

National regulatory control systems
Systèmes de lutte nationaux réglementaires

Clavibacter michiganensis* subsp. *sepedonicus

Specific scope

This standard describes a national regulatory control system for *Clavibacter michiganensis* subsp. *sepedonicus* that provides guidance on surveillance for the pathogen and its containment and eradication if found.

Specific approval and amendment

First approved in 2003–09.
Revision approved in 2011–09.

Introduction

Clavibacter michiganensis subsp. *sepedonicus*, which causes bacterial ring rot of potato, is an A2 pest for EPPO. It has a restricted distribution, being mainly found in the north and east of the EPPO region. This reflects its biology, since persistence of the disease is favoured by cool moist conditions. Prevention of further spread of the pest within the region is achieved mainly by international phytosanitary measures and the operation of certification schemes for seed potato. If countries can demonstrate that they are pest-free areas, or can establish pest-free areas within their territories, potatoes and plants from these areas will not be subject to the ring-rot restrictions which otherwise apply. Requirements for establishing pest-free areas are described in EPPO Standard PM 3/61(1) (OEPP/EPPO, 2004a). EPPO Standard PM 8/1 on commodity-specific phytosanitary measures specifies requirements for commodities of potatoes with respect to *Clavibacter michiganensis* subsp. *sepedonicus* (OEPP/EPPO, 2004b). This standard presents the basis of a national regulatory control system for the containment and eradication of *Clavibacter michiganensis* subsp. *sepedonicus*.

Outline of the system

A national regulatory control system is recommended to all the EPPO countries for the surveillance, containment and eradication of the organism if present, and provides sufficient guarantees to allow export of potatoes within the region, in conformity with EPPO Standard PM 8/1. This system is described in the present standard and takes into account the relevant EU Council control directive 93/85/EEC amended by Commission directive 2006/56/EC (EU, 1993, 2006). It is also recommended that EPPO

member countries at risk prepare a pest-specific contingency plan (based on EPPO standard PM 9/10 *Generic elements for contingency plans*) to ensure that the necessary management and operational arrangements are in place to deal with an outbreak.

Visual inspection of potato tubers is not adequate to prevent the spread of ring rot because the disease is often latent. Ring rot control therefore depends primarily on the use of certified seed potatoes and on the testing of seed potato samples by internationally agreed methods for detection and identification of *C. m. sepedonicus*. Whenever the disease is found, measures need to be taken to contain and suppress it, with the aim of eradication, especially by delimitation of a regulated area, by restriction of the cultivation of potato and control of volunteer potatoes for several years. *C. m. sepedonicus* can also survive in a dry state for several years so the contamination of surfaces, for example in storage areas, grading equipment and boxes, can result in disease spread. Strict hygiene measures are therefore a key element in disease control.

The national regulatory control system is devised to ensure that countries which demonstrate that they apply it can export potatoes and other plants on the same basis as countries which have demonstrated that *C. m. sepedonicus* does not occur.

Control system

This control system for *C. m. sepedonicus* has four objectives:

- to determine if the pest is present in the country, and, if present, to locate it and determine its distribution.
- to prevent its spread.
- to eradicate incursions.
- to eradicate the pest from potato production systems in areas where it is present.

1. Surveillance

The holding and handling of *C. m. sepedonicus* should be prohibited, except under special licence; see EPPO Standard PM 3/64(1) *Intentional import of organisms that are plant pests or potential plant pests*. *C. m. sepedonicus* should be considered as a notifiable pest. All persons suspecting or confirming the presence of the disease should therefore notify the fact to the NPPO.

Surveillance for the presence of *C. m. sepedonicus* in a country or area not known to have potato ring rot, is usually based on a systematic detection survey. The intensity of the surveillance should be designed and conducted based on risk assessment and should provide assurance for pest freedom covering the whole production system.

Surveys should preferably be undertaken on potato tubers in store. If sampling of tubers is undertaken in the field (e.g. early potatoes) it should preferably be done shortly before harvest. Samples should be taken at random to ensure that they are representative and that reliable results can be obtained. An individual sample for analysis should not comprise more than 200 tubers. In addition, other samples may be inspected visually by cutting tubers at the stolon end, and growing potato crops may be visually inspected at appropriate times for typical signs and symptoms of the disease. It should be considered that under European climatic conditions symptoms are rarely found and then often only at the end of the season.

ISPM No. 31 *Methodologies for sampling of consignments* may be used as a basis for establishing sampling rates and provides probability levels for detection at a given tuber sampling rate.

Processing, testing of tuber samples and identification of bacteria extracted from samples are described in EPPO Standard PM 7/59(1) (OEPP/EPPO, 2006a), which takes into account Council Directive 93/85/EEC as amended by Commission Directive 2006/56/EC.

