NEWSLETTER

SPRING 2021

INTRODUCTION

Roy Culberson, Chairman, Atlantic Grains Council

The Pandemic has impacted many aspects of our lives. Who would have thought "you're still on mute" would become one of the more common phrases as many of us became accustomed to meeting over Zoom or other virtual platforms. This time last year we all faced great uncertainties concerning the impact that Covid-19 would have on our families and communities. In agriculture we were concerned about supply-chain issues, would products and parts be available when required? There was labour uncertainty as well as concern about potential markets.

From an Atlantic Grains Council perspective Heather Russel, seamlessly managed the AGC office from home keeping the Executive, as well as others involved in the Council's work in touch through Zoom. While pandemic related travel and work restrictions did impact us all AGC was able with the help of our agronomist team to successfully complete the majority of the planned 2020 on farm agronomy trials. My thanks on behalf of the AGC goes out to Dave Bell, Bell Crop Services, Perennia as well as to Misty Croney, Lise LeBlanc and the entire team from L.P. Consulting Services for their efforts on the AGC trials.

The second year for the Yield Enhancement Network (YEN) was a great success with a total of 59 participants from across 3 of the 4 Atlantic Provinces (see inside for a report on YEN). The information collected from and shared with the YEN participants will I am sure make a significant impact on cereal and perhaps other field crop production and management techniques in the Atlantic region. Dr. Aaron Mills, Agriculture and Agri-Food Canada continues his effective leadership with this initiative. Those interested in participating in the 2021 YEN competition can use the following link to register, https://atlanticgrainscouncil.ca/yen

This Newsletter contains articles contributed by AGC partners, I thank those who have shared their time and knowledge for the benefit of all. I also want to acknowledge and thank AGCs' members, check-off partners, the Canadian Agricultural Partnership program and the farmers from across the region who through their contributions make the work of the Atlantic Grains Council possible.

Finally, I want to extend on behalf of AGC best wishes for a safe and healthy 2021 crop year with good-prices and yields.

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada | New Brunswick | Nouveau Brunswick | Nova Scotia | Prince Edward Island | Canada | Newfoundland Labrador | Canadian Agricultural Partnership

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Atlantic Grains Council

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MICHAEL J. DELANEY, POLICY ADVISOR, ATLANTIC GRAINS COUNCIL

Michael Delaney is no stranger to the Atlantic Grains Council and is well known in cereal and oilseed circle both across the region and nationally. However, no matter how well you think you know someone there is always something new to discover. That is why the AGC is presenting this profile of Michael Delaney.

Michael was raised in Barrie, Ontario and had early work experiences on dairy, beef and hog farms in both Alberta and Ontario. Early exposure to agriculture set his path towards the University of Guelph where he graduated in 1977 with a B. Sc. In animal science.

Immediately after graduation Michael worked with the Ontario Ministry of Agriculture as a farm and plant milk inspector. In 1979 Michael accepted a position in the PEI Department of Agriculture's Extension Branch, as swine specialist and continued in that role to 1990.

A change of pace occurred for Michael in 1990 when he became the manager of pork industry strategic planning as well as manager for PEI of the Federal/Provincial triparte programs for livestock. In 1993 Michael was a policy analyst for the PEI Department of Agriculture with an emphasis on trade policy, including the Federal/Provincial agricultural trade policy committee, as well as food safety.

In 2001 a new path opened for Michael with his appointment as general manager of the PEI Grain Elevator Corporation. Michael's eleven-years as general manger was a period of great change for the Corporation. Storage capacity was greatly expanded, finances of the Corporation were reorganized, and new opportunities were sought which expanded both the Corporation's purchase and sale of locally produced cereals and oilseeds.

Michael was a member of the AGC's Board between 2006 and 2012 and since 2012 has been the main policy advisor to the AGC and is active representing AGC at the national level. Among other activities Michael is a respected voice from Atlantic Canada to the Canadian Agri-Food Trade Alliance, Cereals and Soy Canada and the AGC representative on the Federal/Provincial Grain Industry Roundtable. Michael is also currently a director for the Grain Growers' of Canada and the Canadian Agri-Food Alliance and Chair of the Grain Growers' of Canada, Trade and Marketing Committee.

Along the way Michael found time to get married and with his wife Gail raised three children and now has three grandchildren as well. From 1979 to 2008 Michael owned and operated a small (up to 45 cows) cow-calf-finish operation in Hamilton PEI. Michael has always had a keen interest in farm machinery and is active with the Kier Memorial Museum, Malpeque Bay Historical Society and has actively participated in the demonstration of restored historical farm equipment for threshing grain.

UPDATE - SOYBEAN SEED RATES, PLANT POPULATION AND YIELD

On Farm Agronomy Team

The Atlantic Grains Council (AGC) between 2015 and 2020 has conducted over 40 trials across the Maritime Provinces concerning soybean seeding rates. A review of the data generated from these trials and statistical analysis provides helpful information concerning seeding rate and plant population that should be considered as plans for planting the 2021 crop are finalized.

Trial Summary

- Over 40 sites across the Maritimes from 2015-2020
- Statistical analysis is completed
- Variables: germination, variety, fertilizers, soil fertility
- Treatments: 90,000, 110,000, 130,000, 160,000, 190,000 seeds/acre

Results of each treatment were divided into three groups (using raw data): see Figure 1,

- (+/-20% of target) 80%-120% of target population
- <80% of target population
- >120% of target population
- Accuracy of seeding is a problem, especially at lower and higher seeding rates.

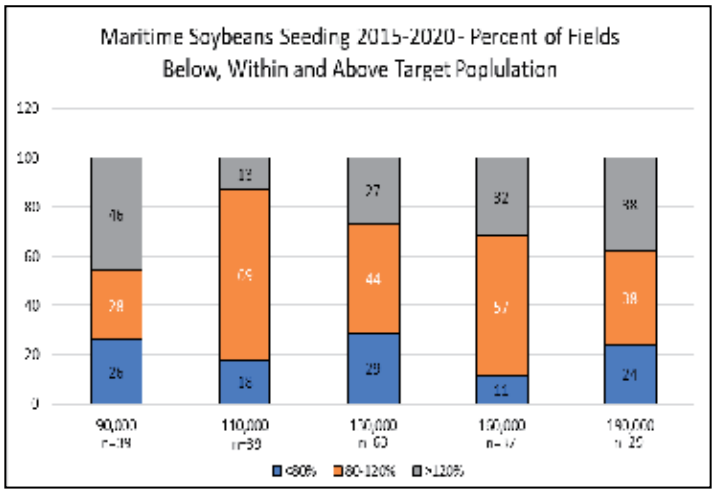


Figure 1. Percent of fields below, within and above desired target

Calibrate

Many farmers calibrate. Once!

Need to recalibrate for different varieties and seed sizes.

Seeding rate of 160,000 seeds/acre

- Seed size of 5000 seeds/kg = 70 lb/ac

BUT

- 70 lb/ac of seed with a seed size of 5710 seeds/kg results in planting 180,000 seeds/acre – Over planting!

Target Population	Target Seed Cost/acre	Cost/acre Over Target
90,000	$51	$10 - $27
110,000	$63	$13 - $33
130,000	$74	$15 - $68
160,000	$91	$18 - $96
190,000	$109	$22 - $115

Figure 2. Seeding accuracy economics

What do the trials say about plant population? The statistical analysis of the data shows there is a significant difference in plant population. This is as expected given the great range in target population.

Did the increase plant population result in increased yields?

The data, see Figure 3, indicates that an increased seeding rate did not result in increased yields.

Last year looking at the trends from the raw data it appeared that seed rates of 130-160,000 seed per acre provided the best chance to minimize risk and maximize yield.

However, using 2015-2020 statistical yield data and the following assumptions:

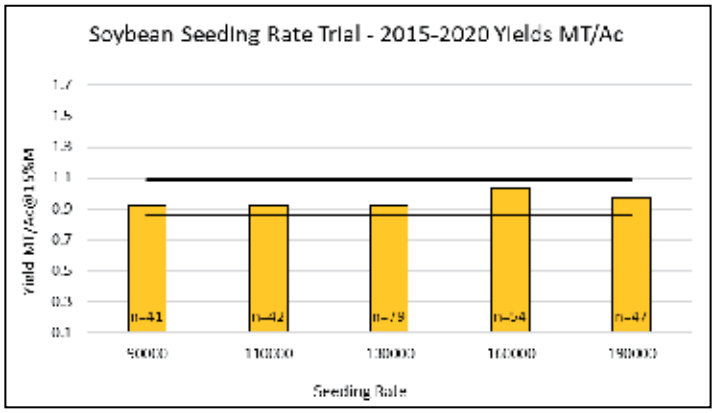


Figure 3. Soybean seeding rate trial

- 1 bag of seed (140,000 seeds) = $85, and
- Value of soybeans = $500/tonne

The optimum seed rates are outlined in Figure 4.

