



Over the **Fenceline**

Summer 2021

Battle River
Research Group

www.battleriverresearch.com



Regenerative, Organic, Conservative agriculture



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UPCOMING EVENTS



SUMMER 2021 TOUR
This year WheatStalk is travelling to

Forestburg, AB hosted by Battle River Research Group
Thursday, August 12, 2021
9:00 AM to 12:00 PM

Additional tour stops include:
Westlock, AB | Oyen, AB | Falher, AB
Visit our Events page for dates and times

WheatStalk

Reserve your spot today!

Register for FREE on our Events page at albertawheatbarley.com
Limited quantities available. Pre-registration required.

Battle River Research Group | Alberta Wheat Commission

About this event:

The wheat centric field day, WheatStalk, is on its Summer Alberta Tour for 2021!

PRE-REGISTRATION IS REQUIRED TO ATTEND. ONLY 60 SPOTS AVAILABLE!

Join Alberta Wheat Commission and Battle River Research Group (BRRG) for WheatStalk - a day of agronomic learning and fun in the sun!

Sign up for to attend WheatStalk on August 12 in Forestburg to have a safe walk through various wheat trial plots.

All growers will be able to find useful information on the latest in wheat agronomy to implement on their farm.

Be one of the first 25 to pre-register for the event and get our famous wheat socks upon check-in!

SIGN UP HERE

BRRG WHEATSTALK PLOTS



OUR NEW HIRES



Karin Lindquist

Extension Environment Agrologist

Karin grew up on a mixed farm near Barrhead, AB with backgrounding/stocker beef steers, as well as growing barley and canola for feed and cash crop. Her interest in agriculture took her to the University of Alberta where she obtained a BSc in Agriculture with an Animal Science major. Though Karin graduated in June 2015, she has worked for the university as a research assistant both with the Rangeland Research Institute, and at the Breton Plots the following summer with crop and soil science research.

She also worked as a forage-beef specialist from Alberta Agriculture's Ag-Info Centre office in Stettler for over four years. She worked part-time as a general assistant for a large animal veterinarian.

All this experience has helped Karin develop a great passion for plant identification, rangeland and pasture management, grazing practices, forage and beef production, and the natural environment.



Alexander Olson BSc

Field Coordinator

Alexander Olson has a passion for biology and an interest in the ecosystems of Central Alberta. He has worked for two seasons in variety, efficacy, and magnitude of residue trials in the Alberta parkland. For 7 years previously, Alex repaired and maintained an expansive variety of machines.

Alex's passion for biology blossomed at the Camrose Augustana campus of the University of Alberta where he earned a Bachelor of Science degree in Biology. He grew up in the Camrose County which was also instrumental in his growing interest in agriculture. Alex lives in Camrose with his wife and their two daughters. They enjoy hiking, camping, and playing board games.

SUMMER STAFF 2021



Ava Moller

I'm Ava Moller. I grew up on a farm outside of Forestburg. I have always been interested in farming and grew up with it being a part of my life. I'm looking forward to attending Lakeland college in the Crop Technology program. I am excited to learn more in-depth detail about the industry.

Christopher Kapeller

Hi, I'm Christopher. I'm from Calgary and I'll be completing my final year of Environmental Science at the University of Calgary in the fall. I enjoy working in research, handling and recording data, and this is my first experience working in agriculture. My passion for scientific research and the desire to try new experiences brought me to Battle River Research, and I'm looking forward to learning all about the applied research process.

Jade Knodel

Hey I'm Jade! I am 20 years old and my family owns 7 horses. I grew up and graduated in Forestburg so it's great to be a part of the local community. Currently I am going to Lakeland college for my second year of my Animal Science Technology Diploma. I am thrilled to be a part of the team and hope to learn how we are improving the ag industry.

