

## THE POLISH SYSTEM FOR THE PRODUCTION OF ELITE PLANTS OF POMOLOGICAL MATERIAL AUGSTĀKO KATEGORIJU AUGĻAUGU STĀDU RAŽOŠANAS SISTĒMA POLIJĀ

**Czynczyk A.**

Research Institute of Pomology and Floriculture, 96-100 Skierniewice, ul. Pomologiczna 18, Poland.

### **Kopsavilkums**

Galvenās prasības: augu materiāls, kas pavairots tikai no elites vai sertificēta materiāla, ir bāzes vai sertificēts pavairošanas materiāls; materiāls, kas pavairots no vīrustestēta materiāla, ir vīrustestēts pavairojamais materiāls; augi tiek audzēti augsnē, kura brīva no *Globodera* spp. un *Synchytrium endobioticum*; elites un sertificēts *Prunus*, *Rubus* un *Fragaria* ģinšu materiāls tiek audzēts no *Longidorus* spp. un *Xiphinema* spp. nematodēm brīvā augsnē. Kandidātaugi tiek iegūti no selekcijas vai izlases materiāla, stādīti konteineros, kas nav saskarsmē ar nesterilizētu augsni, audzēti tīklu mājās, brīvi no EPPO shēmās minētajiem kaitīgajiem organismiem. Kokaudzētavā obligāti jāievēro telpiskā izolācija, šķirnes tīrība, ierobežots izmantošanas laiks, rekomendētās pavairošanas metodes un augu aizsardzības prasības.

### **Abstract**

The general requirements concerning production and quality of nursery plant material of fruit tree and small fruit species are the following: fruit plant material propagated exclusively from elite or certified components is regarded as basic or certified nursery material; fruit plant material propagated from virus-tested components is regarded as virus-tested nursery material; nursery plantations shall be established on ground or in soil regarded as free of *Globodera* spp. and *Synchytrium endobioticum*; nursery plantations of elite and certified material of the genera *Prunus*, *Rubus* and *Fragaria* should be established on ground or in soil regarded as free of *Longidorus* spp. and *Xiphinema* spp. nematodes.

Reselected plants shall be divided from candidate plants of the same cultivars proven to be true – to type. Candidate plants usually descent from a breeding program or are selected trees from a group of trees of one cultivar. Plants should be planted in containers without contact of their roots with soil or in disinfected soil quarters protected by netting (carcasses). Plants should be indexed for the organism listed in Annex 1 and Annex 2.

Indexing should be periodically repeated by one of the methods recommended by the European and Mediterranean Organization for Plant Protection - EPPO.

Most important requirements for all fruit nursery material are following: spatial isolation, purity of species and variety (trueness to type), limited period of use, recommended method of propagation, health status – List of harmful organisms which reduce the quality of nursery plant material: pests, fungi, bacteria and viruses, Annex 1 and Annex 2.

**Key words:** pomological plant material, methods of propagation, spatial isolation, purity of species and clones, health status

### **Propagation system of plant material**

In order to meet the needs for the production of elite nursery-propagated fruit-bearing plant material, it is essential to select the candidate plant from a group of trees (plants) of the same variety. The candidate plants can also come from a breeder or be obtained from foreign centres involved in the production of elite nursery plant material. The plants obtained are tested to determine if they are free from the organism listed in the annex to the Directive by the Ministry of Agriculture and Rural Development (Dziennik Ustaw, 2004; Jelkman, 2001; Nemeth, 1986).

Virus-tested material which has been tested and recognized as free of viruses, and also the material obtained directly from virus-tested material which is produced or maintained within the specified number of passages or multiplication cycles, have to be kept under conditions that guarantee absence of infection. To meet these requirements, plants should be grown in containers without the roots touching the soil, or in disinfected substrates and kept in rooms enclosed with wire netting (carcasses).

Testing shall be periodically repeated to check the state of plant health, by one of the methods recommended by the European and Mediterranean Organization for Plant Protection (EPPO), (Desvignes, 1999; Roy and Smith, 1994).

