MCDC

2022

MHPEC Inc. acts as the industry partner in managing the Manitoba Crop Diversification Centre (MCDC).

MCDC's programs are broadly classified as water and irrigation, applied potato research, environmental, and crop diversification. This partnership between MHPEC and Manitoba Agriculture provides a unique opportunity for a collaborative site which amplifies the scale and significance of research that can be done.

Keystone Potato Producers Association, McCain Foods Canada, and Simplot Canada II constitute the members of the Manitoba Horticulture Productivity Enhancement Centre (MHPEC Inc.)

OUR GOAL

to provide leadership and vision through cooperation, coordination and strategic collaborations between industry members and the scientific community, resulting in the development of a research program that will ensure the long term sustainability of the potato industry in Manitoba.

FROM THE SITE MANAGER

MCDC Celebrates 30 Years of Research and Extension

Manitoba Crop Diversification Centre (MCDC) marks its 30th anniversary in 2023. The MCDC was established between the Government of Canada, the Government of Manitoba, and Manitoba Horticulture Productivity Enhancement Centre (MHPEC) in 1993. The Centre's mission is to facilitate the development and adoption of science-based solutions for crop production. MCDC's strategic areas include sustainable irrigation, sustainable potato production, improving the environmental sustainability of intensive crop production, and crop diversification. MCDC's activities include testing and demonstrating current irrigation technologies and crop performance field tests; forages and crop-livestock systems; and cover crops and regenerative agriculture projects. The Centre is located at the northeast corner of the junction of highway number 1 and number 5 at Carberry Manitoba.

We are fortunate to have the support of our three industry members Keystone Potato Producers Association (KPPA), McCain Foods Canada, and Simplot Canada II Ltd. that provide the support to operate and conduct research for the potato industry, as well as other Crop Diversification focused trials. The results of MCDC's potato-focused trials and Crop Diversification trials are available online at www.mbpotatoresearch.ca and https://mbdiversificationcentres.ca/, respectively.

I would like to thank you for taking time to read and review this publication. We welcome agricultural researchers, commodity groups and interested industry experts to bring forward your research projects for discussion. We are always open to the possibility of new research and trials at our site.

Call us at 204-834-2007

Garth Christison

Site Manager for MHPEC Inc, MCDC Carberry

BENEFITS OF CONDUCTING RESEARCH AT MCDC CARBERRY

- Soil types that match light and heavy soils used in Manitoba crop production
- Irrigated or dry land available
- Ability for the site to provide other services – tillage, sprays, specialized crop research and precision agricultural equipment
- Low overhead costs
- Soil optix available for nutrient mapping
- Drone imaging available for canopy reflectance measurements
- Decades of historical data, maps, soil horizons, and surveys onsite
- Access to dedicated research staff onsite with experience conducting trials with potatoes, grains, brassica crops, legumes, forages, and specialty crops
- Proximity to Environment Canada and Agriculture and Agri-Food Canada weather stations
- Easy access at the junction of highways #5 and Trans-Canada highway #1
- Proximity to Carberry growers and central placement in Manitoba's processing potato region

On site events and extension

- Annual field day
- Extension workshops
- Presence at major provincial extension events including Manitoba Potato Production Days, Manitoba Ag Days, Manitoba Agronomists Conference, Crop Connect Conference, etc.
- Demonstrations
- Boardroom, classroom, laboratory space also available to rent

Potato Program

Zack Frederick, PhD, P. Ag

Applied Research Agronomist

MHPEC Inc.

CMCDC Carberry

Cell: 204-841-3632

Zack received his Master of Science in Plant Pathology with a minor in fungal and Oomycete biology from Cornell University in 2013

Zack received his Doctor of Philosophy in Plant Pathology with a minor in fungal and Oomycete biology from Washington State University in 2017. Zack's advisers included Drs. Dennis Johnson, Mark Pavek, Debra Inglis, and Weidong Chen, and his research and extension program focused on disease management strategies for soilborne fungal diseases of potato in Washington State's Columbia Basin with a focus on Verticillium wilt. Zack was awarded the J. de Weerd Fellowship in Potato Research in both 2015 and 2016. Zack was also an ARCS scholar (Achievement Rewards for College Scientists) from 2013 to 2017.

Zack has been the principal investigator of a research and extension program from 2017 to the present day for the Manitoba Horticulture Productivity Enhancement Centre (MHPEC) Inc. Zack's efforts to study Manitoba's potato yield variability have highlighted the importance of Verticillium wilt identification and management, as well as nutrition optimization for regional nitrogen and sulfur programs. Additional research is currently underway to study black dot and powdery scab identification and management, the development of disease-suppressive soils, irrigation decision support tools, seed cutter disinfection, and the implementation of precision agriculture tools into research with UAVs and a remote sensing device called Soil Optix.

Manitoba

HAIDER ABBAS

Crop Diversification Program

Haider Abbas, M.Sc. P.Ag.
Applied Research Specialist
Manitoba Crop Diversification Centre
Manitoba Agriculture

Box 160, NE Corner of Hwy 1 & 5
Carberry MB R0K 0H0

Cell: 204-247-0768

Haider Abbas works as the Applied Research Specialist with Manitoba Agriculture and provides scientific and technical support to the Crop Diversification program of the Manitoba Crop Diversification Centre. Haider received a B.Sc. degree in Agricultural Engineering (Irrigation & Drainage Engineering focus) and a M.Sc. degree in Agricultural & Biosystems Engineering (Soil and Water Engineering focus) from the University of Manitoba.

