THE IRRIGATOR

March 2022

Research Director's Corner

Garry Hnatowich, Research Director
Irrigation Crop Diversification Corporation

We've all heard of the ancient Chinese proverb of "living in interesting times", I propose that 2021 conforms – continuing pandemic, supply chain disruption, and the worst drought in most of our lives. Record grain prices coinciding with a historic drought. Kick me again. That said, 2021 was a year where irrigation paid in spades. It underscored the Government of Saskatchewan's announced $4 billion expansion of the irrigation sector, and its importance to agriculture, food security and the economy of the province.

The past season was certainly a more productive year, compared to the previous, with a full program undertaken. We were allowed to hire summer staff and re-established a full research program. Dr. Gursahib Singh joined us in April and has quickly and effectively settled into his role. As always, the assistance from our colleagues at both Agriculture & Agri-Food Canada and the Crops & Irrigation Branch of the Saskatchewan Ministry of Agriculture is gratefully acknowledged. I also wish to acknowledge Dr. Doug Waterer, Professor Emeritus at the University of Saskatchewan. Doug was the Principal Investigator on several vegetable trials and invited ICDC to participate, which we were happy to do.

Projects that were deferred or postponed due to the early days of the pandemic were started in 2021. As such, we established greater than 60 trials. Trials can be split between both Field Crops and Horticulture and between Varietal or Agronomic evaluations. The season was successful, we didn't loose any irrigated trials due to drought! We did initiate a nitrogen fertilizer trial with both silage and grain corn. We established 3 irrigated and 3 dryland trials. We only harvested 2 of the 3 dryland sites due to the drought. The only reason the one dryland site was harvested was it was located on land irrigated in prior years and limped to the finish line on subsoil moisture reserves from those previous irrigations. Just how efficient is having rain on demand!

ICDC and SIPA jointly hosted their annual AGM last December with the venue moving to the Dakota Dunes Casino. The AGM was a hybrid structure with attendees both present in-person and participating via a video broadcast. I think it safe to state that all in-person attendants were happy to return to a live event and were impressed with the venue. ICDC had several board members who had completed their terms. We wish to thank outgoing members Greg Oldhaver (Miry Creek), Paul Heglund (Consul-Nashlyn) and Larry Lee (Macrorie) for their dedication and commitment to ICDC and irrigation in Saskatchewan. A very special thank you to Anthony Eliason (Non-District) who served 2-terms as Chair and was instrumental to the growth and wellbeing of ICDC. Anthony was tireless in his efforts and was greatly appreciated by members of the board and by staff. We welcome Jeff Ewen (Riverhurst) who assumes the Chair position. Jeff is energetic and brings his experience as both an irrigator and an agronomist to the position. We also like to welcome David Bagshaw (Luck Lake), Joseph Heck (Non-District) and Gerry Gross (SSRID).

The new board has already been active. Talks continue to explore a merger of SIPA and ICDC as discussed at the past few AGM's. The board also reclused to Swift Current for a combined two-day board meeting and 5-year strategic planning session to guide the direction of ICDC in the coming years.

This will also be my last Research Director's Corner with my imminent retirement in June. It has been an honour to serve irrigators in Saskatchewan. I left the public sector back in 1983 to accept a position with the legacy Saskatchewan Wheat Pool. I served the Pool, or affiliated companies, until 2001. I absolutely loved working for "farmers" and on projects that benefited them, not corporate shareholders. So, it didn't take much persuasion when Gerry Gross (yup a present board member) inquired whether I might consider becoming ICDC's first employee and developing a research program for the sole purpose of, and for, irrigators. The program is a collaborative effort and its evolution the combined efforts of all your ICDC employee's. I wish I was 20 years younger as I see exciting things coming to the sector in the next decade and would wish to be actively engaged. However, I'll passively watch with great interest, knowing that ICDC is in good hands. Again, thank you for your trust, encouragement, and support over the last decade.

Garry

Visit the ICDC website at:
https://irrigationsaskatchewan.com/icdc
to stay current on our publications and newsletters.

Broadcasting N Fertilizer on Frozen or Snow-Covered Soil

Garry Hnatowich, Research Director
Irrigation Crop Diversification Corporation

The sight of fertilizer applicators on fields in the depths of winter has seemingly become more common. Nitrogen (N) fertilizer broadcast onto frozen ground is a potential risky proposition so why contemplate its use. It's simply a matter of time management. Farm size has increased, timely seeding essential, hired help wanting, etc. It's tempting to get your N fertilizer needs out of the way and be able to seed more acres daily without fertilizer re-fills.

