

Phytosanitary procedures
Procédures phytosanitaires**PM 3/59 (3) *Synchytrium endobioticum*: descheduling of previously infested plots****Specific scope**

This Standard describes a procedure for descheduling plots previously infested by *Synchytrium endobioticum*.

Specific approval and amendment

First approved in 1999-09.
Revisions approved in 2003-09 and in 2017-09.

Introduction

Synchytrium endobioticum is an A2 pest for EPPO, and details of its biology, distribution and economic importance can be found in the EPPO Global Database. In the EPPO National Regulatory Control System for *S. endobioticum* (Standard PM 9/5) no inspection procedures are considered for the pathogen on potatoes as such, because the wart disease regulations of most countries subject any plot known to be wart-infested to long-term official control and prohibit the growing of potatoes on it. In addition, many countries allow only cultivars resistant to the pathotype(s) present to be grown in a surrounding zone ('safety zone' or 'buffer zone'). Exported potatoes, plants with roots, flower bulbs and tubers should come from a plot in which *S. endobioticum* has never occurred, or else from a plot found free from *S. endobioticum*. As EPPO countries have, in general, kept detailed records of the distribution of wart incidence since the beginning of the twentieth century, the second requirement principally concerns the procedure of releasing previously infested plots from official control (revoking the demarcation of the contaminated plot, in the language of EU Directive 69/464 (EU, 1969), or 'descheduling'). It could, however, also be applied to plots for which records provide no information.

The procedures described here are for descheduling a plot that has been 'scheduled', i.e. demarcated as contaminated (in the language of EU Directive 69/464), because symptoms of potato wart disease have been detected at an earlier date. There is a presumption that resting spores of *S. endobioticum* survive on the plot. The soil test, combined with the interval since the previous infection, may be used as a criterion for complete or partial descheduling of that plot; complete descheduling removes all official limitation

on the types of crops that may be grown, whereas partial descheduling removes only some of the limitations on use and allows the growing of ware potatoes resistant to the pathotype(s) present. Caution should be applied when growing resistant cultivars after partial descheduling in case of possible breakdown of resistance.

Descheduling relates to the entirety of the plot that was originally scheduled. However, for partial descheduling there may be conditions in which a subunit of the plot may be considered separately, provided that the NPPO can guarantee the phytosanitary security of the subplot.

Tests

Tests are of three types: (1) direct examination of soil for the presence of viable resting spores; (2) bioassay methods; (3) field testing. Details on tests (1) and (2) are provided in EPPO Standard PM 7/28 *Diagnostic Protocol for Synchytrium endobioticum*.

In bioassays and field tests, cultivars should be used that are known to be susceptible to all known pathotypes of *S. endobioticum*. Cultivars known to be susceptible to pathotype 1(D1) (and hence to all other pathotypes) are listed in Standard PM 7/28.

Direct examination

The tests described in EPPO Standard PM 7/28 allow determination of the number of resting spores of *S. endobioticum* per unit weight of soil, and provide guidance on assessing whether they are viable or not.

The tests are somewhat laborious to apply but give a rapid result. A negative result is not considered as a sufficient criterion to deschedule a plot, and a confirmatory

bioassay should be performed. A positive result, however, could avoid the need to undertake the relatively slow bioassay procedure for the sample concerned, so direct examination may be useful as a first screening test.

Bioassay

Bioassay with susceptible potato cultivars is based on a pot test.

Field testing

The plot to be tested may be planted with a susceptible potato cultivar, according to local agricultural practice, and the harvested tubers examined for symptoms. Such a field test gives a high level of confidence if soil and climatic conditions are favourable for infection and harvested tubers are subjected to intensive inspection. However, if a positive result is obtained, the practical consequence is that the inoculum level of the plot is increased and therefore the period of official prohibition on planting potatoes must start again. For this reason, and also because of its dependence on climatic conditions, field testing is not recommended and thus not included in the descheduling procedure described here.

Criteria for descheduling

A plot that has been infested with *S. endobioticum* and has been kept under official control with limitations on the crops allowed to be grown may be descheduled either completely or partially, depending on the interval since the last symptoms of the disease and on the results of soil tests.

