

OPERATING PROCEDURES

OF THE

ONTARIO CEREAL CROPS COMMITTEE

FOR THE

ASSESSMENT OF CANDIDATE VARIETIES

Revision date: November 1, 2018

Effective November 1, 2018

Also available on www.gocereals.ca

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1.0 INTRODUCTION

This document outlines the pre-registration testing system protocol and evaluation process for The Ontario Cereal Crops Committee (OCCC) which is recognized as a Recommending Committee by the Variety Registration Office (VRO) of the Canadian Food Inspection Agency (CFIA). The OCCC evaluates candidate varieties of wheat, oats, barley, spelt, triticale, rye and buckwheat for merit as a part of pre-registration requirements and makes recommendations for registration to the VRO for Ontario province of Canada. The procedures for entering a variety for testing are documented and reviewed annually by the OCCC, and are available to the public, upon request to the Secretary of the committee.

As required by the *Seeds Regulations* paragraphs 65.1 (1) (e) and (2) (c), each Recommending Committee shall function transparently and deal with varieties in a fair and consistent manner.

1.1 Legislation and Authority

The *Seeds Act* is the legislative authority for the *Seeds Regulations*. In section 65.1 of the *Seeds Regulations* (Appendix I) there is a provision for the Minister of Agriculture and Agri-Food to approve crop-specific variety registration recommending committees. **The purpose of each recommending committee is to establish and administer protocols for testing varieties of crop kinds listed in Parts I (e.g. wheat, oats, barley, triticale, rye and buckwheat) and II of Schedule III of the *Seeds Regulations*, to determine the merit of varieties of crop kinds listed in Part I and, subsequently, to make registration recommendations to the Registrar, VRO.** In practice, the Minister's authority to approve each RC is delegated to the Registrar (currently the National Manager, Seed Section, CFIA).

These committees are integral to the variety registration system in Canada and serve to provide expertise and guidance to the Registrar.

1.2 Role of the Variety Registration Office

The VRO reviews and approves each committee's operating procedures document annually. Any changes to this document require approval by the committee members and subsequent approval by the VRO. The VRO issues an annual approval letter, signed by the Registrar on behalf of the Minister to each variety recommending committee in Canada. This letter recognizes the committee as the sole authority in that region to provide variety registration recommendations to the VRO for the year.

The VRO has regulatory oversight of the recommending committees to ensure that the committees are functioning transparently and that varieties are dealt with in a fair and consistent manner, in accordance with the approved committee operating procedures and in compliance with the *Seeds Regulations*. The VRO provides guidance on the requirements of the *Seeds Act* and the *Seeds Regulations* to all the recommending committees as required. The committees provide their expertise and advice to the VRO, and this is considered by the Registrar in rendering a decision on variety registrations.

The VRO (the Registrar) is also the ‘court of last resort’ for stakeholders taking issue with the compliance of the recommending committees with the MOPs, or the *Seeds Regulations*, the first step being to contact the committee itself with the grievance.

The list of all current, recognized recommending committees can be found on the following CFIA website at:

<http://www.inspection.gc.ca/plants/variety-registration/registration-procedures/recommending-committees/eng/1359958262947/1359958370983>

2.0 THE ONTARIO CEREAL CROPS COMMITTEE

2.1 Mandate, Objectives, Roles and Responsibilities

The mandate of the OCCC is:

- to determine merit¹ criteria to be used in evaluating candidate varieties (as defined in the *Seeds Regulations*, Appendix 2),
- to establish practical and science-based test protocols,
- to develop a written procedures manual, and
- to evaluate trial data to determine the merit of candidate varieties of crop kinds for which they are recognized.

The OCCC has no registration recommending authority outside of Ontario province of Canada for which it is recognized.

The objective of the OCCC is to recommend for registration, based on merit and in accordance with the approved committee operating procedures, candidate varieties to the VRO for all types of wheat, barley, oat, spelt, triticale, rye and buckwheat.

The roles of the Ontario Cereal Crops Committee (OCCC) are to:

- Act as the recommending committee for cereal variety registration in Ontario. As a CFIA recognized recommending committee, the OCCC’s tasks include:
 - Understanding and following the Seeds Act and CFIA guidelines regarding registration of cereal varieties.
 - Set variety registration protocols and minimum standards for support of registration including agronomic performance, quality, disease reaction, and check varieties.
 - Evaluate sponsor generated and supplied data to determine adherence to protocols
 - Advise CFIA on merit based candidate variety recommendations;
 - To ‘support’ candidate for registration in Ontario
 - To ‘do not support’ candidate for registration in Ontario

¹ “merit” means, with respect to a variety, that the variety is equal or superior to appropriate reference varieties with regard to any single characteristic or combination of characteristics that renders the variety beneficial for a particular use in a specific area of Canada

2.2 Membership

The OCCC is comprised of voting members from organizations in the public and private sectors with an interest in cereal production and utilization. (See also Appendix 3.) The voting representatives are named by the respective organization and recognized by the committee. The term of membership for a voting member can be renewed upon a simple majority vote of the OCCC.

The Chair and Vice-Chair of the OCCC are elected by the voting members at the Annual Meeting held each January. The Chair and Vice-Chair must be members of one of the organizations which comprise the membership of the OCCC. The Treasurer and Secretary may be either elected or hired positions.

OCCC Executive (non-voting members, 2 year terms)

- Chair
- Past Chair
- Vice Chair
- Secretary
- Treasurer

OCCC Voting Members (one vote each)

- Agriculture and Agri-Food Canada
- Canadian Seed Trade Association
- Grain Farmers of Ontario
- Ontario Agri Business Association
- Canadian National Millers Association
- Ontario Ministry of Agriculture, Food and Rural Affairs
- Ontario Seed Growers Association
- Ontario Soil and Crop Improvement Association
- University of Guelph

Ex-officio Non Voting Member

- Canadian Food Inspection Agency
- Canadian Grain Commission

OCCC Coordinators (non-voting, 2 year terms)

- Performance Trial Coordinator
- Disease Coordinator(s)
- Quality Subcommittee Chair
- Winter Wheat, Triticale, and Spelt Registration Coordinator
- Spring Wheat, Triticale, and Spelt Registration Coordinator
- Barley Registration Coordinator
- Oat Registration Coordinator
- Data Coordinator

OCCC has three committees (see also Appendix 3)

- Quality Subcommittee
- Appeals Committee (the executive)
- Confidentiality Committee

Eligibility for Membership

Additional members that represent a sector of the value chain or area of expertise not currently represented on the OCCC may be added to the committee via a simple majority vote,

An organization may apply for membership on the OCCC by submitting a written request to the Secretary of the OCCC, outlining the area of expertise/interest of the organization, why it believes that area of interest is not currently represented on the OCCC and why it believes that it is the organization best suited to representing that area of interest.

2.3 Meetings

The OCCC regularly meets in January, August and October. Other meetings may be held as required and may be conducted by conference call or via internet/email. In the absence of the Chair, the Vice-Chair shall preside.

Principle Meeting topics:

January: consider registration support requests from sponsors; review production topics and policy or procedural matters; receive reports from member organizations
August: review and discuss winter cereal trial data and protocols for the upcoming year
October: review and discuss spring cereal trial data and protocols for the upcoming year

Other topics related to the cereal industry may be discussed at any OCCC meeting when necessary

All interested parties are welcome to attend and participate in meetings of the OCCC at the discretion of the meeting chair.

A \$20.00 fee to attend OCCC meetings may be charged to cover costs.

2.4 Voting Procedures

A minimum of fifty percent of the voting Committee membership must be in attendance to constitute a quorum. Only designated voting committee members may vote. In the absence of a member organization's named representative, another member of that organization may be granted voting privileges for that meeting. Over fifty percent of the voting members present must vote in the affirmative for a motion to be carried. A secret ballot may be requested by any member for any motion, with approval of a majority of the members present. The Committee has adopted Sturgis' Rules of Parliamentary Procedures.

2.5 Voting Options

There are only three possible voting options for committee members:

- 1) To **support** (the motion),
- 2) To **object** to (the motion) or, rarely,
- 3) To **abstain** from voting.

Abstaining is only appropriate if there is a real or perceived conflict of interest. A lack of suitable data is not a valid reason for abstaining from voting on variety recommendations.

2.6 Waiving of Rules

The OCCC may in its wisdom choose to set aside the existing rules for merit assessment for specific variety where the overall merit of the variety is being considered. A simple majority vote is required to suspend or waive rules.

Applicants can request that the committee set aside the rules to consider the merit of a variety that otherwise has failed to meet the standard in one or more required characteristics. The OCCC may take the vote on a variety by variety basis or they may choose to lump all such varieties together and take a single vote for the group. For this to proceed, a simple majority vote must be held to set aside the rules. The committee will then hear the applicant's request (a presentation of the attributes of the variety and why it should be considered) followed by a registration recommendation vote based on a simple majority. For example, a new and valuable technology has been introduced in an otherwise partially deficient variety and the committee is being asked to make a decision on the new, valuable attributes not yet captured in the definition of merit for that crop kind. In this example, the proponent may be requesting interim registration or a full registration. As another example, if the minimum data set or minimum merit performance are lacking due to extenuating circumstances, the committee may choose to take this into account.

2.7 Conflict of interest (with respect to voting on the committee)

If a variety proponent believes that a conflict of interest is responsible for their variety not being recommended by the committee, their recourse is to file an appeal with the committee and present their case.

3.0 REGISTRATION TRIAL PROCEDURES

3.1 Cultivar Evaluation Procedures

Cultivar evaluation trials may be conducted by either public or private research facilities. All candidate cultivars for registration are to be tested under an approved standard procedure for field crop production and data collection as set by the OCCC (see document OCCC Trial Methods and Procedures Appendix 11). These procedures are reviewed annually. Failure to comply with OCCC procedures may result in the exclusion of data from consideration for support of registration.

3.2 Crop Coordinators

Registration Coordinators are appointed by the OCCC. Coordinators aid the committee in setting merit criteria for respective species (e.g. merit trait standards and testing protocol). Crop coordinators check and report on data submissions received from variety sponsors. They report on

registration requests and determine if all requirements for registration as set forth in the “operating procedures document” have been met (including disease, quality and agronomy). Coordinators present a list of variety registration support requests to the OCCC for voting at the January meeting. For the list of crop coordinators, refer to Appendix 3.

3.3 Testing Sites

For Registration Trials, sponsors are responsible for site locations, subject to OCCC approval. There must be at least 20 km between sites in any one growing area, except where significant differences in growing environment are demonstrated (e.g. extreme differences in soil type or disease pressure). At least, one third of the registration data must come from “independent sites” (i.e. trials not managed by the sponsor) for conventional (non-restrictive) registration support.

All grain harvested in registration tests by test co-operators conducting registration trials for themselves or others must be retained until December 1 of the current year, and preferably until the next year’s crop is sown.

3.4 Inspection of Trials

For registration tests, sponsors must inform OCCC crop species coordinators of the location and other appropriate information of sponsor-run trials by May 31. Inspection of registration trials will take place for probationary growers only and only for a period of three years. Inspections will be done by an OCCC appointed inspection team which is to be composed of at least three persons, of whom at least two-thirds must approve acceptability of the test. Each test site for the probationary grower will be inspected as soon after heading as possible to confirm that each test is being conducted in an acceptable manner and is acceptable for uniformity of stand, pests, fertility and other agronomic characteristics.

Probationary growers must provide detailed maps and directions showing test location, along with a detailed sketch of the location itself, showing where the test is located within the field. A randomization plan must also be provided. A sign clearly visible from the road must be posted. If the inspectors cannot find the test in a reasonable period of time or cannot reach it, the test will not be inspected.