The AGC's on-farm agronomy trials are conducted over many sites and years. This allows for the analysis of the influence of other variables that can impact yield. One variable that influenced yield for this set of trials was crop rotation.

	90,000	110000	130000	160000	190000
Yields MT/acre	0.92	0.93	0.92	1.03	0.98
Cost of seed/acre	$55	$67	$79	$97	$115
Net $/acre	$405	$398	$381	$418	$375

Figure 4. Yield economics

Yields by rotation (Figure 5)

- There is a statistical influence of crop rotation on soybean yields.
- This alone is not the entire story.
- There is also an interaction between the seeding rate and the rotation.

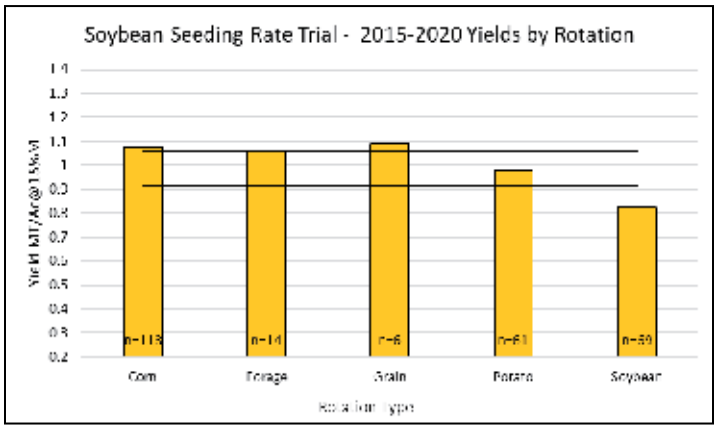


Figure 5. Soybean yields by rotation

Yield Economics (Figure 6)

- Based on rotation
- Potential net profit increases when customizing seeding rate for rotation.

Rotation	Corn	Forage	Grain	Potato	Soybean
Ideal Seeding Rate	90000	160000	160000	90000	160000
Yields MT/acre	1.08	1.26	1.24	1.24	0.97
Cost of seed/acre	$55	$97	$97	$55	$97
Net $/acre	$487	$533	$523	$565	$389
	90,000	110000	130000	160000	190000
Net $/acre	$405	$398	$381	$418	$375

Figure 6. Yield economics based on rotation

Conclusions (2019)

- Calibrate! Losing money over-seeding.
- Increasing seeding rate does not increase yield.
- Rotation impacts yield more than seeding rate.
- Optimum seeding rate is between 130,000 and 160,000 seeds/acre based on economics, risk and yield.

Still true, but there is more to understand! (2020)

- There is an interaction between the seeding rate and rotation.
- Maximize profits by customizing seeding rates based on the field rotation.
- Spring calibration should be done for:
- Different varieties
- Optimum seeding rate based on rotation.

For a more indepth review of the on-farm agronomy trials concerning soybean seed rates, follow this link to the AGC website:

https://atlanticgrainscouncil.ca/soybean-seeding-rate-trial-2015-2020-barley-nitrogen-timing-trial-2019-2020/

A factsheet and video on the calibration of a grain drill is available at: https://atlanticgrainscouncil.ca/calculating-seeding-rates-and-grain-drill-calibration/

MAIN CEREAL, OILSEED AND PULSE CROPS IN ATLANTIC CANADA

Principal Field Crops Area, Production and Estimated Value[1] - Canada and the Maritime Provinces, 2020 Crop Year

Crop	Acres/ Production/ Value	Canada	New Brunswick	Nova Scotia	Prince Edward Island	Maritimes
Wheat	Area ac	25,188,400	13,350	10,900	49,420	73,670
	Production t	35,183,000	14,300	11,900	62,200	88,400
	$ Value	8,443,920,000	3,432,000	2,856,000	14,928,000	21,216,000
Oats	Area ac	3,838,930	14,300	3,950	7,910	26,160
	Production t	4,575,800	13,700	3,100	8,800	25,600
	$ Value	1,258,345,000	3,767,500	852,500	2,420,000	7,040,000
Barley	Area ac	7,561,010	20,020	2,220	47,690	69,930
	Production t	10,740,600	17,600	2,500	65,200	85,300
	$ Value	2,738,853,000	4,488,000	637,500	16,626,000	21,751,500
Corn	Area ac	3,559,500	8,900	18,040	13,100	40,040
	Production t	13,563,300	22,300	51,500	41,800	115,600
	$ Value	2,916,109,500	4,794,500	11,072,500	8,987,000	24,854,000
Soybean	Area ac	5,069,990	7,660	9,880	38,300	55,840
	Production t	6,355,900	5,400	11,200	39,300	55,900
	$ Value	3,654,642,500	3,105,000	6,440,000	22,597,500	32,142,500
Dry Peas	Area ac	4,255,550	2,220	740	14,830	17,790
	Production t	4,594,300	1,500	N/A	16,000	17,500
	$ Value	1,516,119,000	495,000	N/A	5,280,000	5,775,000

The table above provides information concerning the area, production and estimated value of cereal, oilseed and pulse crops for Canada and the Atlantic region. In the Maritimes, the value of the principal field crops for the 2020 crop year exceeds112 million dollars. In Newfoundland and Labrador, the area devoted to field crops is low compared to the rest of the region, however, work by individual farmers and efforts by the NFLD Department of Fisheries, Forestry and Agriculture is currently evaluating the viability of cereal production in that province (see article on Grain Cultivation Trials in Newfoundland and Labrador).

Wheat, both spring and winter represents approximately 25% of the land area devoted to cereal, oilseed, and pulse crop production in the region. In Nova Scotia winter wheat comprises 72% of the wheat crop across the Maritimes only 32% of the wheat crop is represented by winter wheat.

The area devoted to oats declined by 13,000 acres in 2020 compared to 2019 with the greatest decline in acreage occurring in Prince Edward Island.

Barley area increased in New Brunswick in 2020 by 6,400 acres off-setting a decline in acreage in both Nova Scotia and Prince Edward Island compared to 2019.

[1] Statistics Canada (STC) and Agriculture and Agri-Food Canada (AAFC)

MONITORING EFFORTS FOR BT-RESISTANT ECB CONTINUE

Caitlin Congdon

Overview

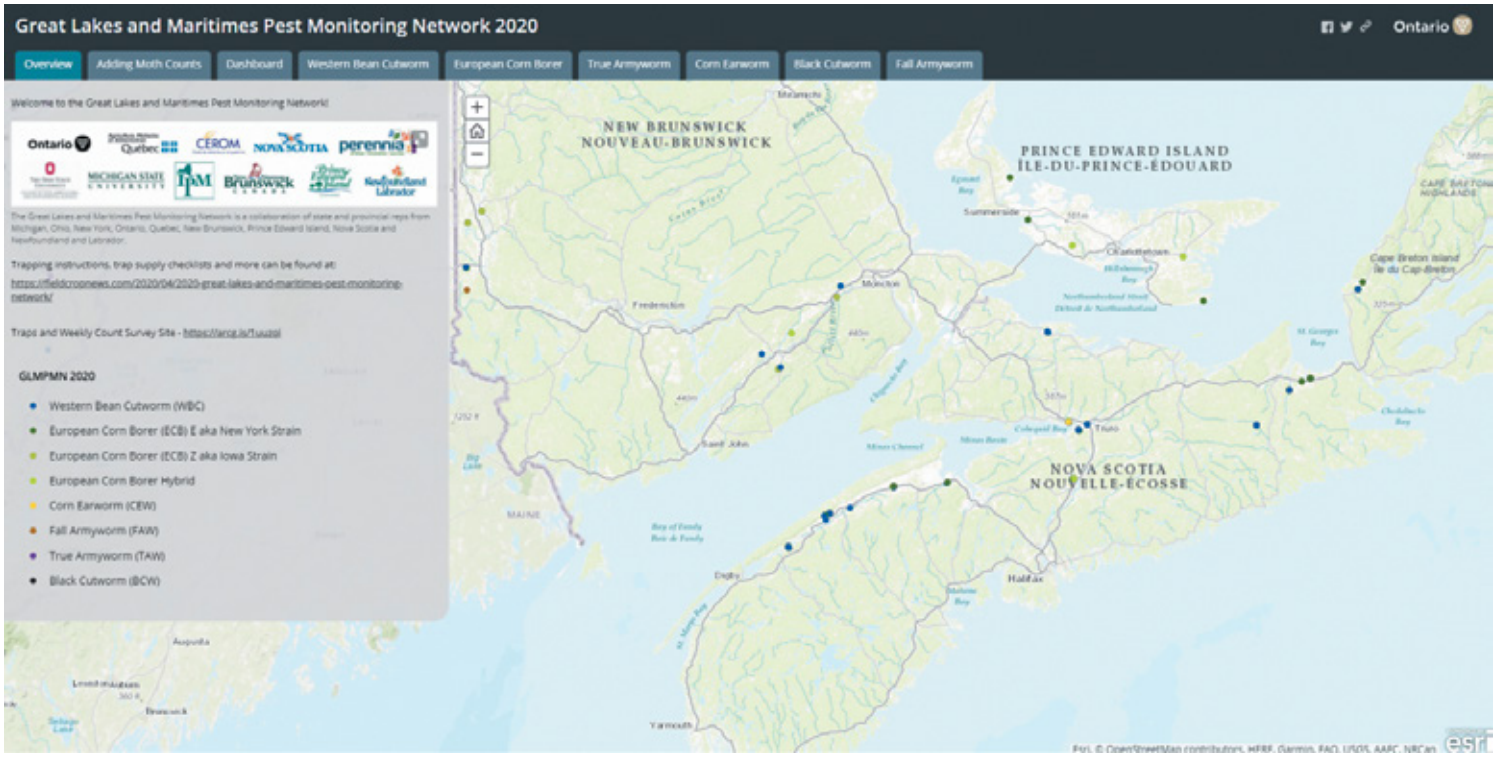
Unexpected damage to select fields planted with Bt corn in 2018 in Nova Scotia led to the launch of a three-year investigation to determine the spread of the resistance. Pheromone traps were set up on farms across the Maritimes, and ECB samples were sent to Dr. Jocelyn Smith at the University of Guelph for resistance testing. There were several objectives looking to be achieved through the trapping network, including determining when ECB flights peak, determining the number of generations per year (univoltine or multivoltine species) and determining which strain of ECB (Iowa, New York, or hybrid) is present, all of which is important information for insect control and resistance management.

