Improvement of the propagation process of certified fruit plants by in vitro production of the mother plant and transplanting of herbaceous cuttings

Summary

Bioreactors were built to produce a plant with a complete health guarantee. Plant material was produced in large quantities, and herbaceous cuttings were transplanted efficiently. High quality finished plants were produced at low cost.

Objectives

Producing a plant with a complete health guarantee, at low cost and in large quantities in a short time was a goal of this project.
Construction of bioreactors to produce Adara, Garnem, OHF 87 and UCB 1 and adapt them to the Plavise facilities.
Transplant this entirely herbaceous material efficiently with high transplantation percentages.
Build efficient transplanting beds able to cope with different climate conditions.
Obtain a very competitive finished plant of interest to the market.

Description of the actions carried out in the project

Construction of 24 bioreactors at the FRUITCENTRE facilities, adapting to the requirements of each species to be tested. Mobile shelves with controlled lighting. Six bioreactors with the air ducts and culture medium connected were placed on each shelf.
Construction of transplanting beds for transplanting these herbaceous cuttings from bioreactors.
Adapt the transplanting beds as the different and changing climate variables appear.
Several 3 x 20 m beds with a double sun protection cover were built. The cuttings were also protected with micro-perforated plastic film, which at times provides protection from low RH and adverse outdoor weather conditions.
The different climate variables were studied at each time of the year to adapt the beds to these variables, and to ensure that the herbaceous cuttings were not harmed.
Ambient humidity applicators were incorporated to lower the temperature and increase the RH.
The finished plant format in sockets with 60 units produced a 30-40 cm plant.
The 7 x 7 container format produced a plant measuring 40-60 cm.
With these formats, the 30% perlite and 70% blonde peat draining substrate was very satisfactory in 7 x 7 cm (350 cc) containers.
The coconut fibre substrate alone or with 50% peat was very suitable for the plant in sockets.

Final results and practical recommendations

The species studied adapted well to growth in bioreactors.
There were some problems with endophytes in the bioreactor medium, but these were resolved.
The construction of 24 bioreactors with the species studied was completed.
Optimum amounts of plant material were produced in Adara, Garnem, UCB 1 and OHF 87 bioreactors.
This plant material was tested on PLAVISE transplanting beds with satisfactory results. Transplanting occurred in 20-30 days depending on the species, and there were very few losses in rooting due to the quality of the plant material provided by the bioreactor.
The transplanting zone was adapted to the different climate conditions. There were significant variations in the climate variables throughout the year, and they were corrected satisfactorily.

The finished plant was produced in a competitive and very healthy format. The plant sizes were 30-40 cm in sockets and 40-60 cm in 350 cc containers. The production time varied from 4 to 6 months from the beginning of the transplanting process to the finished plant. This is very short, which means that the technique is very interesting.

Conclusions

The mother plant production system in bioreactors and the subsequent management to transplant these herbaceous cuttings in specially prepared transplanting beds provided very satisfactory results. The objective of producing a healthy plant almost all year round in a short production period and at very low costs was achieved.

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Subject area(s) of application

- ☒ Agricultural production system
- ☒ Agricultural practice
- ☒ Vegetable production and horticulture
- ☒ Pest and disease control
- ☒ Climate and Climate Change
- ☒ Energy management

Geographical area(s) of application

PROVINCE(S): Lleida, Tarragona, Zaragoza, Murcia
REGION(S): Agricultural areas in the provinces above

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2019	Total budget: €194,079.12
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