



AgriScience Program

2020-2021 Annual Performance Report

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| Name of Recipient: Prairie Oat Growers Association | |
| Project Title: ASP-004 POBC Prairie Oat Breeding Consortium/ASP-004 POBC Prairie Oat Breeding Consortium | |
| Project Number: CAP-J-002038 ASP-004 POBC | Period Covered by Report (YYYY-MM-DD to YYYY-MM-DD): 2020-04-01 to 2021-03-31 |
| Activity #: Name of Activity: POBC | Principal Investigator: Kirby Nilsen |
| Activity Start Date (YYYY-MM-DD): 2018-04-01 | Activity End Date (YYYY-MM-DD): 2023-03-31 |

1. Performance Measures

In the performance measures table below, please provide the results and achievements that were finalized during the reporting period. Do not include results that are not final or that will continue to be developed. It is quite possible that in the first year or two, there may not be any results to report. Please see Annex A for a description of each performance measure.

| Performance Measures | | Results Achieved | Provide a brief description of each final result achieved during the reporting period. |
|----------------------|---|------------------|--|
| 1. | Number of highly qualified personnel (HQP) working on funded activities (HQP refers exclusively to current Master and PhD students) | Not Collecting | |
| 2. | Training/Knowledge transfer events | | |
| | 2.1 Number of training/knowledge transfer events organized by the recipient | Not Collecting | |
| | 2.2 Number of presentations made in training/knowledge transfer events | 1 | Nilsen, K. Oat Breeding: What's Hot New and Coming Soon. Presented to the Manitoba Oat Growers Association. March 10th, 2021. Virtual |
| 3. | Number of participants at training/knowledge transfer events | Not Collecting | |
| 4. | Number of new knowledge transfer products developed | 0 | |
| 5. | Number of papers published in peer reviewed journals | 1 | A.Nakhforoosh, S.Kumar, T.Fetch, and J.Mitchell Fetch. Peduncle breaking resistance: a potential selection criterion to improve lodging tolerance in oat. Canadian Journal of Plant Science. 100(6): 707-719. https://doi.org/10.1139/cjps-2019-0286 |



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| 6. | Number of new technologies (new products, practices, processes and systems) that are developed | 0 | |
| 7. | Number of new technologies (new products, practices, processes and systems) that are assessed under research conditions | Not Collecting | |
| 8. | Number of new technologies (new products, practices, processes and systems) that are demonstrated on-farm or in-plant | Not Collecting | |
| 9. | Number of new technologies (new products, practices, processes and systems) that attain Intellectual Property (IP) protection | 0 | |
| 10. | Number of new technologies (new products, practices, processes and systems) that are utilized | Not Collecting | |

2. Summary of Activity

Please provide a high-level summary of this activity that includes an introduction, objectives, methodology, deliverables, results and discussion. Technical language can be used in this section.

Executive Summary
Executive Summary

The objective of the Prairie Oat Breeding Consortium (POBC) is to develop new oat cultivars suited to production in western Canada, and suited to end use markets identified by the Prairie Oat Growers Association (POGA) and the milling industry. These cultivars will be developed as efficiently and effectively as possible. The cultivars developed will have end-use quality identified as important by the industry and will carry genetic resistance to major diseases, pests and adverse environmental conditions prevalent in the planned production areas. This project will address several of the priority areas identified in the new Canadian Agricultural Partnership Policy Framework, including helping oat producers and the oat industry to use science and innovation to increase their productivity and become even more resilient. It could enable the farmers and oat food processors to become more competitive by increasing their export capacity and addressing the needs of new markets around the world. The project, through the development of cultivars that are genetically resistant to pests and adaptable to various climatic conditions, will help producers be more resilient by reducing the following: the cost of growing oats, the fossil fuel use and greenhouse gas emissions and the amount of pesticides used in oat production. Many of the industry partners in this project focus on adding value to the producers oat crop, directly addressing the priority for growth in Value-added Agriculture and Agri-Food Processing. Risks to the producers and the oat processing industry will be reduced by oat cultivars that perform better agronomically, are resistant to pests and produce reliably healthy products for the human and animal consumers, in Canada and around the world. This will also increase the Public Trust in the Canadian oat crop as a whole.

2020-2021 Report Executive Summary



During 2020, we faced the unprecedented challenge of navigating a global pandemic that emerged during one of the busiest times of the year for the program. This created a significant interruption to normally planned field activities. As a result, restrictions were put in place on what could be planted in the field, and approval was given only to advanced generation tests. No early generation material was planted in 2020, and the full effects of this will only be realized in future years of the breeding cycle. Despite the COVID related challenges, the near term project health is good. A more cautious longer term outlook will be required due to COVID19 restrictions that were in place during 2020, and could continue to impact the program in 2021 and beyond.

