POST SESSION DOCUMENT April 2019 (clean)

Note: All changes from the March 2019 session have been accepted and comments removed. Please consult the TC document for reference.

**GUIDE concerning the commercial quality and marketing of MINITUBER PRODUCTION**

# Introduction

This guide has been devedloped by the Seed potato specialized section of the UNECE working party on Agricultural Quality Standards in order to be a reference tool given recommendations for the production and certification of seed potato minitubers.

When the production of potato microplants (plants including micro tubers produced by micropropagation/tissue culture techniques) and minitubers (G0 seed potatoes) is used for subsequent multiplication within a seed Scheme, it is very important that this step allow for the production of high quality material.

The main focus is to ensure that the material produced ;

* [has maintained vVarietal identity and varietal purity or trueness to type]
* Is Disease and pest frees
* Is traceable to the origin of production

The UNECE standard S-1 for seed potatoes defines a set of conditions and minimum quality requirements to be satisfied for the production and the marketing of pre-basic TC seed potatoes.

For the phytosanitary risk management and phytosanitary certification, International Standards for Phytosanitary Measures (ISPM)[[1]](#footnote-1) are recommend for the National Plant Protection Organization (NPPO).

The production of potato microplants and minitubers (G0 seed potatoes) should be conducted within specific producer’s procedures, which are supported or approved by the Certification Authority (CA). Hence this guide is a resource for the producers and for the CA. In addition to annexes I, II, III and IV of the UNECE Standard, it provides recommendeations for the production of microplants and minitubers within a seed potato certification scheme.

# Production of the initial micropropagation material

## Requirements for the tissue culture laboratory

The tissue culture laboratory used to produce microplants shall maintain the high health status of the nuclear stock, avoid pathogen contamination, and ensure the integrity of the material that is produced. It shall comply with the following requirements:

1. Appropriate sterile laboratory procedures are applied and documented to avoid contamination of the cultured plant material, e.g., use of sterile tools, laminar flow hoods and sterile growing media for aseptic multiplication of plant material, dedicated clothing for operators (e.g., lab coat, overshoes). The laboratory should demonstrate good laboratory practices to maintain high plant health and traceability.
2. Management practices must be such to ensure that integrity of variety is kept at all times
3. Regular visual monitoring of the growing tissue culture plants is conducted to ensure no contamination of tissue culture stocks has occurred.
4. Appropriate cleaning of all laboratory surfaces including media preparation and growth room. Appropriate management of the tissue culture laboratory to ensure no mites, spiders, or other insects can reside.
5. Records and quality management systems are needed to ensure traceability of all lines.
6. Laboratory staff are suitably trained.

## Conditions to be satisfied for the initial micropropagation material

The microplants which constitute the initial micropropagation material (or the *in vitro* nuclear stock) shall fulfill specifically the following points;

1. All the *in vitro* propagating material shall have originated from an *in vitro* facility which respects the conditions detailed in point 2.1 and possibly approved by the CA.
2. The parent material must be true-to-type for the variety
3. The nuclear stock must be well labeled to ensured the integrity of the variety
4. The nuclear stock must be laboratory tested to be declared and maintained free from at least the following pathogens;

* Potato Spindle Tuber viroid
* *Clavibacter michiganensis* spp. *sepedonicus* (ring rot)
* *Ralstonia solanacearum* (brown rot)
* *Pectobacterium* spp. and *Dickeya* spp. (syn. *Erwinia* spp.)
* Potato viruses, X, Y, S, M and A
* Potato Leaf roll virus

Other pathogens e.g. Liberibacter and pests may be tested at the discretion of the Certification Authority.

Material that has positive detections for any of the above pathogens must not be allowed entry into the minituber production unit.

Records are to be kept of testing protocol, testing results and sources of original material.

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## Traceability

The nuclear material will be the foundation for further multiplication of plant material within the seed Scheme. This material shall be referenced and its origin well documented prior to entry into the Scheme. The CA should have the guarantee of traceability of this material and access to the following information regarding the introduction of nuclear material if necessary.

