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UNECE Guide to Seed Potato Field Inspection

UNECE Guide to Seed Potato Field Inspection: Recommended practices

Submitted by the secretariat*

The text of this document was reviewed by the Extended Bureau at its meeting in Melbourne, Australia, in April 2014. The Specialized Section may wish to recommend this Guide to the Working Party for approval.

* The present document was submitted late due to resource constraints.

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Guide to Seed Potato Field Inspection: Recommended practices

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

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 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 most up-to-date version of the Guide is available at the UNECE website at: http://www.unece.org/trade/agr/standard/potatoes/pot_e.html. The adopted version of 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
- External tuber quality and physiology
- Sizing and labelling.

1.1. Scope of inspections

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

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
- Assess and record the disease level, varietal purity, field rotation, cultivation, separation and overall health of a seed potato field
- Determine seed status eligibility of the inspected field and, if appropriate, assign a seed class and a field unique certification number.

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

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.

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/mentor" inspector (mentoring/shadowing process).

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 to cooperate for a better understanding of field inspection practices, comparison and discussion of methodologies and of 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.

3. Information available to the inspector

For every potato field 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. zero-tolerance diseases)
- Field number (may be assigned by inspector)
- Location of field
- Identifiers for the fields 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 potato and other crops planted in the vicinity of the potato crops submitted for certification (field history).

3.1. Imported seed potatoes

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

4. Before the 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 to fields 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 fields entered for certification are ready for inspection.

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 fields, 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. Level and timing of inspection

Proper timing of field inspections is very important. 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 field. The number of plants affected by the diseases listed in Appendix 2 (Annex 9 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 field.

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 should (if not known) introduce themselves and take the time to discuss the inspection process with the growers or representatives. The following is a list of items for the inspector to address prior to field entry:

- Update the grower or representatives 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 the certification
- Confirm information on potato and other crops planted in the vicinity of the 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 materials when conducting a field inspection:

- Map of the fields supplied by the grower
- Inspector's field notes filled with grower (variety, field number, class, seed source, hectares, and proper minimum counts of each field)
- Guide on Seed Potato Field Inspection
- The Standard
- Variety description of the varieties to be inspected
- Pen/pencil
- Approved disinfectant, sprayer and brush or 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.

Where possible, inspections should start at or shortly before the flowering stage. The first inspection is the initial opportunity for the inspector to observe the growing field. 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 field. The number of plants affected by the diseases listed in Appendix 2 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 field.

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







When entering a field 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 field 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 field. Annex II in the Standard lists tolerances for defects, diseases and varietal mixtures upon field inspections for all classes of seed potatoes. Faults counted under the tolerances for field-grown seed potatoes, seed potato field entered for certification, 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 field at the time of inspection based on random visual examinations of growing plants performed by walking through the fields. Any abnormal and/or unusual cultural conditions, such as chemical damage, observed in the field 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:

<p>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 (particular with viruses), or genetic factors.</p>	
<p>Lesion: A distinct area of diseased plant tissue. A canker on the stem or a confined area of necrosis on the leaf.</p>	
<p>Mottling: A variegated pattern marked with yellowish spots or patches of many colours or shades.</p>	
<p>Necrosis: Death of plant cells or plant tissues, usually accompanied by darkening or discolouration, occurring as a disease symptom.</p>	
<p>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.</p>	
<p>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 viruses.</p>	

<p>Stalk break: Disease caused by <i>Sclerotinia sclerotiorum</i> in which water-soaked 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 <i>Sclerotinia</i> can be seen.</p>	
<p>Wilt: Leaflets lack turgor, causing them to become limp and droop, with the leaves rolling inwards. Caused by a dehydration due to environmental or pathological causes (e.g. <i>Rhizoctonia</i>). May affect the whole plant or single stems (if pathological).</p>	

4.5. Assessing and counting faults

A representative sample of plants is inspected to determine disease infection and varietal mixtures levels in the field. They are taken at regular intervals in a randomized pattern throughout the field/crop to ensure the inspection results are representative of disease levels and varietal mixtures in the field. 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.