Ksenia Stromsmoe

Hey, I'm Ksenia Stromsmoe. I was raised on a cattle farm and have been in Equine 4-H for 10 years. I'm currently going into my 4th year at the University of Lethbridge for a Bachelor of Environmental Science. I have also graduated from Olds College in their Land and Water Resources diploma program. I hope to learn more about the processes of research groups and get some sun this summer!

Layton McMahon

I'm Layton McMahon. I am a 5th generation grain farmer from Galahad, AB. I am graduating from Forestburg High School in June and plan to attend Olds College for precision agriculture-techgromy program. Agriculture has always been a major aspect of my life, and having this job is a great way to be a bigger part of the industry and learn more about it.

ANNOUNCEMENT

Crop Walk 2021

The Battle River Research group established six research sites this year.

ALL THE BATTLE RIVER RESEARCH GROUP SITES ARE OPEN FOR VISITORS FROM THE 2ND WEEK OF JULY 2021.

To Visit any of the research sites or a guided tour, please contact:

Khalil Ahmed Ph. D, PAg

Manager and Crop Research Coordinator

manager@battleriverresearch.com

780-837-6274

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BRRG NEW RESEARCH PROJECTS

1. Impact of soil amendments on root-borne diseases, N uptake, soil health, and field crops productivity in four soil zones of Alberta

Over 90 percent of the acid soils in western Canada occur in Alberta (Agrifacts, 2002). Soil Acidification adversely affects soil health, nutrient availability, and the composition of the root exudates, which attract soilborne pathogens and caused root-borne diseases such as root rots in different crops (Fukui et al. 1994). It has been estimated that soil pH may be costing producers \$100/ac due to lost production and fertilizer inefficiencies. This problem may affect up to 20 million acres in western Canada (Elston Solberg, 2015). Soil acidity can be improved by applying lime or other acid-neutralizing materials. However, the efficiency of any soil amendments involves soil type, climate, and amendment properties. Most of the time, soil amendments need to be applied in large amounts to correct soil acidification. Applications of these amendments without knowing their suitability are not cost-effective for large-scale farmers.

The specific objective of this proposal is to assess and compare the impacts of four commonly known soil amendments applications on root-borne disease, N availability, crop productivity, and economic feasibility. This project will generate soil zone-specific information about the efficacy of each soil amendment critical to farmers. The research outcome will help producers make informed decisions about disease prevention, optimize N fertilizer rates, soil conservation, and enhance crop production.



Figure 1 Soil Amendment trial BRRG 2021 (wood ash treated plots)

2. Applying humalite for enhancing wheat and canola production and soil health

Humalite is a naturally occurring Humic substance containing organic matter, high concentrations of Humic acid, and low heavy metals due to its unique

freshwater depositional environment. Large deposits of this product are in the holdings of Prairie Mines and Royalty ULC (PMRU) southeast of Hanna, Alberta.

One of the main challenges is low nutrient use efficiency by crops (e.g., nitrogen) due to leaching, denitrification, and volatilization. Previous research has shown that inorganic fertilizer treated with Humic acid can significantly improve the soil nutrient availability and fertilizer use efficiency, nutrient uptake, root growth, shoot growth, nutritional quality, and yield.



Figure 2 BRRG Humalite plots 2021

Therefore, the objectives of this project are to:

- (1) Evaluate the effect of different humalite application rates on wheat and canola yield/quality;
- (2) Determine ideal application rates of humiliate in wheat and canola production systems;
- (3) Evaluate the effects of different humalite application rates on nitrogen use efficiency in different soil zones and plant nutrient uptake
- (4) And assess the effects of humalite on soil health parameters. The goal is to identify the ideal application rate for humilite and fertilizer, quantify how these rates affect yield and yield in wheat and canola, and the short-term effects on soil health.