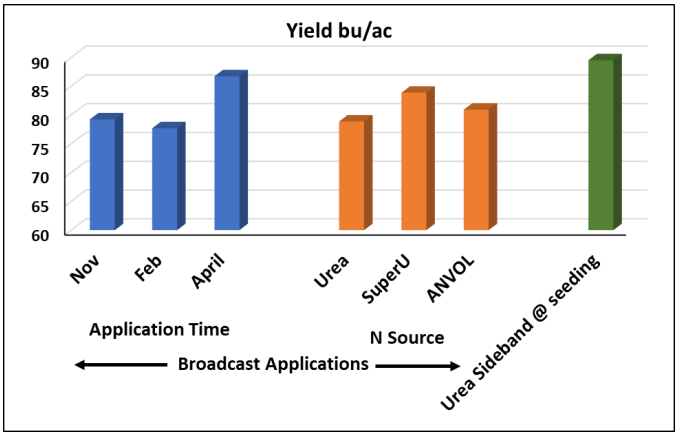
However, agronomically, it's fraught with risk as you're gambling on three of the 4r's (right time, right source, and right place, theoretically even the right rate could be added). Urea fertilizer is subject to volatile losses. As it dissolves the urea reacts with an enzyme (urease) in soils to convert to ammonia, if exposed to the atmosphere, gaseous losses of N can occur. The ammonia further converts, ultimately to nitrate (nitrification), this process can also result in gaseous losses. If the urea is placed in, or washed into, soil the N forms can be trapped and losses minimized. So, if N is floated onto frozen or snow covered ground your hoping for a slow spring thaw. Under these conditions the hope is that most of the fertilizer will be moved into soils with minimal losses. If little snow cover is present, chances are the fertilizer remains on the surface – not good. A fast snow melt will make for very green ditches and algae covered sloughs – not good. Several N fertilizer efficiency products have been developed that are intended to limit potential N losses and may have a place if considering ice fishing N fertilizer application timings.

In 2020 ICDC cooperated in a two-year study to assess N fertilizer applications onto frozen or snow-covered soil. Trials were conducted at 7 ArgiARM sites. Dryland trials were established at Melfort (NARF), Prince Albert (CLC), Yorkton (ECRF), Indian Head (IHARF) and Redvers (SERF), the lone irrigated trial was ICDC. Three fertilizer forms where used: (1) bare urea, (2) SuperU® (urease + denitrification inhibitor) and (3) ANVOL® (urease inhibitor). These N fertilizers where applied mid-November, mid-February, and mid-April as a broadcast application. Broadcast applications were compared to a side band application of urea at seeding. Meteorological data such as snow depth and soil temperatures were measured at each broadcast timing, along with numerous other agronomic information. The N fertilizer application rates differed between sites and based on soil testing results.

As the study is on-going, I will only be discussing the results of last year at ICDC. The base rate of all N fertilizer applications was 138 lb N/ac (155 kg N/ha). We broadcast N on November 17, 2020, February 16 and April 15, 2021. Snow depth at the November, February and April was 10.2", 9.4" and 0", and soil temperatures (2" depth) 1.7, -10.5 and 4.0 °C, respectively. Spring wheat seeding occurred on May 5.

Yield obtained for each fertilizer N application is shown in Figure 1. The bar graph shows mean effects for time and fertilizer source. For example, the November yield represents the average yield of all 3 N fertilizer forms applied at that time. Similarly, the urea broadcast yield represents the average yield obtained for all broadcast application times. Results indicate that the November and February applications resulted in significantly lower grain yields. Though N gaseous and/or run-off losses were beyond the scope of the study results suggest that overwinter losses did occur, lost yield was approximately 9 bu/ac compared to the April timing. By April soil temperatures were thawing and, fortunately, the trial received 1.1" of precipitation from time of application to seeding. Its my experience that at least ½ inch of rain is necessary to move broadcast N into soil.

Figure 1. Spring wheat yield as influenced by mean fertilizer N placement and timing, 2021.



So, we were fortunate. However, the highest yield was obtained with the side band urea application. The side band N treatment provided 3 bu/ac additional yield compared to the April broadcast applications.

