PRAIRIE GRAIN DEVELOPMENT COMMITTEE

Prairie Recommending Committee for Oilseeds (PRCO)
Operating Procedures

(March 2011)

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Introduction

This document outlines the evaluation and testing system operated by the Prairie Recommending Committee for Oilseeds (PRCO). *Appendix A* contains definitions. *Appendix B* and *Appendix C* describe the operating procedures for the registration of a condiment mustard cultivar and a flax cultivar, respectively, for production in Western Canada. Information for PRCO members is incorporated into a companion document, *General Information Concerning Membership in the Prairie Recommending Committee for Oilseeds (PRCO)* of the Prairie Grain Development Committee (PGDC), which is available to PRCO members in the password-protected section on the PGDC website (www.pgdc.ca), under the "Committee: Oilseeds" link.

1. Objectives

The PRCO is responsible for the testing and evaluation of candidate cultivars of condiment mustard [*Sinapis alba* L. (yellow mustard) and *Brassica juncea* (L.) Czern. and Coss. (oriental and brown types)] and flax (*Linum usitatissimum* L.), for registration in Canada. The PRCO mandates are:

- To establish guidelines and define criteria for the recommendation of potential cultivars of condiment mustard and flax for registration by the Variety Registration Office (VRO) of the Plant Production Division, Canadian Food Inspection Agency (CFIA);
- To co-ordinate and conduct trials and characterize the phenotype of potential cultivars of condiment mustard and flax as per the operating procedures developed by the PRCO and approved by the VRO;
- To specify relevant reference cultivars as standards for agronomic, quality and disease resistance traits of candidate cultivars of condiment mustard and flax;
- To determine whether condiment mustard and flax candidate cultivars have merit relative to the standard and to recommend such candidate cultivars to the VRO;
- To act as a forum for exchange of information relevant to the development of improved cultivars of condiment mustard and flax for Canada;
- To advise Canadian regulatory agencies on issues concerning condiment mustard and flax grown in Canada.

2. Guidelines for Committee Operation

The PRCO Operating Procedures are reviewed at least every three (3) years and updated as required by the membership of the PRCO. Operating Procedures are valid pending approval by a ⅔ majority of the PRCO membership in attendance at the annual meeting of the PRCO and recognition by the VRO.

Appendices to the PRCO Operating Procedures are reviewed and updated on an annual basis, or as required, to reflect new markets, technologies, races of pathogens or testing in new environments.

Appendices to the PRCO Operating Procedures include unique procedures for condiment mustard (*Appendix B*) and flax (*Appendix C*) that govern the conduct of Co-operative tests, collection of data and the measurement of traits of interest for each crop species.

2.1 Membership and Structure

The membership of the PRCO consists of individuals actively engaged in the research and development, production, marketing, commercialization and processing of commodities or end-use products of condiment mustard or flax grown in Canada. Members are recognized for their technical and/or scientific expertise for a specific crop, or the end-use products derived from the crop species within the PRCO. Members will participate on one (1) of the Evaluation Teams (Breeding, Agronomy and Production Evaluation Team, Disease Evaluation Team, and Quality and End-Use Evaluation Team) that will best benefit from their expertise. All PRCO members will vote on motions and/or resolutions at the meetings of the PRCO and its committees.

Membership on the PRCO is reviewed annually by the Membership Committee and is subject to approval by the PRCO at the annual meeting. The Membership Committee consists of a member from each of the Evaluation Teams and is chaired by the PRCO Secretary. The PRCO Secretary may request the participation of additional PRCO members. The Membership Committee reviews the membership list, receives requests for new members and sponsored members, and presents recommendations for new members as well as recommendations on membership issues to the PRCO members at the annual meeting.

All applications for new membership in the PRCO must be received by the PRCO Secretary at least seven (7) days prior to the annual meeting. PRCO members in good standing can nominate new members by forwarding the name(s), affiliation(s), and co-ordinates of the nominee(s), and written justification describing the expertise of the nominee(s), to the PRCO Secretary who will communicate the information to the Membership Committee for review.

If the nomination(s) is supported by the PRCO Membership Committee, then the PRCO membership in attendance at the annual meeting will vote on the nomination(s). New member(s) will have voting status effective April 1 following the annual meeting.

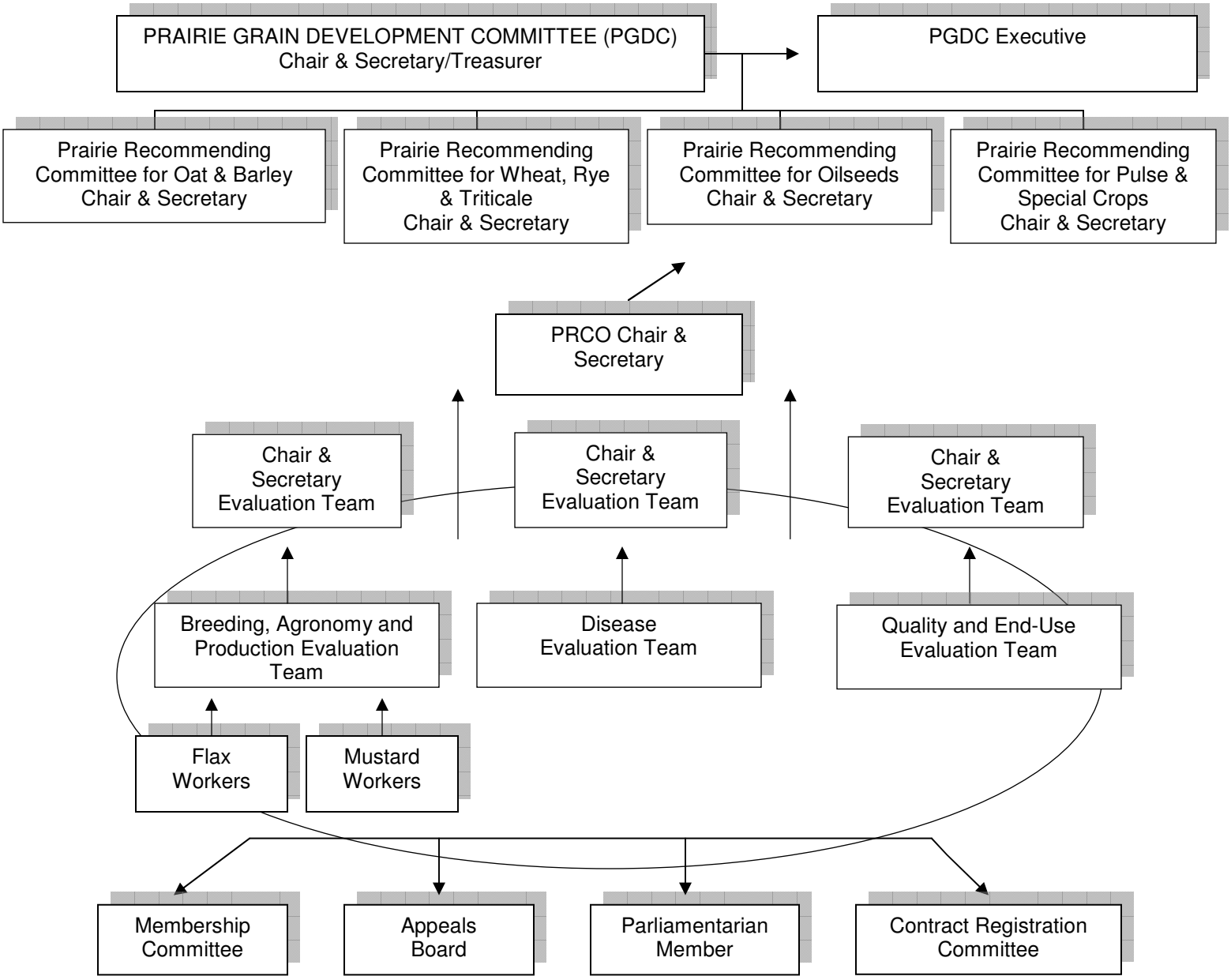
In the case of members representing the seed trade, producer organizations, and provincial governments (sponsored members), the identity of the sponsored member shall be requested in writing by the PRCO Secretary at least one (1) month prior to the annual meeting of the PRCO. The identity of the sponsored member shall be provided in writing to the PRCO Secretary at least ten (10) days prior to the annual meeting of the PRCO. Once the sponsored member has been identified, the PRCO Secretary will forward the appropriate documents to the member as well as the password to access the password-protected section of the PRCO on the PGDC website (www.pgdc.ca).

Members not attending at least two (2) consecutive annual meetings of the PRCO will forfeit their membership status. Exceptions to this rule are accepted only when there is prior notification of extenuating circumstances preventing the member from attending the annual meeting.

Members of the PRCO hold concurrent membership in the Prairie Grain Development Committee (PGDC) which functions to organize the annual meeting of the PRCO and the other recommending committees, and other concurrent workshops or meetings. The Chair and Secretary of the PRCO are the PRCO representatives on the Executive of the PGDC.

The Executive of the PRCO consists of the Chair and Secretary of the PRCO and the Chairs and Secretaries of the three Evaluation Teams. The Chair and Secretary of the PRCO will be elected from the membership of the PRCO. The Chairs and Secretaries of the three Evaluation Teams will be elected from the membership of their respective Evaluation Team. All Executive positions are held for a three (3) year term which commence on April 1 following the annual

Structure of the PRCO and relation to the PGDC



meeting where the position holders were elected. Terms are renewable, subject to PRCO membership approval.

In circumstances where a Chair is unavailable to act in the official capacity of the position, the Secretary will assume the role of Chair and appoint a temporary Secretary from among the membership of the evaluation team or the PRCO, whichever is appropriate. In circumstances where the Secretary is unavailable, the Chair will appoint a temporary Secretary from among the membership of the evaluation team or the PRCO, whichever is appropriate.

A Financial Auditor may be elected from the membership.

A Parliamentarian Member is nominated by the PRCO membership at the start of the annual meeting of the PRCO. This member serves to provide guidance on the rules of order and conduct of the annual meeting.

The PRCO membership participates on the Appeals Board (Section 2.4) and the Contract Registration Committee (Section 3.2.5).

2.2 Meetings

The PRCO meets annually, usually in the second or third week of February. These meetings may be held concurrent with the PGDC meetings at a location determined at the previous annual meeting of the PGDC. Notice for the meeting will be distributed through the PGDC or the holder of the contract for organization and co-ordination of the PGDC and related meetings. The normal sequence for the February meetings of the PRCO membership is as follows although logistics may result in changes:

Executive Committee PRCO
Evaluation Teams, Membership Committee and other Committees as required
Entire PRCO membership annual meeting
Executive Committee PRCO

Meetings are open to all interested parties. All guests must make a request to the PRCO Chair to attend the meetings and are to be identified at the start of the meetings. Members attending meetings of their respective evaluation teams and/or the annual meeting of the PRCO may, by a simple majority vote, create in camera portions of the meetings, as necessary.

All meetings will be conducted according to Robert's Rules of Order.

Quorum for the meetings of the Evaluation Teams shall be a simple majority of the total current membership of the respective Evaluation Teams. Quorum for the annual meeting of the PRCO shall be a simple majority of the total current PRCO membership. The only exception to these quorums is when a member has provided, to the relevant Chair, advance (7 days) notice of their absence and the extenuating circumstances that prevented their attendance at the meeting(s). In this case, the absent member will not be included in the total membership count.

Meetings of the Contract Registration Committee or Membership Committee will be held prior to the annual meeting of the PRCO if there is a reason to do so. Extraordinary meetings may be called on thirty (30) days notice or less with the consensus of the membership of the committees.

An Appeals Board meeting may be held after the adjournment of the annual meeting of the PRCO in February if an appeal has been initiated and the members of the Appeals Board are available for the meeting. Other meetings of the Appeals Board may be called with the consensus of the membership of the Appeals Board. The Appellant will pay for all expenses incurred for such a meeting.

Extraordinary meetings of the PRCO may be called on thirty (30) days notice. A simple majority of the total current PRCO membership is required to call such meetings. Notice of

extraordinary meetings will be communicated by facsimile, electronic mail, or telephone. The notice will be sent by the PRCO Chair or Secretary, who will record notification of receipt of the notice and tabulate the vote to support the calling of the extraordinary meeting.

2.3 Voting

Voting is normally done at the meetings of the Evaluation Teams and the annual meeting of the PRCO. Proxy votes are not permitted.

Major motions such as recommendations, changes to procedures, membership or set aside of the rules and tabling of motions, require a ⅔ majority of the membership in attendance at the meeting.

Minor motions such as calling and adjourning of meetings and approval of reports, require a simple majority of the membership in attendance at the meeting.

In special circumstances, and at the discretion of the pertinent Chair, voting may be conducted using regular mail, facsimile or electronic mail. This would be considered an extraordinary meeting. Quorum for voting at such a meeting is a simple majority of the membership who:

a) Received the motion as distributed to the membership and notification of receipt of the motion was received back to the Chair or Secretary; and
b) Are available to submit their vote back to the PRCO Chair or Secretary in the time allocated for completion of the vote.

Voting at Evaluation Team meetings will normally be by a show of hands of members in attendance at the meeting. Voting at the annual meeting of the PRCO will be by a show of voting cards that have been prepared as per the current membership list and distributed to members at the beginning of the annual meeting. Counting of votes will be by two (2) members of the PRCO appointed by the Chair at the start of the meeting. The members will independently count and record the votes. If the vote count agrees between the recording members, the result will be announced. If the vote count does not agree, a recount will be done.

It is expected that all members will vote impartially.

Abstentions are expected only in the case of a previously and openly declared conflict of interest (refer to Section 6). Where the number of abstentions is equal to or greater than ⅓ of the votes cast, the Chair will ask for a re-vote. If the re-vote results in the number of abstentions being equal to or greater than ⅓ of the votes cast, the Chair will file a report stating that no recommendation could be made.

The Chair (or Acting Chair) is not entitled to a vote. The Chair may actively participate in the discussions only if the Chair steps down from that position for the duration of the discussion.

Under extenuating circumstances, it may be necessary for the PRCO to temporarily disregard its approved procedures. Any proposed suspension of procedures must be put to a vote, with a ⅔ majority of the membership in attendance required for the procedures to be suspended. The rationale for such an action and the record of the empowering vote will form part of the final decision.

There are two levels of voting for consideration of a candidate cultivar. These levels are at the Evaluation Team meetings and at the annual meeting of the PRCO. All members will cast a vote, including the breeder/sponsor, providing that he/she is an eligible voting member.

In order to allow sufficient time for consideration of the request to support a candidate cultivar, the members must receive the Request for Support of Registration document for a candidate cultivar at least seven (7) days prior to the annual meeting of the PRCO. Members are expected to cast their vote based on the science of the data presented in the Request for Support of Registration document and vetting of the data at the Evaluation Team meetings. The

vote at the annual meeting of the PRCO will be made according to the holistic attributes of the candidate cultivar.

Voting at the Evaluation Team meetings: Based on information provided by the Registration Trials and on the member's area of expertise, each Evaluation Team member will consider the specific merit[1] of each candidate cultivar which has completed the registration testing requirements relevant to the Evaluation Team.

The Chair of the Evaluation Team will call for a vote to be cast in one of the following categories:

Support: The candidate cultivar has a summary of performance superior to that of the relevant check cultivar(s) for the traits specified in the operating procedures developed for the relevant crop.

Do not object: The candidate cultivar shows similarity to relevant check cultivar(s) by having a summary of performance equal to or better than the relevant check cultivar(s) for the traits specified in the operating procedures developed for the relevant crop.

Object: The candidate's attributes for the traits being considered are inferior to those of the relevant check cultivar(s) for the traits specified in the operating procedures developed for the relevant crop.

Abstain: Abstentions are only expected in cases of openly declared conflicts of interest, or in the absence of information on which to base a decision.