Highlights:

- The Western Cooperative Oat Registration Test (WCORT) was planted at 13 locations in western Canada including disease nurseries at Morden. The test included 30 entries, of which four were second year from the BRDC program. The data from this test was compiled and used for evaluation of candidate lines at the 2021 PGDC meeting on February 23-25th. One line (OT2129) was recommended for registration from the BRDC program. This line is a shorter, earlier maturing milling oat variety with excellent grain quality and higher yield potential suitable for western Canadian growing environments.
- Pre-registration tests (49 BRDC entries) were conducted at seven locations across western Canada, including disease nurseries at Morden (Crown Rust, Stem Rust, FHB). Data were analyzed and compiled, and 4 lines were selected for entry into the 2021 WCORT test as first year entries.
- The dedication of all project collaborators to ensuring the work was able to continue despite the numerous challenges this season highlights the commitment and resiliency of the team.

Looking ahead, emphasis will need to be placed on a return to normal activities for the program. As material is cleared out of the advanced stages of the breeding program, new material must be generated and evaluated to take its place in the pipeline. The full extent of the COVID19 impact on operations moving forward is unknown, and will require careful monitoring and flexibility and adaptability on behalf of the team.

Objectives

Description: The objective of the Prairie Oat Breeding Consortium (POBC) is to develop new oat cultivars suited to production in western Canada, and suited to end use markets identified by POGA and the milling industry. These cultivars will be developed as efficiently and effectively as possible.

Outcome: New oat cultivars that will be produced on a significant acreage and utilized by processors and the milling industry.

The cultivars developed will have end-use quality identified as important by the industry and will carry genetic resistance to major diseases, pests and adverse environmental conditions prevalent in the planned production areas.

Performance Summary:

Report 2021. In February 2021, one oat breeding line (OT2129) from the BRDC program was supported for registration at the PGDC-PRCOB Meetings. OT2129 is a good yielding line (104% of Summit). It has earlier heading, and maturity relative Summit (-4 days), with a short plant height that is equivalent to Summit. It has good test weight, thousand kernel weight, %plumps and thins. OT2129 has excellent groat percentage, protein, beta-glucan content and acceptable TDF levels. It has average levels of oil, well within the range desired by the milling industry. To summarize, this line is similar to Summit, with several improved characteristics. Work is currently underway to apply for VRO/PBR registration as soon as possible.



Milestones

POBC

Activity: Annual Meeting with Industry Partners

Milestone / Deliverable: Meeting with Industry Partner

An ANNUAL meeting is held with the industry partners (sometime during this period of time) to discuss merits of breeding lines being advanced within the program, and potential lines to possibly obtain support for registration.

Report 2021. The annual meeting was held January 25th, 2021. This meeting was held virtually due to the COVID19 pandemic. The Western Cooperative Oat Registration Trial Report data were presented so decisions could be made on which line(s) should be presented at the PGDC-PRCOB to request support for registration. It was decided that two lines would be presented for request for support (OT2129, OT7100). Decisions were made to move 3 lines from 1st year to 2nd year of testing in the 20WCORT. During the meeting, the current opinion of the group regarding breeding targets for oat was discussed in detail. POBC members asked for an update on the outlook for the 2021 field situation relative COVID19. It was mentioned activities would be increased relative 2020, but would likely not see a return to 100% of normal activities.

POBC

Activity: Annual Report

Milestone / Deliverable: Information and data will be collected for an annual report submitted to appropriate recipients

Progress Summary: (In Progress) The Interim report will be submitted on time to fulfill this objective.

POBC

Activity: Annual Field Tour

Milestone / Deliverable: Field Tour

An ANNUAL field tour will be held by Kirby Nilsen and staff during the growing season, to inform Industry funding partners, interested producers and agronomists, provincial specialists, and media representatives of research and advances being made within the project.

Progress Summary: (In Progress)

Report 2021. Due to COVID19 pandemic the normal field tour was not held due to restrictions. However, a private tour was arranged with Dawn Popescul, Interim Executive Director of POGA on Monday September 14th, 2020 to visit research plots on Quintaine's field, near Brandon MB. Dawn was able to observe our oat yield plots and harvest activities that were underway during the tour.

