



Quebec Seed Potato Certification Program

SPECIFICATIONS 2022

Les Producteurs de pommes de terre du Québec
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INTRODUCTION

- This document is the property of the Potato Producers of Quebec.
- This edition was revised in May 2022.
- All requirements must be respected to obtain and keep the "Potato Seed of Quebec" certification.
- An audit conducted by an organization mandated for this purpose by the Union is required according to the frequency provided for in the regulation.
- Additional audits and unannounced visits may be made as needed.
- Producers applying for certification agree to accept the audits requested by the Union, to pay the costs and to implement any corrective measures requested.
- The criteria of these specifications as well as any Quebec or Canadian regulation that applies to the seed potatoes of companies applying for certification must be respected at all times.

Scope of the program

- Participation in the program is mandatory for all Quebec producers who wish to market seed potatoes, in accordance with the "*Règlement sur la production et la mise en marché des pommes de terre de semence*" (DÉCISION 8901 DE LA RÉGIE DES MARCHÉS AGRICOLES ET ALIMENTAIRES DU QUÉBEC EN 2007).

CRITERIA

The criteria of these specifications as well as any Quebec or Canadian regulation that applies to the seed potatoes of companies applying for certification must be respected at all times.

1. Documents

1.1 Mandatory documents

The following documents are mandatory and a copy of the most recent version of each record is available online at : <https://epatantepatate.ca/les-associations/semences/>.

- Cleaning and Disinfection Record (#1): June 2019 version
- Treatment record (#2): February 2019 version
- Crop assessment (self-inspection) record (#3a): May 20, 2022 version
- Scouting Protocol (for conducting crop evaluation) (#3b): May 20, 2022 version
- CFIA Inspector's Observation Record (#4): May 14, 2012 version
- Producer Declaration for Late Blight (#4b): May 2022 version
- Late Blight Assessment Grid (#4): May 2022 version
- Harvest Sample Record (#5): May 2022 version
- Storage Record (#6): February 2019 version
- Tuber Inspection Report (#7): February 2019 version
- Bulk and Bag Shipping Records (#8 and #9): February 2019 version
- Tuber sampling protocol at harvest (Schedule 1): May 2022 version
- Disinfection and Biosecurity Protocol: May 14, 2018 version
- PCQ shipping inspection protocol: June 2014 version

1.2 Retention of documents

All documents mentioned in section 1.1 must be retained from the date of the first application for certification and for a minimum period of 36 months. The PCQ program must be maintained during this period.

2. Seed Quality

2.1 Seed selection

- a) Any seed lot planted on the seed farm must meet the criteria of the CFIA Federal Potato Certification Program guidelines to prevent the introduction and spread of regulated potato quarantine pests in Canada..
- b) With the exception of Nuclear and Pre-Elite lots, all seed lots planted on the seed producing farm must be accompanied by a post-harvest test result for PVY and PLRV viruses. The test must be performed by a CFIA approved laboratory. The sampling protocol must be available (see appendix 1 and 2).
- c) The combined post-harvest test results for PVY and PLRV viruses must meet the following tolerance levels for any seed lot planted on the seed farm:

Maximum tolerance limits for PVY + PLRV for planted seed				
E1	E2	E3	E4	F
0,5 %	1 %	2 %	2 %	2 %

- d) When using protected or private varieties, a written agreement between the producer and the plant breeder or selector must be available at the time of audit.

2.2 Nuclear material

An updated quality manual is mandatory for any production unit that produces nuclear material.

2.3 Companies specializing in the sale of Nuclear and Pre-Elite seeds for recertification purposes

Companies specializing in the sale of Nuclear and Pre-Elite seeds for recertification purposes must produce a quality manual, approved by the certification committee. They must be audited once a year.

3. Phytosanitary Control

3.1 Bacterial Ring Rot (*C. michiganensis* subsp. *sepedonicus*)

- a) For producers who are new members of the PCQ, all lots produced on the production unit, from harvested class Elite 2 to Certified, as well as other lots that have not been inspected by the CFIA, must be tested for bacterial ring rot during the first three years of PCQ membership.
- b) After the first three years of PCQ membership, lots submitted for CFIA certification must be tested for bacterial ring rot. For all other lots produced on the farm **that have not been inspected by the CFIA**, a minimum of two lots must be tested for bacterial ring rot. These two lots must be selected from the lowest seed classes.
- c) Testing must be performed in accordance with CFIA guidelines by a CFIA approved laboratory and the sample must be representative of the lot.
- d) Lots having positive PCR or ELISA+IMF results for bacterial ring rot may not be sold or planted in a Protected Crop Area (PCA) or for recertification purposes.
- e) A company that fails to obtain certification due to bacterial ring rot will not be allowed to sell seed for recertification for two years.
- f) A farm that has received a positive PCR test result for bacterial ring rot may not transfer any potatoes produced on that farm in the same production year, and the two production years following the date of the test result, into a protected growing area for seed purposes.