3. Hemp as an alternative forage

Alternative cropping and improvement in soil health approaches continue to be on the rise. Hemp has been studied and used as cattle feed in different states of the U.S and other prairie provinces except for Alberta. In 1998, Saskatchewan researchers tested hemp in the chicken meal as ruminant and proved to be a suitable replacement for other ruminant sources. Later, another research conducted by University of Saskatchewan researchers revealed that hemp is a good source of protein as a cattle feed. In Alberta, hemp was tested as an industrial crop in different regions of the province. Hemp can be used as silage. In previous studies mixing hemp with corn silage, cows had improved weight gains. Hemp is a common crop in the Netherlands as it is an alternative to straw and is low in dust, and is very absorbent. One report in the popular press suggested that dairy cows fed hemp give a little more milk and seem to be healthy (journal of dairy science)., Currently, hemp has not been tested as a forage crop in the province.

Battle River Research team has taken the initiative to cultivate and test hemp varieties as forage alternatives. The Canadian agriculture partnership grant sponsors the project.

The objectives of this project are to:

Identify hemp varieties that are suitable for grazing. We will use three hemp varieties. These varieties have been chosen as they are genetically diverse and are known to be adapted to the environmental conditions of Alberta. The nutritional value of at different growth stages of the hemp plants will be compared with standard. We established the small research plot at Galahad at two different locations.



Figure 3 Hemp varieties emergence (BRRG, 2021)



WHAT BRRG IS UP TO:



WHY REFUSING LAND ACCESS TO THE ORPHAN WELL ASSOCIATION MIGHT BE A BAD IDEA

The Orphan Well Association (OWA) has fostered great relationships with landowners on sites where they execute work. However, occasionally, a few landowners feel that by restricting access to the OWA, they may create leverage to obtain overdue surface lease payments from defunct companies or the Land and Property Rights Tribunal (formerly, the Surface Rights Board). In fact, by refusing access to the OWA, landowners may be harming their ability to obtain payments and/or reduce the amount of payment they may ultimately receive. Let's look into this issue a little further.

What Happens When A Company Fails To Make Surface Rental Payments?

When a company fails to make annual lease payments, landowners may apply to the Tribunal to recover the missed payments by submitting a Recovery of Compensation Application under section 36 of the Surface Rights Act (SRA). After a complete application is received and the Tribunal is satisfied with the non-payment, the Tribunal will demand payment from the operator and any working interest participants (WIPs) identified and provide a deadline to comply. Following that, one of two scenarios play out.

- 1.If the operator or WIP responds within the deadline and provides proof of payment to the Tribunal, no further review of the application is necessary.
- 2.If the operator or WIP does not make payment within the deadline, a panel of the Tribunal will consider the application and any evidence provided by the parties in a hearing by written submissions. Following that, the Tribunal will issue a Decision and/or a Direction to Pay Order where it may direct the Minister to pay to the landowner the full amount claimed or a reduced amount. The Tribunal may also suspend and terminate the operator's rights to enter the site, other than for required maintenance or reclamation purposes.

Please Note: *Payments directed by the Tribunal and paid by the Minister come from provincial tax dollars and become a debt owing to the Crown from the operator and any identified WIPs.*

It's important to note that this does not terminate the lease or the operator's associated responsibilities for decommissioning (also known as abandonment) and reclamation.

Landowners may claim missed lease payments for subsequent years by submitting a Returning Recovery of Compensation Application with the Tribunal until a reclamation certification has been formally issued.

How Do Sites End Up In The Orphan Well Program?

Once companies stop making annual surface lease payments, as outlined above, there is a good chance that they are struggling to survive. Unfortunately, in Alberta, over the past several years many oil and gas producers have failed. When this happens, their wells, pipelines, and facilities often end up in the Orphan Well program. For a site to be designated an Orphan, the Alberta Energy Regulator (AER) must first conduct a thorough review to determine that no responsible party remains. After this review the AER provides the OWA regulatory authority to deal with the site.



Insolvency, Bankruptcy, Receivership, and Inactive

These terms are thrown around a lot, and many landowners find themselves wondering what exactly these terms mean. If the operator on your land is struggling financially, you may have received a letter regarding your surface lease. Let us break it down so you know what's going on:

It is possible that the well on your land has simply been shut-in and is no longer producing (called inactive). In these cases, the company is still viable, and you should continue to receive your rental payment.