Voting at the annual meeting of the PRCO: Based on the information provided by the Registration Trials, and vetting by the Evaluation Teams, the PRCO membership will consider the overall attributes and merit of the candidate cultivar. The breeder/sponsor may present a case requesting support for the registration of the candidate cultivar. Deliberations and recommendations are then presented by the Chair of each Evaluation Team. Following discussion, a motion to support the recommendation for registration of the candidate cultivar may be put forward by the breeder/sponsor. At the PRCO level of consideration of a candidate cultivar, deficiency in one characteristic of merit may be compensated for by strength in another characteristic of merit. Traits not considered for merit should not be used to influence the basis for decision of the vote for a candidate cultivar.

The PRCO Chair will call for a vote to be cast in one of the following categories:

Support: The candidate cultivar shows merit by having a summary of characteristics which are equal to, better than, or superior to the relevant check cultivar(s) for the traits determining merit as specified in the operating procedures developed for the relevant crop.

[1] A candidate cultivar that shows merit is "equal to", "better than" or "superior to" relevant check cultivar(s). The phrase "equal to" is defined as arithmetic equality to the check mean or mean of the checks. The phrase "better than" is defined as arithmetic superiority to the check mean or mean of the checks. The phrase "superior to" is defined as statistical superiority to the check mean or mean of the checks by a one-tailed test at the 95% confidence level using the pooled error mean square as the error term.

Object: The candidate cultivar's attributes are inferior to those of the relevant check cultivar(s) for the traits determining merit as specified in the operating procedures developed for the relevant crop.

Abstain: Abstentions are only expected in cases of openly declared conflicts of interest, or in the absence of information on which to base a decision.

Recommendations to support the registration of a candidate cultivar are in effect for two (2) years from the adjournment of the annual meeting where the recommendation was made. The PRCO Secretary will record the results of the votes and/or recommendation and submit the documentation to the VRO within two (2) weeks from the adjournment of the annual meeting. Exceptions to this include, but are not limited to, the meetings of the Contract Registration Committee and request for support for Interim Registration. If erroneous data or omission of pertinent data is used as a basis of decision for voting on a candidate cultivar, the breeder/ sponsor must inform the PRCO Chair with an explanation and provide a new supporting document to the PRCO Executive. The PRCO Executive will determine if there was an omission or error and if this information may have affected the original decision. If it is determined that the original decision would have been affected, then the Chair will inform the PRCO membership of the need for a re-vote.

2.4 Appeal of PRCO Recommendation for Request of Support for Registration of a Candidate Cultivar

The PRCO recommendation for request of support for registration of a candidate cultivar may be appealed by the breeder/sponsor of the candidate cultivar. The bases of appeal of a PRCO recommendation of a candidate cultivar are:

a) Failure of the PRCO to follow its approved Operating Procedures document and its relevant appendices; and/or
b) The recommendation was the result of erroneous data.

A written request to appeal the recommendation must be received by the PRCO Chair within fifteen (15) days of the close of the annual meeting of the PRCO. The appeal must indicate the basis for the appeal and include a copy of the data package for the candidate cultivar. Consideration of the appeal will be done by the Appeals Board.

The Appeals Board will consist of eight (8) individuals, representing the PRCO Executive and PRCO membership. Where there is a conflict of interest, members of the Appeals Board will appoint alternates. These alternates will be selected based on the next ascending seed number on the PRCO membership list. The PRCO Chair will preside over the meeting of the Appeals Board and the PRCO Secretary will record the minutes. The Appeals Board consists of:

The PRCO Chair and Secretary (2 members);
The PRCO Evaluation Teams Chair or Secretary (3 members); and
The PRCO Members selected on his/her randomly generated seed number and not being part of the PRCO Executive (3 members).

The processing of the appeal may take one of the following forms as decided by the Appellant:

a) If the members of the Appeals Board are available immediately or shortly after the adjournment of the annual meeting of the PRCO, then a meeting may be held where the Appellant will be given the opportunity to present the appeal to the Appeals Board. Documentation on the appeal will be distributed to the Appeals Board by the Appellant. Following presentation of the arguments, the Appellant will withdraw from the meeting room, the vote will be held and the Appellant will be notified upon conclusion of the meeting.
b) If the appeal is requested after the annual meeting of the PRCO is adjourned, the appeal documentation will be circulated to the Appeals Board by the Appellant. A conference call defending the appeal may be arranged by the Appellant and the vote will be held during the conference call. Alternatively, a written case defending the appeal may be provided to the Appeals Board. The vote is conducted using regular mail, facsimile or electronic mail.

Following deliberations of the Appeals Board, the Chair will call for the vote and the decision will be based on ⅔ majority of the Appeals Board members present. Where the number of abstentions is equal to or greater than ⅓ of the votes cast, the Chair will ask for a re-vote. If the re-vote results in the number of abstentions being equal to or greater than ⅓ of the votes cast, the Chair will file a report stating that no recommendation could be made. No additional appeals will be available at the Recommending Committee level.

The Appellant and members of the Appeals Board will be sent written notification of the Appeals Board decision and its rationale by April 1. All expenses incurred by the Appeals Board meeting will be paid by the Appellant.

2.5 Appeal of a PRCO Recommendation by the Contract Registration Committee

See Section 3.2.5 Contract Registration Trials.

3. Registration Trials

3.1 Types of Registration

In Canada, the *Seeds Act and Regulations* is the federal legislation governing the testing, inspection, quality and sale of seeds in Canada. The Seeds Regulations now partitions the list of crop types requiring registration of varieties (Schedule III) into three parts with different requirements for each part:
- Part I : Pre-registration and merit assessment, and the basic requirements for variety registration.
- Part II: Pre-registration testing and the basic requirements for variety registration.
- Part III: Basic registration requirements only.
Condiment mustard and flax are placed in Part I. The registration of condiment mustard and flax is based on recommendation from the recommending committee officially recognized by the Minister of Agriculture and Agri-Food Canada for this purpose - the Prairie Recommending Committee for Oilseeds (PRCO).

a) Full Registration[2]

"Unless otherwise specified in the certificate of registration, the registration is valid for all provinces and territories of Canada, until such time as the registration is cancelled or suspended, and without any restrictions on the production of the seed or commodity. Regional tests normally provide the basis for national registration. A variety is to be entered into official tests in the area(s) of anticipated adaptation. If it is supported by a recommending committee (see Section A.9) and granted a registration, it may be imported or sold in all of Canada, except where regional restrictions apply".

b) Restricted Registration[2]

Restricted registration consists of Interim, Regional, or Contract Registration.

Interim Registration is used for the purpose of production of grain or other commodity for market acceptability tests; or for emergency/crisis reasons (*e.g.*, disease). A minimum of one (1) year of evaluation in variety registration trials is required for Interim Registration. Interim Registration may be granted initially for a period of up to three (3) years, if requested by the Recommending Committee, provided the appropriate fees are submitted and that an acceptable application package is received. Otherwise, a variety will be granted a one (1) year registration. Interim Registration may be renewed for additional periods, to a maximum total life of five (5) years.

Regional Registration may be granted for crop varieties in those instances where the variety poses a potential threat to agriculture in specific regions for reasons such as seed/grain distinguishability, quality, disease or where the variety or its progeny may be detrimental to human or animal health and safety, or the environment. For Regional Variety Registration purposes, "harm" is defined as harm to the industry.

Contract Registration is used for varieties where delivery of the resulting commodity into traditional commodity channels would cause harm to those channels. Thus, a variety must demonstrate the possibility of harm if granted an unrestricted registration in order to qualify for this type of registration. The applicant must make available to the VRO, a quality control system that describes fully how any and all potentially adverse effects of the variety will be managed. In addition, the quality control system must address any regulatory concerns under the *Canada Grain Act* and the *Canadian Wheat Board Act*.

3.2 Registration Trials

3.2.1 General Guidelines

Some of the following guidelines may not apply to disease resistance testing. Guidelines for disease resistance testing are described in *Appendix B*/*Sub-Appendix B3* (condiment mustard) and *Appendix C*/*Sub-Appendix C3* (flax).

a) Purpose

Registration Trials are conducted by groups of collaborating public institutions and/or by private sector companies or organizations.

The purpose of Registration Trials is to generate relevant, unbiased and representative data on candidate cultivars and the relevant check cultivar(s). This data is provided to the Evaluation Teams, the PRCO or its relevant committees to provide the basis for an informed decision for consideration of candidate cultivars for registration.

[2] Procedures for the Registration of Crop Varieties in Canada, Canadian Food Inspection Agency, Plant Production Division, Variety Registration Office, 8 July 2009, available on the CFIA website.

The procedures and operation of Registration Trials for condiment mustard and flax candidate cultivars are under the jurisdiction of the PRCO and are approved by the members of the PRCO. Where there is disagreement over testing protocols, admittance of a candidate to a Registration Trial, interpretation of data, or validity of data, the majority decision of the PRCO will be final.

There are different types of registration trials. Co-operative trials are managed on behalf of the PRCO by Test Co-ordinators and the co-operating group. Test Co-ordinators of Co-operative Trials are appointed by the co-operators in the test, subject to approval by the PRCO. In addition to Co-operative Trials, there are Pre-registration, Private Registration and Contract Registration trials. Upon agreement of the PRCO, new Co-operative Registration Trials may be established. Operation and standards for new trials will be similar to existing Co-operative Registration Trials.

Co-operative Pre-registration Trials may be organized by interested parties. The purpose of these trials is to generate data for entry of candidates into the Co-operative Registration Trials and do not operate under the auspices of the PRCO (Section 3.2.3).

Plants known to have novel traits must have been granted unconfined release status for such material by CFIA before acceptance into the condiment mustard or flax Co-operative Registration Tests. Should it be determined that the candidate cultivar violated any protocols for isolation and containment, all resulting damages or liability will be borne by the breeder/sponsor and not the Test Co-ordinators or Co-operators, providing that all approved Co-operative Registration Test procedures were followed. In situations where the there are concerns over material which may be considered as “Plants with Novel Traits” (PNT), the issue should be discussed with the PRCO prior to the testing of any such material in the unconfined field trials of the Co-operative Registration Test. Where there is concern that the requirements for testing a particular candidate cultivar(s) would seriously jeopardize the normal operation of the Co-operative Registration Trial, the co-operating group may refuse entry of the candidate cultivar(s) into the Co-operative Registration Test. In such a case the PRCO may recommend the candidate cultivar enter into Private Registration Trials (Section 3.2.4) or Contract Registration Trials (Section 3.2.5). Candidates accepted for testing under Contract Registration Procedures will not normally be tested in Co-operative Registration Trials.

b) Locations

Locations for Registration Trials are chosen to represent areas of adaptation for commercial production of condiment mustard or flax in targeted agro-ecological zones throughout Western Canada.

c) Security of Entries

Test Co-ordinators and Co-operators will take reasonable precautions to ensure the security of entries and will not distribute seed for purposes other than registration testing without the written consent of the owner.

d) Experimental Design

Registration Trials shall be no larger than 30 entries, including relevant check cultivar(s) with a minimum of three (3) complete replicates. Use of recognized experimental designs that permit localized error control through the use of sub-blocks is encouraged.

e) Check Cultivars

Check cultivars of condiment mustard and flax are widely grown, established cultivars, special purpose cultivars or recent cultivars of superior merit. A superior cultivar with an offsetting weakness in a particular trait (*e.g.*, a high yielding cultivar with unusual susceptibility to fusarium wilt) may be included as a check cultivar without diminishing the selection standard for the trait

in which it is deficient. Such cultivars will be specifically excluded as a check cultivar for the traits in which they are deficient at the time of their elevation to check status and all such exceptions are to be noted in the list of check cultivars.

Changes in check cultivars must be approved by the PRCO and are listed in the PRCO Minutes. Data collected for a check cultivar(s) prior to registration are considered to be check data.

Candidate cultivars will not be compared to other lines in the test for registration recommending purposes. The candidate cultivar will be compared specifically to the relevant check cultivar(s) of their type at the time of consideration.

N.B. The current check may not be the same as the one used when the candidate cultivar was first entered in the Registration Trials. Refer specifically to *Appendix B* and *Appendix C*, the operating procedures for condiment mustard and flax, respectively, for the requirements for testing of candidate cultivars relative to check cultivar(s).

f) Seed Purity of Candidate and Check Cultivars

Seed stocks for candidate and check cultivars used in the Registration Trials must be of reasonable purity. As a guideline, the standards for germination should be similar to that required for Certified Seed, as defined by the Canadian Seed Growers' Association (CSGA). Candidate cultivars may have morphological off-types, but these should not exceed 5%. Acceptable off-types are plants that exhibit phenotypes or genotypes that can be readily removed during the process of breeder seed development.

g) Inspection

Registration Trials will be inspected on an annual basis. These inspections may be done by a Test Co-ordinator, Assistant Test Co-ordinator or a CSGA recognized plant breeder. At least ⅓ of the Co-operative Registration Trials should be inspected by a recognized plant breeder who is independent of the test site. Further, inspection of a Co-operative Registration Trial by a plant breeder employed at the same location is permissible if there is no association with the trial. Access to Co-operative Registration Trials will be granted to the Test Co-ordinator, Co-operators and other parties with a *bona fide* interest in the test. Co-operators should be contacted in advance to provide entrance to the trial site, treatment lists, randomizations and other pertinent information.

Trial sites will be considered valid when a minimum of three (3) complete replicates have been approved. If a check cultivar has only two (2) acceptable replicates in a trial, the data for that trial will be considered non-valid. Exceptions to this principle are made in the case of recognized weakness in a specific check cultivar (*e.g.*, disease susceptibility). In addition, a trial is considered non-valid if visual inspection reveals unacceptable planting, emergence, soil gradient, pest and/or environmental problems.

Inspectors should discuss concerns for the site with the individual responsible and, if possible, agree on corrective action. A brief, critical evaluation of the site should be written, identifying the areas that required attention and the solutions discussed. These reports shall be forwarded to the Test Co-ordinator of the Co-operative Registration Test or the Chair for Contract and Private Registration Trials, for action, follow-up, and additional inspection if necessary. If issues are not resolved by the PRCO Chair, the concerns will be forwarded to the PRCO Executive.

h) Reporting of data

Data for each agronomic trait must be summarized on a site basis, with standard errors or least significant differences (LSDs) reported for each trait. Test Co-ordinators must use discretion in

judging acceptability of data for each trial site. In general, yield data will be considered acceptable if the coefficient of variation (C.V.) for yield is ≤16% for condiment mustard and ≤15% for flax.

3.2.2 Co-operative Registration Trials

Traditionally, oilseed breeders, agronomists, pathologists and seed or end-use quality experts work together to evaluate candidate cultivars of condiment mustard and flax. It is the collective responsibility of the participants in the Co-operative Registration Trials to ensure unbiased and accurate testing of the candidate cultivar(s).

The Test Co-ordinators are responsible for admission of new candidate cultivars, general co-ordination of the trial, compilation and analysis of the data, and preparation and distribution of the Co-operative Test Reports. Co-operative Test Reports are included in the PRCO Minutes.

The Co-operators are responsible for the management of the individual trial sites. All trials are managed and harvested according to the standard and sound agronomic and scientific practices as appropriate for each site. At the present time, no "special management" practices shall be performed for any candidate cultivar. If the need for special management of a cultivar candidate can be demonstrated by the breeder/sponsor, a new testing procedure may be developed. Co-operators should meet all reasonable requirements set by the Test Co-ordinator with regard to quality, quantity and time for submission of seed, and provision of data for consideration of candidates.

a) Entry into trials

Request for entry of a candidate cultivar(s) into Condiment Mustard Co-operative Registration Trials must be made prior to March 1 of the year of planting of the next Co-operative Test. Exceptions to this principle may be accommodated provided the numbers of entries in the Co-operative Registration Trials are low enough to ensure precision and to avoid undue demands on those performing the testing. Request for entry of a candidate cultivar(s) into Flax Co-operative Registration Trials must be made one (1) week prior to the annual PRCO meetings. The request and data documents must be sent to the Test Co-ordinator, no later than the Monday, seven (7) days prior to the start of the Annual Meeting of the PRCO. This request and document containing pre-Coop data will then be forwarded by the Test Co-ordinator to members of the Flax Workers group at least five (5) days prior to the start of the Annual Meeting of the PRCO. Merits of flax candidate(s) for entry into the Co-op Test will be evaluated by the Flax Workers group at the PRCO meeting, and will decide whether the candidate will be included in the upcoming Co-op Test.