Preliminary results suggest that both SuperU® and ANVOL® did provide some protection from gaseous losses. Yield of ANVOL® was 2.0 bu/ac and SuperU® 5.0 bu/ac. If overwinter losses of urea were due to gaseous loss, then results indicate these products can be efficacious.

Of further interest is the influence of these fertilizer applications on grain protein content as shown in Figure 2. No broadcast application produced seed protein contents approaching that obtained with the side band application. The November & February application timings contained protein > 2% lower than the side band application. The April application was 1.3% lower

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Broadcasting N Fertilizer on Frozen or Snow-Covered Soil

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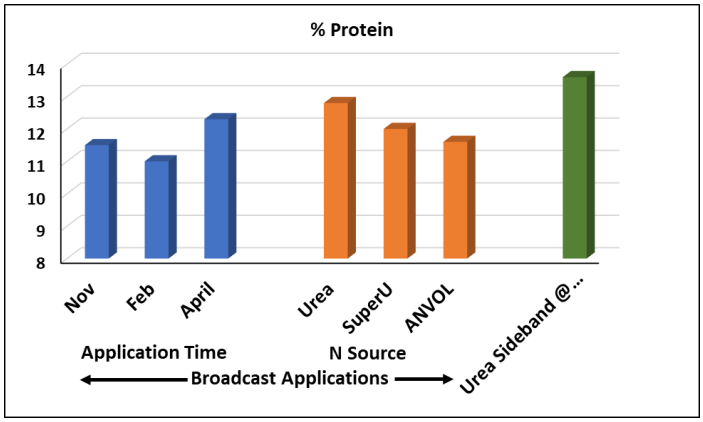
Figure 2. Spring wheat seed protein as influenced by mean fertilizer N placement and timing, 2021.



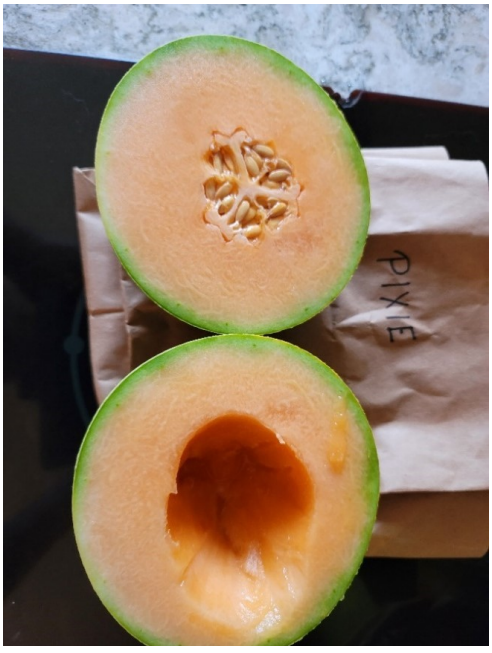
than the side band treatment. Only the side band application achieved a desired protein content of 13.5%. Fertilizer sources were also ineffective in achieving the protein levels when broadcast compared of the side band application.

These results suggest to me that the early and mid-winter broadcast applications were simply ineffective and costly. Timely precipitation helped move the mid-April N into the soil which allowed higher yields but not enough N to optimize either yield or protein. Results presented are from a single year and should be tempered, however, the most effective application was plain-old urea side banded during seeding. The trial is continuing in 2022 with the November and February broadcast applications already applied.

Saskatchewan Grown Cantaloupe

Cara Drury, PAg, Irrigation Agrologist, Outlook
Saskatchewan Ministry of Agriculture

In the growing season of 2021, the Saskatchewan Vegetable Growers' Association put forward an ADOPT project for determining size profiles of cantaloupe grown in Saskatchewan. The objectives of this trial were to demonstrate the potential of growing cantaloupe in Saskatchewan, as well as help retailers create a size profile to categorize locally grown cantaloupe. Currently, the best place to find the locally grown fruit is at farmers markets in late July and through August. Retailers have identified this crop as having good potential for the locally grown market in their stores.



Eight varieties of cantaloupe were used in the trial: Avatar, Pixie, Sugar Rush, Timeless Gold, Goddess, Early Champ, and Divergent. Vine crops are known for loving the heat; therefore, it is no surprise that the cantaloupe had an excellent season. In early spring expectations were for small, almost personal snack sized, cantaloupe with amazing flavor. What was achieved were a variety of sizes, from 5-pin bowling balls to large basketballs, but still with amazing flavor.

