Thermotherapy applied to whole plant as a sanitation method against three grapevine viruses (GLRaV-1, GVA and GRSPaV).

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Introduction

Viral diseases are reported to cause several detrimental effects on grape and wine production. In the viticulture industry viruses are disseminated mainly through vegetative propagation and grafting. Propagating of healthy material is one of the main purpose of certification programmes. In Switzerland, clones must be free of 6 to 7 viruses (GFLV, ArMV, GLRaV-1,-3, KSG and CB, plus GFkV for rootstocks) to be certified. Rèze is a white grape cultivar confined to Valais (Switzerland). It is an old autochthonous grapevine variety since it was mentioned for the first time already in 1313. It has been even argued that Rèze could be the old cultivar *Raetica* already cultivated during the roman period (Vouillamoz et al. 2007). A survey to preserve the genetic diversity of local cultivars was carried out in old Swiss vineyards. It came out that all the 60 collected clones of Rèze were infected by different viruses. Thus, none of those clones was suitable to enter the certification programme. Various approaches have been applied to eliminate viruses in grapevine (Martelli 2010): chemotherapy, cryotherapy, micro-shoot tip tissue culture, micrografting and somatic embryogenesis. The objective of this work is to clean-up one clone of Rèze using whole plant thermotherapy in order to add this variety to the certification programme.

Materials and Methods

- Two plants of Rèze 171 were cultivated in pots and submitted to sanitation process.
- At BBCH 55, they were put in growth chamber for 4 months. The growth conditions were 16h/8h day/night time period at 36 ℃.
- Terminal und auxiliary buds (circa 1 cm) were collected once a month, rooted and then transplanted in pots to generate full plants (figure 1).
- Virus detection was done on leaf petioles of 6 months old cuttings using DAS-ELISA for *grapevine leafroll-associated virus 1* (GLRaV-1) and RT-PCR *for grapevine Rupestris stem pitting-associated virus* (GRSPaV) and *grapevine virus A* (GVA).

Results

The clone 171 of Rèze is infected by GLRaV-1, GVA and GRSPaV. After sanitation, 155 plantlets were obtained. The efficiency of virus elimination was evaluated and results are given in Table 1.

Table 1. Efficiency of elimination of 3 viruses by in vivo thermotherapy for Rèze cultivar.

Viruses	Plantlets tested	Plantlets negative	Efficiency
GLRaV-1	155	116	75 %
GVA	30	13	43 %
GRSPaV	30	28	95 %

These preliminary results seem to indicate that in-vivo thermotherapy is effective in eliminating 3 important viruses in grapevine. However, further tests are needed to confirm on older cuttings the elimination of those viruses. Furthermore, the heat-treated Rèze has to be first evaluated during biological indexing before entering the certification programme.
The advantage of the in-vivo thermotherapy is its simplicity and, unlike sanitation processes with tissue culture methods, does not present any risk of somaclonal variation.

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References

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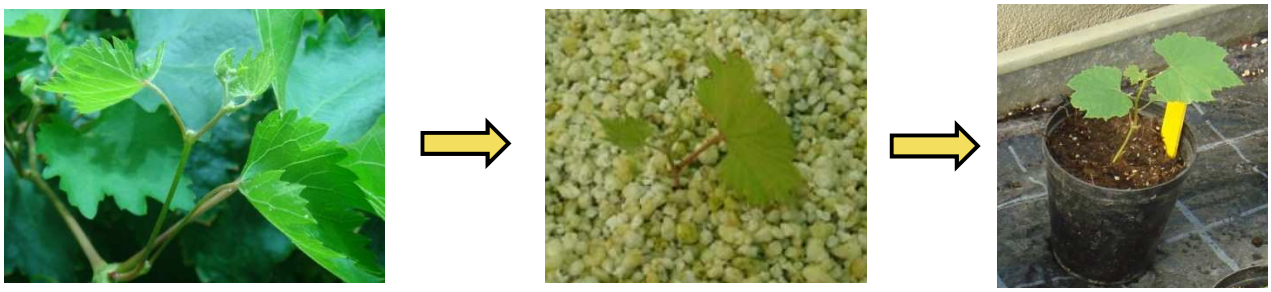

Figure 1. Whole plant thermotherapy: from shoot apices to full plant.

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