3.5 Registration Categories

The committee has three primary registration options to consider when recommending a variety:

- (1) National registration (non restrictive)
- (2) Interim registration (restrictive)
- (3) Contract registration (restrictive)

Based on the result of the trials, the committee will provide recommendations to the CFIA as follows:

- That they ‘support’ or ‘do not support’ candidate varieties for registration
- That they ‘object’ or ‘do not object’ to the National registration of a variety: Some varieties of certain crop kinds (e.g., wheat) may be desirable in one region but could be deemed to be a threat to crop production in other regions. In this case, the VRO consults recommending committees other than the committee that supported the variety to see if they object or do not object to the National registration of the variety being recommended.

3.5.1 National registration (non restrictive)

Candidate varieties which have merit, as determined by the committee, will be recommended for registration. By default, all variety recommendations from a recommending committee are for National registration. After the committee's recommendation and during the variety registration process, other regional committees that exist for that same crop kind will be contacted to see if they have any objection to the National registration of the variety. An objection by another RC (same crop, different region) can only be based on the candidate variety being assessed as a potential harm to a given crop sector in a given region of Canada (e.g., due to disease susceptibility or to significantly inferior end use characteristics). As a result, a restricted National registration (a regionally restricted registration) may be applied by the Registrar (e.g., a PRCWRT recommended wheat variety being restricted from being grown in Quebec by the Atelier des Céréals, Quebec's cereal RC, on the basis of Fusarium susceptibility).

3.5.2 Interim registration (restrictive)

The committee may consider a recommendation for Interim registration in situations where, after a minimum of one year of testing, the data indicates that a candidate has sufficient merit that it may be eligible for registration. This provision is intended to be used in situations such as:

- (a) where a variety proponent brings forward an innovative variety with (a) valuable characteristic(s) not necessarily captured in the merit assessment, viewed as being of benefit to the crop sector and worth bringing to the market quickly. It may be slightly deficient in one or more merit characteristics but its attributes outweigh its deficiencies. Normally such a variety would be considered for interim registration and concurrent (continued) testing for the purposes of full registration;
- (b) where a variety demonstrates outstanding merit after the one year of testing. The committee has the option, if they deem it appropriate, of considering the variety for interim registration and further, concurrent testing for the purposes of full registration; and
- (c) where a variety is brought forward that is deficient in one or more merit criteria, but the proponent has evidence (presented to the committee) of commercial interest in an identity preserved (IP) production program between the developer and an end user (this can be a tool to allow a variety to establish a niche market in a closed loop system).

Interim registrations are typically recommended for three years initially and would normally involve a condition of generating new data to be brought back to the committee during that time frame in order to support either a request for recommendation of National registration or an a request for extension of the Interim registration up to a total maximum of 5 years.

The registrant has the option of coming back to the committee and making a request for an extension of Interim registration for an additional one or two years but the total cannot not exceed five years. They do this by submitting the full data package to the committee including data collected since registration. Interim registrations expire after their designated term.

Reference: **68.** (2) (a), *Seed Regulations*

(2) The Registrar shall make the registration of a variety subject to the following terms and conditions, where applicable:

(a) in the case of a variety of a species, kind or type of crop that is listed in Part I or II of Schedule III, if a minimum of one year of testing demonstrates that the variety may be eligible for registration but that further testing is required before a final decision can be rendered, the registration shall be limited to an initial period of not more than three years that shall be extended on written request by the applicant if eligibility for registration continues to be demonstrated, but under no circumstances shall the total duration of the registration exceed five years;

3.5.3 Contract registration (restrictive)

Contract registration is available for candidate varieties where biochemical or biophysical characteristics distinguish them from the majority of registered varieties of the same kind or species. Further, it must be shown that these characteristics may cause **harm toward varieties registered for traditional commodity markets**. For example, high erucic acid rapeseed although valuable, is a threat to the integrity of canola production. Another example is canola quality mustard as a threat to the integrity of mustard production. To qualify for Contract registration, the owner/sponsor of the variety must demonstrate the possibility of industry harm if granted an unrestricted registration. Contract registration is only a possibility for varieties that may cause harm based on agronomic performance, disease reaction or end-use quality, not based on socio-economic factors. The determination of whether a variety has the potential to cause harm is a scientific process where it is determined whether the variety has the potential to have an adverse effect on the identity of other registered varieties of that crop kind or if the variety or progeny thereof may be detrimental to human or animal health and safety of the environment. As a general rule, Contract registration is not to be used as a substitute for traditional forms of registration (National or Interim) in situations where the committee has objected to the registration of the candidate variety based on deficiency in merit. However, the committee may suggest that the candidate be considered for Contract registration where there is rationale to do so.

Reference: **68.** (2) (c) (i to iv) of the *Seed Regulations*

(c) where the biochemical or biophysical characteristics of a variety distinguish it from the majority of registered varieties of the same kind or species and it may have an adverse effect on the identity of those registered varieties, the registrant shall

(i) establish and maintain a quality control system for the management of potentially adverse effects of the variety, including management responsibility, contract review, product identification and traceability, inspection, testing, control of nonconforming product, corrective and preventive actions, records and training of personnel,

(ii) describe the quality control system in a document and submit the document and any subsequent amendments to that document to the Registrar for review and approval,

- (iii) implement the quality control system, and
- (iv) agree in writing, for the purpose of verifying compliance with subparagraph (iii), to provide the Registrar with information relating to the distribution, use and disposition of any seed of the variety or any progeny thereof.

3.6 Support Requirements

To exhibit merit, a variety must be equal to or better than designated check variety (ies) for the identified agronomic, disease or quality traits. (See Appendix 9 for the list of current checks.)

All foreign varieties and breeding lines must be tested under their original designations or breeder's code.

Also see Section 4.0 – Registration Support Protocol

3.6.1 Support for “Plant With Novel Traits” Varieties

A PNT (Plant with Novel Trait) must be approved for unconfined release before being planted in registration trials and before support for registration can be considered.

When a request is made for OCCC support for registration of a variety carrying a PNT, the sponsor must inform the OCCC at the time of request for support that the variety is a PNT and also reveal the modified trait to the Committee. All other requirements for registration support must be met as outlined below.

3.6.2 Data Requirements For Registration Support of Candidate Cultivars of Winter Wheat, Spring Wheat, Oats, Barley - National (Non-Restrictive) (see below for Spelt, Buckwheat, Triticale, Rye or Durum)

- a) **Agronomy and disease:** Cultivar sponsors must provide the OCCC with evidence that their candidate cultivar(s) is/are adapted to the growing conditions that normally prevail in the intended areas of Ontario. Evidence under this category is to be obtained from plots grown in Ontario (***see note below**) and includes:
 - yield (10 station yrs, minimum crop 2 years, 4 rep trials)
 - number of days to heading (minimum 2 station-years)
 - 1000 kernel weight (minimum 2 station-years)
 - weight per volume (minimum 2 station-years)
 - lodging resistance (minimum 2 station-years)
 - winter survival (for winter cultivars; minimum 2 station-years)
 - disease data for specific crops (see Section 3.10) and Appendix 6 & 7) Fusarium below.

Current check varieties are listed in Appendix 9.

* **NOTE:** Data from Canadian sites immediately adjacent to Ontario may be accepted by the OCCC on an individual basis. They must meet all OCCC requirements. A minimum of 8 station-years in Ontario and two from such outside tests will be acceptable for registration purposes.

Reaction to Fusarium for wheat

For registration purposes, a minimum of 4 station-years of inoculated test data from 2 crop years are required for both winter and spring wheat. The level of infection of the variety representing the S/HS check must be moderate to severe for the data to be considered valid. (see Appendix 6 & 7 for specific wheat support requirements).

- b) **Quality:** Candidate cultivar(s) of winter wheat and spring wheat must fit into the quality requirements of the cereal industry in Ontario. Data should be provided from a minimum of six station-years planted over two years with a minimum of two station-years per year. The OCCC uses the Quality Subcommittee Guidelines (Appendix 8) as the template to define:
- 1) the category to which a line belongs,
 - 2) the checks pertinent to the category,
 - 3) the quality traits that have to be monitored and the performance in relation to the checks.

The Quality Subcommittee annually reviews the quality data of candidate wheat varieties and advises the OCCC of its assessment of their quality in relation to the check cultivars. (See Appendix 8).

Quality is not a merit consideration for support of registration by the OCCC for crops other than wheat. Recommended quality targets for oats are listed in Appendix 8 solely for the guidance of variety sponsors.

3.6.3 Data Requirement for Registration Support of Candidate Spelt Cultivars - National (Non-Restrictive)

Cultivar sponsors must provide the OCCC with evidence that their candidate spelt cultivar(s) is/are adapted to the growing conditions that normally prevail in the intended areas of Ontario.

Evidence under this category is to be obtained from plots grown in Ontario and includes:

- yield (4 station years, minimum 2 crop years)
- report all agronomic data collected including: number of days to heading, 1000 kernel weight, weight per volume, lodging resistance, winter survival (where applicable) and disease data.

All data may be generated by sponsor.

Tests (checks and candidate cultivars) with C.V.s for yield greater than 16% in a four-replicate test may not be included in the means for yield. Even if yields are not used in the mean, other data must be presented. A test shall consist of OCCC designated checks (Appendix 9) and any number of candidate cultivars, with at least four replications planted.

All tests need not contain the same candidates.

Reaction to Fusarium for spelt:

Inoculated test data from a minimum of 4 station-years of inoculated test data from 2 crop years are required. The level of infection of the variety representing the S/HS check must be moderate to severe for the data to be considered valid.

The level of resistance of the candidate cultivar to FHB, based on both visual assessment of symptoms, and deoxynivalenol (DON) must be equal to or better than the worst of the MS check(s). (Appendix 7)

Fusarium inoculum used in evaluating Ontario cultivars must be a mixture of isolates representative in pathogenicity of the pathogen populations occurring in Ontario as shown by reaction of designated inoculation check(s) All fusarium data must be reported.

3.6.4 Data Requirement for Registration Support of Candidate Buckwheat Cultivars - National (Non- Restrictive)

Cultivar sponsors must provide the OCCC with evidence that their candidate buckwheat cultivar(s) is/are adapted to the growing conditions that normally prevail in the intended areas of Ontario. Evidence under this category is to be obtained from plots grown in Ontario and includes:

- yield (4 station years, minimum 2 years; see Section 4.0)
- report all agronomic data collected, to include: number of days to flowering and/or maturity, 1000 seed weight, weight per volume, lodging resistance, disease data. (flowering defined as 3 flowers visible on 75% of plants; maturity defined as 70% brown seed)

Conventional registration of buckwheat (non-restrictive):

- 1) Merit testing - arithmetically compared to check variety as environmental index only.
- 2) Minimum of four station-years of data
- 3) Minimum of two years testing, at least two tests in any one year, if only two years of data are presented.
- 4) All data may be generated by sponsor.
- 5) Variety AC Manisoba to be used as comparative check variety for yield.

Data from all tests must be presented in summary form for all traits measured. All the replication data for all traits measured must be made available to the OCCC upon request.

Tests (checks and candidate cultivars) with C.V.'s for yield greater than 16% in a four-replicate test may not be included in the means for yield. Even if yields are not used in the mean, other data must be presented. A test shall consist of OCCC designated checks (see Appendix 9) and any number of candidate cultivars, with at least four replications planted. All tests need not contain the same candidates.