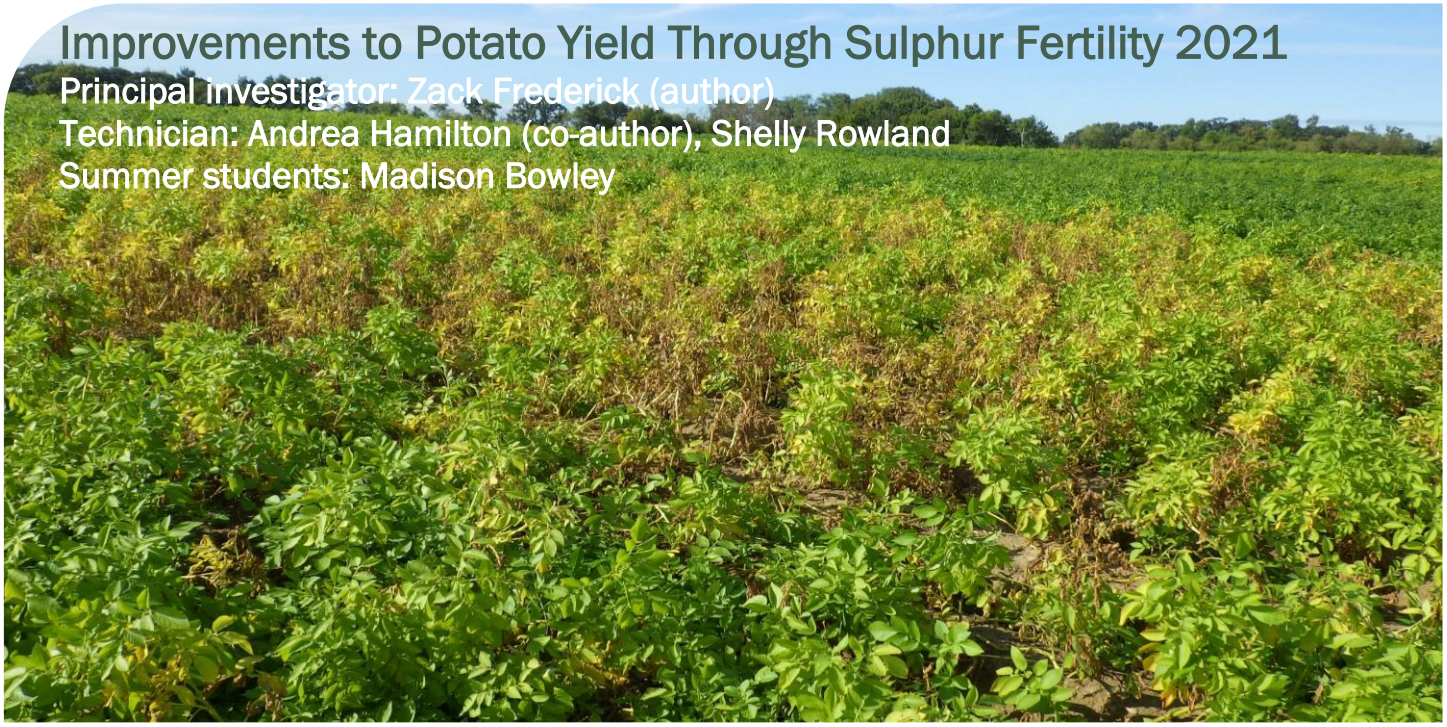
Haider has over 13 years of professional experience in agricultural research and extension. His areas of expertise include sustainable potato production, water management, agricultural machine design, crop production systems, field crops scouting, and soil fertility management. The major focus areas of the Crop Diversification program include:

- Increase the adoption of new agricultural production technologies and practices
- Provide growers with tools for environmental and economic decision making
- Address the need of regional applied research and demonstration
- Test, evaluate and demonstrate potential new technologies and practices
- Share research outcomes at field days, producer meetings, workshops and online

Haider also provides the Secretariat support to the Manitoba Potato Research and Advancement Committee and assist the committee in implementing the Manitoba Potato Science Strategy.

Improvements to Potato Yield Through Sulphur Fertility 2021

Principal investigator: Zack Frederick (author)
Technician: Andrea Hamilton (co-author), Shelly Rowland
Summer students: Madison Bowley



Previous research and results:

- Field Variability Study (FVS): 40-60 lbs of sulphur appeared to be the most beneficial amount of available soil sulphur, and compromised yields were observed outside of this range. Sulphur-associated decreases in total yield and 10-12 oz tubers often occurred in lighter-textured fields or areas of fields that had 0-5 lbs of sulphur at row closure.
- CMCDC Plot-scale Sulphur Study 2019-2021: All preplant sulphur fertilizers (magnesium sulfate, ammonium sulfate, Tiger Combo) met or exceeded their target amount of soil sulphur at row closure with the exception of Tiger XP. The use of any of the four sulphur fertilizers (independent of rate) tested improved soil sulphur availability at row closure, total yield, and the dollar value of that yield. 2019-2020 results did not have significant results with regard to fertilizer rate, but this is likely due to statistical power problems rather than not having a real-world effect. Dataset should be conclusive with 2021 data.

Objectives:

