

FARMING SMARTER

Fall 2021 Edition



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Global Crop Production
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December 15, 2021

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March 2022

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Lethbridge Exhibition Park

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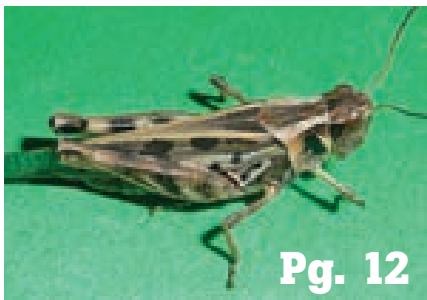
June 2022

Lethbridge Plot Hop2

July 2022

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Farming Smarter is published bi-annually by Glacier FarmMedia LP for Farming Smarter, 211034 Hwy 512, Lethbridge County, AB, T1J 5N9

Editorial Board: Ken Coles, Jamie Puchinger
Editor: C. Lacombe



COVER PHOTO:
Participants at a Farming Smarter Plot Hop in July 2021 were glad to be in the field with us at last.

PHOTO: FARMING SMARTER

Use us to improve your farm

BY RYAN MERCER



This is a good year to talk about making your farm resilient and the role Farming Smarter can play in helping you make that happen! The good ol' Oxford Dictionary defines resilient as "able to withstand or recover quickly from difficult conditions."

Farming Smarter exists to drive agriculture innovation at the farm level. We know innovation is hard, and focuses on long-term results. That's why we feel privileged to be able to say that innovation drives us, not profit.

This allows us to study practices such as implementing cover crops on the prairies without the risk a farm incurs by experimenting with new ideas. Our Cover Crops Across Prairie Canada project led by Yvonne Lawley of University of Manitoba has some stories to tell and information to share.

After the spring 2021 drought, the idea of winter cover crops in a rotation could stand out as an idea worth considering. Winter cereals and pulses planted in the fall of 2020 did better than most of the spring planted crops. Farms with fall planted crops were probably more resilient this year.

The winter of blowing soil we had last year certainly makes a good argument for reduced tillage practices. But reduced tillage sometimes means too much spring crop residue in fields. Proper residue management presents a challenge as it can lead to cold and wet seedbed conditions and improper seed to soil contact during seeding.

Farming Smarter took on a project working with a strip tiller to compare it to zero-tillage and conventional tillage practices. We're watching its effect on crop emergence and seed yield of conventionally sown and precision-planted canola on dryland and irrigated farming systems. We hope that the strip tilled row will provide better seed to soil contact and a warmer protected seedling bed. The Strip Tillage and Precision Planting for Canola project still has another season before final results.

Farming Smarter started precision planter projects some years back now. They aren't really new technology anymore, but we're experimenting with all the ways these planters might improve southern Alberta farms. Precision planters clearly offer some benefits to crops, but any piece of new technology bought for the farm must pay its way



Strip tiller in action PHOTO: FARMING SMARTER

in versatility and usefulness. We've planted corn, pulses, cereals and hemp now with the planter. You can read about these projects on our website.

Our website, by the way, is just the tip of the iceberg when it comes to all the ways we share our research results with you. We can be just as innovative in our communication with you as we are in our fields. Take advantage of this and all the ways we work for you. It will improve your farm survival prospects, because that's what we're here to do – we change the way people farm. —

A handwritten signature in black ink, which appears to read "Ryan Mercer". The signature is fluid and cursive.

Ryan Mercer
Farming Smarter Board President

Innovation is hard Particularly to define

BY KEN COLES



You know Farming Smarter for its field-tested work, its agronomy research, its custom trials, and its farmer extension efforts. We're proud of what we do, and we know where we're going. But as any business leader knows, sometimes it pays to stop and really look holistically at your organization. This summer, we invested effort into articulating Farming Smarter's reason for being and our operating mandate.

We wanted to clearly define our direction and our role in both agriculture and the research community. Alongside our ultra-busy, farmer-centric, project-based efforts, we spent time – in fact, a whole lot of time – developing a clear and purposeful Brand Promise: our promise to you as producers about the work we do on your behalf and our definition of Farming Smarter as an organization.

Because of our roots, people typically think of Farming Smarter as an applied research organization. In the early years, partially due to our smaller capacity at the time and partially because of better government-funded pure and academic research, we truly were an applied research organization: our projects tended to be relatively small and entirely production and extension related.

Today, however, our goals, projects and investment go far beyond applied research. We still prioritize farm-applicable and practical projects, but our primary goal centres on helping farmers innovate to best meet the changing realities of farming now and into the future.

As we worked through developing our brand promise, we ran up against a challenge: exactly what is innovation? I have a love/hate relationship with the word innovation. On the one hand, it's become an overused word that, in many cases, has lost its meaning. On the other hand, we knew– if we could just articulate it correctly - it describes a critical part of Farming Smarter's culture.

There's an interesting YouTube video about innovation where the presenter compares a high-tech robotic dog to a living, breathing mule. At first glance, she says, the robotic dog seems much more innovative: after all, it's complicated, tech-based and new. But, she then points out, the mule is functional by nature; it requires no high-tech programming or parts; its ongoing operation requires only some



Ken and Trevor calibrating a plot sized Valmar to apply Edge and fertilizers. PHOTO: FARMING SMARTER

green grass and water; and anyone can work with and gain value from it. In fact, the mule is an incredible innovation of nature that can likely out-compete the robotic dog in almost every trial.

I absolutely agree with her point. True innovation isn't just doing something in a new way or inventing something to change for the sake of change. It's doing something in a new way that brings benefit.

For us, innovation is creativity and a belief that new ideas and new technologies can bring improvement, grounded in great science applied at a grassroots, gritty, relevant level. Our goal is innovation that is usable and valuable; practical and meaningful.

We hope that our clearly articulated brand promise helps us redefine our image in the eyes of producers, the research community, the broader public and – yes – amongst funders too.

Ken Coles
Farming Smarter Executive Director

Farming Smarter: Building and Inspiring a Culture of Innovation in Western Canadian Agriculture

Farming Smarter exists to drive agriculture innovation at the farm level. We attract a community of passionate innovators and provide agronomic testing, scientific knowledge, and the right connections for them to succeed.

Innovation drives us, not profit. This makes us a trusted source for regional adaptation of profitable and resilient crops, cropping systems and agronomic practices. Farming Smarter instills a culture of innovation and takes a bottom-up approach that is gritty, practical, and achievable. As a flexible organization we take chances, break the rules and encourage failure so we can learn. We adapt and excel at innovation development and adoption. This is crucial

to keep farmers competitive and viable in a complex and dynamic environment.

Innovators can rest easy knowing we scan the world for new and old ideas that may apply locally. When they turn to us, they are confident our information is grounded and relevant. We love agriculture and offer our community informative, safe, and enjoyable experiences. They feel part of a diverse community who enjoy learning, networking, and bouncing ideas off each other.

Innovation is hard and about long-term results. We invite anyone interested in agriculture innovation to work with us and together we can change the way people farm.

Problem solving at an innovation level

BY MADELEINE BAERG



A seeding crew works out how to keep everything in line. PHOTO: ISAAC MILKO

A fly on the wall at our Farming Smarter office hears two regular and ongoing topics of conversation: How can we add value to farmer's bottom lines and how can we do the best possible work despite shrinking government investment. Two years ago, we came up with a very outside-the-box way of furthering both priorities. Our Smart Partner program, unveiled this spring, is the ultimate win-win-win for our business partners, our research efforts and — most importantly — farmers.

The Smart Partner program works like this:

For an upfront cost of \$1,000, a farmer, agronomist or other boots-in-the-dirt agribusinessman can become a Farming Smarter 'Smart Subscriber.' The subscription includes a front-row ticket to every one of our events, live or online. It also gives priority access to the latest data and analysis from our research efforts, and full access to our private video library.

There's more value, too: up to \$15,000 more, in fact. To add extra and obvious return on investment to a Smart Subscription, we've partnered with 15 Smart Partner businesses, each of whom offers our Smart Subscribers a discount of approximately \$1,000 on a product or service.

“Our Smart Partners are companies — fertilizer companies, banks, accountants, etc. — who value and want to work with agriculture’s top performers: exactly the people who see value in a program like this.

KEN COLES

“Our Smart Partners are companies — fertilizer companies, banks, accountants, etc. — who value and want to work with agriculture’s top performers: exactly the people who see value in a program like this. In order to promote products or services to the ‘best-in-the-business’ farmers, our Smart Partners agree to provide a benefit exclusively to those farmers,” says Ken Coles, Farming Smarter Executive Director. “The discounts are a secondary benefit to the resources and informational access subscribers get directly from Farming Smarter,

but \$15,000 in bonuses is a pretty attractive secondary benefit.”

To make the program appealing to businesses, we only take on one Smart Partner in each product or service category.

“If you’re a bank and you sign with us, you know you’re the only bank in our program,” says Coles.

The \$1,000 annual subscription fee paid by producers who enroll in the program, together with the \$5000 annual partnership fee paid by Smart Partner businesses, goes directly into supporting Farming Smarter’s work. As such, the program offers an important and sustainable revenue stream: critical as government dollars decrease and become less reliable.