1. Name of supplier
2. Origin of the material
3. Type of material (tissue culture plantlets or micro tuber).
4. Varietydenomination .
5. Quantity of material (number of microplants).
6. Name of company material supplied to.
7. Date material supplied.
8. An official diagnostic report of plant health status especially ensuring the material is free from restricted pathogens which may include any quarantine entry documentation that may apply for material entering a country or region.
9. Variety description to enable certification officers in the field to accurately identify the variety.
10. Description of any treatments applied eg heat treatment to remove viruses

Only micro propagation material which complies with the conditions detailed in this guide should be eligible for inclusion in the certification Scheme operated by the CA.

other plant species may not be produced in the tissue culture laboratory, unless appropriate risk mitigation is in place such as isolation between production cycles..

## Official checks

It is recommended that the CA set up a system of authorization or approval, which may include delegation of authority, of the tissue culture laboratory. This is in order to ensure the traceability of the material and the production of the microplantlets is in compliance with the requirements.

The CA may conduct initial and periodical audits.

In any cases, the CA must ensure that the initial stock used to produce minitubers as Pre-basic TC seed potatoes is free of the pests and diseases listed in 2.2.

# Production of Minitubers (G0)

The UNECE standard S-1 provides a set of conditions specified in annex I. The facilities used for minituber production must be free of diseases/pests specified in the respective Standard. The only material that may enter the minituber production facility are disease/pest-free potato micro propagation material. Produced minitubers used to enter the Scheme for seed certification shall be certified as pre-basic TC.

## Eligible plant material

1. Only *in vitro* micro-propagative material may be planted to produce the minitubers (G0).

2. All the *in vitro* propagating material shall have originated from an *in vitro* facility which respects the conditions detailed in point 2.

## The location of the minituber facility

The location of the minituber facility should be assessed in relation to plant pest and disease concerns.

Measures should be implemented to ensure the minituber facility has adequate physical and operational safeguards in place to prevent introduction of specified diseases/pests.

Considerations on a location may also include:

* The placement of the facility in a disease/pest-free area, or an area that is free or sufficiently isolated from sources of specified diseases/pests.
* The inclusion of a buffer zone around the facility for specified diseases/pests.
* The placement of the facility in a region with low disease/pest prevalence and low vector pressure.
* Production takes place in period of low disease/pest and vector pressure where possible.

## The minituber production facility/greenhouse

The operator of the minituber facility must take all reasonable husbandry practices for the prevention or spread of pests and diseases. In addition, the growing crop must have been kept free from *Synchytrum endobioticum* (Schilb) Prc., potato viruses, bacterial diseases and from deviations of variety and type.

The generation of minitubers (G0) shall be produced from microplants in a facility protected from external contaminations, insect-proof and on growing medium free from pests and diseases.

No other plants or plant species may be produced in the minituber production facility.

One generation only of minitubers should be produced.

**3.4 visual inspections**

Visual inspections during the growing period by the CA should be conducted, with a minimum of 2 inspections recorded per production cycle.

Authorisation of producers of minitubers may be granted by the CA.

The CA may include systematic testing of every lot of minitubers to check the absence of viruses (PLRV, PVA, PVM, PVS, PVX , PVY) and of the absence of quarantine bacteria *Ralstonia solancearum* and *Clavibacter michiganensis subsp sepedonicus*.

To check varietal identity and purity and absence of diseases, the CA may require a post-control in field for the miniubers (G0) which are produced.

Additional Auditing

Requirements of the facility

Auditing requirements

Requirements concern appropriate facilities, organisation for traceability, competent staff.

To check the required conditions and possibly authorize the producer, the CA may conduct initial and regular audits .

In auditing the minituber facility, the CA may record;

1. The type of greenhouse.
2. The physical location of greenhouse.
3. The maintenance of the area around greenhouse eg weed and alternative host free.
4. Controlled entry with authorize access to procedures .
5. The use of an anteroom with double door access in the entrance area where protective clothing and overshoes can be donned. The entrance area shall be equipped with a footbath for disinfecting footwear and wash bay for washing and disinfecting hands.
6. All access doors, openings and ventilation openings must be sealed with insect proof mesh with reference to local pests and vectors. The mesh size for the virus netting to isolate the structure, must be in the order of 75 threads per inch (insert cms). (75 Mesh size).
7. All openings should be sealed between the external and the internal environment of the structure.
8. The floor area of the greenhouse shall be covered in such a manner that the roots of plants kept in containers thereon, cannot penetrate the soil on which the greenhouse is erected (e.g. Cement floors or the separation from soil through a dense membrane).
9. Designated areas for washing and disinfecting containers and cleaning, sorting, packing and storage of minitubers.
10. An appropriate air filtration system, if appropriate.
11. Water used for irrigation filtration and sanitation systems.

