was collected. The greenhouse hybrid group had the highest yielding varieties. Tomatoes grown in the ground were found to be slightly less acidic than those grown in pots. Some varieties exhibited a difference in sugar content depending on growing method. Several tomato varieties were preferred in terms of texture, flavour and appearance. Results from this project provided information that is applicable to small-scale tomato production in Quesnel area as well as other areas in the north.

Figure 2. Workshop participants in the Farming Session, listening to Hughie Jones present on *Using plastic film mulches and low tunnels for crop protection and season extension in the Cariboo*.



Workshop Engagement Sessions

One of the goals of the Applied Research Workshop was to initiate a discussion with producers in order to identify potential research projects, to help CARA outline near-term activities that could be undertaken. The initial engagement sessions occurred at the end of the concurrent session presentations; participants were encouraged to think about the presentations and suggest natural “next steps” from these projects, and/or suggest other areas of research that should be considered.

The second engagement session occurred in the afternoon. The plan was to have the topics identified earlier in the day to be transferred to chart paper and posted around the room; participants would be encouraged to move to the topic they were most interested in to discuss the concept further, and identify research question(s) and resources on that topic. Due to a shortage of time for the final discussion, the list of research topics and needs were presented to the participants as a whole, then participants were asked to record their own notes (vs. working as a group). Specific topics developed during the afternoon engagement included:

- Fire-recovery research (*mentioned in four groups' notes*)
 - Recovery of heavy disturbed soils (e.g. from fire guards) and burnt soils
 - Re-seeding of forage in burned/disturbed rangeland
 - planting trees vs natural re-vegetation effect on forage quality
- Approaches to reducing impact of increased wind on farming and ranching operations (*mentioned in two groups' notes*)
- Crop Diversity/Development
 - Potato research at long-term research plot
 - Frost-resistant green crops and fall planting
- Greenhouses
 - Passive heating (e.g. compost); biofuel heating
 - Underground or Chinese style greenhouses on increasing R-factor
- Alternative Forage Management Practices to revitalize older hay and pasture fields (*mentioned in 5 groups' notes*)
 - Specifically in a no-tillage system, and without the use of chemical inputs
 - Specifically looking at soil health associated with such practices
 - Using Management Intensive Grazing (MiG) techniques
 - trial other livestock with MiG (e.g. pigs, sheep).
 - use of MiG on bog meadows/peat meadows; how to reduce arrowgrass on wet meadow peat soils.
 - Exploring permaculture principles as could be adapted into MiG and ranching

Though time was short, workshop participants were eager to engage and provide feedback to help inform CARA as it works towards developing a Strategic Plan for Regional Research. Several participants stayed after the conclusion of the workshop, and followed up with the Coordinator directly on several ideas in the days following the workshop.

Winter Steering Committee Meeting

An in-person Steering Committee meeting was organized for the afternoon, following the Applied Research Workshop (Appendix 9). The meeting was focused on confirming organizational structure,

finalizing contractual agreements (e.g. Terms of Reference and Memorandum of Understanding), reviewing how the workshop went, and discussing the next phase of work in more detail. Due to unforeseen circumstances, several members were unable to attend the meeting; and poor weather conditions required the meeting to end early. Therefore, items were discussed but final decisions were tabled until the next meeting (scheduled for April 2018). However, progress still was made on all the items on the agenda.

Workshop Evaluation

Recruitment of participants largely was the result of connecting with people individually and discussing the event; this was accomplished through individually connecting with contacts provided by partnering organizations, as well as Steering Committee members reaching out through their networks and other meetings they attended. Having these direct connections and trust within the community is important to the success of any future workshop or activity. Initially, participants were hesitant to commit to the workshop without a defined agenda and this is something that should be confirmed and presented with hand-out materials in advance. Once it becomes a more established event, Save-the-Dates should be provided in early fall to producers, which will also help coordinate with other events (e.g. association AGM's, webinars, etc.).

With more than 50 people in attendance, the CARA Launch and Applied Research Workshop can be considered a success for the Alliance. Producers who attended showed enthusiasm during the research presentations, and were also eager to discuss the future role and responsibility of CARA as an organization within the region. It is clear that in the future there should be more time in the agenda allocated to allow producers to network with those in the room (e.g. not limiting lunch to 30 minutes; allowing for longer breaks between sessions).

Next Steps Identified

The Applied Research Workshop should become an annual or bi-annual event for CARA, as producers are eager to interact with researchers and with each other. The best timing appears to be late January or early February for such an event; and the location could move throughout the region to allow diversity of participation.

The workshop may not be the best format to engage with researchers, and it is worth considering alternative formats that would connect producers and researchers directly, to share interests and discuss potential projects. Such an activity would benefit CARA in organizing its Strategic Plan for Regional Research and Extension.

3.0 Future CARA Activities

The most pressing next step for the Cariboo Agricultural Research Alliance is to secure additional funding so that it can continue with its core functions. As such, three funding proposals are being developed to be submitted in February – April 2018. The Kersley Farmers' Institute has agreed to administer the funding for the next stage of CARA, the *CARA Extension and Research Development Project*, which will hopefully be carried out over the next two years (2018-2020). The core activities that will be addressed with this project funding include:

- Regional applied research workshops and field days
 - Pest Management Workshop(s);
 - Field Days on Assessing Soil Health;
 - 3 Regional Workshops: Implementing BCFC's Guide to On-Farm Demonstration Research
- Formalize CARA's Scientific Advisory Committee
 - Establish a CARA's list of research priorities for the Cariboo Regional District and draft CARA's Strategic Plan for Research;
 - Develop a minimum of 1-3 research project proposals, with committed research teams.
- Communication/Extension Services Development
 - Develop a dedicated Website and Social Media presence for CARA;
 - Develop regional agriculture events calendar that would gather news and events from all our participating members to share throughout the region;
 - Continued development on Cariboo Agriculture Research Database;
 - 3 Fact Sheets on regional, applied research projects per year (based on topics identified during CARA Launch and Workshop Project).
 - .
- First Nations community engagement
 - Establish partnerships with local bands to ensure their representation on the Steering Committee;
 - Incorporate their needs and priorities into CARA's Strategic Plan;
 - Identify a minimum of one applied research project, coordinate a research team, and apply for funding.

