

# Guide to Seed Potato Field Inspection: Recommended Practices



UNECE Standard S-1,  
concerning the marketing  
and commercial quality  
control of seed potatoes





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Guide  
to Seed Potato  
Field Inspection:  
Recommended  
Practices



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# Note

Further copies of this *Guide*  
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# Introduction



# 1. Introduction

To harvest a plentiful and healthy yield of seed potatoes for trading internationally, producers have first to plant seed potatoes of the highest quality. The United Nations Economic Commission for Europe (UNECE) has drawn up an international reference quality Standard for Seed Potatoes (UNECE Standard S-1) to help producers do exactly this.

The *UNECE Guide to Seed Potato Field Inspection* has been developed to aid countries in the application of the Standard. The Guide is recommended for use at the discretion of the Designated Authority (DA).

The Standard sets common terminology and minimum requirements for certifying high-quality seed potatoes for international trade. It covers:

- Varietal identity and purity
- Genealogy and traceability
- Diseases and pests affecting commercial quality or yield
- External tuber quality and physiology
- Sizing and labelling.



## 1.1 Scope of inspections

All seed potato crops to be certified under the Standard must be inspected during growth.

The term “field” is defined in annex VII of the Standard. A field may contain more than one crop. For the purpose of this Guide the crop is “a defined area of seed potatoes that is limited to an individual variety and class and is entered as a single unit for certification”. The “field” is “where” the inspection is carried out and the “crop” is “what” is inspected.

The DA shall specify the inspection procedures. Field inspections should be carried out in accordance with the following procedures:

- Determine the farm unit production eligibility for field inspection through review of the application and assign a unique crop certification number
- Assess and record the disease level, varietal purity, crop rotation, cultivation, separation and overall health of a seed potato crop
- Determine seed status eligibility of the inspected crop and, if appropriate, assign a seed class.

The DA should adopt a risk-based approach to the inspection of ware potatoes growing in the vicinity of seed potatoes.

Other measures, e.g. specifying provenance of seed potatoes which may be planted, may also be deployed to control the health of non-seed potato fields on seed-producing farms.





# Training for field inspection

## 2. Training for field inspection

In order to qualify to perform seed potato field inspection, the inspector must have completed the appropriate training.

Initially field inspection must be done in collaboration with a senior mentoring inspector.

Prior to doing seed potato field inspections on their own, newly trained inspectors should undergo an evaluation to ensure they are qualified to conduct the inspection by themselves.

There is a desire and willingness among countries participating in the UNECE standardization work to cooperate to better understand field inspection practices, to compare and discuss methodologies and fault assessment in a field-based situation. There is also an opportunity for this activity to contribute to capacity-building for countries with limited experience in seed potato classification or those with a limited resource base for training. Participating countries are encouraged to work together at a practical level on inspection practices, particularly sharing training field resources.



*Training of inspectors in the Russian Federation - © Boris Dorokhov*



*Inspectors training course in Canada - © NDSSD*



Information  
available  
to the  
inspector



# 3. Information available to the inspector

For every seed potato crop being grown on the farm unit the following information must be made available to the inspector at the point of inspection:

- Grower number
- Field eligibility information (e.g. absence of zero-tolerance diseases)
- Field number (may be assigned by inspector)
- Crop eligibility information
- Crop number (may be assigned by inspector)
- Location of crop
- Identifiers for the crops entered for certification
- Variety planted
- Number of hectares planted
- Class planted
- Certification number of lots planted (source of seed)
- Quantity of seed planted
- Date of planting, if available.

The DA may also collect information on the field history, as well as on potato and other crops planted on the farm or in the vicinity of the seed potato crops submitted for certification.

## 3.1 Imported seed potatoes

The inspector should be aware of imported seed stocks and may take risk-based measures.



# Field inspection

# 4. Field inspection

For an inspector, it is important to build and maintain a strong working relationship with growers and be considerate of private property. Good practice for an inspector would be to:

- Communicate frequently with the grower
- Never discuss or compare one grower's field inspection readings with another grower
- Avoid unnecessary damage while driving between fields or while conducting field inspections
- Leave the farm gates as found.

It is the grower's responsibility to ensure that the seed potato crops entered for certification are ready for inspection and to inform the inspector on other potato crops grown on the farm.

Roguing is the physical process of removing all unwanted plants or plant parts including all tubers from the field. Tubers left in the field to be harvested or plants left in the row as sources of inoculum may affect the quality of the seed harvested. Growers should be encouraged to rogue early and often and in consultation with the inspector. This process should take place before the inspector initiates first inspection and should continue throughout the growing season.

## 4.1 Scheduling inspection


The following items should be considered when planning inspection activities:

- Knowledge of the farm unit location, including the number and size of crops, will help determine how long the inspection(s) will take
- Understanding the physical characteristics, disease reactions, growth habit, and time to field maturity for varieties listed on the application is necessary to conduct a field inspection.