Candidate cultivars entered into the Co-operative Registration Trials must have sufficient merit to warrant registration testing and the consumption of limited research resources. An entry must meet the minimum criteria for agronomic, disease resistance and quality characteristics.

Entry of candidates into the Co-operative Registration Trials requires previous testing in preliminary or pre-registration trials, comparison to the relevant check cultivar(s) and satisfactory evaluations for important agronomic, disease and quality traits. Refer to approved PRCO Operating Procedures in *Appendix B* and *Appendix C* for the criteria for entry into Co-operative Registration Trials for condiment mustard and flax candidate cultivars, respectively.

The data collected will be submitted to, and vetted by, the Test Co-ordinator and the co-operators. Entries are admitted or retained based on the performance of the candidate cultivar(s) compared to the relevant check cultivars, the likelihood of their registration, consensus among the co-operators, and the decision of the Test Co-ordinator.

If an entry that has been tested in the Co-operative Registration Test, and has not been supported for registration, yet has been requested by the breeder/sponsor to be re-entered into a Registration Trial, permission by the PRCO is required.

Although Co-operative Registration Trials may be run without charge, co-operators are reminded that testing candidate cultivars is expensive. The PRCO has the authority to institute a system of charges pending additional costs and benefits of operating the Co-operative Registration Test. Such fees are subject to annual review. Institutions that do not make a substantial contribution towards the co-operative testing system may be charged a candidate entrance fee to help defray the costs of testing.

An offer of payment for testing does not assure entry or retention of a candidate into the Co-operative Registration Test. A description of any such charges will be documented in the appendices as a requirement for entry.

If an individual or company cannot get a candidate cultivar entered into the Co-operative Registration Test, then the appeals mechanism provided by the PRCO Appeals Board will be used.

b) Disposition and Retention of Entries

The breeder/sponsor of a candidate cultivar may withdraw it at any time.

Candidate cultivars or registered cultivars are retained in the Co-operative Registration Test based on the request of the breeder/sponsor, the approval of the co-operators and the PRCO. Retention of candidate cultivars for a second or third year of testing should focus on performance in the Co-operative Registration Test. Retention of an entry in the registration testing system, beyond one (1) year of the completion of its trial requirements, is at the discretion of the Test Co-ordinator and is dependent on interest and availability of resources.

Exceptions to this are the testing of registered varieties which are grown throughout the targeted agro-ecological zones. Data generated by the Co-operative Registration Test on these registered varieties may be used as performance information for provincial publications which are available to producers. In this case and dependent on size of the trials and the resources available, the decision of the Test Co-ordinator will determine the retention of the registered varieties in the Co-operative Registration Trials.

c) Reporting of data from the Co-operative Registration Trials

The Co-operative Test Reports (agronomic, quality and disease evaluations) should be circulated by the Test Co-ordinator at least seven (7) days prior to the annual meeting of the PRCO.

3.2.3 Pre-Registration Trials

Data for entry of candidates into a Co-operative Registration Test may be obtained by organizing or participating in Co-operative Pre-registration Trials (*e.g.*, “A” and “B” level tests or “preliminary” tests). While the consideration of these trials may appear as an agenda item, these trials are not run under the auspices of the PRCO. The co-operating groups set rules for their operation and the PRCO will not mediate among the co-operating group in such trials.

3.2.4 Private Registration Trials

Private Registration Trials may be conducted outside of the co-operative testing system and must emulate the professional standards set by the comparable Co-operative Registration Trials. The company or institution conducting Private Registration Trials must obtain approval of testing protocols from all of the Evaluation Teams prior to evaluation of the candidate cultivar(s), rather than at the time when support for registration is being sought. Without prior approval of

the testing protocols by each Evaluation Team, the PRCO will not recognize the proposed Private Registration Trials.

The following rules apply to the establishment and conduct of Private Registration Trials for candidate cultivars of condiment mustard and flax.

N.B. With respect to disease resistance and end-use quality testing, it is very important to consult with the pertinent Evaluation Team to determine the specific testing requirements and/or methodology prior to seeking approval of the proposed testing protocols.

a) Request for Private Registration Trials

The proposal for Private Registration Trials will be submitted to the PRCO no later than February 1 in the year of first planting to allow discussion prior to the annual meeting of the PRCO, where approval of the Trials will be requested.

The requirements indicated in Section 3.2.1 (General Guidelines) apply for Private Registration Trials with regards to the following categories: Locations, Security of Entries, Experimental Design, Check Cultivars, Seed Purity, and Inspection. In addition, the requirements for agronomy, disease and quality assessment using methodology approved for the respective Co-operative Registration Trial are required for the Private Registration Trial.

b) Time of Testing

Testing of a candidate cultivar in a Private Registration Trial shall encompass three (3) consecutive years. The required number of station-years is the same as that required for candidate cultivars in the Co-operative Registration Tests for condiment mustard and flax.

c) Reporting of Data

Annual reports of the Private Registration Trial will be distributed to the PRCO membership at least seven (7) days prior to the annual meeting of the PRCO. The Evaluation Teams and PRCO membership will conduct an annual vote to accept the report data as valid, and will provide guidance to improve the tests and/or report, if necessary. Annual or revised reports of the Private Registration Trial will be made available to the Chair and Secretary for inclusion in the PRCO Minutes.

The report must be prepared in a manner similar to that used for the Co-operative Registration Test. In addition, a brief explanation of the testing protocol for each trait measured is required to assist the Evaluation Teams and PRCO in determining the validity of the data.

The Request for Support of Registration document for candidate cultivars which were tested in the Private Registration Trials must be meet the same requirements as that of candidate cultivars tested in the Co-operative Registration Trials (Section 4).

3.2.5 Contract Registration Trials

a) Requirements for Contract Registration

Before a candidate cultivar will be considered for testing under Contract Registration procedures, the breeder/sponsor (or designate) must provide the rationale for Contract Registration. A written document addressing the following points must be received by the Contract Registration Committee at least thirty (30) days prior to the annual meeting of the PRCO:

1. The candidate cultivar is considered for Contract Registration where the biochemical or biophysical characteristics of such a candidate would 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;

2. Delivery of the resulting commodity into traditional commodity channels would cause harm to those channels. The candidate cultivar must demonstrate the possibility of harm if granted an unrestricted registration in order to qualify for this type of registration;

3. An end-user/purchaser exists for the specialty product. This is indicated by a letter of support and commitment for the candidate cultivar by the end-user/purchaser; and

4. A closed loop system for the isolation, production, transport and/or processing of the candidate cultivar must be in a Quality Control System that is reviewed and acceptable by the VRO. The closed loop system is necessary to provide assurance that "off-grade" production shall not enter the normal marketing system for the commodity crop.

Breeders/sponsors of candidate cultivars being tested under Contract Registration procedures are encouraged to contact the VRO for details on the required Quality Assurance Manual, which must be complete before registration is granted. See Appendix VIII of the Procedures for the Registration of Crop Varieties in Canada (www.inspection.gc.ca) for further information.

Upon the endorsement that testing of the cultivar under Contract Registration procedures is appropriate, the VRO will be informed of the recommendation and any additional data requirements prescribed by the Contract Registration Committee.

Contract registration is not to be used as a substitute for traditional forms of registration (full or interim) or in situations where the PRCO has objected to the registration of the candidate cultivar based on deficiency in merit. However, the PRCO may recommend that the candidate be considered for Contract Registration if the required conditions for Contract Registration can be met. In this case, an extraordinary meeting of the Contract Registration Committee may be required.

b) Contract Registration Committee

A Contract Registration Committee will exist under the auspices of the PRCO and will normally consist of five (5) members:

1. One (1) plant breeder recognized by the Canadian Seed Growers Association (CSGA) who is a member of the PRCO Breeding, Agronomy and Production Evaluation Team;
2. One (1) pathologist member of the PRCO Disease Evaluation Team;
3. One (1) seed quality expert who is a member of the PRCO Quality and End-Use Evaluation Team;
4. One (1) provincial oilseed specialist; and
5. One (1) representative from a producer organization of the candidate cultivar crop species, where the producer organization is a member of the PRCO.

The Chair of the Contract Registration Committee will be chosen from among these five (5) individuals. In cases where confidentiality of data is important, and there is a conflict of interest, the owner of the proposed candidate may request an alternate member to be appointed by the remaining members of the Contract Registration Committee, provided that member meets the requirements for membership on the Committee. Members of the Contract Registration Committee will act to protect the confidentiality of data where required.

c) Contract Registration Request and Recommendation

The breeder/sponsor (or designate) of a candidate cultivar will provide the Contract Registration Committee with written notification of his/her intent to approach the PRCO or the Contract Registration Committee at least seven (7) days in advance of the annual meeting. Appropriate

documentation, letters of intent and/or data summaries must be included with the notice. The breeder/sponsor of the candidate cultivar will be informed of the date and time of the Contract Registration Committee meeting and is allowed to address the committee. Following the meeting, the Contract Registration Committee will have up to ten (10) days to rule on the suitability of the candidate for testing under Contract Registration procedures, prescribe additional data requirements over the minimum specifications, or make a recommendation on the request for Contract Registration. The Contract Registration Committee may seek external advice, recognizing that confidentiality may be of extreme importance. A simple majority vote will constitute the decision of the Contract Registration Committee. Votes will be cast in two categories: "Support" or "Object".

d) Appeal of Decision of Contract Registration Recommendation

The breeder/sponsor of the candidate cultivar may contest a Contract Registration Committee decision. The basis of appeal of a PRCO Contract Registration Committee recommendation of a candidate cultivar is based on a recommendation where:

1. The Contract Registration Committee has determined that the candidate cultivar is ineligible for testing under Contract Registration procedures; and/or
2. The Contract Registration Committee has objected to the Contract Registration of the candidate cultivar.

Appeals will be conducted as outlined in the PRCO Operating Procedures for the Appeals Board. Costs incurred in convening any extraordinary meeting of the Executive shall be borne by the Appellant.

e) Conduct of Contract Registration Trials and Minimum Data Requirement

It is a condition that, upon acceptance of a candidate for testing under Contract Registration procedures, the breeder/sponsor agrees that the testing and evaluation protocols defined by the Contract Registration Committee are appropriate and that these protocols, however defined, will not justify an appeal. The following are minimum data requirements for Contract Registration of a candidate cultivar; however, the Contract Registration Committee may set additional requirements within ten (10) days following the meeting, to determine the suitability of the candidate for Contract Registration procedures.

A minimum of two (2) years of testing is required. Testing must be conducted in the region where production is intended to take place. The geographic region(s) may vary in area from all of Western Canada to a smaller region within a province. Testing will provide comparisons with the relevant check cultivar(s) for the crop kind, as currently used in regular registration (Co-operative) testing, or as determined by the Contract Registration Committee. Agronomic performance and disease reaction data will not be considered confidential.

Agronomic data must be collected but will be used for descriptive purposes only. No minimum levels of performance are required for agronomic traits. A minimum of eight (8) station-years of agronomic data are required, with a minimum of three (3) station years in each of two (2) calendar years. A minimum of three (3) of the eight (8) station-years of data shall be collected by an individual or organization that is independent from the breeder/sponsor, with a minimum of one (1) station year in each of the calendar years tested. The independent test organization must be disclosed to the Contract Registration Committee prior to conducting trials for approval. An independent third party PRCO member will be identified by the Contract Registration Committee to inspect all field trials.

Disease evaluation will take place in each of two (2) years of testing and shall be conducted under the auspices of the Disease Evaluation Team. Candidates must meet minimum disease resistance requirements in place for traditional cultivars (full registration), unless the owner of the candidate can demonstrate that susceptibility to a particular disease will not endanger

production of traditional cultivars in, or adjacent to, the geographic region(s) identified for contract production.

Seed quality data will be deemed confidential. The trait deemed to cause potential harm will be evaluated in each year of testing, and compared to the relevant check cultivar(s) for the crop kind. This data will be evaluated by the Contract Registration Committee in consultation with appropriate grain quality experts if deemed appropriate or necessary. The Contract Registration Committee will respect the confidential nature of the data in soliciting expert advice. The purpose of this evaluation is to confirm that the candidate has the quality claimed by the breeder/sponsor and that such quality requires production within a closed, contract system.

All costs for data collection for Contract Registration shall be borne by the breeder/sponsor of the candidate cultivar.

Recommendations in support of Contract Registration will be made by the Contract Registration Committee and forwarded to the VRO. The VRO will examine the request and rule on the applicability of the candidate for Contract Registration.

3.3 Registration Recommendation

The PRCO will only consider a Request for Support of Registration for a candidate cultivar that has shown satisfactory performance compared to the relevant check cultivar(s) in the required amount of testing for condiment mustard and flax as prescribed in the their respective operating procedures. Exceptions to this are extraordinary circumstances where there is strong evidence of urgent, great benefit to the industry should the candidate cultivar be considered for support of some form of registration.

Interim Registration may be requested for a candidate cultivar prior to its completing the requirements for evaluation in the Co-operative Registration Trials. This request must be supported by the Canadian Grain Commission and would require suspension of PRCO procedures. This would be considered an extraordinary occurrence and the vote must pass with a ⅔ majority.

Varieties which have the potential to cause harm and for which further registration is required, may be granted Contract Registration. Contract Registration may be granted interim or permanent registration (*i.e.*, with no restriction on duration of registration) for varieties for which merit has been established.

Varieties which have the potential to cause harm and for which further registration is required, may be granted Interim Contract Registration. Interim Contract Registration may be requested for initial periods of one (1) to three (3) years, and may be renewed for further terms to a maximum of five (5) years in total.

Renewal of Interim Contract Registration requires the recommendation of the appropriate Contract Registration Committee, approval by the VRO and a review of the Quality Management System with the appropriate audits to determine if conditions have changed significantly from the time of initial recommendation.

Recommendations to support the registration of a candidate cultivar are in effect for two (2) years from the date of the conclusion of the annual meeting of the PRCO where the recommendation was made. A recommendation for support of registration by the PRCO of a candidate cultivar does not represent a recommendation by the PRCO endorsing commercial production of the candidate cultivar. The recommendation on registration made by the PRCO is ratified by the VRO.

The breeder/sponsor must submit the request to the VRO to register a candidate cultivar within the two (2) year period. After this period, a breeder/sponsor wishing to register a candidate cultivar will require the PRCO to review the original request document and re-vote on the recommendation to support registration.

Based on the decision of the PRCO or its relevant committee, the PRCO Secretary will inform the VRO in writing of the recommendation of the PRCO regarding the candidate cultivar. Copies of this communication and copies of the deliberations from the Evaluation Teams will be provided to the breeder/sponsor, the PRCO Chair and to the VRO.

The breeder/sponsor submits the Registration Application Form available from the VRO, or from the CFIA web site (www.inspection.gc.ca). The application, along with other required supporting documentation, reference samples and the prescribed fee, must be sent to:

Variety Registration Office
Plant Production Division
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa, Ontario K1A 0Y9
Telephone: (613) 221-7533
Facsimile: (613) 228-4552

Further information on Contract Registration is available on the CFIA website: www.inspection.gc.ca

4. The Request Document

The Request for Support of Registration document will be concise and error free. Legible copies of the request document must be received by the voting membership of the PRCO no later than the Monday, seven (7) working days prior to the start of the annual meeting of the PRCO. The Request for Support of Registration document may be distributed by electronic mail unless the member does not have access to an electronic mail method of communication, in which case, a paper copy will be sent by postal mail. If electronic mail distribution is used, then an acknowledgement of receipt of the correspondence should be requested when the mail is sent. The PRCO may refuse to consider a request on the grounds of late circulation, illegibility or inaccuracy.