2. Determination of presence

If an outbreak is detected by routine testing, or if an outbreak is suspected, the NPPO should prohibit all movement of the material directly concerned and may take various other safeguarding measures, such as prohibiting the movement of other potatoes or other host plants from the place of production¹ concerned. Suspect material should be submitted for confirmatory testing as soon as possible, following EPPO Standard PM 7/59 (OEPP/EPPO, 2006a). The NPPO should preserve appropriate specimens (e.g. original sample, original extract, prepared IF-microscope slides from extracts, cultures of the organism, relevant documentation) for at least one month after finalization of the tests.

If the material presents a risk for another country, the NPPO of that country should be informed immediately of suspect

¹A place of production is defined as “Any premises or collection of fields operated as a single production or farming unit. This may include production sites which are separately managed for phytosanitary purposes” (ISPM 5, 2010).

findings. Information for the potato lots exported should at least consist of:

- the variety name of the potato lot.
- the type (ware, seed, etc.) and where applicable the seed category of potatoes.
- the name and address of the consignor and the consignee.
- the date of delivery and quantity of the potato lot.
- the size of the potato lot delivered.

Additionally, the registration number of the grower or merchant and a copy of the delivery notice should be provided if available.

If the outbreak is associated with material from another country, evidence such as appropriate specimens or material and documentation should be kept for up to one year according to the requirements in ISPM No. 13 *Guidelines for the notification of non-compliance and emergency action* as appropriate.

The NPPO should investigate the extent and primary source of the outbreak. This investigation should include sampling and testing at least all other potatoes grown at the place of production concerned and the clonally-related seed potato stocks. Where relevant, it should also include, for example, places of production in contact with infected material through machinery, adjacent places of production, store houses and potato-cleaning and grading premises.

The NPPO should designate as ‘infested’, as appropriate:

- the lot from which the sample was taken.
- the waste from an infested lot (e.g. soil, processing waste).
- contaminated equipment and other articles (e.g. machinery, packing material, store) which have been in contact with the lot.
- the place of production, where the lot was grown.

It should also determine the extent of ‘probable infestation’², considering, where relevant, all clonally related stocks, seed and ware potato stocks which may have been in contact with possible infection, host plants, places of production, stores and machinery linked with the designated infestation. It should demarcate a regulated area, composed of places of production designated as ‘infested’ and places of production designated as ‘probably infested.’

In some cases, the regulated area may extend into other countries, in which case the NPPO concerned will also have to establish an equivalent regulated area. As a result of these operations, the extent of the area connected with the outbreak is determined not only geographically, but also in relation to production links and clonal links.

3. Containment

The planting of tubers or plants designated as ‘infested’ or ‘probably infested’ should be prohibited.

To reduce the risk of spread of the disease with seed potatoes, all seed potatoes intended for marketing should meet the requirements laid down in EPPO Standard PM 4/28 (*Potato certification scheme*) (OEPP/EPPO, 1999) and also additional tests for *C. m. sepedonicus* should be carried out either on each

²No positive test result, but a strong presumption that infection is possible.

plant of the initial clonal selection or on representative samples of basic seed potatoes (or higher grades of propagation stock).

If *C. m. sepedonicus* is detected (and confirmed by testing) in the seed potato production system, earlier propagations should be tested for the pest, including the initial clonal selection and systematically the basic seed potato clones. If no clonal or contact relationships are found, investigations should be extended to other basic seed clones or earlier propagations.

Sampling and testing for *C. m. sepedonicus* in the seed potato production system should be intensified in accordance with sound scientific and statistical principles. It is recommended that each seed potato crop is sampled and tested prior to certification in the regulated area.

If *C. m. sepedonicus* is detected (and confirmed by testing) in ware production similar action should be taken as for seed potatoes in particular regarding farm-saved seed if relevant.

Infested waste from industrial potato processing or packaging premises should be treated according to EPPO Standard PM 3/66 *Guidelines for the management of plant health risks of biowaste of plant origin* (OEPP/EPPO, 2008).

4. Eradication from the production system

In order to ensure that *C. m. sepedonicus* is eradicated from the potato production system a programme of phytosanitary measures should be undertaken. The following requirements should be made.

4.1 Measures for 'infested' and 'probably infested' material

Successful application of the disposal methods recommended below for all material designated as 'infested' or 'probably infested' will require careful implementation to ensure pathogen containment during treatment and thorough pathogen elimination prior to release from containment of treated material. Regular monitoring and auditing of disposal procedures should ensure their efficient and effective application at all times. In addition, if material is transported for processing a system of cleansing and disinfection (see below) should be in place at least for all vehicles that have been used for transportation.

4.1.1 All tubers or plants of potato designated as 'infested'

- incineration.
- heat sterilization.
- industrial processing at a processing plant with appropriate waste facilities.
- controlled composting at an officially approved composting site (see EPPO Standard PM 3/66).
- steaming and feeding to animals.
- deep burial where there is no risk of seepage to agricultural land or surface water.

Alternatively:

- tubers can be fed directly to cattle on a contained hard-standing area provided all the manure and tuber debris is collected and composted in a contained area for a period of at least two months and is not subsequently returned to arable land.

- fermentation of contaminated potatoes during silage production may also be a convenient pre-treatment prior to direct feeding to animals under the same controlled conditions as for direct tuber feeding.

