New approaches to producing selected varieties of chestnut

Meeting the demands for quality chestnuts

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Galician chestnut variety ('Negral') micrografted on a hybrid chestnut resistant to "ink disease" (clone 111) at day 25 after grafting. *Ref: Juan Luis Fernández Lorenzo*

Why do we need new systems for the production of chestnut?

Agroforestry with chestnut *(Castanaea sativa Miller)* is a traditional land use system in the eastern part of the Lugo province in Galicia, North West Spain. Although chestnut groves are rarely intercropped (due to the low understorey production) or grazed (due to the fear of tree damage), the groves create a fine-grained mosaic of land uses including cropland and forests. However, where high slopes make chestnut harvesting unprofitable, pig grazing does occur during the autumn and winter. Chestnut woodlands are also one of the best habitats for the commercial production of edible mushrooms.

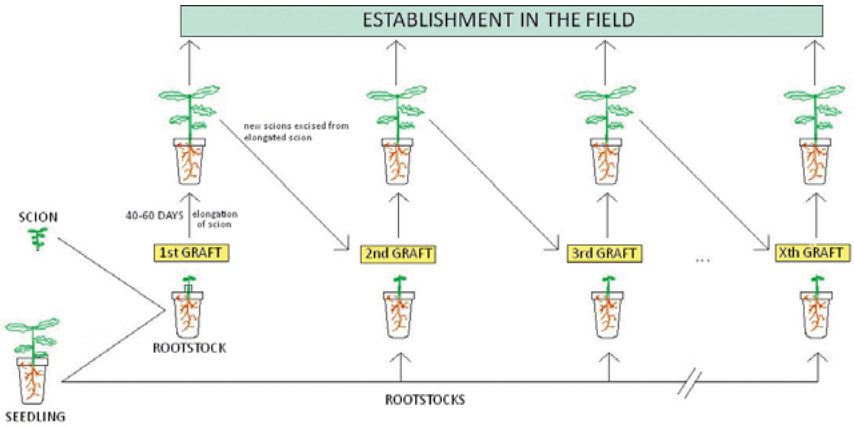
There is an increasing demand from farmers interested in establishing chestnut orchards for commercially attractive varieties. Apart from the environmental benefits of chestnut trees, the profitability of new plantations can be enhanced through understorey management and grazing animals.

The traditional method of grafting varieties on wild chestnut seedlings (used in areas free from ink disease), as well as on hybrids resistant to "ink disease", is inefficient and unable to meet the increasing demand for stock. Varieties grown on their own roots, could potentially avoid the relatively complex process of grafting and help rapid establishment in areas free of "ink disease".

How can the production of quality chestnut be improved?

In vitro culture has an important role to play in developing efficient systems for the production of quality chestnuts. It is an excellent system for early detection of possible incompatibilities. Further, rooting of microcuttings in vitro has a higher rate of success than traditional methods, such as cutting propagation or layering. Aerial grafting in a growth chamber using chestnut seedlings as rootstocks is an alternative method. This method can produce a large number of plants in a significantly shorter time as compared to conventional methods of grafting.

The first step in the process involves the in vitro establishment of suitable hybrid clones to be used as rootstocks and of chestnut varieties. These provide, on the one hand, scions for micrografting and serial grafting and, on the other hand, microcuttings for rooting tests. In parallel, serial grafting on seedlings can provide a constant source of grafted plants for orchards to be established in areas free from "ink disease". Previously grafted plants, maintained in a growth chamber, are the source of new scions in a continuous process of production. In the second step, after a process of acclimatization, micrografted and in vitro self-rooted varieties and plants from serial grafting are established in the field.



Serial grafting in a growth chamber *Ref: Juan Luis Fernández Lorenzo*

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Advantages

- The use of micrografting permits early detection of possible incompatibilities for specific combinations of hybrid clones and varieties.
- As the process is carried out in sterile (or semi-sterile) conditions, the risks of possible infections derived from the grafting process are minimized.
- The production of grafted plants is much quicker than using conventional methods, and grafting can be done all the year round.
- In varieties showing good rooting ability, production of plants grown on their own roots constitutes a new source of material for planting in areas free from "ink disease".

Variety 'Parede' grafted on seedlings by serial grafting ready for planting in the field. *Ref: Miguel Martínez Cabaleiro*

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Grafting of 'Parede' variety on a chestnut seedling in growth chamber. *Ref: Juan Luis Fernández Lorenzo*

In some cases, the introduction and stabilization in vitro of chestnut varieties can take between 1 to 2 years. However, once the material is ready to be used as a source of scions, the process of production of grafted plants is very rapid. The first results show that micrografting success ranges from 40 to 75 %, depending on the variety/hybrid combination. When using wild chestnut seedlings for serial grafting, success is often close to 100 %. The potential for production of grafted chestnuts is extremely high: grafting cycles of 60 days and an average yield of 4 scions per cycle allow a grower to obtain more than 106 grafted plants from one single initial scion after 20 months under growth chamber conditions. In any case, for seedlings to be available for use as rootstocks throughout the year, there is a need for suitable preservation systems for chestnut seeds.

Plants from some varieties, such as "Loura" and "Parede", have been successfully produced from microcuttings, but their performance in the field is not yet known. Field tests of all these materials will identify possible longer term problems, such as delayed incompatibility when using hybrid rootstocks,to reveal. Tests will also reveal whether the low height of the grafting point in micrografting, which will be very near to the soil, could have any influence on the risk of infection by *Phytophthora spp.* which causes "ink disease".

Further information

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