4.1 Description of the Candidate

The Request for Support of Registration document will contain the following information describing the candidate cultivar. Where this information is omitted, justification may be required.

- The testing identification under which the candidate cultivar was tested;
- The species name and type of the candidate cultivar;
- The breeder/sponsor and/or proposer of the candidate cultivar;
- The registration category being sought (interim or full);
- A brief description of the phenotype:
- Details of parentage, derivation and selection history must be included with the phenotypic description, but exceptions may be made if they disclose information of significant technological or commercial value;
- The testing history;
- All strengths and weaknesses of the candidate cultivar;
- The expected area of adaptation;

- The expected end-use; and
- The rationale for registration.

4.2 Data Summaries

The data summaries must use all the data generated by the Registration Trials in which the candidate cultivar was evaluated, where the data was valid, accepted by the PRCO and reported in the Co-operative Registration Test Report. The Request for Support of Registration document will contain the following summary of data supporting the request of registration:

- The individual testing years and an overall summary of agronomic performance;
- The individual testing years and an overall summary of quality characteristics; and
- The individual testing years and an overall summary of disease reactions.

A summary of end-use quality may also be included; however, the PRCO will only consider that information as supplemental information which should not influence the decision for registration.

Performance of other candidates unregistered at the time of application is not relevant, nor is the performance of previously registered cultivars not designated as check cultivars.

The manner in which data was summarized will be in accordance with accepted scientific practice, and will not conceal any weakness of the candidate. Registration Trial data may be reanalyzed, and other supporting data may be introduced in support of specific or unusual claims of performance, but this will not replace the summary that was accepted by the PRCO in the Co-operative Registration Test Reports. The PRCO may assume that a candidate is deficient in an important trait if it is excluded from the summary.

4.3 Errors in the Request for Support of Registration Document

If the Request for Support of Registration document or the Co-operative Registration Test Reports have missing or erroneous data, or omission of pertinent data is used as a basis of decision, the breeder/sponsor may call for a re-vote on the revised data package. This request must be submitted in writing, to the PRCO Chair, accompanied by an explanation and a new Request for Support of Registration document. The PRCO will determine if there was omission or erroneous data and if this information could have changed the original decision. If there is majority agreement among the PRCO Executive, the PRCO Chair will then inform the membership and a re-vote will be conducted. If the annual meeting of the PRCO has concluded, then the re-vote will be carried out using regular mail, facsimile or electronic mail. The PRCO Secretary will distribute the information, collect the voting records, and report to the PRCO Chair who will inform the breeder/sponsor. All documentation for this process will be provided to the VRO along with the results of the re-vote.

4.4 Definition of Merit

To receive support for registration, a candidate cultivar must show merit. A candidate cultivar that shows merit is “equal to”, “better than”, or “superior to” relevant check cultivar(s). The

phrase “equal to” is defined as arithmetic equality to the check mean or mean of the checks. The phrase “better than” is defined as arithmetic superiority to the check mean or mean of the checks. The phrase “superior to” is defined as statistical superiority to the check mean or mean of the checks by a one-tailed test at the 95% confidence level using the pooled error mean square as the error term.

4.5 Supplementary Data

Data collected external to the Registration Trials may be included in the Request for Support of Registration document to improve the case for registration or substantiate claims of specific or unusual performance. Data generated outside the prairie region of Canada or other relevant source will be considered a supplement to the registration trial data, not a substitute for it. Registration Trial data and supplementary data must be presented in separate tables and labeled appropriately. A motion to accept the supplementary data as part of the Request for Support of Registration must be passed by a ⅔ majority.

5. Policy on Release of Information

5.1 PRCO Operating Procedures

Operating Procedures used by the PRCO will be available from the Secretary of the PRCO on request directed from the PRCO Chair.

5.2 PRCO Co-operative Test Reports

Reports of the PRCO will be available to all registrants of the meeting, usually for a fee. A disclaimer indicating the restricted distribution of the report and limitations of the data will be included on each document.

Developers, owners and marketing institutions may only use the data generated on their lines and relevant check cultivar(s). Comparisons may only be made with check cultivars in the trials in which the candidate was evaluated.

Data must be used in entirety (*i.e.*, all valid trial sites).

Data for candidates supported for registration may be used in “provincial government variety guides” without request for permission.

The PRCO Co-operative Test Reports will be placed on the password-protected PRCO section of the PGDC website following the annual meeting of the PRCO.

5.3 PRCO Minutes

The PRCO Minutes will be placed on the password-protected PRCO section of the PGDC website following the annual meeting of the PRCO. Included in the Minutes will be the Minutes of the meetings held by the Evaluation Teams and the Minutes of the annual meeting of the PRCO (including the Evaluation Team and PRCO voting results for each candidate cultivar).

Disclaimer to be published with the PRCO Minutes:

> "The data contained in this document is the copyright property of the Prairie Recommending Committee for Oilseeds (PRCO). The information contained herein may not be reproduced, published or disseminated in any form other than in its entirety, without the express written consent of the PRCO Chair. The data contained in this document are collected from several sources. The PRCO does not guarantee the veracity of subsets of these data. The members/experts of the PRCO evaluate the merit of genotypes/candidate cultivars using a pool of performance parameters collected over several years and multiple locations. Any subset of these data cannot be considered a reliable indication of overall merit. Requests for permission to use portions of this document must be forwarded, in writing, to the PRCO Chair."

Guidelines to the PRCO Chair in granting permission to use portions of the PRCO data:

a) Permission to use data subsets will be refused in situations where, in the considered opinion of the Chair, the data will be presented in a misleading manner.
b) The data for the checks is considered public domain and a request for use will be approved unless it conflicts with point (a).
c) The use of data specific to entries may be approved with the express written consent of the relevant breeder/sponsor.
d) The Chair, in granting permission to use the data, will consider and respect information that is proprietary.

6. Conflict of Interest

One of the mandates of the PRCO is the responsibility to advise on the performance of lines in test and make recommendations to the VRO. While members are expected to vote impartially, abstaining from a vote is appropriate when sound ethical judgment indicates a "Conflict of Interest".

According to Dr. Michael McDonald, Director of the Centre for Applied Ethics at the University of British Columbia, "a Conflict of Interest arises when an individual acting in an official capacity (public official, employee, professional, etc.) has private or personal interests sufficient to appear to influence the objective exercise of their duties. Conflicts of Interest interfere with professional responsibilities by clouding objective, professional judgment.

The key elements in defining a Conflict of Interest are:

1. Private or personal interest: The pursuit of private or personal interests does not create a conflict of interest unless it occurs during the exercise of official capacity.
2. Exercise of official capacity: Duties and obligations that are part of an office or official capacity must prevail over private or personal interests.
3. Responsibility to use objective professional judgment: Professionals are expected to provide sound, objective and independent advice. Factors that interfere (or appear likely to interfere) with professional objectivity are a matter of legitimate concern to those who rely on this advice.

In addition to actual conflicts of interest, apparent and potential conflicts should be avoided. An Apparent Conflict of Interest is a situation in which a reasonable person would believe that the professional's judgment is likely to be compromised. A Potential Conflict of Interest is a situation that could develop into an actual conflict of interest.

The key in discovering a personal conflict of interest is to determine if the situation is likely to interfere, or appears to interfere, with the independent judgment expected in performing one's

official duties. Trust is the core issue. Conflicts of Interest involve an abuse (actual or potential) of the trust that people have in professionals. In addition to direct damage to particular clients and employers, Conflicts of Interest injure the entire profession by reducing the confidence that people have in professionals."

When a personal Conflict of Interest is recognized, the ethical responses are:

1. Reveal your private interest to the relevant parties.
2. Remove yourself from the decision making process or advice-giving role.

APPENDIX A - Definitions

Acronyms:

CFIA	Canadian Food Inspection Agency
CSGA	Canadian Seed Growers Association
PGDC	Prairie Grain Development Committee
PRCO	Prairie Recommending Committee for Oilseeds
VRO	Variety Registration Office of the CFIA

Candidate cultivars: Candidate cultivars are lines which are being evaluated according to the rules specified by the Operating Procedures of the PRCO and for which Request for Support of Registration documents may be submitted to the VRO following recommendation for registration at the annual meeting of the PRCO or by the Contract Registration Committee of the PRCO.

Check cultivars: Check cultivars (or checks) are widely grown, established cultivars, special purpose cultivars or recent cultivars of superior merit of condiment mustard and flax against which the performance of candidate cultivars is assessed. A superior cultivar with an offsetting weakness in a particular trait may be included as a check without diminishing the selection standard for the trait in which it is deficient. Such cultivars will be specifically excluded as a check for the traits in which they are deficient.

Co-operators: Co-operators are scientists or field trial managers responsible for conducting the various tests, or breeders/sponsors submitting candidate cultivars to the Co-operative Registration Test.

Co-ordinators: Co-ordinators are appointed by the Co-operators in the test, subject to approval by the PRCO. Test Co-ordinators are responsible, in consultation with the Co-operators, for deciding on admission of new candidates, general co-ordination of the trial, compilation and analysis of the data, and preparation and distribution of the Co-operative Test Report.

Co-operative Trials: Co-operative Trials are replicated yield trials grown at testing sites representing areas of adaptation for commercial production of condiment mustard or flax in targeted agro-ecological zones throughout Western Canada. Co-operative Trials are conducted by groups of collaborating public institutions and/or by private companies or organizations.

Co-operative Test: A co-operative Test is the collective of the Co-operative Trials for condiment mustard or flax, and the data generated from the entries grown at these individual testing sites.

Evaluation Team: An Evaluation Team is a collection of members based on the area of technical and/or scientific expertise that the individual member is contributing to the recommendation process.

The Breeding, Agronomy and Production Evaluation Team consists of members who provide expertise relating to:

a) Developing or assessing new cultivars of condiment mustard and flax for production in Western Canada;
b) Producing or marketing of new cultivars of condiment mustard and flax; and
c) Co-ordinating regional performance variety trials of condiment mustard and flax.

The Disease Evaluation Team consists of members who provide expertise relating to the evaluation of Co-operative Test entries for disease resistance and /or pathology of diseases affecting the commodity crops of condiment mustard and flax, or related crop species.

The Quality and End-Use Evaluation Team consists of members who provide expertise relating to the chemistry of the seed and its components, the commodity crops of condiment mustard and flax, or the end-use products produced from the commodities or their components.

Extraordinary Vote: An extraordinary vote may be held as a result of extenuating circumstance at a time other than the annual meeting of the PRCO membership. In this case, the vote will be conducted using regular mail, facsimile or electronic mail.

PRCO Members: Membership in the PRCO consists of individuals actively engaged in the research and development, production, marketing, commercialization and processing of commodities or end-use products of flax or condiment mustard grown in Canada.

In the case of seed trade and producer organizations (associations or commissions), the member must be elected by a democratic process within their organization, and as such, are accountable to the organization for their actions. Only one individual will act as member on behalf of the organization they are representing.

Organizations or private companies may be Canadian or foreign-owned, provided that they are directly involved in the processing and/or development and marketing of the Canadian condiment mustard or flax crops, the commodities produced from or the end-use products derived from these crops.

Merit: Merit is the worth or excellence of a candidate cultivar in comparison to the check cultivar with regards to traits that will make the cultivar beneficial for a particular use in a specific production area of Canada. A candidate cultivar that shows merit is “equal to”, “better than” or “superior to” relevant check cultivar(s). The phrase “equal to” is defined as arithmetic equality to the check mean or mean of the checks. The phrase “better than” is defined as arithmetic superiority to the check mean or mean of the checks. The phrase “superior to” is defined as statistical superiority to the check mean or mean of the checks by a one-tailed test at the 95% confidence level using the pooled error mean square as the error term.

Plants with Novel Traits (PNTs)[3]: A PNT is defined as a plant that contains a trait which is both new to the Canadian environment and has the potential to affect the specific use and safety of the plant with respect to the environment and human health. These traits can be introduced using biotechnology, mutagenesis, or conventional breeding techniques and have some potential to impact weediness, gene flow, plant pest potential, non-target organisms, or biodiversity.

Seed number: Seed number is a randomly-generated number assigned annually to members of the PRCO.

Recommending Committee[4]: All committees that recommend varieties for registration must be officially recognized by the Minister of Agriculture and Agri-Food Canada for this purpose. Appendix IX of the Procedures for the Registration of Crop Varieties in Canada lists the

[3] CFIA, Plant Biosafety Office (www.inspection.gc.ca)
[4] CFIA, Variety Registration Office, Procedures for the Registration of Crop Varieties in Canada, 8 July 2009.

currently recognized committees. The names and addresses of the contact persons for each recommending committee is available on the CFIA website at:
http://www.inspection.gc.ca/english/plaveg/variet/vartoce.shtml.
The recommending committees are responsible for:

- Formulating testing procedures that are appropriate for their crop(s) including a mechanism for verification of trials/validation of data;
- Regularly reviewing the testing procedures to ensure that they reflect acceptable scientific practices; and
- Ensuring that reference varieties are current and fairly represent the requirements of Canadian agriculture.

Registration Trials: Registration Trials are replicated, multi-location experiments designed to evaluate agronomic performance (*e.g.*, flowering, maturity, lodging, plant height and seed yield). Seed collected from these experiments are analyzed for seed quality traits. Response to disease is assessed in replicated disease nurseries or using a recognized laboratory test.

PRAIRIE RECOMMENDING COMMITTEE FOR OILSEEDS (PRCO)

APPENDIX B

APPENDIX B - Operating Procedures for the Registration of a Condiment Mustard Cultivar for Production in Western Canada

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PRAIRIE RECOMMENDING COMMITTEE FOR OILSEEDS (PRCO)

APPENDIX B

Operating Procedures for the Registration of a Condiment Mustard Cultivar for Production in Western Canada

B1. Background

Three types of condiment mustard are grown in western Canada, representing two species.

1. Yellow mustard, *Sinapis alba* L. (yellow seeded)
2. Oriental mustard, *Brassica juncea* (L.) Czern. (yellow seeded)
3. Brown mustard, *Brassica juncea* (L.) Czern. (brown seeded)

Western Canada is the world's leading producer of condiment mustard, with up to 800,000 acres seeded annually, usually on a producer contract basis. The majority of production in western Canada is of the yellow mustard type, and the remaining production is split between the oriental and brown types. Market supply and demand for a given year dictates the percentage split in production among the three types, with yellow mustard typically commanding 40 to 60 percent of the total acreage.

B2. The Prairie Recommending Committee for Oilseeds (PRCO)

This document outlines the evaluation and testing system operated by the Prairie Recommending Committee for Oilseeds (PRCO). The PRCO makes recommendations to the Variety Registration Office (VRO) of the Field Crops Division, Canadian Food Inspection Agency (CFIA) regarding the suitability of candidate cultivars of flax and condiment mustard for registration in western Canada. The PRCO operates under the umbrella of the Prairie Grain Development Committee (PGDC) (www.pgdc.ca).

The procedural framework outlined in this document exists to generate relevant, unbiased and representative data for candidate cultivars. A recommendation to "support" or "object to" an application for registration of a condiment mustard cultivar will be based on data generated by the Co-operative Mustard Test. The candidate cultivar must demonstrate acceptability and merit for agronomic, quality, and disease resistance traits, and meet the minimum standards outlined in *Sub-Appendix B5*.

The PRCO may suspend a particular guideline to allow consideration of a candidate by a two-thirds majority vote. The rationale for such action and the record of the empowering vote will form part of the recorded decision. The voting is valid only when a quorum is present. The quorum for the PRCO is a simple majority of the membership. The PRCO votes are cast in three categories: "Support", "Object to", or "Abstain". Abstentions are only expected in the case of an openly declared conflict of interest. Recommendations in support of registration by the PRCO remain in effect for two (2) years.

