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RFID microchips as a tool for traceability in grapevine nurseries: pre- and post-grafting implants

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Radio Frequency Identification (RFID) technology has been used for some years for the identification and traceability of various products. This approach has been successfully adopted also in the agrifood sector to guarantee a reliable traceability system. In grapevine nurseries, the storage of data in a field log is an essential step in the plant production process. Specific regulations require the presence of colored labels indicating the type, origin and other features of the material. This system is inexpensive and simple, but has several drawbacks, thus the application of RFID technology in grapevine nurseries has been studied. The insertion of RFID tags (microchip) in grafted and ungrafted cuttings would allow to store and retrieve a large quantity of data concerning the single plant, including the application of hot water treatment against phytoplasma diseases.

In March 2011, microchips (0.21 x 1.20 cm) were inserted in the pith of two types of grapevine (*Vitis* spp.) propagation materials: grafted cuttings (a) and grafted rootlings (b), subjected or not to hot water treatment (50 °C for 45 min). In (a) the microchips were inserted in the rootstock cuttings (Kober 5BB and S.O.4) after direct drilling of pith, before grafting the cuttings with scions of 'Barbera' and 'White Muscat'. In (b) the microchips were inserted in grafted rootlings of three 'Nebbiolo' clones, a few cm below the grafting point, through a "U" cut performed laterally by a specially designed machine. Tags were read through a palmtop computer and an appropriate software program allowed management of the stored data.

After the first year of cultivation in the nursery, the grafted cuttings (a) were planted in a vineyard in spring 2012. There was some variability in the nursery take among treatments also related to the quality of the plant materials, whereas tagging accuracy (readable microchips) in September 2012 was very good (about 90% successful read rate). The grafted rootlings (b) were planted in a vineyard in spring 2011. In the following summer more than 90% of microchips were readable, whereas this percentage decreased to 50% in summer 2012 under more humid conditions, indicating that microchip insertion in grafted rootlings can encounter some problems.

In conclusion, electronic tagging of grapevine propagation materials proved technically feasible, although the cost of microchips (still too high compared to the average price of grapevine rootlings) continues to hinder their routine adoption in nurseries. Nevertheless, electronic tagging could be advisable for "basic" material (that used by nurseries to establish their mother-vine vineyards) as it has greater commercial value.