### 4.1.1 Timing of inspection and preparatory work by inspector

Proper timing of field inspections is very important. A minimum of two inspections for every crop is recommended for growing plants. The first inspection should start as early as possible. In general, the procedures should allow the inspector to inspect





at random a representative sample of plants from a crop. The number of plants affected by the diseases listed in the annex of this Guide (annex II of the UNECE Standard S-1) and those not true to variety or of another variety should be recorded separately in the field inspection report and each expressed as a percentage of the total number of plants inspected in the crop.

During each crop inspection the inspector should verify the purity and identity of the variety. The first generation derived from Pre-basic TC class seed potatoes is recommended to be inspected at a more intensive rate to identify off-types.

It is important for the inspector to communicate with the grower to ensure the final inspection occurs before haulm killing takes place, making the timing of this inspection crucial for early maturing cultivars.


After ensuring the inspector has a good understanding of the points above, the grower should be contacted to schedule an inspection. Consideration must be given to the following:

- Safe field re-entry times after pesticide application, for reasons of occupational health and safety
- Environmental conditions, e.g. drought, environmental stress.

## 4.2 Final review prior to field entry

Once at the farm unit, inspectors, if not known, should introduce themselves and take the time to discuss the inspection process with the growers or their representatives. The following is a list of items for the inspector to address prior to field entry:

- Update the grower or representative on any policy changes or new regulations which may impact their operation
- Verify that the information on the application remains accurate
- Identify withdrawals and/or additions, as appropriate, from/to crops submitted for certification
- Confirm information on potato and other crops planted in the vicinity of the seed potato crops submitted for certification
- Review location, eligibility and history of each field
- Confirm class of seed planted in each field
- When the field has been planted with multiple seed sources, request how the different sources were positioned in the field
- Verify the safety for field entry following any chemical applications
- Any issues that may affect inspections, such as disease (e.g. late blight).



It is recommended that an inspector possess or have access to the following items when conducting a field inspection:

- Map of the fields supplied by the grower
- Inspector's field notes completed with grower (variety, field number, class, seed source, hectares, and proper minimum counts of each crop)
- Guide on Seed Potato Field Inspection
- The Standard
- Description of the varieties to be inspected
- Pen/pencil
- Approved disinfectant, sprayer, brush and bucket
- Knife
- Calculator
- Hand lens
- Handheld counter
- Plastic bags for plant samples
- Appropriate footwear, sun screen, insect repellent and protective clothing.


### 4.3 Field inspection

When an inspector is ready to start inspection, he/she may ask the grower or grower's representative to accompany him/her to the field.

In general, an inspector must be familiar with the variety to be inspected, disease expression, ensure the timing of their inspections are suitable, ascertain variety integrity, cover the crop adequately, take an appropriate number of counts, assess the crop properly and assign the appropriate class at the end of final inspection.

Inspections should start as early as possible. The first inspection is the initial opportunity for the inspector to observe the growing crop. At this time, the plants should normally show all of the characteristics of the variety and most disease symptoms should be identifiable.

The DA specifies or authorizes the inspection procedures. In general, the procedures should allow the inspector to inspect at random a representative sample of plants from a crop. The number of plants affected by the diseases listed in annex II and those not true to variety or of another variety should be recorded separately in the field inspection report and each expressed as a percentage of the total number of plants inspected in the crop.



The first generation derived from Pre-basic TC class seed potatoes is recommended to be inspected at a more intensive rate to identify off-types.

In terms of procedure and preparation, subsequent (if applicable) and final inspections are to be conducted in the same manner as the first inspection. The only notable difference is that the crop entry point should never be the same as the one used in previous inspections to avoid following the identical route as the one followed during the first inspection. This procedure gives the inspector more confidence in stating that the field inspection report is an accurate reflection of the crop at the time of inspection.

General elements to observe and note on the inspector's field notes while performing a field inspection include, but are not limited to, varietal identity and trueness-to-type, virus content, insects present, possible varietal mixture, overall field condition (stand, vigour, and cultivation), bacterial and fungal diseases such as late blight, bacterial ring rot, blackleg, wilts, brown rot/bacterial wilt, abnormal plant symptoms, environmental factors, etc.

The inspector should also consider the crop size to ensure it corresponds to what is declared on the grower's application. If the crop size is obviously in question it should be verified for accuracy.

When entering a crop it is important to verify that the variety you are about to inspect is the variety specified on the grower's application. Certification of a crop should not proceed when the variety integrity is in question.

