Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

SWI 142.1.2-6

SEED PROGRAM SPECIFIC WORK INSTRUCTIONS

SOYBEAN SEED CROP INSPECTION PROCEDURES

Field Crops Division,
Plant Health and Biosecurity Directorate,
Canadian Food Inspection Agency
59 Camelot Dr.
Ottawa, Ontario K1A 0Y9

Canada

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DATE

This version of the Soybean Seed Crop Inspection Procedures was issued November 9, 2010.

CONTACT

The contact for this Seed Program Specific Work Instruction (SWI) is the Chief, Design & Delivery, Seed Section.

REVIEW

This Seed Program Specific Work Instructions (SWI) is subject to periodic review. Amendments will be issued to ensure the SWI continues to meet current needs.

ENDORSEMENT

This Seed Program Specific Work Instruction is hereby approved.

_____ _____

Director, Plant Production Division Date

DISTRIBUTION

The most up to date version of this document will be maintained on the CFIA Intranet site (Merlin) and/or Internet site. In addition, the signed original will be maintained by the National Manager, Seed Section.

0.0 INTRODUCTION

The purpose of pedigreed seed crop inspection is to provide a third party unbiased inspection and the completion of a report for the Canadian Seed Growers' Association (CSGA) on the isolation, condition, and purity of the crop. It is the inspector's responsibility to describe the crop as observed at the time of inspection.

1.0 SCOPE

This Seed Program Specific Work Instruction (SWI) outlines the procedures that an official crop inspector will follow in inspecting soybean seed crops for pedigreed seed status.

These procedures apply not only to oilseed soybeans that are subject to registration under Part III of the *Seed Regulations,* but also miso type, tofu type, and natto-type soybeans as well as vegetable-type and high protein soybean varieties destined for roasting for livestock feed. These latter types are not subject to variety registration.

Crop inspection and the completed report assist the CSGA in determining whether the seed grown for pedigreed status meets the requirements for varietal purity and crop standards as specified by the CSGA Circular 6 (Sections 3 and 12) *Regulations and Procedures for Pedigreed Seed Crop Production*.

2.0 REFERENCES

The publications referred to in the development of this SWI are those identified in SPRA 111. In addition, the following were used:

- QSP 142.1 *Pedigreed Seed Crop Inspection Procedure*

- CSGA Circular 6 *Canadian Regulations and Procedures for Pedigreed Seed Crop Production*

- *Modern Soybean Production*, W.O. Scott and S.R. Aldrich, S&A Publications Inc.

- *Principles of Cultivar Development* Vol 2, W. R Fehr (ed.)
1987 Macmillan Publishing Co.

3.0 DEFINITIONS

For the purposes of this SWI the definitions given in SPRA 101 and the following apply:

Bushy type -	Soybeans with determinate growth type, 90 to 100 cm tall, drying slower than normal soybeans.
Determinate growth habit -	The terminal bud ceases vegetative activity when flowering begins.
Herbicide tolerant soybean variety -	A variety of soybeans that is tolerant of a herbicide for which tolerance is not ubiquitous throughout the traditional North American soybean gene pool.
Hilum colour -	The colour of the hilum or center spot on the seed can range from clear, yellow, grey, brown, or black. See Appendix III. Hilum colour and shape can be affected by environment and disease.
Indeterminate growth habit -	The terminal bud continues vegetative activity throughout the growing season.
Maturity -	For inspection purposes, maturity means that at least 90% of the plants in the inspected field have dropped their leaves. Soybean varieties are classified early, medium and late maturing based on Corn Heat Units, with the lower the number indicating an earlier maturing variety.
Maximum impurity tolerances -	The field standards for off-types and other varieties of the same crop kind. See Appendix I.
Miso type -	Soybean which is fermented to make a paste with barley or rice malt.
Natto type -	Small seeded soybeans with high sugar content used for food purposes.
Off-type -	Plants in a seed field which deviate in one or more characteristics from the official description of the variety.

