**Canadian Agriculture Partnerships (CAP) AgriScience Program Performance Reporting Requirements (2019-2020) - Annual Performance Report**

**AgriScience Program**

**2019-2020 Annual Performance Report**

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| Name of Recipient: Organic Federation of Canada | |
| Project Title: ASC-13 Organic Science Cluster III: Connecting Environmental Sustainability with the Science of Organic Production | |
| Project Number: CAP-J-002151 ASC-13 Organic Cluster Activity #5 | Period Covered by Report (YYYY-MM-DD to YYYY-MM-DD): 2019-04-01 to 2020-03-31 |
| Activity #: 5  Name of Activity: Mitchell Fetch: Organic Oat Breeding / Oat cultivars specifically developed for organic production systems in Canada/ASC-13 Organic Cluster Activity #5. | Principal Investigators:  Dr. Jennifer Mitchell Fetch/Dr. 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.

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| **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 | 1 | Mitchell Fetch, J. 2019. Oat and Wheat Summer Field Tour, Brandon, MB, August 8, 2019. Organized by the Wheat and Oat Project Leads and Staff, AAFC Brandon. The wheat breeder and oat breeder, plus several of the technical staff spoke, in general, about the breeding programs, and the plots and nurseries that were being observed. These people also responded to comments and questions from the attendees. There were no formal (ie. Titled) presentations made. ~80 attendees. |
| 2.2 Number of presentations made in training/knowledge transfer events | 2 | 1. Mitchell Fetch, J. 2019. Organic Oat Breeding Advances. Presented in the field at Organic Field Walks, Swift Current, Saskatchewan July 26 2019.  A field tour was held at Swift Current, SK July 26, 2019, hosted by Dr. Myriam Fernandez, and several Organic Organizations in Saskatchewan.  2.. Nilsen, K. 2020. Leveraging Genomics for Sustainable Oat Breeding. Presented to Industry Funding Partners, January 30 2020, during the Prairie Oat Breeding Consortium Annual General Meeting, held at Kelburn Farm, Howden, MB. 19 Participants |
| 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 | 0 |  |
| 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.