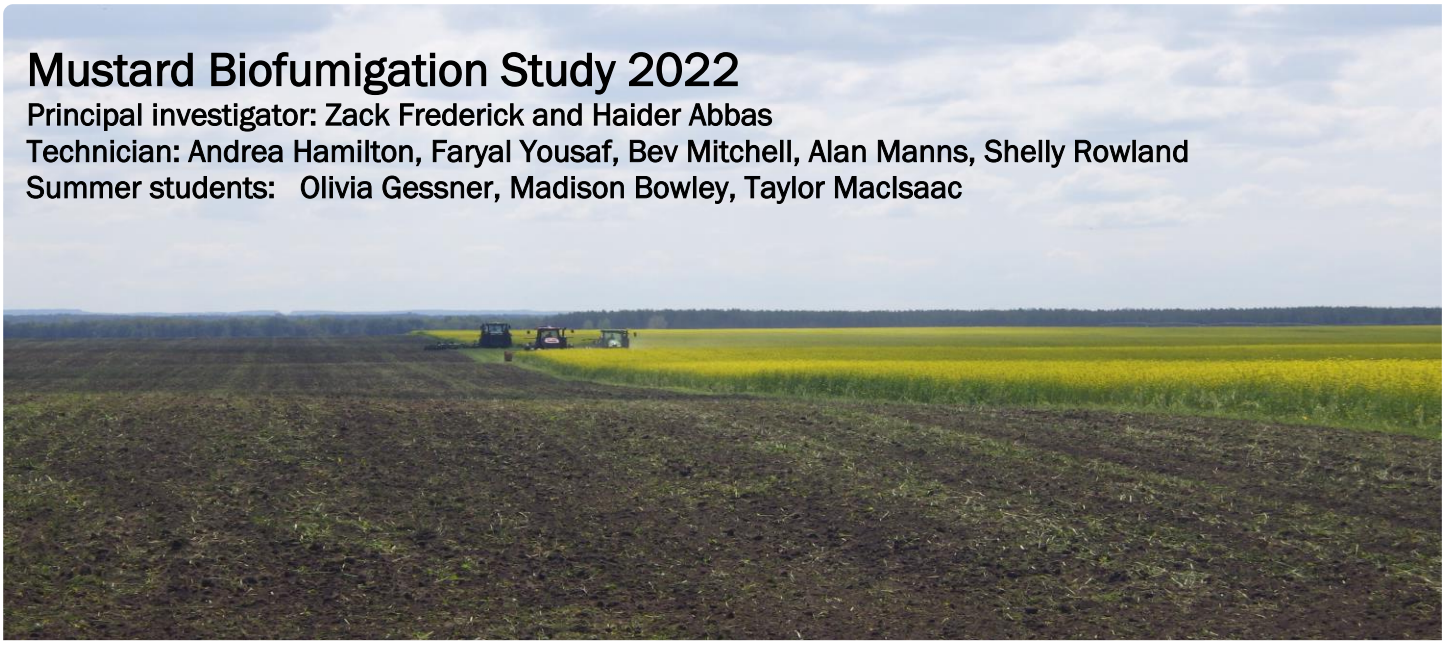
1- Demonstrate field scale sulphur remediation by restoring deficient soil to 60 lbs of soil sulphur will impact total yield and 10-12 oz tubers.
2- Demonstrate field scale sulphur remediation is cost-effective (benefit to yield offsets cost of fertilizer, labor, fuel).

Future goals:

- Move the most promising results for the most cost-effective sulphur programs from the plots to the field scale and verify small plot trends carry over to the large scale.
- Looking for 3-4 growers with lighter soil textures who would be willing to use Tiger-Sul or ammonium sulfate products on an entire 130-acre field or any partial subset.
- Provide community extension to demonstrate benefit and improve industry practice.
- Provide cost analysis tools to estimate money lost per acre due to insufficient sulfur at row closure

Mustard Biofumigation Study 2022

Principal investigator: Zack Frederick and Haider Abbas
Technician: Andrea Hamilton, Faryal Yousaf, Bev Mitchell, Alan Manns, Shelly Rowland
Summer students: Olivia Gessner, Madison Bowley, Taylor MacIsaac



Mustard Biofumigation tackles pest problems in potato fields with a side benefit of making the soil healthier at the same time. The process has been developed and experimentally validated as a control measure of Verticillium wilt of potato. The main goal of this study is to explore ways to economically manage Verticillium wilt of potato in Manitoba using a mustard crop as a biofumigant green manure to kill Verticillium propagules in soil and suppress the disease. More specifically, experiments were conducted to determine agronomic inputs to maximize biomass of mustard cultivars 'AC Volcan', 'Caliente Rojo', 'Cutlass', 'AAC Brown 18', and a male sterile hybrid. Additional studies examined field-scale mustard biofumigation to verify Verticillium CFU/g soil before and after biofumigating, as well as mustard biomass at the time of biofumigation. These experiments demonstrate that these mustards can be grown to sufficient biomass levels to theoretically achieve biofumigation.

Research Outcomes:

Planting date, presence of cereal's stubbles and seed treatment significantly impacted mustard yield and characteristics. The early seeded mustard planting date had the highest yield, population, height, and early season vigor. On the other hand, the late seeded mustard planting date had the lowest yield, population, height, and early season vigor. The mustard grown in this trial did not produce as much biomass as commonly seen in producers' field in the Carberry area, where mustard has become a popular biofumigant. It is possible that more mustard biomass is needed to have a stronger impact on subsequent potato plantings. In addition, growers have experimented with rolling, packing, or irrigating freshly incorporated mustard to help create a seal over the soil surface and increase release of biofumigants in the soil. A high infestation rate of flea beetles was observed in the study areas which effected the capacity of biomass production of mustard varieties, highlighting a potential change that needs to be made for growing mustards in Manitoba.

Full annual research reports will be available at mbpotatoresearch.ca

or scan the bar code provided at the end of this report.

Conclusion:

When managed properly mustard offers another tool to help potato growers control soilborne pests and diseases. It is important to follow the outlined cultural practices to have any chance of success using mustard as a biofumigant. Proper chopping of plant material and soil incorporation is of utmost importance. Although mustard is a remarkable biofumigant, it could have other benefits that is expected from any other cover crop such as;

- Prevention of soil erosion,
- Recycling of soil nutrients,
- Improved soil structure, and
- Maintaining soil organic matter.

Interestingly, there are other crops that show possible biofumigation effect such as but not limited to; buckwheat, pearl millet, Sorghum-Sudan grass, rape seed and oil seed radish.

For agronomic recommendations, please visit https://mbpotatoresearch.ca/

Future goals:

- Continue field work with Caliente Rojo to simultaneously encourage industry uptake of the concept of mustard biofumigation and develop a robust dataset to verify *V. dahliae* reduction in soil counts of disease symptoms after treatment.