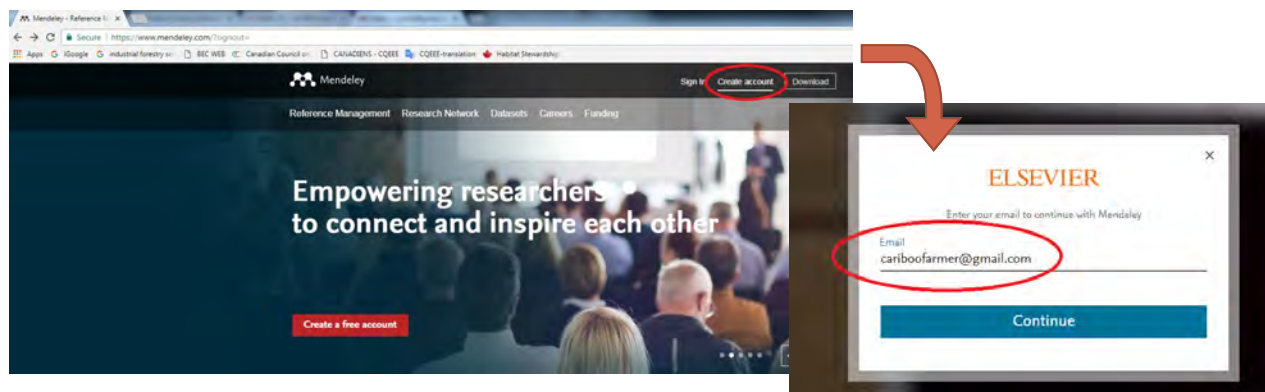
Funding applications to support these activities will be submitted to: Investment Agriculture Foundation (General intake); the Cariboo Strong Community Grant; and the Beef Cattle Industry Development Fund.

Appendix 1: Cariboo Agriculture Research Database User-Guide

Cariboo Agricultural Research Alliance Research Database User Guide

GET STARTED:

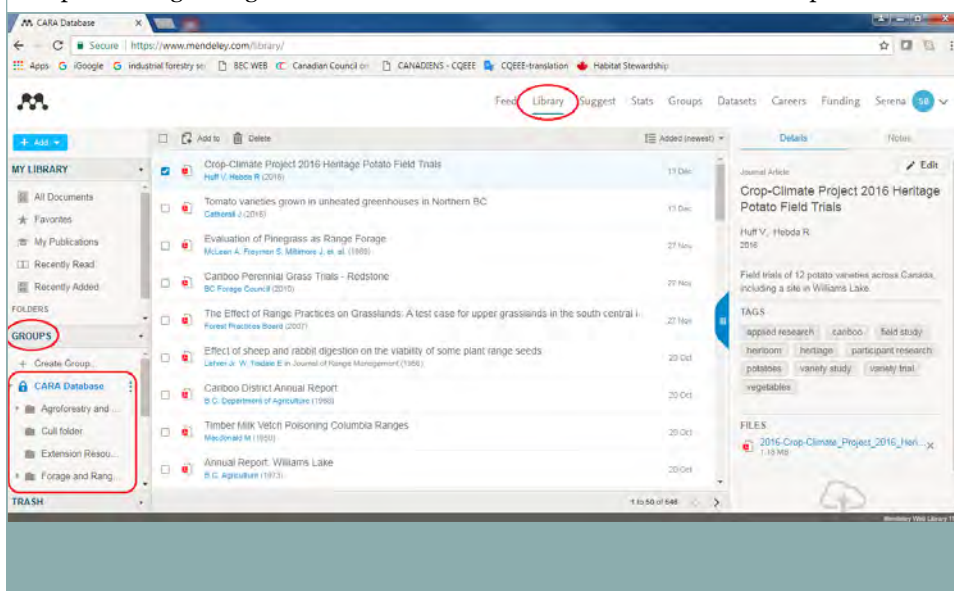
- 1) Go to www.mendeley.com.
- 2) Create a FREE account, using your preferred e-mail address.
- 3) Search for “CARA Database”, and request to join the group. (It’s set up as an invite-only group, to ensure documents are not accidentally deleted or altered.)



ACCESSING THE DATABASE FROM THE WEB

You do not have to download the Desktop Application to use the CARA Database. Once you have signed in online, simply click the “Library” tab at the top of the page. On the left hand side, you will panel titled “Groups” (it may be hiding down towards the bottom of the page to start with).

Once you click on Groups, listed underneath will be the **CARA Database**. (NOTE: The group will appear after you have been approved to join, so there may be an initial delay). Click on the link, and you’ll enter the Database itself. Here, you can browse through the documents available. Once you choose a document, more details will appear on the panel along the right side of the screen. Double click the document to open it.



ONLINE TUTORIALS

Mendeley has several **Video Tutorials** about how to use the different features of the website. Check it out:

www.mendeley.com/guides/videos

ADDING CONTENT TO THE DATABASE

If you have a publication that you would like to share through the database, please send the documents to the CARA Coordinator, at [insert email].

USING THE FOLDERS

The documents in the Database have been sorted into various categories, to make it a little easier to find what you are looking for. Some documents fit into numerous categories, and may be found in multiple sections. These broad categories may be subdivided further, and you can see the sub-categories simply by clicking on the main category.

Broad Categories include:

- | | |
|---------------------------------------|---|
| ⇒ Agroforestry and Wild/Native Plants | ⇒ Policy, Planning and Economics |
| ⇒ Extension Resources | ⇒ Research Summary Reports |
| ⇒ Forage and Rangeland | ⇒ Vegetables, Greenhouses and Novelty Crops |
| ⇒ Livestock, Poultry and Bees | ⇒ Wildfire Preparedness and Mitigation |
| ⇒ Management Practices | |



Can I search the CARA Database using a keyword?

Yes you can, if you are using the Desktop Application (see Page 3 of this Guide).

Unfortunately, Mendeley does not currently allow you to active “Search” the Database while you are using it online. They are aware of this problem, and said that they are working to have this feature available in the future. So keep a look out for it!

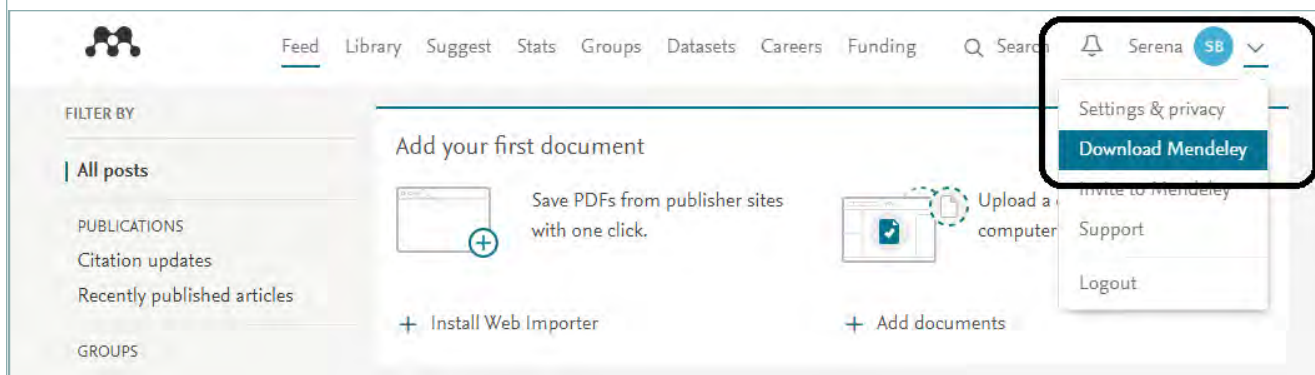
DOWNLOADING THE DESKTOP APPLICATION

To access the Database offline, you can also download the Desktop Application (~55MB of space is required); once you’ve signed in online, click the arrow next to your name on the top right of the screen.