Pubescence colour -	Colour of the short hairs on soybean plant stems and pods at maturity. The colour can vary from grey, light brown, to tawny and dark brown.
Semi-Determinate growth habit -	The terminal bud continues vegetative growth after flowering but terminates this growth before indeterminate types.
Soybean kinds -	Include Oilseed, High Protein, Natto, Tofu/Soymilk, Sprouting, and Miso.
Tofu type -	Soybeans soaked and mashed to produce a curd.
Variant -	Any seed or plant which (a) is distinct within the variety but occurs naturally within the variety, (b) is stable and predictable with a degree of reliability compared to other varieties of the same kind, within known tolerances, and (c) was originally part of the variety as released. It is not an off-type.
Variety description -	A detailed listing of the characteristics used as the basis for identifying each soybean variety.
Volunteer plants -	Unwanted plants growing from residual seeds from the previous crop or a replanted crop.

4.0 SPECIFIC INSPECTION PROCEDURES

4.1 Assessment of Application for Soybean Crop Inspection

The inspector must first review the submitted application and/or preprinted forms. In addition to the standard application information, the application should also be reviewed for the following additional information specific to soybeans.

Special attention should be given to previous land use. The inspector should refer to Circulary 6 for the most up-to-date information on previous land use for soybeans.

If any of information is missing, the applicant should be contacted to ensure that all necessary information is present before the initial inspection of the crop.

4.2 Inspection Requirements

Inspections for soybeans must be made at maturity. As a general guide, and based on harvest pressures, inspection could be conducted when a minimum of 90% of the plants have dropped all their leaves and the mature plants have developed distinguishing pod, pubescence, and hilum colour characteristics.

4.3 Field Inspection

A description of the variety to be inspected must be in the inspector's possession at the time of inspection. This applies for all registered and unregistered varieties. Descriptions for oilseed soybean varieties are available on the Product Registration System database as these varieties are required to be registered for sale in Canada. Descriptions for miso type, natto type, tofu type, vegetable and other specialty use soybeans may be obtained from the CSGA. Descriptions for unregistered oilseed soybean varieties must be provided by the grower.

Inspection is conducted as outlined in QSP 142.1 *Pedigreed Seed Crop Inspection Procedure* including performing counts for off-types and other crop kinds.

Appendix II lists other crop kinds difficult to separate and objectionable weeds. Prohibited noxious weeds must also be reported by frequency.

When inspecting soybeans, some key varietal characteristics at maturity are determined by colour and, therefore, it is important that light conditions for colour and contrast be maximized. This is important when determining off type characteristics such as pubescence and pod colour during inspection. The time of day, shadows, direction and the light angle may also be crucial. Sometimes cloudy or overcast conditions allow for more contrast in colours and easier identification of variants and off-types than bright overhead sunlight. It should be noted that with the passing of time after maturity, the colour characteristics can be affected by weather and may not be as distinguishable. Pod colour at maturity can vary from light brown to black.

Seed coat lustre can vary from dull yellow to shiny yellow and hilum colour can vary from clear, yellow, grey to dark black or dark brown. See Appendix III. Seed shapes may be round and spherical to elliptical and flattened. See Appendix V. It should be noted that seed characteristics should be used to confirm the variety, however, seed characteristics should only be used to confirm variant or off-type plants in counts based on other visible morphological off-type characteristics.

Other factors to inspect for include maturity with later maturing plants often retaining their leaves and being taller. The time of emergence, soil type, disease, and weather conditions can cause variability in plant height and maturity, making off-types for these factors difficult to distinguish at maturity. Appendix VII provides information on diseases that may alter the plant's appearance.

Where the previous land use was soybean, particular attention should be paid to the possibility of volunteers.