A struggling company may enter into what is known as *Companies' Creditors Arrangement Act* or CCAA. At this stage, the company still exists and are attempting to restructure and survive. If CCAA is unsuccessful, companies may become insolvent and fall into bankruptcy.

Bankruptcy is a federally regulated process that may result in a court-appointed receiver taking over the company and selling off assets to pay back creditors. At this stage rental payments will likely cease and as a landowner you would need to file for rental payments from the Land and Property Rights Tribunal.

In some cases, the lease and infrastructure may be sold. This typically happens when the well is still

producing or considered to be an asset. In these situations, landowners should receive notice of the sale (but may not). The new owner would have an obligation to pay rentals. As a landowner, it is important to contact the new company and ensure the information on their file is correct, so you continue to receive rental payments going forward.

Wells and facilities that are no longer viable will not sell through the receivership and may ultimately come into the orphan well program or become the responsibility of a WIP that may hold an interest in the well. This process can take several years and can leave landowners frustrated as surface lease payments are not typically paid while sites are in receiverships and must be applied for from the Tribunal. If the wells or facilities on your land have become orphan, you will receive a letter from the OWA. You may also go onto the OWA website to see if any of the wells on your land are listed within the inventory. *(Further info and website links can be found at the end of this article.)*

Can Landowners Deny Access To A Wellsite?

When an operator has missed or reduced an annual lease payment or where the well has become orphaned, landowners often seek clarification on whether they can refuse access to their land. Unfortunately, denying access will not help your situation or

speed up the payment process. The best thing to do in this situation is to apply to the Tribunal for payment as soon as possible.

When it comes to the abandonment or reclamation of a wellsite, facility or pipeline on your land associated with a defunct operator, several other parties may legally enter the site. They include the Alberta Energy Regulator, the Orphan Well Association and any WIPs.

Denying access to the AER, OWA, or WIPs may result in the Tribunal stopping all future payments in accordance with Section 36 (8) of the SRA. This section states *"The Board may direct the Minister not to make any further payments due to the person if it considers that the person entitled to receive them is refusing access for operations, abandonment or reclamation allowed by law"*.

The Orphan Well Association

The Orphan Well Association is a not-for-profit organization created from a joint industry and government initiative to manage the abandonment and reclamation of upstream oil and gas "orphans" in Alberta. Orphans are oil or gas wells, pipelines, facilities or associated sites left behind by a defunct company and have been legally deemed as orphans by the AER. The OWA operates under the delegated legal authority of the AER, with funding from the oil and gas industry. This includes the repayable

loans provided by the Provincial and Federal Government you may have heard about.

The OWA has the legal authority to access all private and public lands in Alberta to suspend or decommission orphaned oil and gas assets, including wells, pipelines, facilities and associated infrastructure. This authority is based on statutes contained within the Oil and Gas Conservation Act. The Association is further authorized to access any Specified Lands for reclamation and remediation under the authority of the Environmental Protection and Enhancement Act.

The OWA has a well-earned reputation of working cooperatively with landowners; however, they have been denied access in rare cases. In these cases, the OWA informs the Tribunal and/or the Farmers Advocate, and any potential for surface lease payments from the Tribunal may be suspended or denied until access is granted. The OWA can also seek law enforcement support for access if they feel public safety is at risk or in other cases they simply bypass the site and move on to other areas. This may mean that bypassed sites remain on the land for prolonged periods.

It's also important to know that the OWA does not take the place of the former operator and does not hold any surface lease or license for the

well or infrastructure. Therefore, the OWA is unable to compensate landowners for unpaid surface lease payments from defunct companies. So, what can landowners do?

While it may seem in your best interest to refuse access to your land, doing so will only impact future work and will not get you the compensation you're looking for.