3.6.5 Data Requirement for Registration Support of Candidate Triticale Cultivars (Spring and

Winter) – National (Non-Restrictive)

Cultivar sponsors must provide the OCCC with evidence that their candidate triticale cultivar(s) is/are adapted to the growing conditions that normally prevail in the intended areas of Ontario. Evidence under this category is to be obtained from plots grown in Ontario and includes:

- 1) Merit testing - yield (minimum 4 station years, minimum 2 tests per crop year; arithmetically compared to check cultivar(s) as environmental index only; (see Section 4.0).
- 2) Report all agronomic data collected including: number of days to heading, 1000 kernel weight, weight per volume, lodging resistance, winter survival (where applicable) and disease data.
- 3) All data may be generated by sponsor.
- 4) For winter triticale cultivars, the soft winter wheat check cultivars will be used as comparative check cultivars for yield until a registered winter triticale cultivar is designated as a check by the OCCC. For spring triticale cultivars, the spring wheat check cultivars will be used until a registered spring triticale cultivar is designated as a check by the OCCC.

Tests (checks and candidate cultivars) with C.V.s greater than 16% in a four-replicate test may not be included in the means for yield. Even if yields are not used in the mean, other data must be presented. A test shall consist of OCCC designated checks and any number of candidate cultivars, with at least four replications planted. All tests need not contain the same candidates.

Reaction to Fusarium for Triticale: inoculated test data from a minimum of 4 station-years of inoculated test data from 2 crop years are required. For registration purposes, candidate triticale cultivars must be compared with at least the following spring or winter wheat check cultivars:

- one check from S/HS (susceptible to highly susceptible) category,
- one check from MS (moderately susceptible) category and
- one from MR (moderately resistant) category.

For the data to be considered valid, the S/HS check variety must have a moderate to severe level of infection. Representative checks for each category are provided in Appendix 6 & 7.

The level of resistance of the candidate cultivar to FHB, based on both visual assessment of symptoms, and deoxynivalenol (DON) must be equal to or better than the worst of the MS check(s).

Fusarium inoculum used in evaluating Ontario cultivars must be mixture of isolates representative in pathogenicity of the pathogen populations occurring in Ontario as shown by reaction of designated inoculation check(s) (as per Disease Coordinator). All fusarium data must be reported.

Reaction to Ergot for Triticale: For registration purposes, ergot counts should be done on candidate lines, only if present and presented on a scale of 0-9. The level of ergot infection must be equal to or less than that of the checks.

3.6.6 Data Requirement for Registration Support of Candidate Durum (Spring and Winter) Cultivars - National (Non-Restrictive)

Cultivar sponsors must provide the OCCC with evidence that their candidate durum cultivar(s) is/are adapted to the growing conditions that normally prevail in the intended areas of Ontario. Evidence under this category is to be obtained from plots grown in Ontario and includes:

- 1) Merit testing - yield (minimum 4 station years, minimum 2 tests per crop year; Report all agronomic data collected including: number of days to heading, 1000 kernel weight, weight per volume, lodging resistance, winter survival (as appropriate) and disease data.
- 2) All data may be generated by sponsor.
- 3) Letter from miller requesting a pilot run for milling.

Tests (checks and candidate cultivars) with C.V.s greater than 16% in a four-replicate test may not be included in the means for yield. Even if yields are not used in the mean, other data must be presented. A test shall consist of OCCC designated checks (see Appendix 9) and any number of candidate cultivars, with at least four replications planted. All tests need not contain the same candidates.

Reaction to Fusarium for durum wheat: inoculated test data is required from a minimum of 4 station-years of inoculated test data from 2 crop years minimum 3 reps per test).

Winter Durum: For registration purposes, candidate winter durum wheat cultivars must be compared with at least the following winter wheat checks:

- one check from S/HS (susceptible to highly susceptible) category,
- one check from MS (moderately susceptible) category and
- one check from MR (moderately resistant) category.

The variety representing the S/HS check must have a moderate to severe level of infection. Representative checks for each category are listed in Appendix 7.

The level of resistance of the winter durum candidate cultivar to FHB, based on both visual assessment of symptoms, and deoxynivalenol (DON) must be equal to or better than the worst of the MS check(s).

Spring Durum: For registration purposes, candidate spring durum wheat cultivars must be compared with at least:

- Hallmark spring durum
- one wheat check from S/HS (susceptible to highly susceptible) category,
- one wheat check from MS (moderately susceptible) category and
- one wheat check from MR (moderately resistant) category.

Representative checks for each category are listed in Appendix 6.

The level of resistance of the spring durum candidate cultivar to FHB, based on both visual assessment of symptoms, and deoxynivalenol (DON) must be equal to or better than Hallmark.

Fusarium inoculum used in evaluating Ontario cultivars must be a mixture of isolates representative in pathogenicity of the pathogen populations occurring in Ontario as shown by reaction of designated inoculation check(s). All fusarium data must be reported.

3.6.7 Data Requirement for Registration Support of Candidate Rye Cultivars (Spring and Winter) – National (Non-Restrictive)

Cultivar sponsors must provide the OCCC with evidence that their candidate rye cultivar(s) is/are adapted to the growing conditions that normally prevail in the intended areas of Ontario.

Evidence under this category is to be obtained from plots grown in Ontario and includes:

- 1) Merit testing - yield (minimum 4 station years from 2 crop years, minimum 2 tests per year;
- 2) Report all agronomic data collected including: number of days to heading, 1000 kernel weight, weight per volume, lodging resistance, winter survival (where applicable) and disease data.
- 3) All data may be generated by sponsor.

Tests (checks and candidate cultivars) with C.V.s greater than 16% in a four-replicate test may not be included in the means for yield. Even if yields are not used in the mean, other data must be presented. A test shall consist of OCCC designated checks and any number of candidate cultivars, with at least four replications planted. All tests need not contain the same candidates.

Reaction to Fusarium for Rye: inoculated test data from a minimum of 4 station-years of inoculated test data from 2 crop years (minimum 3 reps per test) are required. For registration purposes, candidate rye cultivars must be compared with at least the following winter or spring wheat check cultivars:

- one check from S/HS (susceptible to highly susceptible) category,
- one check from MS (moderately susceptible) category and
- one check from MR (moderately resistant) category.

For the data to be considered valid, the S/HS check variety should have a moderate to severe level of infection. Representative checks for each category are provided in Appendix 6 & 7.

The level of resistance of the candidate cultivar to FHB, based on both visual assessment of symptoms, and deoxynivalenol (DON) must be equal to or better than the worst of the MS check(s).

Fusarium inoculum used in evaluating Ontario cultivars must be mixture of isolates representative in pathogenicity of the pathogen populations occurring in Ontario as shown by reaction of designated inoculation check(s) (as per Disease Coordinator). All fusarium data must be reported.

3.7 Security of Unregistered Cultivars

All persons and institutions conducting agronomic, disease and quality trials on behalf of the

OCCC agree to abide by the “Code of Ethics for Plant Breeders and Co-operators Conducting Cultivar Evaluation Trials in Canada” as detailed in Appendix 5).

3.8 Seed Requirements For Registration Tests

Seed of all candidate cultivars is to be provided untreated unless agreed upon by sponsors and indicated by the species trial coordinator. Decisions to treat seed and seed treatments to use are made year-by-year and differ for each crop kind. All varieties in a trial must be either treated or untreated. Where seed is treated it should be done so in accordance with best practices and in full observance of all manufacturers’ recommendations. Treated seed must be labelled to indicate the treatment used.

3.9 Check Cultivars

Check cultivars should be of a least Certified #1 seed standard and be provided by the sponsor, at no cost, from the same seed lot to all co-operators.

Check cultivars are reviewed annually and are selected from the best varieties commercially available in Ontario. (See Appendix 9.) Some varieties may be checks only for special features or agronomic traits. The checks against which a candidate variety is compared may change during the testing life of the registration candidate. (See Section 4.3a)

3.10 Agronomic Methods and Data Collection

The crop production methods of the test should generally follow those for the crop as recommended in the OMAFRA Publication 811, Agronomy Guide for Field Crops, except as specified in the document “OCCC Trial Methods and Procedures” (Appendix 11).

Special tests may be run in parallel to the main sponsor registration tests for testing cultivars in specialized regimes (e.g. Intensive Cereal Management).

Data collection should be done by generally accepted practices except as specified in the document “OCCC Trial Methods and Procedures”. Disease data should be collected when diseases are present. All disease data must be presented.

The harvested area per replication shall consist of at least 2 rows, each at least 2.5 metres long with a maximum of 30 centimetres between rows.

3.11 Analysis of Data

All yield data should be subjected to statistical analysis. Normally, tests are not rejected on the basis of coefficients of variation (C.V.’s) alone. A C.V. greater than 16% for a four-replicate test (for checks and candidates) or its equivalent for tests with fewer replications is to be considered with caution on the use of the data. All test data (reps) must be available to the OCCC (see Section 4.0).

3.12 Submission of Data

Sponsor-generated data for non-restrictive registration purposes must be sent to the appropriate species coordinator(s) of the OCCC no later than two weeks prior to the January meeting date.

Data from all tests must be presented in summary form for all traits measured. All the replication

data for all traits measured must be made available to the OCCC upon request.

If there are problems with submissions (protocol or merit), coordinators will advise sponsors who must have their final requests to all OCCC and Quality subcommittee members at least one week prior to the January meeting date (see section 4.0 for support request protocol and dates for all registration categories - conventional non-restrictive, and contract restrictive). Submissions for support received after the above deadlines will not be considered, unless the committee agrees to waive the deadline in response to a request from the sponsor. Role of coordinators can also be found in sections 4.0.

4.0 REGISTRATION SUPPORT PROTOCOL

4.1 Voting Procedures

Candidate cultivars that meet protocol and merit requirements will be voted on in a block or slate by a show of hands. Species Coordinators review the agronomic performance of candidate varieties, while Quality and Disease Coordinators report on the acceptability of candidate varieties from his/her perspective. Those that meet most registration requirements but are flagged with a weakness(es) that in the Committee's judgement may adversely impact Ontario agriculture may also be pulled out of their respective block or slate and voted on separately. Any member may have a candidate removed from a block for separate consideration. Cultivars that fail to meet the merit requirements will be removed from the block and considered and voted upon separately. Voting will be by secret ballot.

The sponsor of a cultivar, if a voting member, may vote on a motion supporting the registration of that cultivar.

The OCCC will advise CFIA-VRO of the Committee decision "to support" or "to object to" the registration of the cultivar.

A motion: ***"to support"*** indicates that the cultivar is judged to be of benefit to Ontario agriculture based on Ontario generated data.

"to object to" is only used when there is a potential for harm to a market. Documentation must be provided to sponsor and VRO (e.g. disease epidemic potential).

4.2 Duration of Committee Support

Once a variety is supported by OCCC, the sponsoring individual or organization may apply to CFIA for registration. CFIA requirements to successfully register a variety can be found at http://www.inspection.gc.ca/active/netapp/regvar/regvar_lookupe.aspx

Submission of registration to CFIA may be deferred until January 20, two (2) years after support from OCCC. After this date, committee support for the variety expires. The sponsor can request an extension to registration support to complete the application process to CFIA, if desired.