“The Smart Partner program is a three-way affiliate partnership that we see providing value to each: the Smart Partner businesses, the individual farmers who subscribe, and our project funds,” says Coles.

“What’s been great for us as we develop this program and, in fact, in all aspects of our growing and changing as an organization, is our shift to client-focus. We’ve always had farmers’ interests first and foremost, but we’re now also focusing on building stronger relationships and adding direct value for the farmers who see value in what we do.”

After successfully selling our 15 Smart Partner 'spots' for this year, we're now adding a second level to the business partnership.

"Not all Smart Partners are able to offer a \$1,000 discount. Maybe you're a smaller business, or maybe that big a discount doesn't suit the kinds of services you offer. We're creating a non-exclusive category where you still provide an incentive of some kind to our subscribers, but you're not involved at events and you're not recognized as a full partner. The only point of access you'll have to our subscribers is recognition under the program as a contributor, but that still puts you in front of the top farmers in the business," says Coles.

We're also adding a secondary level to the subscriber category, which allows a farmer a digital subscription to our online resources without access to our events or the Smart Subscriber partner discounts.

Since our genesis in 2012, we've grown by leaps and bounds. Today, our work goes way beyond basic applied research and extension. We focus on innovation and collaboration with our industry's keenest. We're moving agriculture ahead. We're proud that that's exactly what the Smart Partner program achieves. Come join us! For more information and to check out a list of discounts from our current Smart Partners, visit farmingsmarter.com. —



Making the best of a bad Kochia year



Above: All hands on deck as summer students do plant counts in the plots. Right: Find Farming Smarter easier now with our new sign at the entrance on Hwy 512. PHOTOS: FARMING SMARTER



Economic benefit of irrigation upgrades

BY KRISTI COX



What do you get when you cross \$815 million dollars with Alberta irrigation? Increased jobs, increased agriculture production, and both a short and long-term boost to the economy.

This significant investment, announced about a year ago, came from three sources: 50 per cent in the form of a loan from the Canada Infrastructure Bank, 30 per cent from the Government of Alberta, and 20 per cent from the irrigation districts themselves. Eight out of Alberta's 13 irrigation districts plan projects in the program.

The funding is earmarked to modernize current infrastructure, mostly through converting open canal structures to enclosed pipelines, increasing efficiency in water delivery. Four of the districts will also expand or add off stream reservoirs.

"Virtually all of the districts have been doing these conversions over the last 20 to 30 years," explained David Westwood, General Manager at St. Mary River Irrigation District (SMRID). "This program just allows us to do it at a much more accelerated pace than we normally do."

The modernization projects are all to be completed by the spring of 2025, and the reservoirs by 2028. Most districts had projects already planned, and work began immediately. Many more are under way this winter.

"We're trying to get as much done as quickly as possible," said Westwood. "At the SMRID we're seeing very eager participation as we go out to tender for contractors. They're hungry for business and want to work in this sector."

This accelerated pace means an increased need for manpower ranging from engineers designing the projects to the construction crews on the ground. This job creation has a trickle-down effect into other areas of the economy. Crews are staying in hotels, eating in restaurants, and spending disposable income in local communities. Additionally, equipment sales and maintenance and demand for required materials will have immediate effects on the economy.

The boost is long term as well.

These projects will add approximately 200,000 new acres of irrigation to the province's existing 1.7 million. Once these acres are under production, they will require more labour for the increased farm production.

Increased secure production will likely lead to new processing plants and expansions to existing ones in the agri-food corridor between Medicine Hat and Lethbridge. Irrigation districts also have licenses for municipal and industrial clients.

"As we see more irrigation production and food production plants, communities will attract some growth to supply labour to those plants," said Westwood. "I think (the irrigation expansion) will potentially support those municipalities and industry, which will be a by-product of the actual agriculture."

In the SMRID, there is already interest in when the acres will be available. There will likely be a mix of existing irrigators who want to expand, and new irrigators coming on board.

"It's a free market and anybody can apply as long as they meet the criteria to be an irrigator," said Westwood.

Irrigation also enables resiliency for the smaller producers, protecting the existence of the family farm.

"You don't have to have a significant land base to be a successful farmer," said Westwood. "You can grow high value, specialty crops that make it economically viable for you to run a smaller operation."

Increased efficiency in water delivery along with on-farm efficiency improvements mean that additional irrigation acres will be serviced with the same volume of water traditionally used for irrigation in Alberta.

"This year was like a proof case that shows the value of irrigation," said Westwood. "The St Mary River, Taber and Raymond Irrigation Districts found that even with below normal precipitation and above normal temperatures in the growing season, we were able to meet the demands of all of our irrigators. They were able to grow what they wanted to grow. Having strong irrigation infrastructure allows you to be consistent with your production volume because you're guaranteed good water sources."

Irrigation districts have their own up-front costs for these projects, and a loan to repay. This was considered in the planning.

"This kind of major capital infrastructure upgrade was designed to be self sufficient, by being able to sell new acres," said Westwood.

The annual water rates from new additional acres will also help offset costs.

The Economic Value of Irrigation in Alberta, a study prepared for the Alberta Irrigation Districts Association in 2015, found that every \$1 invested by the Government of Alberta in irrigation leads to \$3 in revenue for the combined governments of Canada and Alberta.

"Agriculture has been very steady and very good to the economy," said Westwood. "I think the government recognized that and decided to invest — by doubling down on this industry — because it has shown to be recession proof. It's shown to be very stable." —

A Snapshot of Agronomy

BY SEAN KJOS

As the sun sets in southern Alberta, wind blows through an open field, cascading along the partially tilled ground. Along the surface of the dirt, sprouts of green are beginning to push through the soil. Below ground, canola seeds are beginning to send out their roots to absorb the moisture and nutrients. While this scene might be all too familiar for the southern Alberta farmer, it can be hard to grasp the work that goes into getting the seed to that point.

Out of an entire toolbox, agronomists are the farmer's best friend.

Agronomists dedicate themselves to hours of research both in the fields and in labs. Like a farmer, they ensure that they can achieve the best yields possible in fields. An agronomist spends more time in the field than most people realize. It takes a lot of work to understand the behind-the-scenes of farming; the amount of time that goes into research, the work put into managing resources, and maintaining research networks.

While some recognize agronomists as those who tell them what will kill their weeds, there's more to agronomy than what we see on the surface. Agronomists are the ones putting science into how everything operates in the field.

As technology advances and the duties of running a farm continue to grow, farmers don't always have the time to be in the field as often as they'd like. Due to the nature of the business, managing the business and people evolved to be a larger role for farm owners. By hiring an agronomist, farmers can see incredible benefits to the quality and quantity of their yield.

Agronomists bring a powerful tool to the field — crop planning. Soil, temperature, moisture, pests, and weeds all give valuable insight into the best rotations of crops for a field. An agronomist can wield this insight to create a proactive strategy to allow crops to prosper and thrive.



Slim pickings this year!

Agronomists dedicate themselves to hours of research both in the fields and in labs. Like a farmer, they ensure that they can achieve the best yields possible in fields.

The benefits of this planning extend past the field — into a farmer's wallet. Through crop planning, a farmer can combat disease, fertility problems, and weeds while gaining increased profits. Not only does a solid crop rotation foster an improved soil quality, but it also gives you insight into what you plant; allowing you to see what worked & what to improve.

Agronomists say that planning is the most important aspect to farming, but often the most overlooked. George Lubberts, a long-time agronomist in southern Alberta, says that keeping good records year-to-year and planning long-term are the best ways to efficiently improve your crop profitability.

"If you fail to plan, you plan to fail. It's that way in agronomy, the same as it is elsewhere in life," says Lubberts. "Economics are important, but we have to look at the economics on a sustainable year-by-year platform. Record keeping; knowing what weeds or diseases you've dealt with in the past, and what's done well in the past will impact sustainability in the long-run."

While many farmers keep records of their fields, it can become cumbersome as the scale of your operation grows. In these situations, Lubberts recommends hiring an agronomist to help in the field. However, hiring extra hands isn't always an option.

Thankfully, agronomy isn't restricted to those with lab access! For those looking to hone their agronomy practices themselves, there's plenty you can do to improve your fields. Scott Gillespie, a Regenerative Agriculture Consultant in southern Alberta asserts.

First, consider cover crops! Cover crops can provide shelter and food for beneficial insects and they help retain soil moisture for your crops. Cover crops assist in mitigating threats to your field by crowding out weeds, reducing the strain they put on emerging crops.

Secondly, know the pest threshold in your field. By understanding what pests reside in your fields, and what the threshold is before you need to act, you'll be able to plan and prepare.

Lastly, continue learning. "The best thing a farmer can do to improve agronomy practices is take courses or go to events to learn anything new or interesting," says Gillespie. By staying involved in the ever-changing world of agronomy, you'll keep up to date on the latest and greatest practices and will continue to see the results in your yields.