- Additional research is needed to continue developing best agronomic practices for this pest control measure in Manitoba's local conditions.

As MCDC Celebrates 30 Years of Research and Extension

We want to thank our industry and commodity partners, government, and grower cooperators for their support as we build our Manitoba Potato Centre of Excellence

Potato Nitrogen Study 2022

Principal investigator: Zack Frederick and Haider Abbas
Technician: Andrea Hamilton, Bev Mitchell, Alan Manns, Shelly Rowland, Faryal Yousaf
Summer students: Madison Bowley, Taylor MacIsaac, Olivia Gessner

Previous research and results:

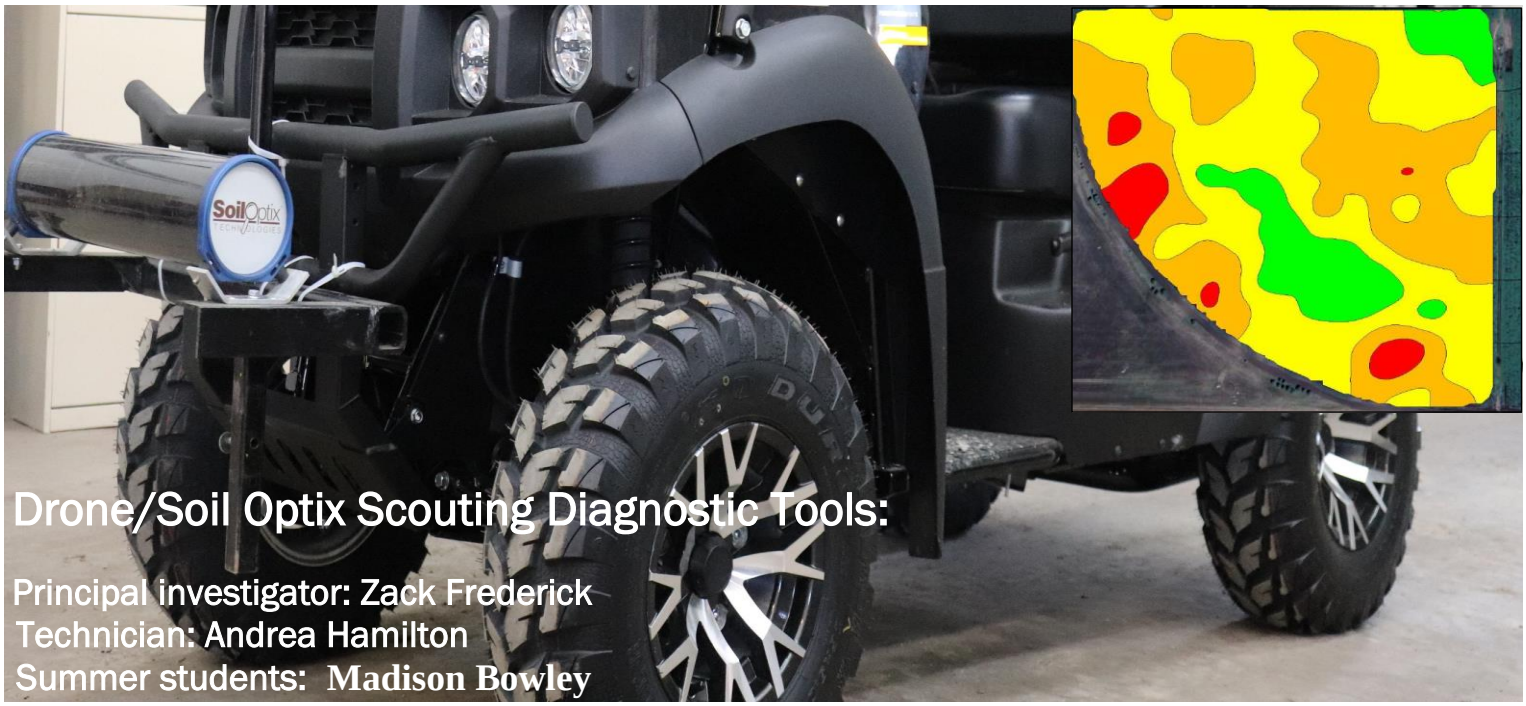
- Field variability study identified that row closure soil nitrogen had significant association with decreased 6-12 oz tuber yield. Possible target was 120-180 lbs soil N by row closure.
- CMCDC Plot-scale Nitrogen Study 2018-2020: ESN and Urea at varying rates at plant and/or top dressing at hilling generally did not provide target row closure N (120-180 lbs N). Even if one plot in one year achieved target rate, other replicated plots could not do so. All nitrogen treatments provided superior yield and quality improvements when compared to a negative control (no added nitrogen), however the impact of any nitrogen treatment compared to another on yield was nonsignificant.
- Piezometers were installed to monitor EC of leachate moving deeper into the soil, and the devices indicated the majority of applied nitrogen, regardless of form, was leaching below the potato root zone.

Objectives:

1- Link 120-180 lbs N in soil at row closure with increased 6-10, 10-12 oz tubers.
2- Determine if N treatments are cost-effective.
3- Decrease N leaching + Salinity (measured by EC).
4- Quantify decreased N loss as part of cost-effectiveness of treatment.

Future goals:

- Begin plot experiments in 2021 and 2022 with preplant nitrogen products that are designed to have significantly less leaching, observe if these products improve row closure nitrogen.
- Move the most promising results for the most cost-effective nitrogen programs from the plots to the field scale and verify small plot trends carry over to the large scale.
- Provide community extension to demonstrate benefit and improve industry practice.