4.3 Requirements for National Registration (Non-Restrictive):

- a) Merit testing – the average relative yield² in t/ha across all trials of the candidate variety must be arithmetically equal to (2 significant figures), or better than, the mean of the relative yields of the agronomic checks designated for yield. A candidate with lower yield may be acceptable if it is superior in some other significant characteristic so that it would fill a need not being met by existing registered cultivars.
- b) Minimum of two years testing, with at least two tests in any one year, if only two years of data are presented.
- c) Minimum of ten station-years planted, with a minimum of eight station-years of yield data, allowing for two test failures.
- d) At least one-third of the tests planted, calculated to the nearest test, must come from independent sources. However, if for any reason beyond the control of the sponsor, the data from independent tests are unusable, (e.g. winterkill, or excessive C.V.), the “independent source” requirement for the candidate cultivar(s) shall be deemed to have been met.
- e) Data from all valid tests must be presented in summary form for all traits measured. All the replication data for all traits measured must be made available to the OCCC upon request.
- f) Tests (checks and candidate cultivars) with C.V.’s for yield greater than 16% in a four-replicate test may not be included in the means for yield. When yields are not used in the mean, data for all other traits must be presented. A test shall consist of OCCC designated checks and any number of candidate cultivars, with at least four replications planted. All tests need not contain the same candidates.
- g) Sponsor responsibility - supplying all merit data to the OCCC for registration support, including quality and disease data where applicable, organization of tests and site inspections. Sponsors must submit support requests to species coordinators at least two weeks prior to the January meetings and to OCCC voting members, and the Quality subcommittee, at least one week prior to the January meeting. Proof of ownership (or marketing rights) must be made available to the OCCC if the candidate cultivar was not bred by the sponsor.
- h) OCCC responsibility - designation of agronomic, disease and quality check cultivars and site inspectors, approval of test protocol, designation of number of quality determinations needed for quality support and voting on support requests.
- i) Agronomy, quality and disease protocol and merit requirements are outlined in section 3.6 above for traditional registration support.

4.4 Requirements for Contract Registration (Restrictive):

(Also see Section 3.5)

Contract registration is used to allow the orderly and legal sale, in Ontario, of cereal varieties with market related uniqueness, where the biochemical or biophysical characteristics of candidates distinguish them from the majority of registered varieties of the same kind or species AND where they would have adverse affects on the identity of those registered varieties. Sponsors may wish to use this category to register candidates that would pose harm to the

² Relative yield is calculated by dividing the yield of a candidate line or check by the mean yield of the currently designated yield checks in each trial.

marketplace if pursued in a non-restrictive manner. **Parts c), d) and e) of the support request below may be achieved in a confidential manner* as described in section f).**

- a) Identification and ownership: Sponsor must provide species, name or experimental number and proof of ownership or market rights if sponsor is not original breeder.
- b) Agronomic merit: Sponsor must provide data from four station-years of yield trials from a minimum of two years. All tests can be sponsor derived. Tests must include appropriate checks and although comparative yields must be reported, no set yield level need be reached. All comparative data for measured traits must be reported.
- c) Uniqueness: Sponsor must state market related uniqueness.
- d) Market or end use: Sponsor must identify end user and show proof of end user's acceptance and intention to purchase seed or grain produced under contract. This demonstrates end user merit.
- e) Harm:
 - i. Sponsor must show harm that candidate would cause if registered in a non-restrictive manner.
 - ii. Sponsor must demonstrate a closed system of production and marketing to be followed that includes:
 - 1. Material sent to end user
 - 2. Material in excess of end user's requirements
 - 3. Material below end user's requirements
 - 4. Material retained for seed but in excess of requirements
 - iii Sponsor must provide Fusarium data for wheat (as per Section 3.6 and Appendix 6 or 7)
- f) * **Confidentiality protocol:** Uniqueness, market or end use and harm sections (other than Fusarium data) of a contract registration request may be pursued in a confidential manner with the Confidentiality Subcommittee. Decisions will be made by consensus. Refer to Appendix 2 for the structure of the Confidentiality Committee.
- g) Request support dates: If confidentiality is requested, the sponsor must notify the chair and secretary of the OCCC at least three weeks prior to the January meetings. The Confidentiality Subcommittee will be organized and ready to accept the confidential sections at least two weeks prior to the January meetings by which time the sponsor must supply the required information. . The OCCC voting members must receive the public part of the documentation at least one week prior to the January meeting as per sponsor responsibility in 4.2).

NOTE: The variety registration office may have additional requirements to fulfill before contract registration is granted. Please consult VRO "Procedures for the Registration of Crop Varieties in Canada" at the following web address
<http://www.inspection.gc.ca/english/plaveg/variet/proced/procede.shtml>

4.5 Interim Registration

"Interim Registration" is defined as a registration for an initial three-year period, unless, less time is requested. Renewals of interim registration (one year) are permitted to a maximum of 5 years. Interim registration may be used for all registration categories. (Also See Section 3.5)

4.6 CFIA requests to the OCCC for decisions on regional restrictions for the region of Ontario -regarding cereal varieties which were recommended by other CFIA recognized recommending committees

The Committee shall respond to the CFIA as to whether or not they have an objection to the national registration of a given cereal variety. The committee has the option of objecting thereby placing a regional restriction on the national registration of a variety. Cereal varieties considered are of the following crop kinds: winter wheat, spring wheat, durum wheat, rye, spelt and triticale. In order for the candidate cultivar to receive a “do not object” vote, it must not be harmful to crop production in Ontario typically on the basis of either disease reaction. They must meet the OCCC Fusarium Head Blight and deoxynivalenol (DON) requirements as outlined in Section 3.6 or Appendix 6 or 7. If the committee deems that there is potential for harm to Ontario’s cereal industry, OCCC will notify VRO, CFIA that the OCCC “objects” to the national registration.

5.0 APPEALS

5.1 OCCC Appeals Procedure

A sponsor whose cultivar has been rejected by the committee may appeal the decision to the Appeals Subcommittee for reconsideration. Contract and Special Consideration Registration Request Supports pursued in a confidential manner may be appealed in a similar manner. Refer for Appendix 3 for structure of the Appeals Committee.

Successful appeals will be referred back to the full committee for re-consideration.

Appeals may be based on:

1. an error of consequence was made in the data that was submitted.
2. additional information is available
3. the accepted procedure in reviewing the data was not followed.
4. there are any other justifications for an appeal as accepted by the Committee.

5.2 Conflict Resolution

In the event that a stakeholder identifies a situation where the OCCC has failed to live up to the spirit or the letter of the MOPs guidance document, they have recourse to present the issue with a detailed explanation to the Chief, VRO or the Registrar. The VRO has oversight in this area and the Registrar with delegated authority from the Minister of Agriculture and Agri-Food will address any shortcomings, oversight or failure to act in accordance with the MOPs directly with the OCCC in question. The purpose will be to bring the committee into compliance as soon as possible and to correct any wrongs that may have been committed.

One of the roles of the VRO is to monitor OCCC meetings and avoid this type of situation from the beginning. If the VRO observes actions or governance out of compliance with the letter and spirit of the MOPs, the office will work directly with the committee to find a solution to bring the committee back into compliance in a timely manner.

Appendix 1: Authority provided under section 65.1 in the Seeds Regulations

RECOMMENDING COMMITTEES

65.1 (1) The Minister shall approve, for Canada or a region of Canada, a committee to establish and administer protocols for testing the varieties of a species, kind or type of crop listed in Part I of Schedule III, to determine the merit of the varieties and to make recommendations respecting their registration if

- (a) the members of the committee have the knowledge and expertise required to establish and administer testing protocols for varieties of that species, kind or type of crop;
- (b) the members of the committee have the knowledge and expertise required to determine the merit of the varieties of that species, kind or type of crop;
- (c) the testing protocols established by the committee are appropriate for that species, kind or type of crop, are practical and are based on scientific principles;
- (d) the procedures established by the committee for determining the merit of varieties of that species, kind or type of crop are appropriate for that purpose and are based on scientific principles;
- (e) the operating procedures established by the committee will ensure that its functioning is transparent and that varieties are dealt with in a fair and consistent manner; and
- (f) no other committee is approved as a recommending committee for that species, kind or type of crop for Canada or the region.

(2) The Minister shall approve, for Canada or a region of Canada, a committee to establish and administer protocols for testing the varieties of a species, kind or type of crop listed in Part II of Schedule III and to make recommendations respecting their registration if

- (a) the members of the committee have the knowledge and expertise required to establish and administer testing protocols for varieties of that species, kind or type of crop;
- (b) the testing protocols established by the committee are appropriate for that species, kind or type of crop, are practical and are based on scientific principles;
- (c) the operating procedures established by the committee will ensure that its functioning is transparent and that varieties are dealt with in a fair and consistent manner; and
- (d) no other committee is approved as a recommending committee for that species, kind or type of crop for Canada or the region.

(3) In carrying out its functions, a recommending committee must apply the testing protocols it has established, act in accordance with its operating procedures and, in the case of a committee approved under subsection (1), apply the procedures it has established to determine the merit of varieties.

(4) For the purposes of subsections 67(1) and 67.1(1), the recommendation of a recommending committee must be based on the following:

(a) in the case of a species, kind or type of crop that is listed in Part I of Schedule III, the results of testing the variety in accordance with the relevant testing protocols and a determination of whether the variety has merit; and

(b) in the case of a species, kind or type of crop that is listed in Part II of Schedule III, the results of testing the variety in accordance with the relevant testing protocols.

SOR/2009-186, s. 2.

Appendix 2: Eligibility Requirements for Variety Registration

67.1 (1) A variety of a species, kind or type of crop that is listed in Part I of Schedule III is eligible for registration if

- (a) the variety has merit;
- (b) the variety has been tested in accordance with the testing protocols of a recommending committee;
- (c) the recommending committee has made a recommendation respecting registration of the variety;
- (d) the variety or its progeny is not detrimental to human or animal health and safety or the environment when grown and used as intended;
- (e) the representative reference sample of the variety does not contain off-types or impurities in excess of the Association's standards for varietal purity;
- (f) the variety meets the standards for varietal purity established by the Association or these Regulations for a variety of that species, kind or type;
- (g) the variety is distinguishable from all other varieties that were or currently are registered in Canada;
- (h) the variety name is not a registered trademark in respect of the variety;
- (i) the variety name is not likely to mislead a purchaser with respect to the composition, genetic origin or utility of the variety;
- (j) the variety name is not likely to be confused with the name of a variety that was or currently is registered;
- (k) the variety name is not likely to offend the public;
- (l) no false statement or falsified document and no misleading or incorrect information have been submitted in support of the application for registration; and
- (m) the information provided to the Registrar is sufficient to enable the variety to be evaluated.

(2) A variety of a species, kind or type of crop that is listed in Part II of Schedule III is eligible for registration if the requirements for eligibility set out in paragraphs (1) (b) to (m) are met.

(3) A variety of a species, kind or type of crop that is listed in Part III of Schedule III is eligible for registration if the requirements for eligibility set out in paragraphs (1) (d) to (m) are met.

