

◆ EPPO Standards ◆

CERTIFICATION SCHEMES

PATHOGEN-TESTED MATERIAL OF *RIBES*

PM 4/9(1) English



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APPROVAL

EPPO Standards are approved by EPPO Council. The date of approval appears in each individual standard.

REVIEW

EPPO Standards are subject to periodic review and amendment. The next review date for this set of EPPO Standards is decided by the EPPO Working Party on Phytosanitary Regulations.

AMENDMENT RECORD

Amendments will be issued as necessary, numbered and dated. The dates of amendment appear in each individual standard (as appropriate).

DISTRIBUTION

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SCOPE

EPPO Certification and Classification Schemes are intended to be used by National Plant Protection Organizations or equivalent authorities, in their capacity as bodies responsible for the design of systems for production of healthy plants for planting, for the inspection of such plants proposed for phytosanitary certification, and for the issue of appropriate certificates.

REFERENCES

OEPP/EPPO (1991) Recommendations made by EPPO Council in 1990: general scheme for the production of certified pathogen-tested vegetatively propagated ornamental plants. *Bulletin OEPP/EPPO Bulletin 21*, 757.

OEPP/EPPO (1992) Recommendations made by EPPO Council in 1981: certification of virus-tested fruit trees, scions and rootstocks. *EPPO Technical Documents* no. 1013, 42-43.

OEPP/EPPO (1993) Recommendations made by EPPO Council in 1992: scheme for the production of classified vegetatively propagated ornamental plants to satisfy health standards. *Bulletin OEPP/EPPO Bulletin 23*, 735-736.

DEFINITIONS

Certification scheme: System for the production of vegetatively propagated plants for planting, intended for further propagation or for sale, obtained from selected candidate material after several propagation stages under conditions ensuring that stated health standards are met. The filiation of the material is considered throughout the scheme.

Certified stock: Material which is produced from propagation stock under appropriate conditions.

Classification scheme: System for the production of vegetatively propagated plants for planting, intended for further propagation or for sale, obtained from selected candidate material after one or several propagation stages under conditions ensuring that stated health standards are met. Different classes may be defined according to the inspections and tests used, the tolerance levels applied and the precautions taken. The filiation of classified material is not considered.

Filiation: The line of descent from a defined parent plant.

Nuclear stock: Material individually tested by the most rigorous procedure in the scheme. Material propagated from nuclear stock may remain nuclear stock under appropriate conditions. All such material must be maintained at all times under strict conditions ensuring freedom from infection.

Propagation stock: Material derived from the multiplication of nuclear stock, under conditions ensuring freedom from infection. Pathogen freedom is checked by an appropriate procedure. Material derived from propagation stock under the same conditions remains propagation stock, but, according to the plant species concerned, a maximum number of generations of propagation may be fixed at this stage.

OUTLINE OF REQUIREMENTS

EPPO Certification and Classification Schemes describe the steps to be followed for the production of vegetatively propagated planting material of a particular cultivated plant, whose health status is attested by an official certificate. Certification and classification represent distinct alternative approaches to the production of healthy planting material. In a typical certification scheme, the certified material is descended by not more than a fixed number of steps from individual plants each of which is tested and found free from pests, and is then maintained and propagated under rigorous conditions excluding recontamination. In a classification scheme, the classified material is descended by one or more steps from material which, as a population, meets certain health standards and is maintained and propagated under conditions minimizing recontamination. In both cases, however, health status is attested by an official certificate. Which of the approaches is appropriate for a given cultivated plant depends on considerations of cost and resources, health status required, practical possibilities for testing, rate of recontamination, value of the final material.

EPPO Certification and Classification Schemes give details on the selection, growth and maintenance of the candidate material, and on the propagation of this material in several stages under conditions ensuring that stated health standards are met. Appropriate checks on specified pests are specified throughout the scheme. Information is provided, as necessary, on relevant pests, cultural practices, inspection and testing methods, recommended certification standards.

Certification scheme

PATHOGEN-TESTED MATERIAL OF *RIBES*

Specific scope

This standard describes the production of certified pathogen-tested material of *Ribes*.

Specific approval and amendment

First approved in September 1994.
Edited as an EPPO Standard in 1998.

The scheme is presented according to the general sequence proposed by the EPPO Panel on Certification of Fruit Crops and adopted by EPPO Council (OEPP/EPPO, 1992a). Certified *Ribes* material for export should in any case satisfy the phytosanitary regulations of importing countries, especially with respect to any of the pathogens covered by the scheme which are also quarantine pests.

1. Selection of material

The scheme concerns mainly *Ribes nigrum* (black currant), *R. rubrum* (red currant) and *R. uva-crispa* (gooseberry) but may be applied to other *Ribes* spp. New or existing cultivars may be selected as candidate material. The starting material should be selected visually on the basis of trueness to type, vigour, pomological quality and absence of pest symptoms, especially symptoms of reversion in black currants, *R. nigrum*. Alternatively, starting material may be obtained from existing certification schemes in other EPPO countries.