3.2 PVY and PLRV viruses

- a) Any seed lot sold (in whole or in part) in the Pre-Elite, Elite 1, Elite 2, Elite 3, Elite 4, Foundation or Certified classes shall be post-harvest tested for PVY and PLRV viruses.
- b) The collection of representative samples from any seed lot sold and post-harvest testing for PVY and PLRV viruses must be done in accordance with the PCQ guidelines. Testing must be performed by a CFIA approved laboratory. The sampling protocol must be available (see Appendix 1 and 2).

- c) Only seed lots that meet the tolerance levels below may be brought to market.

Maximum PVY + PLRV tolerance thresholds for lots sold outside ZCP						
PE	E1	E2	E3	E4	F	C
0 %	2 %	2 %	3 %	3 %	5 %	5 %

- d) For lots sold in protected growing areas, only seed lots that meet the tolerance levels below may be brought to market.

Maximum PVY + PLRV tolerance thresholds for lots sold in ZCP					
PE	E1	E2	E3	E4	F
0 %	0,5 %	1 %	2 %	2 %	2 %

- e) If a producer wishes to take advantage of the opportunity to submit additional samples the new samples must be collected by a person previously authorized by the PCQ. The final test result will be based on the total number of tubers in the submitted samples.
- f) The producer must have and maintain a sampling record (Record #5) in which the following information is recorded for each lot: the variety, the class (harvested), the certification number, the identity of each of the fields or parcels making up the lot, and for each, the date of collection, the area harvested, the number of loads, the number of tubers collected per bucket load, and the number of containers used to store the tubers making up the lot's reserve.

3.3 Late Blight (*P. infestans*)

- a) The first application of a phytosanitary treatment should be made before the plants touch each other in the row. Preventive treatments for late blight should be started no later than 8 weeks after planting.

Preventive treatments should be made on a regular basis (every 7 to 10 days). A longer interval is acceptable if product label directions or predictive model tools allow. However, any exceedance must be documented and a 14-day exceedance is not permitted. Results must be recorded in the most recent version of the Treatment Log #2.

- b) Scouting operations must be performed every 7 to 10 days according to the scouting protocol in place (Register 3b). Scouting activities must be recorded on the most recent version of the Crop Assessment Form #3a.

- c) Upon discovery of late blight, recommended treatments should be made within 24 hours. The most recent version of the Late Blight Scoring Grid (Register 4e) is completed for each field with late blight. This document is completed by an external evaluator mandated by the Registrar.

The producer must complete the most recent version of the Register 4b "Producer Declaration". This document must be completed and submitted with the treatment record to the Registrar.

- d) When the 24-hour deadline cannot be met due to lack of suitable weather conditions, treatment should be carried out as soon as conditions permit.
- e) Tubers from seed lots where late blight was detected in the previous year must be treated with a registered pesticide before planting. In addition, as a preventive measure, the producer must apply a foliar fungicide to the plants from these seed lots as soon as 90% have emerged or, at the latest, 30 days after planting.
- f) Lots affected by late blight and for which a phytosanitary control has not been carried out or has given inconclusive results cannot be sold as seed.
- g) Scrap potato piles must be removed from the production unit by June 15. The date and method of removal shall be recorded in the treatment record provided for in section 3.2a.

3.4 Aphids

- a) The results of the weekly visual detection must be recorded on the Crop Scoring Sheet from mid-July until complete vine dessication. The date of observation of complete vine dessication must be recorded on the most recent version of the Treatment Record #2.

3.5 Phytosanitary Treatments

- a) All potato fields in the unit of production, whether or not they are subject to CFIA inspection or are downgraded during the season, must be subject to the same pest management.
- b) Phytosanitary treatments and weed control treatments shall be recorded in the most recent version of Treatment Record #2.
- c) The producer shall maintain a treatment record of the date of application, product used, rate applied and field or lot number treated, varieties, acreage, date of planting, date of emergence, date of observation of complete removal and PCPA number.
- d) The producer must make a first application of a defoliant product no later than:
- August 27 of the year for the Pre-Elite and Elite1 harvest classes;
 - September 15 of the year for Elite 2, Elite 3, Elite 4, Foundation (F) or Certified (C) harvest classes.