Drone/Soil Optix Scouting Diagnostic Tools:

Principal investigator: Zack Frederick
Technician: Andrea Hamilton
Summer students: Madison Bowley

Previous research and results:

- First Optix scan and map of offsite 2 made in early 2021.
- First Optix grower field scan done in fall 2021. Thirteen fields scanned over fall 2021.
- Optix will be able to scan fields and provide topographical nutrient variability maps before and/or after harvest

Objectives:

1- Identify if treatment impacts areas impacted nitrogen, sulphur, Verticillium wilt
2- Determine if a given fertilizer, green manure, other treatment is cost-effective by identifying and quantifying with a propensity for problems using the soil optix, applying treatment, using the drone to identify if the impacted crop canopy area is smaller than the original problem area, and using the variability study to estimate what the restoration of yield over the improved area netted the grower after the cost of application is factored out.

Future Goals:

- Use the optix to scan grower fields to determine propensity for nutrient deficiency and quantify area(s) with deficiency in the field, use zone map to select sample points that demonstrably represent the complete range of variability in the field.
    - Uses few sample points to represent a larger area than previous studies.
- Use the drone to take images at row closure and preharvest.
    - Images are NDRE to get a better numerical measure of canopy reflectance.
    - Correlate reflectance with nutrient/disease problems.
        - Ground truth to verify.
    - Quantify areas of unique canopy reflectance that correlates to sulphur, nitrogen deficiency, Verticillium wilt, etc.

- Examine the difference between areas that are supposed to be deficient, as indicated by the Soil Optix, to areas that are actually deficient according to drone imagery. The amount of deficiency land that decreases from Soil Optix to Drone Imagery could be due to positive treatment effect. Given information from the variability study, an estimate can be made on the actual dollar value and yield improvement that can occur in this area, which can be compared to the cost of implementing the treatment. This ultimately can give use our measure of cost-effectiveness.
- This tool could also be used by consultants to see if a desired treatment is cost-effective – the model is not limited to research (but does require a running optix and drone).

The collaboration between the Keystone Potato Producers Association (KPPA) and the University of Manitoba will share data with the MHPEC program

The collaboration aims to improve potato crop production in the face of climate change impact and abiotic stressors' variability. A new research project led by Dr. Nasem Badreldin (Dept. of Soil Science) will leverage advanced technologies such as remote sensing, machine learning, and IoT to achieve its objectives.

One of the project's key objectives is to develop robust models to predict soil and plant variabilities. The team will achieve this by identifying, differentiating, and quantifying the areas of a field that have a propensity for nitrogen (N) deficiency. They will also quantify the change in impacted field area between pre-season scan/field survey and in-season UAV/satellite images to infer treatment effectiveness. This will enable the team to determine if a given N treatment is cost-effective and its impact on potato yield. Additionally, the team will assess the climate change impacts, such as drought, on N spatiotemporal distribution and availability.

The team will evaluate the crop changes using remote sensing data to improve potato yield production via a resilient farming system to abiotic stressors' variability. They will detect nitrogen (N) deficiency using multispectral UAVs and machine learning and map the spatiotemporal dynamics of N deficiency at several potato fields.

Another key project objective is to develop data-based decision models for smart potato farming. This will involve developing a data-driven potato crop yield application and designing a data interoperability framework for big data management. The team will connect several farms to a central data hub for advanced machine-learning modeling.

The project also aims to utilize hyperspectral remote sensing technology for precision phenotyping. Dr. Badreldin's team will develop a spectral phenotyping library for potato-related nutrient deficiencies, diseases, and climate change impacts. They will assess the spectral signatures with lab and field analysis and build a central model that detects several objectives (abiotic and biotic stressors) using advanced machine learning modeling.

Finally, the team will evolve a real-time potato crop management system using proximal sensing. This will involve creating an effective site-specific management (SSM) tool that accurately represents spatiotemporal variability in potato farms. The team will utilize IoT technology as a smart farming tool for crop management and build a cloud-based application for data visualizations and analysis.

The collaboration between KPPA and the University of Manitoba is a forward-looking initiative that aims to improve potato crop production and resilience to climate change and abiotic stressors.

Living Root Research Summary 2022

Principal investigator:

Zack Frederick

Technician: Andrea Hamilton

Summer student: Madison Bowley

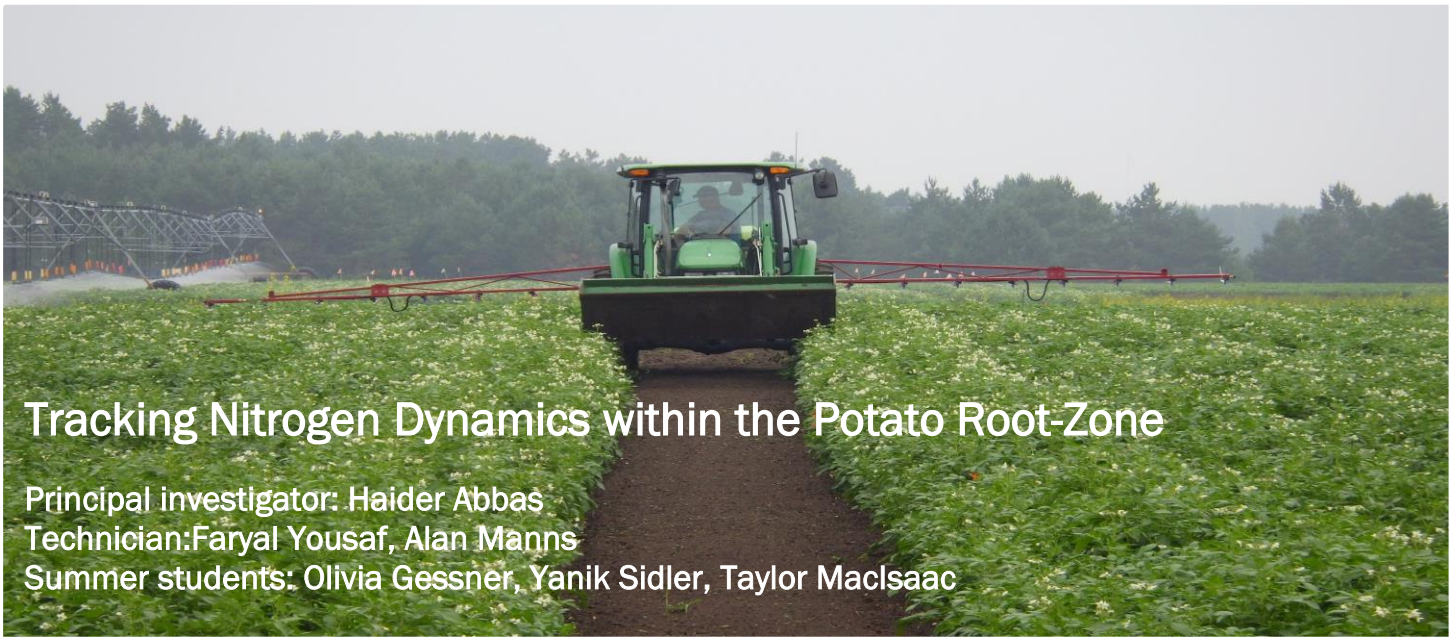
There has been significant interest in soil health and input efficiency within the agricultural sector over the last few years. This has included the idea of trying to keep a living root and soil armor for as much of Manitoba's frost-free period as possible. This is to help with the four ecosystem processes: nutrient and water cycling, energy flow, and rotation diversity. Soil doesn't usually have any living plants during pre-seeding and post-harvest periods of the year, otherwise known as the shoulder seasons. Cover crops, nurse crops and companion crops are all great options to increase the number of days with a living root during these shoulder seasons. **The overall goal is to help producers find different options that could help with keeping a living root in the soil for as long as possible while creating soil armor. All while increasing soil health and decreasing different social and economic issues within the potato industry.** This created two projects with a different focus: the spring shoulder season with nurse and companion crops and fall shoulder season with cover crops.

Objectives

1. Plant combinations of species together to see how they complement each other throughout the growing season whether it's within the cash crop or outside of the cash crop growth period with nurse, companion or cover crops.
2. Promote living roots growing through most of the frost-free season to help create soil armor all season long.
3. Trying to promote Nitrogen fixing legumes to try and fixate more atmospheric nitrogen to help increase nitrogen credits within the soil to potentially decrease the total nitrogen costs within potato production.
4. Observe two different seeding dates for a fall shoulder season cover crop mimicking the range of digging dates (first week of September and third week of September)
5. Observe how the integration of nurse/companion and cover crops affect plant growth, plant health, soil fertility and soil health.

2022 Conclusions

1. The nurse and companion crop treatments had similar yield, but the yield profile was more desirable with the companion crop which had half the nitrogen applied.
2. At row closure the nurse crop treatment had twice the nitrate as the companion crop treatment. While both were at sufficient levels for both soil and petioles at this time.
3. The self-seeded peas from the companion crop out competed the cover crop planted one week later.
4. Diversity of the cover crop planted can be a helpful risk management tool to get the most out of a cover crop as possible.



Tracking Nitrogen Dynamics within the Potato Root-Zone

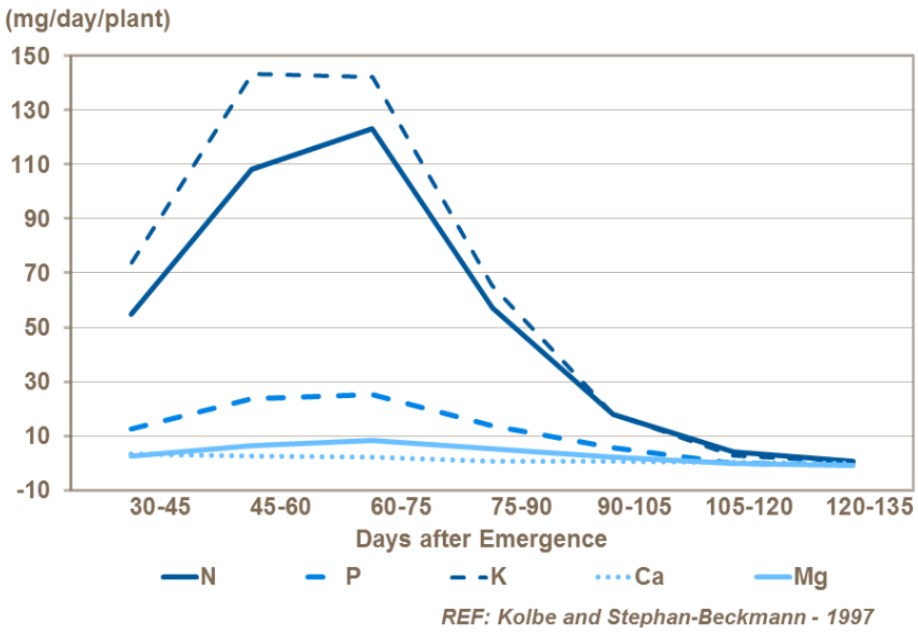
Principal investigator: Haider Abbas
Technician:Faryal Yousaf, Alan Manns
Summer students: Olivia Gessner, Yanik Sidler, Taylor MacIsaac

Like all other crops, a substantial amount of fertilizer Nitrogen (N) is required to get the optimum yield and quality of potato tubers and to tolerate the diseases as well. In addition to nitrogenous fertilizers, irrigation management also plays a significant role in improving the crop yield. Potato tubers are very sensitive to water stress. Yield may be significantly reduced by water deficit. On the other hand, excessive water application may result in respiration stress and denitrification. Maximum potato production is achieved when the soil moisture is sustained at an optimum level and N is frequently available during the peak demand period within the potato root-zone. In order to achieve high potato yield with minimum water quality impact, both nitrogen and water management should be taken into account.