The world of agronomy is vast and bountiful, with lots of opportunity for growth both in the field of research and individual farm fields. When it comes to tools and equipment, farmers can find a lot of success through an agronomist. —

Managing a thirsty situation

Keep herbicide retention top of mind going into next season

BY NATALIE NOBLE



Winter Wheat sprouting in late August at Farming Smarter
PHOTO: FARMING SMARTER

An extremely dry and hot 2021 growing season had many Alberta farmers sweating, but manufacturers worked behind the scenes to create solutions for success going into next spring. “We know it’s been a drought year and farmers have various concerns moving into next season,” said Nolan Kowalchuk, technical sales manager at FMC. “There are things we can do to manage this and make things better.”

Because moisture-reliant microbial activity drives herbicide degradation, residue left in the soil will be a top concern, especially in crop rotation decisions. “With this year’s record drought, those microbes just weren’t doing what we needed them to do in the soil,” said Colleen Redlick, Technical Marketing Specialist in Herbicides with BASF Canada Agricultural Solutions. “This means farmers will have to watch out for herbicide persistence.”

That diligence depends on the herbicide group applied on each field. “We are mostly concerned with imidazoline herbicides,” said Redlick. “With this group, microbial activity is so important and it was lacking this year. We know the typical breakdown won’t occur and that could affect more sensitive crops such as canola, durum wheat and canary seed. We want growers to be really aware in these cases.”

Higher risk in certain crops will exist in fields where farmers used imidazoline products and didn’t receive 125

mm or more of accumulated rainfall between June and September.

It’s difficult to know what’s happened in a field until observing a response after planting. “There’s so much variability across the fields — hilltops, low spots, areas that received more or less moisture, variability in soil texture, organic matter, stubble across the field,” said Rory Degenhardt, Canadian field sciences research leader at Corteva. “It’s very challenging to get an accurate representation to inform growers what’s happening with these residues in the soil.”

For many farmers, the exceptionally dry conditions also saw persistent high temperatures for much of the season. “When rain events did occur, there would be lots of microbial action with those high soil temperatures. The microbes would have worked quickly to break down herbicide residues in the soil,” said Degenhardt. “But looking at the balance of the season, and considering evapotranspiration rates, it’s more than likely we’ll see some herbicidal active ingredients persisting longer than in a normal rainfall year.”

Farmers can look to factors such as soil texture and organic matter for indicators. “We know that the finer soils with higher levels of organic matter hold moisture better,” said Redlick. “They have a better water retention environment for microbial degradation.”

If a farmer is unsure of what’s happening in the soil,

“There’s so much variability across the fields — hilltops, low spots, areas that received more or less moisture, variability in soil texture, organic matter, stubble across the field...”

RORY DEGENHARDT

Redlick suggested consulting with a local agronomist and investing in soil testing to better understand soil properties in their fields. Then compare results with rainfall over the season to assess risk. They can make stronger decisions when tweaking crop rotation plans.

Especially after an abnormal year like 2021, it’s essential farmers look to product labels when considering next year’s rotation. “There are guidelines on most herbicide product labels that provide information around soil conditions that can extend the soil retention time,” says Degenhardt. “They also describe any extended intervals for specific crops when certain environmental events occur. Check those labels carefully, watch for any revised manufacturer recommendations and reach out to the local company representative with questions specific to your situation.”

There is another side to the relationship between drought and herbicide this year. Mid-to-late-season moisture drove extreme weed growth in some areas, especially in perennial and winter-annual type weeds including dandelion, narrow-leaved hawk’s beard and annuals like Kochia and volunteer canola. With that, it’s important farmers take a proactive approach. For many, a late-fall herbicide application provides strong benefits.

Paramount after a dry season is the conservation of moisture. “A fall application helps reduce spring weed biomass and results in more available moisture and nutrients for spring crops,” says Kowalchuk.

A university of Nebraska Lincoln study indicated an 800-pound water loss through one pound of winter weed biomass production. As each acre can produce 500 pounds of winter annual weed biomass by spring planting, weeds could waste 1.75 acre-inches of soil moisture by seeding. “Starting off with a dryer spring, this is significant,” says Kowalchuk. “If we can manage the fall weed growth so it’s not consuming excess moisture, it can be sitting in the soil for the crop.”

Fall application can also preserve readily available nitrogen left over in the soil this season. “Winter annual weeds can use up nitrogen farmers want to bank for spring-seeded crop development,” says Kowalchuk, adding that the average nitrogen uptake from winter annual weeds measured 16 pounds per acre based on a 2017 Kansas State University study. “If we put that into a dollar amount given today’s prices, that loss equates to approximately \$5.80/acre.”

With flea beetles present in many fields at the end of the season, fall application also helps ensure they can’t feed off, or seek refuge in, plant residue over the winter. Finally, applying herbicide in the fall is the most effective and economical time to control perennials and winter-annual weeds as herbicides move with the roots’ nutrient uptake.

Farmers are probably eager to put this tough year behind them. Understanding what’s happening in the soil, reaching out to trusted experts, and creating informed strategies for next year is the best defence should Mother Nature throw another challenging year at them.

“Farmers are going to have to take a hard look at the moisture they received, the herbicide application history in those fields and think critically about their crop rotation. That’s going to be the best line of defense to ensure they grow a good crop in 2022,” said Redlick. “It’s going to be tough on everyone through this drought, but we are here to support our farmers.” —

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Preventing a plague on the Prairies

BY SEAN KJOS

This year, we saw a nigh-biblical swarm of grasshoppers descend on the Prairies.

While we all hid from the heat, in the fields the little critters were thriving. For a month, grasshoppers crawled (or hopped) through the Prairies, infesting each town they passed through and devouring each field they crossed.

Under the crimson, smoky skies it was hard not to feel at the center of a biblical apocalypse as hordes of grasshoppers moved from the fields into our city streets. Thankfully, these grasshoppers didn't become locusts.

The species of grasshoppers that plagued the Prairies were the two-striped and clear-winged grasshoppers. While they tend to migrate, they do not experience the hormonal changes that cause locusts to spawn.

Typically, these grasshoppers wouldn't bring the level of destruction that they did. However, the temperature played a big part in that. Because the past two years were some of the hottest in recent history, this only ramped up the energy output of the grasshoppers. This extra energy meant they required more food and had more time to lay eggs.

Commonly, grasshoppers will lay 40-100 eggs, but most do not make it. Consecutive years of hot, dry weather only increases this amount. Drier years can see juvenile grasshoppers reach maturity faster, thus laying eggs earlier. A late frost means more time for laying eggs, which can lead to a boom in the population the following year.

Unfortunately, there is not much that a farmer can do to help his field at this point in the grasshopper lifestyle. Nor over winter, as the eggs are safely beneath the soil and snow.

The best time for a farmer to deal with grasshoppers is late spring, when they begin to hatch. To reduce the levels of grasshoppers in your field, monitor for young grasshoppers as they begin to emerge.

Usually, eggs will be concentrated around lush, green vegetation in September/October. Remembering these spots will help you know where to look in spring. To look for the juvenile grasshoppers, disturbing the green vegetation will cause them to hop out — grasshoppers that are in the third to fifth juvenile stage will have emerging wing buds. This stage is when insecticide is most effective.



Above: Two-striped grasshopper in various life stages. Right: Adult clear-winged grasshopper.

PHOTOS: JOHN GAVLOSKI

The best time for a farmer to deal with grasshoppers is late spring, when they begin to hatch. To reduce the levels of grasshoppers in your field, monitor for young grasshoppers as they begin to emerge.

Pre-maturely using insecticide can result in needing multiple passes which adds costs.

Other than catching the grasshoppers in their juvenile stage, your only hope is to rely on the weather. An early, hot spring can reduce the food supply for the grasshoppers which can reduce their numbers. Additionally, a heavy rain or sudden snowfall in late-spring could cause the grasshoppers to lose numbers from the cold as well! Because the eggs have a water-resistant barrier, heavy rains rarely affect the eggs but can easily wash away the juvenile 'hoppers that can't yet fly.

Not every day you find yourself wishing for the snow to freeze bugs! —

YES, BLOWING SOIL BREAKS A LAW

BY KRISTI COX



Blowing soil can cause costly clean up. PHOTO: COUNTY OF NEWELL

It's not just a heartbreak to see soil blowing east across roads and fields — it's also an infraction.

Soil erosion has negative effects, not just for the landowner losing precious soil, but also for neighbouring lands, roads, ditches, and buildings. In Alberta, the Soil Conservation Act and the Agricultural Service Board Act pair up to provide protection for this soil and help ensure longevity of agriculture in the province.

The Soil Conservation Act originated in response to the severe wind erosion the prairies saw in the 1930's. Alberta passed the Control of Soil Drifting Act in 1935, then replaced it in 1962 by the Soil Conservation Act. The root of its purpose is summed up by this:

Section 3

Duty of landholder

Every landholder shall, in respect of the landholder's land, take appropriate measures

- (a) to prevent soil loss or deterioration from taking place, or*
- (b) if soil loss or deterioration is taking place, to stop the loss or deterioration from continuing.*

1988 cS-19.1 s3

To understand how this all plays out in practice, we need to look at both the Soil Conservation Act and the Agricultural Service Board Act.