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| **Executive Summary**  ​Organic oat growers, processors and consumers continue to ask for cultivars developed for their unique systems and needs. Organically-produced versus conventionally-produced oat still fetches a premium price (Organicbiz.ca 2017). The project to develop milling quality oat cultivars suitable for organic production in western Canada will focus on the identification and evaluation of oat germplasm with high levels of genetically conferred disease resistance. The anticipated outcome is oat cultivars with disease resistance, especially to oat rusts, and hopefully with improved resistance to fusarium head blight. These oat cultivars will also have acceptable milling quality, suitable for organically managed production systems in western Canada, and for the ever-increasing organic markets. In achieving this objective, this activity will address the Priority Research Areas identified by the Organic Sector\"1. Increasing competitiveness through improvements in productivity, production stability and resiliency with climate extremes and/or quality of product, including: Breeding - Developing/identifying crop cultivars adapted to regional organic management, resilient to pest pressure, adapted to use nutrients efficiently\" and \"Pest (disease) management strategies - with an emphasis on prevention, for cereal crops (e.g. fusarium head blight, rusts etc.)\"Another identified area of Priority Research will be addressed: \"Improving quality of organic products through improved nutritional value through management practices and cultivar selection\", achieved through the step-wise improvement of the nutritional quality of the developed organically-suited milling oat cultivars. Increases in nutritionally beneficial soluble fibre (β-glucan) and protein content will be made. Developing disease resistant cultivars for organic oat production will also improve public good and environment health will be improved through reducing or eliminating fungicide use to combat disease in non-resistant cultivars.  **2019-2020 Report Executive Summary**  **Objectives**  Development of milling quality oat cultivars suitable for organic production in western Canada, and potentially across Canada  Description: Development of milling quality oat cultivars suitable for organic production in western Canada, and potentially across Canada  Outcome: Oat cultivars that perform well under organic management systems  Performance Summary: (Partially Met)  Report March 2020 OT8007 was not put forward for Request for Support after discussion between the breeder and the Industry Funding partner. OT8008 was advanced to a 2nd year of testing in the 20WCORT and in the 2020 BORG. OT8010 was entered into the 20WCORT. AAC Oravena is now being reported on insured acres in western Canada, so it will be exciting to discover how it performs for the producers. AAC Kongsore is still in the Certified Seed development process.  Successful Preliminary Organic Trials were grown at 4 sites in 2019, including Carman and Glenlea, MB (organically managed) and Lacombe, AB, and Brandon, MB (conventionally managed). in spite of the extremely dry spring and growing season, followed by excessive moisture and cold during the ripening and harvest seasons in the western areas, the trials were productive. Disease pressure was lower, but selections will be advanced to the next year of testing in 2020.  Successful B Organic Yield Trials (BORG) were grown at 9 organically managed sites across western Canada, as well as in disease nurseries at Morden. Twenty-five Lines and checks were screened for milling quality traits. Sixteen entries in this test were selections from the Participatory Plant Breeding (PPB) Project. Data were utilized to determine which lines would be advanced to the next year of testing in 2020. Five of the PPB lines will be tested again in 2020. One line from AAFC will be advanced to the 2020 WCORT (OT8010)  Potential Future Success:  If any of the 5 PPB lines continue to perform well in 2020, they could be advanced for testing in the WCORT, and potentially could be proposed for registration in a few years.  2019-20 field work deliverables:   1. **Parents selected, and Crosses made among lines showing better performance under organic management, with germplasm exhibiting increased resistance to diseases.**   Crossing was carried out during the summer of 2019, to incorporate slow-rusting and crown rust resistance genes into AAC Oravena and AAC Kongsore, as well as some other high-performing breeding lines. The F1 progeny from these crosses were increased in the 19-20 NZ winter nursery. Crossing was also carried out during the winter of 2019-2020, with more crown rust resistance genes being added (top crosses) to AAC Oravena and AAC Kongsore.   1. **Inheritance and pyramiding of resistance genes followed in progeny (at various filial generations) with pathogens and molecular markers.**   This work continued in 2019, with progenies being evaluated in field disease nurseries as well as in seedling tests carried out in the greenhouse.  Molecular markers continue to be discovered and utilized to make selections for breeding lines carrying the desired genes.   1. **Progeny from the crosses evaluated for performance in artificially inoculated disease nurseries.**   **This work continued in 2019-2020, with progenies being evaluated in field disease nurseries as well as in seedling tests carried out in the greenhouse.**  Advanced breeding lines were tested in disease nurseries coordinated by the pathologists at Morden.   1. **Progeny evaluated under organic management**   Early generation breeding lines were advanced in the 2019 Early Generation Organic Nursery grown at Carman, MB under organic management. Panicles were collected at random from the most advanced generations, threshed individually and sent to New Zealand for increase in the 2019-2020 winter nursery. Lines selected in New Zealand would normally have been returned to Canada in March 2020, for planting in the 2020 Preliminary Organic Yield Trials, under both organic and conventional management.   1. **Advanced selected lines evaluated in single replicate yield trials. Data collated, analyzed and selection decisions made.**   The 2019 Preliminary Organic Yield Trials had 145 entries, and were grown under organic management at Carman and Glenlea, and under conventional management at Brandon and Lacombe. Data were collected for agronomics, physical quality, nutritional quality and disease reactions. Eleven selections were advanced to the 2020 BORG Trial.   1. **Advanced selected lines evaluated in yield trials (B Organic Yield Trial aka BORG) and associated disease nurseries. Data collated, analyzed and selection decisions made.**   The 2019 BORG had 16 breeding lines selected from the Participatory Plant Breeding Project and 2 lines from the Organic Oat Breeding project. Five of the PPB lines were selected to be tested for a second year in the 20BORG, 1 of the lines from the Organic Oat Breeding project will be utilized as a crossing parent, and the other line was selected to advance to testing in the 20WCORT as OT8010.   1. **Superior Lines (possibly 1 or 2) evaluated in the WCORT and associated disease and quality testing. Data collated, analyzed and selection decisions made.**   OT8007 was not put forward for request for support at the 2020 PGDC meetings. OT8008 was selected for a second year of testing in the 20WCORT.  **Milestones**  Organic Oat Breeding  Activity: Organic Oat Breeding / Oat cultivars specifically developed for organic production systems in Canada  Milestone / Deliverable: Field Tour  Progress Summary: (In Progress)  March 2020 Report. A field tour was held at Swift Current, SK July 26, 2019, hosted by Dr. Myriam Fernandez, and several Organic Organizations in Saskatchewan. Several people, including industry funding partners and producers attended. Dr. Mitchell Fetch presented an update on the lines being tested in the BORG trial located there.  A field tour was also held at the conventional site at Brandon, MB August 8, 2019, hosted by Dr. Mitchell Fetch, which funding partners and producers also attended. The wheat breeder and oat breeder, plus several of the technical staff spoke, in general, about the breeding programs, and the plots and nurseries that were being observed. These people also responded to comments and questions from the attendees. There were no formal (ie. Titled) presentations made. ~80 attendees.  Organic Oat Breeding  Activity: Organic Oat Breeding / Oat cultivars specifically developed for organic production systems in Canada  Milestone / Deliverable: Meeting with Industry Partner  Progress Summary: (In Progress)  Report March 2020. Representatives of the main industry funding partners attended the annual meeting held near Winnipeg, MB January 30, 2020, where they received reports on performance of both conventionally developed and organically developed breeding lines. Decisions were made on which lines to advance to the next level of testing. A follow-up teleconference February 4, 2020 was utilized to make decisions on which lines to advance within the testing system. The organically developed breeding line, OT8008, will be tested for a second year in the 2020 WCORT, and OT8010 will be advanced from the 2019 BORG and tested for its first year.  Organic Oat Breeding  Activity: Organic Oat Breeding / Oat cultivars specifically developed for organic production systems in Canada  Milestone / Deliverable: Annual Report  Progress Summary: This Annual Report is being submitted on time to the funding partners to fulfill this Deliverable. |