Nitrate leaching in the agricultural soil is influenced by many factors such as the irrigation system/applicator, irrigation management, N fertilizer management (N rate, application method, and splitting), soil characteristics, and rainfall patterns. Soil thickness and distance between the bottom of the root-zone and groundwater table also plays a role in determining the potential for ground water contamination. If the plants roots are closer to the water table, nitrate leaches into the groundwater more easily.

Faryal Yousaf started as the Applied Research Technician in the MCDC's Crop Diversification program during the 2021-planting year. Faryal is graduated in B.Sc. Agriculture (Soil Science) and Masters in Agri-business. To enhance her agronomic and business management skills, Faryal got her MBA degree from the Conestoga College (Waterloo, ON), and Diploma in Agronomy from Olds College Alberta. Born and brought up on a family farm and working with ag-industry in the Canadian prairies, Faryal has a significant experience in crop husbandry, nutrient management, field scouting, and statistical analysis. Faryal also received a certification in Website Development and Administration and is managing the Manitoba's Crop Diversification Centres' website.

Daily Rate of Macronutrient Uptake - Potato Tuber



REF: Kolbe and Stephan-Beckmann - 1997

This graph shows the daily uptake of macronutrients in potato tubers. The dark blue continuous line shows N uptake. It indicates that Potatoes require comparatively less N during the early part of the growing season i.e. sprout development, and vegetative growth stages compared to the later part i.e. tuber initiation, and tuber bulking stages.

Excessive N application during the early part of the growing season leads to delay onset of the tuber initiation stage, and decrease the yield. Potato requires an adequate and steady supply of N from tuber formation to tuber bulking. Therefore, potato growers apply approximately 25-50 % of the total recommended N at the beginning of the growing season and the remainder is applied at the tuber initiation stage. Although this scheduling improves the yield and quality of tuber, it is costly and labor intensive.

Outcomes:

Impact of different nitrogen application treatments on nitrate dynamics within the potato root zone was studied in Carberry, Manitoba. The objective of this study was to examine the effects of different nitrogen application rates on nitrogen dynamics within the potato root-zone in a loamy sand soil, and to analyze the nitrate leaching potential below the root-zone.

A trend of nitrate leaching was observed within the potato root-zone with the progression of growth stages. It resulted in higher nitrate contents in the deeper depths compared to shallow depths in some ESN applied treatments.

Nitrate leaching potential from the effective root-zone was found significantly higher at tuber initiation stage, and tuber bulking stage. Tuber initiation and tuber bulking stages are sensitive to irrigation and nutrients stress.

2022 Conclusion:

The potential risk of nitrate leaching increases with the accumulation of excessive nitrates within the root-zone combined with excessive irrigation and/or intense rainfall on well-drained sandy soils having low water-holding capacity. A higher amount of nitrogen application in sandy loam soil system facilitates the availability of nitrogen for plant growth. However, the application of a higher rate of slow released nitrogen is comparatively beneficial than Urea for better nitrogen use efficiency.

The supplemental irrigation was applied to the irrigated treatment during the tuber initiation, and tuber bulking stages. Overhead irrigation and rainfall coupled with favorable temperature facilitated the release of nitrogen from PCU/ESN granules in the plant-available-form. This accumulated nitrate may have been available to leach below the root-zone with the irrigation and rainfall events.

Potato Wind Erosion Study:

Previous research and results:

- Anecdotes from growers have been recorded from mustard biofumigation project where treatments visibly reducing blow over winter and spring led to interest in ways of quantifying this observation.

Objectives:

1- A collaboration was fostered with Dr. David Lobb of the University of Manitoba to prototype dust collection buckets in 2022. Future work in 2023 will evaluate if 2022 cover crop treatments decrease spring wind erosion in early 2023.
2- Use these tools in cover crop/green manure, black dot vine removal studies to capture an additional aspect of soil health.
3- Identify which cover crop/green manures and other practices have the greatest impact on decreasing wind erosion.

Variable Rate Irrigation Study:

Previous research and results:

- Several growers have VRI systems but community anecdote suggests these systems are not used to their fullest extent.
- MCDC's VRI system primarily used to allow contiguous experiments to be simultaneously watered while having different water requirements.

Objectives:

1- Establish MCDC Offsite VRI for research in irrigation efficiency (such as available soil water, irrigation depth based on texture and amount of water applied, etc).
2- Enable community confidence in creating and using VRI prescriptions to facilitate the use of existing infrastructure.
3- Generate conversation between industry and research partners to list and pursue future irrigation research.

Andrea Hamilton started as MHPEC's applied research technician in the spring of 2021. Andrea completed her agriculture diploma in livestock management at the University of Manitoba before she continued her education to complete her Bachelor of Science in Agronomy in 2019. Andrea has a diverse knowledge base within agriculture with working in livestock, potato, grain, and green house hydroponic systems. Andrea also has a background in regenerative agriculture with taking the soil health academy course and presently taking the Soil Food Web course. Andrea's current roles include the implementation of MHPEC research projects such as planting, irrigation, collecting soil and plant samples, grading and analysis.

MANITOBA CROP DIVERSIFICATION PROGRAM

Long-term health of regional agriculture based communities and Manitoba in general is strongly dependent on the inclusive sectors ability to consistently improve competitiveness while maintaining the sustainability of production practices. Crop Diversification program of Manitoba Crop Diversification Centre (MCDC) supports key agriculture sector growth and sustainability through applied research for accelerated adoption of innovation.

MCDC's activities include testing and demonstrating current irrigation technologies and crop performance field tests with and without irrigation; extreme moisture and drought management; forages and crop-livestock systems; cover crops and regenerative agriculture projects. MCDC partners on a variety of projects with numerous other public and private organizations.