APPENDIX 3: STRUCTURE OF THE OCCC

ORGANIZATION

INDIVIDUAL

CONTACT

OCCC Executive (non-voting members)

Chair	AAFC, ORDC	Dr. Gavin Humphreys	gavin.humphreys@agr.gc.ca
Past Chair	Dow AgroSciences	Mr. Mark Etienne	mjetienne@dow.com
Vice Chair	Bramhill Seeds	Mr. Carl Coleman	carl@bramhillseeds.com
Secretary	Employed by OCCC	Mr. David Morris	davidtmorris@rogers.com
Treasurer	RealAgriculture C & M Seeds	Mr. Peter Johnson Ms Ellen Sparry (alternate for signatures)	peter.johnson@bell.net esparry@redwheat.com

OCCC Voting Members (in no particular order)

Agriculture and Agri-Food Canada	AAFC	Dr. Weikai Yan	Weikai.Yan@AGR.GC.CA
Canadian Seed Trade Association	CSTA	Ms. Ellen Sparry	esparry@redwheat.com
Canadian National Millers Association	CNMA	Mr. Peter Worfolk	peter.worfolk@ardentmills.com
Ontario Ministry of Agriculture, Food and Rural Affairs	OMAFRA	Ms. Joanna Follings	joanna.follings@ontario.ca
Ontario Soil and Crop Improvement Association	OSCIA	Mr. Mark Burnham	mburnham@ontariosoilcrop.org
Ontario Seed Growers Association	OSGA	Ms. Sarah Fretz	sarah@cribit.com
Grain Farmers of Ontario	GFO	Mr. David McEachren	mceachrenfarms@aol.com
Ontario Ag Business Association	OABA	Mr. Andy Wilder	awilder@parrishandheimbecker.com
University of Guelph	U of G	Dr. Ali Navabi	anavabi@uoguelph.ca
Ex-officio Non-voting Member			
Canadian Food Inspection Agency	CFIA	Dr. Sima Vyas	sima.vyas2@canada.ca
Canadian Grain Commission	CGC	Dr. Bin Xiao Fu	Binxiao.fu@grainscanada.gc.ca

ORGANIZATION	INDIVIDUAL	CONTACT
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OCCC Quality Subcommittee

Chair (Tradition Fine Foods)	Mr. Luke Hazlett	luke.hazlett@tradition.ca
Vice Chair (U of Guelph)	Dr. Jayne Bock	Jebock@uoguelph.ca
Past Chair (ADM Milling)	Ms. Sheilagh Arney	Sheilagh.arney@adm.com
Secretary (non-voting)	Mr. David Morris	davidtmorris@rogers.com
Ardent Mills	Mr. Peter Worfolk	peter.worfolk@ardentmills.com
Canadian Grain Commission	Dr. Bin Xiao Fu	Binxiao.fu@grainscanada.gc.ca
Canadian Grain Commission	Mr. Daryl Beswitherick	Daryl.beswitherick@grainscanada.gc.ca
Ontario Ag Business Association	Mr. Andy Wilder	awilder@parrishandheimbecker.com
Quaker/Pepsico	Mr. Eric Ouellette	eric.ouellette@pepsico.com
ORDC, Grain Quality Lab	Dr. Lucasz Pietrzak	lukasz.pietrzak@agr.gc.ca
Griffith Foods	Mr. Joachim Baur	jbaur@griffithfoods.com
Cribit Farms	Mr. Craig Martin	craig@cribit.com
P & H Milling	Mr. Sunny Mathew	smathew@phmilling.com
P & H Milling	Ms. Ingrid Coyle	icoyle@phmilling.com
Canadian Seed Trade Assoc.	Ms. Ellen Sparry	esparry@redwheat.com
J C Baking Innovation	Mr. Jim Chen	jim.chen@jcbakinginnovation.com
Kellogg (OCIRC)	Mr. YuLai Jin	YuLai.Jin@kellogg.com
U of Guelph	Ms. Sanaa Ragae	sragae@uoguelph.ca
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OMAFRA	Joanna Follings	joanna.follings@ontario.ca
GFO	Matthew Czerwinski	mczerwinski@gfo.ca

OCCC Crop Coordinators

Performance Testing	Ms. Ellen Sparry	esparry@redwheat.com
Disease - Spring Cereals & Winter Cereals	Dr. Lily Tamburic	ltamburi@uoguelph.ca
Quality Sub-Committee Chair	Mr. Luke Hazlett	luke.hazlett@tradition.ca
Winter Wheat Registration	Ms. Ellen Sparry	esparry@redwheat.com
Spring Wheat Registration	Ms. Ellen Sparry	esparry@redwheat.com
Spring Barley Registration	Dr. Raja Khanal	rkhanal@uoguelph.ca
Winter Barley Registration	Mr. Mark Etienne	metienne@hylandseeds.com

Oat Registration	Dr. Weikai Yan	Weikai.Yan@agr.gc.ca
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Other OCCC Roles

Data Coordinator	Jonathan Brinkman	jbrinkma@uoguelph.ca
OCCC Webmaster		tech_help@gocereals.ca

OCCC Appeals Committee

The Appeals Subcommittee consists of the executive members of the OCCC.

OCCC Confidentiality Committee

The Confidentiality Subcommittee is elected by the OCCC and is comprised of 3 members who do not have potential conflicts of interest and are willing to sign confidentiality agreements. Decisions will be made by consensus.

APPENDIX 4: ROLES AND RESPONSIBILITIES

<u>Roles</u>	<u>Responsibilities</u>
Ontario Cereal Crop Committee	<ul style="list-style-type: none"> Approval of Protocols and Procedures
Registration Crop Coordinators	<ul style="list-style-type: none"> Recommend standards for respective species for registration support protocols Evaluate sponsor generated data for adherence to OCCC registration support requirements and prepare report of candidate lines Coordinate sponsor driven orthogonal tests and provide entry lists to cooperating site operators
Registration Disease Coordinators	<ul style="list-style-type: none"> Recommend standards for respective species for registration support protocols Evaluate sponsor generated data for adherence to OCCC registration support requirements and prepare report of candidate lines
Quality Committee	<ul style="list-style-type: none"> Assesses candidate cultivar(s) to ensure that they fit into the quality requirements of the cereal industry in Ontario.

APPENDIX 5

CODE OF ETHICS FOR PLANT BREEDERS AND CO-OPERATORS CONDUCTING CULTIVAR EVALUATION TRIALS IN CANADA

The mutual interests of all engaged in cultivar development and evaluation are served by the climate which engenders the greatest freedom of communication and exchange of breeding material, while at the same time providing adequate safeguards to the breeder of any material.

It is the desire of all breeding institutions to receive credit for their discoveries and to recognize the discoveries of other institutions, both privately and publicly funded. For this reason, it is recommended that breeders, test co-operators, institutions and companies conducting cultivar trials in Canada subscribe to the following code of ethics:

A. GENERAL

In case of conflict between this code and any provincial or federal legislation such as plant breeders' rights legislation, the legislation would prevail.

B. WRITTEN PERMISSION NOT REQUIRED

Material registered and/or commercially available as a cultivar in any country may be used without the permission of the Breeder, as parental material for making crosses or for induction of mutations, for the purpose of creating other cultivars.

C. WRITTEN PERMISSION REQUIRED

1. Material not registered and/or commercially available as a cultivar in any country may only be used as parental material in a breeding program with the written permission of the breeder.
2. When the repeated use of a cultivar is required for the production of seed of another cultivar, the written permission of the breeder must be obtained. This does not preclude the use of a registered cultivar as a recurrent parent in a back - cross breeding program.
3. Selection within a normally self-pollinated cultivar for the purposes of creating a new cultivar may only be done with the written permission of the breeder.
4. The isolation of parental lines that are present as mixtures in hybrids and any use of them may only be made with the written permission of the breeder.
5. Material not registered and/or commercially available as a cultivar in any country, may not be distributed for purposes other than registration tests, without the written permission of the breeder.
6. Seed multiplication of any unregistered cultivar, for purposes other than for seed stocks for registration trials, may only be made with the written permission of the breeder.

APPENDIX 6:

Requirements Regarding Fusarium Head Blight for OCCC Registration Support of Spring Wheat and Triticale Varieties in Ontario

1. FHB data must be presented from a minimum of 4 station-years of inoculated tests for winter wheat from 2 crop years, 3-4 replicates per station-year.
2. At least one check from S/HS (susceptible to highly susceptible) and one check from either MS (intermediate to moderately susceptible) or R/MR (resistant to moderately resistant) categories needs to be included. The level of infection of the variety representing the S/HS check must be moderate to severe. Representative checks for each category are provided in Table 1. *Checks must be approved by the Ontario Cereal Crop Committee.*
3. The level of resistance of the candidate cultivar to FHB, based on both visual assessment of symptoms, and deoxynivalenol (DON) must be equal to or better than the worst MS check(s).

Candidate cultivars that do not meet or have not been demonstrated to meet the above three requirements would be considered to possess a potential harm to Ontario’s wheat industry.

Representative checks for each category are provided in Table 1.

Table 1. The three categories of FHB resistance in spring wheat and representative cultivars/lines

<u>Category</u>	<u>Preferred Check Cultivars</u>	<u>Acceptable Alternate Check Cultivars</u>
R/MR	AAC Scotia	Alsen, FHB37, HY644, Fuzion
MS	Carberry, Norwell	AC Barrie, AC Brio, AC Helena, Superb, AC Voyageur, Columbus, Quantum, SS Blomindon, SS Fundy, Torka, Celtic
S/HS	Sable	5700PR, AC Foremost, Roblin, AC Vista

APPENDIX 7:

Requirements Regarding Fusarium Head Blight for OCCC Registration Support of Winter Varieties of Wheat, Durum, Triticale and Rye in Ontario

1. FHB data must be presented from a minimum of 4 station-years of inoculated tests for winter wheat from 2 crop years, 3-4 replicates per station-year.
2. At least one check from S/HS (susceptible to highly susceptible), one check from MS (moderately susceptible) and one from MR (moderately resistant) categories needs to be included. The level of infection of the variety representing the S/HS check must be moderate to severe. *Checks must be approved by the Ontario Cereal Crop Committee.*
3. The level of resistance of the candidate cultivar to Fusarium, based on both visual assessment of FHB symptoms and deoxynivalenol (DON) level must equal to or better than the worst of the MS checks.

Candidate cultivars that do not meet or have not been demonstrated to meet the above requirements would be considered to possess a potential to harm Ontario’s wheat industry.

Representative checks for each category are provided in Table 2.

Table 2. The three categories of FHB resistance in winter wheat and representative cultivars/lines

<u>CATEGORY</u>	<u>REPRESENTATIVE CHECK CULTIVARS</u>	
	Soft Winter Wheat, Winter Triticale, Winter Rye	Hard Red Winter Wheat, Hard White Winter Wheat and Winter Durum
MR	Marker, Ava	AC Morley
MS	CM614, 25R46	Priesley
HS/S	DS572SRW, E0028W	AC Sampson

APPENDIX 8: OCCC Quality Guidelines for Registration Support (January 2015)

1. WHEAT – Guidelines are based on grade #1 wheat

Sample Submission for Quality assessment: A 3 kilogram sample of each of the registration candidates (composite of all reps) along with a 3 kilogram sample of each check cultivar must be sent each year for quality analysis. A bulk sample over replications of each candidate and checks from all tests over at least a two year period must be used for quality determinations. For wheat, quality determinations are performed on all samples. The Ottawa Research and Development Centre (ORDC) Quality Lab, Ottawa is currently performing quality evaluations for wheat. Refer to Appendix 9 for deadlines of sample shipments to the Quality Lab. Other quality labs **may** be utilized **if approved** by the OCCC.