B3. The Co-operative Mustard Test

B3.1 Requirements for Entry

Candidate cultivars may be entered in the Co-operative Mustard Test by Canadian public institutions or through a private sector Canadian sponsor or breeder's agent. The sponsor must obtain approval from the Co-ordinator of the Co-operative Mustard Test. Requests for entry of the candidate cultivar must be received by the Test Co-ordinator by March 15 of each year and a three (3) year supply of seed for planting the trials must be provided to the Test Co-ordinator by April 15.

A minimum of three (3) station-years of data collected from valid replicated field trials in the mustard growing areas of western Canada is required. The data must indicate that the candidate cultivar has merit for agronomic performance and seed quality in comparison to the designated check cultivars indicated in *Sub-Appendix B4*. A minimum of one (1) station-year of valid data is required for blackleg and white rust reaction. The data must indicate that the candidate cultivar has merit for disease resistance in comparison to the designated check cultivars in *Sub-Appendix B4*.

The maximum number of entries in the Co-operative Mustard Test is 30 entries of *S. alba* including checks, and 30 entries of *B. juncea* including checks. If the maximum number of entries exceeds this limit, then submissions of supporting data from the candidate cultivar will be reviewed by the Test Co-ordinator. Merit will be considered as well as date of submission of supporting data.

B3.2 Testing Period

All candidate cultivars must be evaluated in the Co-operative Mustard Test for three (3) or more calendar years prior to recommendation by the PRCO.

B3.3 Test Co-ordinator and Co-operators

The Co-ordinator of the Co-operative Mustard Test is responsible for co-ordinating the movement of seed for test entries, generation of randomizations and field books, trial site inspection, data analysis, and production of a report for the PRCO. The Test Co-ordinator retains the prerogative to delegate these responsibilities to designated alternates. The current Test Co-ordinator and the designated alternates are listed in *Sub-Appendix B6*. Experimental protocols and the size of trials are communicated to sponsors and/or the breeder of candidate cultivars. Co-operators are then contacted and trial sites are arranged throughout the mustard growing areas of Saskatchewan, Alberta and Manitoba (*Sub-Appendix B1*).

Trial site management is the responsibility of each of the Co-operators. All trials are managed and harvested according to sound agronomic and scientific practices appropriate for each trial site. This includes using appropriate fertilizers and pesticides applied according to label recommendations.

All Co-operators are expected to conduct the trials in an ethical manner, allowing the Test Co-ordinator approved visitations to trial sites and making efforts to ensure the security and confidentiality of trials.

Trial sites are planted according to planting plans provided by the Test Co-ordinator. No additional lines may be added to the Co-operative Mustard Test and no additional testing may be done at the trial site(s) (*e.g.*, disease evaluation) without the approval of the Test Co-ordinator.

After seeding, the Co-operators will label the trial site and the first plot. Trial site information is supplied to the Test Co-ordinator or designated alternate(s) indicating trial site location, seeding date and any other relevant information specific to the trial site.

Currently, no “special management” practices will be performed for any candidate cultivar. If the breeder or sponsor can demonstrate the need for special management of a candidate cultivar, a new testing procedure may be considered.

B3.4 Data Collected

Information is collected on days to flower, plant height, resistance to lodging and days to maturity. Detailed instructions are available in *Sub-Appendix B1*. Problems associated with specific plots (*e.g.,* poor emergence, flooding) must be noted in the field books and relayed to the Test Co-ordinator.

Seed yields are obtained at all trial sites and are recorded to represent yields on a dry weight basis. Adjustments for moisture content should be indicated with the data collected. Sub-samples of 50 to 60 grams from each plot are sent to the Test Co-ordinator for determination of quality traits. Measurements of quality traits are determined using the methodologies outlined in *Sub-Appendix B2*. Disease reactions are determined by plant pathologists following the procedures outlined in *Sub-Appendix B3*.

B3.5 Check Cultivars

Check cultivars are included in the Co-operative Mustard Test as comparisons for agronomic and quality traits and disease reaction purposes. Check cultivars are determined by the Co-ordinator of the Co-operative Mustard Test based on recommendations by stakeholders. Changes in check cultivars must be approved by the PRCO. The current check cultivars are listed in *Sub-Appendix B4*.

Widely grown cultivars may remain in the Co-operative Mustard Test to provide additional information for provincial variety recommendation committees. Additional or alternate checks may be suggested when deemed appropriate. These changes would appear as amendments to the sub-appendices after acceptance by the Test Co-ordinator and the PRCO.

B3.6 Experimental Design

A four (4) replicate randomized complete block design experiment is used to evaluate agronomic and quality traits. However, a lattice design may be utilized if an appropriate number of entries are tested. Experimental design details for disease resistance testing are given in *Sub-Appendix B3*.

Plot size may vary from four (4) to six (6) rows in width and five (5) to seven (7) metres in length. The entire plot or only the centre rows may be harvested. Other modifications may be made as necessary at each location.

The seeding rate for *B. juncea* is 6 lbs/acre (1.1 g/plot or 200 seeds/6 m or 20 ft row); for *S. alba*, the appropriate seeding rate is 12 lbs/acre (2.1 g/plot or 200 seeds/6 m or 20 ft row). Adjustments for germination percentage and seed weight may be made if necessary.

B3.7 Seed Requirement and Seed Treatment

On the first year of entry, a 3 kg quantity of untreated seed must be provided to the Test Co-ordinator for each of the candidate cultivars being tested in the Co-operative Mustard Test. This allows for the same seed source to be used for all three (3) years of testing. If germination or vigour is low on the seed lot provided, it may be replaced after the first year of testing.

Co-operators retain the prerogative to treat seed for pest management purposes if it is deemed necessary at the trial site. If seed treatment is used, this information must be relayed to the Test Co-ordinator.

B3.8 Trial Inspection and Validation

It is the intent of the Co-ordinator of the Co-operative Mustard Test to inspect trials on an annual basis.

In order for a trial to be valid, the inspector must approve a minimum of three (3) replicates. For yield trials, plots must be a minimum of four (4) rows in width, and five (5) metres in length. A trial is considered non valid if visual inspection by the Test Co-ordinator or a Co-operator reveals unacceptable planting, emergence, soil gradient, pest or environmental problems. If a check cultivar has only two (2) acceptable plots in a trial, the entire trial shall be considered non valid and the data will not be included in the Co-operative Mustard report.

If a candidate cultivar has only two (2) acceptable plots in a trial, the data for that line or cultivar will not be used from that trial; however, data from the remaining entries that have a minimum of three (3) good replicates may be considered acceptable.

Data collected from a trial site will be considered valid if the overall coefficient of variation (C.V.) for plot and/or kg/ha yield is less than 16%. If the C.V. for yield is equal to or exceeds 16%, then data collected from the trial site will not be used in the Co-operative Mustard Test report. No quality analyses will be conducted on seed from such trials. If there were unusual circumstances (*e.g.*, wind blown swaths, hail damage) that contributed to the C.V. for yield exceeding 16%, and if the Co-operator is confident that agronomic observations are valid, then these agronomic observations may be included in the Co-operative Mustard Test report.

Blackleg disease evaluation trials will be considered valid when the mean severity rating for Westar is greater than or equal to 2.60 (scale: 0–5 where 0 = healthy, 5 = dead); a minimum of three (3) replicates must be approved. Westar is a *B. napus* canola cultivar highly susceptible to blackleg, and is included in the trials as a check to monitor disease pressure. In years where there is poor disease development in western Canada the use of data from trials with a rating for Westar exceeding 2.0 may be used. A white rust trial will be considered valid when the susceptible check has a disease incidence >90% for the appropriate race(s) of white rust.

B3.9 Fees

Currently, there is no fee associated with the testing of entries in the Co-operative Mustard Test. This Test is financially supported by the Saskatoon Research Centre of Agriculture and Agri-Food Canada, and the Canadian Mustard Association and its members. If there is a substantial increase in the number of entries in the Co-operative Mustard Test, then fees may be charged for quality testing of entries.

B3.10 Security of Entries

The Test Co-ordinator and Co-operators will take reasonable precautions to ensure the security of entries and will not distribute seed for purposes other than registration testing without the consent of the owner(s).

B4. Submission of Data for Support for Registration

B4.1 Years and Checks

The data submitted for consideration for support for registration must include all the valid data from all the years in which the entry was included in the Co-operative Mustard Test. Candidate cultivars must be compared to the designated check cultivar of similar type.

During all three (3) years in the Co-operative Mustard Test, a candidate cultivar shall be compared to the same check cultivar(s) that were in place in the year of initial entry into the Co-operative Mustard Test.

B4.2 Relevant Data

All relevant data, including screening and laboratory data judged to be acceptable and useful by the PRCO, may be used in support of registration in addition to official test data generated from the Co-operative Mustard Test. Data provided for Request for Support for Registration other

than official Co-operative Mustard Test data must be peer approved. Subsets of data from the Co-operative Mustard Test must be accurately represented and meet with the approval of the Test Co-ordinator, pathologists and chemist. Agronomic and quality data from trials grown outside the western Canadian mustard growing areas is not acceptable.

B4.3 Analyses of Data

Analyses of data to generate means over all locations and years of testing must utilize recognized statistical models that use the appropriate error term to generate standard error or least significant differences (LSD). Generally a two-tailed test is used.

B4.4 Performance and Definition of Merit

To receive support for registration, a candidate cultivar must show merit for agronomy, seed quality and disease reaction. The minimum standards are described in *Sub-Appendix B5*.

A candidate cultivar that shows merit is "equal to", "better than", or "superior to" current check cultivars. The category "equal to" is defined as the arithmetic equality to the check or mean of the checks. The category "better than" is defined as the arithmetic superiority to the check or mean of the checks with or without statistical significance. The category "superior to" is defined as statistically superior by a two-tailed test at a 5% level of significance.

If a candidate cultivar fails to meet the minimum standards for the traits normally considered for recommendation for registration of a condiment mustard variety, but shows a collection of other strengths in relation to the check(s) that are deemed to be of value to the Industry (*e.g.*, to develop new technologies, to respond to new pathogen threats, to create new market opportunities for specific oil and meal qualities, etc.), then this collection of traits must be considered by the PRCO when the sponsor of the candidate cultivar presents the support for registration data.

B4.5 Deadline

The breeder or sponsor of a candidate cultivar must provide a "Request for Support for Registration" and a written summary of the data to all voting members of the PRCO no later than seven (7) working days prior to the annual meeting of the PRCO. This time should allow PRCO members to consider the merit of the candidate cultivar proposed for registration prior to the PRCO meeting. The PRCO may refuse to consider a request on the grounds of late circulation, illegibility or inaccuracy of data.

In addition, a copy of the "Request for Support for Registration" and a written summary of the data should be sent to the Variety Registration Office (VRO) of the CFIA. The address is listed in Section B6. This is not a requirement, but rather a request from the VRO to allow efficient processing of documentation if a candidate cultivar has been supported for registration.

B4.6 Appeal of PRCO Recommendation

Appeals of PRCO recommendations on the suitability of candidate cultivars for registration are directed to the PGDC executive under the procedures set out in the PGDC Operating Procedures.

B5. Review of Procedures

The Operating Procedures for Registration of a Condiment Mustard Cultivar For Production in Western Canada (*Appendix B*) shall be reviewed and amended at least once every five (5) years or when necessary, at the discretion of the Co-ordinator of the Co-operative Mustard Test, based on recommendations made by stakeholders.

Check cultivar(s) and minimum standards for agronomic and quality traits, and disease reaction may be reviewed each year at the annual meeting of the PRCO and any of the other relevant sub-appendices may be modified accordingly.

B6. Registration Office

Based on information provided by the Co-operative Mustard Test and interpretation by the Evaluation Teams, a recommendation to "support" or "object to" the application for registration of a candidate cultivar shall be made.

The PRCO Secretary shall inform the Registrar of the VRO in writing, of the decision of the PRCO. Copies of the decision will be sent to the breeder or sponsor and the PRCO Chair. Copies of the statements from the Evaluation Teams shall be provided by the Secretary and sent to the breeder or sponsor and to the VRO.

Applications for registration of the recommended candidate should be submitted on the Variety Registration Application Form available from the VRO, or from the CFIA web site (www.inspection.gc.ca). The application, along with other required supporting documentation, reference samples and prescribed fees, must be sent to the address indicated below. For further information, refer to the most recent publication of the "Procedures for the Registration of Crop Varieties in Canada".

Variety Registration Office
Field Crops Division
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa, Ontario K1A 0Y9
Telephone: (613) 773-7146
Fax: (613) 773-7144

B7. Oilseed Mustards

The PRCO will not test oilseed *B. juncea* (*e.g.*, canola quality) lines and cultivars. This is the responsibility of the Western Canada Canola/Rapeseed Recommending Committee (WCC/RRC).

B8. Contract Registration

Contract registration is not to be used as a substitute for traditional forms of registration (full or interim) when the PRCO has objected to the registration of a candidate cultivar based on deficiency in merit. However, the PRCO may suggest that the candidate cultivar be considered for contract registration when there is rationale to do so. The Contract Registration Committee (CRC) may be required to consider the case and determine if the required conditions for contract registration have been met.

Contract registration is available for candidate cultivars where biochemical or biophysical characteristics distinguish them from the majority of registered cultivars of the same kind or species. It must be shown that these characteristics could compromise the end-use suitability of cultivars registered for traditional commodity markets. The sponsor of the candidate cultivar must demonstrate the possibility of industry harm if granted an unrestricted registration.

For more information regarding Contract Registration, refer to the VRO Contract Registration procedures.

SUB-APPENDIX B1 - Agronomy Evaluation Co-operative Mustard Test

SB1.1 Trials

At each trial site there are two trials, one for each species, *Sinapis alba* and *Brassica juncea*.

Each of the two trials is replicated and randomized, and the two trials must be treated separately. Species borders on the sides of each trial must be the same as the species in the trial.

SB1.2 Trial Sites

In western Canada, mustard production is best suited to the Brown and Dark Brown Soil Zones; however, there is limited acreage in the Black and Grey Zones. Saskatchewan is the primary production area, followed by Alberta and Manitoba. Trial sites are established to reflect the areas of production. Specific locations are selected on an annual basis, depending on the Co-operator and land availability.

SB1.3 Measurement and Rating Scales

SB1.3.1 Height

A minimum of two measurements of plant height is taken in each plot; the average is determined and expressed in centimetres (cm).

SB1.3.2 Lodging

A visual rating scale is used to measure resistance to lodging:

1 to 5 (1 = completely erect, 5 = completely lodged, flat on ground)

SB1.3.3 Maturity

Maturity is the number of days from date of seeding to swathing maturity. Swathing maturity is reached when the seeds are firm when pressed between the fingers, which represents a moisture content of about 25%. The lower pods will have changed colour, but the upper pods may be green. At this time, 60% of the seeds in the pod have started to change colour to reddish brown in brown mustard and 75% of the seeds will have turned yellow in oriental mustard. Yellow mustard is fully mature when the plot is free of green seed.

N.B. The use of a desiccant is an undesirable method for the Co-operative Mustard Test, but if it is necessary, then the desiccant must be applied to the yellow mustard when at least 60–70% of the seeds within the pod have reached their mature colour.

SB1.3.4 Yield

Plot yield at each site is measured, adjusted to dry weight and harvest area if different from seeded area, and expressed as kg/ha and yield relative to the designated check(s).

SB1.3.5 Seed Weight

Seed weight is determined on a randomly selected sample of 500 counted seeds dried to <5% moisture content, measured as grams per 500 seeds, and then adjusted to 1,000 kernel weight and expressed as grams per 1,000 seeds.

Height, Lodging (when differences occur among entries), Maturity and Yield are determined on all four replicates from valid trials.

Seed Weight is determined on a minimum of two (2) replicates from trials with acceptable C.V. for yield. If the number of trials throughout western Canada exceeds the required number for a given year, then seed weight will be determined on trials with the lowest C.V. for yield.

SB1.4 Trial Sites for Evaluation of Agronomic Traits

Agronomic traits are measured only on valid trials.

A minimum of twenty-one (21) station-years of agronomic data collected over three (3) or more calendar years is required.