During the 2022 planting year, the Crop Diversification program conducted 45 research and demonstration projects on cereals, forages, oilseeds, pulses, special crops, and potatoes in collaboration with Manitoba Agriculture, AAFC, academic intuitions (University of Manitoba, Assiniboine Community College), producer groups and industry partners. Over 3,000 research and demonstration plots were maintained during this period. MCDC is one of many sites that are part of the Manitoba Crop Variety Evaluation Trials (MCVET), which facilitates variety evaluations of many different crop types in the province. MCDC conducted winter wheat, fall rye, flax, soybeans, field peas, sunflowers, and annual forages trials for MCVET with the focus on varietal evaluations.

Following trials were conducted during the 2022-growing season with the objective of variety evaluation, development of best agronomic practices, nutrient management, protein testing, crop-livestock integration, and climate resilience:

Cereals:

1- MCVET Winter Wheat Variety Evaluation
2- MCVET Fall Rye Variety Evaluation
3- Winter Wheat Fertility Management
4- Winter Cereals Agronomy Management
5- Malt Barley Variety Evaluation
6- Development of Decision Support Tools for Fusarium Head Blight Management
7- MCVET Spring Wheat Variety Evaluation
8- MCVET Oat Variety Evaluation
9- MCVET Barley Variety Evaluation

Corn:

10-Evaluation/selection of Parent lines adapted to Carberry region
11-Inbred Corn Variety Evaluation
12-Evaluation of Corn for Goss's Wilt Resistance
13-Manitoba Corn Committee corn hybrid evaluation trial
14-Performance evaluation of high yielding corn advanced variety
15-Corn Advanced Material Trial
16-Corn Breeding Material Trial

Pulses:

17-MCVET Field Peas Variety Evaluation
18-Effect of fertilizer management on agronomic and economic performance of Black Bean - Fertilizer N rate and inoculant
19-Effect of fertilizer management on agronomic and economic performance of Black Bean - Fertilizer P rate and placement
20-Effect of fertilizer management on agronomic and economic performance of Pinto Bean - Fertilizer N rate and inoculant
21-Effect of fertilizer management on agronomic and economic performance of Pinto Bean - Fertilizer P rate and placement
22-Impact of Nutrient Management on Protein Content of Soybean - Variety Trial - Phosphorus Study
23-Impact Assessment of white mould incidence severity on black beans under irrigated conditions
24-Impact Assessment of white mould incidence severity on pinto beans under irrigated conditions

Oilseeds:

25-Sunflower Variety Evaluation – Oil Varieties
26-Sunflower Variety Evaluation – Confectionary Varieties
27-Sunflower Staging and Harvesting Test Trial
28-MCVET Flax Variety Evaluation

Forages:

29-MCVET Annual Forages Test
30-Hemp-Cereal Silage Intercropping
31-Pea-Cereal Silage Intercropping
32-Alfalfa Forage Trial
33-Teff Grass Test for Feed Quality

Special Crops:

34-Quinoa Seeding Date Evaluation
35-Quinoa Variety Evaluation
36-Characterizing Irrigation Impacts on Quinoa Production
37-Agronomic Impacts of Irrigation Application on Quinoa Yield and Quality
38-Hemp Grain Variety Evaluation Trial
39-Hemp Fibre Variety Evaluation Trial
40-Hops Variety Evaluation

Horticulture:

41-Development of Agronomic Recommendations to produce maximum biomass for Mustard Biofumigation Process in Potatoes
42-Tracking Nitrogen Dynamics within the Potato Root-Zone
43-Controlling Soil Erosion in Potato Farming Systems
44-Variable Rate Irrigation Testing in Potatoes
45- Evaluation of herbicide injury in potato production systems

Results of these trials would be available in the 2022 CMCDC Annual Report at **mbdiversificationcentres.ca**

For your questions and feedback on the diversification program,
contact Haider Abbas at haider.abbas@gov.mb.ca

MHPEC Inc.

PO Box 309
Carberry, Manitoba
R0K 0H0

204-834-2007

Contact Us:

Garth Christison – Manager
mhpec_manager@outlook.com

Zack Frederick – Applied Research Agronomist
mhpec@outlook.com

Sherree Strain – Office Administrator
mhpec1@outlook.com

Support Staff:

MHPEC's research program is supported by a research technician and seasonal staff: Garth Christison, Sherree Strain, Andrea Hamilton, Beverly Mitchell, Alan Manns, Shelly Rowland, Alex Christison along with summer students, are critical team members whose efforts are essential for work at the research site.

New Technician:

Amy Unger started in January 2023 as the new Applied Research Technician for potatoes at MHPEC Inc. Amy received her Bachelor of Science in Agronomy from the University of Manitoba in 2017 and spent time working as a technician in the Soil Science Department at the U of M before entering the potato industry in 2019 working first in the field with processing potatoes at McCain Foods and then in a research capacity with AAFC in Morden. Amy values the role that science plays in supporting growers in their pursuit to sustainably provide high quality food to our wider community. On this team, Amy looks forward to investigating the ways that nutrient dynamics, water management, and land stewardship practices impact the yield, quality, and disease resilience of potato systems in Manitoba.

Our 2022 Team

Back rows (left to right): Bev Mitchell (Technician), Garth Christison (Centre Manager), Madison Bowley (Summer Student), Sherree Strain (Office Administrator), Taylor MacIsaac (Summer Student), Yanik Sidler (Summer Student), Shelly Rowland (Field Technician), Zack Frederick (Applied Research Agronomist), Andrea Hamilton (Applied Research Technician, Potato), Haidar Abbas (Applied Research Specialist), Alan Manns (Field Manager) Front row (left to right): Olivia Gessner (Summer Student), Faryal Yousaf (Diversification Technician) Missing: Alex Christison (Field Operation Technician), Donna Christison (harvest)

For project findings and recommendations, please visit the following websites for our Annual Reports or scan the QR code

mbpotatoresearch.ca QR code

mbdiversificationcentres.ca QR code