A. SOFT: Ontario Soft Winter Wheat (CEWW, CESRW)

CHECK:		Venture (white) Branson (red)
GRAIN:	Test Weight, kg/hl	=>76
	Kernel Hardness	=> 70.0
	Grain Protein %	Mean of checks -0.5 to +1.5
	Falling Number, sec	=> Mean of checks
MILLING (Flour):	Yield, % of grain (corrected to ash)	=> Mean of checks
	Flour Ash	=< Highest Check
	Flour Protein	Mean of checks -0.5 to +1.5
	Protein Difference	< (Mean of checks + 30%)
COOKIE	Spread cm	Mean of checks +/- 0.25
	W/T cm	Mean of checks +/- 0.50
ALVEOGRAM	Pressure (P) mm H2O	Mean of checks +/- 10
	Length	Mean of checks +/- 50
	P/L Ratio	Mean of checks +/- 0.10
	Energy (W), 10E-4J	Mean of checks +/- 15
SRC	Lactic Acid	90 minimum
	Water	54 maximum

B. HARD: Ontario Hard Spring Wheat (CERS, CEHWS)

CHECK:		Norwell and Carberry
GRAIN:	Test Weight, kg/hl	=>78
	Kernel Weight	=> Mean of the checks
	Kernel Hardness	=< Mean of the checks
	Protein	> (Mean of the checks – 1.0)
	Ash Content, %	=< Mean of the checks
	Falling Number, sec	> (Mean of the checks – 10%)

MILLING (Flour):	Yield, % of grain	=> Mean of the checks
	Ash	=< Mean of the checks
	Protein	Mean of the checks +/- 1.5
	Protein Difference	< (Mean of the checks + 30%)
FARINOGRAPH	Absorption	> Mean of the checks – 2.5
	Peak	Mean of the checks +/- 2.5
	Stability	> (Mean of the checks – 1.5)
	MTI	< (Mean of the checks + 10)
RVA DATA	Peak V	> (Mean of the checks – 20%)
BAKE	Loaf Volume	> (Mean of the checks – 50)
OTHER	Starch Damage	< (Mean of the checks + 1)

C. HARD: Ontario Hard Winter Wheat (CEHRW, CEHWW)

CHECK:		AC Morley and Gallus
GRAIN:	Test Weight, kg/hl	=>78
	Kernel Weight	=> Mean of the checks
	Kernel Hardness	=< Mean of the checks
	Protein	=> Mean of the checks
	Ash Content, %	=< Mean of the checks
	Falling Number, sec	> (Mean of the checks – 10%)
MILLING (Flour):	Yield, % of grain	=> Mean of the checks
	Ash	=< Mean of the checks
	Protein	=> Mean of the checks
	Protein Difference	< (Mean of the checks + 30%)
FARINOGRAPH	Absorption	=> Mean of the checks
	Peak	> (Mean of the checks – 1.0)
	Stability	=> Mean of the checks
	MTI	< (Mean of the checks + 10)
RVA DATA	Peak V	> (Mean of the checks – 20%)
BAKE	Loaf Volume	> Mean of the checks
OTHER	Starch Damage	< (Mean of the checks + 1)

D.
DURUM: Ontario Durum Wheat (CESAD, CEWAD)
- Letter of acceptance from end user

OATS

(Quality is not a merit requirement for support of registration for oats)

A. HULLED/COVERED

CHECK:	Bradley and Vitality	
	Plumpness	Minimum 50% plump (% by weight over a 6/64" x 3/4" slotted screen)
OAT GRAIN (with hull)	Test Weight	38 lb/ W bu or 42.5 lb/A bu (53 kg/hL, 245 g/0.5 L) or equivalent to/ greater than check varieties
	Groat %	equal to or greater than quality check, target 73% or higher
	Thin oats	10% maximum through a 5/64" x 3/4" slotted screen lab precision grader
	Kernel Weight	Minimum 30 g / 1000 kernels
MILLING:	Ease of dehulling	Hull moderately easy to remove
	Breakage during processing	Equal to or better than check varieties
	Milling yield	160 pounds maximum to make 100 pounds of finished product
GROAT:	Flavor	Clean characteristic oat flavour
	Color	White to cream
	Protein	13% minimum (as is N x 6.25) or equivalent to check varieties (higher protein content preferred)
:	Groat oil %	7.5 maximum (as is). Lower values are desirable for milling purposes
	Beta-Glucan*	4% minimum (D.B.)
	Total Dietary fibre**	10% minimum (D.B.)

* testing should be completed by Quaker Oats or other Lab using Quaker protocol

** oat as now defined by Health Canada 2010 Web Posting 'Oat Products and Blood Cholesterol Lowering'

B. HULLESS/NAKED

CHECK:	Navaro	
GROAT:	Plumpness	Equal to or better than quality check
	Kernel Weight	For Milling purposes, kernel weight should be similar to groat weight of hulled varieties
	Oil	Equal to or better than quality check
	Protein	Equal to or better than quality check
	Test weight	Equal to or better than quality check
	Hull %	Equal to or better than quality check

APPENDIX 9: OCCC Designated Check Cultivars as of September 2018

	<u>Agronomy & Disease</u>	<u>Quality</u>	<u>Fusarium (inoc)</u>
Oat: covered	AAC Bullet AAC Roskens	Vitality Oscar	
Oat: hullless	Navaro	Navaro	
Barley: 2-row covered	Bornholm Conestogo		
Barley: 6-row covered	HY 621-6R Cyane		
Barley: 2-row hullless	AAC Starbuck		
Barley: 6-row hullless	AAC Azimuth		
Barley: winter	Branson (SRW)		
Wheat: HRS Spring Triticale	Norwell	Norwell, Carberry	See Appendix 6
Wheat: spring durum	Hallmark	letter of acceptance from end-user	Hallmark
Wheat: Winter durum	AC Morley Priesley	letter of acceptance from end-user	See Appendix 7
Wheat: SWW/SRW Winter Triticale	Branson Ava	Venture (white) Branson (red)	See Appendix 7
Wheat: HRW, HWW (Medium and Strong)	AC Morley Priesley	AC Morley Gallus	See Appendix 7
Spelt	Branson		Heritage (MR) Princeton (MS)
Winter Rye - Conventional	Hazlet		See Appendix 7
Winter Rye - Hybrid	Brasetto		See Appendix 7
Buckwheat	AC Manisoba		

APPENDIX 10: DEADLINE DATES

Registration Deadlines:

1. **Site Inspection Requests:** For registration tests, sponsors must notify crop coordinators of trials by May 31 for all crops.

2. **Data Submission**
 - a. Quality Coordinator must send applicable data to the sponsors three weeks prior to the January meeting.
 - b. Disease Coordinator must send fusarium inoculation data to sponsors before the August meeting for fall cereals; for spring cereals - at least three weeks before January meetings.
 - b. Sponsor generated data for unrestricted registration requests must be sent to appropriate species coordinators two weeks prior to the January meeting date and to the OCCC members one week prior to the January meeting date.
 - c. Sponsors asking for confidentiality for restricted registration requests must advise the chair and secretary of the Variety Subcommittee at least three weeks prior to the January meetings, then proceed as per (b) above.

3. **Data Submission to Out-of-Province Crop Committees:** Data should be sent one week prior to their meetings for registration support. Contact the OCCC secretary for names and addresses.

4. **Quality Samples to ORDC Lab**
Soft Winter – September 20; Hard Winter – September 25; Spring Cereals – October 15

5. **Meeting Dates for Registration**
 - Winter Cereals - Usually held in the last week of August - early September to designate checks for registration tests and in January to vote on candidate cultivars.
 - Spring Cereals - Held in January to designate checks and vote on candidate cultivars.

Actual Meeting Dates

Consult Minutes or Agendas of the OCCC or www.gocereals.ca

APPENDIX 11: OCCC TRIAL METHODS AND PROCEDURES

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1.0 GENERAL INFORMATION

1.1 Purpose

This document sets out the approved procedures to be used for growing trials/tests and conducting character assessments as defined by the OCCC.

These procedures apply to all varieties/cultivars of spring and winter cereals in performance and registration trials grown under the auspices of the OCCC.

Trial cooperators who wish to deviate from the following procedures or who are uncertain as to the appropriate course of action must consult with the trial coordinator before making changes.

2.0 AGRONOMY AND DISEASE TRIAL PROCEDURES

2.1 Site Suitability

The Trial/Disease site cooperator will be responsible for providing a suitable location, which meets the following criteria:

- Previous cropping must be appropriate for the cereal crop to be grown.
- Soil type should be typical of those on which cereals are grown locally. Soil fertility, texture and drainage should be uniform across the site. The soil should be sufficiently uniform to avoid variation in the growth of the trial.
- The trial should be sited away from trees, hedges, headlands and other features, which are likely to cause uneven growth or encourage grazing damage from wildlife. If a trial is grown close to a tree line, it is recommended that the distance from the tree line should be at least 1.5 times the height of the trees.
- The trial area should be cultivated in the direction of ploughing and drilled across the direction of ploughing and cultivation such that each plot receives similar wheel compaction. Cultivations should follow best local practice.
- The goal should be to select a site with a phosphorus soil test level of 20 ppm P (Olsen test) or higher and a potassium soil test level of 120 ppm K or higher.

2.2 Sowing the Trial

Trial design/layout: The Performance Trial Coordinator will supply the performance trial and disease site cooperators with the final sowing list and trial design. For Registration trials, design should be RCBD, Lattice, Alpha Lattice or other recognized experimental design. All trials grown for Performance or Registration purposes must be a minimum of 4 replicates.

Plot Size: The harvested plot area per variety must be no less than 3m² per replicate for trials with four replications. The plot width for calculating the harvested area is measured from outer row to outer row, plus half the inter-plot gap on either side. The allowance for the inter-plot gap must be no greater than 0.46 m.

Plant population: The following tables give the required number of viable seeds per square metre to achieve the desired target populations for each crop, after any losses due to poor germination or establishment. Trial operators are responsible for achieving the correct target populations and for

making sure equal number of viable seed is planted in each experimental unit. The following seeding rates are based on OMAFRA recommendations.

<u>Crop</u>	<u>Viable Seeds /m²</u>
Winter Wheat	350-450
Winter Barley	350-400
Spring Wheat	300-400
Spring Barley	250-350
Oats	200-300
Rye and Triticale	200-300

The following formula will be used to calculate the seed rate for a given thousand seed weight: Seed rate (g/plot) = (Viable seeds/m² X Plot Area m² X TKW/1000)/actual % germ

Planting: Plot seeders are to be set up, calibrated and used only when conditions are fit for planting. Care must be taken with drill settings and drilling speed to ensure satisfactory and uniform establishment and plant population from plot to plot. It is also important to ensure that there is no carry over of seed between plots. Precautions must be taken to avoid any missing rows. Any missing rows and/or parts of rows must be noted.

Planting date. Cooperators should plant the winter trials as close as possible to recommended planting date recommendation in the OMAFRA Agronomy Guide for Field Crops (OMAFRA Publication 811). For spring cereals, planting as early as possible is recommended.

2.3 SEED

Seed Quality:

The seed **must meet** the quality criteria (germination, purity, etc.) for Canada Certified #1 under the Canada Seeds Act as a minimum.

Labelling of Seed:

Seed must be labeled appropriately when shipped to cooperators. Seed must be clearly marked with “Entry name”, and “Performance Trial” and “Seed treatment used”.

1000 kernel weight and **germination** must be provided for each entry **at the time of shipment**

The following cultivar information must be provided at the time of entry:

Winter Wheat: hrw = hard red winter; sww=soft white winter; srw=soft red winter
a = awned;

Spring Cereals:

Wheat classes: hrs = hard red spring; efs = eastern feed spring; sd = spring durum; a = awned

Barley classes: 6R =six row; 2R = two row; H = hullless

Oat classes: Y = yellow; W = white; H = hullless

Seed Treatment:

Winter Wheat: Seed must be treated with a registered fungicide that includes difenoconazole for control of soil borne dwarf bunt.

Treatment with a registered insecticide to control European chafer is also recommended, due to presence of the insect at some sites.

Spring Cereals: **All seed must be treated.** Only registered fungicidal seed treatments applied at the rate recommended by the manufacturer are allowed. Samples must be labeled as "*Performance Trial Seed Treated with [chemical name]*" so that the appropriate safety precautions for handling treated seed can be followed.

2.4 HUSBANDRY

Agronomy: The crop production methods for OCCC trials should generally follow those for the crop as recommended in 'OMAFRA Agronomy Guide for Field Crops (Publication 811) and must be reflective of farm practices employed by growers in Ontario.

Fertilizer application: Application of fertilizers should be uniform. It is normally best to apply these perpendicular to the direction of the plots. Application rates should take into account inherent fertility, soil test, previous crop, rainfall, the best local practices, and advisory guidelines found in OMAFRA Publication 811. In winter cereals, supplemental spring nitrogen should be applied at the higher end of the rate for soft wheat and as early as conditions allow safe application with the least chance of damage to the developing crop/plots. Phosphorus and potassium applications should be based on a soil test and OMAFRA recommendation (Pub 811). Cooperators should target to build and/or maintain a phosphorus soil test level of 20 ppm P (Olsen test) or higher and a potassium soil test level of 120 ppm K or higher. Sulphur: A minimum of 10 - 20 kg S/ha must be applied to all wheat trials.

