

PLANT TISSUE CULTURE LABORATORY

Activities:

- 1) Production of virus-free rootstocks;
- 2) Conservation of endemic plant species;
- 3) Production of various ornamental plants;
- 4) Practical training of foreign and Maltese University of Malta students on Plant Tissue Culture and acclimatisation.

What is Plant Tissue Culture?

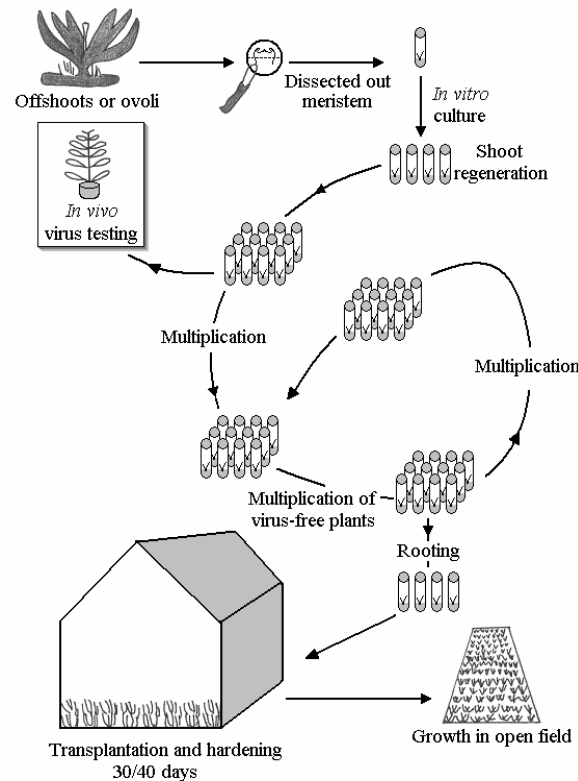
This is a kind of propagation that is initiated using various plant parts such as buds, leaves, stems or root sections that vary in size between 1 - 20mm. These plants are grown, multiplied and rooted in glass jars containing sterile nutritive medium. It is similar to plant propagation by cuttings in the conventional manner.

Advantages of Tissue Culture

There are several advantages when using tissue culture for agricultural purposes:

- High quality plants are obtained in a relatively short period of time as plants grow and multiply more rapidly than plants grown in soil.
- Small plants may die due to the diseases caused by viruses, bacteria, fungi and environmental conditions. Many of these diseases may be inherited from the mother plants that provide the seeds and cuttings. With this new laboratory technology it is possible to eliminate many plant diseases.
- In the laboratory plants, can be grown all year round as they are not affected by the different seasons and weather conditions.
- Unlike conventional methods, there is no need for irrigation or pesticide use.

- By means of tissue culture large numbers of plants can be grown in a small place.
- With conventional propagation methods, one cutting or one seed will only produce one plant. On the other hand, by means of tissue culture, one cutting or one seed will produce many plants, therefore only a limited number of stock plants or mother plants are needed for further propagation.



Production of Rootstocks

The laboratory has been working for a number of years on two production lines of rootstocks. These are the GF677 and Myrobolan 29C, the former being a rootstock for peaches and nectarines, and the latter for plums and apricots. These productions targeted the needs of the local growers.

The starting off material for these rootstock productions is certified as virus-free and is brought from an Italian Laboratory specialised in the production of such plant material. This material is then propagated and multiplied *in vitro* using specific media, procedures and conditions to maintain its virus-free condition.

Although no certification scheme is in force, the laboratory is already following standard procedures so that when such a certification scheme comes into force the laboratory will be ready to operate accordingly. A Plant Passport is issued with the plants supplied from the Plant Biotechnology Centre stating that the plant material is virus - free.

Transplantation and Hardening

As soon as the plants root, they are acclimatised. Acclimatisation is the process by which plants are adapted to the ambient conditions before being transferred into the fields. This is delicate work which requires great care and it is carried out in a purposely built glasshouse at the Plant Biotechnology Centre.

The glasshouse, which is fully computerised, has three partitions. The first partition is used for plant acclimatisation, the second partition is further split into smaller sections and it is utilised for the diagnosis of plant diseases and the final partition is an anteroom where the potting mixtures are prepared and plants are transferred to pots.

The acclimatisation process starts by immersing the plants into a fungicide solution in a container. The plants are left in this solution for a short period and they are then transferred to small pots containing compost.

The plants are later transferred to a plastic tunnel where they are watered with more fungicide. The plants and the plastic are then misted with water and the tunnel is closed to maintain high humidity levels. After about one week, the tunnel is opened for a few minutes each day. The opening time is increased from day to day. By doing this the humidity is reduced and the plants start getting adapted to the glasshouse ambient conditions.

Due to the high humid levels under the tunnel, great care must be taken to avoid fungal diseases as high humid levels are ideal for fungal growth.

Once new growth is observed on the plants, fertiliser applications begin and as soon as the plants are fully acclimatised, the plastic tunnel cover is removed completely.

The plants will then require further hardening off prior to being transferred in the fields. Therefore they are placed in a shade house where they are protected from the wind and hot sun. The plants can later be certified and passed on to the government nursery at St. Vincent de Paule residence where they are either sold to growers or prepared for grafting.

Endemic and Ornamental Plants

The following endemic species have been given particular importance at the Tissue Culture lab during the last years:

- *Helichrysum melitense*;
- *Cremnophyton lanfrancoi*;
- *Tulipa sylvestris*;
- *Ophrys lutea*;
- *Barlia robertiana*;
- *Aristolochia clusii* ; and
- *Sarcopoterium spinosum*.

These endangered endemic species have particular cultural and scientific importance. The purpose of the research carried out on them was to develop efficient micropropagation methods that could be used for the mass production and at the same time conservation of these valuable, ornamental plants. Parent material of these plants is available at the Plant Biotechnology Centre and from time to time plants are grown in the laboratory.

Among the ornamental plants grown at the Centre are *Kalanchoe*, *Begonia rex*, *Yucca* and Boston ferns. Once these plants are grown and adapted to glasshouse conditions they are sold to growers, nurseries and to the general public.

These plants are used by the Centre's staff as training on new procedures and by the students who perform their practical experience on plant tissue culture.

PLANT BIOTECHNOLOGY CENTRE

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