The minimum number of counts the inspector must take is six:

- 10,000 plants per count for Foundation, Registered, and Certified;
- 20,000 plants per count for Select and Breeder;
- if a reduced plant count method is used, the number of counts must be increased to provide a good representative record of the crop. The number and size of the counts must be accurately recorded in the Report of Seed Crop Inspection. Appendix VIII of QSP 142.1 provides reduced plant count procedures for crops with the following standards: Foundation 2/10000, Registered 4/10000 and Certified 20/10000

Note: Breeder and Select fields are only produced on 2.5 acre plots. Larger fields established with breeder seed are only eligible for Foundation status when grown by a Select grower and Registered status when grown by other regular pedigreed seed growers.

If off-types are found in a number of fields of a variety**,** crop inspectors should notify their area network seed specialist as it may be indicative of contaminated parent seed. See Appendix I for varietal purity standards for pedigreed soybeans.

4.4 Completion of the Report of Seed Crop Inspection (CFIA/ACIA 1115)

The report must be completed as described in QSP 142.1. If a reduced plant count method is used the plant count and the number of counts must also be accurately recorded.

For certain weeds such as Field Bindweed and Jimsonweed, the stage of maturity must be identified, i.e. ("in a late flowering state", "not likely to set seed prior to harvest", "several mature seeds developed", etc.) For American Nightshade, the presence of mature berries should also be reported. As volunteer corn can create problems for seed cleaning, the stage of maturity and the presence of mature cobs and kernels should be identified on the Report of Seed Crop Inspection.

APPENDIX I: SOYBEAN VARIETAL PURITY STANDARDS IN CANADA

The Varietal Purity Standards for pedigreed soybean crops in Canada are:

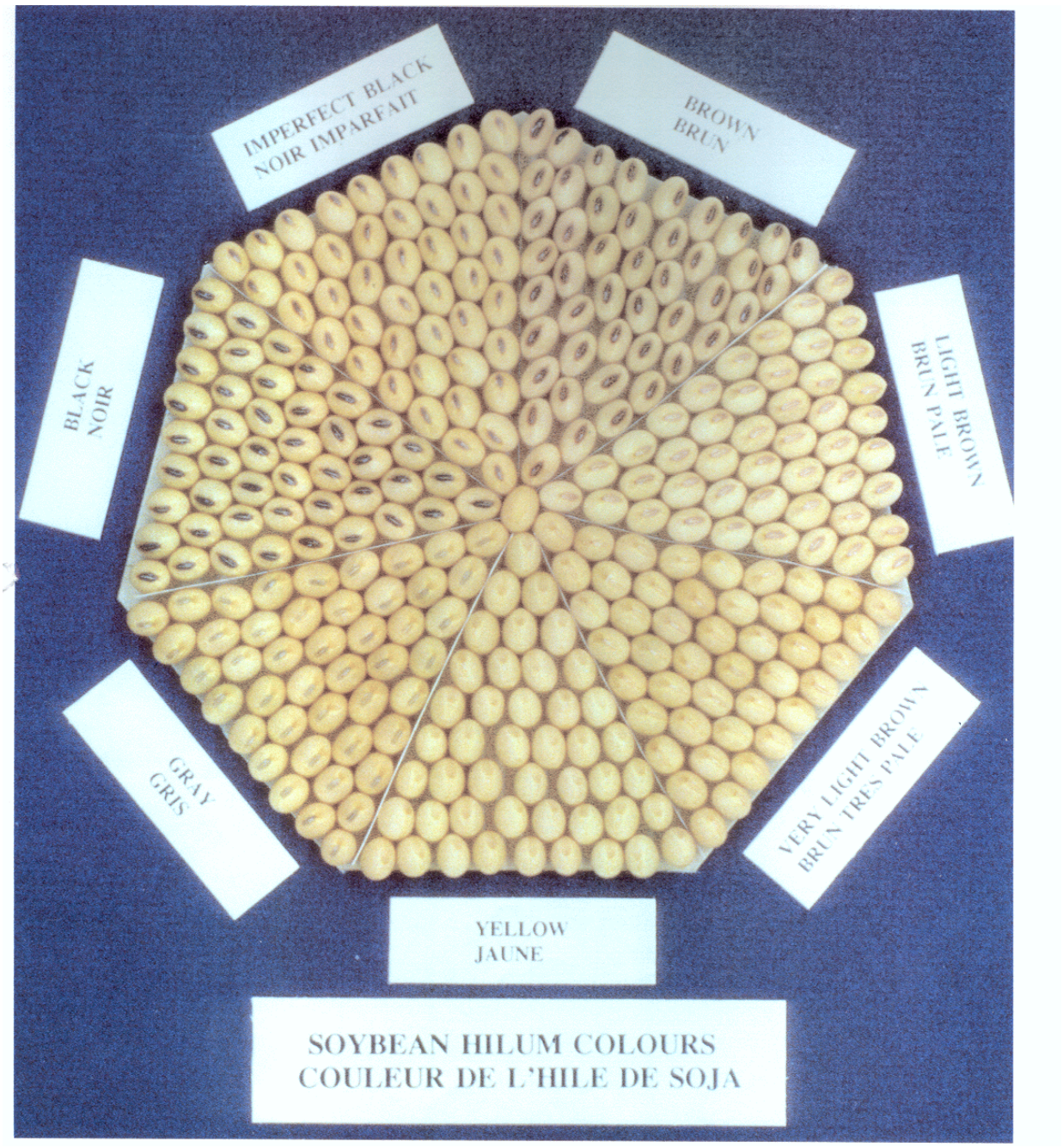
Pedigreed Status	Maximum Other Varieties or Off-Types	Maximum Plants in Six Counts
Breeder and Select	2/20,000	12
Foundation	2/10,000	12
Registered	4/10,000	24
Certified	20/10,000	120