What Have We Learned So Far?

The first two years of monitoring have yielded some important information so far. As determined by pheromone-specific trap catches, all three ECB strains are present in the Maritime provinces. However, it appears that the New York strain is more prominent in Nova Scotia, while the Iowa strain is more prominent in PEI. It also looks like NS and PEI have two generations per year, which affects the timing of adult flight and therefore scouting activities since the multivoltine species (two generation) emerges earlier in the season. Based on catches so far, a growing degree day model used to predict the peak flight of ECB seems to be a good indicator and may be a good tool for helping to determine the best time to scout.

Great Lakes and Maritimes Pest Monitoring Network App

Trap monitoring in all three provinces has been tracked and can be viewed through the Great Lakes and Maritimes Pest Monitoring Network App. The interactive map provides access to data from each trap in the network, including which pheromone lure is being used and the number of moths caught in each trap by date. Besides ECB, a number of other pests are being monitored across the network, including Western Bean Cutworm and Corn Earworm. For more information on the app, including instructions on how to gain access and add data captured with personal traps, check out the article on "European Corn Borer Trapping Instructions and Resources" from Field Crop News in Ontario.



Sentinel Plots

Another great tool for ECB monitoring has been sweet corn Sentinel plots. Comprised of paired single Bt-protein and non-Bt sweet corn varieties, the Sentinel plots can be used to pinpoint practical resistance between proteins. Data from the Sentinel plots in Nova Scotia suggest that the Cry1Ab, Cry1A.105 and Cry2Ab2 proteins are still effective in the field for protection from ECB. Continued resistance management is critical for preserving the integrity of the remaining Bt proteins. The following steps should be taken for resistance management:

- Use corn hybrids with more than one Bt trait. It's important to note that even if a pyramid hybrid is being used if there is resistance to one of the traits, resistance can develop for the other much more quickly since there is essentially a single trait being used for control.
- Respect the refuge requirements of the hybrid. Most hybrids include the refuge in the bag, but if not, at least 20% of the field needs to be planted to a non-Bt variety within the proper distance guidelines.
- Use cultural controls such as shredding the corn stalk after harvest, leaving the stalk on the surface through the winter rather than discing it into the soil in the fall, and crop rotation, all of which can help manage ECB populations.
- Monitor for ECB damage in both Bt and non-Bt fields. Report any unexpected damage to your seed provider and provincial extension specialist. Photos of what to look for when scouting for ECB can be found on the Canadian Corn Pest Coalition website, along with scouting methodology.

UPDATE - ON FARM AGRONOMY TRIALS

On Farm Agronomy Team

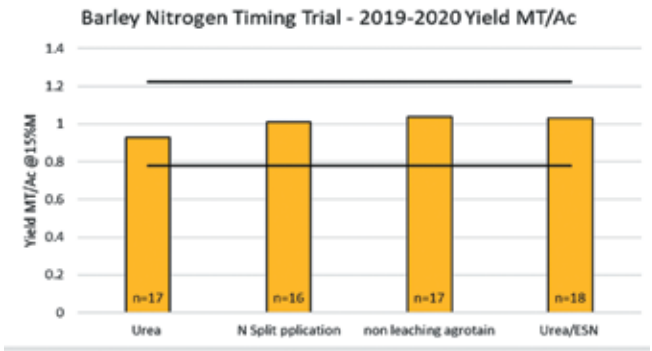
The following trials are underway:

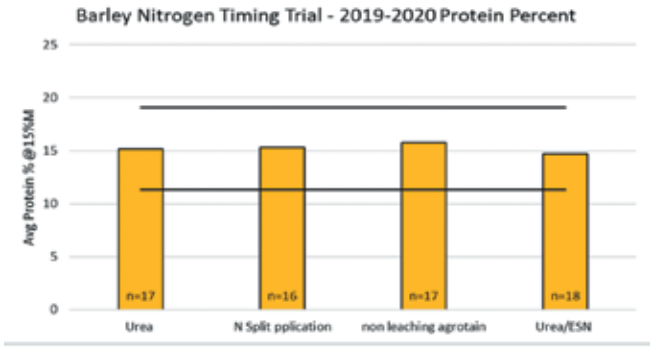
- Barley nitrogen timing – Trial #23
- Soybean fungicide timing – Trial #7
- Corn sulphur and boron – Trial #12

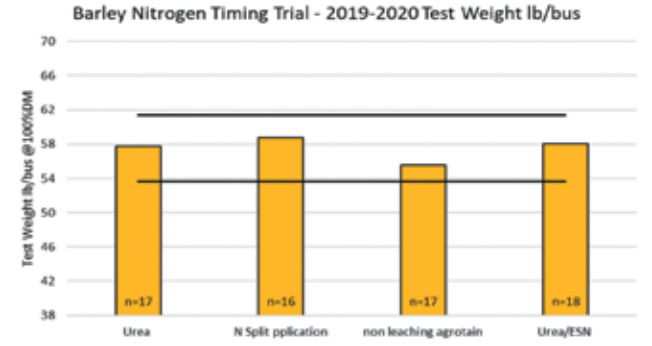
These trials will be repeated however, the preliminary results are presented for each trial as they may be of interest.

Barley Nitrogen Timing Trial

- Evaluation of application timing and source of nitrogen.
- 17 sites across the Maritimes 2019 and 2020.
- Statistical analysis completed.