Weed Control: Weeds should be controlled an appropriate, registered herbicide based on the weed population in the field applied according to label recommendations. Application should be perpendicular to the direction of the plots. Rate and timing should be as based on label recommendations.

Insect Control: Registered pesticides should be applied in the event of a severe pest infestation [such as army worm] that threatens the viability of the trial. Application timing, rates and methods should be based on label recommendations.

Foliar Disease Control: Fungicides should **not** be applied on Regular Performance Trials or Inoculated Fusarium trials for control of foliar diseases. Fungicides should be applied on Intensive Management Trials in accordance with the protocols established for those trials and label recommendations.

2.5 HARVESTING

Timing of harvesting: The date of harvesting is to be determined by the respective Trial and Disease Site Operator based on crop maturity and local weather conditions.

Harvest Area: The plot dimensions should be measured prior to harvesting. If it is necessary to reduce the size of any plot at harvest to less than below current OCCC standards, details of the changes should be clearly recorded.

Harvesting method: Plots should be harvested by direct combining and combine settings must be optimal for the crop and harvest conditions.

Samples: A composite sample for each cultivar (minimum of 5 kg) should be retained until January 1 following the crop season to allow for further analysis if required/desired.

It is essential that all samples:

- Are representative of the variety/plot from which they are taken and have minimal contamination
- When sampling on-combine, it is essential to minimise the risk of contamination of grain from the previous plot.
- Are taken from the same source.

All bagged samples must be kept in good condition at a moisture content and temperature appropriate for long term storage. They should be clearly labeled with variety name/breeders reference, Test/Entry ID#, replicate number and Trial/Disease Site location.

2.6 RECORDS

Site Information record: Site details including site location, detailed plot map, outline of agrochemical applications (fertilizer, herbicide; etc.) prior/post seeding should be recorded. If the trial is in good condition, with no problems, this should also be recorded.

Site Character report: All characteristics recorded and their respective means shall be included within the final characteristic report. All yield rep data should be made available for review if requested.

3.0 TRIAL CHARACTERISTICS FOR ASSESSMENT

Procedures for recording Characteristics: The test procedures as outlined in Table 1 below must be followed for measuring characteristics used in assessment. For Performance Trials, characteristics are listed as either mandatory (required, if present) or additional (present at a high enough level to be recorded and/or requested of the site operator by the Trial Coordinator). Additional characteristics may be “added” to the site characteristic report within the “additional characteristics section”. Site Operators are to enter the appropriate characteristic under the appropriate column within the input template.

The following must also be measured or recorded for all trials:

- Sowing Date
- Harvest Date
- Plot Size
- Plant Population (where there are plots in trial with poor establishment)

- Bird Damage (where present at levels that will affect results)
- Stalk Breakage (where present at a level which will affect results)
- Winter survival notes for winter types only

Table 1: Characteristics to be Recorded:

Assessment	Characteristic	Wheat	Barley	Oats	Rye & Triticale
		winter & spring	winter & spring		
Yield	Grain Yield	**	**	**	**
Quality	Hectolitre weight (Test Wt)	**	**	**	**
	Thousand Grain Weight	**	**	**	**
	<i>Protein Content</i>	*			
	<i>Hagberg Falling Number</i>	**			
	<i>Sprouting</i>	*			
Resistance to Disease***	Refer to Section 6.0: Disease Test Procedures for Crop Specific assessments	***	***	***	***
Reaction to Environment	Winter hardiness/survival	*	*		*
	Plant Height	**	**	**	**
	<i>Lodging</i>	***	***	***	***
	<i>Days to Heading</i>	***	***	***	***
	<i>Days to physiological Maturity</i>	***	***	***	***

* Mandatory for all winter cereals if discernable differences are present

** Mandatory

*** Mandatory if discernable differences are present and/or if requested by OCCC Inspection team

Italics = Additional only if requested by the test co-ordinator

4.0 YIELD TESTING PROCEDURES

For the Performance trials, yield shall be listed in T/ha (tonnes/hectare) at two decimal points, at the standard moisture content for the crop when reported to the Data Coordinator. Yields on the individual plot data sheet may be listed in kg/ha (kilograms/hectare) based upon the standard moisture content

Standard Moisture Contents:

Wheat (all types), Rye, Triticale, Spelt: 14.0%

Oats and Barley: 13.5%

Buckwheat: 16%

In some cases, as a result of the inspection and/or the trial site operator's opinion, yield may be supplied but not incorporated into the final report. Yield CV's greater than 16% will come under review, and, after evaluation, may be re-analyzed and missing plots used to offset peculiarities within the data set.

Moisture at harvest may vary according to environmental conditions. All material should be adjusted to the standard moisture content for the crop being reported.

Adjusted Weight @ Std moisture %

= Harvest Weight X (100 - % harvest moisture) / (100 - std moisture %)

Measurements of plots should be taken to ensure that plot yields are relative to all other plots in the trial. If plot yield is based on 3m plots, for a plot 3.5 m yield would be 12% higher than the normal plot. 3m plot yield= ([wt at 3.5m]*3m plot)/3.5 m plot.

5.0 QUALITY TESTING PROCEDURES

5.1 Hectoliter/Test Weight (kg/hl)

Determining test weight: Source: Official Grain Grading Guide 1-1 August 1, 2016

Test weight is the weight of a measured volume of grain expressed in kilograms per hectolitre.

Equipment needed to determine test weight:

- **Ohaus 0.5 litre measure** A cylindrical shaped cup with an inside diameter of approximately 90 mm and a height of approximately 77.5 mm. The measure is calibrated to contain 500 ml of water, ± 1 ml, at 20°C.
- **Cox funnel** A funnel with a 3.81 cm opening and a drop of 4.41 cm, from the opening in the funnel to the top of the measure used to uniformly direct the flow of grain into the 0.5 litre cup.
- **Striker** A piece of round hardwood, 2.2 cm in diameter and approximately 23 cm in length.
- **Scale** Any CGC approved electronic metric scale.
- **Computer interface** For CGC inspection purposes, the electronic scale is connected to a computer which converts the grams in the 0.5 litre Ohaus measure to grams per hectolitre. If the computer interface is not available, the test weight conversion can be done by utilizing charts provided by the CGC Statistical unit.
- **Test weight conversion charts** Used to convert the weight in grams from the Ohaus 0.5 litre measure to kg/hl.

Procedure: Fill the Ohaus measure to overflowing with the grain to be tested. Ensure the slide is inserted into the Cox funnel. Pour the contents of the 0.5 litre measure, plus an extra handful, into the Cox funnel. Place the 0.5 litre measure on a solid base. Position the Cox funnel on top of the 0.5 litre measure so that the notched legs of the Cox funnel fit securely onto the measure's rim. Remove the slide on the Cox funnel quickly so that the grain drops evenly into the 0.5 litre measure. Carefully

remove the Cox funnel from the top of the 0.5 litre measure so as not to disturb the grain. ▲ **Important:** Any jarring of the cup at this point will result in compaction of the grain in the 0.5 litre measure and could produce inaccurate results. Place the hardwood striker on the rim of the 0.5 litre measure and, using three zigzag, equal motions, scalp off the excess the grain in the measure. Pour the grain remaining in the 0.5 litre measure into the scale pan. Determine the weight in grams of the grain in the scale pan. Convert the grams in the 0.5 litre measure to kg/hl.

5.2 TKW Thousand kernel weight (grams)

The weight of a representative 1000 grains at 85% dry matter from a cleaned grain sample is recorded.

Procedure: Select a representative sample of clean grain—250 g minimum. Count a pre-determined number of whole kernels (100-200). Weigh the counted kernels (g). Multiply the weight x 5 (200) or 10 (100) to represent weight of 1000 kernels. A minimum of 2-replicates per test is recommended.

5.3 Protein Content Determination (%)

An approved NIR methodology can be used, provided that the instrument uses reference samples from ORDC and/or the Canadian Grain Commission for the appropriate crops.

5.4 Hagberg Falling Number (sec)

A methodology recognized by the Canadian Grain Commission must be used.

5.5 Sprouting (%)

This must be recorded where present at a level which will affect grain quality.

Determining Sprouting: Source: Official Grain Grading Guide 1-1 August 1, 2016

Grains other than Oats:

Kernels are classified as spouted if one of the following conditions exists:

- Kernels show clear evidence of growth in the germ area. The bran is noticeably split over the germ from apparent growth. The germ is missing and there is apparent greyish discoloration normally attributable to sprouting. The germ, though intact, appears distinctly swollen as a result of sprouting activity.

Sprouting Procedure (% SPTD): Obtain a representative clean sample from the plot for analysis (250 g minimum). Using a Boerner-type divider, divide a representative portion from the 250 g plot sample (Minimum: 10 g; Optimum: 100 g). Separate all kernels showing any evidence of sprouting.

▲ **Important:** For CEWW, unless there is clear evidence of growth, do not count the kernel as sprouted. You may use a 10-power magnifying lens to confirm sprouting activity. For Performance purposes, take the weight of spouted kernel as a percentage of the total sample used. A minimum of two replicates may be required to get a true indication of sprouting within that trial and entries.

$\% \text{ sprouted (SPTD)} = \text{weight sprouted (g)} / \text{weight sample (g)} \times 100$

Oats

For oats, groats must be used for the sprouting determination.

1. Divide representative sample using Boerner or other type divider.
2. Using split of 50 grams, dehull sample using Codema de-huller or other.
 - Codema settings: 100 psi, 2 min. run time.

3. Pick groat sample for Sprout Damage (germ missing).

% Sprout Damage = [weight of sprout damaged groats (g.)] / [weight of hulled groats (g.)] x 100

5.6 Kernel/Groat Content Of (hulled) Oats (% GRT)

Each grain sample tested should be in good condition having been stored at 13.5 % moisture content or less and cleaned according to approved CGC methods (Source: Official Grain Grading Guide 1-1 August 1, 2016).

Simplified hand method: Use this method only if a mechanical huller is not available. The bulk sample (minimum 250 g) of each entry must be thoroughly mixed and divided by quartering, using a Boerner divider, until two 10 gram samples are obtained. Any material other than grain and husk should be removed and discarded. Any free grains found in each sample should be extracted, weighed, and discarded. If the free grain content of the sample is more than 1% of the total, by weight, a note should be taken. Five g of good oats should be retained from each sample for manual de-hulling. The remainder of the sample should be set aside. Each sub-sample should be de-hulled by applying pressure to the base of each grain with the thumb/finger or tweezers. The good kernels and husks should be placed in separate containers and then weighed individually. The mean kernel and husk weights should then be calculated. If the weight of kernel and husk obtained from the two sub-samples differs by more than 1%, then a further sub-sample should be drawn from the original bulk and dehulled. If this is necessary, the final percentage of kernel should be the mean of the three results; otherwise, the final percentage should be the mean of the two sub-sample results.

The mean percentage of kernels (groats) in the samples should be calculated thus:

((Mean weight of kernel (g) / Total mean weight of kernel and husk (g) x 100)

The data should be recorded as % GRT (% Groat Content)

Mechanical method: Two sub samples per entry are de-hulled. The 'fresh' (air-dry) sample is thoroughly mixed and divided by halving until two 25 gram samples are obtained (one for de-hulling and a spare if needed for checking). Any material other than grain and husk is removed and discarded. Dehull sample using Codema de-huller or other.

- Codema settings: 100 psi, 2 minute run time.