The general requirements concerning the production and quality of nursery plant material of fruit trees and small fruit plants are as follows:

- fruit plant material propagated from virus-tested components is regarded as basic or certified nursery material;
- fruit plant material which is propagated from virus-tested components is regarded as virus tested nursery material;
- nursery plantations shall be established on the ground or in the soil regarded as free from *Globodera* spp. and *Synchytrium endobioticum*;
- Nursery plantations of elite and certified material of genus *Prunus*, *Rubus* and *Fragaria* should be established on the ground or in the soil regarded as free of *Longidorus* spp. and *Xiphinema* spp. nematodes.

In Poland specific requirements have been developed for the nursery-propagated fruit-bearing plants, for fruit tree production, mother orchards for seeds and scion wood production, and for small fruit plantations, respectively:

- plantations of vegetatively propagated rootstocks for fruit trees;
- nurseries of generative rootstocks for fruit trees;
- mother orchards for seed plants;
- mother orchards for scion wood production;
- nurseries for fruit trees and plantations of budded rootstocks;
- mother plantations and runner plants of strawberry;
- mother plantations and nurseries of currants and gooseberry;
- mother plantations and nursery plants of raspberry and blackberry;
- mother plantations and nursery plants of blueberry and cranberry.

Detailed requirements concerning the production and quality of nursery plant material of fruit plants are as follows:

- recommended method of propagation and proposed grades for certification;
- spatial isolation;
- health status - List of harmful organisms which reduce the quality of nursery plant material: pests, fungi, bacteria and viruses;
- purity of species and varieties;
- age of mother orchards, mother plantations and nursery plant material;
- additional requirements;
- number and time of inspection;
- after observing irregularities which are corrigible, dates for additional inspection are proposed;
- each species, variety, rootstock and grade shall be labelled.

Detailed requirements for plantations of vegetatively propagated rootstocks for fruit trees

1. Spatial isolation:
  - a) stock plantations of plants which can be affected by Plum pox virus shall be situated no closer than 500 m from wild plants or plantations of fruit bearing plants of the same genus;
  - b) stock plantations of plants which cannot be affected by Plum pox virus shall be situated no closer than 10 meters from wild plants or plantations of fruit bearing plants of the same genus;
  - c) virus-free stock plantations shall be situated no closer than 3 meters from other stock plantations;
  - d) rootstocks of different clones shall be planted in separate rows, which includes also rootstocks of the same clone planted in different years.
2. Material for establishing basic nursery plantations shall be produced from pre-basic plants produced by micropropagation, cuttings or stoolbeds. Rootstocks dedicated for establishing mother plantations of pome species shall be no older than two years, for stone fruit species one-year-old shall be used. Material for establishing stock nursery plantations shall be derived from basic plantation or rootstocks certified as elite ones.
3. Purity of species and clones. For mother plantations complete clonal purity is required.

4. Period of use:

- a) basic plantations of pome species are maintained for up to 8 years, those of stone fruit species – only for up to 6 years;
- b) certified plantations of pome trees are maintained for up to 12 years, while those of stone fruit trees - for up to 10 years.

5. Health status

Material for mother plantations of vegetative rootstocks shall be:

- a) free of organisms to be controlled;
- b) on the basis of visual evaluation – in practice free of organism that could reduce its quality, in particular organisms referred in Annex 1;
- c) virus diseases and virus-like diseases: rootstocks free of organisms referred in Annex 1 are regarded as free of virus diseases and virus-like diseases (Jones and Aldwinckle, 1997).

6. Additional requirements

- a) once a year, the plantation is presented for inspection – at the end of summer or at the beginning of autumn;
- b) after observing irregularities which are corrigible, dates for additional inspection can be proposed;
- c) each clone of rootstock shall be labelled at the beginning of row quarters.

Very similar requirements were accepted for nurseries of generative rootstocks for fruit trees.

Mother orchards for scion wood production

1. Spatial isolation

- a) orchards of plants which can be affected by Plum pox virus shall be situated no closer than 500 m from wild plants or orchards of fruit bearing plants of the same genus;
- b) orchards of plants which cannot be affected by Plum pox virus shall be situated no closer than 50 m from wild plants or orchards of fruit bearing plants of the same genus;
- c) orchards for scion wood production of different varieties of the same species shall be planted in separate rows, or in one row when spacing is no closer than 2 m;
- d) virus-free orchards for scion wood production shall be situated in different quarters maintaining an isolation distance of 50 m for trees of pome species and 500 m for trees of stone fruit species of the same species and genus from CAC category.