Then you can use the Desktop Application the same way you would online.

Identical to the Website version, the group folders are located along the left panel of the screen. In the middle panel, make sure to click on the “Documents” tab to see the list of documents. The search function is found in the top right hand side of the screen. You can also filter documents by Tag, Keyword or Publication, by using the filter function on the bottom of the left hand side of the panel.

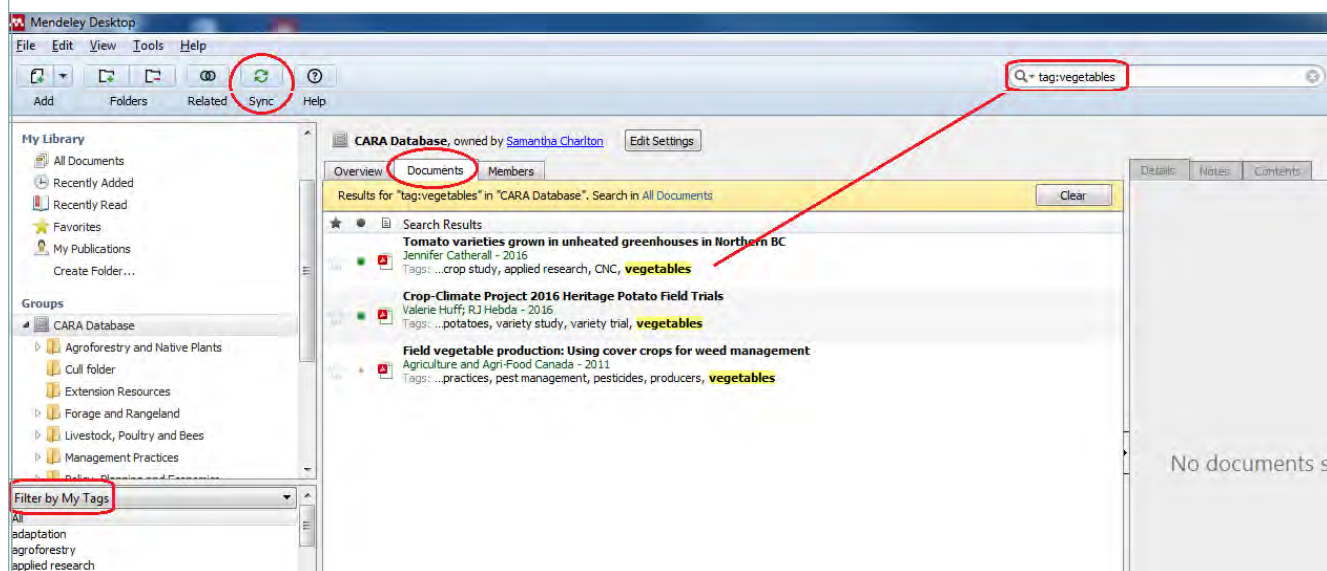
Finally: don’t forget to “Sync” your Desktop Application every once in a while when you are online, to make sure you have access to latest documents added to the Database. (All of the latest documents will be shown automatically if you are accessing the Database through the website.)



SEARCH THE DATABASE ON THE DESKTOP: KEYWORDS & TAGS

You can search the entire Database by typing a keyword into the search bar, located on the top right corner of the screen. Once you find a document you are interested in, double click on the document, and a new screen tab will open. These open searches will search all the parts of the document, including author, title, abstract and the full document itself.

You can get more specific results by searching the Database using the 'Tag' feature. Each document entered into the Database was given multiple Tags, to make them easier to find (for example, 'Cattle', 'Vegetables' or 'Weeds'). To search by a documents Tag, you use the same search bar, but you start by typing in '**tag:**' before the word, with no spaces. (For example, '**tag:vegetables**').



ABOUT CARA

The Cariboo Agricultural Research Alliance (CARA) was officially launched in early 2018, with a goal of becoming the steward of applied agriculture research in the Cariboo Regional District. More than 32 organizations have expressed interest in working with CARA, including industry groups, local organizations, government agencies, First Nations communities and academic institutions.

The objectives of CARA are to:

- ⇒ Provide leadership on agriculture applied research problems and encourage collaboration between producers and their associations
- ⇒ Provide extension and technology transfer opportunities, including increasing access to local and new knowledge
- ⇒ Provide Cariboo farmers and ranchers with opportunities to grow and sustain their operations, particularly in response to climate adaptation needs.

The CARA Database was one of the initial projects of the Alliance, aimed to increase producer access to relevant, local research.

There's an App for that?


There is an App for Android and iPhone users—and it takes up about 17.89MB of space. You can search within the Database, and documents that you are interested in can be downloaded individually. Be careful about your Data usage! The app does tell you the size of each document, which should help you keep track.

Appendix 2: CARA Informational Brochure

AGRICULTURE IN THE CARIBOO

As of 2016, the Cariboo has a total of 1,411 farms, averaging 332ha in size. The region's gross revenue is over \$106 million.

Production in the Cariboo is primarily cattle, sheep, horse, poultry, forage, cereal and vegetable crops, among other niche crops.



Cariboo Agriculture Research Alliance

CARA Coordinator:
Serena Black

Phone: 250-564-4115 loc233
Fax: 250-563-9676
E-mail: info@cara.ca

This brochure is funded in part by *Growing Forward 2*, a federal-provincial-territorial initiative.

Growing Forward 2

Climate Action Initiative
BIOLOGICAL
CULTURAL
Canada

Environment Canada
Agriculture and Agri-Food Canada
ardcorp

Cariboo Agricultural Research Alliance





Who's involved?

CARA is an umbrella organization, working with industry associations, local organizations, government agencies, first nation communities and academic institutions.

Currently, the Steering Committee includes representation from:

- ⇒ District H Farmers' Institute
- ⇒ Cariboo Cattle men's Association
- ⇒ Kearsley Farmers' Institute
- ⇒ Central Interior Poultry Producers Association
- ⇒ BC Sheep Federation
- ⇒ BC Forage Council
- ⇒ BC Agriculture & Food Climate Action Initiative
- ⇒ BC Ministry of Agriculture
- ⇒ Cariboo Regional District
- ⇒ Thompson Rivers University
- ⇒ College of New Caledonia
- ⇒ University of Northern BC

OBJECTIVES & GUIDING PRINCIPLES

CARA was developed to provide farmers and ranchers with access to research results, help set regional priorities and provide coordination for programs and projects which are important to multiple commodity sectors.