## 4.4 Guidelines for field assessment

The field will be inspected to confirm compliance with the Standard for the various classes of seed potatoes, as well as to assess the overall health status of the crop. Annex II in the Standard lists tolerances for defects, diseases and varietal mixtures upon field inspections for all classes of seed potatoes. In seed potato crops, faults counted under the tolerances may consist of bacteria, fungi, viruses, mixtures and off-types or other biological entities affecting seed potato quality. The damage that they cause varies from year to year depending on a number of biotic and abiotic factors.

During field inspection the inspector attempts to confirm varietal identity and accurately describe the status of a crop at the time of inspection based on random visual examinations of growing plants performed by walking through the fields. Any abnormal or unusual cultural conditions, such as chemical damage, observed in the crop

are also recorded. To perform field inspection, an inspector must be familiar with symptom recognition, as well as some of the terminology used to describe disease symptoms or physiological disorders.

The following are some of the examples of terms used in describing symptoms on potato plants:

**Chlorosis:** Abnormal light green or yellow colouration of leaves due to insufficient production of chlorophyll, which may be caused by lack of light, mineral deficiency, infection (particularly viral), or genetic factors.



NDSSD

**Lesion:** A distinct area of diseased plant tissue. A canker on the stem or a confined area of necrosis on the leaf.



NDSSD

**Mottling:** A variegated pattern marked with yellowish spots or patches of many colours or shades.



NDSSD

**Necrosis:** Death of plant cells or plant tissues, usually accompanied by darkening or discolouration, occurring as a disease symptom.



*NDSSD and SASA*

**Rotting:** Disintegration and decomposition of plant tissue, and may be of two general types: dry rot or soft rot. A dry rot is a firm dry decay; and a soft rot is soft, usually watery, and often odoriferous.



*NDSSD and SASA*

**Rugose mosaic:** Severe mosaic accompanied by deformation such as crinkling, curling or ruffling of the leaf surface. It may be caused by a combination of viral infections.



*SASA and NDSSD*

**Stalk break:** Disease caused by *Sclerotinia sclerotiorum* in which watersoaked lesions expand causing the stem to dry out, turn brown and die. Foliage above the lesion wilts and dies. Symptoms progress until the whole stem is papery and, if broken open, the black sclerotia of *Sclerotinia* can be seen.



SASA

**Wilt:** Leaflets lack turgor, causing them to become limp and droop, with the leaves rolling inwards. Caused by dehydration due to environmental or pathological causes (e.g. *Rhizoctonia*). May affect the whole plant or single stems (if pathological).



SASA and SASA

## 4.5 Assessing and counting faults

A representative sample of plants is inspected to determine disease infection and varietal mixture levels in the crop. They are taken at regular intervals in a randomized pattern throughout the field to ensure the inspection results are representative of disease levels and varietal mixtures in the crop. There are many methods of calculation. For example, one count may consist of 100 consecutive plants in a row. They can be counted individually or by number of steps, as indicated below.

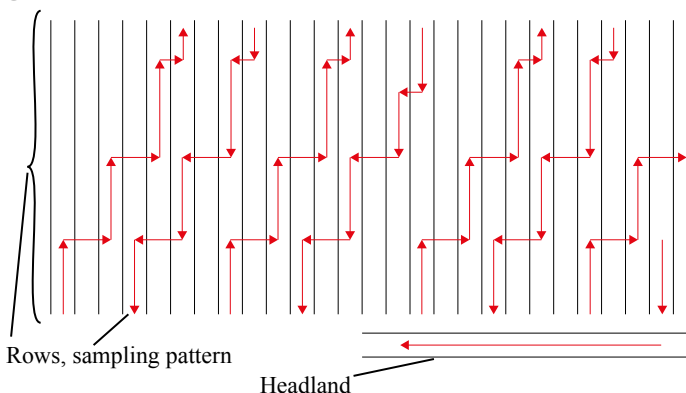
**Field inspection sampling:** The sample is the number of plants observed. When no fault is found or observed, the sample size does not need to be exactly determined, provided the inspector can demonstrate that a representative

sample has been observed. When the planting density is known the size of the sample (number of plants) can be calculated based on the area of the crop observed during the inspection.

To calculate the percentages of faults one needs to count a number of faults within the population of a known number of plants. For example when crossing rows one can count the number of rows and look for faults within five plants on each side. After one hundred rows and 10 plants each one has a population of 1000 plants. When one has counted 1 fault the percentage is 0.1%.

**Field inspections by making counts:** One may follow the rows, e.g. 167 steps (1 m each) at a planting distance of 33 cm, or 125 steps at a planting distance of 25 cm, while looking over two rows will give you close to 1000 plants. It is recommended to count the plants the first time and then keep the same number of steps. In small fields one may count the plants in the row and based on that number calculate how many passes need to be made to arrive at 1000 plants. It is preferable to switch rows and not walk in a straight line when counting.

**Figure 1. Field inspections by passes**



Each red line from one end of the field to the other represents a “pass” through the crop (Figure 1). In each pass you normally look at both drills (rows). Look at the end rigs. The sample should be random and cover the whole crop.