The ever-changing weather of a Saskatchewan growing season is hard to predict and expecting to produce basketball sized cantaloupe every year would be fool hardy; but it is safe to say with appropriate varieties, agronomics and the help of irrigation, cantaloupe producers can count on a delicious harvest.

Effect of fertility, herbicide, seed treatment and foliar nutrients on Aphanomyces root rot in peas

Gursahib Singh, Research Director
Irrigation Crop Diversification Corporation

When we think about pulses diseases, the disease that makes the top on the list and is economically important is Aphanomyces root rot. This article will discuss the two-year project focused on Aphanomyces root rot in peas that ICDC completed in collaboration with three other Agri Arm sites (WARC, NARF and IHARF). The major challenge in Aphanomyces management is the resting spores (oospores) which are hard to kill and can survive for 10-15 years, even when no host is present. Cultural and chemical controls are available to reduce the adverse impact of this disease. Still, when used individually, none of these practices is highly effective. Primarily for Aphanomyces management, utilizing multiple control strategies, including herbicides, seed treatment, fertilizer rates and foliar nutrient applications, are recommended and can limit the effects of Aphanomyces and improve pea root health.

Table 1. Production management strategies to improve field pea root health in Aphanomyces contaminated soils treatment list.

TRT	Pre-Seed Herbicide	Fertilizer (lb/ac)	Seed Treatment	Foliar Nutrient
1	Glyphosate	20 P only MAP[1] "Low"	No ST	N/A
2	Glyphosate	20 P only MAP	Vibrance Maxx + Intego	N/A
3	Glyphosate + Trifluralin	20 P only MAP	Vibrance Maxx	N/A
4	Glyphosate + Trifluralin	20 P only MAP	Vibrance Maxx + Intego	N/A
5	Glyphosate + Trifluralin	20 P only MAP	Vibrance Maxx + Intego	Rogue II (Fn)
6	Glyphosate	50 P, 20 K, 10 S[2] "High"	No ST	N/A
7	Glyphosate	50 P, 20 K, 10 S	Vibrance Maxx + Intego	N/A
8	Glyphosate + Trifluralin	50 P, 20 K, 10 S	Vibrance Maxx	N/A
9	Glyphosate + Trifluralin	50 P, 20 K, 10 S	Vibrance Maxx + Intego	N/A
10	Glyphosate + Trifluralin	50 P, 20 K, 10 S	Vibrance Maxx + Intego	Rogue II

Gly= Glyphosate, Tri= Trifluralin, Fertilizer "Low"; "High", ST= Seed Treatment, VM= Vibrance Maxx, I= Intego, Fn= Foliar Nutrient

1 Low (20P) – application of 20 lb/ac of actual phosphorus (total of 4 lb/ac of nitrogen)

2 High (50P, 20K, 10S)- application of 50 lb/ac of actual phosphorus, 20 lb/ac of actual potassium, 10 lb/ac of actual sulphur (total of 20lb/ac of nitrogen)

The idea behind this project was to help producers identify which management strategies will most improve plant health and, consequentially, crop yield. Factors evaluated in this demonstration were fertility, herbicide, seed treatment, and foliar nutrients for a total of ten treatments (Table 1). For the effectiveness of each treatment, disease root ratings were assessed twice at five weeks after planting (WAP) and at eight WAP, and yield comparisons were made for each treatment. This project was funded by Saskatchewan pulse growers, started in 2019 and was put on hold due to covid in 2020 and then re-established in 2021.

Disease pressure was high at eight WAP, with root rot spread to the whole root compared to five WAP when disease levels averaged at less than half of the roots infected (< 2 out of 5). Regarding the treatment impact on disease, none of the treatments decreased the disease to desirable levels. The trend of disease suppression was different across all sites, but treatment with higher fertilizer rates regardless of the herbicide (Glyphosate or Trifluralin) performed better than lower fertilizer rates (20P) treatments. Even yield was not influenced by any of the inputs applied in both years (Fig.1), except at Scott in 2019. The highest yields at Scott were achieved by adding higher fertilizer rates (50 P, 20 K, 10 S) resulting in a 9 bu/ac yield gain compared to when low fertilizer (20 P) was applied. Seed treatments did not prove effective in disease suppression at any location. Both years of the study were typically drier, and the effects of a seed treatment were not seen to their fullest potential. The economics of each strategy was analyzed to determine the most productive and cost-effective treatment. The most profitable combination was the application of Glyphosate + high fertility (50 P, 20 K, 10 S). Although this combination produced the highest yield, it did not benefit disease management.

continued on page 7

Is Potassium Needed on Irrigated Soils?