CARA's objectives are to:

- ⇒ Provide leadership on applied research projects;
 - ⇒ Provide localized extension and technology transfer opportunities;
 - ⇒ Manage and steward applied research reports and data, while providing access to them; and
 - ⇒ Provide the Cariboo region's farmers and ranchers with benefits and opportunities to grow and sustain their operations.
- CARA's guiding principles include:
- ⇒ Be producer-led and responsive to regional agriculture and food research needs;
 - ⇒ Leverage the efforts of local partner organizations for mutual benefits;
 - ⇒ Build a resilient agricultural system that can adapt to a changing climate.

EXTENSION & RESOURCES

One of the strongest tools a farmer has to make informed management decisions is access to relevant, local information.

As such, CARA aims to help increase the extension and resources available to Cariboo producers.

CARA is in the middle of developing a free online database that includes 500+ documents related to Cariboo agriculture—from livestock health, to crop and variety trials, rangeland management, soil health, economics and more. For more information, contact the CARA Coordinator.

Moreover, CARA has developed three Factsheets on recently completed research (web link), and intends to produce additional fact sheets as current and future research is completed.



DRAFT

Appendix 3: CARA Draft Logo



Appendix 4: Factsheets



Cariboo-Chilcotin forage variety trials (2009-2012)*

C. Tucker¹, H. Starr², R. Kaufman³, H. Bayliff⁴, Dr. M.L. Swift⁵, Dr. S. Bittman⁶ and D. Hunt⁷

Cariboo Agricultural Research Alliance



The BC Forage Council conducted the variety trials to provide producers with data on new forage varieties, so producers could select the most suitable varieties for their specific agronomic conditions. The study established four research sites across the Cariboo-Chilcotin, and tested new varieties of perennial grasses and legumes, as well as non-traditional legume crops sainfoin and birdsfoot trefoil, and varieties of annual crops. This factsheet focuses on the legume trial results of the study.

Study Objectives

- To test new forage legume varieties of alfalfa and clover to specific agronomic conditions (e.g. varying soil conditions, irrigation vs. dryland) and evaluate their performance;
- To test non-traditional forage legumes, such as sainfoin, and evaluate suitability;
- To improve BC forage producers ability to select the most economically viable forage crops for the changing growing conditions throughout the Cariboo-Chilcotin region.

Geographic Applicability

This study was conducted in the Cariboo-Chilcotin, but may be applicable in the surrounding areas that exhibit similar growing conditions.

Commodity Relevance

This study was conducted on alfalfa, sainfoin and clover, but may be applicable to other forage legumes.

Timeline

2009-2012

¹ Project Lead, Producer, Director of BC Forage Council

² Producer and Research Participant, Miocene Ranch.

³ Producer and Research Participant, Dunlevy Ranch.

⁴ Producer and Research Participant, Chilancoh Ranch.

⁵ Research Analyst, Trowe Nutrition Canada

⁶ Research Scientist Agriculture and Agri-Food Canada.

⁷ Biologist, Agriculture and Agri-Food Canada.

*Funding and support for this research was provided in part by: IAF, NDIT, CIDC and local producer associations.

Key Findings

- It is possible to establish legume crops within the Cariboo region, including areas where it is traditionally thought not possible.
- Livestock, particularly cattle, may cause significant damage to young plants through trampling and/or heavy grazing. Keep livestock off these fields during sensitive seasons.
- It is recommended that producers start with a clean seed-bed before starting legume forage crops.
- Wildlife (e.g. deer, elk) may cause significant damage to fields; while reportedly a rare issue, monitoring wildlife activity is recommended.

Table 1. Williams Lake, BC weather station data for 2010-2012. (Elevation 940m) Source: climate.weather.gc.ca

Williams Lake Weather Station	2010	2011	2012
Mean Annual Temperature (°C)	5.5	3.7	5.3
Mean Summer Temperature (°C) (May-July)	12.7	11.4	12.9
Total Annual Precipitation (mm)	298.8	522.6	393.9
Total Summer Precipitation (mm) (May-July)	95.5	289.4	173.8

Climate Adaptation Implications

Many crop varieties are developed outside of the Cariboo region; therefore, it is necessary to evaluate newly released varieties to determine their suitability to local conditions. Finding varieties that can provide sustained yield over numerous years and under stress conditions, would help contribute to a resilient, economically thriving livestock industry within the Cariboo-Chilcotin region.

Design

This project was conducted on 4 sites located across the Cariboo-Chilcotin:

- *Williams Lake*: High-elevation with irrigation
- *Miocene*: High-elevation dryland without irrigation
- *Redstone*: Mid-elevation with irrigation
- *Kaufman*: River bottom with irrigation

Each site contained variety plots and samples were collected from 4 sub-plots in each field. Harvest was conducted on the same date at all sites for comparison purposes.

Limitations

Two sites were lost: William's Lake due to excessive weed issues, and Miocene due to deer damage. Therefore, limited data from those sites were gained, and data reflects conditions of river bottom site with sandy gravel only. It is preferred to have 3-5 years of data for accurate variety evaluation.

Next steps

To build on this work further and ensure quality data collection, a key next step would be to establish long-term permanent field sites, in conjunction with acquiring localized climate data. More research is also needed to measure Nitrogen fixing capacity of various legumes in these trials, and developing mixed species trials, particularly in areas with significant weed pressure.

Climate change may enable the growth of crops previously believed to be unsuitable (e.g. like legumes in the Cariboo). Developing local crop and variety trials provides producers with valuable information, and reduces the producers' risk of trying new practices. A key to this adaptation is comparing past yield results (Fig. 1 and Table 2) to the climate data from the trial years (Table 1), and compare to more recent weather/climate trends to determine suitability.