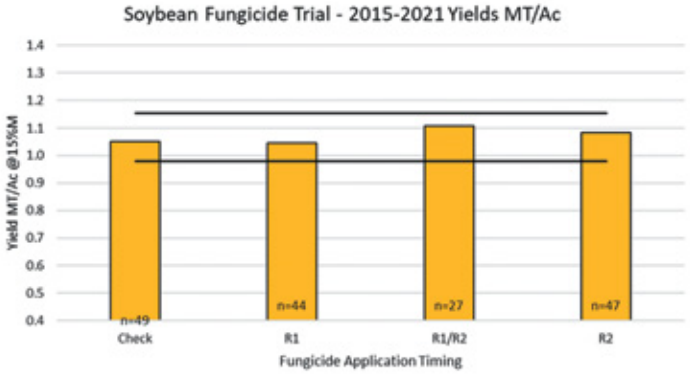
- Minimum 1-acre plots and minimum 0.25 acres harvested
- All treatments received 80 lb/ac of nitrogen as follows:
- Urea – all at planting
- Urea – 40 lb/ac at planting & 40 lb/ac at stem elongation
- Urea/ESN – Mix 60% urea & 40% ESN all at planting
- Non-leaching Agrotain – coated urea all at planting

Results:

- No statistical difference in yields, but the trial is young
- Positive increase with Agrotain and ESN
- No statistical difference in protein
- Current data shows the protein is not affected by the timing of the nitrogen application
- No statistical difference in test weight, but results differ from protein and yield
- More data will make the results more accurate and may distinguish any interactions

Soybean Fungicide Timing

- Over 45 sites across the Maritimes 2015-2020
- Fungicide treatments: R1 (1st flower), R2 (full flower), both, check (none)
- Double application was added in 2018
- Minimum 1-acre plots with a minimum of 0.25 acres harvested
- Allegro, Acapela or Stratego Pro
- Stats completed

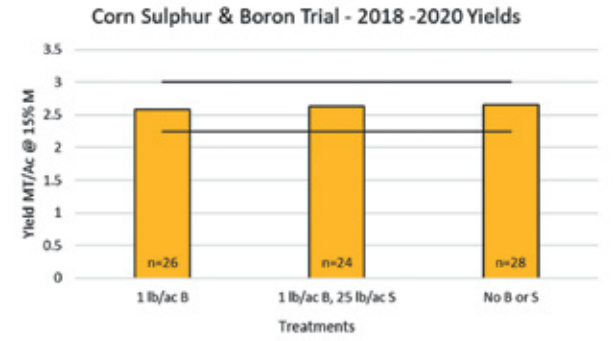


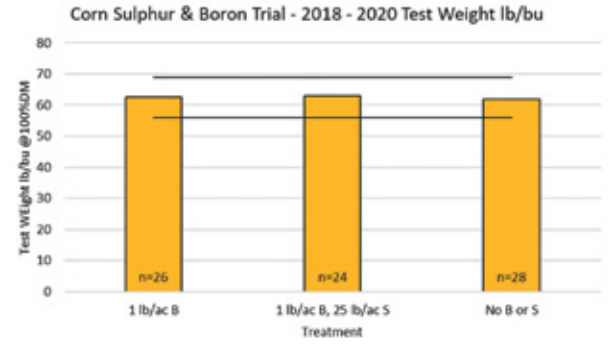
Results:

- No statistical difference in yields
- For economical gain, the yield would have to increase more than 0.1 t/ac.
- Includes plots with and without disease present

Corn Sulphur and Boron

- Over 25 sites across the Maritimes from 2018-2020
- Purpose is to measure effects of boron on corn yields, alone and in combination with sulfate
- Statistical analysis completed.
- Minimum 1-acre plots with 0.25 acres harvested





Treatments:

- No Boron or Sulphur
- 1lb/ac Boron in top-dress
- 1lb/ac Boron + 25lbs/ac Sulphur in top-dress

Results:

- No statistical difference in yields
- We may need to increase the boron application rate.

Note: For all treatments, the same amount of nitrogen, phosphorus, boron, and sulfur was applied. Potassium application was based on a soil test.

CEREAL AND OILSEED MARKET OUTLOOK

Neil Campbell, PEI Grain Elevators Corporation

Some thoughts as we move forward into a new planting season here in Atlantic Canada with optimism for future prices of our crops. As in every marketing year there are several things to consider for a successful marketing plan. Rotation, input costs, seed availability, Canadian dollar, forward contract prices and of course demand for your commodity are all things to evaluate.

Here in the Atlantic region, we are affected by the larger markets of the World and North America, but slightly isolated as well as there are less options for sellers and customers, which normally takes some of the extreme volatility out of the market for us. Incremental selling through the marketing year is a good way to avoid the all or nothing strategy. At the time of writing this article (March 15) we still have not seen the USDA report on Prospective plantings (due last of March), early indications are that soybeans have the profit edge over corn currently.

This is partly due to the expected higher inputs cost with growing corn. I think is fair to say that with the market at these levels Corn and Soybeans will dominate and probably steal acres away from spring wheat depending on the US weather during planting season. With an increase of winter wheat already seeded, there is less dirt available for other crops.

Most years, we would say new-crop corn prices of over $5.00/bu. at elevators and $15/ bu. soybeans would result in lots of winter wheat getting torn up and planted to these crops in the spring in Ontario and Quebec. But this year, with prices for Soft Red Wheat at the 2021 harvest well above $7/bu, we are not so sure. Of concern to our prices is the rising Canadian dollar which is sitting just under the 80-cent value and just a few months ago was at 74 cents. The risk is that too high of a Canadian dollar will certainly hurt most Canadian Agriculture prices. The Canadian dollar will certainly rise if crude oil rebounds from the lows of 2020.

The current futures market has a large amount of funds dollars invested into Agricultural markets at this time and of course if the speculators withdraw the futures will also decline. It is expected to see volatility in markets when funds dollars are entering and exiting.

With the strong demand from China lately the US is reporting lower inventories on most crops (soybeans is lower than corn) and may take a couple years to rebuild stocks to previous levels. This strong demand from China and other counties is also lowering the inventories on all Canadian commodities. Note the big increase for Canola prices at the same time as there is a trade war between China and Canada. The increase in demand has driven the price of all grains upward in Western Canada.

We are currently enjoying strong prices, another positive will be, as the world's economies recover from Covid-19 the demand for more ethanol and bio-diesel will increase. This should bode well for prices in this region for the coming marketing year,

Locally there is strong demand for all grains and oilseeds as we have had two back-to-back dry years in most of Atlantic Canada with lower yields, but with excellent quality and quality always sells first. Have, a safe planting and profitable marketing year!

REVISITING INTERCROPPING AS AN OPTION FOR THE MARITIMES

C.D. Caldwell, Dalhousie University

Farmers are the original ecologists and I have not met one who does not want to leave their farm in a better state than when they first started farming. Farmers know the benefit of rotations and increasing diversity on their farms. However, for a crop farmer, rotations and cropping practices that do not make money are not sustainable. We continue to work in this region towards developing both economic and environmental sustainability and intercropping may be another tool for farmers to consider.

What is intercropping?

Many will remember from agriculture courses in high school or college the simple definition of intercropping: "the process of growing more than one crop in the same field at the same time". The crops may be seeded at the same time (mixed intercropping) or they may be seeded at different times (relay intercropping). Strip intercropping is a production system where different crops are grown in wide strips (usually the width of a seeder) in the same field. (Note the final reference at the end of this article)

Why intercrop?

1. **Environment:** all forms of intercropping introduce greater diversity into the system, especially at the soil level; this means increased environmental stability. Intercropping allows for reduced use of chemical inputs, including fertilizers and pesticides.
2. **Economic:** reduced chemical use means reduced input costs. However, the main benefit of intercropping occurs when there is "over yielding". Over yielding occurs when the yield produced by an intercrop is larger than the yield produced by the component crops grown in monoculture on the same total land area. Calculation of such an effect is the Land Equivalency Ratio (LER). The LER is a measure of how much land would be required to achieve intercrop yields with crops grown as pure stands. When the LER is greater than 1, the intercrop is more productive than the component crops grown as sole crops. When the LER is less than 1, the sole crops are more productive than the intercrop.

A new mixed intercropping option possibility

One option for mixed intercropping that has been tested in Western Canada in the past and more recently here in the Maritimes is intercropping of selected brassicas with peas. Advantages of this mix include different rooting patterns, nutrient requirements, disease profiles, seed sizes and potential use of the products. Trials in the Maritimes over the past several years have investigated the best intercrop ratio to obtain optimum LER for oil, protein and per hectare profitability. Experiments have tested peas and mustard, growing each species both separately and in combinations of 3 seeding rates of peas with 3 seeding rates of mustard. Results are still preliminary but show encouraging LER effects.

Table 1 shows the results from the Canning Nova Scotia site in 2020 for the Mustard Pea intercrop.

Table 1: The effects of different ratios of mustard (M) and pea (P) planting rates on yield and land equivalent ratio (LER) in Canning, NS 2020

Actual seeds planted/m^2	Mustard yield (kg/ha)	Pea yield (kg/ha)	Yield LER
M 100 P 0	1243	0	1.00
M 0 P 100 s	0	3191	1.00
M 100 P 50	1519	976	1.48
M 100 P 100	1181	1947	1.46
M 100 P 150s	1158	2316	1.50
M 50 P 50	1343	1322	1.33
M 50 P 100	1017	2197	1.39
M 50 P 150	1219	2888	1.73
M 150 P 50	1421	632	1.31
M 150 P 100	1210	1586	1.39
M 150 P 150	1219	1704	1.43

A fuller discussion of these experiments can be found online at: https://atlanticgrainscouncil.ca/presentations-archive/

Note that the introduction of peas into the mustard field does not have a significant impact on the overall yield of the mustard. As a result, the peas become a bonus on the field. In this particular experiment, every intercrop situation produced a significant increase in LER. The best intercrop ratio to obtain optimum Land Equivalent Ratio (LER) for total yield was mustard 50 seeds/m2 and Pea 150 seeds/m2. Analysis of the oil and protein LER is underway.