The Agricultural Service Board Act provides direction on how municipalities monitor and enforce the Soil Conservation Act, and others. Municipal district councils can establish an Agricultural Service Board, that functions as an advisory body as well as advising and assisting with agriculture challenges like soil conservation. The council and board must appoint an agricultural fieldman empowered with roles including soil conservation officer. In this role, the agricultural fieldman provides services and education to the producers in the municipality and monitors and enforces the regulations in the Soil Conservation Act.

Generally, landholders are conscientious about preventing wind soil

erosion, but when it occurs, soil conservation officers, along with the agricultural service board they represent, can enforce the Act.

Section 4, of the Soil Conservation Act, "Direction to take remedial measures," states that if the landholder isn't taking appropriate measures to prevent or stop soil erosion, an officer can serve a notice to the landholder. This notice outlines specific remediation efforts that must be completed in a set timeframe.

If the landholder fails to comply with the terms of the notice, the officer is empowered to complete the work or hire someone to do it. The landholder receives the bill for these expenses. If they aren't paid by the deadline, the Act allows for the outstanding amount to be placed on the tax roll.

In practice, it is very rare for an officer to serve a notice under the Soil Conservation Act. Municipalities prefer to manage these issues proactively.

"We take proactive steps," explained Gary Secrist, Lethbridge County Supervisor of Agricultural Services. "If someone's land is blowing, we go out, and we make phone calls, and get the farmers to take action. We've only given one soil erosion notice in about 10 years."

Todd Green, Newell County Director of Agricultural Services, explained that some municipalities add their own bylaws to address specific areas that are relevant to their specific challenges.

"That's the great part about the provincial legislation," said Green. "It's what's called enabling legislation — so it enables local and rural municipalities to put in place policies to deal with things that are on a local level. Every municipality is going to have a different approach."

Secrist explained that Lethbridge County has a soil conservation guideline in their county policy handbook. This addresses how fees are calculated for cleaning county-owned roadways and drainage ditches. They also took the proactive step of putting out ads in local newspapers and posted a public service announcement with links to both tips on wind erosion control and the Soil Conservation Act.

Jason Bullock, Director of Agricultural Services for the Municipal

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Spot the truck. PHOTO: C. LACOMBE

District of Taber, said that following the severe wind erosion in their area this past winter, he is looking to add soil conservation bylaws.

“We don’t have any (soil conservation) bylaws in place,” said Bullock. “I’m looking at putting that in place this winter. We’ve never had anything as dramatic as we did this past winter and spring. We would have a farmer here and there that (had problems), and we deal with that, but not where the whole municipality was blowing.”

In some cases, the landholder isn’t the owner. This can complicate the process, and it is important that owners ensure lease agreements include soil conservation instructions.

“I think there may be an opportunity in lease and rental contracts to have specifics for what the land looks like going into the winter,” said Green. “...for it to be more than a production type of rental lease — a little bit more like a land stewardship type of lease.”

Prevention is best, but if producers find themselves with blowing soil, they must make attempts to control it.

“If your land is blowing, you need to take emergency control measures,” said Secrist. “There are things that can be done. You’re affecting your neighbor relationships as well.”

Landholders can reach out for assistance if they want a proactive plan or to deal with a dire situation.

“The agricultural fieldmen in Alberta are a wealth of knowledge,” explained Green. “When we’re not a wealth of knowledge in the right area, we have the contacts to bring in to make sure we’re doing the right thing. Absolutely the first call can and should be to your local municipality or rural municipality. Talk to your fieldman.”

The Soil Conservation Act is there to ensure that everyone does their part to protect soils from erosion. Ultimately, municipalities want to work with landholders to ensure success for everyone.

“I do love the carrot, not the stick,” said Green. “I think most local municipalities do. We’d like to work with our landowners toward a prosperous agriculture community for everybody.” —

DOLLARS BLOWING IN THE WIND

BY KRISTI COX

There’s more to blowing soil than what (painfully) meets the eye. Those airborne particles can hold vital nutrients and even crop disease.

Finer soil particles such as silt, clay, and organic matter tend to be more vulnerable to wind erosion. They are also generally rich in nutrients and essential for healthy, fertile soil. Gurbir Dhillon Ph.D., research scientist with Farming Smarter in Lethbridge, explained that this is one of the biggest issues with wind erosion.

What else is blowing away with eroded soil? Money!

Dhillon explained that if an inch of soil is lost to wind erosion, approximately 550 pounds of nitrogen per acre will be lost in addition to other major crop nutrients like phosphorus and potassium. Producers must replace them to maintain productivity on their land. The value for these nutrients in terms of equivalent fertilizer costs can be as high as \$325 per acre. With several dust storms, the erodible portions of fields can lose this amount of soil in about a decade. This estimate only addresses the loss of macronutrients and doesn’t account for other factors that can reduce profits such as yield decreases, loss of soil structure, less water retention by soils etc.

All this macronutrient-rich soil is going somewhere.

“Some is deposited on roads and in ditches, where it isn’t productive at all,” said Dhillon. “The deposition of nutrient-rich windblown soils in the drainage ditches or irrigation canals may have other implications such as aquatic weed and algal growth and reduction in water quality.”

To make it worse, the soil can also come with problems like weed seeds or diseases. This is a gift the neighbour doesn’t want.

Clubroot is a soil-borne disease that can cause premature death of the plants it affects, including canola. While soil transfer from field to field on equipment is a major cause of spread, wind can also contribute.

Wind soil erosion occurs both close to the ground and up in the air.

“Large soil particles and occasionally even small stones roll and bounce across the sur-



PHOTO: COUNTY OF NEWELL

face,” said Bruce Gossen, research scientist in plant pathology with Agriculture and Agri-food Canada. “You find soil moved by strong winds accumulating where the wind velocity drops. There can be tens of millions of (clubroot) spores per gram of surface soil from clubroot infested patches in fields. It accumulates in the next field, and that field is then also infested with clubroot.”

Smaller, lighter particles can be picked up into the air and carried long distances.

“Spores are small enough that they can be picked up into the air column and carried across the Prairies,” said Gossen “That’s when you get really long-distance movement.”

The percentage of plants infected with clubroot in an affected field will vary, but the costs to production are significant.

“Moderate to severe clubroot generally reduces canola yield by about half,” said Gossen.

Clubroot isn’t the only pathogen to spread long distances via wind. Gossen explained that when soybean rust showed up in the Southern U.S. in the early 2000s, researchers started watching for spores in Canada.

“In Saskatchewan, we found those spores in our spore traps,” Gossen said. “There weren’t a lot, and the spores likely weren’t viable anymore because they’d spent so long in the upper atmosphere. but spores were moving from the southern U.S. all the way up to Canada.”

And what about weeds? Is their spread with soil erosion significant?

“In terms of weed seeds, even small seeds are a lot bigger than spores of plant pathogens,” said Gossen. “(They) tend to not move as far as pathogen spores, but certainly they can be moved from field to field.”

The loss of beneficial nutrients and the potential for spread of disease and weeds makes it vital for producers to act on soil erosion. Prevention is the best plan, but if the air starts to get thick with blowing soil, emergency measures are available. Nobody wants to see their dollar bills flying away in the wind. —

ECONOMICS OF BLOWING SOIL

BY MADELEINE BAERG

When the wind picks up and the sky turns grey with blow-dirt, everyone loses.

For the farmer whose field seems suddenly half in the air, the economic impact of a major wind event can be nothing short of devastating.

“The topsoil is the most productive strip of soil. Losing any amount of topsoil disproportionately impacts productivity, even if there is a decent amount of topsoil,” explains Gurbir Dhillon, a research scientist at Farming Smarter in Lethbridge.

Unfortunately, there are too many variables and not yet enough research to make an effective assessment of wind erosion’s actual costs at a farm level, says Dhillon. That said, he says some past studies can provide some guidance, including a study conducted in the 1990s by AAFC soil conservation research scientist Dr. Frank Larney that showed a yield drop of 40% when a two-inch layer of topsoil was stripped from a wheat plot.

Wind selectively removes soil’s fine mineral particles, clay and organic matter. The loss of these soil components dramatically impacts the remaining soil’s water infiltration and water holding capacity, leads to increased soil crusting, run-off, and water erodibility, and decreases soil’s positive ion exchange capacity. Together, all of these factors reduce soil fertility and productivity.

Wind also costs nutrient availability. Since some nutrients attach themselves to clay or organic matter, a farmer’s nutrients will hitch a ride out of the field when the soil blows. Too, losing organic matter means a corresponding loss of nutrients that would otherwise have become available through natural decomposition of that organic matter.

Taken across all Canadian agriculture, the costs are very significant.

“It’s hard to quantify the losses but studies suggest that the loss of soil from erosion has negatively impacted (Canadian crop) yields by five to 10 per cent,” says Dhillon.

In 2019 University of Manitoba researcher Dr. David Lobb reported that erosion losses of all kinds (wind, water and tillage erosion combined) cost Canadian agriculture approximately \$3B per year in lost yield.

Since farmers lose so much when their topsoil blows, one might guess there must be someone downstream who, upon receiving that topsoil, must gain. If only that were true.

