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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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; linseed flax, which has a high linolenic acid oil used primarily for industrial purposes, and solin which has a low linolenic acid oil used in the edible oil market.

C2. The Prairie Recommending Committee for Oilseeds (PRCO)

The Prairie Recommending Committee for Oilseeds (PRCO) is the recommending body for registration of linseed flax and solin (low linolenic) flax cultivars for production in western Canada. Recommendation for support of registration will be based on data from the Linseed Flax Co-operative and the Solin Flax Co-operative. To obtain this recommendation, the candidate cultivar must be evaluated in one of the Co-operative tests usually for a minimum of three (3) years and meet the minimum standards (*Sub-Appendix C4* and *Sub-Appendix C5*) which demonstrate agronomic, quality and disease resistance acceptability and merit.

In order for a line to be evaluated in the Flax Co-operative tests, 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 test by Canadian public institutions or private breeding institutions, through a private sector Canadian sponsor or breeder's agent.

C3. The Co-operative Flax Test

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

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 test. 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 test. The maximum number of entries

is limited to 36 in the Linseed Flax Co-operative Test and 25 in the Solin Flax Co-operative Test including checks, by the availability of resources. In the event the requests for entry exceeds 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 Test 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 Test Procedure

C3.3.1 Testing Period

All candidates must be evaluated in the Co-operative test for two (2) years prior to consideration by the PRCO for support for registration. The two year Co-op requirement for flax is in effect for entries in the 2009 Flax Co-op. For entries entered into the 2008 Co-op, the three year Co-op requirement still pertains.

C3.3.2 Coordinator/Associate Coordinator

The Coordinator of the Flax Co-operative Tests 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 Test 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 a Co-operative Test reports. The Associate Co-ordinator acts under the auspices of the Flax Co-operative Test Coordinator. The Associate Coordinator functions as the Coordinator for the Low Linolenic Flax Co-operative Test.

C3.3.3 Co-operator

The Co-operative test is conducted at up to fourteen (14) locations (*Sub-Appendix C1*) throughout the major flax growing areas of the prairies with an additional four (4) sites in eastern Canada. In addition, a late seeded (after June 1) co-operative test is conducted at a minimum of 3 locations. Individual test management is the responsibility of the co-operators, all tests 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. Other information is collected where appropriate and feasible, including days to maturity, resistance to lodging, and plant height. A duplicate sample of seed, obtained by bulking seed of an entry from replicates 1 and 2, and from 3 and 4, are

sent to the test coordinator for determination of 1000 seed weight, oil, fatty acid, iodine number and protein content. The quality determinations are carried out at the 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 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-ordinator by November 30. Data/seed sent after these deadlines may not be included in the Co-operative Test 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 randomized complete block design is generally used, but a lattice design may be employed if the number of entries allows it. All yield and disease trials contain at least 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 in the Linseed Flax Co-operative Test is equivalent to 40 lbs per acre adjusted for germination. All Low Linolenic Flax varieties entered in the Solin Flax Co-operative Test 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 test is limited. Judgment of merit of the entry for retention will be based on the data collected during the previous year(s) of the Flax Co-operative Registration tests.

C3.3.8 Seed Requirement

Six kg of untreated seed is required for first year entry into the test. Seed for the second year of testing is produced annually in a common increase by the test coordinator. The Associate Coordinator will annually multiply seed for the second year of the Solin Flax Co-operative Test. However, the sponsor of an entry is advised to have on hand a 6 kg seed supply in case the Co-operative test increase is lost.

C3.3.9 Seed Treatment

Seed treatment will not be used. No treated seed will be accepted in the Linseed or Solin Flax Co-operative Test.