## Access control to the minituber production facility

Access to the minituber production facility should be restricted:

1. Access to the facility should be controlled and is limited to authorized access only.
2. Provision should be made for the wearing of protective clothing, disinfection of footwear and hand cleansing.
3. .

## 4.Production of minitubers

## 4.1Growth Medium, nutrients and water

The growing medium, fertilizer used, and any water used shall be free from disease causing organisms, or have been effectively decontaminated. Options may include:

1. Use of soil-free medium.
2. Fumigation / disinfection / sterilization of growth medium for plants.
3. Transport and storage conditions of growth medium to avoid contamination.
4. Use of borehole / spring water or municipal water.
5. Appropriate treatment of water.
6. Regular testing of water.
7. Use of inorganic nutrients.
8. Appropriate treatment of organic nutrients.

## Plant containers

The plant containers used by the minituber production facility shall be of such a nature that they can be easily sanitized and are isolated from the ground.

The procedures for the sanitation of the containers that are used should be audited to ensure the procedures are appropriate to prevent introduction of pest and diseases.

## Crop management

Appropriate management systems have to be in place to ensure;

1. Plants in the minituber production facility be clearly identified according to variety

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1. There are procedures to prevent the occurrence of variety mixes, i*n vitro* potato plants shall be separated from each other by a suitable separation in order to prevent variety mixes from the adjacent planting, during the growing and harvesting processes.
2. .
3. Precautions or corrective actions against disease/pests must be documented by the facility operator.
4. Regular and effective fungicide and or insecticide spray programs should be documented by the facility operator.
5. Aphid monitoring in greenhouses should be compulsory. Aphid traps covered with an adhesive strip should be distributed through every greenhouse.. The date on which the traps were affixed must be noted. All observations during the monitoring action shall be noted for each production cycle and retained for an appropriate period of time, .

## Sanitation

The facility operator should ensure;

1. Appropriate hygienic practices for handling plant material.
2. Sanitation during growth includes regular removal of plant debris.
3. Appropriate discarding procedures.
4. Proper disinfection of facilities between plantings.
5. No growth of algae on floor or wet walls.
6. The facility should be thoroughly disinfected after each production cycle or growing season.

## Post-harvest handling

The facility operator shall have appropriate systems for post harvest handling including;

1. Appropriate storage conditions. The minitubers must be handled, packed, stored and transported in such a manner that infestation by specified diseases / pests are prevented.
2. Handling procedures should be conducted in a manner to prevent varietal mixtures.
3. Sorting and packaging according to requirements for certification.
4. New containers be used for packing of minitubers.
5. Cleaning and disinfection of any equipment and storage facilities.

## Record keeping

Documented or recorded evidence shall be available concerning the;

1. Map of varieties planted for each greenhouse.
2. Traceability of all the minitubers produced
3. Disease test results, if appropriate.

## Competence training and awareness of personnel

The producer should have documented evidence for its staff involved in the production and check of the minitubers concerning the:

1. Qualification.
2. Continuous training and evaluation.

## Labelling of material produced

When the minitubers meet the requirements, the minitubers can be certified as Pre-Basic seed class (PBTC) by the CA and can be labeled appropriately.

1. The following ISPM’s are recommended as guidelines:

   • ISPM No. 10 - REQUIREMENTS FOR THE ESTABLISHMENT OF PEST FREE PLACES OF PRODUCTION AND PEST FREE PRODUCTION SITES (1999)

   • ISPM No. 33 - PEST FREE POTATO (SOLANUM SPP.) MICROPROPAGATIVE MATERIAL AND MINITUBERS FOR INTERNATIONAL TRADE (2010)

   ISPM 34 [title] [↑](#footnote-ref-1)