Yes, adding topsoil — were it to go where you’d want it — might arguably be beneficial in some of southern Alberta’s thin-topsoil areas. Unfortunately, redistributed soils are problematic for all sorts of reasons.

During a wind event, blowing soil can abrade the next field’s soil surface, causing it to begin moving too and/or decimating a seedling crop.

Once blowing soil comes to rest, it rarely collects where one might like. In agricultural fields, uneven soil distribution translates to major fertilizing and growing challenges and, when drifts get especially deep, equipment movement headaches.

Blow-dirt and blowing agricultural debris (mostly stems from past crops) that collect in irrigation canals costs irrigation districts in emergency clean-up and can compromise operations for individual producers too.

“This year we had impellers that were getting plugged. It wasn’t even getting to the screens before it shut down our irrigators’ systems,” says George Bohner, assistant manager of St Mary River Irrigation District’s operations west. “We were seeing blow-dirt plug off end guns on pivots. And at the bottom of our pipeline, a lot of our irrigators had to go out every



Blow-dirt clogged canal. PHOTO: KEN COLES



SMRID saw debris blown into canals at a rate to clog trash racks. PHOTO: SMRID

two to three hours to clean out their systems because their pumps kept shutting down this spring.”

Most clean-up costs remain uncalculated. An attic full of blow-dirt, a barn full of sand-filled hay bales, a lawn covered in two-foot-deep silt drifts: unless landowners go to small claims court, there is no way to determine or recover those costs. Secondary costs — costs to human health from breathing dust, costs of flooding when ditches overrun, costs to neighbour relations when one’s life and living are compromised — are even more impossible to calculate.

At a municipal or district level, however, at least some of the economic impact is more obvious. In the spring of 2021, Newell County excavated 94 kms of road ditch, at a cost of \$6,500/km for the equipment and operator alone, thanks to blow-dirt caused by wind erosion. Add significant administrative costs and the total cost for clean-up neared half a million dollars.

Wind erosion mitigation strategies exist. Though some might feel frustrating and costly, an ounce of prevention is always better than unnecessarily lost soil fertility, big gouges in yield potential, and the heavy load of guilt you’ll carry as you watch your neighbours dig out from beneath your dirt. —

DON'T BLOW GOOD NEIGHBOUR RELATIONS

BY MADELEINE BAERG

Getting along with neighbours is important no matter where one lives. When you live in a rural, agricultural area where the land is both home and livelihood, good neighbour relations can be extra critical. Unfortunately, wind-blown soil erosion can come between the best of neighbours.

Jane Anderson came home from a trip to the city this spring to find soil blown onto her lawn. Not a small amount of soil.

“You know how snow blows into drifts. That’s what happened on my lawn, except that it was dirt. I just sat in my car and stared at it. I didn’t even want to get out of my car because then I’d have to figure out how to deal with it.”

Anderson lives near Lethbridge, Alta., across the road from agricultural fields. She’s supportive of agriculture — her parents were farmers, and many friends are too. In fact, the primary reason she asked us not to use her real name in this article is that she doesn’t want her neighbour, whose soil blew onto her lawn, to be identified and vilified. Though she admits that the blow-dirt was more than a frustration — cleaning up ended up costing her significant time and money — she says she believes the cause was Mother Nature rather than her neighbour’s management error.

Not everyone, upon finding unexpected blow-dirt suffocating their lawn, crushing their newly planted flower beds, filling their window-wells or blackening their doorsteps, would be as charitable as Smith. In some years, regional districts around southern Alberta receive multiple calls from unhappy recipients of blown soil.

Blow-dirt can also be detrimental to farm fields downwind. Anyone who has found themselves in or next to a field that starts to blow knows that wind filled with particles of sand, clay and organic material is highly abrasive. When a field starts to blow, the abrasive action can decimate a



We don’t typically think of municipalities as neighbours, but in this case, they are. Soil collected in ditches over the winter of 2020-21.

PHOTO: MD OF TABER

seedling crop next door, and/or can scrape up the surface of a neighbouring field and start it blowing too.

Two years ago, Farming Smarter’s general manager, Ken Coles, received blow-dirt from a neighbour next door. So much soil blew that it filled an entire 12’ deep, 12’ wide drainage ditch between the properties, then proceeded to lay six to 12 inches of accumulated soil through the first 300 feet of Coles’ seed alfalfa field. His sub-surface drip irrigation, installed under 12 inches of soil, was essentially useless where the blow-dirt doubled the topsoil depth. The blown soil also carried in weeds and disease, including Group 1 resistant wild oats.

“I’m definitely not happy with what happened. It’s been a major economic impact for me,” says Coles. Though additional topsoil sounds like a benefit, he says exactly the opposite is true.

“It’s not the same as getting nice topsoil. It’s like getting dead soil. The texture is gone, which almost kills the soil. Nothing wants to grow.”

At a municipal or regional district level, the costs of blow-dirt can be significant. So far in 2021, the County of Newell, for example, spent nearly \$250,000 on its soil conservation program, specifically on contractor fees, labor, trucking, staff time, and gravel to resurface silt-covered roads.

“This spring, Mother Nature gave us a whopping spring, so (the County) did bear the majority of the costs of clean-up,” says Todd Green, director of agricultural services with the County.

That said, he points out that costs aren’t always so high: the County spent just \$908 on soil conservation programming last year, and \$0 in both 2018 and 2019. To better meet taxpayers’ needs into the future, the County is currently creating a soil conservation policy, and updating the Unauthorized Use of Property bylaw regarding who must pay for clean-up.

“We’ve talked to many producers who have had (blow events) happen and they all know we can’t sustain the practice of paying for the clean-up. It’s not sustainable long-term for ratepayers who don’t have soil erosion issues to pay for those who do,” says Green.

As a farmer himself, Coles knows that blowing soil is not always a management error: last fall and winter’s extreme winds blew even well-managed fields. Still, he says today’s farmers may need to adjust their farming with an eye to better mitigating wind erosion.

“The weather has been rough lately. The wind we’ve had recently exceeds what’s normal. I’m hearing soil is even blowing in standing stubble, which didn’t happen before,” says Coles. “If that continues to be the trend, it is up to all of us as farmers to change our management practices to adapt. Managing wind erosion is good for neighbour relations, but it’s good for the individual farmer too.” —



Soil isn’t the only thing that blows around in those storms. This is a canal trash rack from spring 2021 clogged with blown crop residue. We don’t typically think of irrigation districts as neighbours either, but in this case, they are. PHOTO: SMRID



Winter crops can also add a layer of protection for the soil over the winter. Winter wheat in early spring 2021. PHOTO: FARMING SMARTER

TILLAGE IS PROBLEMATIC ON THE PRAIRIES

BY KRISTI COX

No till, cover crops and wind breaks all play a role in mitigating wind soil erosion, but are they equally effective? Allowing soil to blow has negative effects, so it's important for producers to determine the best practices to ensure they are protecting this resource.

David Lobb, professor in the department of soil science at the University of Manitoba, explained that even small amounts of soil loss can cause big problems. Blowing soil and crop residue can: damage crops; reduce road visibility causing accidents; and cause respiratory problems.

Ultimately, even with careful measures to decrease wind erosion, it can't be eliminated completely.

"You should never have the expectation that wind erosion will be completely stopped," said Lobb. "We always need to produce food, and wind erosion occurs even in natural environments. But, when humans are involved, they need to make sure what they do doesn't make it dramatically worse."

How do we keep soil where it belongs?

"Use as little tillage as possible," said Lobb. "It reduces wind, water and tillage erosion problems."

No-till practices have a two-fold benefit when it comes to wind erosion. The plants themselves slow the speed of the wind at the soil surface, substantially decreasing soil loss. Tillage breaks the soil into individual, lighter particles, which are more easily lifted by the wind, so avoiding that practice holds soil in place as well.

Cover crops are used as an alternate source of fixed vegetation.

"If you keep your residue from the previous crop in the ground, the extra residue from the cover crop probably isn't going to make a significant dent in the wind erosion issues," explained Lobb. "They can add biomass, but they are not likely to have a huge impact on soil erosion. I would always argue that you shouldn't till in the first place if you can help it."

Cover crops can, however, be useful following low residue crops like pulses or potatoes.

"Soybean, for example, does not produce as much biomass, and what it does produce is very lush, so it breaks down rapidly. Its ability to provide cover is very limited, and short term," Lobb said.

The challenge is that soybeans tend to get harvested late in the fall, which makes it difficult to establish a cover crop. The same can be true for long season potatoes. In these cases, it is important to leave residue in place. Producers should consider rotation options. For example, barley can be planted early, reducing the duration of bare soil in the spring.

Another option people often look at is windbreaks. These can slow the speed of the wind across fields to varying degrees, depending on species used and spacing. However, they also take land out of production and may create shadowing effects.

"That doesn't mean there's not an argument to be made for windbreaks, but I would use no-till or cover crops first," said Lobb. "If there is still a problem, then consider a windbreak."

If the soil starts to blow, producers must mitigate it according to the Soil Conservation Act. However, emergency measures lack the long-term effectiveness of prevention.

"Typically, what's done in the prairies is to till the blowing field," said Lobb. "The tillage creates roughness, and it turns moist soil to the surface. Those two things stop wind erosion in its tracks."