Complete descheduling

A plot that has previously been infested with *S. endobioticum* can be completely descheduled after a minimum of 20 years since the last detection, provided that it is sampled, tested and found free from viable resting spores (Fig. 1). As a general principle, the plot should have been cultivated during the period of scheduling; it should not have been under permanent grassland. In practice, the plot should be subdivided into units of 0.33 ha, from each of which 60 subsamples are taken. The sample is either:

1. subjected to direct examination and tested for infestation using a bioassay. From a practical point of view, it is preferable to perform the direct examination before a bioassay, since direct examination is quicker. If any viable resting spores are observed in the direct examination, the overall result is positive, and there is no need to proceed with a bioassay; or
2. tested for infestation by two successive bioassays. The soil should be sampled on separate occasions for the two bioassays, with a cultivation (rotavation/ploughing) of the field between the two occasions.

If positive results are obtained in the direct examination or bioassays, further testing should wait until at least a further 3 years have passed. If negative results are obtained for all samples, the plot can be descheduled.

A plot that has previously been infested with *S. endobioticum* can be completely descheduled without a soil test after a minimum of 50 years since the last detection, provided that the field history shows that no susceptible crops have been grown during this period.

After descheduling, there are no official limitations on the types of crops that may be grown on the plot, apart from the strong recommendation that the first crop of potatoes of a susceptible cultivar should be inspected at harvest by the NPPO for any infection.

Partial descheduling

A plot can be partially descheduled after a shorter period of time (at least 10 years) so that ware potato cultivars resistant to the pathotype(s) present in the infested plot may be grown. However, the plot may not be used for growing other types of potatoes (seed potatoes or susceptible cultivars of ware potatoes) or for plants for planting until complete descheduling (Fig. 1). As in the case of complete descheduling, it is a general principle that the plot should have been cultivated during the period of scheduling; it should not have been under permanent grassland. For partial descheduling, the plot should be sampled and tested as above, with the requirement that bioassays should give negative results and that fewer than five viable spores per gram of soil should be found by direct examination. If more than five viable spores per gram of soil are detected by direct examination, or a positive result is obtained in bioassays, a further test may be performed after 2 or more years depending on the level of infection and/or number of viable spores detected in the present test.

In certain cases where there is reason to believe that the soil is not conducive to long-term survival of spores (e.g. a plot with optimum aeration and water conditions that has been continuously cultivated, higher ambient temperatures) partial descheduling may be obtained after only 5 years since the last infection. In such a case, the sampling intensity should be increased to 10 samples per hectare, each of 60 subsamples. The bioassays should give negative results and fewer than five viable spores per gram of soil should be found by direct examination (as for partial descheduling after 10 years).

Sampling scheme for soil

From each unit of the plot to be sampled (0.1 ha or 0.33 ha depending on the descheduling procedure; see section above on 'Criteria for descheduling'), one sample should be taken, composed of 60 subsamples. The subsamples should be taken with an auger or other suitable tool to a depth of 20 cm and evenly distributed throughout the area. Each