It should be remembered that these are small plot experiments that need to be scaled up and tested for reliability at larger levels. However, there are good indications that such an intercrop would be both environmentally and economically worthwhile.

Figure 1. Photo in July 2020 showing pea intercrop with mustard and sole pea plot. Mustard out competed peas during the season.

Heads up! Managing intercrops requires thought and planning.

If you are considering intercropping, there are several things to be taken into consideration:

1. What are the markets for your proposed intercrops?
- If one of the crops is of low value, even if you do have a high LER, you may not make as much money as you would with the sole crop of the high-value one.
- The environmental advantage of increasing diversity may not pay for the loss of income.

2. Are the crops complementary?
- Will they complement or will they just compete with each other?
- Do they differ in nutrient requirements?
- Are their rooting patterns different?
- Will they prevent disease spread?

Mixed Cereals

One of the traditional types of intercropping in this region has been mixed grain. This type of intercrop does have some advantages in terms of disease control. The disadvantage of a mix such as oat and barley is that they differ very little in such attributes as rooting pattern and nutrient requirements, so that they compete with each other and lose any advantage, in the absence of disease.

3. Matching maturity is very important. The crops both need to be ready for combine at the same time.

4. Herbicide compatibility is often a problem with intercrops.
- Do you have a piece of land for the intercrop with little weed problem? For example, if you are growing a Brassica in your intercrop, do you have a lot of Brassica weeds that will cause problems?

5. Are the seeds easily separated?
- You may need to separate the crops either for storage and/or sale. Consider seed size and the logistics of seed separation very carefully.

I strongly encourage farmers to consider opportunities for intercropping, but they should do so very carefully. The following is a list of some popular references that can give a bit more information and point you in the direction for more advice.

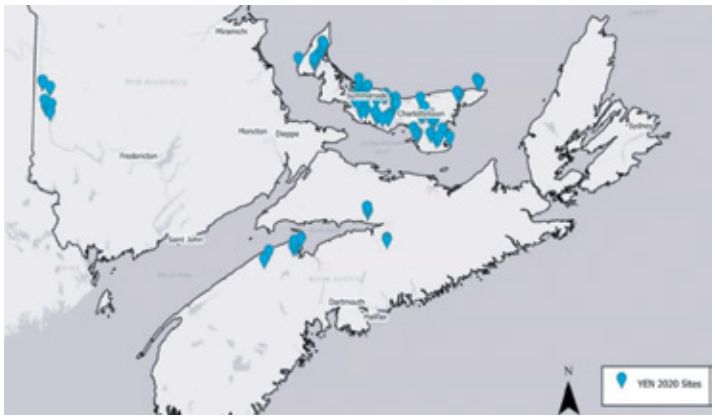
1. https://www.umanitoba.ca/outreach/naturalagriculture/articles/intercrop.htm
2. https://www.grainews.ca/features/ins-and-outs-of-intercropping/
3. https://farmingfortomorrow.ca/a-farmers-viewpoint/carefully-choose-your-intercrops/

One last note about strip intercropping. Those who are growing soybeans and corn may want to take a good look at this excellent paper and the results that show the right ratio of soybeans to corn in your field will give you an LER greater than 1 even with strip intercropping.

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0129245

Note: this work was funded by ECODA

YIELD ENHANCEMENT NETWORK GROWS



In its second year, the YEN expanded to include barley and wheat producers across the Maritimes.

Not even a worldwide pandemic could stop Agriculture and Agri-Food Canada (AAFC), Atlantic Grains Council (AGC) and grain producers in the Maritimes from participating in the second year of the highly successful Yield Enhancement Network (YEN). After new partnerships formed in its first year in 2019, the YEN expanded its reach to an additional 25 producers in PEI, now 42 total, and into the rest of the Maritimes, where 10 producers in Nova Scotia and seven in New Brunswick joined the network.

On March 4, 2021, the network held their second annual conference and awards ceremony virtually. This allowed participants to share successes of the second growing season and to find out who would take home the top honours for highest total yield and highest percentage of potential yield (calculated by comparing the actual crop yield to the yield the field is capable of producing).

This year's winners were:

Barley Highest Percentage of Potential Yield

- **Gold:** Randy Drenth, Graham's Rd., PE, 62.5% of 2.91 t/ac, variety Leader
- **Silver:** Kevin Schurman, Freetown PE, 61.2% of 2.97 t/ac, variety Leader
- **Bronze:** Troy Webster, Kinkora, PE, 58.2% of 2.79 t/ac, variety Selena

Barley Highest Total Yield

- **Gold:** Eric Richter, Rollo Bay, PE, 2.2 t/ac, variety Sirish
- **Silver:** Myles Rose North Lake, PE, 1.86 t/ac, variety Island
- **Bronze:** Tie between Randy Drenth, Graham's Rd., PE, & Kevin Schurman, Freetown PE, 1.82 t/ac both with Leader

Spring Wheat Highest Percentage of Potential Yield

- **Gold:** John Visser Crapaud, PE, 70.2% of 2.88 t/ac, variety AC Helena
- **Silver:** Ryan Hamill, Kinkora, PE, 68.2% of 2.78 t/ac, variety AC Walton
- **Bronze:** Colin McNevin, Desable, PE, 65.4% of 3.11 t/ac variety CM Raven

Spring Wheat Highest Total Yield

- **Gold:** Leonard McIsaac, Glencoe, PE, 2.15 t/ac, variety AC Walton
- **Silver:** Colin McNevin, Desable, PE, 2.03 t/ac, variety CM Raven
- **Bronze:** John Visser Crapaud, PE, 2.02 t/ac, variety AC Helena

Winter Wheat Highest Percentage of Potential Yield

- **Gold:** Troy Webster, Kinkora PE, 82.8% of 2.79 t/ac, variety 25R61
- **Silver:** Kyle Jewell, Meadowbank, PE, 81.2% of 3.47 t/ac, variety 25R61
- **Bronze:** Pat Dunphy, Caledonia, PE, 75.1% of 4.79 t/ac, variety 25R40

Highest Total Yield

- **Gold:** Pat Dunphy, Caledonia, PE, 3.6 t/ac, variety 25R40
- **Silver:** Leonard McIsaac, Glencoe, PE, 3.07 t/ac variety 25R40
- **Bronze:** Ben Visser, Orwell, PE 2.9 t/ac, variety 25R40

Measurement of rooting depth is used to estimate yield potential at each site.

During the virtual conference, the winners also participated in a panel discussion. They discussed their method in achieving their yields and fielded questions from other producers and researchers involved in the network. In the end, the network will make winners of all participating producers through knowledge sharing and friendly competition.

"The fact that we have added more then 40 new producers, shows the value of the YEN model, and the strength of producers working together to achieve higher yields by sharing expertise and by applying weather models and soil data," says Dr. Aaron Mills, AAFC research scientist.

The YEN model was developed seven years ago by the British Agricultural Development and Advisory Service (ADAS) to help researchers and farmers to work more closely together in pursuit of higher yields by efficiently using the resources they have including weather, water, fertilizer, insecticides and more. YEN encourages farmers to identify what is preventing them from reaching full yield potential on their farms and encourages participants to share their ideas and experiences for the maximum benefit of all participants.

The type of survey data gathered through the YEN is a first of its kind for grain farmers in the Maritimes. It enables researchers to develop on-farm innovation and helps farmers to understand the factors that contribute to their overall yield. Dr. Mills notes that the YEN is "one of the most intense on-farm databases in Canada and an important tool to explain the variations in yield across all the farms in the network."

In the 2020 growing season, grain producers and researchers continued to collect data to assess soil health, plus soil and grain nutrient analysis. The type data gathered through the YEN is a first of its kind for grain farmers in the Maritimes. It enables researchers to develop on-farm innovation and helps farmers to understand the factors that contribute to their overall yield.

While part of YEN is the competition for bragging rights to see who can achieve the highest crop yields perhaps the most important component is understanding and increasing the yield potential for your farm. When combined with a network for sharing on-farm experiences with others the YEN benefits everyone involved.

"Everyone was happy to see that yields were higher by 40 per cent in year two and we also expanded to measuring new crops such as spring and winter barley," said Heather Russell, Project Officer, Atlantic Grains Council. "Producers were interested in barley as it's such a big crop for the Maritimes, it doesn't require as much farm management as wheat, and it attracted the interest of more producers into the project."