However, this emergency solution is very short-term.

"There are long-term risks," Lobb continued. "What if you have wind two to four days from now? It's now disturbed, and it will be dry. It's potentially going to blow even worse."

If producers have a source of manure, spreading it can be another emergency solution. Adding moist material to the field will make it less likely to blow. As the manure dries, though, it becomes another source of material to blow in the next wind event.

"Unlike tillage, manure might help build up the organic matter level and provide long term stability," said Lobb. "It has a short-term benefit and a long-term benefit."

Prevention helps producers avoid reaching the point of choosing emergency measures. No till, cover crops and shelter belts are all tools available to keep soil where it belongs. —

Western Canadian barley variety advances

BY LEE HART

There are some great new feed and forage-type barley varieties coming along with improved standability, better disease resistance and higher stress tolerance — all features that will benefit western Canadian farmers as well as livestock feeders.

But as researchers point out, the job isn't done yet. Agronomic progress yes, but there is still a way to go, to overcome some of the production challenges that, depending on the year and growing season, can really impact yield, quality and harvestability.

According to Statistics Canada, western Canadian farmers seeded about 8.3 million acres of barley in 2021. That was up about 10 per cent from the previous year. In Alberta, barley acres were up about six per cent. Although it varies from year to year, on average about 50 per cent of the seeded acres produces feed and forage type varieties.

Dr. Sheri Strydhorst, agronomy research specialist with Alberta Wheat and Barley, says there barley breeders are working on several agronomic improvements, but among the feed grain types, finding varieties with improved straw strength tops the list of improvements.

“A year like this is a good example,” says Strydhorst. “Barley prices are up, producers are interested in increasing yield, that usually means pushing fertility and, if growing conditions are favourable, you get a big crop and then it lodges. So, it's an industry priority to develop new varieties with improved standability.”

Strydhorst says that improved standability could result by developing varieties with shorter stems — perhaps semi-dwarf features — or by increasing straw strength or a combination of the two.

She points out the introduction of plant growth regulators (PGR) such as Moddus can certainly help improve standability but cautions they should only be used under optimum growing conditions. Applying a PGR in a dry growing season can adversely affect yield.

Other breeding priorities include developing varieties with improved resistance to Fusarium Head Blight (FHB) as well as varieties with more consistent yield stability — better able to perform under variable growing conditions.

Strydhorst who co-ordinates regional variety trials for barley across the province, says it is important to have improved varieties in the development pipeline. “A variety like CDC



AB Tofield, developed by FCDC and licensed to SeCan is a newer, high yielding six-row barley.

PHOTO: YADETA KABETA

Austenson is still very popular, making up about 18 per cent of feed barley acres,” she says. “But that's a variety that is more than 10 years old and perhaps disappointingly we haven't moved away from it, so it is important to develop new varieties with improved characteristics.”

A few of the new feed grain varieties with improved features include, AB Hauge, developed by the Field Crop Development Centre (FCDC), now part of Olds College. Licensed to FP Genetics it is a two-row barley showing improved drought resistance.

An unnamed variety, TR19175, developed by the University of Saskatchewan Crop Development Centre (CDC) and licensed to Secan, is a new two-row variety showing improved lodging resistance.

AB Wrangler, again developed by FCDC and licensed to Canterra Seeds is a two-row variety showing improved Fusarium Head Blight resistance.

AB Cattlelac, developed by FCDC and licensed to Alliance Seed is a six-row feed barley showing improved resistance to leaf spot disease.

And AB Tofield, developed by FCDC and licensed to Secan is also a newer six-row barley. It is a smooth awned feed and forage barley, with a grain yield advantage of eight per cent higher than AC Ranger and seven per cent higher than CDC Austenson.

Strydhorst says, to ensure breeding and other research projects continue, research dollars are critical. She urges producers to support the barley check off program that collects \$1.20 per metric tonne for all barley marketed to commercial buyers such as feedlots and grain elevators. “Those check off dollars are the primary source of research funding,” she says. “Barley research is already underfunded compared to other grains, so it is important that check off dollars are available to reinvest in agronomic research and variety development.”

FCDC — DUAL PURPOSE VARIETIES

Meanwhile at the Field Crop Development Centre, Dr. Yadeta Kabeta, feed and forage barley breeder, points out that FCDC released six new varieties over the past five years. Work continues to develop more and, hopefully, dual-purpose varieties for either grain or forage production.

“Generally, FCDC tries to develop barley varieties suitable for both feed and forage uses,” says Kabeta. “This is important for two reasons. First, these dual-purpose varieties give farmers the flexibility of using them either for feed or forage production, depending on the circumstances.

“The second advantage of dual-purpose varieties is that their higher grain component means better digestibility and energy yield. However,

we also develop varieties specifically suited for forage production, that have either a very high biomass yield or have a specific fodder quality that is desirable, for example by the dairy sector and other industries. “

FCDC launched a new forage barley project in 2021 to collaboratively evaluate advanced barley lines for forage performance across different soil zones of western Canada, and to select and release lines that have high forage yield and enhanced fodder quality for commercial cultivation. Several researchers from across Western Canada are involved in this project. A coalition of funders including the Results Driven Agricultural Research (RDAR), Alberta Beef Producers (ABP), Beef Cattle Research Council (BCRC), Saskatchewan Cattlemen’s Association (SCA), Alberta Milk, and Sask Milk financially support this project.

The western Canadian barley registration test (co-op) has recently been reorganized. As of 2021, we are running the feed and forage co-op separately from the malting co-op. At FCDC Lacombe, we also run a dedicated feed and forage barley program. With this focused approach, we can deploy the best and unique germplasm in the breeding program to increase yield and lodging resistance, without worrying about malting quality.

The most recently released varieties from FCDC include two-row type varieties (AB Wrangler, AB Hague and AB Prime) and three six-row type varieties (AB Cattlelac, AB Advantage and AB Tofield).

“It is an exciting time for feed and forage barley in Western Canada,” says Kabeta. “Not only have several varieties come into market in recent years, but we are hopeful that with the recent changes in our breeding/testing processes, even better varieties may be forthcoming in the near future.” —



AB Hague, developed by the Field Crop Development Centre (FCDC), now part of Olds College. Licensed to FP Genetics it is a two-row barley showing improved drought resistance. PHOTO: SHERI STRYDHORST



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Research investigates winter crop options

BY LEE HART

Winter wheat and fall rye, those are a couple winter crops western Canadian farmers are quite familiar with, but what about winter peas, winter oats, winter barley, or even winter durum? Are those crops that might have a fit in your cropping rotation?

It's all a pretty preliminary discussion at this point, folks, but Farming Smarter along with the Saskatchewan based Western Ag Innovations are venturing into some new territory to determine if some winter crops that are unconventional to western farmers, might actually have a fit.

Winter cereals, pulse crops and oilseeds are quite commonly grown in many parts of the world, but finding varieties that can survive Canadian prairie winters and early spring frosts is the challenge. A dozen or more years ago there was a lot of interest and hope in finding fall seeded canola varieties that could cope with prairie winters and after some initial field testing with marginal results that thought was shelved.

And although winter crops isn't the main business focus of Western Ag Innovations — its primary business is applying unique technology to measure soil fertility on western Canadian soils — it is one of those side ventures the company would like to pursue.

"With contacts around the world, we are familiar with a number of winter crops," says Dr. Eric Bremer, head of Western Ag Innovations research and development. "So really we are trying to determine the potential for winter crops in Western Canada. Are there some out there than can be adapted to our growing conditions?"

The company first hired Farming Smarter as research contractor in 2020 to look at some winter crops and that relationship, now more of a collaborative role, continues with a wide range of winter crops seeded in southern Alberta this fall — in simple terms Western Ag finds the seed, Farming Smarter gets them in the ground.

"In 2021 working with Western Ag Innovations we were able to source some project funding from the RDAR (Results Driven Agriculture Research) program for a one year project," says Ken Coles, Farming Smarter general manager.

"So we are in more of a partnership or collaborative role that fits within the mandate of Farming Smarter and includes testing some new ideas, trying cropping techniques that may



In spring 2021, the fall planted winter lentils grew well. PHOTO: MORTON MOLYNEUX

be outside the box to see if there is something that might be of value to Alberta producers."

Starting in 2020 and continuing in the fall of 2021, Farming Smarter planted at least eight different winter crops in an initial evaluation to see which ones have the greatest potential. Winter crops include; winter oats, barley, durum, hard white winter wheat, lentils, faba beans, peas and winter camelina.

"Washington State has done a lot of work with winter crops, so we source some from there to see if they will work under southern Alberta growing conditions," says Bremer. "But we also source far and wide. The winter oats come from Poland, for example, while both the winter faba beans and winter durum come from Germany. We will try them here in southern Alberta and apply the selection pressure of Alberta growing conditions to see what has the greatest potential."

In one of the trials in 2020 for example, Farming Smarter seeded 33 different varieties of winter oats, and from that trial three varieties pulled through the winter in good condition, and went back into further evaluation in 2021.