All reasonable attempts will be made to collect agronomic data from a minimum of seven (7) valid trials per year. If the number of valid trials in any given year is fewer than seven (7), then the deficient trials may be made up in another year of the Co-operative Mustard Test, provided that a minimum of five (5) valid trials in each year is used.

SUB-APPENDIX B2 - Quality Evaluation Co-operative Mustard Test

SB2.1 Seed Quality Traits to be Measured

SB2.1.1 Oil Content

Oil content is determined by near infrared spectroscopy (NIRS) using measurements calibrated against the nuclear magnetic resonance method adapted for use in mustard from the American Oil Chemist Society (A.O.C.S.) recommended practice (Ak 3-94) - Oil Content of Rapeseed by Nuclear Magnetic Resonance. Results are reported as percent whole seed, calculated on a dry weight basis.

SB2.1.2 Protein Content

Protein content is determined by near infrared spectroscopy (NIRS) using measurements calibrated against the Dumas Combustion method adapted for mustard from the A.O.C.S. Official Method Ba 4e-93. Total nitrogen content of the seed is measured and the value is multiplied by a correction factor of 6.25 (N × 6.25) to give a value for protein. Results for protein are reported as percent whole seed on a dry weight basis.

SB2.1.3 Glucosinolates

The glucosinolate content is determined by capillary gas chromatography of the trimethylsilyl derivatives of extracted and purified desulfoglucosinolates (Sosulski and Dabrowski 1984). Intact glucosinolates are extracted from the seed using 67% methanol and purified via the ion-exchange chromatography and "on-column" enzymatic method of Thies (1980). Preparation of trimethylsilyl derivatives utilizes the acetone and 1-methylimidiazole based method of Landerouin et al. (1987). Benzyl glucosinolate is used as the internal standard. Potential allyl isothiocyanate evolution (synonyms: AITC, volatile oil) is reported for oriental and brown mustard as mg/g on a seed (8.5% moisture) basis. It is based on a direct conversion of the measured allyl glucosinolate content to an equivalent value for allyl isothiocyanate.

References:

Landerouin, A., Quinsac, A. and Ribailler, D. (1987) Optimization of silation reactions of desulfoglucosinolates before gas chromatography. World Crops: Production, Utilization, Description 13:26–37.

Sosulski, F. and Dabrowski, K.J. (1984) Determination of glucosinolates in canola meal and protein products by desulfation and capillary gas-liquid chromatography. J. Agric. Food Chem. 32:1172–1175.

Thies, W. (1980) Analysis of Glucosinolates via "on-column" desulfation. Proc. Symposium "Analytical Chemistry of Rapeseed and its Products", Winnipeg, Canada. pp. 66–71.

SB2.1.4 Seed Colour

Seed colour is determined by near infrared spectroscopy (NIRS) using measurements calibrated against the HunterLab colour system. The calibrated index of reflectance that best describes the darkness and purity of the brown colour of the seed coat and/or meal and the brightness or intensity of the yellow colour is used.

SB2.1.5 Mucilage Content

Mucilage content is determined by measurement of the viscosity of the mucilage released from the seed. Mucilage content is reported in Centistokes(Cs) × ml/g seed.

SB2.1.6 Green Seed

The number of green seeds is determined by a subjective measurement of the number of distinctly green seeds after a random sample of 1,000 seeds has been crushed with a roller. Results are reported on a percentage basis.

SB2.1.7 Chlorophyll

Chlorophyll content is determined by a spectrophotometric method adapted for mustard seed from the A.O.C.S. official method Ak 2-92 - Determination of chlorophyll content in rapeseed (Colza) by spectrophotometry. The results are reported as mg/kg on a seed (tel que) basis.

The above methods of measuring the required seed quality traits may be modified, or new methods utilized, as they are developed and accepted as providing equivalent or better data to the above described methods.

Other seed quality traits that may be viewed as important characteristics for condiment mustard will be added to the list of required seed quality analyses when appropriate testing methods have been developed and accepted. These modified and additional measurements of seed quality will then be presented as an amendment to *Sub-Appendix B2*.

Quality data will be collected from a minimum of two (2) separate replicates for each of the traits, using the same two replicates whenever possible.

SB2.2 Trial Sites for Evaluation of Quality Traits

Measurement of quality traits is done only for valid trials with acceptable C.V. for yield.

A minimum of twenty-one (21) station-years of quality data collected over three (3) or more calendar years is required. Refer to *Sub-Appendix B1*, Section B1.4 (Trial Sites for Evaluation of Agronomic Traits) for more detail.

SUB-APPENDIX B3 - Disease Evaluation Co-operative Mustard Test

SB3.1 Procedures for Blackleg (*Leptosphaeria maculans*; anamorph: *Phoma lingam*) Evaluation

Candidate cultivars of *Brassica juncea* (brown and oriental mustard) and *Sinapis alba* (yellow mustard) are evaluated for resistance to blackleg of crucifers in comparison to designated check cultivars in field nurseries naturally infested with *L. maculans*. Separate trials are conducted for the *B. juncea* and *S. alba* entries. Westar, a *B. napus* canola cultivar highly susceptible to blackleg, is also included in each trial as a check to monitor disease pressure.

For each trial, single (1) or two (2) row plots of each entry are sown in a randomized complete block with four (4) replicates; rows are at least three (3) metres long and contain 100 seeds/3 m. Planting is normally done during mid to late May. Additional rows of Westar may also be sown in each trial as indicators of disease pressure and uniformity of inoculum, and to provide a source of secondary (pycnidiospore) inoculum. Additional pycnidiospore inoculum from agar cultures of *P. lingam* may be sprayed on the plants at the 2–3 leaf stage. Plots may be irrigated with overhead sprinklers as required to maintain moisture conditions conducive to blackleg.

The severity of blackleg infection is evaluated on a minimum of 25 plants per entry in each replicate after the plants are fully podded and just beginning to ripen. In trials having only three (3) good replicates, 35 plants per replicate must be evaluated for each entry. Plants are uprooted, cut through the hypocotyl and/or tap root, and blackleg severity is scored for each plant using the following scale based on the area of diseased tissue in the cross-section:

0 = No diseased tissue visible in the cross-section.
1 = Diseased tissue occupies less than or equal to 25% of cross-section.
2 = Diseased tissue occupies 26% to 50% of cross-section.
3 = Diseased tissue occupies 51% to 75% of cross-section.
4 = Diseased tissue occupies more than 75% of cross-section with little or no constriction of affected tissues.
5 = Diseased tissue occupies 100% of cross-section with significant constriction of affected tissues; tissue dry and brittle; plant dead.

Mean blackleg severity is calculated for each combination of replicate and entry as follows:

$$\text{Blackleg severity} = \frac{\sum [(\text{Numerical value of disease category}) \times (\text{Number of plants in disease category})]}{[\text{Total number of plants in all disease categories}]}$$

Mean blackleg severity values over all replicates are reported for each entry.

The minimum requirement for blackleg reaction to support a recommendation for registration of a *B. juncea* (brown and oriental mustard) or a *S. alba* (yellow mustard) candidate cultivar is disease severity less than or equal to the designated check for each type of mustard (*Sub-Appendix B4* and *Sub-Appendix B5*). All designated checks are highly resistant to blackleg.

SB3.2 Procedures for White Rust (*Albugo candida*) Evaluation

Candidate cultivars of *B. juncea* (brown and oriental mustard) are evaluated for resistance to race 2a of *A. candida* in comparison to designated check cultivars; additional testing with race 2v may also be conducted.

Candidate cultivars of *S. alba* (yellow mustard) are evaluated for resistance to races 2 and 7 of *A. candida* in comparison to designated check cultivars. Evaluations are conducted with races 2v and 7v since these are currently the most prevalent races in western Canada; additional testing with races 2a and 7a may also be conducted.

All trials are conducted in controlled environment chambers. Separate trials are conducted for each race of white rust, and each trial includes appropriate checks to monitor race purity.

The severity of white rust infection is evaluated on a minimum of 100 plants per entry for each race of *A. candida*. A suspension of zoospores (10^4 zoospores/mL) from germinated sporangia is applied to the plants using one of the following methods:

a) A 10 µl droplet of the zoospore suspension is applied to each cotyledon 6–7 days after planting.
b) The zoospore suspension is sprayed onto the seedlings 12–14 days after planting, when the first true leaf is expanding.

Immediately following inoculation, plants are incubated in a misting chamber (100% RH) in the dark for 24–48 hours. White rust severity is scored for each plant 7–8 days (cotyledon) or 10 days (leaf) after inoculation using the following scale:

0 = No visible symptoms on either leaf surface.
1 = Small, pinpoint to larger brown necrotic flecks under the point of inoculation on upper surface, occasionally necrosis extending to lower epidermis. No sporulation.
3 = Very sparse, one to few, minute scattered pustules on upper surface. None to very few pustules on lower surface. Lesions usually have chlorosis and/or necrosis.
5 = Few to many scattered pustules on upper surface. None to few scattered pustules on lower surface. Pustules sometimes have a chlorotic halo.
7 = Many to few pustules on upper surface. Many scattered small to larger pustules on lower surface.
9 = Very few to no pustules on upper surface. Many large coalescing pustules on lower surface.

Mean white rust severity is calculated for each entry as follows:

$$\text{White rust severity} = \frac{\sum [(\text{Numerical value of disease category}) \times (\text{Number of plants in disease category})]}{[\text{Total number of plants in all disease categories}]}$$

Mean white rust severity values are reported for each entry. The mean percentage of infected plants (disease incidence; includes plants with disease scores of 3 or more) may also be provided.

The minimum requirement for white rust reaction to support a recommendation for registration of a *B. juncea* (brown mustard) candidate cultivar is disease severity less than or equal to the designated check for race 2a (*Sub-Appendix B4* and *Sub-Appendix B5*). The designated check is susceptible (2011) or resistant (from 2012 onwards) to race 2a. Resistance requirements for race 2v will be established when cultivars resistant to this race are commercialized.

The minimum requirement for white rust reaction to support a recommendation for registration of a *B. juncea* (oriental mustard) candidate cultivar is disease severity less than or equal to the designated check for race 2a (*Sub-Appendix B4* and *Sub-Appendix B5*). The designated check is resistant to race 2a. Resistance requirements for race 2v will be established when cultivars resistant to this race are commercialized.

The minimum requirement for white rust reaction to support a recommendation for registration of a *S. alba* (yellow mustard) candidate cultivar is disease severity less than or equal to the designated check for races 2 and 7 (*Sub-Appendix B4* and *Sub-Appendix B5*). The designated check is moderately resistant to races 2a, 2v, 7a, and 7v.

SB3.3 Other Diseases

Alternaria black spot: This disease is prevalent on *B. juncea* mustard. All currently registered cultivars of brown and oriental mustard are susceptible to this disease. No minimum standards can be established until reliable sources of resistance/tolerance are identified and become available to breeding programs. All currently registered cultivars of yellow mustard are moderately resistant to this disease.

Sclerotinia stem rot: This disease attacks all members of the Brassicaceae. All currently registered cultivars of brown, oriental, and yellow mustard are susceptible to this disease. No minimum standards can be established until reliable sources of resistance/tolerance are identified and become available to breeding programs.

Other diseases such as seedling blight, root and foot rot, aster yellows, and downy mildew are of minor importance. There are currently no guidelines or standard requirements for these diseases in the evaluation of candidate cultivars.

SB3.4 Trial Sites for Evaluation of Disease Resistance

A minimum of three (3) station-years of valid blackleg resistance data collected over two (2) or more calendar years, and a minimum of two (2) station-years of valid white rust resistance data collected over two (2) or more calendar years, are required for recommendation for registration of a condiment mustard variety.

The blackleg and white rust resistance data provided to the Co-ordinator of the Co-operative Mustard Test to satisfy the entry requirements of a candidate cultivar into the Co-operative Mustard Test shall be considered the first station-year of valid data toward satisfying the total data requirement for the candidate cultivar in the Co-operative Mustard Test. If more than one (1) station-year of valid data are provided to satisfy the entry requirements, an average shall be calculated such that the data are considered a single station-year. Candidate cultivars must be entered into the Co-operative Mustard disease resistance trials starting the year in which they first enter the Co-operative Mustard Test.

SUB-APPENDIX B4 - Designated Check Cultivars for the Co-operative Mustard Test

Cultivars that have significant commercial production in the condiment mustard growing areas of western Canada are generally chosen as checks. Checks will include established cultivars, special purpose cultivars or recent cultivars of superior merit. Changes in check cultivars must be approved by the PRCO. A candidate cultivar will be compared to the appropriate check cultivar(s) in place at the time the candidate cultivar is first entered into the Co-operative Mustard Test; assigned check(s) will remain with the candidate cultivar for the duration of testing.

SB4.1 Yellow Mustard (*Sinapis alba*)

The current check cultivar for yellow mustard is AC Pennant. The check cultivar for yellow mustard candidate cultivars first entering the Co-operative Mustard Test in 2014 is Andante.

SB4.2 Oriental Mustard (*Brassica juncea*)

The current check cultivar for oriental mustard is Cutlass.

SB4.3 Brown Mustard (*Brassica juncea*)

The current check cultivar for agronomy and quality for brown mustard is Duchess. The check cultivar for agronomy and quality for brown mustard candidate cultivars first entering the Co-operative Mustard Test in 2014 is Centennial Brown.

The current check cultivar for blackleg and white rust resistance for brown mustard is Duchess. The check cultivar for blackleg and white rust resistance for brown mustard candidate cultivars first entering the Co-operative Mustard Test in 2012 is Amigo.

SUB-APPENDIX B5 - Minimum Standards for Condiment Mustard Cultivar Registration

To receive support for registration, a candidate must show merit. A candidate that shows merit is "equal to", "better than" or "superior to" current check cultivars.

If a candidate cultivar fails to meet the minimum standards for the traits normally considered for recommendation for registration of a condiment mustard variety, but shows a collection of other strengths in relation to the check(s) that are deemed to be of value to the Industry (*e.g.*, to develop new technologies, to respond to new pathogen threats, to create new market opportunities for specific oil and meal qualities, etc.), then this collection of traits must be considered by the PRCO when the sponsor of the candidate cultivar presents the support for registration data.

Agronomic and quality data collected over a minimum of three (3) calendar years and twenty-one (21) station-years from valid trials, blackleg resistance data collected over a minimum of two (2) calendar years and three (3) station-years from valid trials, and white rust resistance data collected over a minimum of two (2) calendar years and two (2) valid trials, are required for consideration for recommendation for registration of a candidate cultivar.

Valid trial sites for evaluation of agronomic and quality traits shall be representative of the mustard growing areas of western Canada and have a C.V. for yield less than 16%.

Agronomic and quality data from a minimum of seven (7) valid trials per year shall be collected, whenever possible, to ensure that candidate cultivars have enough data to meet this minimum standard. If the number of valid trials in any year is lower than seven (7), then the deficient trials may be made up in another year of Co-operative Mustard testing; however, data from a minimum of five (5) valid trials in any given year is required.

Agronomic traits considered for merit evaluation include: Yield.

Quality traits considered for merit evaluation include: Oil content (fixed oil for *B. juncea* only), protein content, glucosinolate content (for *B. juncea* only), mucilage content (for *S. alba* only), chlorophyll and/or green seed content (*B. juncea* only). Seed weight and seed uniformity are traits that may be measured and reported in the Co-operative Mustard Test, but merit consideration is not required for these traits.

