

HOW TO PROPAGATE NO SUCKERING HAZELNUT (*CORYLUS AVELLANA* L.)

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Abstract

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To obtain a good number of rooted hazelnut plants from no-suckering hazelnut clones of “Tonda Gentile delle Langhe” (TGL) a modified layering was devised. Before the sprouting the branches of hazelnut no-suckering plants were cut at 35 cm from the ground. The water sprouts so obtained were ringed, as usual for mounding layering application. The ringed water sprouts were surrounded by a container and covered with an appropriate substrate. The plants so obtained are very vigorous with a good height and diameter at the collar and rich roots mass and therefore immediately suitable to plantation in orchard. It seems that this new method could be adopted by nurseryman for its simplicity and very good results.

Key words: Hazelnut, layering, no-suckering clones, propagation, water sprouts

Introduction

In Italy, especially in the past the hazelnut (*Corylus avellana* L. – Figure 1) was propagated by suckers digging out in the hazelnut orchards. This method has a lot of drawbacks both from genetic and phytopathologic point of view.

Another old method of hazelnut propagation, with very scarce results, was the classic woody cutting. More modern methods like mist-propagation and micropropagation are applied but, today in Italy, (especially for Tonda Gentile delle Langhe) the results are no yet suitable for commercial purposes. Fifteen years ago following the nursery techniques observed and studied in the States, hazelnut propagation was improved also in North Italy by using the layering (Roversi and Mozzone, 1998) just to obtain rooted suckers. In this way it is possible, starting from selected and certified mother plants, to check the genetic origin and the phytopathological quality. Of course for no suckering hazelnut the layering is not suitable because of the absence of suckers. In any case the no suckering hazelnut clones, considering the desuckering cost, are very much desirable. In fact in the hazelnut orchard the suckers must be eliminated (desuckering) at least twice per year. Currently the desuckering can be done in several ways:



Fig. 1. Hazelnut mother plant without suckers but with many water sprouts

manually, with desiccant, mechanically, and with the flame (Tomasone et al., 2009). In any case it is not easy operation which often requires to be repeated at least once more and is always expensive. In addition, the desiccants are not allowed in organic farming.

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There is another alternative, rather recent and applied on a large scale only in Serbia; it is the grafting variety of *Corylus avellana* onto a no suckering rootstock like *Corylus colurna* (Roversi and Cerovic, 2013).

In the main Italian hazelnut cultivation area that is Langhe (Piedmont) some no suckering “Tonda Gentile delle Langhe” (TGL) plants are rarely observed. In Chile in an orchard established with a stock of 20 000 TGL plants imported from Italy I had the opportunity to find three no suckering plants, to select one of them and provide to its micropropagation in Italy. The origin of no suckering plants could be due to a mutation but investigations haven’t been done at this regard, however the frequency (3/20,000) of the presence of these plants makes this assumption plausible.

The Chilean clone and the no suckering plants in Piedmont were kept under observation for several years and their productivity and nut quality were absolutely the same of TGL and therefore for these reasons their propagation and diffusion in orchards seemed very interesting and promising. However, actually the diffusion appears difficult because for the nurseryman the propagation problems of these no suckering clones are not yet solved.

A new idea, as an attempt for a possible solution of the problem, could be to use – *ad experimentum* – water sprouts, instead of suckers. Actually in Italy, among the different methods of hazelnut propagation only mounding layer is widely distributed and applied commercially. Of course mounding layer couldn’t be applied to no-suckering clone so an innovative method had to be studied. More precisely in order to overcome the problems of other hazelnut propagation methods and in an attempt to get many rooted plants in a short time (lesser than 1 year), an experimental trial was carried out with an innovative method. Therefore preliminary trials were made on micro propagated no-suckering hazelnut plants obtained from a no-suckering “Tonda Gentile delle Langhe” (TGL) clone I selected many years ago in Chile.

Materials and Methods

Mother plants of no-suckering TGL clone, obtained by micropropagation 6 yr ago, grown in the experimental field of Institute (Piacenza, Italy), were considered for this investigation. At the end of February 2012, the main trunk and lateral branches of seven of these plants were cut at 30–35 cm from the ground. All around the coppice was done a sheet of roofing felt in order to obtain a cylinder of 80 cm diameter and 70 cm in height. This cylinder was filled till 60 cm from the ground level with a mixture of soil, clay and peat ($\frac{1}{3} + \frac{1}{3} + \frac{1}{3}$) as a rooting media just to cover the basis of coppice and the ringed water sprouts. A drip irrigation device was also applied with

two droppers placed above the rooting media.