2. Production of nuclear stock

The candidate material for nuclear stock status should be kept under quarantine in an isolated, suitably designed, insect-proof gauzehouse, separately from the nuclear stock. All plants should be grown in individual pots in a sterilized growing medium, with strict precautions, including preventive treatments as appropriate, against infestation by aphids, black currant gall mite (*Cecidophyopsis ribis*), powdery mildews (*Sphaerotheca mors-uvae* and *Microsphaera grossulariae*), black currant leaf midge (*Dasyneura tetensi*) and red spider mite (*Tetranychus urticae*). The general status of the plants with respect to these pests, and to other diseases or unknown symptoms, should be regularly checked by visual inspection.

All plants are individually tested (according to Appendix I) for the following viruses and virus-like agents: gooseberry vein-banding agent, black currant reversion agent, strawberry latent ringspot nepovirus,

raspberry ringspot nepovirus, arabis mosaic nepovirus, cucumber mosaic cucumovirus¹.

Plants giving negative results in all tests should be transferred to a separate gauzehouse of similar standard. Plants giving positive results for any virus should be removed immediately.

If no plants of a cultivar or clone prove to be free from these pathogens, etc., heat treatment or meristem tip culture may be applied to eliminate infection. The progeny resulting from this process may be considered to be candidate material and should be re-tested for the viruses above and re-assessed for agronomic and varietal characters.

The recommended test methods are given in Appendix I.

3. Maintenance of the nuclear stock

Nuclear stock plants should be kept in a suitably designed insect-proof gauzehouse, containing only nuclear stock plants. They should be maintained under the same conditions and with the same checks on pest freedom as candidate nuclear stock plants. They should be individually re-tested at least at intervals of 4 years for all the viruses and virus-like agents listed in Section 2 (Production of nuclear stock). Cuttings taken from nuclear stock plants can also be considered as nuclear stock, provided they are grown under the same conditions and are individually tested for all the pests just mentioned. Checks should be made on trueness to type.

4. Multiplication of the material (propagation stock)

Hardwood cuttings, taken from the nuclear stock and either rooted then planted in stool beds or separated with roots attached ('cuttings with roots') and directly planted in stool beds, become the propagation stock.

¹ Detection is performed according to the tests described in Appendix I but specific identification of viruses detected may be done by ELISA.

Alternatively, softwood cuttings may be rooted under the same growing conditions as nuclear stock plants and then planted in stool beds. The rooting and stool beds should be isolated from other non-certified *Ribes* material by at least 200 m. The soil should be checked for the presence of virus-vector nematodes (*Xiphinema* spp. and *Longidorus* spp.) before planting (Appendix I), and the stock should be protected by spraying against air-borne virus vectors. The propagation stock should be inspected annually for virus diseases. General precautions against pests (including pathogens) should be maintained. Any plant showing symptoms of any of the pests listed in Table 2 should be eliminated. Recommended certification standards are given in Appendix II.

The stool bed of propagation stock may be maintained for a maximum of five years as propagation stock I. A second stool bed (propagation stock II), derived from the first by hardwood or softwood cuttings (as above), may be established and again maintained under the same conditions for a maximum of 5 years. Alternatively, a propagation stock I stool bed can simply be maintained for up to 5 more years as propagation stock II.

The filiation of the plants should be recorded, so that each certified plant is known to be derived from nuclear stock and propagation stock under the required conditions.

Stages 1-4 should only be carried out by registered specialized establishments, satisfying defined criteria (OEPP/EPPO, 1993).

5. Production of certified stock

Hardwood cuttings, taken from the propagation stock as above, may be used to give two types of certified stock:

(1) planted out in rows for 1 or 2 years to grow into marketable bushes, which are lifted and leave the scheme as certified plants; (2) used to establish a certified stock stool bed, from which further cuttings leave the scheme as certified plants.

At the site at which the stock is planted, there should have been an interval of at least 3 years since the previous *Ribes* crop. If the site has contained other hosts of nepoviruses during the previous 2 years, the soil should be tested for nematodes (see Appendix I) and the site should only be used for the production of certified stock if either no nematodes are found or if those found are shown to be free from virus by a slash test (Appendix I). The site should be isolated from other *Ribes* material by at least 100 m. General precautions against pests should be maintained. Any plant showing symptoms of virus disease should be eliminated.

The rooting of cuttings to give certified stock should only be performed by registered specialized establishments, for which the admission criteria are less stringent than for stages 1-4 (OEPP/EPPO, 1993).

Throughout the maintenance of nuclear stock and the production of propagation and certified stock, checks

should be made on varietal purity and on possible mutations or back mutations.

6. Certification

Inspection for the granting of certificates should be performed in spring and early summer. Recommended certification standards are given in Appendix II. Bushes of *R. nigrum* should be in their second growing season at final inspection, in order to assess trueness to type and to detect reversion disease, both of which are difficult in younger plants.

Certified *Ribes* material for export should in any case satisfy the phytosanitary regulations of importing countries, especially with respect to any of the pests covered by the scheme which are also quarantine pests.

The stages of the certification scheme are illustrated in Fig. 1.