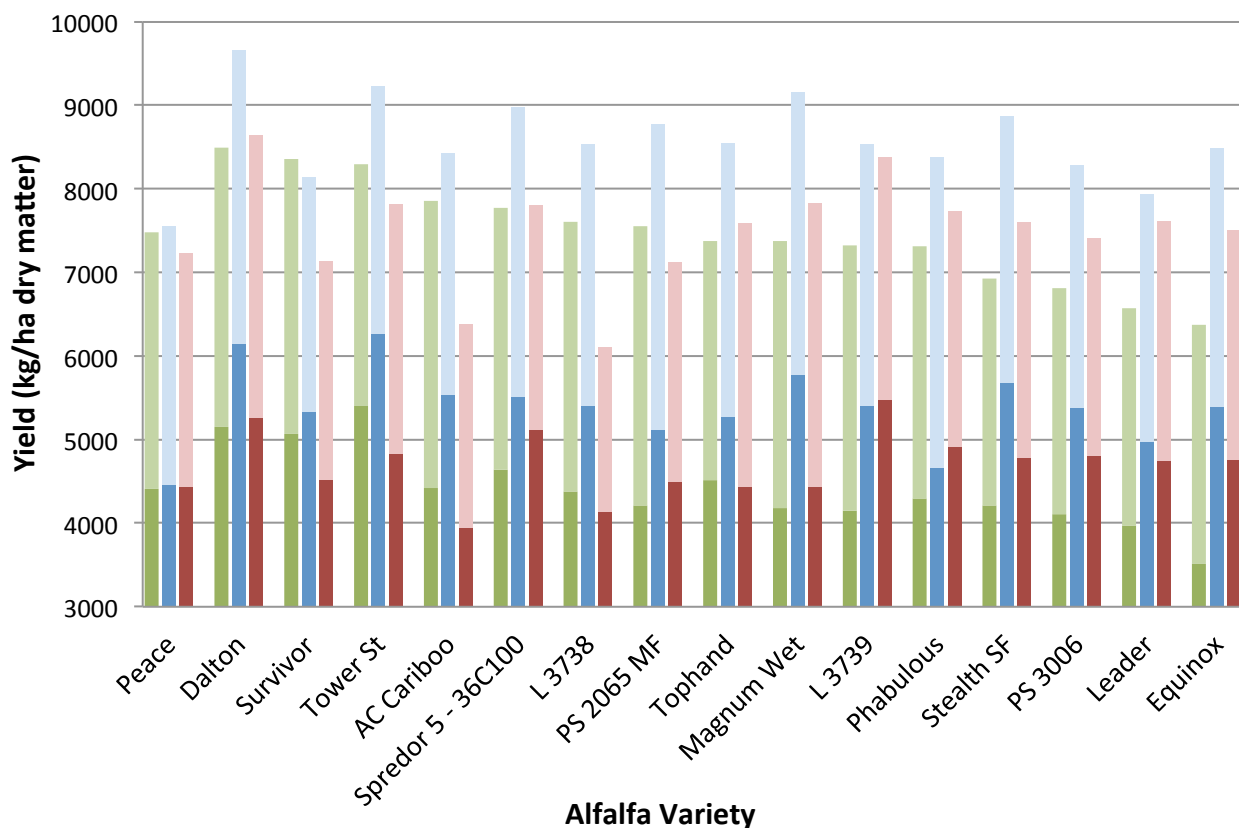


Figure 1 (above). Alfalfa yield data from the Kaufman Site (sandy gravel, river bottom) in Soda Creek, BC. 'Peace' was the check variety used in the trial.

Table 2 (right). Non-traditional legume yield from the Kaufman Trial Site for 2011, in Soda Creek, BC.

Non-traditional Legume Yield (kg/ha dry matter)			
	Cut 1	Cut 2	Total
<i>Sainfoin</i>			
LRC 3401	5312	-	5312
LRF 3519	6038	-	6038
<i>Birdsfood Trefoil</i>			
Bull	4036	-	4036
Leo	4426	-	4426
<i>Cider Milkvetch</i>			
Oxley	4937	-	4937
Veldt	4693	-	4693
<i>Clover</i>			
Altaswede Red			
Clover	5557	4494	10051
Tempus DC Red			
Clover	5612	2066	7678
Dawn Alsike	5012	-	5012
Aurora Alsike	4361	-	4361

Links

The complete set of data, including grass variety trial and annual crop trial portion of this research, is available on the CARA Database, as well as at the BC Forage Council's website:

<http://www.bcforagecouncil.ca/page/>

For weather data, climate adaptation information, weather based farm calculators and more, visit Farmwest:

www.farmwest.com

Funding and support for this factsheet was provided by:



Climate Action Initiative
BC AGRICULTURE & FOOD

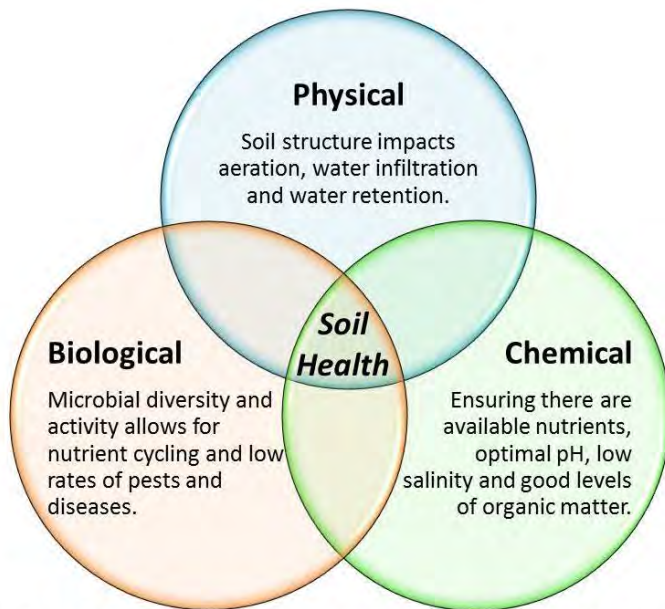




Soil Quality Test Kit: An applied tool to assess soil physical, chemical & biological health on the farm*

Serena Black¹, Dr. Bill McGill², and Dr. Scott Green³

Cariboo Agriculture Research Alliance



*Modified from a diagram from Forage Facts #95 from the Peace River Forage Association of BC

In agriculture, soil quality is assessed through its capacity to support high, sustainable yields, and mitigate pests and disease. Producers have a strong understanding of the chemical aspect to soil health (e.g. nutrients, pH, CEC, etc.), but measuring physical and biological traits of soils can provide the whole picture, and help explain plant growth issues or concerns. The Soil Quality Test Kit can provide the support that is needed to make this link; the kit was first developed by the USDA for use in annual cropping systems in Iowa.

To determine which aspects of the kit would be most valuable to local producers, UNBC researchers partnered with producer associations to test the kit in predominantly perennial systems throughout the Bulkley Valley (2015) and in the Peace River (2015-2017). This factsheet outlines how these test kit might be adapted for use in the Cariboo-Chilcotin Region.

Geographic Applicability

The soils test kit was evaluated on 35 different agriculture fields in the Bulkley Valley, and can be adapted for any location.

Commodity relevance

Most of the fields analyzed were in perennial cropping systems (e.g. forage), but the kit was originally designed for annual cropping systems.