C3.3.10 Trial Inspection

It is the intent of the Test Co-ordinator, Associate Co-ordinator and/or other members of the flax workers evaluation team to inspect trials on an annual basis. A trial is considered non-valid if visual inspection by a Co-operator, Associate Co-ordinator or Test 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 Test. Candidate cultivars should be compared to a check variety of similar maturity. If possible, the check cultivar should have the same commercial application. During the years in the test, an entry should be compared to the same check cultivar(s). That is, an entry in year 2 of the test 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 committee, may be used in support of registration in addition to official test data. Replicated, pre-Co-op field data will be attached with the Co-op data when soliciting support for variety registration. This pre-Co-op data will be collected and reported in the same manner as the Flax Co-op Test report (*i.e.*, yield, maturity, height, etc.) and entries will be compared with the same check(s) as the Co-op test. Agronomic data from tests outside the Canadian flax growing areas is not normally acceptable. When appropriate, market acceptability or pilot scale test 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.

All entries presently in the 2008 Co-op test will still be tested for 3 years. All new entries into the 2009 Co-op Test will be tested using two years.

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* and *Sub-Appendix C5* 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 Committee 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 check cultivar of similar maturity. 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 designated check cultivars (see Sub-*Appendix C4* and *Sub-Appendix C5*). The candidate cultivar can be equal to the appropriate 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, and 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, Plant Production 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 Tests 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 Test will have sufficient merit compared to check cultivars to warrant their consumption of limited research resources. This co-operating group, the Co-ordinator and the Associate Co-ordinator have a collective responsibility to manage the Flax Co-operative Test to ensure unbiased and accurate testing of candidates.

SUB-APPENDIX C1 - Agronomic Evaluation for the Flax Co-operative Tests

I. Linseed Flax Co-operative Test

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. Test Sites:

1. **Early Seeded Co-operative Test**
   Zone 1- Black & Grey Soil Zones (Longer Growing Season)
   Manitoba - Morden, Brandon North and South, Portage-la-Prairie
   Saskatchewan - Indian Head

   Zone 2 - Brown Soil Zone
   Saskatchewan - Regina, Saskatoon, Scott
   Alberta - Lethbridge

   Zone 3 - Black and Grey Soil Zone (Shorter Growing Season)
   Saskatchewan – Lake Lenore, Glaslyn, Melfort
   Alberta - Lacombe, Vegreville

2. **Late Seeded Co-operative Test**
   Manitoba - Morden, Brandon North
   Saskatchewan - Indian Head, Saskatoon

3. **Quebec**
   Saint-Mathieu-de-Beloeil, Normandin and Princeville

4. **Maritimes**
   Truro, Nova Scotia

D. Measurement and Rating Scale:

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

1. >00 kg/ha
2. % of Flanders overall for 2nd and 3rd year entries; % of Bethune for new entries
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:	Three (3) sites from Zone 1 (Morden, Indian Head, Brandon South), three (3) sites from Zone 2 (Lethbridge, Saskatoon, Scott), three (3) sites from Zone 3 (Melfort, Glaslyn, 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 Linseed Flax Co-operative Test Report.

As of 2009, all new entries into the Linseed Flax Co-operative Test for yield will be evaluated against CDC Bethune rather than Flanders. Entries entered into the Test prior to 2008 will be evaluated against Flanders.

II. Solin Flax Co-operative Test

A. Co-ordinator:

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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

Associate Co-ordinator:

Dr. Paul Dribnenki
Viterra
c/o Alberta Research Council Facility
P.O. Box 4000
Vegreville, Alberta T9C 1T4
Tel: (780) 632-8224
Fax: (780) 832-8612
Email: paul.dribnenki@viterra.ca

B. Check Cultivars:

Linola™ 1084, Linola™ 2047, Linola™ 2090

C. Test Sites:

1. Early Seeded Co-operative Test

Zone 1- Black & Grey Soil Zones (Longer Growing Season)
Manitoba – Morden, Brandon North and South, Portage-la-Prairie
Saskatchewan – Indian Head

Zone 2 - Brown Soil Zone
Saskatchewan – Regina, Saskatoon, Scott
Alberta – Lethbridge