2. Purity of species and variety. Complete purity of species and variety are required.

3. Propagation – orchards for scion wood shoots shall be established from the elite trees dedicated for mother orchards for scion wood production.

4. Usage

- a) orchards for scion wood production of stone fruit trees will be maintained up to 6 years, while orchards of pome trees – up to 8 years;
- b) with the exception of stone fruits mother trees are allowed to bear fruit.

5. Health status

- a) free of organism covered by duty to fight against, which are an Annex 1;
- b) on the basis of visual evaluation – in practice free of organisms that could reduce its quality, in particular organisms referred in Annex 1;
- c) virus diseases and virus – like diseases: mother trees and scion wood free of pathogens referred in Annex 1 are regarded as free of virus diseases and virus – like diseases (Jones and Aldwinckle, 1997; Ogawa *et al.*, 1995).

6. Additional requirements are the same as for vegetatively propagated rootstocks.

Nurseries for fruit trees and plantations of budded rootstocks

1. Spatial isolation

- a) nurseries of plants which can be affected by the Plum pox virus shall be situated no closer than 500 m from wild plants or orchards of bearing fruit plants of the same genus;
- b) nurseries of plants which can not be affected by Plum pox virus shall be situated no closer than 10 m from wild plants or orchards of fruit bearing plants of the same genus;
- c) elite nurseries for trees and plantations of budded rootstocks shall be situated no closer than 5 meters from certified mother plantations and CAC;
- d) nurseries of virus-free trees shall be situated no closer than 2 meters from other trees and the plantations of budded rootstocks.

2. Purity of species and variety. In nurseries for trees and plantations of budded rootstocks complete purity of species and variety are required. Trees with incompatibility symptoms (leaf drop, yellowing of leaves and discoloring of bark) are distinguished.
3. Propagation – nurseries shall be established from the elite or certified material dedicated for nurseries.
4. Age. Elite trees shall be no older than 2 years. Certified trees shall be no older than 4 years of age
5. Health status
  - a) free of organisms covered by duty to fight against;
  - b) in practice free of organisms that could reduce its quality – organisms referred in Annex 1;
  - c) free of virus diseases and virus-like diseases – pathogens referred in to Annex 1;
6. Additional requirements are the same as for vegetatively propagated rootstocks. Mother plantations and runner plants of strawberry:
  1. Propagation. Material for the establishment of basic nursery plantations shall be propagated from pre-basic plants produced by micropropagation or runner plants. For strawberry four certification grades are used:
    - a) super elite (SE) – pre basic material;
    - b) elite 1 and elite 2 (E1, E 2) – basic material;
    - c) original (O) certified material.
  2. Spatial isolation
    - a) basic plantations shall be situated no closer than 200 m from wild plants or plantations of fruit bearing plants of the genus *Fragaria spp.*– while certified plantations – no closer than 50 m;
    - b) distance between varieties, certification grades or categories in plantations shall be no smaller than 3 m.
  3. Purity of species and variety. Complete purity of species and variety are required
  4. Age. Plantations of strawberry may be maintained up to 1 year. On land dedicated for strawberry: no strawberry, potato cucumber tomato, flax, currant bush, gooseberry, raspberry or blackberry is allowed to be planted for at least 4 years prior to the establishment of the plantation.
  5. Health status – mother plants and runner plants of strawberry shall be:
    - a) free of organisms covered by duty to fight against, which are an Annex 2;
    - b) on the basis of visual evaluation – in practice free of organisms that could reduce its quality, in particular organisms referred in Annex 2 and the following ones: viruses and virus – like pathogens see Annex 2.
  6. Additional requirements
    - a) once a year the plantation is inspected, which is performed in summer or in autumn before lifting the plants or before sale of potted plants, other requirements in point b and c are similar as for vegetatively propagated rootstocks;
    - b) similar requirements are recommended for mother plantations of currants, gooseberry, raspberry, blackberry, blueberry and cranberry.