"The comprehensive reporting and information sharing from 2019 really helped the network to boost yields in 2020. We appreciate the work of AAFC, AGC and ADAS and I'm very pleased to be a part of YEN as a grower." – Eric Richter, Producer, Rollo Bay, PEI.

Background information, details and video concerning the 2020 YEN is available to view on the AGC website at: https://atlanticgrainscouncil.ca/atlantic-canada-yield-enhancement-network-awards-2020/

For information regarding participation in the 2021 Yield Enhancement Network please contact: Heather Russell, Atlantic Grains Council heather@atlanticgrainscouncil.ca

506-380 -9663 or Aaron Mills, Agriculture and Agri-Food Canada aaron.mills@canada.ca 902-314-7949.

ON FARM AGRONOMY TRIALS

Dave Bell, Bell Crop Services

The Atlantic Grains Council (AGC) On Farm Agronomy (OFA) initiative is only possible due to the assistance of collaborating growers in each of the Atlantic Provinces. AGC agronomists work closely with grain, oilseed, & pulse producers to develop and deliver quality field size trials in Atlantic Canada. The trial protocols are first determined by consultation with growers from all Atlantic Provinces focusing on the priorities and challenges of commercial producers. In most cases small plot research trials precede the on farm trials as proof of concept that is then tested on farms at multiple locations across the region. On farm trials require plot sizes to be 1 acre or larger to give a real world look at the treatments and utilize commercial planting, application, and harvesting equipment. The agronomy team work to minimize disruption of farm operations while preserving the quality of the trials.

AGC agronomists first meet with cooperating growers to discuss their interest in hosting an OFA trial and determine what is needed from them to succeed. As an example, the Field Pea Population trial #22 requires 4 seeding rates to be planted side by side. The agronomy team calibrates the producer's seeder to the desired seeding rates and supplies the settings to the producer and his planting crew well ahead of the expected seeding date. The grower, along with AGC selects the field for size and consistency & road visibility where possible. When the grower is ready to seed the trial, they contact the AGC agronomist to arrange for them to be on site. Seeding begins at the grower's standard rate, then the trial rates are seeded, strips are staked, and the seeder returned to standard to complete the field. Depending on the seeder width and harvester swath, the number of strips at each rate are decided. The AGC coordinator collects all planting data, from the grower, variety, seeder type, settings, fertilizer applied, crop rotation, cultivation methods etc. The agronomist may take a soil sample at planting or at harvest depending on the trial protocol. All measurements are done by the AGC agronomist or their staff. The first is final plant population taken once the crop is fully emerged. Several visits thru the season are made to record pest & disease levels, foliar samples if required and to assist in timing of fungicide applications as required by the crop and protocol. Cooperating growers need only to allow access to the field by the AGC agronomy team.

Trial results are taken at the normal harvest time of the crop decided by the grower. The grower must contact the agronomy team to arrange the harvest date and time…this is critical to the successful completion of the work, simple as it seems several trials have been lost due to a communication breakdown leading to a trial field harvested with no one there to weigh the strips. The AGC agronomist will arrange to have a plot weigh wagon on site to weigh the strips or use other methods that may include weighing trucks or using the on board yield monitor of the combine if it is well calibrated. The harvesting of the one-acre minimum trial strips does take some time to do properly, and the grower's patience is needed, but usually a couple of hours is all the delay, and the combine is back up to full speed. Small 1 to 2 lb. harvest samples are taken for testing and the rest stays with the grower. On Farm Agronomy trial data is analyzed and shared with all growers via website and grower meetings. Growers usually receive their own farm results directly from the agronomy team.

The OFA trials conducted by AGC are funded by the check-off contribution from growers and multiplied several times by federal and provincial programs. The bridge these trials make between traditional small plot trials and on farm implementation has been a great success. Many thanks to all of our collaborators, all the best in 2021.

SOYBEAN SEEDING RATE AND FUNGICIDE SEED TREATMENT EFFECT ON YIELD AND REVENUE 2021[1]

Alec Beaton, Andrew McKenzie-Gopsill and Adam Foster
AAFC Charlottetown, PE

Background

Profit is an important aspect of any farming operation. It is important to determine optimal seeding rates to maximize revenue while minimising seed input costs. Seed treatments are another consideration. Though they provide several benefits, their cost needs to be considered when calculating revenue. Fungicide seed treatments act primarily to protect plants from damping off and root and crown disease, caused by different pathogens including *Fusarium spp., Pythium spp.,* and *Rhizoctonia solani*. Previous experiments found significant increases in yield using fungicide seed treatments, however the relationship between their effects on yield and revenue at different seeding rates has not been explored. The Atlantic Grains Council in collaboration with Agriculture and Agri-Food Canada (AAFC) are leading a research project to determine the interactions between seeding rates and fungicide seed treatments in the Maritime region towards identifying an optimal seeding rate for maximum yield and revenue.

Trial Methods

A small plot trial was performed at the AAFC Harrington Research Farm, PE in the 2020 growing season to test the impact of seeding rate and fungicide seed treatments on yield, quality parameters and revenue (Fig. 1). In this study, two conventional soybean cultivars (DH864 and DH401) were chosen. As no significant differences existed between cultivars, data from each were pooled together for analysis. Seeding rates used were 100,000, 200,000, 300,000 and 600,000 seeds/acre. These cover a range of reported seeding rates in the Maritimes. A much higher unconventional rate was included to establish the upper limit of seeding rate on yield and the consequences of extreme seeding rates on revenue. The fungicide seed treatments used included Apron XL LS (40 mL/100 kg seed; metalaxyl-M), Vibrance Maxx RFC (100 mL/100 kg seed; fludioxonil, sedaxane and metalaxyl-M) or left untreated. The effects of fungicide seed treatments were tested at these seeding rates to evaluate changes in yield, protein, and oil in addition to net profit. Harvested seeds were dried to 16% moisture for yield calculations. Protein and oil content of seeds were assessed through near-infrared reflectance spectroscopy (NIR). Revenue was calculated by multiplying yield by market soybean selling price ($540/tonne) and subtracting the estimated cost of treatment (Apron XL LS: $1.63/100,000 seeds; Vibrance Maxx RFC: $3.63 /100,000 seeds) and the untreated seed cost ($40/100,000 seeds). Data analysis was conducted using SAS Studio 3.8 (SAS Institute) PROC GLIMMIX and means were compared using an LSD test.

Figure 1. Seeding rate and fungicide seed treatment interaction trial 2020. AAFC Harrington Research Farm, PE.

Interim 2020 Results

Seeding rate and fungicide seed treatment effect on yield

Overall, yields in 2020 were lower than those measured in previous years' research trials, likely due to prolonged dry weather conditions. Despite this, significant effects of both seeding rate and fungicide seed treatment on yield were detected. As seeding rates increased, a continual increase to yield was also observed; however, differences between 200,000 and 600,000 seeds/acre were often insignificant (Fig. 2). Seed treatment had a significant effect on yield, but only at the lowest seeding rate. At 100,000 seeds/acre, treatment with Apron XL LS and Vibrance Maxx RFC increased yield by 28.5% and 18.9%, respectively over untreated seed.

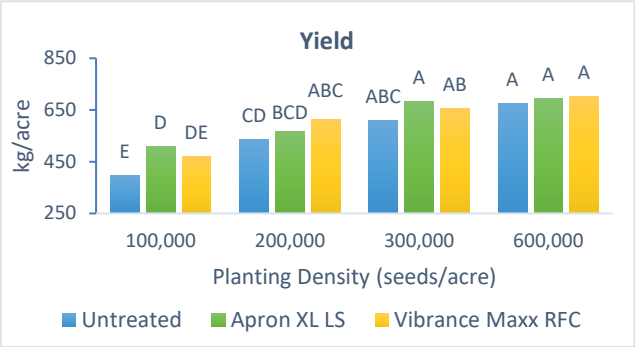


Figure 2. The effect of seed treatments and seeding rate on yield. Bars not sharing the same letter are significantly different ($p < 0.05$).

Effect of seeding rate and fungicide seed treatment on protein and oil content

Protein content of seeds was affected by both seeding rate and fungicide seed treatment. Protein content displayed a negative trend with seeding rate until 300,000 seeds/acre (Fig. 3). At the lowest seeding rate, treatment with Vibrance Maxx RFC produced significantly lower seed protein content. In contrast, at 300,000 seeds/acre both fungicide seed treatment significantly increased protein content over untreated seed. Protein content at the extreme 600,000 seeds/acre rate was not significantly affected by seed treatment or seeding rate and was highly variable.