Zone 3 - Black and Grey Soil Zone (Shorter Growing Season)
Saskatchewan – Lake Lenore, Glaslyn, Melfort
Alberta – Lacombe, Vegreville

2. Late Seeded Co-operative Test

Manitoba – Morden, Brandon North
Saskatchewan – Indian Head, Saskatoon

D. Measurement and Rating Scale:

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

1. >00 kg/ha
2. % of Linola™ 1084 overall
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:	Three (3) sites from Zone 1 (Morden, Indian Head, Brandon South), three (3) sites from Zone 2 (Lethbridge, Saskatoon, Scott), three (3) sites from Zone 3 (Melfort, Glaslyn, 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 Solin Flax Co-operative Test Report.

SUB-APPENDIX C2 - Quality Evaluation for the Flax Co-operative Tests

Oil Content:	NI Oil Content is determined by near infrared measurements calibrated against the FOSFA extraction reference method. 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.
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, paired field replications are bulked to provide two laboratory replications for each entry or in the case where three replications are used then individual plots are used.

I. Linseed Flax Co-operative Test

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

Three (3) sites from Zone 1 (Morden, Indian Head, Brandon South), three (3) sites from Zone 2 (Lethbridge, Saskatoon, Scott), three (3) sites from Zone 3 (Melfort, Glaslyn, Vegreville).

Where a location has a C.V. for yield over 15%, oil content, fatty acid analysis, 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. Solin Flax Co-operative Test

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

Three (3) sites from Zone 1 (Morden, Indian Head, Brandon South), three (3) sites from Zone 2 (Lethbridge, Saskatoon, Scott), three (3) sites from Zone 3 (Melfort, Glaslyn, Vegreville).

Where a location has a C.V. for yield over 15%, oil content, fatty acid analysis, 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.

SUB-APPENDIX C3 - Disease Evaluation of the Flax Co-operative Test

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.	Moderate 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 Linseed and Low Linolenic Flax candidate cultivars, is the moderately resistant reaction. The wilt reactions of the cultivars NorLin and Flanders represented the minimum standards for linseed cultivars. For Low Linolenic Flax candidate cultivars, the cultivar Linola™2047 represents the minimum standard.

Other Diseases

Powdery Mildew: This disease has been widespread in western Canada since it was first observed in 1997. Some flax cultivars have demonstrated good level of resistance to this disease. It is suggested that minimum standards of resistant reaction be established recommending linseed and low linolenic flax cultivars for registration by 2009 following further analysis and study.

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.

Other diseases including steam 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 Linseed Flax Cultivar Registration – 2009

Agronomic

Yield - For entries in the second and third year of testing, not significantly less than the check cultivar Flanders; for entries in the first year of testing, not significantly less than the check cultivar CDC Bethune.

Maturity - Not significantly later than Flanders.

Seed size - Not significantly less than Flanders.

Lodging resistance - Not significantly less than Flanders for entries intended for production in Manitoba.

Quality

Oil content - Not significantly less than the check cultivar of Flanders.

Oil quality (Iodine number) - Not significantly less than Flanders.

Oil-Free Protein content - Not significantly less than Flanders.

Seed coat color - Brown.

Disease resistance

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

Fusarium wilt - Moderate resistance, not significantly less than the mean of the check cultivars Flanders and NorLin.

SUB-APPENDIX C5 - Minimum Standards for Solin Cultivar Registration – 2009

Agronomic

Yield - Not significantly less than Linola™ 1084.

Maturity - Not significantly later than Linola™ 1084.

Seed size - Not significantly less than Linola™ 1084.

Lodging resistance - Similar to Linola™ 1084 for entries intended for production in Manitoba.

Quality

Oil content - Not significantly less than Linola™ 1084.

Fatty acids - Less than 5.0% linolenic fatty acid.

Oil-Free protein content - Not significantly less than Linola™ 1084.

Seed coat color - Yellow.

Disease resistance

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

Fusarium wilt - Moderate resistance, not significantly less than Linola™ 2047.