- e) The producer must apply mineral oil every 7 to 10 days. This is a mandatory practice for high class planted Nuclear, PE and E1 and recommended for low class planted E2 to certified. The application of mineral oil should be done when 50% of the plants in a field have emerged. It is advisable to follow the recommendations in the PVY Management Strategy document¹. The document is available online at https://epatantepatate.ca/wp-content/uploads/2020/09/Brochure-PVY_v2-14-avril-2016.pdf.

3.6 Potato Cyst Nematode (PCN) Scouting, Suspended Criteria

- a) The producer must conduct intensive soil sampling for PCN on all production units registered for CFIA certification for a minimum of three years.
- b) Thereafter, the producer must submit a minimum of 10% of the area registered for CFIA certification to soil sampling annually.
- c) The producer shall not market seed potatoes until the soil test indicates a negative result for PCN.
- d) With the exception of Nuclear lots, any seed lot originating from another farm and planted on the seed producing farm must originate from a farm that has submitted a minimum of 10% of its production unit areas to soil sampling for PCN.

4. Crop approaches

4.1 Documentation

- a) Each field or lot of seed potatoes must be identified with a sign showing the names of the varieties and their classes or a corresponding identification number. An annual field plan shall be made available to the auditor showing this information.

1 Morissette, Samuel, (2013). *Guide de prévention PVY*. Alma : Agrinova

- b) The producer must complete a crop assessment form (Record 3a) for each lot enrolled in the certification program.
- c) Field assessment and roguing should be done as soon as the plants reach a height of 25-30 cm (10-12 inches) or before the rows close. Evaluation sheets should include roguing dates.
- d) All lots issued a roguing notice by a CFIA inspector due to viruses must undergo post-harvest testing.
- e) Accompanying the CFIA inspector for a half day for training purposes is mandatory.

4.2 Rotations

- a) For Nuclear and Pre-Elite planted classes: three-year cycle (one year of seed potatoes and two consecutive years of other crops).
- b) For other classes: two-year cycle (one year potatoes and one year other crops) or four-year cycle (two consecutive years of potatoes and two years of other crops).
- c) The use of varieties resistant to golden nematode (*Globodera rostochiensis*) should be preferred. In case golden nematode resistant varieties are produced on the production unit, these varieties should be included in the crop rotations in the fields with the most years in potato.

5. Cleaning and Disinfection

The company must have and maintain a Cleaning and Disinfection Operations Record (Record 1) where it records information on cleaning and disinfection operations: date, product used, concentration and building or equipment cleaned. The most recent version of the Cleaning and Disinfection Operations Record #1 or other record deemed equivalent by the PCQ must be used.

Cleaning and disinfection activities must be performed in accordance with the Disinfection and Biosecurity Protocol, which can be obtained at : https://epatantepatate.ca/wp-content/uploads/2020/06/Protocole_de_desinfection_et_de_biosecurite_2018.pdf.

All equipment used in the production and harvesting of potatoes and all materials, containers and vehicles that have been in contact with potatoes must be cleaned and disinfected at least once a year.

6. Multi-sites

A quality manual is required when a producer operates more than one production unit. This manual must be kept up to date. Guidelines for developing a quality manual are available online at: <https://epatantepatate.ca/wpcontent/uploads/2020/06/Lignesdirectricemanuelqualitefourmisiseurshauteclasse-juillet2018.pdf>.

7. Storage

All measures must be taken to ensure the preservation of seed potato quality.

7.1 Registry

- a) Producers must have and maintain a storage logbook (current version of Logbook 6) that records the temperature and humidity levels in each of their storage facilities on a weekly basis. This information must be recorded from the time of storage until the time of sale. It is strongly recommended that temperature and relative humidity measuring equipment be calibrated annually for each warehouse.
- b) The producer must post a storage plan at the entrance to each warehouse that readily identifies varieties, lot classes and locations.
- c) Seed lots should be segregated according to CFIA guidelines to minimize the risk of mixing of lots in storage.
- c) For lots stored in boxes, each box must be identified by variety and class.