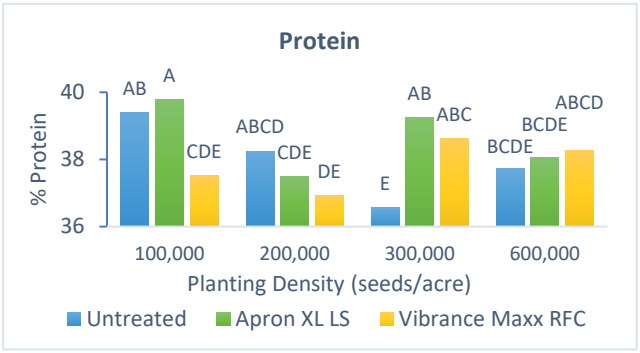


Figure 3. The effect of seed treatments and seeding rate on the protein content of harvested seed. Bars not sharing the same letter are significantly different ($p < 0.05$).

Oil content of seeds ranged from 18.03 % and 16.8 % across all treatments (Fig. 4) and was significantly affected by seeding rate. Oil content was negatively associated with seeding rate, but these differences were small, where the greatest difference between the lowest and highest seeding rate was only 1.1 %. There was no significant effect of fungicide seed treatments on oil content at any seeding rate.

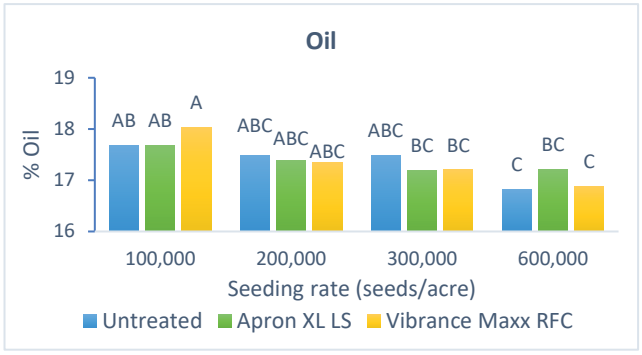


Figure 4. The effect of seed treatments and seeding rate on seed oil content. Bars not sharing the same letter are significantly different ($p < 0.05$).

Effect of seeding rate and fungicide seed treatment on estimated revenue

The effect of seeding rates on revenue (Fig. 5) did not follow the same pattern as yield (Fig. 2). As seeding rate was increased, a positive yield response was observed. Revenue was largely stable across most seeding rates but was significantly reduced at the unconventional 600,000 seeds/acre rate. Fungicide seed treatments were effective at increasing revenue at 100,000 and 200,000 seeds/acre. Both fungicide seed treatments significantly increased revenue at 100,000 seeds/acre. Revenue was greatest with a 33% increase at the 200,000 seeds/acre seeding rate using Apron XL LS compared to untreated seeds. Of interest, the Vibrance Maxx RFC treatment at 200,000 seeds/acre had a numerically higher yield than Apron XL LS but resulted significantly lower revenue due to the higher cost of this treatment.

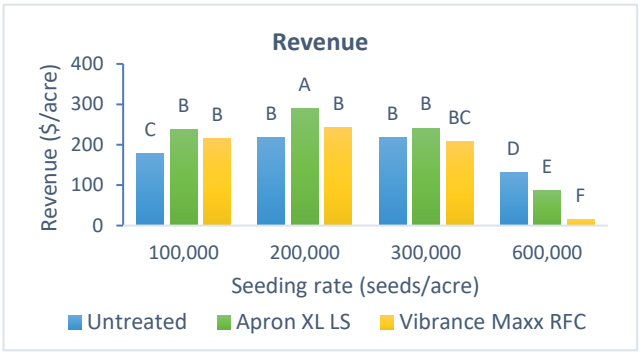


Figure 5. The effect of seed treatments and seeding rate on revenue at a selling price of $540/tonne. Bars not sharing the same letter are significantly different ($p < 0.05$).

Overall, these results show how yield and revenue are not necessarily correlated. One possible explanation for these results is that while yield of the field increased with seeding rate, this coincided with a concurrent decline in seeds per plant. This experiment will be repeated in summer 2021 to confirm these results.

EXAMINING CORN TEST WEIGHT

Dan MacEachern, AAFC Charlottetown PE

The test weight of corn is one of the major factors considered when determining corn quality and it unfortunately can be a limiting factor in determining grain quality in Atlantic Canada. Many factors can influence corn test weight, including hybrid, plant population, precipitation, total accumulated CHU's and the list goes on. In 2018, the Atlantic Grains Council began funding a small research project that would test a few different management practices on corn, to see if when planted at a common plant population, if test weight would be influenced. Results would then be used to serve as guide for future research.

Figure 1. Atlantic Grains Council Corn Test Weight Trial being grown at the Harrington Research Farm, Prince Edward Island.

The project began in 2018 at the Harrington Research Farm when we grew one corn hybrid, planted it at a plant density (81,500 seeds ha-1), and progressed to three sites, each growing 4 hybrids to represent a range of crop heat units (CHUs 2050 - 2650). Then the fertility treatments were applied as top-dresses, beginning at V4, as required. A list of the treatments and be viewed in table 1.

Table 1. Treatments used in AGC corn test weight experiment.

#1	(Control) V4 top-dress of 100kg/ha AN[1]
#2	Split application of AN[1]. ½ at V4 and ½ at R1
#3	UAN top-dress at V4
#4	Split application of UAN[2]. ½ at V4 and ½ at R1
#5	AS[3] top-dress at V4
#6	Plastic Mulch using the control fertility
Note: For all treatments, 50 N was applied at planting and the treatments made up the final 100N. P&K applied according to soil test.	

[1]AN=Ammonium Nitrate, [2]Liquid Urea Ammonium Nitrate, [3]Ammonium Sulfate

The idea behind the experiment was quite simple in that we threw a few things against the wall to see what would stick. The questions potentially answered would be; Do split applications affect test weight? And, does sulfur affect test weight? The plastic treatment was chosen because producers have claimed that it can improve grain quality or enable corn growth in climates not traditionally suitable. So we wanted to see what would happen.

As a result of combining 6 site years of data from the 3 locations (NB, NS & PEI), Figure 2 shows that the plastic and AS (ammonium sulfate) treatments significantly increased corn test weight over the control. Overall, this wasn't surprising for the plastic treatment because of how it works. When a biodegradable plastic mulch is used, it acts as a greenhouse by trapping the suns energy, resulting in higher soil temperatures. Data loggers present in the field showed that soil temperatures at rooting depth could at times reach temperatures 10-15°C warmer than soil at the same depth not covered by plastic. As a result, corn would emerge under the plastic approximately a week earlier than those plants not under plastic providing the plants with an advantage.

The second highest test weight in the trial resulted from the AS treatment where it improved test weight by approximately 6 g per ½ L (Fig.2). This treatment also corresponded to the highest yields in the trial (Fig. 3) with AS producing 926 kg ha-1 more yield over the control treatment.

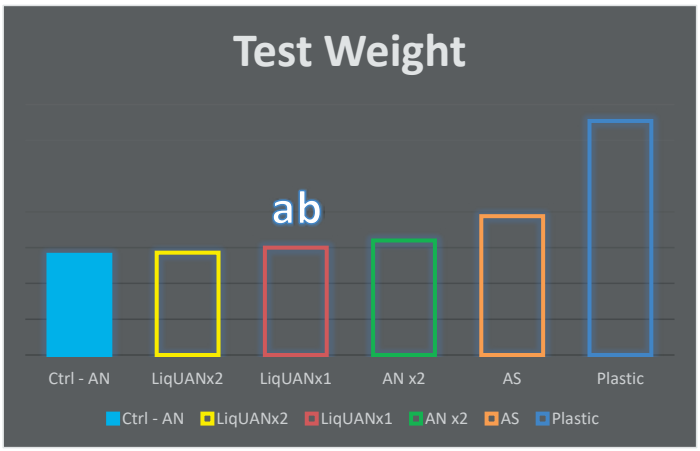


Figure 2. Bar graph showing how treatments influenced corn test weights. Treatments not sharing a letter are significantly different (P<0.05).

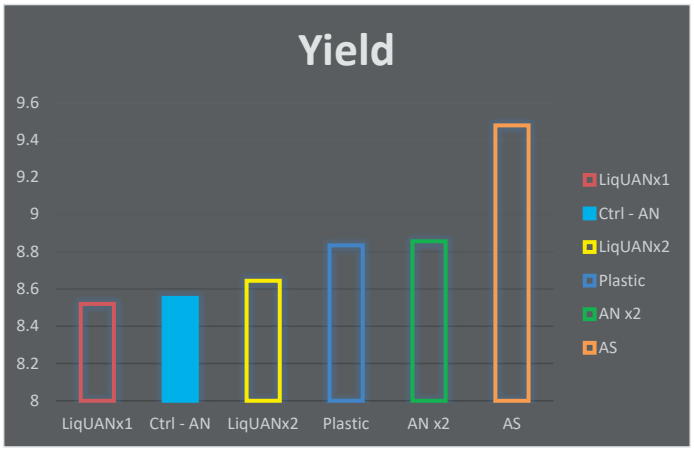


Figure 3. Bar Graph showing how treatments influenced corn plot yield. Treatments not sharing a letter are significantly different (P<0.05).