The number of passes is determined in the following way. First, the share of the sample area in the total surface of the field is calculated (the size of the sample area is divided by the size of the crop). Then the number of drills in the crop is multiplied by that share, and the result is divided by 2, as two rows are inspected during each pass.



Example (sample is 0.1 ha):

- In a 4.0 hectare crop with 200 drills, the number of passes would be:

$0.1 \div 4.0 = 0.025$ ;  $200 \times 0.025 = 5$  drills,  $5 \div 2 = 2.5$  passes to inspect 0.1 ha.

The number of plants showing faults, as listed in the Standard, such as virus, blackleg or mixture, is recorded and used to determine the percentage in the inspector's field notes. Any plant parts including tubers not properly rogued should be included in the count of faults in the sample.

#### 4.5.1 Inspecting at the minimum sample size

It is essential to inspect each crop using a minimum sample size depending on the class planted and the area. Infected plants which are observed but not part of a count should be noted in the inspector's field notes.

Additionally, there are times when the calculated percentage of faults does not give an accurate representation of the level of faults in the crop. For example, an inspector may observe no faults in the sample but may have seen faults outside the prescribed samples. The sample thus shows zero percentage but it is apparent that the crop is not totally free from faults. It is not appropriate for the inspector to add these additional faults to the official calculation of the percentages. However, in such a situation the inspector should note this on the note sheet and bring it to the grower's attention since these faults, if not removed, will reduce the quality of the crop and may have an impact on subsequent inspections and/or test results.

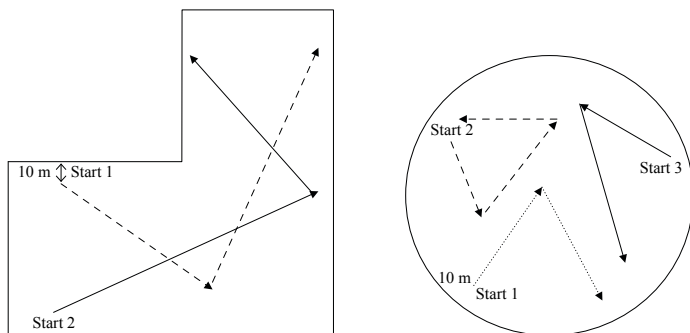
#### 4.5.2 Patterns for walking the crop to ensure random sampling

The inspector should walk the crop and make a random examination of the plants covering both sides of the crop either following a figure "X" pattern, or an inverted "V", or a zigzag pattern. These patterns generally give the inspector the highest degree of randomness and allow the greatest surface area of the crop and the highest number of plants to be covered while reducing the chances of omitting a pocket of infestation. If the area is very small or the field configuration does not allow for this type of pattern it is up to the discretion of the inspector to use the most random method possible to ensure the crop is properly covered.



For crops using centre pivot irrigation, a “V” or triangular pattern to the centre of the pivot should be followed for each inspection. This should be followed by two additional and shorter modified “V” patterns to complete the inspection. The pattern in the field and entry point should be predetermined and varied between inspections. These two patterns, as illustrated below, will give the highest degree of randomness and allow the greatest surface area of the field and highest number of plants to be covered while reducing the chances of omitting a pocket of infestation.

**Figure 2. Field inspections by passes**



When entering the crop, the inspector should be aware of the “edge effect” where the margins (e.g. 10 m) may be particularly prone to insect attack, other stresses or varietal mixtures. Try to maintain the pre-determined sampling pattern without giving undue attention to the very edges of the field. From the entry point the entire field should be viewed, varietal integrity determined, and notes should be made on potential problem areas to investigate, as the inspection progresses. Special attention should be paid to areas in the field which are susceptible to biotic or abiotic interactions. The inspector should observe low or high spots and areas along hedgerows which could contribute to disease problems or preservation of volunteers/ground keepers. Remain aware of potential presence of foreign varieties.

Although the diagrams in Figure 2 indicate a diagonal pattern, as this is basically how you are moving through the crop, this is accomplished by an inspector moving through the crop in a zigzag type of pattern, moving over several rows after each count, to commence a new count, i.e. count or pace a hundred plants, move over several rows, do another count, move over again, and continue as such. This will help ensure a properly representative sample of the crop is observed during the inspection.

During field inspection the inspector may need to take a sample to send for laboratory diagnostic testing.



*Inspecting the crop in Finland - © Evira*



*Inspecting the crop in South Africa - © Wesgrow (PTY) Ltd*



*Group discussion of crop quality in Egypt - © FN3PT*

### 4.5.3 Biosecurity

Biosecurity processes are a set of practices intended to minimize the introduction, transmission and spread of pathogens and pests in plant populations.