7.2 Biosecurity Measures

- a) A sign describing to visitors the issues of the certification program and the restrictions on movement on the farm shall be placed on each potato storage building. Plant health safety instructions and restrictions on movement within the storage buildings shall be prominently displayed at the entrance to each storage building.
- b) The mandatory equipments are:
 - A shoe brush;
 - Bottle of disinfectant well identified (name of the registered product and dilution);
 - Plastic disposable boots.

This equipment must be easily accessible.

Footbaths are not acceptable for disinfection as the disinfectant is deactivated by organic matter. It must be applied with a canister.

- c) Any person circulating on the production unit must apply and respect the disinfection and biosecurity protocol developed by the CFIA and MAPAQ. This protocol must be available. Here are some examples of important points to respect for biosecurity.
- Make available clean boot covers and protective apparel for employees and visitors.
 - Boots, protective apparel, boot covers and gloves used by employees must remain on the premises and be washed weekly (6-8 days) in hot soapy water (protective apparel, cotton gloves).
 - Disposable plastic boots are useful for occasional visitors, but it is important to use two pairs as they are fragile.
 - The interior and exterior of all vehicles on the farm must be cleaned regularly.

8. Shipping

8.1 Quality Control

- a) Producers must maintain a tuber inspection record of the results of their inspections of seed sold. The producer must ensure that the requirements of the PCQ shipping inspection protocol and the CFIA Seed Potato Quality Management Program (SPQMP) are met. However, if the two programs have separate requirements for an item, the more stringent requirement must be followed. A certificate of compliance must accompany each lot prior to shipment.
- b) The producer shall maintain the most current version of the bulk and/or bag shipment records numbered 8 and 9 recording the date of loading, consignee, variety, quantity shipped, class and certification number.
- c) A conveyor and/or roller table must be available at the time of potato loading to ensure product quality.
- d) Trailer loads should be segregated according to CFIA recommendations to minimize the risk of mixing.

8.2 Cleaning of potato transport trailers

- a) Trailers used to transport a producer's seed potatoes must be disinfected at a MAPAQ approved disinfection center. A copy of the disinfection certificate, provided by the MAPAQ, must be available for each load when the producer is located in a protected growing zone. If the trailer transports lots from several producers, only the first producer must have the disinfection certificate. However, the other producers must also keep a copy of the certificate. The names of all companies visited must be listed on the disinfection certificate in order of passage.
- b) Trailers used to transport seed potatoes shall be cleaned prior to arrival at the production unit.
- c) When the producer does not have access to a disinfection facility, disinfection must always take place at the same location, ideally in a secluded area on the farm or near the farm away from the loading dock. The initials of the producer and the trucker must be recorded on the disinfection certificate.

GLOSSARY OF TERMS

CFIA	Canadian Food Inspection Agency
E.L.I.S.A.	Enzyme Linked ImmunoSorbent Assay
IMF	Immunofluorescence
Lots	All potatoes of the same variety and class that come from one or more plots of the same production unit and that will be sold or used under the same certification number
PCQ	Programme de certification de la pomme de terre de semence du Québec / Quebec Seed Potato Certification Program
PCR	Polymerase Chain Reaction
PLRV	Potato Leaf Roll Virus
Post-Harvest Test	Laboratory testing for the presence of PVR and PLRV in seed tubers. This program refers to RT-PCR and E.L.I.S.A. detection methods for post-harvest testing
PVY	Potato Virus Y
Quality Manual	Definition according to ISO 9000: 2005: Document describing the quality management system of an organization. The level of detail and form of a quality manual can vary to suit the size and complexity of a particular organization. Guidelines for developing a quality manual are available online at : https://epatantepatate.ca/wpcontent/uploads/2020/06/Lignesdirectricemanuelqualitefournisseurshauteclasse-juillet2018.pdf
RT-PCR	Reverse Transcriptase Polymerase Chain Reaction
SPQMP	CFIA Seed Potato Quality Management Program
Transporter	One who transports seed potatoes
Union	Potato Producers of Quebec/Les Producteurs de pommes de terre du Québec
Unit of production	Any person or company specializing in the production of seed potatoes

Appendix 1: Tuber sampling protocol at harvest

Establishment of a pool of tubers representative of a lot and the number of tubers taken from the pool to be tested for post-harvest detection of that lot

It is recommended that you read the entire specification, appendices, records and protocols.

Why create a reserve of tubers representative of each lot?

