Malling Centenary

Plant propagation Guidelines

November 2017

These propagation guidelines for Malling Centenary are based on Jorrit de Vries' agronomic observations and trials work for Meiosis Ltd during 2016-17.

The two main challenges for the successful production of Malling Centenary are disease control (especially *Phytophthora cactorum* and *Pestalotiopsis clavispora*) and ensuring sufficient flower truss initiation to provide economic yield.

Malling Centenary is known to be susceptible to *Phytophthora cactorum*. In commercial production *Pestalotiopsis clavispora* has also been identified in plant samples. This disease is not well known in the UK and northern Europe, but a useful summary of disease characteristics and potential control measures can be found on the website of Berryplants ltd here:

http://berryplantsltd.co.uk/files/7714/8613/2214/Pestalotiopsis.pdf

The symptoms of both diseases are similar, and it is possible that *P. clavispora* weakens the plant then *P. cactorum* lethally infects the plant.

Management in the propagation of tray plants especially needs to minimise the conditions that enable both pathogens to infect the plants:

- Ensure adequate nutrition to maximise plant health and keep plants in generative growth rather than vegetative.
- Minimise irrigation
- Ensure very good drainage of water away from the plants
- Minimise physical damage to the plants so there are no points of entry for diseases. Note that well-grown plants should not require any de-leafing
- Control insects, especially sciarid fly, that can cause physical damage to stems

Nutrition

- Optimum nutrition is necessary to reduce plant susceptibility to fungal disease.
- To achieve healthy plants with good truss numbers plants should be propagated very generatively from the beginning.
- It is also suggested, though hasn't been put into practice prior to Autumn 2017, that maintaining feeding right up until cold storage may help to reduce disease susceptibility.

Current recommendation for feeding:

Propagation recipe

Ammonium	0.0 millimoles
Potassium	5.0
Calcium	6.0
Magnesium	1.0
Nitrogen	11.5
Sulphate	1.5
Phosphate	1.0
Iron	30.0 micromoles
Manganese	20.0
Zinc	7.0

Boron	15.0
Copper	0.75
Molybdenum	0.5

NB The elements are in the same ratio as for fruiting mix.

NITROGEN:

- Trials at Proefcentrum Hoogstraten (PCH) have demonstrated that relatively high levels of feed in tray plant propagation can reduce plant losses due to disease and increase flower initiation giving increased yields.
- In PCH trials, Nitrogen was applied in the form of Calcium Nitrate; it could be that the higher level of calcium was a key factor.
- It is recommended that very low Nitrogen is required in propagation with higher levels of Calcium to keep the plants generative.

CALCIUM:

- Malling Centenary can be affected by tip burn due to low calcium levels in the plant, and this can be severe enough to cause the loss of the first fruit truss.
- Therefore, measures must be taken to ensure maximum Calcium levels in the plant during and especially at the completion of the propagation cycle, when plants are being taken into cold storage.
- This can be achieved through the use of foliar feeds containing Calcium. Calcium Chloride (for example Koppert Veni Calcium) has been shown to supply Calcium in a form that is easily available to plants, helping to quickly correct localised deficiencies.
- Calcium is an important element. In propagation apply Calcium six weeks prior to packing, or during the whole propagation period. Maximum Ca level is not known.

Irrigation

- Malling Centenary requires less irrigation than other varieties such as Elsanta.
- Overhead watering will encourage disease therefore irrigation needs to be managed carefully in propagation and fruiting plants.
- Apply more water in each application, but at less frequent intervals, though overall water application is less than for Elsanta.
- The less frequent watering events minimises the fluctuations in substrate temperature, and a uniformly stable temperature stresses the plant less.
- Malling Centenary is sensitive to less than ideal conditions.
- To achieve optimum irrigation, planting tips together that are at the same growth stage aids water management.
- In the tray plant propagation field, the tips should be carefully size graded to ensure the resulting plants have similar water requirements; this will help avoid over-watering smaller plants that are being grown in the same field as larger tray plants.

EC levels

- In tray plant propagation after establishment of the roots aim for an EC of 2.0–2.5 in the substrate.
- Maintain EC levels in substrate hanging tip production drip water at 3.0-4.0.