**Farm hygiene:** The inspector should be aware that farm hygiene is an efficient way to prevent spread of pathogens and pests. At all times equipment, machinery, boxes and other material coming in contact with seed potatoes or the soil from outside the seed farm should have been cleaned before being allowed on the farm.


**Inspector hygiene:** Upon completion of daily field inspection the inspector should clean footwear and equipment prior to leaving the farm. When possible, clothing should be changed between each farm unit. If wearing disposable gear, discard and replace with new gear (i.e. Tyvek pants). Footwear and other non-disposable equipment and protective clothing, required to conduct field inspection, should be cleaned. Washing and cleaning the vehicle between farm units is recommended, if dirty (soiled tyres, wheel wells, etc.).

#### **Prior to field entry:**

- Ensure that your vehicle has been cleaned and is relatively free of soil
- If possible, park your vehicle in a location such as the side of the road or driveway, so as to avoid direct entry into the field
- Carefully clean and disinfect footwear and equipment (should be performed when arriving and leaving a farm unit)
- Begin with the highest class to be inspected that day on the farm unit and end with the lowest class. This is a good practice to reduce the probability of spreading/vectoring mechanically transmissible pests, i.e. bacteria, fungus and viruses. If it is not possible to start the inspection with the higher class, boots and protective clothing disinfection must be done prior to proceeding to another class inspection
- Schedule inspections of crops, known to be infested with late blight outbreaks, at the end of the day.

### 4.5.4 During the inspection

The inspector should take notes of all observations of varietal identity and purity, diseases and pests, or any other aspects, e.g. isolation conditions or late blight. In this case, please do not forget that the inspector's duty is a visual inspection and it is important to note all observations. The inspection should be done according to the patterns.



At the time of inspection, consideration should be given to the evaluation of disease level, virus content and varietal mixture, if the crop was planted with different seed sources. This information is very important, as if the crop does not meet the standards, the inspector may choose to proceed with partial rejection of the crop.

#### 4.5.4.1 Assessing faults

Symptoms are described in the “UNECE Guide to Seed Potato Diseases, Pests and Defects” (see the reference section for details).

Between counts, the inspector must stop periodically to:

- Look for insect and disease damage
- Inspect individual plants for aphid infestations by observing the underside of leaves.
- Inspect fields for insect damage predominantly close to the edge of the field. This is especially important for determining flea beetle and aphid activity
- Examine leaves and stems for symptoms of fungal infestation.

#### 4.5.4.2 Assessing stand, vigour and cultivation

During the course of the field inspection, the stand, the vigour and the cultivation of the crop may be rated at the discretion of the DA. These are subjective ratings and a crop will not fail as a result of these ratings. These assessments are valuable for inspectors, producers and buyers to determine if crop characteristics are due to seed quality problems, a result of natural conditions or field management. For example, if one individual lot is planted in several fields in different areas and has reduced vigour in all of these crops it may indicate another underlying problem, leading to further investigation. Stand refers to overall uniformity of the plants in the crop (e.g. in colour, height, etc.) combined with the percentage of plant emergence. An excellent stand would show a very even and complete emergence with very few misses in a row.

Vigour is measured by observing the intensity of plant growth in the crop. An excellent crop should show lush new growth with even colour. In cases where the crop is performing poorly, possibly attributed to drought, variable fertility, herbicide injury or poor quality seed (physiologically aged, chilled, bruised, small seed pieces), the crop will be given a lower vigour rating.

Cultivation is the condition of the field in relation to tillage and weed control. An excellent seed field should be free of weeds and the plants are well-hilled with loose friable soil.

Any disease or anomaly, other than those mentioned above, that is encountered during the inspection process, should also be noted in the inspector's field notes, as well as in the report on field inspection.

#### 4.5.4.3 Corrective action during the inspection period

The inspector may allow the grower to take corrective action (see 4.6.1) when it is determined that the problem can be corrected by the grower. In such a case a written interim report may be issued. In doing so the inspector needs to make sure that the grower understands the situation and sets a time limit for subsequent inspection. The grower/multiplier is responsible for the action to be taken, i.e. request a subsequent inspection, and carry out corrective measures.

#### 4.5.4.3 Termination of field inspection during the inspection

Upon arrival at the farm unit or during the inspection process, conditions can be encountered which will warrant immediate termination of inspection of a specific crop, or termination of all crop inspections on the farm unit. For example, the inspection of a single crop may be terminated immediately under any of the following conditions:

- Inspection counts show excessive levels of disease or varietal mixture whereby the crop is clearly ineligible for Certified class
- There is no clear marking or separation between crops of the same variety in different classes and a lower class cannot be assigned because the crop with the lowest class is not certifiable, e.g. is rejected
- The inspector becomes aware that the crop has been treated with or has been exposed to a sprout inhibitor
- As a result of excessive presence of weeds, leaf injury, pesticide or fertilizer injury, it is not possible to determine by visual inspection the varietal purity or disease incidence
- Biosecurity measures prescribed by the DA have not been met.