APPENDIX II: Crops and Weeds to Report

Crop Kind	Other Crops to Report in Counts	Difficult to Separate Weeds to Report in Counts	Objectionable Weeds to Report by Frequency
Soybean	Other bean types, corn, lupins, peas	None	Field bindweed Nightshade * Velvetleaf

* Nightshade species to be reported include: Eastern black nightshade, American nightshade, climbing nightshade, hairy nightshade, smooth ground cherry, clammy ground cherry, wild tomato.

APPENDIX III : HILUM COLOUR CHART



APPENDIX IV: BASIC SOYBEAN BIOLOGY

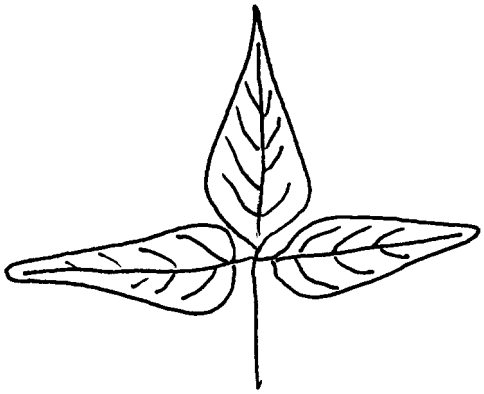
The soybean is a highly self-pollinating crop with an outcrossing rate of less than 1% among fertile plants. In Canada, most soybean varieties have an indeterminate growth habit. Indeterminate varieties begin to flower when less than half of the nodes on the main stem have developed such that vegetative and reproductive development occur simultaneously for a considerable portion of the plant's life. Pod and seed development begin at the bottom of the plant and progress toward the top as new nodes form, but all seeds reach maturity at the same time.