Garry Hnatowich, Research Director
Irrigation Crop Diversification Corporation

Saskatchewan is blessed in potassium (K), undoubtably every resident has driven by a potash mine and marveled at tailing piles of processed material, mined thousands of feet below. Fortunately, this same K is generally also abundant within our soils, such that fertilizer K recommendations are far less common compared to nitrogen, phosphorus, or sulphur. Those soils that are low in soil available K are usually along the parkland fringe in the northern grain belt. Still, grain producers continue to question whether they might obtain a yield response to a K fertilizer application. ICDC lead a project in 2021 intended to offer an insight on K applications. K fertilizer was applied to both wheat and malt barley at rates of 0, 9, 18 and 28 lb K20/ac (10, 20 & 30 kg K2O/ha). The fertilizer was applied either in a sideband position or in the seed-row. A final high K fertilizer treatment of 18 lb K/ac seed-row + 36 lb K/ac sideband was included.

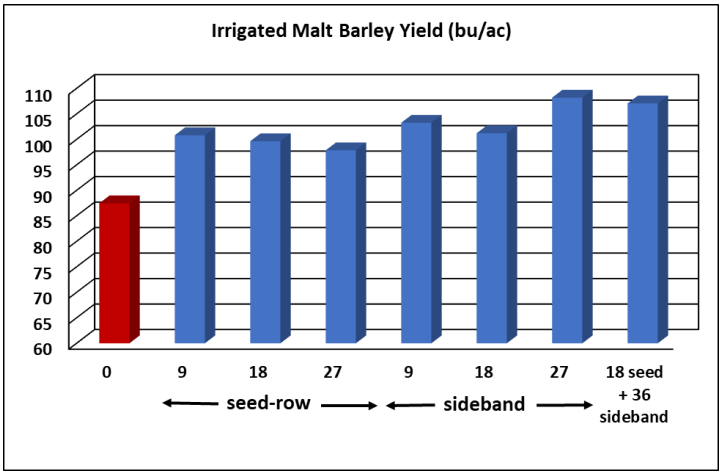
The trial was conducted at 5 dryland AgriARM sites located at Swift Current (SWA), Prince Albert (CLC), Yorkton (ECRF), Redvers (SERF) and Indian Head (IHARF). Soil test available K at these sites ranged from 278 – 1174 lb K/ac and most had a 10 lb K/ac fertilizer recommendation. No dryland location obtained a yield response with either wheat or malt barley to fertilizer K applications. It should be stated that drought likely negated possible responses at 2 of the 5 dryland trials.

The ICDC trial was irrigated and established on soil with a soil test available K level of 380 lb K/ac (190 ppm) and a recommended application of 10 lb K/ac. Irrigated wheat did not respond to K fertilizer applications. Malt barley had a different story. Yield response of the barley is illustrated in the graph below.

The average malt barley yield response to all K fertilizer applications was 17%. All seed-row K fertilizer additions increased yield but at rates higher than 9 lb K/ac yield began declining. This is attributed to seed damage from higher levels of salts associated with the fertilizer. The trial was seeded before irrigation was available and seedbed moisture conditions were dry, this would enhance fertilizer salt damage. Positioning the K fertilizer away from germinating seed in a sideband position removed the salt damage effect and our highest yield was obtained with an application of 36 lb K/ac. The combined high K fertilizer treatment was just slightly lower yielding than the 36 lb K/ac treatment and again likely due to some damage from the seed-row portion of the treatment.

The soil at this site was a very well-drained sandy loam with an organic matter of 1.5%. These soils would be considered a better candidate for K fertilizer responses compared to a finer textured soil. This field has also had a periodic history of alfalfa forage over the years. The majority of K in plants remains in the straw rather than the harvested seed. Therefore, in annual grain production much of the K is returned to the soil as crop stubble and debris decomposes. However, with forage legumes & grasses much of this K is removed with harvested biomass. So, these are the irrigated fields to consider first for a K fertilizer application – sandy textured as opposed to loams, low organic matter, a history of forages.

A bit of a mystery as to why barley responded to K fertilizer but not wheat. It might be that barley is simply more responsive to the nutrient. ICDC has applied for additional funding to repeat this experiment again in 2022, fingers crossed.