Trevor Deering, research associate with Farming Smarter handles the contract research projects with companies such as Western Ag Innovations. Farming Smarter has the land, the equipment and the expertise to design and carry out plot and field research projects on behalf of contractors.

The 2020 research trials, seeded September 2020, looked at intercropping different winter

crops, says Deering. One project involved seeding winter oats, peas and barley together at the same time, while the other trial was a combination of winter peas, lentils and camelina. All were grown under dryland conditions. They also seeded monoculture plots of some crops as well.

"So with the different treatments the idea is just to find out what might work and what doesn't," says Deering. "With the oats, peas and barley all seeded in a blend generally they did quite well and came through winter in pretty good shape. We had some losses due to heavy spring frost, but some also survived. So that gave us some idea of which varieties to try in 2021."

The 2021 research work will involve more monoculture plots of seven or eight different winter crops grown in three southern Alberta locations.

Trials involve winter oats, lentils, peas, camelina, durum, barley, hard white winter wheat and faba beans seeded at Lethbridge, Enchant and Taber. At all sites, they seeded plots under both dryland and irrigation conditions.

"Through this research we hope to determine the crops that might have the most potential for southern Alberta farmers, with a number of benefits," says Deering. "It can determine another crop that can be included in rotation, might help to improve opportunities and options for cover cropping, and also help farmers make better use of fall moisture." —

Farming Smarter boosts Agronomy Smarts Subscribers

BY MICHAEL KAAKE

As Farmers prepare for winter, Farming Smarter continues to find new ways to help improve farms across Western Canada.

The Agronomy Smarts subscription allows farmers to get first access to new research, as well as access to all Farming Smarter events and the opportunity to meet some of the Farming Smarter team. The subscription also allows for downloadable content throughout the year on a secure app.

Alison Davies, owner/operator and two-year subscriber to Agronomy Smarts said she loves how much the research benefits her crops.

“I have enjoyed getting relevant information that I have been able to try on my farm. It’s made me see some simple changes we can make to grow a better crop.”

Davies does the majority of the agronomy on her farm. Her crops include potatoes, Timothy, seed canola, wheat, flax, and fava beans. Davies added she loves that Farming Smarter is local and has great research about irrigation, which

she believes there is limited information on. She added the events have also been a great place to network and talk with other agronomists and people in the industry.

The subscription also allows subscribers to meet with the Farming Smarter staff one on one during the winter months to answer any questions about research or other information such as potential future projects or useful information sources through its website.

Agronomy Smarts also gives subscribers more than \$15,000 in Smart Partner discounts. Smart Partner discounts come from different companies that partnered up with Farming Smarter to help with what farmers need to have the best farm possible. Some of these companies include 20/20 Seed Labs, ATB, Bridge City Dodge, the Alberta Wheat Commission and 11 more fantastic companies who support Farming Smarter.

Brian Buckman, farmer and Agronomy Smarts subscriber said there has been a major obstacle in the last year.

“They have a bunch of events that you can attend, but with Covid-19 last year, it was all virtual. So, it’s been hard to attend events and network.”

Events such as the 2020 Conference and Trade Show, which are usually held in person, were held online due to covid restrictions, making it harder to network with other agronomists.

Buckman has a mixed green farm and he rolls red spring wheat, barley, canola and flax. He added he appreciates the work Farming Smarter puts into their research to help farmers. He appreciates that it tests new innovative ideas so the farmers don’t have to do it themselves.

“To me, it’s a neutral face research firm. It’s not favouring one side or the other. So, it’s a neutral ground for agronomy information,” Buckman says.

To find out more about the subscriptions and for more content from Farming Smarter, visit <https://www.farmingsmarter.com>. —

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Project compares different tillage and planting systems

BY MADELEINE BAERG

Despite planting high-quality canola seeds, Canadian farmers are often challenged by low and/or variable emergence and, too often, less than ideal seedling survival. Typically, the biggest challenges to seed and seedling survival are too cold soil, an overly wet or dry seedbed, and/or poor residue management.

With conventional tillage no longer a preferred option, many farmers ask how they can optimize ground opening to improve emergence, yield and crop quality. Starting this year, Farming Smarter aims to answer exactly that, partnering with Lethbridge College on a study about the effects of strip tillage and precision planting on canola emergence, seed yield and quality.

“Farmers are under a lot of pressure to produce more on the limited land we have, but we also want to protect that land. What we’re asking is: how can we get seed in the ground as well as possible to achieve more yield while taking care of our soil?” says Carlo Van Herk, the project’s coordinator.

Farming Smarter is one growing season into a three-year project comparing strip tillage against no-till and conventional tillage in crops seeded using multiple ground opening options (a Monosem vacuum precision planter versus conventional seeder using either a one-inch narrow knife opener, a three-inch spreader hoe opener or a disc-hoe opener) on both irrigated and dryland fields.

Not surprisingly, Van Herk and his team found that the cultivated land achieved the best emergence in year one.

“Honestly, that was to be expected because conventional tillage provides the best seedbed. But it’s not good for the structure and health of the soil,” he says.

On irrigated land, strip tillage showed nearly as good emergence as the cultivated land this year. No-till placed last for emergence, but not by an enormous amount. On dryland fields, strip tillage achieved poorer emergence than conventional and no-tillage.

For seeding method, the spreader on cultivated land proved the winning option for seedling emergence. Rows planted with a disk hoe opener after zero-tillage proved the worst option for emergence on dryland and the second worst on irrigated land.

Crop canopy cover proved closely tied to



Carlo Van Herk inspects wheat roots from the biostimulant project to compare roots between different treatments. PHOTO: SEAN KJOS

emergence. Cultivated plots achieved better canopy earlier in the season (60 per cent ground cover 40 days after seeding on cultivated land, compared to 40 per cent on no-till and 45 per cent on strip-tilled land). Two weeks later, however, the canopy cover of all three systems was exactly the same.

Cultivated land’s soil temperature was affected by air temperature changes more than uncultivated land. It dropped a degree lower than no-till and strip-tilled land when night temperatures dipped to -4°C , and climbed 5°C warmer than no-till and 2.5°C warmer than strip-tilled land on ultra-hot ($+30^{\circ}\text{C}$) days.

Ultimately, of course, the proof is in the yield. As anticipated, cultivated, irrigated land achieved top yield: approximately five bu./ac. better than tilled and strip tilled land. On dryland, no-till yielded about two bu./ac. better than cultivated and strip-tilled land.

In terms of seeding type, the spreader opener optimized yield in every system.

“No matter what tillage method, the spreader opener did multiple bushels better,” says Van Herk.

Van Herk says he doesn’t yet have enough results to be confident about giving out production advice. Admittedly, this summer’s growing challenges may skew results, especially from the drought in the dryland plots. Still, Van Herk says the 2021 findings are relevant and important.

“I don’t like to look at this year as an outlier year because this was a year that did happen. It might not be the average and it’s not what we were hoping for, but it’s still valuable information.”

The project is set to expand beyond Farming Smarter’s trial fields to two additional locations (Taber and Enchant) next year.

Ultimately, Van Herk’s goal is to have solid recommendations, plus answers about whether strip tillage offers return on effort and cost, and whether it could be a way to get some benefits of cultivation without the drawbacks.

“Producers always ask, is it worth the time, fuel and machinery cost? That’s what we’re really trying to figure out. It’s still too soon, but I really hope that at the end of three years we’ll have good answers.” —

Smart, dynamic, autonomous irrigation not just a pipe dream

BY MADELEINE BAERG

Though there's talk of variable rate everything these days, let's be honest: the reality of variable rate irrigation (VRI) is, well... problematic. Typically, VRI means making a moisture map at the beginning of a season that turns off certain heads for certain zones all season long (or, quite often, year after year). While current systems can decrease overwatering wet spots and heavy saline zones, they are only variable over space, not over time. Technology exists that can improve on static VRI, but farmers rarely have the time, expertise, or support to invest in adjusting prescriptions in-season. Fortunately, better technology may be ahead.

Farming Smarter, working with the University of British Columbia and Ensemble Scientific, started a project to test an intelligent, autonomous VRI system that could will help farmers conserve water and build yield.

"There is a lot of frustration with VRI products out there. One farmer told me that the wind knocked over his variable rate pivot and it was a Godsend because then he could put up a regular pivot," says Lewis Baarda, a certified crop agronomist and Farming Smarter Field Tested Manager.

"VRI's potential is not yet actually applicable or useful to farmers. We hope to figure out a VRI system that actually decreases workload and improves outcomes."

VRI isn't a new concept. Currently, many pivots are equipped with the technology neces-

sary to adjust irrigation rates. The aim of this project is to make in-field moisture sensors communicate to an artificial intelligence controller that adjusts irrigation output in real-time.

"What we want to do is place a whole bunch of sensors throughout the field that feed information back to the pivot throughout the season, so the pivot knows exactly how much moisture is in the soil anywhere in the field and can move autonomously to react," says Baarda. "The technologies exist. What's innovative is putting it all together."

To get to the goal of a new kind of 'smart' irrigation system, computer scientists and software engineers at the University of British Columbia LiteFarm and Ensemble Scientific are building data-driven decision-making software.