The field inspection on a farm unit may not continue when:

- A zero-tolerance pest has been detected, as described in annex II to the Standard, such as:
  - *Globodera rostochiensis*
  - *Globodera pallida*
  - *Synchytrium endobioticum*
  - *Clavibacter michiganensis* spp. *sepedonicus*
  - *Ralstonia solanacearum*
  - Potato spindle tuber viroid
  - Potato stolbur

- Rotation and isolation requirements prescribed by the DA have not been met
- The inspector has substantive knowledge that equipment used to plant or cultivate the field was used in a field where a quarantine organism had been detected
- Falsification of records.

Where a quarantine pest is suspected appropriate action should be taken.

#### 4.5.5 Upon completion of inspection

- Advise growers or their representative of the inspection results, i.e. virus content, blackleg, varietal mixtures, inappropriate separation, insects, blight, and inform them of any action required prior to the next inspection in order to meet the applicable class requirements. This includes roguing, separation for varietal purity, notification prior to haulm killing.
- If the grower or their representative is not available upon completion of inspection, contact the grower as early as possible to provide results.

While on the farm unit, record all field inspection results directly on the inspector's field notes and upon completion of inspection, determine if the observations recorded are consistent with the class intended. Changes to information on the report must be initialled and dated, and the format for recording information (blanks, dashes, lines and checkmarks) must be consistent throughout. Comments or any actions or samples taken and sent for laboratory testing should be recorded and dated in the inspector's field notes. The grower should be advised when samples are being sent to the laboratory.

#### 4.5.6 Subsequent inspection

A subsequent inspection is not a first or a final inspection. A subsequent inspection is used or may be necessary to review a prior assessment of a field, if the inspector feels that he was not in a position to accurately determine disease expression or varietal mixtures at the time of their first inspection.

#### 4.5.7 Second-opinion inspection

In the case of a disputed inspection, growers will be entitled to ask the DA for a confirmatory inspection.

## 4.5.8 Notes on final inspection

As the growing season progresses, exposure to pathogens increases and the inspector should be aware of environmental conditions, such as temperature and moisture, which may influence disease levels. In addition, disease inoculum levels increase over time and potential for viral spread from virus-transmitting aphids is enhanced. Virus concentration levels within plants will increase over the growing season, and plants which were symptomless could then show symptoms, as virus replication occurs. Inspectors should remain aware of current-season virus infection which may appear as circular pockets of symptomatic plants when infested aphids move into a crop and spread virus in a circular manner from the point of introduction. In addition, late blight, blackleg and early blight can develop rapidly at this time, as heavy dews at night create an environment favourable for their development and spread.

## 4.6 Crops not meeting standards


A crop may fail inspection and be subject to rejection or downgrading to applicable class for a variety of reasons. When a crop is downgraded or rejected, the inspector must indicate their readings and observations on the inspector's field notes and identify the reason(s) for rejection or downgrading.

When a crop does not meet the standards applied for, the inspector must inform the grower of the inspection results.

### 4.6.1 Recommending corrective actions

Based on requirements in the Standard and field observations, the inspector must determine the status of the crop inspected. The following non-exhaustive list of criteria may assist the inspector in determining if corrective action (roguing or other) should be administered or not to determine the crop status:

- Observations during the first field inspection are above the tolerances but a corrective action (e.g. roguing) is expected to be feasible
- When roguing or another corrective action is necessary to achieve the required standard, and the total area to be covered is such that corrective action is realistic and achievable
- The variety, field condition and maturity (plant size, senescence, etc.) are at optimal conditions for a corrective action
- Corrective actions can be put in place immediately or within a given period of time determined by the inspector.



A recommendation for a corrective measure should not be issued for the same problem twice. Failing to correct the situation, the crop concerned will be downgraded or rejected.

The producer should initiate the implementation of the corrective actions while the inspector is on the farm unit in order to be able to refer to him, if needed. Once the corrective actions requested are completed, the producer must contact the inspector to conduct the first complete inspection, a subsequent inspection or the final inspection.

#### 4.6.2 Crops downgraded or rejected

A crop not meeting the standard for the class applied for, will be downgraded to the class for which the standard is met. Crops that are downgraded will continue to be inspected, but will be required to meet the standard for an appropriate class. Reasons for downgrading a crop may include:

- Inspection shows disease or varietal mixture over the tolerance
- In the case of no clear marking or separation for crops of the same variety and different classes, one crop will be downgraded to the lower of the two classes. If the crop does not meet the standard for Certified class seed potatoes on the first or during subsequent or final inspection, the crop must be rejected as seed. The inspector must indicate the reason for the rejection on the report of field inspection. Rejected crops require no further inspection with regard to seed potato certification.