The reserve of representative tubers for the lot consists of the tubers randomly removed from the conveyor during storage of the lot's crop. The total number of tubers to be removed from each field in a lot is determined by completing the PCQ Record #5.

The tuber reserve is approximately 2.5 times the total number of tubers to be shipped. This reserve allows a sufficient number of representative tubers from the lot to be submitted to the laboratory for one or two post-harvest tests, and if necessary, to be reshipped if tests are to be repeated.

How many tubers from the reserve should I submit to the lab for testing?

The virus test may be performed using the same tubers as those tested for bacterial ring rot when the grower submits a request to the laboratory to perform both tests for the seed lot.

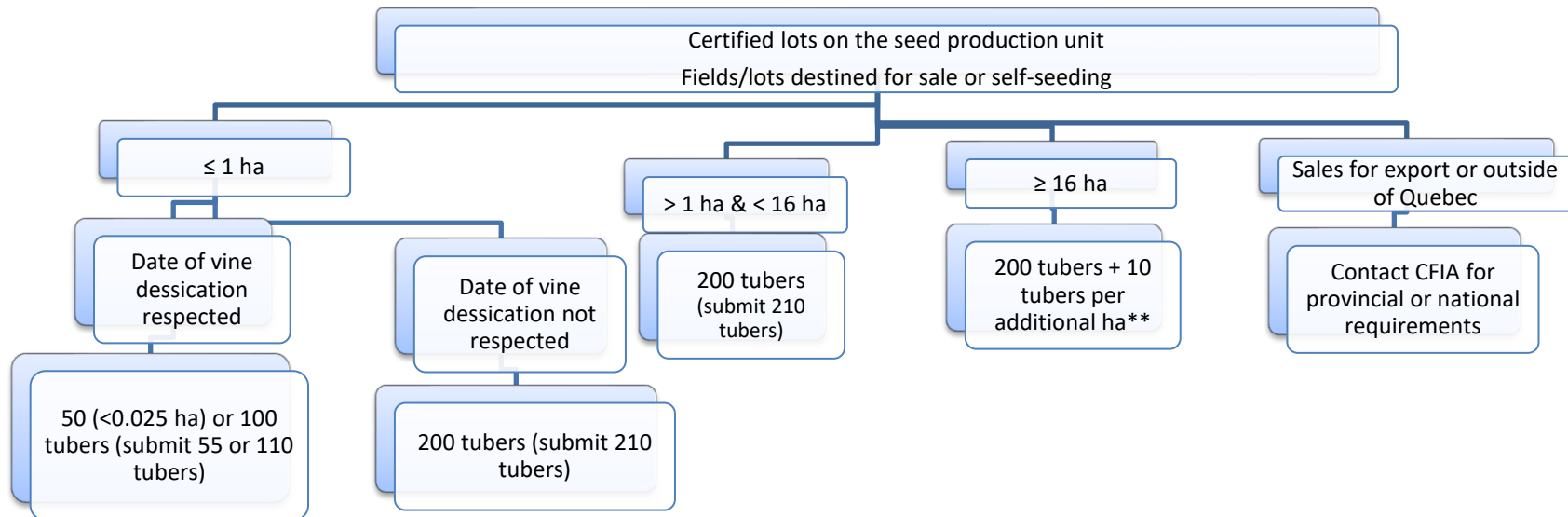
The total number of tubers to be stockpiled is recorded in the green column of Table 1. The total number of tubers to be randomly selected from the pool for shipment to the laboratory is determined by the total area of the lot. The three right hand columns of Table 1 indicate the total number of tubers to be submitted based on the type of detection test requested or if the producer requests to do both detection tests for the same lot.

Table 1 Establishment of a pool of representative tubers from a lot and the total number of tubers from the pool to be submitted to the laboratory to perform a single test or two tests for detection.

Please add 5-10% more tubers to the total to be submitted to compensate for losses during transport.