Once that huge component of the project is complete, Farming Smarter will deploy and test the systems in a field-scale trial. Baarda and his team will collect the data and observations at strategic locations throughout the field to evaluate the system effectiveness and identify improvement opportunities.

An autonomous irrigation system offers the potential to increase farm productivity in multiple ways. It can: increase arable land by reducing the size of saturated zones and saline areas, reduce the producer workload, optimize overall water usage, support crop growth potential, and ultimately — hopefully — produce higher quality agricultural products.

For many producers, managing irrigation is one of the most hands-on and critical components of crop growing success. Some producers may be hesitant to give up control, Baarda recognizes. There's also the still unknown issue of cost.

"Our approach to start is to throw the kitchen sink at this. We don't have a good idea of how many sensors we actually need, so we're putting a whole lot out," says Baarda. "But, then we'll look at it and consider what's actually possible in a practical application. Maybe we achieve 98 per cent success if we put out all these sensors, but maybe we'd be at 96 per cent success if we only put out half or a quarter as many sensors. We're starting with the proof-of-concept stage — can we actually do this — and then we'll move on to looking at what's best for a real-life application."

The irrigation project began in the spring of 2021. Baarda hopes to finish testing and complete a final report on the findings by the end of 2022.

"I know some farmers are skeptical, but some of the farmers we've connected with are really excited about the potential once we explain what we're trying to do. For myself, I'm really thrilled about this project. It's a fun, fast-paced, innovation-focused project. And, conserving water is top of everyone's mind, which makes this project great timing. I think this project could really help push the irrigation envelope forward." —



A sample of a soil tension sensor with temperature

PHOTO: ENSEMBLE SCIENTIFIC



Low pressure drop tubes made a significant water saving.

PHOTO: MORTON MOLYNEUX

All research adds to innovation

BY NATALIE NOBLE

Third party unbiased research serves farmers as much as corporations which is why the Farming Smarter Contract Research Unit, led by research associate Trevor Deering, oversees private research conducted on behalf of private companies around crop protection, management products and techniques, as well as variety, biological, and management trials.

“Just as Farming Smarter in its entirety supports our farmers and agronomists, so too does the Contract Research Program and our team,” says Deering. “Our difference is that we do this by helping companies supply the industry with products and practices that work by providing unbiased and trusted research through our boots on the ground.”

Research initiatives may cover a range of subjects including most effective products and best practices around fertilizers, pesticides, crop varieties, soil health and overall agronomy. Trials move around yearly, but tend to take place on quarter-acre plots in multiple southern Alberta locations including Lethbridge, Taber, Enchant, and others. Deering and his team happily take on all the heavy lifting.

“First, we prepare and manage the site, including working on soil preparations, weed control strategies and these kinds of things,” says Deering. “Then we seed the crop, apply the

product we’re testing or implement the agronomic practice we’re studying and maintain the crop including any necessary weed control and mowing. All the while we collect the data. Finally, we harvest the crop and send off our final report to our clients.”

Research methods include conducting soil samples, plant counts, efficacy ratings and maturity evaluations as well as collecting any custom data based on a client’s agreement.

Currently, the Contract Research Unit heads up three projects with the Alberta Alfalfa Seed Commission. One project involves testing products to control alfalfa weevils. It uses four different insecticides sprayed at different rates in separate field locations on two Rosemary farms.

“We didn’t have to seed the trial plots or maintain them because the farmers took care of everything when they worked the rest of the field,” says Deering. “We conducted sweeps and counts of the number of larvae in each plot right before spraying, counting again four, seven and 10 days after spraying to assess the efficacy of the chemicals. We will also assess yield differences at harvest.” The second alfalfa project explores different desiccation timings and the third tests different desiccation products.

A rolling barley study in partnership with Complete Agronomic Services rolls a barley

crop at six different growth stages from right after seeding, to leaves one-through-four and then at the first node stage.

“We evaluate the lodging, disease, height at maturity, biomass, feed value, seed yield and seed quality,” says Deering. “We’re running statistical analysis to determine the best time to roll the crop.”

While some private companies may keep information private for proprietary reasons, some Contract Research Unit projects are public and permit the sharing of results.

“Our work with the Alfalfa Seed Commission, CARA Soil Health Lab and Pest Monitoring Program are publicly available,” says Deering.

The varied and extensive expertise held within the Contract Research Unit team and its partners, along with the unique business structure, is leading ag research into new realms.

“We are growing stronger every year, positioning ourselves to provide research for products and practices,” says Deering. “We’re working to change the way people farm, especially facing the rapid changes occurring in the world.”

Deering encourages farmers with questions or ideas for the program contact Farmer Smarter or him, 403-317-0022. —

Trevor Deering with his 2021 research team: Isabel Rattay and Michala Gates.
PHOTO: MORTON MOLYNEUX



Living Lab in southern Alberta



From small plot to field scale, research needs to help farmers stay sustainable. PHOTO: ISAAC MILKO

There is still time to join a virtual workshop November 10 to learn more about what a southern Alberta Living Lab might mean for you and take part in shaping its direction.

This new Canadian initiative will bring together farmers, scientists, and other agricultural collaborators to develop and test innovative practices and technologies.

The program promises to bring a much needed financial boost to agriculture research in Alberta. It's possible there will be more than one Living Lab in operation in Alberta by mid-2022.

Farming Smarter is making a pitch to be southern Alberta's Living Lab.

"A Living Lab works the same way we do," explains Farming Smarter Executive Director, Ken Coles.

The core principles advocate a focus on farmer needs, collaborate with partners of diverse expertise and test innovations in real-life context. This is in line with Farming Smarter's apply-adapt-adopt approach that encourages farmers' participation and includes field scale trials through its Field-Tested program.

The application process to become one of Alberta's Living Labs began in mid-2021 and Farming Smarter received the go ahead to move into phase two of the process in late summer.

A recent set of workshops were held across southern Alberta to collect input from various stakeholders to prepare its application for the 5-year program (Phase 2). The online session, November 10, is open to anyone interested in providing input.

This final initiative has three core principles:

- **Focusing on farmers' needs: The people who ultimately use the innovations are key throughout the process.**
- **Broad and diverse partnerships: Bring in a multi-disciplinary team of scientists, farmers, agronomists, non-profits, industry representatives, First Nations, and governmental institutions.**
- **Testing the real-life context: Test practices and technology on-farm under real agricultural production conditions.**

Initial research and dialogue resulted in identifying the following goals:

1. Enhance and maintain soil OM content through higher C inputs

- winter cover crops
- perennial crops
- high biomass producing crops
- permanent cover on marginal lands

2. Reduce soil erosion through soil conservation practices

- strip tillage; low disturbance tillage practices
- variable-rate and reduced volume irrigation management
- strategies for dry bean, potato and sugar beet production
- agroforestry practices

3. Enhancing energy efficiency of agricultural operations

- reduced reliance on fertilizers through incorporation of legumes in crop rotations
- 4R fertilizer management strategies
- variable rate fertilizer application
- integrated pest management strategies

Words we'll live by

BY C. LACOMBE

If you have any doubt about what Farming Smarter is about or trying to achieve, we think we nailed it for you.

Trust me when I say that if we didn't believe this was necessary, we would have dropped it like a hot potato! But Farming Smarter is about to turn 10 years old and we needed to take a deep look at who we are, what we do and why we do it.

Ten years ago, Farming Smarter was a Board of Directors, three permanent staff and a couple of summer students. In 2021, we have 10 permanent staff, (one staff Ph.D. scientist and three Masters degree staff). We also hired about 10 students to do field work. In this decade, Farming Smarter grew from working a few hundred dryland acres east of Lethbridge to its present capacity on dryland and irrigated land in several southern Alberta locations. It was time to review what we say about ourselves to see if it's still true.

We know that our loyal followers have clear ideas about what we do, we're just not sure they realize the scope of our growth. We also know that there are people who might follow us if they knew what we do, but we hadn't really taken the time to tell them. It took some time and lots of people got to chime in before we settled on some things we confidently share now.

Read the sidebar on Ken Coles Executive Director message for our full brand promise that lays out the value or experience you can expect from us. Further to that, we have some well-established programs that can now stand on their own two feet, so we gave them descriptive taglines to reinforce what our brand stands for and what we aim to achieve.

Our Taglines:

Farming Smarter

We change the way people farm

Programs

Field Tested:

We change the way people farm through grounded on-farm innovation.

Agronomy Research:

We change the way people farm through experimentation and collaboration.

Custom Research:

We change the way people farm by delivering unbiased trusted results.

Extension:

We change the way people farm with enriching and interactive learning experiences.



L to R on the ground: Toby Mandel, Sara Gateman, Michaela Gateman, Isabel Rattai, Joseph St. Louis, Brendan Roy, Declan Sander, Gurbir Dhillon, Trevor Deering, Shelly Barclay, Claudette Lacombe, Sean Kjos, Lewis Baarda, Jamie Puchinger. Back row L to R: Kyrsten French, Carlo Van Herk, (behind Carlo — Orion Legg) Mike Gretzinger, Ken Coles Missing: Aidan Sander, Ben Irwin & Caleb Campman. PHOTO: MORTON MOLYNEUX

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