Resistance to blackleg and white rust diseases is considered in evaluation for merit. Refer to *Sub-Appendix B3* for the different pathogen races for the different mustard species.

a) Brown mustard (*Brassica juncea*)
   Blackleg - highly resistant; equivalent to but not more susceptible than the designated check (*Sub-Appendix B4*)
   White rust - susceptible (2011) or resistant (from 2012 onwards) to race 2a; equivalent to but not more susceptible than the designated check (*Sub-Appendix B4*)

b) Oriental mustard (*Brassica juncea*)
   Blackleg - highly resistant; equivalent to but not more susceptible than the designated check (*Sub-Appendix B4*)
   White rust - resistant to race 2a; equivalent to but not more susceptible than the designated check (*Sub-Appendix B4*)

c) Yellow mustard (*Sinapis alba*)
   Blackleg - highly resistant; equivalent to but not more susceptible than the designated check (*Sub-Appendix B4*)
   White rust - moderately resistant to races 2 and 7; equivalent to but not more susceptible than the designated check (*Sub-Appendix B4*)

SUB-APPENDIX B6 - Current Co-operative Mustard Test Co-ordinator, Chemist and Pathologists

SB6.1 Test Co-ordinator and Designated Alternate

Co-ordinator:
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Agriculture and Agri-Food Canada
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107 Science Place
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Designated Alternate:
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SB6.2 Agronomy Evaluation

Plant Breeder:
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SB6.3 Quality Evaluation

Chemist:
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SB6.4 Disease Resistance Evaluation

Pathologists:
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PRAIRIE RECOMMENDING COMMITTEE FOR OILSEEDS (PRCO)

APPENDIX C

Operating Procedures for the Registration of a Flax Cultivar for Production in Western Canada

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PRAIRIE RECOMMENDING COMMITTEE FOR OILSEEDS (PRCO)

APPENDIX C

Operating Procedures for the Registration of a Flax Cultivar for Production in Western Canada

C1. Background

There are two types of flax grown in western Canada brown and yellow linseed which have high linolenic acid oil used for industrial and edible purposes.

C2. The Prairie Recommending Committee for Oilseeds (PRCO)

The Prairie Recommending Committee for Oilseeds (PRCO) is the recommending body for registration of brown and yellow linseed. Recommendation for support of registration will be based on data from the Brown Linseed Flax Co-operative Trial, the Yellow Linseed Flax Co-operative Trial and the Northern Linseed Flax Co-operative Trial. To obtain this recommendation, the candidate cultivar must be evaluated in one of the Co-operative trials usually for a minimum of two (2) years and meet the minimum standards (*Sub-Appendix C4, Sub-Appendix C5* and *Sub-Appendix C6*) which demonstrate agronomic, quality and disease resistance acceptability and merit.

In order for a line to be evaluated in the Flax Co-operative trials, the sponsor of the candidate must obtain approval from the Flax Evaluation Committee. The Flax Evaluation Committee is made up of voting members of PRCO who are actively involved in the production, development and/or evaluation of potential flax cultivars for western Canada. Lines may be entered in the trial by Canadian public institutions or private breeding institutions, through a private sector Canadian sponsor or breeder's agent.

C3. The Co-operative Flax Trials

C3.1 Requirements for Entry into the Flax Co-operative Trials

A minimum of six (6) station-years of data collected from scientifically sound replicated field trials is required from locations in the major flax growing areas of Canada. The data must show that the potential candidate meets, at least, the minimum requirements for end-use suitability/ market place identification, disease reaction and agronomic performance as determined by its performance relative to appropriate check cultivars. Cultivars used as checks must include the designated check cultivars from the appropriate Co-operative Trial. Agronomic data in comparison to the appropriate check cultivars must include grain yield data from six (6) station-years; days to maturity, plant height, and 1000 seed weight from at least three (3) station-years; oil content and oil quality from at least two (2) station-years. Data is also required for reaction to rust and fusarium wilt and the testing procedure outlined in *Sub-Appendix C3* should be followed. (Testing for rust and fusarium wilt can be arranged by contacting the flax pathologist at Agriculture and Agri-Food Canada at the Morden Research Station; cost of such testing will follow cost recovery guidelines.)

Additional data for all of the above parameters may be useful especially when it becomes necessary to eliminate entries due to lack of space in the Trial. The maximum number of entries

is limited to 36 in the Brown Linseed Flax Co-operative Trial, the Yellow Linseed Flax Co-operative Trial and the Northern Linseed Flax Co-operative Trial. In the event that requests for entry exceed that total, the Flax Evaluation Committee will determine which entries will be included. The decision will be based on the merits of the potential entry relative to the appropriate check as determined by the data submitted for the entry and on an equitable and fair allocation of entry number. Requests for entry with the necessary supporting data must be supplied to the respective Trial Co-ordinator at least one (1) week prior to the annual meeting of the PRCO.

C3.2 Security of Entries

Breeding lines and non-released cultivars received from private or public sector plant breeders will be released only under conditions specified by the breeder or Canadian breeder agent. The professional code of ethics as developed by the Cultivar Registration Committee will be strictly followed by all individuals involved in the Co-operative testing and the cultivar registration process.

C3.3 Flax Co-operative Trial Procedure

C3.3.1 Trial Period

All candidates must be evaluated in the Co-operative Trial for two (2) years prior to consideration by the PRCO for support for registration.

C3.3.2 Trial Co-ordinator/Associate Trial Co-ordinator

The Co-ordinator of the Linseed Flax Co-operative Trial prepares lists of checks and candidate cultivars, experimental protocols and variables to be assessed (agronomic, quality and diseases) and verifies with owners of candidates. The Trial Co-ordinator organizes disease testing with the flax plant pathologist of Agriculture & Agri-Food Canada, prepares randomized designs, field books, packages seed for both agronomic testing and disease evaluation, distribution of packaged seed, harvest labels, electronic files, multiplication of seed of checks and candidates, receiving, cleaning, processing grain samples, measuring seed size, preparing subsamples and composites for oil content, fatty acid composition, and protein content, conducts quality evaluation, entering, analyzing, summarizing data on agronomic traits, writing and distributing the Co-operative Trial reports. Co-ordinators will be named for the Brown Linseed Flax Co-operative Trial, the Yellow Linseed Flax Co-operative Trial and the Northern Linseed Flax Co-operative Trial.

C3.3.3 Co-operator

The Co-operative trials are conducted at up to eleven (11) locations (*Sub-Appendix C1*) throughout the major flax growing areas of the prairies. Individual trial management is the responsibility of the co-operators, all trials are managed and harvested according to the standard and sound agronomic and scientific practices as appropriate for each site. At the present time, no “special management” practices can be performed for any candidate cultivar. If the need for special management of a cultivar candidate can be demonstrated by the sponsor, a new testing procedure may be developed.

C3.3.4 Data Collected

Seed yields are obtained at all sites. There will be a minimum of two replications per entry. Other information is collected where appropriate and feasible, including days to maturity, resistance to lodging, and plant height. Seed from each plot will be sent to the Trial Coordinator for determination of 1000 seed weight, seed colour, oil, fatty acid, iodine number and protein content. The quality determinations are carried out at the AAFC-Morden Research Station using

the methodology outlined in *Sub-Appendix C2*. Reaction to rust and fusarium wilt are determined by the plant pathologist at the AAFC-Morden Research Station following the procedures outlined in *Sub-Appendix C3*. Data from each co-operator must be sent to the Co-ordinator by November 15. We would prefer receiving the data in electronic form. All seed samples must be sent to the appropriate Co-operative Trial Co-ordinator by November 30. Data/seed sent after these deadlines may not be included in the Co-operative Trial Report.

C3.3.5 Check Cultivars

Check cultivars are included for agronomic, quality or disease resistance purposes, and normally include the best available registered cultivars for the main flax growing regions of western Canada. Check cultivars are determined annually by the Flax Evaluation Committee (see *Sub-Appendix C1* for current check cultivars).

C3.3.6 Experimental Design

A lattice design will be used, but a randomized complete block design may be employed if the number of entries does not allow for a lattice design. All yield and disease trials contain three replications. Yield trials vary from 3–8 rows, 3–6 m in length, with 23 or 30 cm row spacing. The entire plot or only the centre rows may be harvested; other modifications may be made as necessary at each location. The seeding rate used for brown linseed flax entries is equivalent to 40 lbs per acre adjusted for germination. All yellow linseed entries will use a seeding rate of 45 lbs per acre adjusted for germination. The appropriate coordinator is responsible for seed set-up, randomization and supplying field books to Co-operators.

C3.3.7 Continuation of Testing

Retention of entries for further testing is subject to approval by the Flax Evaluation Committee, especially in situations where space in the trial is limited. Judgment of merit of the entry for retention will be based on the data collected during the previous year(s) of the Linseed Flax Co-operative Registration trials.

C3.3.8 Seed Requirement

Four and a half kilograms of untreated seed is required for first year entry into the trial. Seed for the second year of testing is produced annually in a common increase by the trial coordinator. The appropriate Trial Coordinator will annually multiply seed for the second year of the Brown Linseed Flax Co-operative Trial, the Yellow Linseed Flax Co-operative Trial and the Northern Linseed Flax Co-operative Trial. All seed entered in all trials, both first and second year entries, will be tested prior to seed setup for presence/absence of CDC Triffid by the sponsor. If an entry is shown to be contaminated (positive/present) to any level for the presence of CDC Triffid, the sponsor will be asked to replace the source of seed with a clean source of seed of the entry or provide an alternative entry which has shown to be uncontaminated. Additionally, a copy of the certificate will be provided to the co-ordinator(s) by the sponsor. The sponsor of an entry is advised to have on hand a 6 kg seed supply in case the Co-operative Trial increase is lost.

C3.3.9 Seed Treatment

Seed treatment will not be used. No treated seed will be accepted in the Brown Linseed Flax, Yellow Linseed Flax, or the Northern Linseed Flax Co-operative Trials.

C3.3.10 Trial Inspection

It is the intent of the Co-operative Trial Co-ordinator and/or other members of the Flax Workers group to inspect trials on an annual basis. A trial is considered non-valid if visual inspection by a Co-operator, or Trial Co-ordinator reveals unacceptable planting, emergence, soil gradient, pest or environmental problems. A trial is considered valid if the overall coefficient of variation for

yield is 15% or less; for C.V.'s over 15%, all agronomic and quality data will be eliminated for that location and year. Only in exceptional circumstances would this 15% guideline be waived.

C3.3.11 Fees

The Flax Evaluation Committee reserves the right to charge fees for the entry of candidate cultivars, in order to cover the cost of trial management and quality analysis and disease evaluation. Such fees will be negotiated with the sponsor when necessary.

C4. Submission of Data for Support of Registration

C4.1 Years and Checks

The data submitted for consideration for support for registration must include all the valid data from all the years in which the entry was included in the Flax Co-operative Trial. Candidate cultivars should be compared to the appropriate check variety within the co-operative trial entered. If possible, the check cultivar should have the same commercial application. During the years in the trial, an entry should be compared to the same check cultivar(s). That is, an entry in year 2 of the trial should be evaluated against the same check cultivar(s) against which it was evaluated in year 1.

C4.2 Relevant Data

All relevant data, including screening and laboratory data judged to be acceptable and useful by the PRCO, may be used in support of registration in addition to official trial data. Replicated, pre-Co-operative field data will be attached with the Co-operative data when soliciting support for variety registration. This pre-Co-operative data will be collected and reported in the same manner as the Flax Co-operative Trial report (*i.e.*, yield, maturity, height, etc.) and entries will be compared with the same check(s) as the Co-operative Trial. Agronomic data from trials outside the Canadian flax growing areas is not normally acceptable. When appropriate, market acceptability or pilot scale trial data are considered in support of registration; this may include letters of support from growers associations, provincial special crops or oilseeds committees, seed growers associations, contractors and buyers.

C4.3 Performance

To obtain support for registration, the minimum standard is overall performance of equal or better than the check cultivars with which the candidate has been compared during the two (2) years of testing (see *Sub-Appendix C4*, *Sub-Appendix C5* and *Sub-Appendix C6* for minimum standards). It is recognized that certain criteria are mandatory for certain regions or market classes and that minor deficiencies in certain parameters may be outweighed by advantages in others.

The principle of merit is used by the members of the PRCO in their decision regarding the support of a candidate for registration. The candidate cultivar must demonstrate merit when compared to the check and other registered cultivars. A candidate cultivar is considered superior if it is significantly higher yielding than the designated check cultivar for the Co-operative Trial (minimum standard). In addition, the candidate cultivar must be immune to rust and meet the minimum standards for oil content, oil quality and resistance to fusarium wilt as indicated by the designated check cultivars (see *Sub-Appendix C4*, *Sub-Appendix C5,* and *Sub-Appendix C6*). The candidate cultivar can be equal to the appropriate designated check cultivar in yield if the candidate is superior in oil content, oil quality, has earlier maturity or improved resistance to wilt and rust (new resistance gene or multigenic resistance), or other desirable attributes. A candidate has merit when, considering all traits including agronomic performance, disease resistance and end-use suitability, it has the potential to provide an advantage to the

producer or consumer in terms of production or marketing. The sponsor must demonstrate that the candidate cultivar has the desired end-use characteristics for its intended market class.

A candidate cultivar may be supported for registration based on performance advantage in a particular area of Canada and need not excel across the whole region. However, the decision to support a candidate cultivar for registration on a regional basis rests with the committee, and it is necessary for the sponsor to convince the committee of this "special" adaptation and that sufficient data exists over enough station-years to support the case.

C4.4 Deadline

An electronic or written summary of the data and the request for support for registration must be received by all members of the evaluation teams within the PRCO, specifically the Breeding, Agronomy & Production, Disease, and Quality & End-use evaluation teams, members of the Executive Committee of the PRCO and the Variety Registration Office, Plant Health and Production Division, Canadian Food Inspection Agency, 59 Camelot Drive, Ottawa, Ontario, K1A 0Y9 no later than the Monday, one (1) week prior to the annual meeting of the PRCO in February to be considered for support for registration.

C4.5 Registration Office

Once a candidate cultivar has been supported for registration, both the sponsor and the PRCO Secretary submit the data summaries, along with the copies of letters of support from the PRCO, to the Variety Registration Office, Field Crops Division, Canadian Food Inspection Agency, 59 Camelot Drive, Ottawa, Ontario, K1A 0Y9.

C5. Review of Guidelines

The guidelines shall be reviewed and amended where necessary at the discretion of the Flax Evaluation Committee at least once every five years. Amendments shall require the majority vote of the Flax Evaluation Committee. The check cultivars and locations in the Co-operative Trials and minimum standards for agronomic characters, oil content and quality and disease will be reviewed each year at the Prairie Recommending Committee for Oilseeds meeting.

C6. Specific Evaluations

Candidates entered and retained in the Flax Co-operative Trials will have sufficient merit compared to check cultivars to warrant their consumption of limited research resources. This co-operating group, the Trial Co-ordinator and the Associate Trial Co-ordinator, have a collective responsibility to manage the Linseed Flax Co-operative Trials to ensure unbiased and accurate testing of candidates.

SUB-APPENDIX C1 - Agronomic Evaluation for the Linseed Flax Co-operative Trials

I. Brown Linseed Flax Co-operative Trial

A. Co-ordinator:

Dr. Scott D. Duguid
Agriculture and Agri-Food Canada
Morden Research Station
Unit 100 - 101 Route 100
Morden, Manitoba R6M 1Y5
Tel: (204) 822-7232
Fax: (204) 822-7207
Email: scott.duguid@agr.gc.ca

B. Check Cultivars:

Flax - Flanders, CDC Bethune

C. Trial Sites:

1. **Co-operative Trial**
   Zone 1- Black & Grey Soil Zones (Longer Growing Season)
   Manitoba – Morden AAFC, Brandon South AAFC
   Saskatchewan – Indian Head AAFC

   Zone 2 - Brown Soil Zone
   Saskatchewan – Regina AAFC, Strasbourg VT, Moose Jaw VT, Saskatoon U of S, Floral U of S

   Zone 3 - Black and Grey Soil Zone (Shorter Growing Season)
   Saskatchewan – Lake Lenore VT, Melfort U of S
   Alberta – Vegreville VT

   Zone 4 – Eastern Canada
   Quebec – St-Mathieu-de-Beloeil

D. Measurement and Rating Scale:

Yield - Yield at each station will be calculated and expressed in three ways:

1. >00 kg/ha
2. % of CDC Bethune
3. rank of entries calculated

Maturity - days from time of seeding to 75% brown boll stage

Height of main stem - cm

Lodging: 1–9 (1 = no lodging; 9 = completely lodged)

Seed weight - g/1000 seeds

E. Sites for measurement of:

Yield and Maturity:	All sites.
Height and Seed Weight:	Two (2) sites from Zone 1 (Morden, Brandon South), two (2) sites from Zone 2 (Strasbourg, Saskatoon), two (2) sites from Zone 3 (Melfort, Vegreville).
Lodging:	All sites reporting significant lodging.