A generous emission (10–12 by coppice) of water sprouts occurred as a result of the main trunk and the lateral branches cutting. The best ones were preserved to be ringed, in the June second half when their height was around 70 cm. As usual for mounding layering (Roversi and Mozzone, 1998) application, the water sprouts with a diameter ≥ 10 mm were ringed at their basis with a metallic ring to strangle the water sprouts as they grew to stimulate their rooting. A Ring-Plier, which is a special clamp to easily apply a metallic ring at the base of the water sprouts, was used. The trial was conducted on a batch of seven randomized mother plants each of which was considered as a replicate.

After the falling of leaves, the container with the covering mixture was removed to check the results. Rooted water sprouts percentage, height; diameter at the collar, root mass and marketable quality was measured as previously reported (Roversi et al., 2008).

The statistical analysis has been made with Duncan’s test at the .001 probability level.

Results

At the digging out time it was observed that the total number of water sprouts issued after the cuttings, was of 11.9 by coppice. The 96.52% of them were ringed because their diameter was ≥ 10 mm. The general rooting average of ringed water sprouts was 88.33%, which is a very good result without hormonal treatments. All the results with their statistic analysis (Duncan test) are reported in Table 1.

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Commercial Classification

The rooted water sprouts, through the evaluation of their calibre at the collar, height and root mass, were classified in four marketable categories such as: Extra; first class; second class and discarded (Roversi et al., 2008). Also the number of no rooted water sprouts was recorded.

The percentages of rooted water sprouts result (Table 1) were satisfactory for the extra (33.88%) and first class (35.33%) plants and acceptable (22.04%) for the second one. Actually in some others works (Roversi and Mozzone, 2008; Malvicini et al., 2009) the percentage of extra and first class plants were very often highest, but these positive results were due to use of rooting hormone and some other forcing techniques don’t applied there. The little percentage (8.75%) of discarded plants was attributable to the poor quality of water sprouts at the ringing time. As usual for the nursery of Langhe district, the plants

Table 1**Characteristic of rooted water sprouts obtained by a modified layering applied to no-suckering TGL hazelnut clone**

Plant categories:	Rooted water sprouts, %	Height, cm	Size at the collar, mm	Fresh roots mass, g
Extra	32.51 B	216.7 C	14.8 B	345 B
First selection	34.20 B	154.7 B	11.6 A B	268 B
Second selection	21.34 B	133.6 A B	9.1 A	150 A
Discarded	8.47 A	85.0 A	8.3 A	131 A

of second selection will be transplanted in nursery and grow for 1 yr more just to be sold the following year.

Plant height

The value of this parameter are reported in Table 1 from which the very good or strong growth of the water sprouts in the vegetative period from ringing time to falling of leaves clearly appears. The average values are more than 2 m (216.7 cm) for the plants of extra selection and more than 1 m for the first and second ones. These data are very larger if compared with the results obtained (Malvicini et al., 2009; Roversi et al., 2009) for TGL in other investigations made with usual mounding layer.

The hazelnut growers in Langhe (Piedmont) prefer to buy and plant in the news orchards vigorous and large plants, but the practice in the field not recommends their use.

Plant calibre at the collar

As expected the values of this parameter are related to the rooted sucker's height and the values in Tab. 1 are of the same magnitude of those usually obtained with mounding layer by the nursery of the Langhe (Piedmont). Only the value (9.1 mm) for the plants of second selection are very unsatisfactory and, of course, also those (8.3 mm) of discarded.

Root mass

The root mass estimated by weight shows (Table 1) interesting values that appears related to plants height and calibre. For the plants of extra (345 g) and first (268 g) selection the weight of root mass is very high if compared with the results of other works (Roversi et al., 2009; Malvicini et al., 2008) of my Institute (Fruit growing, Piacenza, Italy).

Discussion

The introduction of no suckering clones in hazelnut orchards could be a possible solution for the heavy problems of sucker's control. Unfortunately these clones couldn't be propagated by layering. Cutting under mist and micropropagation hasn't reached more practical results for nurserymen. This new method allows having plants ready to be planted in 7

months instead of 18 months till 2 years needed with the usual other methods like cutting under mist or micropropagation. In fact starting the ringing in May-June allows the digging out in November-December of the rooted suckers suitable to be planted immediately in orchard.

More than 65% are from extra or first marketable quality and therefore immediately suitable for plantation in orchard. It is well known that the plants obtained by cutting under mist or by micropropagation need at least 1 yr of nursery before being suitable for plantation in orchard.

Conclusions

Even if further investigations to validate or not these results were carried out, this preliminary work clearly evidences the possibility to obtain rooted plants from no-suckering hazelnut clones without resorting to micropropagation. The plants obtained from water sprouts by a modified mounding layer here presented are very vigorous with higher values for their very good height and diameter at the collar and rich roots mass.

It seems that this new method, similar to the air layering (!), more than the mounding one could be adopted by nursery for its simplicity and very good results.

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