Studies on Dwarfing Rootstocks of Japanese Persimmon©

Takuya Tetsumura
Faculty of Agriculture, University of Miyazaki, 1-1 Gakuen Kibanadai-Nishi,
Miyazaki 889-2192, Japan

Email: tetsumur@plant.miyazaki-u.ac.jp

Japanese persimmon tends to grow to a large tree. Hence the necessity of propagation of dwarfing rootstocks has been urged for 50 years (Ito, 1988), although nursery stocks grafted on the dwarfing rootstocks are not available yet. It has been thought that Japanese persimmon is one of the difficult-to-root fruit species, and propagation by cuttings has so far proved to be very difficult (Tao and Sugiura, 1992). A few reports on cutting propagation of Japanese persimmon proved that an etiolation treatment on mother plants and auxin and vitamin treatments on cutting bases were effective in rooting the cuttings collected from seedlings and cultivars (Machida and Fujii, 1969; Tukamoto et al., 1959). However, these techniques have not been applied to commercial production mainly because the production of mother plants and cuttings are cumbersome and complicated.

Many researchers have investigated the field performance of double grafted trees in which potentially dwarfing interstocks were grafted on seedlings. After long-term investigation, some strains and cultivars used as interstocks produced dwarfed trees (Asakura et al., 2002; Ito, 1988; Koshita et al., 2004; Manago et al., 2000; Morinaga et al., 2000; Nezu et al., 1999). Although a great number of apple trees in Japan are grafted on dwarfing interstocks, the roots of vigorous rootstocks make trees a larger size some years after field establishment (Kikuchi and Ikeda, 2001). Japanese persimmon trees on dwarfing interstocks are becoming larger than expected, because their roots are still seedlings.

Studies on in vitro propagation of Japanese persimmon began 20 years ago. Many commercial cultivars were micropropagated and produced as own-rooted nursery stocks (Copper and Cohen, 1984; Fukui et al., 1989, 1992; Fumuro et al., 1988; Murayama et al., 1989; Sarathchandra and Burch, 1992; Sugiura et al., 1986; Tao and Sugiura, 1992; Tetsumura et al., 1992; Tetsumura, 1997), while explants were harvested from shoots (suckers) sprouting from rootstocks' roots of dwarfed trees and micropropagated successfully (Ito-Ogawa et al., 2001; Kagami et al., 1995). Kimura et al. (1985) assumed that such a rootstock might have a genotypic dwarfing ability. In fact, some of the trees grafted on these micropropagated rootstocks showed dwarfism (Kamada et al., 2004; Wada et al., 2004). In the near feature, other cultivars grafted on the potentially dwarfing rootstocks will be investigated for their field performances under various conditions. However, the expensive facilities required for micropropagation and the multiplication rate of micropropagation of Japanese persimmon is high partly because of the difficulty in acclimatization of micropropagules (Tao and Sugiura, 1992). This fact will possibly present an obstacle for success of commercial micropropagation of dwarfing rootstocks.

The phenomenon of cuttings from the micropropagated trees rooting better than those from grafted trees has been reported for many woody plants (Hogue and Neilsen, 1991; Howard, 1987; Howard et al., 1989; Jones and Webster, 1989; Marks, 1991; Plietzsch and Jesch, 1998; Tetsumura et al., 2001). Micropropagated stock plants of Japanese persimmon also produced the hardwood and softwood cut-

Figure 1. A well-rooted hardwood cutting derived from a micropropagated Japanese persimmon tree.

Figure 2. A well-rooted leaf-bud cutting derived from a micropropagated Japanese persimmon tree.

tings with high rooting ability (Tetsumura et al., 2002) (Figs. 1 and 2), which will promote commercial production of the dwarfing rootstocks. The apple trees grafted on micropropagated dwarfing rootstocks often showed undesirable characteristics, such as more vigorous shoot growth, delayed cropping, and increased sucker production (Jones and Hadlow, 1989). However, apple trees on dwarfing rootstocks derived from cuttings, which were collected from micropropagated plants, were similar to trees on rootstocks from conventional propagation, not to trees directly from micropropagation (Jones and Webster, 1993). Dwarfing rootstocks propagated by cuttings will exhibit their dwarfing ability in the field, since trees propagated by cuttings of Japanese persimmon grew less vigorously than micropropagated trees (Tetsumura et al., 2003). In the meantime, cuttings taken from suckers sprouting from rootstocks' roots of a dwarfed Japanese persimmon tree had a high rooting ability (Tetsumura et al., 2000) (Fig. 3), which will shorten a term for production of dwarfing rootstocks because of no need of micropropagation. Although it takes a very long period of time to research on rootstocks for fruit trees, we have to pursue further investigations on dwarfing rootstocks of Japanese persimmon.

Figure 3. A source of cuttings of a potentially dwarfing rootstock for Japanese persimmon. A dwarfed tree cut off just above the ground level in spring. Many root suckers sprouted and elongated in early summer. Their rooting ability was high.

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