#### 4.7 Conditions warranting rescheduling of field inspection

A field inspection may be rescheduled if:

- The plant or environmental conditions are not favourable for a good inspection (e.g. strong winds, excessive presence of weeds, wilted plants due to drought, recently cultivated, insufficient plant growth)
- Excessive foliar damage is present (e.g. damage from frost, hail, insect damage, fungus)
- The conditions for inspection are not safe. Most pesticides have safe field re-entry times listed on the label (e.g. 24-72 hours). Encourage growers to post signs at the edge of the field which indicate any chemicals applied and date of safe re-entry. Consulting the appropriate guides is recommended to determine a specific chemical safe re-entry time.





## 4.8 Official reporting of all field inspection results

After the final field inspection a report of field inspection is produced from the inspector's field notes. That becomes the finished copy of the field inspection. All pertinent information contained within the inspector's field notes is transcribed.

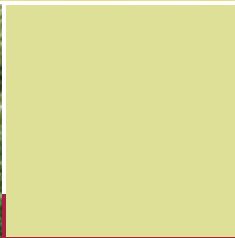
Upon completion of all field inspections on a farm unit for the season, the original copy of the report of field inspection is to be filed with the DA. The field inspection results must be provided to the grower.

All field inspection reports should be checked for accuracy and proper completion.

## 4.9 Additional measures to support crop inspection

Field inspection results will normally be determined by visual assessment of the crop. Inspectors may be supported by appropriate tests when confirmation of the cause of a particular symptom is required.





Conditions  
to  
downgrade  
or refuse  
certification

# 5 Conditions to downgrade or refuse certification

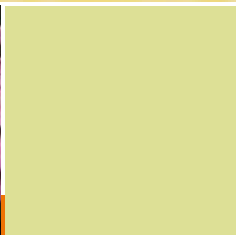
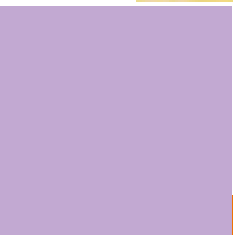
If after the final field inspection the DA becomes aware of circumstances affecting the eligibility of the crop for certification, the crop may be downgraded or rejected from the certification.

The following situations lead to refusal for certification:

- The crop has lost its identity
- The crop has been mixed with another crop or crops without the agreement of the DA
- Inspection requirements have been breached
- If the inspector determines that the field had been contaminated with a zero-tolerance pest (see 4.5.4.4).

Other situations may lead to downgrading or refusal, such as:

- The crop does not meet the standards
- Haulm destruction was not carried out when necessary
- The crop has been treated with or has been exposed to a sprout inhibitor or a herbicide, as in the case of drifting from another field.




# Field inspection tips

# 6 Field inspection tips

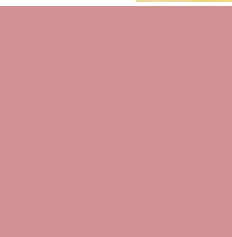
The following are a few inspection techniques or tips which may assist the inspector in increasing her/his accuracy in the assessment of a seed potato crop:

- An inspector should have filled out grower name, field number, variety, hectares, seed source, for each field on inspector's field notes prior to walking any field.
- Inspectors should pay close attention to symptoms of potato leafroll virus (PLRV), as the expression may be first seen on the bottom of the leaves when infected seed is planted (secondary infection).
- An inspector should attempt to maintain the sun at their back to reduce glare and strain on the eyes. This also helps significantly in being able to see symptoms of disease.
- The inspector should shade suspect plants to more readily view characteristic disease symptoms such as mosaic, interveinal necrosis and mild mottling.
- The inspector may need to physically handle plants to determine the presence and type of disease- or stress-related problem. For example, PLRV-infected plants show lower leaf curling and are of a lighter colour, but the leaves are generally firm and rattle when shaken. Blackleg-infected plants may also show leaf curling and be of a lighter colour, but the leaves remain soft. This may require the pulling of a few plants to observe other symptoms and determine the cause.
- The inspector should examine suspect plants for the presence of insects, particularly the underside of the lower leaves of plants near edges and throughout the field to determine presence of aphids. Physiological problems may be attributed to different factors. For example, nutrient deficient plants could display symptoms similar to mosaic in contrast to healthy plants.
- The inspector should become familiar with the characteristics of the variety being inspected, as some pathogens are capable of expressing themselves very differently on various varieties.
- Inspectors should remember that varieties can display symptoms of primary and secondary infection during different periods of the growing season.
- Inspectors should take note of areas of potential environmental factors which could lead to disease development (e.g. along hedgerows, and other shaded areas, where moisture lingers on the plants, late blight symptoms may be more prevalent).