Ministry of Agriculture welcomes Morgan Coté as our newest Provincial Irrigation Agrologist in the Ministry of Agriculture Crops and Irrigation Branch. She is a recent graduate from the University of Saskatchewan, as she received her BSA in Horticultural Sciences in April 2020. Her areas of focus will be:

- Providing support to ICDC with research and demonstration projects
- Providing extension services to the province's irrigation farmers
- Working with new irrigation farmers providing support with irrigation scheduling and general irrigation agronomy
- Providing support to irrigation farmers to identify crop diversification opportunities.

Morgan has a background in both grain and specialty crop farming and spent the last two years as a sales rep for a crop inputs company. Outside of the job, Morgan spends a lot of time volunteering, dancing and lending a hand on the family flower farm.

Irrigation and Drainage go Hand in Hand

The Saskatchewan Irrigation Projects Association has been working with landowners and the Water Security Agency (WSA) to implement demonstration projects, which research how irrigation and drainage go hand in hand. The demonstration project research is showing there are opportunities to use some drained water for irrigation.

At first glance it might seem counter intuitive to put water onto a field while also removing water. It really is about balance-balancing the ideal field soil moisture for optimum crop production.

Under pivots dealing with surface water either through ditches, buried pipes with uprisers or tile can be the first step planned.

Secondly, tiling key areas in a field to control the water table and create that ideal root zone is gaining momentum.

"All drainage in Saskatchewan requires an approval. We are seeing farmers with existing drainage and proposed drainage applying for approvals", says Dwayne Siba, Supervisor of Agriculture Water Management South for WSA. "I'm seeing projects come across my desk with a combination of tile and surface drainage where farmers are targeting areas that need drainage on existing irrigation plots or where they are planning to develop irrigation."

What are we seeing coming out of the Irrigation Districts right now?

Did you know that while you have an Irrigation Certificate from Ministry of Agriculture and a Surface Water Allocation from Water Security Agency any drainage field improvements require a Drainage Approval?

Water Security Agency is available to help you.

Many irrigators have been receiving drainage approvals, but there is still an opportunity for more. Many of the quarters that have not yet been irrigated in current districts might need some drainage to make irrigating feasible. With the current opportunity and push to in-fill, lining up drainage approvals opens the door to more irrigatable quarters.

"Most irrigation districts have an established network of district drains making it much easier to identify an adequate outlet for potential drainage projects", states Kelly Farden, Manager of Agronomy Services, Irrigation Section from the Ministry of Agriculture. "Drainage improvements can help to address limitations such as flooding, water-table buildup, and salinization. However, every parcel is unique so it is important to fully understand all of the soil and landscape limitations and develop your drainage plan accordingly."

"It is a lot easier to have a successful project when you know where to start, and AgH2Onward helps you get there," says Julie MacKenzie, Agrologist with AgH2Onward.

Getting started.

The Water Security Agency recognizes the need to help farmers learn more about the opportunities presented by water management and specifically drainage. So, with support from Natural Resource Canada's BRACE funding program and numerous partners, the Water Security Agency developed AgH2Onward.

AgH2Onward, is a free workshop delivered over two short sessions. It provides producers with information about Saskatchewan's Agricultural Water Management Strategy and how drainage works can be constructed to be more resilient to a changing climate. AgH2Onward walks you through the things to consider with your drainage project and the most important things you, as a farmer, can to expect.

"It is a lot easier to have a successful project when you know where to start, and AgH2Onward helps you get there," says Julie MacKenzie, Agrologist with AgH2Onward. "An approved drainage project can be a game changer for your operation. The right drainage in an irrigation project can make a big difference if you can move to successfully adding a really high value crop to your rotation."