Varietal purity may be difficult to achieve without extensive roguing when the parental seed was produced in the U.S.. This is because AOSCA standards for varietal purity are lower than CSGA standards:

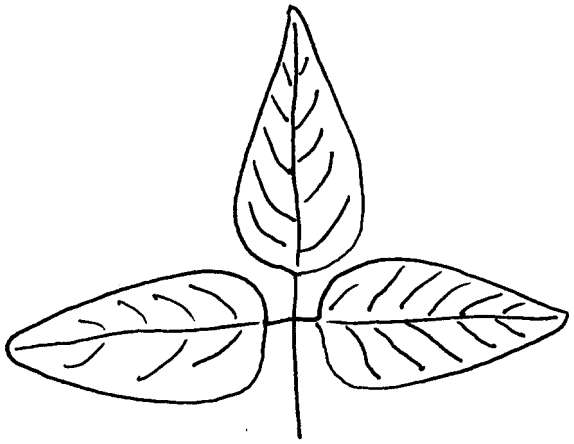
AOSCA Standards	Max Off-types / 10000 plants
Foundation	10
Registered	20
Certified	50

APPENDIX V: SOYBEAN TRAIT DIAGRAMS

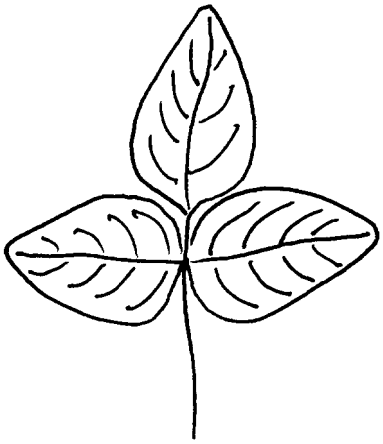
Terminal Leaflet Shape



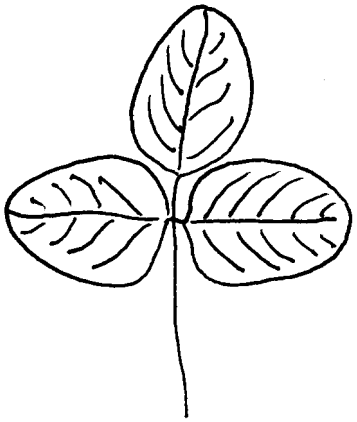
lanceolate



triangular

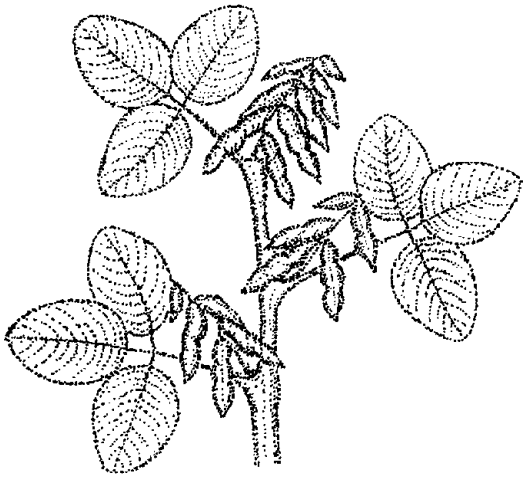


pointed ovate

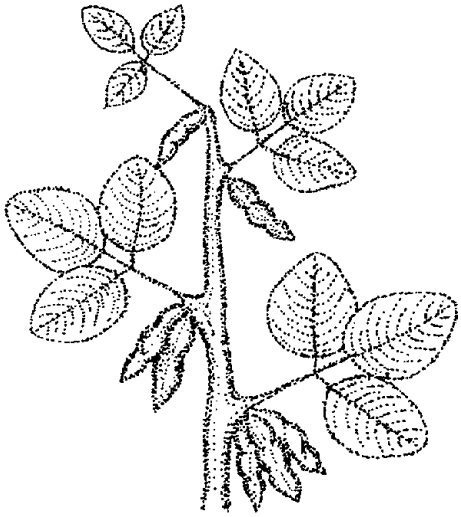


rounded ovate

Stem Termination Type



determinate



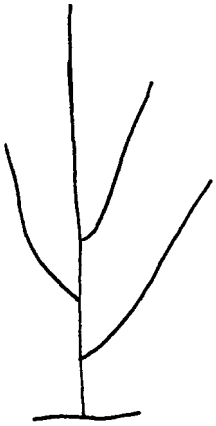
indeterminate

Determinate-	The terminal bud ceases vegetative activity when flowering begins.
Semi-determinate-	The terminal bud continues vegetative growth after flowering but terminates this growth before indeterminate types.
Indeterminate-	The terminal bud continues vegetative activity throughout the growing season.