Working Together

It's important to note that the OWA will work alongside landowners and communicate openly about the process and timelines in place. Stakeholders will also be engaged during the decommissioning and reclamation process.

Keep in mind that the OWA only receives sites that were owned completely (i.e., 100%) by the defunct company. The OWA will then contact landowners and let them know the well site has been designated an orphan. The OWA is not responsible for rental payments, only the care, management, decommissioning and reclamation of the site.

Taking Care of Landowners

Although the OWA requires access to sites year-round, it's important to know that they will do their best to communicate openly with landowners before accessing their land. They will also consider landowners' perspectives and concerns but may not be able to delay work and therefore some landowners may be impacted minimally. Again, these impacts should be documented and provided to the Tribunal as part of the application.



Interested in learning more?

- For additional information about applying to the Tribunal for missed payments under a Surface Lease or Compensation Order, please visit www.alberta.ca/surface-rights-board.aspx.
- For additional information on the Farmers Advocate, please visit <https://www.alberta.ca/farmers-advocate-office.aspx>
- For additional information on the Alberta Energy Regulator, please contact inquiries@aer.ca
- For additional information on the Orphan Well Association, please visit <https://www.orphanwell.ca/>

This article was written as a collaboration between the Orphan Well Association and Farmer's Advocate Office with input from the Land and Property Rights Tribunal. We thank all participating parties involved.



**Orphan Well
Association**

**farmers'
advocate
office**

RESEARCH AROUND THE WORLD

Sustainability By Any Other Name

By Kelly Young, Education Resource Manager; and Allison Thomson, Vice-President, Science and Research, Field to Market: The Alliance for Sustainable Agriculture

Published on Crops and Soils Magazine | May - June 2021

Disclaimer: The article is just to share the knowledge. BRRG is not sharing any profit.



Photo by Jason Johnson, USDA-NRCS Iowa.

There is increasing interest across agricultural supply chains in growing crops in ways that are better for the environment, support communities, and make farming more profitable. With so many initiatives springing up recently, including markets for soil carbon sequestration, water quality improvements, and other ecosystem services, it is becoming increasingly difficult to navigate the options and sift out opportunities for crop advisers and the growers they serve.

By now, every crop adviser has heard time and time again that U.S. agriculture production has to change its ways to remain economically viable, support vibrant rural communities, and protect the natural

environment. How we collectively achieve that “triple bottom line” is the topic of countless articles, presentations, and boardroom discussions. For the past several years, a number of initiatives have emerged to bring producers and their trusted advisers into those discussions and chart a path forward. Each new initiative seems to come with its own set of terms, which can lead to confusion and even reluctance by farmers to participate. Indeed, the rapid evolution of terminology, what it all means, and how to best communicate that to growers can be challenging for even the most seasoned crop adviser. This article will review some of that terminology and explore how to talk about sustainability with growers to support them and ensure they benefit from these emerging opportunities.

Stewardship, conservation, organic, sustainable, climate smart, soil health, carbon farming, and regenerative agriculture are among the common terms floating around in the agriculture universe to describe the systems that lead to better outcomes

for farmers, their communities, and the environment. The good news is that once you get “on the ground,” there is a great deal of commonality in the recommended farm practices among these systems, and embracing one system including the associated set of terms, in most cases, does not imply exclusion of any other. It behooves those of us working closely with growers to stay nimble and understand that a solid foundation in one system is in fact a passport to the others. Another thing to remember is that some of these systems have precise definitions established by state and national governments, whereas others are more open to interpretation.

