

Canadian Agri-Science Cluster for Horticulture 3



Update to Industry

2019-2020

Activity title: Development of All-Male Asparagus Hybrids with Improved Traits
Name of Lead Researcher: David Wolyn, University of Guelph
Names of Collaborators and Institutions: Mary Ruth McDonald-University of Guelph, Travis Banks-Vinland Research and Innovation Center
<p>Activity Objectives (as per approved workplan): Overall, the activity has seven objectives to be completed over five years. In 2019/20, three objectives were addressed:</p> <p><u>FY 2019-2020</u></p> <p>(A) Breeding</p> <ul style="list-style-type: none"> • Plant breeding nursery • Identify new parents and make hybrid crosses • Plant hybrid trial • Evaluate previous hybrid trials • Produce small quantities of seed for grower strip trials <p>(B) Purple spot (Stemphyllium) pathology (M.R. McDonald)</p> <ul style="list-style-type: none"> • Initiate development of inoculation protocol and test on asparagus spears and plants under controlled environment systems <p>(C) Winterhardiness – Seedling de-acclimation</p> <ul style="list-style-type: none"> • Complete first replicate experiment to assess dormancy and de-acclimation in germplasm
<p>Research Progress to Date (use plain language):</p> <p>(A) Breeding All aspects of the breeding program progressed in the 2019/20 fiscal year. Crosses for new hybrids (65) and germplasm development (63) were completed, and seed was collected from 143 superior male plants for supermale development. All will be planted in the field in the spring of 2020. New trials were planted in the spring of 2019 from crosses made in 2018; these included 79 new hybrid combinations planted in preliminary trials, and 80 germplasm crosses planted in the breeding nursery. Seed was produced of five select, new hybrids for grower strip trials.</p>

In 2019, several yield trials were evaluated, including three advanced and three preliminary. Advanced trials assess those hybrids identified as superior in preliminary trials. In the advanced assessments, several hybrids are showing commercialization potential, including UG028, UG031, and UG030. The best are improved approximately 14-34% for marketable yield and up to 10% for percent marketable yield (a measure of quality) compared to the standard, Guelph Millennium.

In preliminary trials, the first evaluation of new genetic combinations, several hybrids showed improved traits compared to the standard. The three trials evaluated were in the first, second and third full harvest seasons. For hybrids in the second and third years of harvest, improvements for marketable yield and percent marketable yield ranged 50-100% and 10-30%, respectively, compared to Guelph Millennium. For the newest preliminary trial in the first full harvest season, the best hybrid was improved 32% for yield with similar quality to the control; additional harvest years are necessary to validate the magnitude of the improvements.

Overall, the breeding program has been advanced with new parental selections and hybrids for evaluation, and the identification of new, improved hybrids compared to the standard, Guelph Millennium in both preliminary and advanced yield trials.

(B) Purple spot (*Stemphyllium*) pathology

Field assessments for purple spot were conducted in the spring of 2019; a bioassay was also tested to determine resistance under controlled conditions. Due to the environment in the field, low levels of infection were observed, where most cultivars had 1 lesion per spear and one had 3.5. These levels are insufficient to assess resistance or use for correlations with results of the bioassay.

For the bioassay, measurable levels of infection were achieved. Although some isolates responded differently in the assay, consistent patterns of infection were observed among the cultivars. Guelph Millennium and Eclipse had similar lesions numbers that were higher than those for Jersey Giant and Gijnlim. The bioassay should be repeated, and compared with multiple years of field observations for validation.

(C) Winterhardiness – deacclimation.

Two experiments are in progress to investigate dormancy release and freezing tolerance in asparagus cultivars with different adaptation to Ontario. The project has been delayed for several months but results will be forthcoming in the next report.

Extension Activities (presentations to growers, articles, poster presentations, etc.):

D. Wolyn, Asparagus Breeding, Annual Asparagus Research Meeting Nov 12, 2019, Guelph, ON

D. Wolyn, Asparagus Winterhardiness, Asparagus Farmers of Ontario Annual Meeting March 3, 2019, Delhi, ON

G. Austin, Purple Spot Disease Annual Asparagus Research Meeting, Nov 12, 2019, Guelph, ON

George Austin, Dave Wolyn and Mary Ruth McDonald, 2019, Developing a Bioassay to Identify Resistance to Purple Spot in Asparagus, Annual meeting of the Southwestern Ontario Regional Association of the Canadian Phytopathological Society, Nov. 1, 2019, Simcoe ON

George Austin, Dave Wolyn and Mary Ruth McDonald, 2019, Developing a Bioassay to Identify Resistance to Purple Spot in Asparagus, Ontario Pest Management Conference, Nov. 5, 2019, Guelph ON

Early Outcomes (if any) or Challenges:

Promising hybrids have been identified in preliminary trials and will be advanced to multi-location trials.

Several hybrids with improved characteristic were noted in advanced trials.

A bioassay show promise for controlled purple spot evaluations but field validation is required.

Challenges:

1. Purple spot assessment in the field is dependent on weather and strength of assessments can vary from year to year.
2. The graduate student project is behind schedule due to his personal circumstance, which have now been resolved.

Key Message(s):

- Breeding is making progress to develop new hybrids.
- Early results to develop a bioassay for purple spot are promising.

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