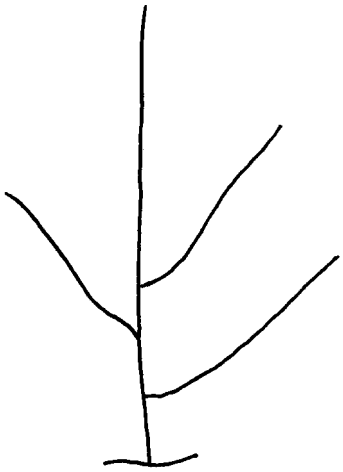
Plant Growth Habit

erect

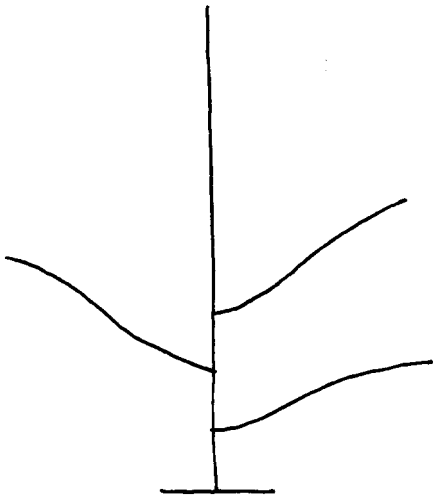
erect to semi-erect



semi-erect

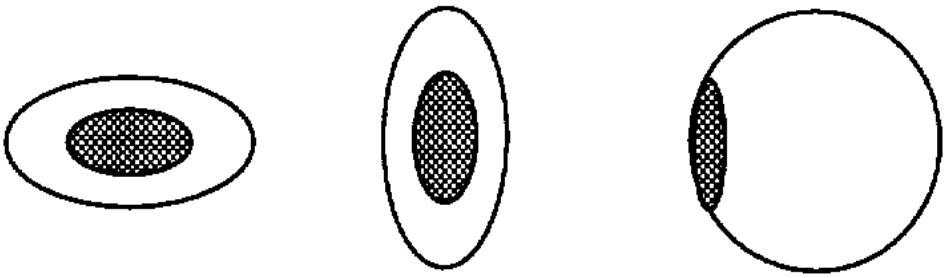


semi-erect to horizontal



horizontal

Seed Shape



length width thickness

Spherical rounded (L/W, L/T, and T/W Ratios = < 1.2)

Spherical flattened (L/W Ratio > 1.2: L/T Ratio < 1.2)

Elongate (L/T Ratio > 1.2: T/W Ratio < 1.2)

Elongate flattened (L/T Ratio > 1.2: T/W Ratio > 1.2)

APPENDIX VI: ABBREVIATIONS THAT MAY BE USED BY INSPECTORS FOR REPORTS OF SOYBEAN SEED CROP INSPECTION

Abbreviation	Impurity	Abbreviation	Impurity
BUSH	Bush type plants	LM	Later (less mature)
ER	Erect plants	TL	Taller and later plants

APPENDIX VII: DISEASES THAT MAY INFLUENCE SOYBEAN PLANT APPEARANCE

Plant is normal height - but discoloured leaves:

- anthracnose
- bacterial pustule
- downy mildew

Plants die prematurely / mature plants retain dead leaves:

- brown stem rot
- phytophthora root rot
- stem canker
- pod and stem blight
- sclerotia rot (also sclerotia bodies)

Plants remain green after remainder of field matures:

- bud blight
- herbicide injury

Pods and/or seeds abnormal in appearance:

- anthracnose
- downy mildew
- purple seed stain
- pod and stem blight

Plants stunted with crinkly or ruffled leaves:

- soybean mosaic virus (also bleeding hila)
- 2-4,D damage