APPENDIX I

Guidelines on testing procedures

Virus testing

Testing *Ribes* for viruses or virus-like agents is done on woody or herbaceous indicators (Table 1). Identification of the specific viruses concerned requires serological tests, normally applied to extracts from the herbaceous indicator.

Grafting on woody indicators is normally done in the glasshouse at 20-25°C and the grafted plants are then held in a cool glasshouse. When testing for black currant reversion, tests on several shoots from large bushes are necessary because of the uneven distribution of the agent in the plant. Tests for reversion are continued for up to 2 years. For other pathogens they continue until the following spring.

For herbaceous indicators, tests should be done in the glasshouse using 5 replicate plants at 20-25°C and the plants observed for up to 4 weeks.

Soil test for virus-vector nematodes

Soil in which propagation stock and certified stock is to be planted should be sampled and the samples found substantially free from the following species of nematode vector: *Xiphinema diversicaudatum* (the vector of arabis mosaic and strawberry latent ringspot nepoviruses), *Longidorus macrosoma* and *L. elongatus* (vectors of raspberry ringspot nepovirus). The test procedure to be followed is given in the relevant part of the EPPO certification scheme for virus-free or virus-tested fruit trees and rootstocks (OEPP/EPPO, 1992b).

The nematodes can be tested directly for the presence of virus by a 'slash test', i.e. breaking up small numbers of nematodes in phosphate buffer (pH 6.9) and inoculating virus-indicator plants with the suspension (Taylor, 1964).

APPENDIX II

Recommended certification standards for *Ribes*

Nuclear stock

Records should show that all nuclear stock plants were negative when tested for all listed viruses and virus-like agents. No plant may show any symptom of infestation by any pest listed in Table 2. All plants should also be substantially free from symptoms of infestation by other pests (including pathogens). If these conditions are not met at the time of the certification inspection, certification will be refused.

Propagation stock

Infestation by various pests should not exceed the limits indicated in Table 2 at the time of the certification inspection. If the limits are exceeded, certification will be refused to the whole stool bed. All plants should also be substantially free from symptoms of infestation by other pests (including pathogens).

Certified stock

At the certification inspection, infestation by various pests should not exceed the limits indicated in Table 2. If the limits are exceeded, certification will be refused to the whole stool bed. All plants should also be substantially free from symptoms of infestation by other pests (including pathogens). The same certification standards apply to certified plants leaving the scheme as to the certified stock mother plants.

References

OEPP/EPPO (1992a) Recommendations made by EPPO Council in 1981: certification of virus-tested fruit trees, scions and rootstocks. *EPPO Technical Documents* no. 1013, 42-43.

OEPP/EPPO (1992b) Certification schemes. No. 1. Virus-free or virus- fruit trees and rootstocks. Part IV. Technical appendices and table of contents. *Bulletin OEPP/EPPO Bulletin* **22**, 277-283.

OEPP/EPPO (1993) Certification schemes. No. 7. Nursery requirements - recommended requirements for establishments participating in certification of fruit or ornamental crops. *Bulletin OEPP/EPPO Bulletin* **23**, 249-252.

TAYLOR, C.E. (1964) Transmission. In *Report of the Scottish Horticultural Research Institute for 1963/1964*, p. 65. SCRI, Dundee (GB).

Table 1. Recommended methods for detection and identification of *Ribes* viruses and virus-like agents occurring in the EPPO region

Pathogen	Host	Test methods
Gooseberry vein-banding agent	<i>R. nigrum</i> <i>R. rubrum</i> <i>R. uva-crispa</i>	Graft transmission to <i>R. rubrum</i> cv. Jonkheer van Tets or B1385/81
Strawberry latent ringspot nepovirus	<i>R. rubrum</i> <i>R. nigrum</i>	Mechanical inoculation to test plants*
Raspberry ringspot nepovirus	<i>R. rubrum</i>	Mechanical inoculation to test plants
Black currant reversion agent	<i>R. nigrum</i> <i>R. rubrum</i>	Graft transmission to <i>R. nigrum</i> cv. Baldwin
Arabis mosaic nepovirus	<i>R. nigrum</i> <i>R. rubrum</i> <i>R. uva-crispa</i>	Mechanical inoculation to test plants
Cucumber mosaic cucumovirus	<i>R. nigrum</i> <i>R. rubrum</i>	Mechanical inoculation to test plants

* *Chenopodium quinoa*, *Cucumis sativus*, *Nicotiana clevelandii*.

Table 2. Recommended tolerances for pests of *Ribes*

	% plants		
	Nuclear stock	Propagation stock I & II	Certified stock
Reversion of black currant	Nil	Nil	0.5
Other viruses and virus-like agents	Nil	0.05	0.2
Reversion + other viruses for black currant	Nil	0.05	0.5
Gall mite/big bud (<i>Cecidophyopsis ribis</i>)	Nil	0.05	0.1
<i>Aphelenchoides ritzemabozii</i> (on buds)	Nil	0.05	0.1

Infection of neighbouring stocks within 50 m by aeriably transmissible pathogens over tolerance should disqualify the entered material from certification.

Fig. 1. Diagram in the *Ribes* certification scheme