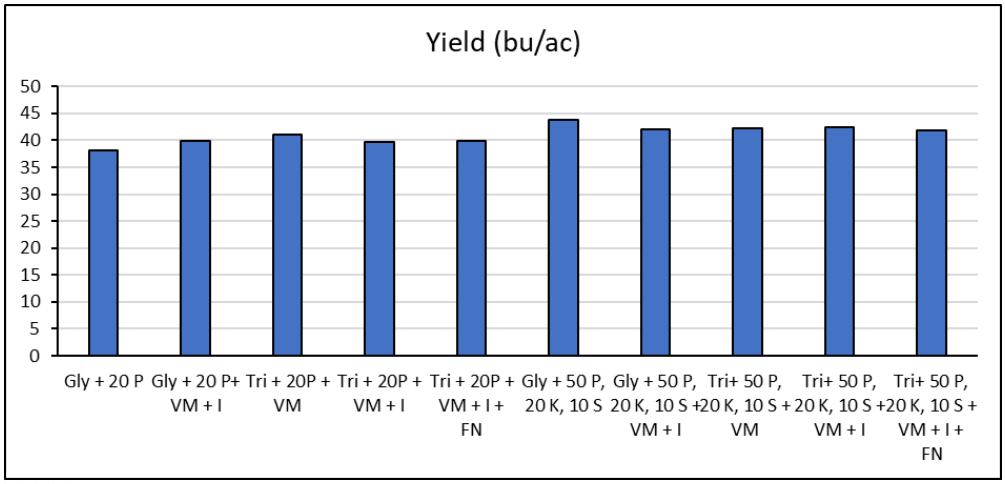
The Water Security Agency is offering AgH2Onward (www.agh2onward.ca) through to seeding. Come check it out!

Effect of fertility, herbicide, seed treatment and foliar nutrients on Aphanomyces root rot in peas

continued from page 7

At the end of this two-year study, we concluded that out of the four inputs (fertility, herbicide, seed treatment and foliar nutrients) used, the most common factor that influenced disease severity and field pea yields were the fertilizer rates (20 P vs 50 P, 20 K, 10S). Proper nutrient management can help promote the development of healthy plants and root systems to better withstand disease pressure and adverse environmental conditions.

Figure 1: Pea yield averaged across all locations for 10 treatments



More details of this project are available in ICDC annual report 2022 and on our YouTube channel at: https://

.youtube.com/watch?v=zVXm6D5nPoE

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Travis Peardon, PAg, Livestock and Feed Extension Specialist, (306) 867 5504, Specialty Area: Forage Crops

Morgan Coté, Provincial Irrigation Agrologist, (306) 860-7201 Specialty Areas: Field and horticulture crops, irrigation scheduling and fertility management

Directors of ICDC

Producer Board Members	**Irrigation District**	**Development Area**	**Term Ends**
Jeff Ewen, Chairperson	Riverhurst	SEDA	2022
David Bagshaw, Vice-chairman	Luck Lake	SWDA	2024
Kaitlyn Gifford	SSRID	LDDA	2023
Gerry Gross	SSRID	LDDA	2022
Nick Eliason	Non-district		2022
Joseph Heck	Non-district		2022
Elmer Palmer	Consul-Nashlyn	SWDA	2024
Murray Purcell	Moonlake	NDA	2023
Appointed Board Members	**Organization**		**Term Ends**
Aaron Gray	Saskatchewan Irrigation Projects Association		December 2022
Kelly Farden	Manager, Agronomy Services, Crops & Irrigation Branch Saskatchewan Ministry of Agriculture		December 2022
Dianna Emperingham	Executive Director, Crops and Irrigation Branch, Saskatchewan Ministry of Agriculture		December 2022

THE IRRIGATOR

March 2022

In this Issue:

The *Irrigator* is a publication released bi-annually by ICDC. It provides Saskatchewan Irrigators with an update on ICDC's activities, project highlights and agronomic information. Providing this information help Saskatchewan Irrigators produce their crops using economical and sustainable practices. Copies are mailed out to our mailing list and are available on ICDC's website.

ICDC's focus is on the research and demonstration needs of Saskatchewan's irrigation farmers. ICDC works to ensure that these needs are met.

ICDC Vision

ICDC will be the primary source of irrigation research and demonstration for irrigation producers in the province of Saskatchewan to maximize profitability and sustainability in the irrigation sector.

ICDC Mission

ICDC conducts irrigation research and ensures knowledge transfer of that research to the irrigation producers of Saskatchewan.

ICDC Objectives

- To research and demonstrate to producers and irrigation districts profitable agronomic practices for irrigated crops.
- To develop or assist in developing varieties of crops suitable for irrigated conditions.
- To provide land, facilities, and technical support to researchers to conduct research into irrigation technology, cropping systems, and soil and water conservation measures under irrigation and to provide information respecting that research to district consumers, irrigation districts and the public.
- To co-operate with the Saskatchewan Ministry of Agriculture to promote and develop sustainable irrigation in Saskatchewan.

ICDC
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