- 
- Inspectors should determine where the planting was initiated in the field. Varietal mixture and disease spread may be most apparent in this area because planting equipment may not have been properly cleaned. Special attention should be given to these areas.
  - Inspectors should stop periodically, look around and validate the variety of the field, observe the general health and status of the field and investigate any areas which give indications of pest or disease problems.







# References and annex



# References

- Procedures-P1-005-eng-Seed\_PotatoInspection\_Manual-Chapter\_5 (Canadian Food Inspection Agency).
- UNECE Standard S-1, concerning the marketing and commercial quality control of seed potatoes. Also available at the UNECE website at: [www.unece.org/trade/agr/standard/potatoes/pot\\_e.html](http://www.unece.org/trade/agr/standard/potatoes/pot_e.html).
- UNECE Guide to Seed Potato Diseases, Pests and Defects. Available on the UNECE website at: [www.unece.org/tradewelcome/areas-of-work/tradeagr/brochures-and-publications/potato-diseases-and-pests](http://www.unece.org/tradewelcome/areas-of-work/tradeagr/brochures-and-publications/potato-diseases-and-pests).

# Annex

## (Annex II of the UNECE Standard S-1) Minimum conditions to be satisfied by the crop; field inspection procedures

### A. Minimum conditions to be satisfied by the crop

1. The field shall not be contaminated by *Globodera rostochiensis* (Woll) nor *Globodera pallida* (Stone).
2. The proportion of growing plants affected by blackleg shall not exceed:
  - (a) In crop for the production of Pre-basic category seed, 0 per cent
  - (b) In crop for the production of Basic I class seed, 0.5 per cent and of Basic II class seed, 1 per cent
  - (c) In crop for the production of Certified I class seed, 1.5 per cent and of Certified II class seed, 2 per cent.
3. The proportion of growing plants showing symptoms of virus diseases shall not exceed:
  - (a) In crop for production of Pre-basic TC class seed, 0 per cent
  - (b) In crop for production of Pre-basic class seed, 0.1 per cent
  - (c) In crop for production of Basic I class seed, 0.2 per cent
  - (d) In crop for production of Basic II class seed, 0.8 per cent
  - (e) In crop for production of Certified I class seed, 2 per cent
  - (f) In crop for production of Certified II class seed, 6 per cent.
4. The proportion of growing plants not true to the variety and plants of another variety should not exceed:
  - (a) In crop for production of Pre-basic TC class seed, 0 per cent
  - (b) In crop for production of Pre-basic class seed, 0.01 per cent
  - (c) In crop for production of Basic category seed, 0.25 per cent
  - (d) In crop for production of Certified category seed, 0.5 per cent.

5. The crop shall be free from:

- (a) *Synchytrium endobioticum* (Schilb) Perc.
- (b) *Clavibacter michiganensis* spp. *sepedonicus* (Spieck. and Kotth.) Skapt. and Burkh.
- (c) *Ralstonia solanacearum*
- (d) Potato spindle tuber viroid
- (e) Tomato Stolbur.

6. Depending on the circumstances and character of potato production in the country, requirements for isolation and rotation of the crop may be considered.

7. The satisfaction of the above mentioned standards or other conditions shall be established by official inspection and/or testing.

## B. Field inspection procedures

### 1. Scope of inspections

All seed potato crops to be certified under the Standard must be inspected during growth. Field inspections should be carried out in accordance with the following procedures.


The DA should adopt a risk-based approach to the inspection of ware potato crops growing in the vicinity of seed potato crops.

Other measures, e.g. specifying provenance of seed potatoes which may be planted, may also be deployed to control the health of non-seed potato crops on seed-producing farms.

### 2. Level and timing of inspection

A minimum of two inspections is recommended for growing plants. Where possible, inspections should start at or shortly before the flowering stage.

The DA shall specify the inspection procedures. In general, the procedures should allow the inspector to inspect at random a representative sample of plants from a crop. The number of plants affected by the diseases listed in annex II, section A, points 2 and 3 and those



not true to variety or of another variety (annex II, section A, point 4) should be recorded separately in the field inspection report and each expressed as a percentage of the total number of plants inspected in the crop.

During each crop inspection the inspector should verify the purity and identity of the variety. The first generation derived from Pre-basic TC class seed potatoes should be inspected at a more intensive rate to identify off-types.

### **3. Additional measures to support crop inspections**

Field inspection results will normally be determined by visual assessment of the crop. Inspectors may be supported by appropriate tests when confirmation of the cause of a particular symptom is required.

### **4. Removal of plants with faults mentioned in annex II, section A, points 2-4**

The DA may permit roguing within specified limits, provided the tolerances specified in annex II, section A are met at the time of inspection. Roguing must include removal of all tubers, as well as the foliage of the plant, to ensure that no affected material will be harvested.

### **5. Second opinion inspections**

In the case of a disputed inspection, growers will be entitled to ask for a confirmatory inspection to be conducted by another inspector.





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