Additionally, in cases where a crop is found to be infected during the growing season, destruction of the growing plants (e.g. by glyphosate herbicide application) is recommended. If progeny tubers have formed these should be harvested and disposed of appropriately.

4.1.2 All tubers or plants of potato designated as 'probably infested'

These should also be disposed of, as noted in 4.1.1.

Alternatively:

- Tubers can be used as ware potatoes under the control of the NPPO for direct consumption, provided that they are packed, ready for direct delivery and use without repacking, on a site with appropriate waste disposal facilities.
- On-farm composting at the place of production is also suitable provided it is conducted under official supervision to ensure that the entire quantity of material is adequately composted by exposure to a temperature of at least 55°C during an uninterrupted period of at least 2 weeks.
- Under official control, and provided there is no significant risk of any movement of the material away from the field, tubers may also be returned to the field of origin during winter and left on the surface to be killed by exposure to frost.
- Anaerobic digestion for production of biogas at an officially approved site is also a suitable method for disposal, provided the entire volume of material is subjected to a minimum temperature of 55°C maintained over a period of 24 h without interruption with an hydraulic dwell time in the reactor of at least 20 days.

All equipment and other objects classed as 'infested' or 'probably infested' should be thoroughly cleaned and disinfected (see below Solid and liquid waste) before further use (unless authorized otherwise by the NPPO), or destroyed.

4.2 Solid and liquid waste

Samples from solid and liquid waste considered to pose a risk for the potato production may be taken from processing and packing plants.

4.3 Measures applied in the regulated area

4.3.1 Measures applied at infested places of production

All machinery and storage facilities, in particular wooden boxes, which have or might have been in contact with 'infested' or 'probably infested' potatoes or fields should be immediately and thoroughly cleaned and disinfected, according to EPPO Phytosanitary Treatment PM 10/1 *Disinfection procedure in potato production* before being used or moved (OEPP/EPPO, 2006a,b). In addition, any machinery and storage facilities involved in potato production should be cleansed and disinfected in the year of the infection and after the first subsequent growing year.

Volunteer potato plants and other natural hosts of *C. m. sepedonicus* should be eliminated from all fields of the place of production.

4.3.1.1 Measures for infested fields

- No potatoes or crops for which there is an identified risk of the organism spreading, should be grown for at least 3 years and until no volunteer potato plants are found for 2 consecutive years.
- When potatoes are grown for the first time after the infestation was found, only ware potatoes should be produced (with a laboratory test on the harvested tubers).
- When potatoes are next grown after an appropriate rotation cycle, either seed or ware potatoes may be produced and a survey should be conducted.

Alternatively:

- Infested fields may be left fallow or under close-cut pasture for 4 years.
- When potatoes are next grown, either seed or ware potatoes may be produced, provided no volunteer potato plants were found for 2 consecutive years, with a laboratory test on the harvested tubers.

4.3.1.2 Measures for other fields

- In the first year, only ware potatoes may be produced from certified seed potatoes, with a laboratory test on the harvested tubers.
- In the second and third years, either seed or ware production from certified seed potatoes is allowed, with laboratory tests on tubers each year that potatoes are grown.

Alternatively, in the third year, potatoes grown under official control from certified seed may be planted instead of certified seed potatoes.

4.3.1.3 Measures for protected crop production

Special provisions should be made for potatoes in the early stages of propagation of material coming from *in vitro* culture (where complete replacement of the growing medium is possible).

4.3.2 Further measures applied in the whole regulated area³

4.3.2.1 In the year of the infection

Machinery and storage facilities involved in potato production should be cleansed and disinfected (but within infested places of

production stricter measures are required; see section 4.3.1: Measures applied at infested places of production).

4.3.2.2 For 3 years (or as long as the infested fields are subject to the above requirements).

- Potato production, handling and storage should be kept under official supervision.
- Harvested seed and ware potato stocks should be kept separate or cleansing and disinfection should be carried out between the handling of seed and ware stocks.
- Only certified seed potatoes, or potatoes grown under official control, should be planted (but with additional restrictions within infested places of production, see above).
- Harvested seed potato crops on probably infested places of production should be tested for *C. m. sepedonicus*.
- An official survey should be conducted annually (see section 1. Surveillance).

All seed potato stocks within the regulated area should, if appropriate, be replaced over a suitable period of time.

References

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- OEPP/EPPO (2004a) EPPO Standards PM 3/61 (1) Pest-free areas and pest-free production and distribution systems for quarantine pests of potato. *Bulletin OEPP/EPPO Bulletin 34*, 441–442.
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- OEPP/EPPO (2006b) EPPO Standards PM 10/1 Disinfection procedure in potato production. *Bulletin OEPP/EPPO Bulletin 36*, 463–466.
- OEPP/EPPO (2008) EPPO Standards PM 3/66 Guidelines for the management of plant health risks of biowaste of plant origin. *Bulletin OEPP/EPPO Bulletin 38*, 4–9.

³i.e. within both 'infested' and 'probably infested' places of production.