**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?

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| Report April 2020.  1. The NIR machine being utilized at the Cereal Quality Lab in Winnipeg was repaired and returned in January 2020, but because it cannot be repaired again, according to the manufacturer, a request to replace the equipment was put on the 2020-2021 AAFC Equipment call. It is hoped that unspent funding from the 2019-2020 fiscal year can be utilized to purchase this essential piece of equipment prior to the 2020 harvest season. The cost for contracting this work out would be prohibitive. Both the conventional and organic breeding programs depend on the availability of an NIR.  2. The Covid-19 Pandemic, which required the closure of all AAFC Centres on March 17, 2020 (and later closure of the University of Manitoba, and many other collaborators’ sites) is presenting numerous issues, concerns, and uncertainties……will staff be able to/feel safe to return to work in a timely fashion to prepare for spring planting, will planting happen, and so many other concerns. Scientific activities have been deemed “non-critical”. It could take potentially up to 10 years to realize the damaging effects of this current situation, especially if planting cannot occur in a timely fashion in late April/early May.  3. In January 2020, the Project Lead agreed to delay retirement until July 30, 2020, and the replacement breeder was finally hired Feb 6, 2020. However, the outgoing breeder leaves for vacation as of April 1 2020, so the overlap will be ~2 months. This is not ideal. |

**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.

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| AAC Oravena is just coming onto the certified acreage in western Canada. It will be interesting to see if it can garner a good percentage of the organic oat acres in the next few years. |

**Annex A**

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| **Performance Measures Table** | |
| **Performance Measures** | **Description** |
| 1. Number of highly qualified personnel (HQP) working on funded activities | 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.  For each reported HQP, please provide the following: the name of the student, level of degree, field of study and name of the institution. |
| 2. Training/knowledge transfer events |  |
| 2.1. Number of training/knowledge transfer events organized | 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.  Annual General Meetings do not normally qualify for this category as they are considered to be part of normal day-to-day business.  For each reported item, please provide the following: name of the event, name of the organizer and organization, location, and year/month/day. |
| 2.2. Number of presentations made in training/knowledge transfer events | This includes oral presentations and poster presentations at events that are not organized by the recipient, for example conferences, symposiums or training events.  For each reported item, please provide the following: name of presenter, title of presentation, name of the event, location, and year/month/day. |
| 3. Number of participants at training/knowledge transfer events | This includes individuals who attend the events listed and who may use that knowledge in the future. |
| 4. Number of new knowledge transfer products developed | New knowledge could include, but is not limited to:  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.  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.  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. |
| 5. Number of papers published in peer reviewed journals | 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.  For each reported item, please provide the following: author(s), year of publication, article title, title of journal, volume (issue), and page number(s).  If the item is a book or a book chapter, add name of publisher.  If the item is an article for conference proceedings, add title of published proceedings, location, and year/month/day. |
| 6. Number of new technologies (new products, practices, processes and systems) that are developed | A new technology could include, but is not limited to:  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.  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.  New practices are new agronomic techniques or methods that can be applied directly by producers.  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.  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.  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.  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.  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. |
| 7. Number of new technologies (new products, practices, processes and systems) that are assessed under research conditions | See the definition of new technologies under #6.  Are assessed: when new technologies are evaluated or tested under research conditions.  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.  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. |
| 8. Number of new technologies (new products, practices, processes and systems) that are demonstrated on-farm or in-plant | See the definition of new technologies under #6.  Are demonstrated: when new technologies are presented to the sector by experiments, prototypes, examples or pilot on-farm or in-plant.  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.  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. |
| 9. Number of new technologies (new products, practices, processes and systems) that attain Intellectual Property (IP) protection | See the definition of new technologies under #6.  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).  For each new variety, please provide the registration number, the variety name and year/month/date. |
| 10. Number of new technologies (new products, practices, processes and systems) that are utilized | See the definition of new technologies under #6.  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.  Gene sequences, breeding lines and populations are not eligible under this category.  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. |