3. Issues

- Describe any challenges or concerns in achieving the results and deliverables of this activity during the reporting period. How were they overcome or how do you plan to overcome?
- Describe any potential changes to the work plan and the budget during the reporting period. How were or how will they be managed?

Report 2021. The current project lead was hired and took over the oat breeding program on Feb 6, 2020. The COVID19 pandemic was declared on March 11, 2020. Research activities were halted at AAFC shortly thereafter, coinciding with the peak activity time for preparing seed for planting. Approval for limited restart of on-site activities came late in the spring of 2020 and subsequently delayed planting by several weeks, and field activities were restricted to advanced generation tests only. No early generation breeding material was planted in 2020, but this was partially offset by sending unplanted material to NZ for increase. Scientists have not been able to work on-site regularly since the pandemic emerged. Technical staff have been allowed to report for on-site work, however, reduced indoor occupancy within



the buildings at the BRDC have limited the number of staff allowed on-site at one time. Indoor activities such as the summer crossing block, and greenhouse germplasm increase were reduced relative a normal year, but these activities were resumed during late summer/fall 2020. Travel was limited to local only essential duty travel throughout the year. The annual trip by the breeder to New Zealand was not possible over the winter, but this was offset by having data collection performed by staff in NZ. A larger volume of material than normal was sent to and harvested in New Zealand to advance material that was not able to be planted in Canada during the summer. A fully functional breeding program requires that all generations to be advanced simultaneously, and because this did not happen in 2020, there may be a gap in the program in future years. This will be partially offset by advancing populations through the use of contra-season nurseries and greenhouse increases. The program will continue moving forward despite these challenges.

In January 2021, it was announced that the small plot research sites run by BCGPA at Dawson's Creek and Fort St. John will be discontinued. Therefore we will not be running yield tests at this location for the remainder of the project.

4. Key Achievements

A key achievement represents a significant achievement or tangible result that could potentially be applied either by farmers or industry or the science community. In one to three paragraphs, please provide key achievements that meet one of the following criteria:

- 1) The item has commercial potential (all testing and piloting has been completed);
- 2) The item has been commercialized; or
- 3) The item has been adopted by sector.

Examples of tangible results could include increased sustainability (beneficial management practice), reduced costs, improved productivity or increased profitability. Please note that the information provided will be used for communication purposes only.

If no key achievements have been realized at this stage, please leave this section blank.

Report 2021. One line (OT2129) received support for registration at the PGDC PRCOB meetings in February 2021. This line is similar to Summit, with several improved characteristics. Given that Summit is currently a popular variety for producers, we believe that OT2129 (which offers improved yield, reduced maturity and short plant height relative Summit) would be a good replacement variety for Summit. The data and documentation required for Variety Registration and PBR will be obtained and submitted as soon as possible.



Annex A

| Performance Measures Table | |
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| Performance Measures | Description |
| 1. Number of highly qualified personnel (HQP) working on funded activities | <p>This only includes individuals who are registered in Master or PhD programs and are working on activities that receive funding through the Canadian Agricultural Partnership. They are only counted in their first year working on projects.</p> <p>For each reported HQP, please provide the following: the name of the student, level of degree, field of study and name of the institution.</p> |
| 2. Training/knowledge transfer events | |
| 2.1. Number of training/knowledge transfer events organized | <p>This includes events completed in the reporting year that were organized under the project to share results of the activities with audiences who may use that knowledge in the future. Examples could include training events, scientific meetings, symposia, conferences, workshops, industry meetings, field days or webinars.</p> <p>Annual General Meetings do not normally qualify for this category as they are considered to be part of normal day-to-day business.</p> <p>For each reported item, please provide the following: name of the event, name of the organizer and organization, location, and year/month/day.</p> |
| 2.2. Number of presentations made in training/knowledge transfer events | <p>This includes oral presentations and poster presentations at events that are not organized by the recipient, for example conferences, symposiums or training events.</p> <p>For each reported item, please provide the following: name of presenter, title of presentation, name of the event, location, and year/month/day.</p> |
| 3. Number of participants at training/knowledge transfer events | <p>This includes individuals who attend the events listed and who may use that knowledge in the future.</p> |
| 4. Number of new knowledge transfer products developed | <p>New knowledge could include, but is not limited to:</p> <ol style="list-style-type: none"> 1) newly acquired knowledge that differs significantly from previously acquired knowledge; 2) existing knowledge that is enhanced to meet different requirements; 3) existing knowledge that is applied in different situations. <p>These are knowledge transfer materials created under the project that have been disseminated to transfer information to audiences who may use that knowledge in the future. Examples could include brochures, factsheets, flyers, guides, articles in trade magazines, technical bulletins and social media items. Only the number of products developed should be reported, not the number of copies that were printed and disseminated.</p> <p>For each reported item, please provide the following: author(s), title of the item, type of the reported item (e.g. brochure), name of the trade magazine/publisher and page number(s) if applicable, and year/month/day.</p> |
| 5. Number of papers published in peer reviewed journals | <p>This includes scientific papers that are published in peer reviewed journals. Papers that are not yet published (ex. manuscripts in preparation, under review or accepted) should not be reported.</p> <p>For each reported item, please provide the following: author(s), year of publication, article title, title of journal, volume (issue), and page</p> |