Growing media

- A freely draining media is recommended such as coir.

Tray production

- Striking tips in small modules before transplanting to full size trays can encourage more generative growth rather than vegetative growth.
- Flower initiation is stimulated earlier resulting in a longer period for initiation to occur which gives the potential for more trusses.
- Indoor tray plant production can result in late initiation.
- Transplanting should occur when the roots are well developed.
- Start to apply fertiliser 10 to 14 days after striking.
- Apply Fenomenal and Paraat according to manufacturer's instructions and conditions of approval.

Tip production

- One of the key factors required to produce strong tips is high light levels with stable temperatures.
- Pre-flowering has been noted on the first tips produced by micro propagated mother plants in hanging tip production.
- Development of pre-flowering tips is being followed through to harvest in 2018; tips cut for tray plant production have so far developed as normal.
- Cut tips store well at low temperatures (2°C) and high humidity for a number of weeks.

Tipping dates

- Cutting date of tips is not thought to be crucial though the propagation of a large plant with the maximum number of flower trusses requires as long a growing season as possible.
- Although every growing season is different, it would usually be best to 'tip' runners and plant into trays by the start of July.

Cold storage

- It is suggested that feeding the plant right up to the point of cold storage may help to reduce disease susceptibility, though this has not been trialled prior to Autumn 2017.
- Ensure all elements have been translocated into the root before cold storage (measure sugar levels in the leaf and the upper root zone).
- Thoroughly inspect plants prior to cold storage.
- Separate and/or grade-out any plants that have weak root development and/or are showing symptoms of dieback in order to reduce/limit losses in fruiting crops.

Chemical use

- Any chemical use should always comply with the regulations in the country of use, if in doubt seek professional advice.
- Fenomenal is effective against both *P.cactorum* and *P. clavispora*; Paraat is effective against *P.cactorum*.
- In tip propagation the most effective way to apply Fenomenal is as a 15-minute drench to the tips post cutting, pre-cold storage or planting.
- The use of Folicur is not approved or recommended with Malling Centenary as it can significantly reduce the leaf petiole and truss length.

Plant type

- Several propagators have tried techniques to produce larger healthier plants, such as establishing tray plants or waiting bed plants from cold-stored 'frigo' plants rather than 'tips' or fresh field-grown runners.
- Establishing 'tips' as misted-tip modules before potting on into trays is another possibility.

- Double cold stored plants can show more variability in truss numbers due to later plant development and therefore initiation.
- Tarsonemid mite control is crucial for double cold stored plants.
- Generally, bare-root plants have shown less disease susceptibility than tray plants. Focusing on smaller 'A' grade plants at higher density plantings (30/m) has given good results in fruiting.

Flower Mapping

- Variability between flower mapping and actual fruit production has been high in some instances.
- Although no work has been funded, commercial laboratories are developing their methods to provide a more accurate assessment of the truss and flower numbers present in Malling Centenary.

TRIALS AND COMMERCIAL PRODUCTION OBSERVATIONS

Glasshouse early planted
Planting date: 12/01/17
First harvest: 20/03/17
Waiting bed had more flowers but developed slowly
Tray plants produced large fruit but had 20% plant losses
No second flush
Very high picking speeds achieved – 85kg per hour
Production too low for all plant types.

Glasshouse over-wintered crop
Planting date: August 2016
Autumn crop taken
Over-wintered at 10°C, no chill
Reacted very well to night-break lighting
Very good spring production
Flowered until the end of July

Table top early planting
Waiting bed needed one more truss
Tray plants didn't develop as normal due to Folicur (tebuconazole) use in propagation – severely shortens leaf height and truss length.

Poly-house fruiting of 'A' grade bare-root plants – 60-day substrate production
Planting density: 30 per metre
No plant losses
1.5 trusses per plant on average
5 berries per truss = 225 berries per metre
20-30g per berry
99% class 1 + high picking speeds
Compares favourably in production to other tray plants where plant losses can be an issue.

Glasshouse fruiting of 'A' grade plants – double cropping
Planting date: 28/08/17

First harvest: 21/10/17
Plant density: 30 per metre
Picked biggest yield in November – results to follow for autumn 2017 crop & spring 2018 crop