Study Objectives

- Determine the utility of the Soil Quality Test Kit for on-farm soil quality assessments;
- Determine which soil quality traits can be easily measured and provide the most useful information to producers;
- Develop baseline soil health data for the Bulkley Valley producers.

¹Research Associate, University of Northern British Columbia, Prince George. Current affiliation: Science Research Specialist, Industrial Forestry Service.

²Professor, Ecosystem Science and Management, University of Northern British Columbia, Prince George.

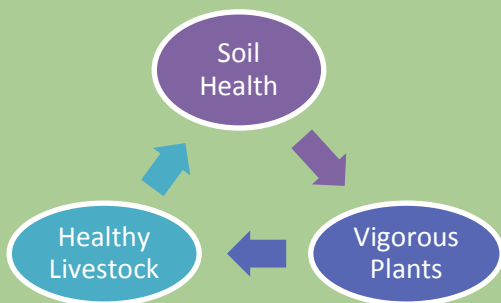
³Associate Professor, Ecosystem Science and Management, University of Northern British Columbia, Prince George.

*Funding and support for this research was provided in part by the **Omineca Beetle Action Coalition**, **Investment Agriculture Foundation**, and the **Smithers Farmers' Institute**.

Key Findings

- **Soil quality field kit – is best used to analyze soil physical and biological characteristics, such as bulk density, water infiltration, soil respiration, and aggregate stability.**
- The field kit is easy to use and provides valuable information, but initial training with the kit and continued support in analyzing results is necessary.
- Within the sample region, soil quality varied significantly between fields and within fields. Understanding the quality of your soil will better inform management decisions.
- The soil test kit does NOT replace, but complements, professional lab testing for nutrient levels and pH values.

Key Message:



Definitions

Bulk Density: the weight of the soil for a given volume, measuring how much compaction there is in the soil.

Water Infiltration: The rate at which water enters the soil, influenced by soil structure and soil texture. Compacted soils have less pore space, and lower infiltration rates.

Soil Respiration: the production of carbon dioxide from the biological activity of soil roots, microorganisms, and soil fauna.

Soil Aggregates: soil particles that are bound together to make clumps, impacting bulk density and moisture retention.

Design

Bulkley Valley – researchers partnered with the Smithers Farmers' Institute and worked with 12 producers to measure soil quality at 35 agricultural fields around the region.

Peace River – researchers partnered with the Peace River Forage Association of BC, and utilized the kit to help measure soil health traits under different management systems.

Soil Test Kit: Limitations

- 1) Time Restraints – the best time to collect data coincides with the busy times on the farm – planting and/or harvesting. Strategic planning is important.
- 2) Organic Matter – a guide to help identify humus layer development would increase the utility of the kit.

Next steps

To bring this tool to the Cariboo, the first step required would be to build the “next generation” Soil Quality Kit. From this study, we suggest the kit **must** include:

- Bulk Density Test
- Water Infiltration Test
- Soil Respiration Test
- Aggregate Stability Test

The second step would be to design a project to implement the soil test kit in an applicable research project that provides training opportunities on how to use, and analyze the results, of the kit.

Climate Adaptation Implications

Soil impacts all producers and a healthy soil can improve **soil water retention**, **reduce erosion**, and provide **reliable yields**. Adopting management strategies that improve soil health will help the farm adapt to changing climatic conditions, and maintain economically viable operations.

Farm:			
Field:			
	Indicator	Site	Rating
Physical Traits	Structure Index	Soil Pit	12.50
	Infiltration (2nd rate - in/hr)	J-01	6.49
		J-02	1.00
		J-03	3.75
	Bulk Density (g/cm3)	J-01	0.91
		J-02	1.23
		J-03	1.05
	Aggregate Stability %	J-01	53.75
		J-02	47.33
		J-03	47.72
Chemical Traits	Electrical Conductivity (dS/m)	J-01	0.06
		J-02	0.04
		J-03	0.06
	pH	J-01	6.09
		J-02	6.22
		J-03	6.43



Figure 1 and 2 (Above). Pictures of the infiltration test (above left) and an soil sample with good aggregation (above right).

Figure 3 (Left). Sample Soil Report developed from data collected with the Soil Test Kit (except for the Organic Matter). A minimum of three locations per field were sampled separately. **Green=good, Yellow=moderate, Orange=needs improvement.**

The project developed an easy Excel worksheet that translates raw data collection into final numbers, and colour codes the results. This allows producers using the kit to have a final “report card” for a field. Since a minimum of three sites (e.g. ‘J-01’, ‘J-02’ and ‘J-03’) are sampled per field, producers are also able to identify variation of soil quality throughout a single field.

For more information:

To conduct additional soils tests (e.g. water holding capacity, organic matter), contact NALS:

<https://www.unbc.ca/northern-analytical-lab-service>

Original USDA Guide:

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=nrcs142p2_053873

Smithers Farmers’ Institute: Final Project Report

<http://www.smithersfarmersinstitute.com/unbc-soils-health.html>

Peace River Forage Association of BC has in-depth Fact Sheets on assessing soil quality based on their use of the kit that are extremely informative:

- **#95: Soil Quality Field Kit: Part I**
http://www.peaceforage.bc.ca/forage_facts_pdfs/FF_95_Soil_Quality_Part_I.pdf
- **#96: Soil Quality Field Kit: Part II**
http://www.peaceforage.bc.ca/forage_facts_pdfs/FF_95_Soil_Quality_Part_I.pdf
- **#106: Soil Quality for Resiliency**
http://www.peaceforage.bc.ca/forage_facts_pdfs/FF_106_Soil_Quality_for_Resiliency_jaf6.pdf
- **#107: Soil Water and Resiliency**
http://www.peaceforage.bc.ca/forage_facts_pdfs/FF_107_Soil_Water&Resiliency_aif6.pdf

Funding and support for this factsheet was provided in part by *Growing Forward 2*, a federal-provincial-territorial initiative:





Yield, pH and sugar content of tomato varieties grown in unheated greenhouses in the North Cariboo (2016)*

Jennifer Catherall¹ and Anien Maree²

Cariboo Agricultural Research Alliance



The goal of the research was to provide information that will help all growers with tomato production in Quesnel and in the north, thereby opening doors for future projects centered on small-scale food production in the region. Horticulture and agriculture are becoming increasingly viable and important in our region, and there is currently a lack of scientific research specific to northern regions around the best practices and viability of commercial tomato production in unheated greenhouses.

Geographic Applicability

This study was conducted in the North Cariboo (Quesnel), but is applicable to any unheated greenhouse operation in the Cariboo.

Commodity relevance

This study was conducted on tomatoes, and may not have relevance to other greenhouse commodities such as peppers or cucumbers.