Defining Terms

Organic Agriculture

Organic agriculture is strictly defined because the USDA has developed and applies a federal standard with a strict certification process (and associated paperwork) for labeling purposes. For an agricultural product to be eligible for organic certification, it must be grown without the use of “prohibited substances”, which include most synthetic inputs, ionizing radiation, and genetic technologies (USDA Agricultural Marketing Service, 2021). The USDA standard for organic crop production mandates that none of these prohibited substances have been used on the land for three years

before the harvest of the first organic crop. Further, soil fertility and pest management is achieved with cover crops, crop rotation, and tillage. Organic certification generally carries a price premium for downstream companies as this term is more familiar to consumers who are willing to pay more for food and fiber produced without chemicals that they may, correctly or not, perceive as unsafe. That price premium for organic foods is typically passed along to the farmer in higher prices for crops grown organically, which helps to offset the costs of adopting the organic practices and going through the certification process.

Regenerative Agriculture

The term **regenerative agriculture** has become quite popular in the past few years and is an example of a system with a definition that is open to interpretation. There is no federal standard for regenerative agriculture, and one striking aspect is the lack of consensus of a definition. Newton et al. (2020) did a literature review to compare and contrast various definitions offered by organizations working in this space. Some definitions focus on agronomic processes, such as eliminating tillage or avoiding synthetic crop inputs, while other definitions center around environmental outcomes like improved soil health or water quality. Many food companies have announced initiatives supporting regenerative



One of the outcomes of climate smart agriculture is to bring about enhanced resilience to climate shocks such as floods. Photo by Keith McCall (USDA-NRCS).

agriculture in their supply chains, including General Mills, Nestle, and Danone. General Mills (2021), for example, has an outcomes-based definition that emphasizes ecosystems and communities. The company has several pilot programs across the United States and Canada that offer growers the opportunity to attend a Soil Health Academy to deepen their understanding of the principles of regenerative agriculture and receive one-on-one technical support as they implement changes in the field.



Hugh Hammond Bennett, considered the "Father of Soil Conservation," visiting an erosion-ravaged field. Photo courtesy of USDA-NRCS.

Sustainable Agriculture

Sustainable agriculture is a term that has been in use for a long time. Field to Market: The Alliance for Sustainable Agriculture offers an outcomes-based definition of sustainability: "Meeting the needs of the present while improving the ability of future generations to meet their own needs." Sustainable agriculture should result in increased productivity as well as improvements in human health through access to safe, nutritious food. It also supports healthy soil, water, air, and habitats by striving for continuous improvement in the environmental impacts of agriculture, such as reducing soil erosion, increasing biodiversity, or reducing the greenhouse gas emissions associated with a farm. Finally, sustainable agriculture helps agricultural communities prosper. In this definition, there is no prescriptive set of practices a grower must deploy to move toward sustainability. Programs developed by Field to Market, the Stewardship Index for Specialty Crops, the Dairy FarmSMART program, and others establish guidelines for how to measure the environmental impact of a farm operation and how to work towards achieving continuous improvement. These programs are used broadly by the agricultural supply chain to engage growers in helping to meet sustainability commitments in both the public and private sector.

Conservation Agriculture

Another term that has been around for a long time is **conservation agriculture**. Some more experienced producers may be quite comfortable with this term. The United States is divided into 3,000 conservation districts, all with the shared mission to “coordinate assistance from all available sources—public and private, local, state and federal—to develop locally driven solutions to natural resources concerns.” And conservation is endemic to the Natural Resource Conservation Service and its post-Dust Bowl efforts to protect soil and other natural resources. The Conservation Agriculture Group at Cornell University (2021) offers a process-based definition that emphasizes minimal disruption of soil and biodiversity. The group goes on to suggest agronomic processes that should be followed, which are cover cropping, alternatives to burning crop residues, integrated pest management, and minimal tillage.