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| | <p>number(s).</p> <p>If the item is a book or a book chapter, add name of publisher.</p> <p>If the item is an article for conference proceedings, add title of published proceedings, location, and year/month/day.</p> |
| <p>6. Number of new technologies (new products, practices, processes and systems) that are developed</p> | <p>A new technology could include, but is not limited to:</p> <ol style="list-style-type: none"> 1) a newly created technology that differs significantly from existing technologies; 2) an existing technology that is modified to meet different requirements; 3) an existing technology that is tested in different situations. <p>New products are goods and services that differ significantly in their characteristics or intended uses from products previously produced and used. Examples could include equipment, software, novel foods or consumer goods.</p> <p>New practices are new agronomic techniques or methods that can be applied directly by producers.</p> <p>New processes are the set of operations performed by equipment in which variables are monitored or controlled to produce an output in labs or processing facilities.</p> <p>New systems are the set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, or solve a problem.</p> <p>Development consists of the creation of a new product, the generation of a new practice, or the demonstration of utility of a new process or system.</p> <p>This category does not include new varieties. New varieties are only reported under 'Number of new technologies that attain Intellectual Property protection' and/or 'Number of new technologies that are utilized'. Gene sequences, breeding lines and populations are not eligible under this category.</p> <p>To avoid duplication, for any new technologies, only set a target that represents the last stage in the innovation process. For example, a new technology is either developed, or assessed, or demonstrated or utilized.</p> |
| <p>7. Number of new technologies (new products, practices, processes and systems) that are assessed under research conditions</p> | <p>See the definition of new technologies under #6.</p> <p>Are assessed: when new technologies are evaluated or tested under research conditions.</p> <p>This category does not include new varieties. New varieties are only reported under 'Number of new technologies that attain Intellectual Property protection' and/or 'Number of new technologies that are utilized'. Gene sequences, breeding lines and populations are not eligible under this category.</p> <p>To avoid duplication, for any new technologies, only set a target that represents the last stage in the innovation process. For example, a new technology is either developed, or assessed, or demonstrated or utilized.</p> |
| <p>8. Number of new technologies (new products, practices, processes and systems) that are demonstrated on-farm or in-plant</p> | <p>See the definition of new technologies under #6.</p> <p>Are demonstrated: when new technologies are presented to the sector by experiments, prototypes, examples or pilot on-farm or in-plant.</p> |



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| | <p>This category does not include new varieties. New varieties are only reported under 'Number of new technologies that attain Intellectual Property protection' and/or 'Number of new technologies that are utilized'. Gene sequences, breeding lines and populations are not eligible under this category.</p> <p>To avoid duplication, for any new technologies, only set a target that represents the last stage in the innovation process. For example, a new technology is either developed, or assessed, or demonstrated or utilized.</p> |
| <p>9. Number of new technologies (new products, practices, processes and systems) that attain Intellectual Property (IP) protection</p> | <p>See the definition of new technologies under #6.</p> <p>Examples for IP protection could include, but are not limited to: plant breeder rights, patents filed, registered trademarks and copyrights, and registered germplasms and released varieties (excluding breeding lines and gene sequences).</p> <p>For each new variety, please provide the registration number, the variety name and year/month/date.</p> |
| <p>10. Number of new technologies (new products, practices, processes and systems) that are utilized</p> | <p>See the definition of new technologies under #6.</p> <p>Are utilized: when new technologies are adopted or implemented for use within the sector. Examples may include, but are not limited to: a signed license agreement, a signed letter of intent, a new product that is available on the market, and a new practice which is adopted by farmers.</p> <p>Gene sequences, breeding lines and populations are not eligible under this category.</p> <p>To avoid duplication, for any new technologies, only set a target that represents the last stage in the innovation process. For example, a new technology is either developed, or assessed, or demonstrated or utilized.</p> |