Timeline

2016

Study Objectives

To determine:

- The best tomato varieties to grow in unheated greenhouses in the north;
- Whether consumers prefer the taste of heirloom over greenhouse hybrid varieties;
- Whether tomato quality/yield ratios differ between plants grown above ground in pots or those grown in the ground.

¹ Instructor, College of New Caledonia, Quesnel Campus

² Research Technician, College of New Caledonia, Quesnel Campus

*Funding and support for this research was provided by:

NSERC Engage Grant

Design

Plants were grown in unheated greenhouses at the College of New Caledonia Quesnel Campus (in pots) and EdgeWood Farm (in the ground) in the summer of 2016.

Four types of tomatoes were tested:

- 1) Greenhouse hybrid (GH)
- 2) Heirloom (H) & Heirloom hybrid (HH)
- 3) Paste (P)
- 4) Cherry (C)

Growth, disease and pest occurrence (for data, see “Links”), sugar content, pH and taste preference were tested.

Limitations

Yield data from the EdgeWood greenhouse could not be obtained due to difficulties in separating study plants from the U-Pick commercial plants.

Due to abnormal cool, humid days during the study year, there was a increased amount of disease occurrence.

Next steps

Based on the results of this study, the team moved into a second year of research focused on the effect of soil moisture content (%) on tomato Brix sugar content (%). The findings of those studies will be made available in the spring of 2018.

Key Findings

- The Greenhouse hybrid group had the highest yielding varieties.
- Tomatoes grown in the ground were found to be slightly less acidic than those grown in pots.
- Some varieties exhibited a difference in sugar content depending on whether they were grown in ground or in pots.
- Golden cherry (C), CobraF1 (GH), New Girl (GH), Giant (GH), Russian Oxheart (H), Perfect Flame (HH) and Roma (P) were the preferred varieties in terms of overall taste.

Table 1. The highest yielding varieties of each type of tomato were (yield data of all varieties found under “Links”).

Type	Variety	Yield
Cherry	Mountain Magic	7.0kg
	Sweetheart	5.6kg
Greenhouse hybrids	Early Girl	12.0kg
	Premio	11.5kg
	Ultra Boy	11.5kg
Heirloom & Heirloom hybrids	Perfect Flame	9.5kg
	Big Brandy	7.4kg
Paste	Big Mama	8.1kg

Climate Adaptation Implications

Unheated greenhouses extends the growing season, requires less energy inputs, and helps produce more predicable yields. Producers need to find varieties that are best suited to their growing conditions, and are resistant to pests and diseases. In greenhouses, space is limited, so varieties that are chosen must produce and taste good.

Table 2. The pH and Brix Sugar Content (%) of cherry, greenhouse hybrid, heirloom and heirloom hybrid, and paste tomatoes grown in unheated greenhouses in the ground (at Edgewood Farm, Quesnel) and in pots (CNC Quesnel Campus). For a complete list of varieties tested, refer to the complete research summary (under “Links”).

	pH		Brix Sugar (%)	
	Ground	Pot	Ground	Pot
<i>Cherry</i>				
Bumblebee	4.20	3.92	6.5	6.0
Mountain Magic	4.30	4.33	6.5	6.5
Red Candy	4.20	4.16	7.8	5.0
Sun Gold	4.14	4.19	8.5	9.5
Sweet Heart	4.23	4.21	7.5	8.5
Tomatoberry	4.24	4.24	7.5	7.0
<i>Greenhouse Hybrid</i>				
Cobra F1	4.30	4.12	5.0	5.0
Early Girl	4.35	4.12	6.0	5.5
Giant	4.23	4.15	5.0	5.0
New Girl	4.41	4.12	5.0	5.5
Pink Cupcake	4.30	4.25	4.8	5.0
Premio	4.22	4.07	5.5	5.5
Ultra Boy	4.34	4.22	5.0	5.5

	pH		Brix Sugar (%)	
	Ground	Pot	Ground	Pot
<i>Heirloom and Heirloom Hybrid</i>				
Bonny Best	4.33	4.20	6.8	6.0
Cherokee Purple	4.24	4.23	5.0	5.0
Old German	4.54	4.21	5.0	5.0
Perfect Flame	4.10	4.05	5.5	5.5
<i>Paste</i>				
Big Mama	n/a	4.16	n/a	5.0
Roma VF	n/a	4.16	n/a	5.0
San Marzano	n/a	4.29	n/a	5.5
Supremo	n/a	4.25	n/a	5.0

***Table only showing varieties grown in both locations. Bolded values denote that the variety has either the lowest pH (most acidic) or the highest Brix sugar content (%).**

Links

The complete research summary may be found on this link:

<http://www.cnc.bc.ca/Assets/Applied+Research/Tomato+Notes.pdf>

Follow these links for additional CNC Applied Research Projects:

www.cnc.bc.ca/research/Projects.htm

Tomato Variety Options for Heated and Unheated Greenhouse Production:

<http://www.johnnyseeds.com/growers-library/vegetables/protected-culture-greenhouse-trials-recommended-varieties.html>



Funding and support for this factsheet was provided by:

Appendix 5: Proposed Organizational Structure

DRAFT Proposed Organizational Model



Appendix 6: Draft Memorandum of Understanding

Memorandum of Understanding (MOU)

This agreement dated for reference the X day of February 2018.

Between:

[Administrative Lead], on behalf of the Cariboo Agricultural Research Alliance (CARA)

-and-

BBBB

Areas highlighted are aimed to allow the template to be adapted for each participant, and outline specific details/commitments.

Whereas:

1. CARA and BBBB have developed strategic plans outlining their respective mission statements, values and strategic directions;
2. CARA is committed to providing leadership on agriculture applied research problems and access to local and new knowledge;
3. CARA is committed to engaging with a broad range of agricultural producers;
4. CARA is committed to providing extension and technology transfer opportunities within the agriculture sector;
5. CARA is committed to building partnerships in order to be innovative, resourceful, and responsive to the agricultural community needs;
6. BBBB is committed to working in partnership with CARA and all of their partnering organizations that will help further their mission;
7. BBBB is committed to *[insert specific in-kind contribution. Eg. administering research projects; providing office space; providing communication with membership; etc.]*
8. CARA and BBBB share co-terminus service areas;
9. CARA and BBBB are committed to establishing structures and processes that enable creativity, innovation and resilience;

Therefore, the parties agree as follows:

- A. To execute this Memorandum of Understanding as an enabling agreement to formalize a long-standing and historical partnership.
- B. To profile the partnership with regional, provincial, and national policy and funding organizations.
- C. To seek opportunities to use a CARA – BBBB partnership to further research, and innovation within the Cariboo-Chilcotin region and beyond.
- D. To designate a lead from each organization, to provide leadership to the initial planning and development of any research and innovation projects through participation on the *Steering Committee and/or other committee*.
- E. To proactively seek funding to support the partnered approach to applied research and innovation from traditional and non-traditional funding organizations.
- F. To seek opportunities to broaden the partnership and to share knowledge, experiences, and expertise with other jurisdictions with similar interests.
- G. To seek opportunities to partner and share knowledge with other organizations focused on improving the enhancing research and innovation in the region.

