Why We Are Using Micropropagated Plants.

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INTRODUCTION

Back in 1986 we wanted an alternative way to produce *Clematis*. With help from consultants from the Danish Nursery Association, we decided to use micropropagated plants. We had a commercial laboratory carry out the propagation and deliver the plantlets to our nursery where we would grow them into saleable plants. We built a growth room where the plants were transferred from the test tubes to soil. Our decision to use micropropagated plants was based on the following reasons:

- To have healthier plant material.
- To obtain plants better suited for production, i.e. with more lateral bud breaks.
- To have available a continuous production of difficult-to-root plants.
- To have a method where we easily could mass produce new cultivars, or plants free from known diseases such as viruses.

We new this would be a large task, and began a collaboration with a commercial laboratory in Arhus who would develop the protocol for micropropagation of *Clematis*. At the same time, we were working with plant material of easy-to-micropropagate plants, such as *Hydrangea* and strawberries, which we received from Dæhnfeldt. However, at the time we were ready to start the production of micropropagated *Clematis*, the commercial laboratory closed.

Therefore, we had to start over again with a new partner, Lars Sommer from Hedeselskabet. At present, we are at the point of starting commercial production. We are now receiving tubes with micropropagated plants twice a week. At last, we believe that we have everything under control. The first plants have already left the nursery, and many more are in production.

HOW FAR ARE WE TODAY?

To get to the point where we are today, we have looked into and established the following transplanting parameters:

- Relative humidity: 80-85% RH.
- Temperature: 22°C.
- Time in the growth room: 2 to 3 weeks.
- Soil mixture: Jiffy blocks 40 × 40, 60 in a tray.
- Irradiance and CO_2: Photoperiod of 18 h, but still have to look further into these parameters.

THE FUTURE

We would like to be able to propagate all *Clematis* cultivars in this way and have a continuous production system. This will ensure that all our plants are healthy,

genetically uniform, and a better product. Already, we can see that the micropropagated plants are much better than those produced by the old system. This have given us confidence that we made the right decision in 1986.

Possibilities and Disadvantages of Genetic Variation

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INTRODUCTION

Plants grow by division of cells in the meristems. Normally the new cells are exact copies of the original cell, so every shoot on a plant has the same (genetic) characteristics. This also holds if the shoot is used as a cutting or in micropropagation because the vegetatively propagated plants are genetically part of the same plant.

However, mistakes may occur during cell division and so cells with new genetic characteristics appear. This is called mutation and is the basis of occurrence of off-types with characteristics other than those of the original plant.

MUTATIONS

The advantage of mutations is that usually only one characteristic changes at a time. If it is good (e.g. compact growth, a new flower colour), the off-type can be used directly as a new cultivar without a need for further breeding. The disadvantage is that new characteristics are usually bad (e.g. slower growth), and thus only show up as loss of uniformity. Problems with genetic variation can be prevented by using only the best plants as stock plants and renewing the stock plants when a certain number of plantlets have been produced. This will happen sooner when using micropropagation; however, by using good tissue culture techniques the number of genetic off-types can be kept as low as for cuttings.

The risk of mutations is not constant, it is known that it can be raised by using irradiation or certain chemicals. The risk of off-types also differs greatly among species and cultivars. Chimeras, plants that have genetic differences between cell layers within the same plant, have a particularly high risk of off-types. Many cultivars with variegated leaves or marbled bracts are chimeras. Such plants are unstable when propagated—both as cuttings and in tissue culture.

MICROPROPAGATION

It is a problem in micropropagation that some kinds of off-types, such as changes in flower colour, are difficult to detect during propagation. Certain tissue culture techniques, such as callus culture and adventitious shoot formation, increase the risk of variation; however, this can be exploited as an advantage in mutation breeding. In addition, one must also be aware that the hormones used in