	Tuber reserve for a lot	A test to detect of Bacterial ring rot	Viruses plan	Two detection tests Bacterial ring rot and viruses
Total lot size (hectares)	Number of tubers to be randomly selected for the RESERVE	Number of tubers to be tested for bacterial ring rot (Note 2)	Number of tubers to be tested for viruses (Note 3)	Number of tubers to be tested for bacterial ring rot and viruses
< 0,025	250 (Note 1)	1 % of plants, min of 5 max of 50	50 (Note 1)	50 (Note 1)
0,025 to less than 1.0	250 (Note 1)	100	100 (Note 1)	100 (Note 1)
1 to less than 4	500	200	200	200
4 to less than 16	1000	400	200	400
16 to less than 36	1000	400	200 over 10 tubers per hectare over 16	400
37 to less than 40	1200	400	200 over 10 tubers per hectare over 16	400 over 10 tubers per hectare over 36
40 to less than 76	2000	800	200 over 10 tubers per hectare over 16	800
More than 76	2200	800	200 over 10 tubers per hectare over 16	800 over 10 tubers per hectare over 76
(Note 1) If a roguing notice for virus detection has been issued, or if the date of pruning is not met, a reserve of 500 tubers, not 250, must be set aside and 200 tubers, not 50 or 100, must be submitted to the laboratory for virus testing				
(Note 2) CFIA Directive D-97-12: Seed Potato Certification Program-Bacterial Ring Rot Testing Program for Field-Grown Seed Potatoes. Available at: http://www.inspection.gc.ca/				
(Note 3) PCQ Specifications: Appendix Diagram of post-harvest testing. Available at: https://epatantepatate.ca/les-associations/semences/ . See Potato Certification Programs - Post-Harvest Testing Flowchart.				

EXPLANATORY GRAPHIC OF POST-HARVEST TESTING (May 2022 version)



Enterprises that consider themselves to be at low risk* for virus detection may apply in writing to the certification committee to obtain:

- 1) **Permission to group lots according to the following criteria**** : Lots should be:
 - in adjacent fields;
 - a minimum grouping of 2 lots and a maximum of 4 lots;
 - a grouping of different varieties of the same class;
 - a grouping for the same variety or different varieties of more than one class that follow each other;
 - au plus 16 % des lots soumis ont eu un résultat positif aux tests viraux des 3 années antérieures;
 - la surface totale des lots une fois regroupés ne doit pas excéder 10 ha.

* The risk level assessment will be made based on visual inspection results, roguing advisories, virus levels in the area, and the history of post-harvest test results.

** There are specific criteria for accepting groupings of lots for sale in garden centers or for vegetable gardens. consult <https://epatantepatate.ca/les-associations/semences/>

N.B. 1. In regrouped lots made into a single sample, if one of the groups in this test is positive, the lot with the positive result should be tested separately at a minimum of 200 tubers/batch. Whether or not the other lots corresponding to this sample are tested will depend on the level of risk on the farm for PLRV and PVY and the traceability of the clusters corresponding to the lot.

N.B. 2. Lots destined for PEI or export cannot be grouped together.

Appendix 2: Protocols for PCQ-approved detection tests.

Protocols for PCQ-approved detection tests must be performed by a CFIA approved laboratory.

A-3.1 Test protocol for bacterial ring rot (*Clavibacter michiganensis subsp. sepedonicus*) of potatoes.

Detection of bacterial ring rot (*Clavibacter michiganensis subsp. sepedonicus*, *Cms*) is performed using the most recent version of the CFIA approved Protocol for the Detection of *Clavibacter sepedonicus*, Bacterial Ring Rot Agent in Potatoes.

Briefly, tuber samples are used to collect subsamples of up to 200 stubs that are ground in lysis buffer. A sample of the grindings is placed in a microplate to perform the steps of an ELISA test for *Cms*. The ELISA-positive samples are concentrated and dilutions of each concentrate are prepared to perform the steps of an immunofluorescence test for *Cms*. Samples with typical *Cms* bacteria detected by immunofluorescence are submitted for confirmation to the CFIA Reference Laboratory in Charlottetown.

The ELISA-positive samples will be used to extract bacterial DNA and subjected to the *Cms*-specific PCR assay developed by Gudmestad et al. (2009). PCR positive samples will be confirmed as positive.

Gudmestad, N. C., Mallik, I., Pasche, J. S., Anderson, N. R., and Kinzer, K. 2009. A real-time PCR assay for the detection of *Clavibacter michiganensis subsp. sepedonicus* based on the cellulase A gene sequence. *Plant Dis.* 93:649-659.

A-3.2 Protocol for the detection of PVY and PLRV viruses,

For post-harvest detection of PVY and PLRV in tissue samples collected from the heel, apex and eyes of tubers, the viruses are detected using the latest version of the PCQ-approved RT-PCR protocol Post-harvest detection of PVY and PLRV by RT-PCR. This protocol was developed by the IRDA Biological Analysis Laboratory, a CFIA approved laboratory.