After de-hulling separate the de-hulled sample and remove any hulls and un-hulled grain. Check the remaining de-hulled kernel fraction for broken kernels and include in the kernel fraction. Weigh the de-hulled kernel fraction. Kernel content/yield is the weight of the de-hulled kernel fraction expressed as a percentage of: the initial 25 g sample weight minus weight of un-hulled grain.

The mean percentage of kernels (groats) in the samples should be calculated thus:

((Mean weight of kernel (g) / Total mean weight of kernel and husk (g) x 100)

The data should be recorded as % GRT (% Groat Content)

5.7 Moisture Content Determination for Yield

Yield data must be corrected to the standard moisture content for the grain being tested. (See Section 4.0) The moisture content of the harvested plot grain may be measured using one of the three following methods: electronic moisture analyzers, NIR determination, or the oven method.

Measuring equipment must be properly maintained and calibrated on a regular basis and used according to manufacturers' recommendations.

Combine-mounted moisture meters must be specifically manufactured for this purpose. The determination of moisture content must be the same for all plots in a replication. If there is a significant risk of rainfall during the harvesting of a replication, then backup samples should be taken from all plots in a replication to allow comparison through the oven method. Similarly, backup samples should be collected if there is reason to question the accuracy of the electronic measurement.

6.0 DISEASE TEST PROCEDURES - NATURALLY OCCURRING

The Trial/Site Operator is responsible for carrying out these procedures.

6.1 Diseases recorded

There shall be no addition of any fungicide treatment to reduce or inhibit natural infestation, unless directed to do so by the Trial Coordinator. Separate fungicide trials grown in proximity to Performance plots shall be a minimum of 2m from the closest Performance trial plot. Care should be taken to ensure that carryover from spraying plots does not come into contact with their Performance neighbours.

The following diseases must be recorded if differences occur within trials.

	Winter Wheat	Spring Wheat	Winter Barley	Spring Barley	Oats	Rye/ Triticale
Mildew (<i>E. graminis</i>)	√	√	√	√		
Leaf rust (<i>P. triticina</i>)	√	√				
Leaf rust (<i>P. hordei</i>)			√	√		
Stripe rust (<i>P. striiformis</i>)	√	√	√	√		√
Stem rust (<i>P. graminis</i>)	√	√	√	√	√	
Crown Rust (<i>P. coronata</i>)					√	
Septoria leaf blotch (<i>S. tritici</i>)	√	√				√
Septoria avenae blotch (<i>S. avenae</i>)					√	
Glume blotch (<i>S.nodurum</i>)	√	√				√
Scald (<i>R. Secalis</i>)			√	√		
Spot Blotch (<i>C. Sativus</i>)*			√	√		
Net Blotch (<i>P. teres</i>)*			√	√		

Barley Yellow Dwarf	√	√	√	√	√	
Wheat Mosaic Virus	√					
Ergot (<i>C. purpurea</i>)						√

*Although every effort should be made to differentiate between Net and Spot Blotch in field trials, operators may occasionally find it impossible. In this case only, symptoms may be recorded as Blotch (list under SPBL).

Any other pathogenic or physiological disorder should be recorded

6.2 Timing of assessments

At or slightly before GS 31:	Record foliar disease if moderate infections (around 5% or score 3) occur in any plot.
GS31-60:	An assessment of foliar disease is required if moderate infections (around 5% or score 3) develop in any plot.
GS 60-80:	Assess all foliar diseases that reach (5% or score 3) infection in any one plot during this period.

The precise time to rate is best judged by the Trial/Site Operator with regard to the stage and development of disease. It may be appropriate to assess different diseases at different stages within this period (e.g. mildew might be better assessed relatively early and leaf rust late).

6.3 General Assessment Procedures

Disease should be scored according to the rating system described in the OCCC Wheat Disease Guide: (http://www.gocereals.ca/Wheat_Disease_Guide.pdf). Only assess diseases which reach a minimum of 5% (score 3) infection in any one plot. Assess disease in all replicates of the trial. Assess foliar diseases on a 'whole-plot' basis, i.e. make an overall assessment of the average infection on all tillers in a small area of the plot and repeat at a minimum of 4 points in each plot. Do not restrict examination to individual tillers or individual leaves. Where primary foci of high infection occur, these should be averaged over the plot as a whole. For foliar diseases, examine the top 4 leaves. As the lower leaves senescence naturally at later growth stages it will become necessary to examine only the top 3 or 2 leaves or, in the case of very late assessments, the flag leaves alone.

Diseases of Field Crops in Canada is an excellent resource for discerning differences amongst the various diseases. The publication is published by 'The Canadian Phytopathological Society.

7.0 DISEASE TEST PROCEDURES - INOCULATED TESTS FOR FUSARIUM HEAD BLIGHT

The Disease Site Operators are responsible for conducting the tests according to these procedures.

Disease values are to be entered on Characteristic Sheet as:

Fusarium head blight ratings Index (F. graminearum)	FHB
Deoxynivalenol	DON

7.1 Winter and Spring Wheat

Fusarium ear blight (FHB):

Each variety will be assessed for visual symptoms when the early dough stage is reached (ZGS 83). Whole plots will be visually rated for FHB incidence and severity. Incidence is defined as the percentage of spikes that show FHB symptoms (i.e. % infected spikes). Severity is defined as the percentage of infected spikelets in the affected spikes. A Visual Ratings Index (VRI or FHB Index) will be calculated as the % Incidence X & Severity/100 should be calculated for each plot and averaged across the reps.

One of the following two inoculation techniques must be used:

- a) Seed varieties/cultivars will be sown in small plots/rows and spray inoculated with a spore suspension of mixture of *Fusarium graminearum* isolates at 50,000 spores/ml. The plots will be inoculated at -2, 0, +2 days prior to/at/post 100% anthesis and misted.
- b) Seed varieties/cultivars will be sown in small plots/rows and inoculated with two applications of infested barley and corn kernels (*Fusarium* infested grain spawn) about 3 and 2 weeks before anthesis (Zadoks scale 15-30). The grain spawn should be separately inoculated with three isolates of *Fusarium graminearum* and equal volumes of the three isolates should be mixed and used for field inoculation. At each inoculation, approximately 50 g of the infested grain spawn should be scattered evenly by hand between the two rows of each plot. Supplementary watering (sprinkler irrigation) should be applied twice daily for about 0.5 hour each in the morning and afternoon (excluding rain days), starting at the first inoculation with the infested grain spawn and continuing until about 3 weeks after anthesis, when plants were at the soft dough stage.”

DON accumulation in grain (DON ppm):

Deoxynivalenol (DON) content may be estimated from the samples from each plot or by using a composite sample from all replicates of each variety or from the three replicates with the highest mean FHB index. Either a suitable ELISA test or gas chromatography mass spectrometry may be used.

Fusarium inoculum used in evaluating Ontario winter wheat cultivars must a mixture of at least 3 aggressive isolates of *F. graminearum* representative of the pathogenicity occurring in Ontario as shown by reaction on inoculated check(s). A mixture of two isolates of 15-ADON and one or two isolates of 3-ADON is recommended.

8.0 ASSESSMENT PROCEDURES OF TRIAL CHARACTERISTICS IN THE FIELD: SITE FACTORS

Any reactions to the physical environment by the entries in the crop specific trial that affect the yield must be evaluated, as an example physiological fleck.

WINTER SURVIVAL: Winter Crops, 0-100%

To be taken for autumn sown trials. Records should be taken from all plots. At least one record should be taken before the onset of spring growth, even if no damage is observed. Varieties should be scored on a 0-100% scale, where 100% = no damage.

PLANT HEIGHT: all crops, cm rating

Distance in cm from the soil surface to tip of inflorescence, excluding awns. The general height of the plot must be measured from at least one point in the plot chosen at random.

LODGING: all crops, 0-9 rating

The Trial Site Operator should assess lodging at a stage that provides good discrimination between varieties and be prepared to repeat the assessment if further lodging develops. If there is lodging it should be recorded as follows: 0 = no lodging, 9 = whole plot flat on the ground. If lodging does not occur in the trial site, do not report data.

HEADING DATE: all crops

Winter Crops: Julian Days; Spring Crops: Days from Planting

For wheat, rye, triticale and oats, days to heading is defined as when 75% of the plants are at Zadok's 59 - in barley, heading date is recorded as the day when 75% of heads have awns visible. The date should be indicated in Julian days for winter cereals (JAN 1=1), and days from planting for spring cereals. Because the rate at which the crop develops may vary and is dependent on weather conditions, it may be necessary to make daily assessments to determine the full range of heading.

PHYSIOLOGICAL MATURITY all crops,

Winter Crops: Julian Days; Spring Crops: Days from Planting

The date of physiological maturity as when the peduncle color has turned yellow in 75% of the plot. Records for this character should be taken from all yield plots varieties including checks. The date should be indicated as Julian days for winter crops (Jan 1=1) and days from planting for spring crops. Because the rate at which the crop ripens is dependent on weather conditions, daily assessments may be necessary during hot, dry conditions.

BIRD DAMAGE all crops, 0-9 rating

This must be recorded where present at a level which will affect results.

0 = no bird damage, 9 = total decimation of plot. All plots should be assessed.

EMERGENCE PROBLEMS (EMER) – all crops, 0-100%

This must be recorded where there is evidence of poor initial emergence or low establishment (0-100%). 100%=no loss. All plots should be assessed.

STALK BREAK all crops, 0-9 rating

This term refers to buckling of the straw at a point well above ground level. It occurs particularly when the crop has become over-ripe but varietal differences may occur at an earlier stage. 0 = no stalk break

9.0 GROWTH STAGES OF CEREALS

SEEDLING GROWTH

10	first leaf through coleoptile
11	first leaf unfolded
12	2 leaves unfolded
13	3 leaves unfolded
14	4 leaves unfolded
15	5 leaves unfolded
16	6 leaves unfolded
17	6 leaves unfolded
18	8 leaves unfolded
19	9 or more leaves unfolded

TILLERING

20	main shoot only
21	main shoot and 1 tiller
22	main shoot and 2 tillers
23	main shoot and 3 tillers
24	main shoot and 4 tillers
25	main shoot and 5 tillers
26	main shoot and 6 tillers
27	main shoot and 7 tillers
28	main shoot and 8 tillers
29	main shoot and 9 or more tillers

STEM ELONGATION

30	Ear at 1 cm
31	1st node detectable
32	2nd node detectable
33	3rd node detectable
34	4th node detectable
35	5th node detectable
36	6th node detectable
37	flag leaf just visible
39	flag leaf ligule/collar just visible

BOOTING

41	flag leaf sheath extending
43	boots just visibly swollen
45	boots swollen

- 47 lag leaf sheath opening
- 49 first awns visible

INFLORESCENCE (EAR EMERGENCE)

- 51 First spikelet of inflorescence just visible
- 52 1/4 of inflorescence emerged
- 55 1/2 of inflorescence emerged
- 57 3/4 of inflorescence emerged
- 59 inflorescence completed

ANTHESIS

- 60 beginning of anthesis
- 61
- 64 anthesis half-way
- 65
- 68 anthesis completed
- 69

MILK DEVELOPMENT

- 71 caryopsis watery ripe
- 73 early milk
- 75 medium milk
- 77 late milk

DOUGH DEVELOPMENT

- 83 early dough
- 85 soft dough
- 87 hard dough

RIPENING

- 91 caryopsis hard (difficult to divide by thumb-nail)
- 92 caryopsis hard (can no longer be dented by thumb-nail)
- 93 caryopsis loosening in daytime

Reference: Tottman D R, Broad H (1987) Decimal Code for the Growth Stages of Cereals Annals of Applied Biology 100, 683-