Where a location has a C.V. for yield over 15%, height and seed weight analysis will not be conducted on that location but an alternate location from that particular zone will be chosen and reported in the Brown Linseed Flax Co-operative Trial Report.

II. Yellow Linseed Flax Co-operative Trial

A. Co-ordinator:

Dr. Helen Booker
Crop Development Centre
University of Saskatchewan
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Saskatoon, Saskatchewan
S7N 5A8
Tel: (306) 966-5878
Fax: (306) 966-5015
Email: helen.booker@usask.ca

B. Check Cultivars:

Flax – CDC Bethune, Flanders

C. Trial Sites:

1. **Co-operative Trial**
   Zone 1- Black & Grey Soil Zones (Longer Growing Season)
   Manitoba – Morden AAFC, Brandon South AAFC
   Saskatchewan – Indian Head AAFC

   Zone 2 - Brown Soil Zone
   Saskatchewan – Regina AAFC, Strasbourg VT, Moose Jaw VT, Saskatoon U of S, Floral U of S

   Zone 3 - Black and Grey Soil Zone (Shorter Growing Season)
   Saskatchewan – Lake Lenore VT, Melfort U of S
   Alberta – Vegreville VT

Zone 4 – Eastern Canada
Quebec – St-Mathieu-de-Beloeil

D. Measurement and Rating Scale:

Yield - Yield at each station will be calculated and expressed in three ways:

1. >00 kg/ha
2. % of CDC Bethune
3. rank of entries calculated

Maturity - days from time of seeding to 75% brown boll stage

Height of main stem - cm

Lodging: 1–9 (1 = no lodging; 9 = completely lodged)

Seed weight - g/1000 seeds

E. Sites for measurement of:

Yield and Maturity:	All sites.
Height and Seed Weight:	Two (2) sites from Zone 1 (Morden, Brandon South), two (2) sites from Zone 2 (Strasbourg, Saskatoon), two (2) sites from Zone 3 (Melfort, Vegreville).
Lodging:	All sites reporting significant lodging.

Where a location has a C.V. for yield over 15%, height and seed weight analysis will not be conducted on that location but an alternate location from that particular zone will be chosen and reported in the Yellow Linseed Flax Co-operative Trial Report.

III. Northern Linseed Flax Co-operative Trial

A. Co-ordinator:

Michelle Beaith
Viterra R&D
Saskatoon, SK
S7N 4L8
Phone: (306) 668-6634 | Mobile: (306) 221-9135
Fax: (306) 668-5564
michelle.beaith@viterra.ca

B. Check Cultivars:

Flax - Flanders, CDC Bethune, Prairie Grande

C. Potential Trial Sites (early discussions with MAFRI & BCGPA):

1. Co-operative Trial

Manitoba – Arborg (MAFRI) and Roblin (MAFRI)

Saskatchewan – Glaslyn (AAFC), Saskatoon, SK (U of S), Lake Lenore (VT) and Melfort (U of S)

Alberta – Lacombe (AAFC) and Vegreville (VT)

British Columbia – Dawson Creek (BCGPA)

D. Measurement and Rating Scale:

Yield - Yield at each station will be calculated and expressed in three ways:

1. >00 kg/ha
2. % of CDC Bethune
3. rank of entries calculated

Maturity - days from time of seeding to 75% brown boll stage

Height of main stem - cm

Lodging: 1–9 (1 = no lodging; 9 = completely lodged)

Seed weight - g/1000 seeds

E. Sites for measurement of:

Yield and Maturity:	All sites.
Height and Seed Weight:	Two (2) sites from Manitoba (Arborg and Roblin), two (2) sites from Saskatchewan (Glaslyn, Melfort), two (2) sites from Alberta (Lacombe, Vegreville) and one site from British Columbia (Fort St. John).
Lodging:	All sites reporting significant lodging.

Where a location has a C.V. for yield over 15%, height and seed weight analysis will not be conducted on that location but an alternate location will be chosen and reported in the Northern Linseed Co-operative Trial Report.

SUB-APPENDIX C2 - Quality Evaluation for the Linseed Flax Co-operative Trials

Oil Content:	NI Oil Content is determined by near infrared measurements calibrated against the NMR which is calibrated against the extraction reference method ISO659-2009. Results are reported as percent, calculated to a moisture-free basis.
Fatty Acid Composition:	Determined by gas liquid chromatography of the fatty acid esters according to the AOCS Ce-91 method with esters prepared by the AOCS Ce 2-66(93) method.
Alpha Linolenic Acid	Determined by gas liquid chromatography of the fatty acid esters according to the AOCS Ce-91 method with esters prepared by the AOCS Ce 2-66(93) method.
Iodine Number:	Calculated from fatty acid composition according to AOCS Cd 1c-85 or NIR.
Oil-Free Protein Content:	NI Protein Content is determined by NIR on the seed, NIR calibrated against the Combustion Nitrogen Analysis Reference Method and is expressed on an N x 6.25, whole seed dry basis and on an oil-free meal basis.

For oil content, fatty acid composition, iodine number and protein content determinations, individual plots are used.

I. Brown Linseed Flax Co-operative Trial

Sites for measurement of Oil Content, Fatty Acid Composition, Alpha Linolenic Acid, Iodine Number and Protein Content of the Seed and the Meal:

> Up to three (3) sites from Zone 1 (Morden, Brandon South, Indian Head), three (3) sites from Zone 2 (Regina, Strasbourg, Saskatoon), and three (3) sites from Zone 3 (Lake Lenore, Melfort, Vegreville).

Where a location has a C.V. for yield over 15%, oil content, fatty acid analysis, alpha linolenic acid content, iodine number and protein content will not be conducted on that location but an alternate location from that particular zone will be chosen and reported in the Co-op Report.

II. Yellow Linseed Flax Co-operative Trial

Sites for measurement of Oil Content, Fatty Acid Composition, Alpha Linolenic Acid, Iodine Number and Protein Content of the Seed and the Meal:

> Up to three (3) sites from Zone 1 (Morden, Brandon South, Indian Head), three (3) sites from Zone 2 (Regina, Strasbourg, Saskatoon), and three (3) sites from Zone 3 (Lake Lenore, Melfort, Vegreville).

Where a location has a C.V. for yield over 15%, oil content, fatty acid analysis, alpha linolenic acid, iodine number and protein content will not be conducted on that location but an alternate location from that particular zone will be chosen and reported in the Co-op Report.

III. Northern Linseed Flax Co-operative Trial

Sites for measurement of Oil Content, Fatty Acid Composition, Alpha Linolenic Acid, Iodine Number and Protein Content of the Seed and the Meal:

All nine (9) sites.

In case of failure of Flanders check cultivar (maturity) in the trial then the check cultivar Prairie Grande will be utilized as the minimum standard check cultivar.

Where a location has a C.V. for yield over 15%, oil content, fatty acid analysis, alpha linolenic acid, iodine number and protein content will not be conducted on that location.

SUB-APPENDIX C3 - Disease Evaluation of the Linseed Flax Co-operative Trials

Procedures for Rust Evaluation

Experimental lines are evaluated for rust reaction, in comparison to standard cultivars, at the seedling stage under controlled growth room conditions of 16 hr photoperiod and day night temperature of 22°/18°C. A total of 300 to 400 2–week old seedlings from each entry are artificially inoculated with the local rust race 371 using 1 g/L of spore suspension in a light petroleum oil (Soltrol 170). The inoculated seedlings are incubated under conditions of high relative humidity for 18 hr and then uncovered and left in the same growth room. Scoring is done ten (10) days after inoculation using the infection type reactions (IT) as follows:

0 = No sign of infection	Immune
; = Fleck, hypersensitive reaction	Highly Resistant
1 = Very small pustule <0.5 mm in diameter.	Resistant
2 = Small pustule 0.5-<1.0 mm in diameter.	Moderately Resistant
3 = Pustule of 1.0-1.5 mm in diameter	Susceptible
4 = Large pustule > 1.5 mm in diameter	Susceptible

Seedlings are classified into three categories: immune (IT 0 & ;), resistant (IT 1 & 2) and susceptible (IT 3 & 4). The percentages of each category in experimental entries segregating for rust reaction are calculated and reported.

The minimum requirement for rust reaction, to support the recommendation for registration of candidate cultivars, is immune reaction (immune or hypersensitive with up to 2% resistant reaction) to the most recent predominant local race(s) of rust.

Procedures for Fusarium Wilt Evaluation

Experimental lines are evaluated for their reaction to fusarium wilt, in comparison to standard cultivars, in wilt infested field nurseries located at the Research Centre in Morden and at the Experimental Farm in Indian Head. The entries are planted in 2-row plots in a randomized complete block design with at least three (3) replicates. Rows are 2.5 m long and 0.3 m apart. The susceptible cultivar Novelty is planted after every six (6) rows to indicate the level of disease and uniformity of inoculum in the soil. Planting is usually done during the last week of May to the first week of June.

Scoring for wilt reaction is based on a combination of wilt symptoms and plant vigour assessments which include discoloration of leaves, reduction in height, reduction in branching, percentage of severely infected and dead plants using a scale of 0 to 9 as follows:

0 = No sign of wilt, the most vigorous.
1 = Vigorous, yellowing on 0–5% of the leaves.
2 = Vigorous, yellowing on 5–10% of leaves.
3 = Slight reduction in vigour, yellowing on 10–20% of leaves, slight reduction in height or branching. No severely wilted or dead plants.
4 = Moderate vigour, yellowing on 20–40% of leaves, moderate reduction in height or branching and/or <1% severely wilted or dead plants.

5 = Moderate vigour, yellowing on 40–60% of leaves, moderate reduction in height or branching and/or 1–10% severely wilted or dead plants.
6 = Poor vigour, yellowing on >60% of leaves, moderate reduction in height or branching and/or 10–30% severely wilted or dead plants.
7 = Poor vigour, yellowing, severe reduction in height or branching and/or 30–60% severely wilted or dead plants.
8 = Very poor vigour, severe reduction in height or branching and/or 60–90% severely wilted or dead plants.
9 = All plants severely wilted or dead.

This assessment is carried out three (3) times during the growing season; at the seedling stage 5 to 6 weeks after planting (early July), at the early flowering stage (end of July), and at the green boll stage (mid August). The reactions of the entries to fusarium wilt are summarized as mean values of the three scores of the four (4) replicates at both locations. The mean values of reactions to fusarium wilt in current year of testing and the preceding year are presented. The 2-year means are also calculated and the final evaluation of the experimental lines is based on their performance in the two (2) years as well as the 2-year means in comparison with the check cultivars. In addition to the check cultivars indicated in *Sub-Appendix C1*, AC Emerson will also be included in the wilt tests.

The minimum standard requirement for fusarium wilt reaction, to support the recommendation for registration of cultivars from the Brown Linseed Flax, the Yellow Linseed Flax and the Northern Linseed Flax Co-operative Trials is a moderately resistant reaction. The mean of the wilt reactions of the cultivars NorLin and Flanders represents the minimum standard for Brown Linseed Flax cultivars whereas the minimum standard for wilt reaction for Yellow Linseed Flax cultivars is Linola™ 2047. However, the breeders and the pathologist are establishing a breeding intention for a new level of fusarium wilt resistance in brown (NorLin) and yellow linseed flax cultivars (mean of Flanders and Linola™ 2047) that will be shown in the annual disease report, which is part of the overall Co-operative Trial report.

Other Diseases

Powdery Mildew: This disease has been widespread in western Canada since it was first observed in 1997. Some flax cultivars have demonstrated a good level of resistance to this disease and the breeders are encouraged to incorporate and strive to maintain resistance to powdery mildew in new flax varieties. It is suggested that minimum standards of resistant reaction be established recommending brown and yellow linseed flax cultivars for registration in the future following further analysis and study and that the issue of minimum standard be reviewed on annual basis. To this end the breeders and pathologist will establish a breeding intention for a level of resistance to powdery mildew for both brown (Flanders) and yellow (Flanders) linseed flax cultivars that will be shown in the annual disease report, which is part of the overall Co-operative Trial report.

Pasmo: This disease is the most prevalent disease on flax in western Canada. Present flax cultivars are susceptible to this disease. No minimum standards can be established for this disease until reliable sources of resistance/tolerance are identified and become available to the breeding programs. To this end the breeders and pathologist will establish a breeding intention for a level of resistance to pasmo for both brown and yellow linseed flax cultivars (Macbeth) that will be shown in the annual disease report, which is part of the overall Co-operative Trial report.

Other diseases including stem break/browning, anthracnose, alternaria blight, basal stem blight, aster yellows and root rot/seedling blight are of minor importance and there are no guidelines or standard requirements for these diseases in the evaluation of candidate cultivars.

SUB-APPENDIX C4 - Minimum Standards for Brown Linseed Flax Cultivar Registration – 2012

Agronomic

Yield – Statistically not significantly less than the check cultivar CDC Bethune.

Maturity – Statistically not significantly later than Flanders.

Seed weight – Statistically not significantly lower than Flanders.

Lodging resistance – Statistically not significantly higher than Flanders for entries intended for production in Manitoba.

Quality

Oil content – Statistically not significantly lower than the check cultivar of Flanders.

Oil quality (iodine number) – Statistically not significantly lower than Flanders.

Oil quality (alpha-linolenic acid) – Statistically not significantly lower than Flanders.

Oil-free protein content – Statistically not significantly lower than Flanders.

Seed coat color – Brown.

Disease resistance

Rust – Immune, with up to 2% resistant, to race 371.

Fusarium wilt – Moderate resistance, statistically not significantly lower than the mean of the check cultivars Flanders and NorLin.

SUB-APPENDIX C5 - Minimum Standards for Yellow Linseed Flax Cultivar Registration – 2012

Agronomic

Yield – Statistically not significantly less than the check cultivar CDC Bethune.

Maturity – Statistically not significantly later than Flanders.

Seed weight – Statistically not significantly lower than Flanders.

Lodging resistance – Statistically not significantly higher than Flanders for entries intended for production in Manitoba.

Quality

Oil content – Statistically not significantly lower than the check cultivar of Flanders.

Oil quality (iodine number) – Statistically not significantly lower than Flanders.

Oil quality (alpha-linolenic acid) – Statistically not significantly lower than Flanders.

Oil-free protein content – Statistically not significantly lower than Flanders.

Seed coat color – Yellow.

Disease resistance

Rust – Immune, with up to 2% resistant, to race 371.

Fusarium wilt – Statistically not significantly lower than the mean of the check cultivar Linola™ 2047.

SUB-APPENDIX C6 - Minimum Standards for Northern Linseed Flax Cultivar Registration – 2012

Agronomic

Yield – Statistically not significantly less than the check cultivar CDC Bethune.

Maturity – Statistically not significantly later than Prairie Grande.

Seed weight – Statistically not significantly lower than Flanders.

Lodging resistance – Statistically not significantly higher than Flanders for entries intended for production in Manitoba.

Quality

Oil content – Statistically not significantly lower than the check cultivar of Flanders.

Oil quality (iodine number) – Statistically not significantly lower than Flanders.

Oil quality (alpha-linolenic acid) – Statistically not significantly lower than Flanders.

Oil-free protein content – Statistically not significantly lower than Flanders.

Seed coat color – Brown or yellow.

Disease resistance

Rust – Immune, with up to 2% resistant, to race 371.

Fusarium wilt – Moderate resistance, statistically not significantly lower than the mean of the check cultivars Flanders and NorLin for brown entries and Linola™ 2047 for yellow entries.