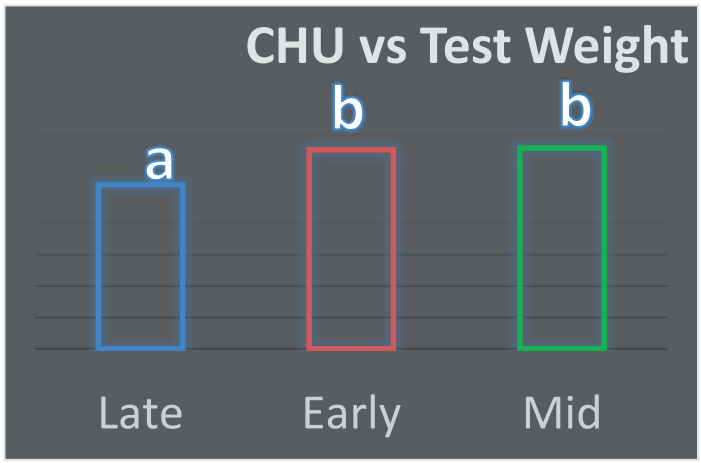


Figure 4. How crop heat unit (CHU) designation impacted test weight. Bars not sharing a letter are significantly different (P<0.05).

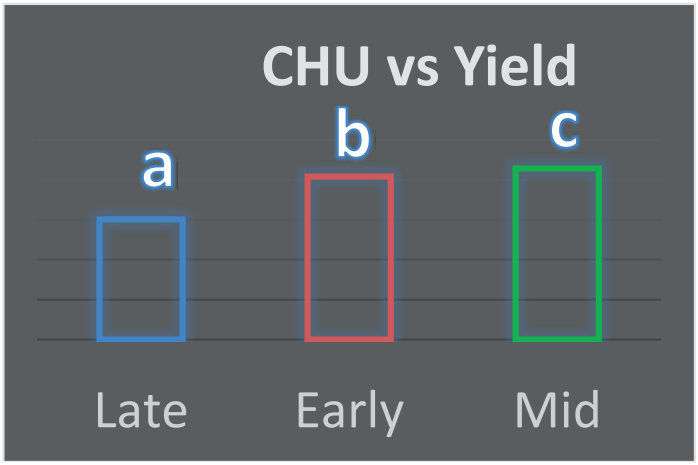


Figure 5. How crop heat unit (CHU) designation impacted plot yield. Bars not sharing a letter are significantly different (P<0.05).

When you observe such a beneficial impact from applying a nutrient such as sulfur, obviously the crop wanted more of that nutrient, despite no visual signs of sulfur deficiency. Soil samples from all three sites returned showing soil sulfur levels in the mid range (12 - 18 ppm). It's clear that corn in Atlantic Canada would like to have more sulfur than what existed at our test sites.

This study utilized 9 different hybrids to determine if the CHU designation played a role in test weight and yield. The hybrids were divided into three groups representing Early, Mid and Late maturity (Table 2) and as you may have guessed, there were noticeable differences. Figures 4 & 5 show that the Early and Mid range hybrids tended to perform the best. Both the Early and Mid range hybrids produced test weights that weren't significantly different from each other and when it came to plot yield, the Mid range produced the higher value. The Late maturing hybrids produced the lowest test weights as well as the lowest yields in the study.

Table 2. Corn hybrids tested were broken down into the following maturity groups based on their CHU designation.

Category	CHU's
Early	2050 - 2200
Mid	2300 - 2400
Late	2500- 2650

Discussion

Sulfur deficiency in crops has been becoming increasingly common in recent years and likely for a couple of reasons. One of these is the reduced amount of acid rain in comparison to what was observed in the past. Acid rain is the product of moisture in the atmosphere interacting with sulfur containing compounds to create acids. Decreased industrial sulfur emissions from industry has improved our water and air quality, but has also reduced the quantity of free sulfur contributed by the sulfur cycle. Organic amendments such livestock manure also act as a supply of sulfur in our agriculture systems. Unfortunately, livestock manure can be hard for some producers to acquire and this can affect soil sulfur in two ways. One is that the sulfur naturally present in the manure doesn't get applied. The other is that without the addition of organic matter there is reduced capacity for the soil to essentially scrub the sulfur out of precipitation and hold on to it for plants to use.

Just as a heads up, not all sulfur is created equal. If you purchase elemental sulfur, be aware that it has to first be converted to sulfate form before plants can use it. Additionally, continued use of elemental sulfur or ammonium sulfate can contribute to lowering soil pH over time. Further AGC research investigating sulfur application rates for corn will begin this spring, determining exactly what rates elicit a response and examining what's practical for on-farm use. Also… in case you were wondering, the bad smell you get from applying some raw organic amendments are often caused by the release of volatile sulfur containing compounds. Get it in the ground or get it covered to hang on to it!

So as a summary, based on the results of this small trial we will say the following. The only treatments that significantly increased test weight over the control was plastic, followed by AS. Despite increasing test weight the most, plastic did not result in the highest yields. The highest yields resulted from the AS treatment where they were significantly higher than both the Control and UAN treatments. We observed no significant benefit of using a split nitrogen top-dress over the Control and we also did not observe any difference between topdressing with a liquid UAN vs a granular AN product. Finally, the Mid and Early corn hybrids produced higher test weights over the Late hybrids, but the top yielders turned out to be Mid range hybrids.

GRAIN CULTIVATION TRIALS IN NEWFOUNDLAND AND LABRADOR

Dr. Vanessa Kavanagh, Research Scientist
Department of Fisheries, Forestry and Agriculture,
Agriculture Production and Research Division

Some of the highest feed costs Newfoundland and Labrador's farmers face are for grains and oilseeds. To help lighten the financial burden for farmers, the Provincial Government has been working on a collaborative research program to investigate the potential use of wheat, barley, and canola as suitable feedstock for the livestock, beverage, and restaurant industries in the province.

Since 2012, the Newfoundland and Labrador Grains and Oilseeds Program has aimed to reduce economic uncertainty and increase farm sustainability by helping farmers produce their own feeds and feed stocks, and reduce the environmental impacts of importing grain.

Initial trials investigated the viability of growing wheat in Newfoundland and Labrador, and the logistics of harvesting a high-moisture crop. The Department of Fisheries, Forestry and Agriculture acquired a Murska bioprocessor – an innovative piece of equipment from Europe – to treat feed grain, roll it, and store it in an Ag-Bag, or augur it into a bunker silo. Research trials have mostly been conducted on farm fields, with farmers acting as research partners who learn as we do, and see the results first-hand.

Research trial on farmer's field testing two varieties of wheat.

Trials have shown grains grown on the Island of Newfoundland are of superior quality, and high-moisture grain production is very economical compared to conventional dry grain in terms of higher protein, lack of drying costs, and often, control over mycotoxin content.

Yields vary depending on location, with the western Newfoundland region around Codroy having an expected harvest of 4.9 tonnes per hectare, and the Deer Lake area, including Pasadena and Cormack, yielding approximately 4.3 tonnes per hectare. Farmers who have fed locally grown, high-moisture grains to their cows have all reported increases in milk production. Last season, Newfoundland and Labrador farmers planted more than 400 acres of their own wheat to offset importation costs and increase self-sufficiency.

Processing high-moisture wheat with the Murska bioprocessor. Grain is offloaded from a dump truck into a 'fill device' that augers it into the Murska hopper where it is first rolled, then inoculated, and finally extruded to be loaded into a bunker silo.

Grain after processing by the Murska bioprocessor.

Current trials are assessing nitrogen application rates and use of nitrogen stabilizers such as Agrotain urea, ESN®, and SuperU®. The goal of these trials is to reduce the environmental impacts of nitrogen fertilizer application, which can also lead to savings for farmers and potentially increase yields.

Collaborations have been essential to the success of this program. Partnerships between the Provincial Government; the local dairy industry; Grenfell Campus, Memorial University; and the Atlantic Grains Council have helped prove that wheat and barley are viable crops in the province and have helped identify regionally appropriate best-management practices such as varietal selection and optimum seeding rates.

Current Check-Off Partners

Thank you to all of our partners who support our Council, in return please support them when buying/selling grain.

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Brennan Farms Ltd.
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Atlantic Grains Council

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