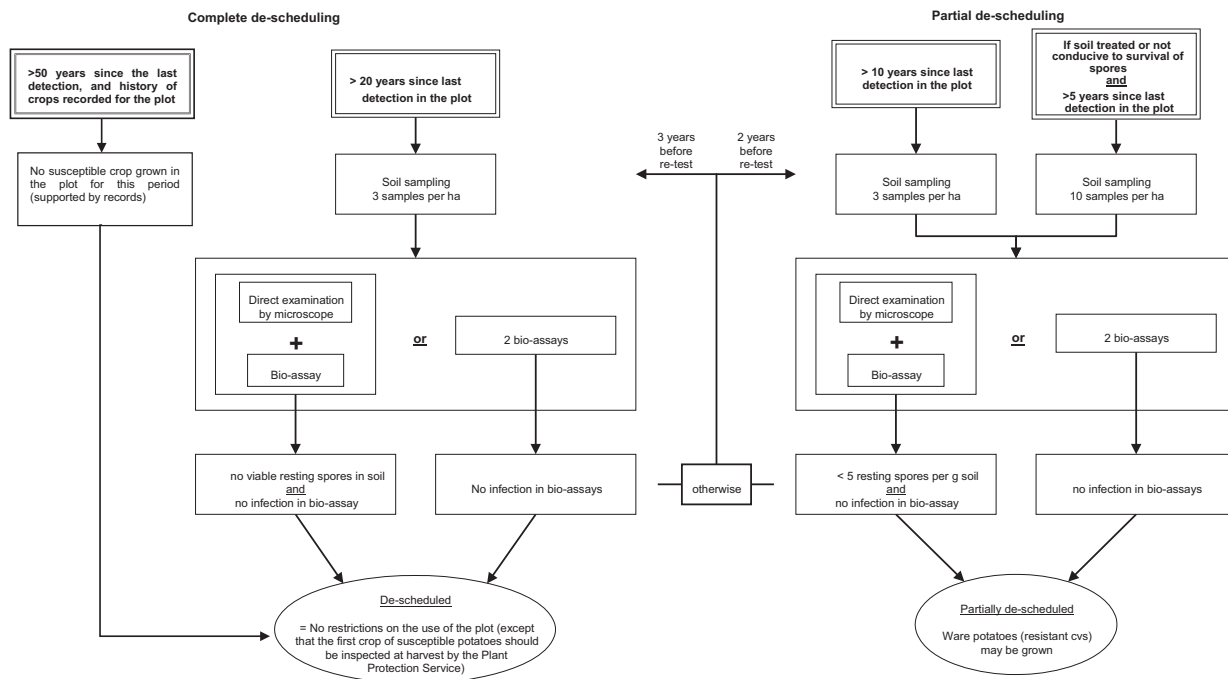


Fig. 1 Diagram of the procedure for complete or partial descheduling of plots previously infested with *Synchytrium endobioticum*.

sample should be thoroughly mixed before being tested. If it is possible to determine the precise position of the infested focus or foci in the field, separate samples should be taken from these foci and analysed separately from those taken from the rest of the plot; in this case, the sampling intensity in the rest of the plot may be reduced. The final total weight usually varies between 20 and 25 kg: 500 g from the bulk sample is used by the laboratory to select subsamples for direct examination (200 g). The remaining soil can be used for bioassays.

References

EPPO PM 7/28. Diagnostic protocol for *Synchytrium endobioticum*. <https://gd.eppo.int/taxon/SYNCEN/documents> [last accessed on 01 June 2017]
 EPPO PM 9/5. National regulatory control system for *Synchytrium endobioticum*. <https://gd.eppo.int/taxon/SYNCEN/documents> [last accessed on 01 June 2017]
 EU (1969) Council Directive of 8 December 1969 on control of potato wart disease. *Official Journal of the European Communities No L 323/1*, 561–562.

ADDENDUM

Addendum - PM 3/59 (3) *Synchytrium endobioticum*: Descheduling of previously infested plots

Since the approval of EPPO Standard PM 3/59 (3) *Synchytrium endobioticum*: *descheduling of previously infested plots*, (EPPO, 2017) new Standard PM 3/88 *Testing of potato varieties to assess resistance to Synchytrium endobioticum* (EPPO, 2020) has been approved. A reference to PM 3/88 is therefore added to PM 3/59.

Under Section 'Partial descheduling', after the sentence 'A plot can be partially descheduled after a shorter period of time (at least 10 years) so that ware potato cultivars resistant to the pathotype(s) present in the infested plot may be grown', the following sentence is added:

'(resistance should be tested following Standard PM 3/88 *Testing of potato varieties to assess resistance to Synchytrium endobioticum*)'.

Under Section 'References', the following reference is added:

'EPPO (2020) PM 3/88. Testing of potato varieties to assess resistance to *Synchytrium endobioticum*. <https://gd.eppo.int/taxon/SYNCEN/documents> [last accessed on 2021-06-21]'.

REFERENCES

EPPO (2017) PM 3/59 (3) *Synchytrium endobioticum*: descheduling of previously infested plots. *EPPO Bulletin* 47(3), 366–368.

EPPO (2020) PM 3/88 (1) Testing of potato varieties to assess resistance to *Synchytrium endobioticum*. *EPPO Bulletin* 50(3), 364–371.