In Witness Whereof the parties have executed this agreement for a 5-year period, as of the date set out below:

Date:	Date:
Cariboo Agricultural Research Alliance	BBBB
Name:	Name:
Title:	Title:
Signature:	Signature:



What:

This **FREE** 1-day workshop will:

- ⇒ Launch the Cariboo Agricultural Research Alliance (CARA);
- ⇒ Share information regarding recent applied agricultural climate change adaptation research completed in the Cariboo region, including topics such as **soil health, vegetable crop trials, forage and range management, emerging pest issues**, and more;
- ⇒ Develop strategies to expand upon the research completed to date;
- ⇒ Discuss and prioritize regional research needs;
- ⇒ Introduce the province-wide BC Agricultural Climate Adaptation Research Network, and discuss how to contribute to the development of provincial research initiatives.

When:

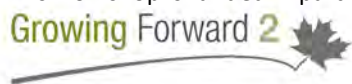
Wednesday, February 14th 2018
8:30a.m. to 2:30p.m.
(Lunch is provided)

Where:

Pioneer Complex
351 Hodgson Road
Williams Lake, BC

Please **RSVP** to Serena Black, CARA Coordinator: sblack@industrialforestry.ca
or 250-564-4115 loc233

This workshop is funded in part by *Growing Forward 2*, a federal-provincial-territorial initiative.



Climate Action Initiative
BC AGRICULTURE & FOOD





Cariboo Agricultural Research Alliance: Launch & Applied Research Workshop

Presenters:

- ⇒ Andrew Pantel
Pantel Environmental Consulting
- ⇒ Allen Dobb
Allen Dobb Consulting
- ⇒ Dr. Lauch Fraser
Thompson Rivers University
- ⇒ Dr. Richard Hebda
Royal BC Museum
- ⇒ Hughie Jones, MSc
University of British Columbia
- ⇒ Jennifer Catherall
College of New Caledonia
- ⇒ Serena Black
University of Northern BC

Topic:

- ⇒ Resilient Livestock Water Development
- ⇒ Silvopasture Demonstration Project
- ⇒ Intensive Grazing Systems
- ⇒ Heritage Potato Field Trials
- ⇒ Protective Vegetable Field Crop Covers
- ⇒ Tomatoes & Unheated Greenhouses
- ⇒ On-Farm Soil Quality Test Kit

Additional Presentations:

- ⇒ BC Agricultural Climate Adaptation Research Network: An introduction
- ⇒ Project Update: Emerging Pests in the Cariboo
- ⇒ CARA Database Demonstration

Please **RSVP** to Serena Black, CARA Coordinator: sblack@industrialforestry.ca
or 250-564-4115 loc233

This workshop is funded in part by *Growing Forward 2*, a federal-provincial-territorial initiative.



Climate Action Initiative
BC AGRICULTURE & FOOD



Appendix 8: Applied Research Workshop Agenda

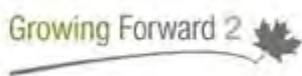
Cariboo Agricultural Research Alliance: Launch & Applied Research Workshop

Pioneer Complex, Williams Lake

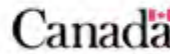
February 14, 2018

DRAFT Workshop Agenda		
08:30	Coffee/Registration	
08:45	Welcome & CARA Presentation	
09:05	Concurrent Presentations	
	<i>Ranching</i>	<i>Farming</i>
	On-farm Soil Quality Test Kit: Applicability for the Cariboo Region – Serena Black , <i>University of Northern BC</i>	Using plastic film mulches and low tunnels for crop protection and season extension in the Cariboo Region of BC – Hughie Jones , <i>PhD Candidate, University of British Columbia</i>
9:45	Break	
10:05	Cariboo Silvopasture Demonstrations: Planning for Silvopasture Applications on Private Land – Allen Dobb , <i>Allen Dobb Consulting</i>	Crop-Climate Project: Heritage Potato Field Trials for Climate Change – Dr. Richard Hebda , <i>University of Victoria</i>
10:45	Management Intensive Grazing – Dr. Lauchlan Fraser , <i>Thompson Rivers University</i>	Tomato varieties in unheated greenhouses in Northern BC – Jennifer Catherall , <i>College of New Caledonia</i>
11:25	Feedback & How to Move Forward	Feedback & How to Move Forward
12:00	Lunch	
12:45	BC Agricultural Climate Adaptation Research Network (ACARN) Presentation – Jason Lussier , <i>ACARN Coordinator</i>	
1:05	Emerging Pests in the Cariboo: Project Update – Samantha Charlton , <i>BC Agriculture and Food Climate Action Initiative</i>	
1:15	CARA Database Demonstration – Serena Black , <i>CARA Interim-Coordinator</i>	
1:30	Interactive Session: Future Research Project Development	
02:30	Closing Comments	

This workshop is funded in part by *Growing Forward 2*, a federal-provincial-territorial initiative.



Climate Action Initiative
AN ADAPTATION IN FOOD



BC Agricultural Climate Adaptation
Research Network

Appendix 9: Steering Committee In-Person Meeting Agenda

Cariboo Agricultural Research Alliance Steering Committee In-person Meeting Agenda

Feb. 14th, 3:00-5:00p.m. @ Pioneer Complex, Williams Lake

1. Welcome and Introductions (5 minutes)
2. CARA Organizational Structure (50-60 minutes)
 - a. Steering Committee
 - i. Representation
 - ii. Chair – appointment?
 - iii. Meeting Schedule
 - b. CARA Structure
 - i. Executive Committee
 - ii. Science Review Committee
 - iii. Extension and Education Committee
 - iv. Events Committee
 - c. Administrative Lead
 - i. Non-Profit Organization vs. Academia
 - d. General Membership
 - i. Required? Purpose? Fees?
 - e. Finalize Terms of Reference
3. Memorandum of Understanding (30 minute)
 - a. Review template MOU for each participant group
 - i. Delivering Agents (e.g. Local Organizations, BC Industry Organizations, Government, First Nations)
 - ii. Researchers (e.g. Academic Institutions)
4. Next Steps (30-40 minutes)
 - a. Workshop Debrief
 - i. What went well? What could have been approved?
 - ii. Annual activity of CARA?
 - b. Near-term activities/initiatives
 - i. regional research priorities (based on workshop discussion, CAI work)
 - c. Long-term CARA Priorities/Strategic Plan
 - d. Funding opportunities and update
 - i. review current proposed project

Closing Remarks (5 minutes)