Climate Smart Agriculture

Because of agriculture’s complicated relationship to climate change, serving as a both the industry most vulnerable to its impacts as well as a source of greenhouse gases, some organizations have embraced the term **climate smart agriculture**. Climate smart agriculture addresses both aspects of the relationship. According to the World Bank (2021), climate smart agriculture has three

primary outcomes: Increased productivity to better feed the world, enhanced resilience to climate shocks like flood drought, and shifting pest pressure; and, lower emissions of greenhouse gases into the atmosphere. While many initiatives supporting climate smart agriculture focus on developing countries facing significant food insecurity, the impacts of climate change on weather patterns in the United States are also causing new challenges for farmers. Adapting to these challenges by adopting practices that help soils retain water better, reduce soil temperatures, and adjust cropping systems and rotations also are considered climate smart agricultural practices. The hot topic in climate smart agriculture in the current moment is soil carbon sequestration—managing soils to increase their soil organic carbon content. The excitement is because practices that promote soil carbon sequestration both help lands adapt to climate change and the storage of more carbon in the soil contributes to overall reductions of carbon in the atmosphere, which is necessary to reduce the risk and impacts of climate change over time.

Investments That Yield Better Environmental, Social Outcomes

It should be noted that a farm may be USDA organic certified while simultaneously applying the principles of regenerative, sustainable, climate smart, or any of the other systems mentioned in this article. As stated previously, organic agricultural products fetch higher prices in the marketplace, which helps cover the costs associated with organic certification. Unfortunately, there is no widespread price premium for crops produced under those other systems, and the downstream food companies do not enjoy higher prices for the resulting packaged goods. Implementing conservation practices like cover crops and no-till tend to have a steep learning curve and can be costly to implement. The cost of implementation often falls on the grower, but many companies are investing in their suppliers to support their transition to systems that yield better environmental and social outcomes.

One example of that investment includes a three-year project in Kansas and Missouri between Country Crock and No-till on the Plains (PR Newswire, 2020). Together, they are investing in soil health education and cost-share to plant cover crops to improve soil health and reduce greenhouse gas emissions from fields.

Growers participating in the project, which covers approximately 13,000 acres, will be compensated \$10/acre to help cover the cost of cover crop seed the first year.

Cargill, Target, McDonald's, and The Nature Conservancy have partnered on a beef sustainability project in Nebraska that aims to remove up to 150,000 metric tons of carbon dioxide from the atmosphere (Cargill, 2020). Leveraging \$8.5 million in public and private funds, participating corn and soy growers will receive technical and financial assistance to implement regenerative farming practices that will not only improve climate outcomes, but also improve soil health and productivity.

It would appear that most of these systems significantly, if not completely, overlap in terms of actual farm operations. All of the systems mentioned so far support the same basic outcomes and encourage similar suites of practices, which in turn, have multiple benefits (Table 1). For example, cover crops are encouraged, when feasible for the cropping system and location, in organic, regenerative, sustainable, conservation, and climate smart agriculture because they are known to have significant positive impacts on environmental outcomes. Covers

crops build soil carbon and may help mitigate climate change. Cover crops also can improve water infiltration into the soil, thereby preventing or slowing water-induced soil erosion and promoting soil health and better water quality downstream.

TABLE 1. Comparing principles and practices of various agricultural systems.

Principles and practices	Agriculture system				
	Sustainable	Regenerative	Conservation	Climate smart	Organic
Emphasize soil health	X	X	X	X	X
Keep soil covered	X	X	X	X	
Minimize soil disturbance	X	X	X	X	
Maintain living roots year-round	X	X	X		
Diversify crop rotations	X	X	X	X	X
Increase soil carbon	X	X	X	X	X
Integrate livestock		X			
Encourage cover crops	X	X	X	X	X
Restricted synthetic inputs					X
Increase productivity	X			X	
Remove CO ₂ from atmosphere	X			X	
Prohibit GM traits					X
Requires certification					X

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UPCOMING TRAINING

FIELD TRAINING

Disease Assessment in Peas



WITH Dr. MICHAEL HARDING

CROP ASSURANCE PROGRAM LEAD
PLANT AND BEE HEALTH
ALBERTA AGRICULTURE AND FORESTRY



JULY 8TH, 2021
TIME: 11:00 AM - 4:00 PM



REGISTRATION REQUIRED
COVID19 PROTOCOLS WILL BE FOLLOWED



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