#### Annex 1

List of harmful organisms which reduce the quality of nursery – garden material -minimum requirements for CAC nursery material.

Free of organism covered by duty to fight against as below:

Apple (*Malus Mill.*).

- 1) pests:
  - a) peach twig borer (*Anarsia lineatella*);
  - b) *Eriosoma lanigerum*;
  - c) aspidiotuses (*Quadraspidiotus perniciosus*, *Epidiaspis leperii*, *Pseudaulacaspis pentagonai*);
- 2) bacterial diseases:
  - a) root nodosity (*Agrobacterium tumefaciens*);
  - b) bacterial cancer (*Pseudomonas syringae pv. syringae*);
- 3) fungal diseases:
  - a) honey fungus (*Armillariella mellea*);
  - b) *Chondrostereum purpureum*;
  - c) cancer of fruit trees (*Nectria galligena*);

- d) ring rot of trunk base (*Phytophthora cactorum*);
  - e) white fusarial rot of roots (*Rosellinia necatrix*);
  - f) scab (*Venturia* spp.);
  - g) verticillium wilt (*Verticillium* spp.).
- 4) virus diseases and virus-like diseases – all.

Such material shall be free of any viruses and virus-like pathogens, in particular the following ones and is labelled as: *vf* – *virus-free*

1) apple:

- a) *Apple chlorotic leafspot virus*,
- b) *Apple mosaic virus*,
- c) *Apple stem grooving virus*,
- d) *Apple stem pitting virus*, causing spy epinasty and decline,
- e) *Apple proliferation phytoplasma*,
- f) *Apple chat fruit*,
- g) *Apple green crinkle*,
- h) *Apple horseshoe wound*,
- i) *Apple rough skin*,
- j) *Apple star crack*,
- k) *Apple ring spot*,
- l) *Apple russet ring*,
- m) *Apple rubbery wood*,
- n) *Apple flat limb*,
- o) *Apple russet wart*,
- p) *Platycarpa scaly bark*;
- q) *Spy epinasty and decline*

*Annex 2*

Health status - mother plants and runner plants of strawberry shall be:

Free of organisms covered by duty to fight against as below:

List of organisms which reduce the quality of the nursery – material minimum requirements CAC

Strawberry (*Fragaria x ananassa* Duch).

1) pests:

- a) nematodes (*Aphelenchoides* spp.),
- b) potato stem eelworm (*Ditylenchus dipsaci*),
- c) *Tarsonemidae*,

2) fungal diseases:

- a) rot of strawberry crown (*Phytophthora cactorum*),
- b) verticillium wilt (*Verticillium* spp.)

3) virus diseases and virus - like diseases: *Strawberry green petal phytoplasma MLO*, one the basis of visual evaluation – in practice free of organisms that could reduce its quality, in particular organisms referred in Annex 2 and the following ones:

- viruses and virus-like pathogens:

- Arabid mosaic virus*,
- Raspberry ringspot virus*,
- Tomato black ring virus*,
- Strawberry crinkle virus*,
- Strawberry latent ringspot virus*,
- Strawberry mild yellow edge virus*,
- Strawberry mottle virus*,
- Strawberry vein banding virus*,
- Strawberry green petal phytoplasma*,
- Aster yellows phytoplasma*,

and pathogens causing strawberry june yellows,

- diseases:

- rot of strawberry crown (*Phytophthora cactorum*);
- verticillium wilt of strawberry (*Verticillium dahliae*);

anthracnose (*Colletotrichum* spp.);  
leaf – spot of strawberry (*Mycosphaerella fragariae*);  
powdery mildew of strawberry (*Sphaerotheca macularis* ssp. *fragariae*);  
red leaf – spot of strawberry (*Diplocarpon earliana*).

- pests:

*Meloidogyne* spp.;  
potato stem eelworm (*Ditylenchus dipsaci*);  
chrysanthemum nematode (*Aphelenchoides ritzemabosi*);  
strawberry nematode (*Aphelenchoides fragariae*);  
strawberry mite (*Phytonemus pallidus* ssp. *Fragariae*);  
aphids (*Aphididae*);  
leafhoppers (*Jassidae*);  
thrips (*Thripidae*);  
common red spider (*Tetranychus urticae*).

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