Crop inspection sampling

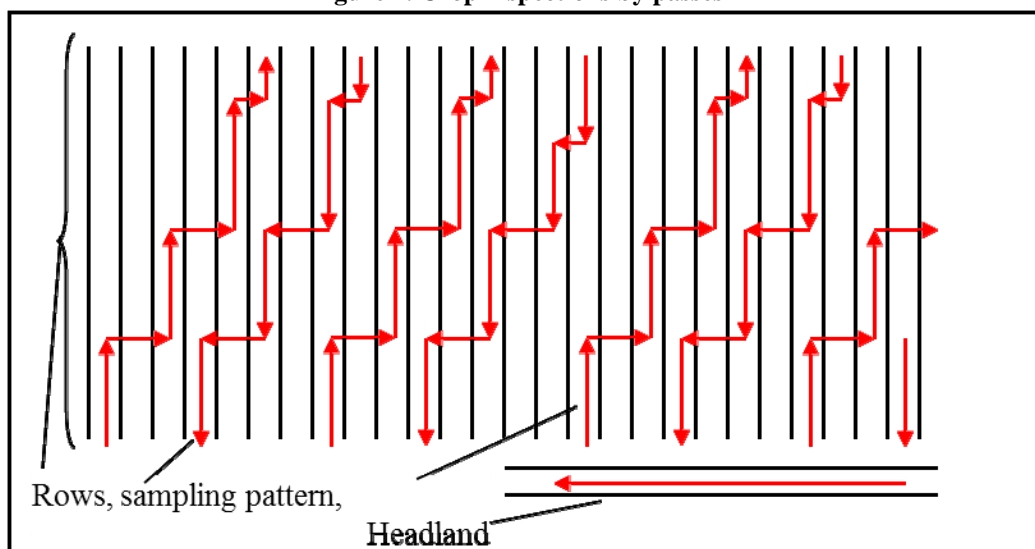
The sample is the number of plants observed. When no fault is found or observed, the sample does not need to be counted. When the planting density is known, the number of plants can be represented by the area observed.

To calculate the percentages of faults one needs to count a number of faults within the population of a known number of plants. E.g. when crossing rows one can count the number of rows and look for faults within two or five (possibly on each side) plants. 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%.

Crop inspections by making counts

One may follow the rows, e.g. 167 steps 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. Crop inspections by passes



Each red line represents a “pass” through the crop. 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 dividing the area to be inspected (sample) by the area of the crop, then multiplying this figure by the number of drills in the crop and dividing by 2.

Example 1 (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, mixture, etc., 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 inspection sample.

4.5.1. Establishing the minimum sample size

It is essential to establish and inspect each field using a minimum sample size (number of counts) depending on the class planted and field. 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 field is not totally free from faults. It is not appropriate for the inspector to add these additional faults to the official counts. However, in such a situation the inspector should note this on his 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 field to ensure random sampling

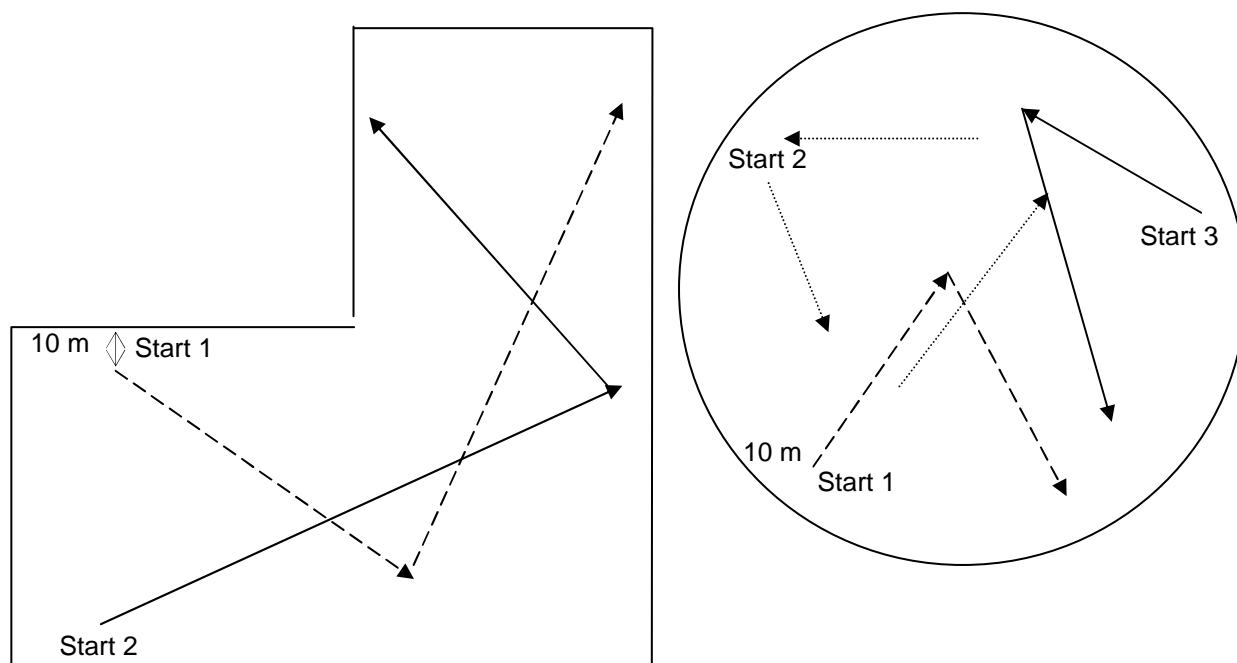
The inspector should walk the field and make a random examination of the plants including/covering both sides of the field either following a figure “X” pattern or an inverted “V” or a zigzag pattern. These patterns generally give the inspector the highest

degree of randomness and allow the greatest surface area of the field and the highest number of plants to be covered while reducing the chances of omitting a pocket of infestation. If the field 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 field is properly covered.

For fields 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. Sample patterns for inspecting circles and irregular-shaped fields are given below. 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. Sample patterns for inspecting circle- and irregular-shaped fields

(Each bold line indicates a count or 100 plants)



When entering the field, the inspector should be aware of the “edge effect” where the margins 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 this 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 field, this is accomplished by an inspector moving through the field 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 that the field is adequately covered.

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 field adequately, take an appropriate number of counts, assess the field properly and assign the appropriate class at the end of final inspection.

During field inspection, in certain situations the inspector may need to take a sample.

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 coming from outside the seed farm should have been cleaned before being allowed on the farm.

Inspector hygiene: Upon completion of daily field inspection, on a farm unit, and at the end of each day, clean footwear and equipment prior to leaving the premises. 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:

- Prior to arriving on the production unit, 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 fields, known to be infested with late blight outbreaks at the end of the day.

4.5.4. During the inspection

During the field 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 pattern choice and to the evaluation of disease level, virus content and varietal mixture, if the field was planted with different seed sources. This information is very important as if the field 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”.

Between counts, the inspector must stop periodically to:

- Look for insect and disease damage
- Inspect individual plants for aphid infestations by turning over leaf trifoliate
- 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 inspection, the stand, the vigour and the cultivation of the field may be rated at the discretion of the DA. These are subjective ratings and a field will not fail as a result of these ratings. These assessments are valuable for inspectors, producers and buyers to determine if field 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 fields it may indicate another underlying problem, leading to further investigation.

Stand refers to overall uniformity of the plants in the field (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 field. An excellent field should show lush new growth with even colour. In cases where the field is performing poorly, possibly attributed to drought, variable fertility, herbicide injury or poor quality seed (physiologically aged, chilled, bruised, small seed pieces), the field 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 each of the “Remarks” sections in the inspector’s field notes, as well as in the report of 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 should 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.

4.5.4.4. *Termination of field inspection during the inspection*

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

- Inspection counts show excessive levels of disease or varietal mixture whereby the field 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 field 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
 - Tomato 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, etc., 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 etc.
- 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, checkmarks, etc.) must be consistent throughout. Comments or any actions or samples taken should be recorded and dated. Any plant samples sent for lab testing must be recorded 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. 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 now 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 field 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. Fields not meeting standards

A field may fail inspection and be subject to rejection or downgrading to applicable class for a variety of reasons. When a field 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.

When a field 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 field inspected. To assist the inspector to make such a decision, the following is a non-exhaustive list of criteria that could be used in order to assist in determining if corrective action (roguing or other) should be administered or not to determine the field status.

Criteria that could justify the recommendation of the issuance of a corrective action:

1. Observations during the first field inspection are higher than the results expected for the applied class standard but a corrective action (i.e. roguing) is expected to be feasible.
2. Field inspection results after the first inspection are equivalent or slightly higher than the minimal class standard applied for. As the virus content is likely to be higher at the second inspection, it is better to recommend a corrective action (i.e. roguing).
3. 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.
4. Following observations, the inspector is confident that with subsequent inspections, they will still be able to determine the criteria for the field status.

5. The inspector shows the grower affected plants with a virus or any other problems and he/she is able to recognize the symptoms easily. At this time, the inspector is confident that the grower will be able to remove enough problematic plants by roguing.
6. The variety, field condition and maturity (plant size, senescence, etc.) are at optimal conditions.
7. The farm history has showed its capacity and efficacy to rogue fields with success.
8. Corrective actions are put in place immediately or within a given period of time by the inspector.
9. Any other possible reasons.

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

When possible, 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. Field downgraded or rejected

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

- Inspection shows disease or varietal mixture in excess of standards.
- 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 growth 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, etc.)
- Excessive foliar damage is present (e.g. damage from frost, hail, insect damage, fungus, etc.)
- The environmental conditions 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.

5. Conditions to downgrade or withdraw eligibility

After the final field inspection the following circumstances may lead to downgrading or withdrawing eligibility for certification of the crop:

- Haulm destruction was not carried out when necessary
- The field has been treated with or has been exposed to a sprout inhibitor or a herbicide, as in the case of drifting from another field
- The crop has lost its identity
- The crop has lost its ability to propagate
- If the inspector determines that the field had been contaminated with a zero-tolerance pest (see 4.5.4.4).

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, that is a lighter colour, but the leaves are generally firm and rattle

when shaken. Whereas blackleg-infected plants may show leaf curling that is a lighter colour but 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, and physiological problems which may be attributed to other related factors. For example, nutrient deficient plants could display symptoms similar to mosaic in contrast to healthy plants. Examine the underside of the lower leaves of plants near edges and throughout the field to determine presence of aphids.
- 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

- 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.
 - UNECE Guide to Seed Potato Diseases, Pests and Defects.
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