Growth of Kaki Trees on MKR1, a Dwarfing Rootstock, for a Decade©

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Kaki (*Diospyros kaki* L.) nursery stocks produced by grafting scion cultivars on kaki seedlings are planted in orchards, and usually have the nonbearing vegetative period for the initial 4 or 5 years like apple (Kataoka, 2002). However, 'Fuyu' and 'Hiratanenashi' scions on MKR1, a dwarfing rootstock for kaki, bore flowers soon after the field establishment in Feb. 2003, and abundantly thereafter (Tetsumura et al., 2010). Hence, we assume that the trees on MKR1 do not have the nonbearing vegetative period. Moreover, the yield efficiencies of young trees on MKR1 were higher than those on kaki seedlings, rootstock-a, and own-roots (Tetsumura et al., 2010). Hence, we also presume that the trees on MKR1 will quickly reach to the high productive age, at which trees on kaki seedlings need a very long period to reach (Kadoya, 1991).

As above-mentioned, the characteristics of kaki trees on MKR1 were different from those on kaki seedlings, and we discussed them in the previous meetings (Tetsumura et al., 2011). We are still investigating them and analyzing the data. As a result, the shoot growth on MKR1 has been shown to become stable by the 5th or 7th years of field establishment. Hence, we introduce the field performance of kaki trees on MKR1, mainly the shoot growth, for a decade. The total shoot length has increased constantly, regardless of the type of rootstock (Fig. 1). However, the tree vigor index of 'Fuyu' trees on MKR1 indicated that they grew slower from 2007. Specifically, Sawamura et al. (1997) showed that the number of shoots 60 cm or more in length (as a percentage) indicated tree vigor of 'Fuyu' trees, and the index of 'Fuyu' trees on MKR1 had been nearly 0% since 2007 (Fig. 2). Similarly, Maesaka and Fujimoto (1998) showed that the number of shoots 20 cm or less in length per total shoot number of 'Hiratanenashi' trees showing weak growth was 80%, and the index of 'Hiratanenashi' trees on MKR1 had been over 90% since 2009 (Fig. 2). The tree height of both cultivars on MKR1 seemed to become fixed from 2009, although the height of the trees with the other rootstocks had increased (Fig. 3).

Yield efficiency such as the cumulative yield per tree per canopy volume is thought to show the productivity of a tree, and the trees of both cultivars on MKR1 produced fruit very efficiently between 2006 and 2008 (Tetsumura et al., 2010). However, in 2010 and 2011, anthracnose, bird, and animal damages made the comparison evaluation impossible. Therefore, the number of shoots with flowers per number of total shoots was used as an alternative index; the more shoots with flowers the kaki trees have, the higher the productivity, because cultural practices in Japan recommend that florets should be thinned to one on each shoot. The shoots with flowers of both cultivars on MKR1 were efficiently produced soon after the field establishment, and the percentages were the highest every year (Fig. 4). However, regardless of the type of rootstock, the percentages varied with year, so probably no trees have reached the high productive age. In addition, 'Fuyu' trees on MKR1 have obviously produced more flowers per shoots with flowers since 2010 (Fig. 5). The high productive age of trees on MKR1 should begin soon.

In conclusion, a tree on MKR1 5 or 7 years after field establishment became stable with a weak shoot growth phase. On the other hand, the trees on kaki seedlings, rootstock-a, and own-roots still showed the strong shoot-growth phase. However, no trees seemed to become the high productive age phase yet. The continuous collecting of data will reveal when the high productive age of the trees on MKR1 starts.

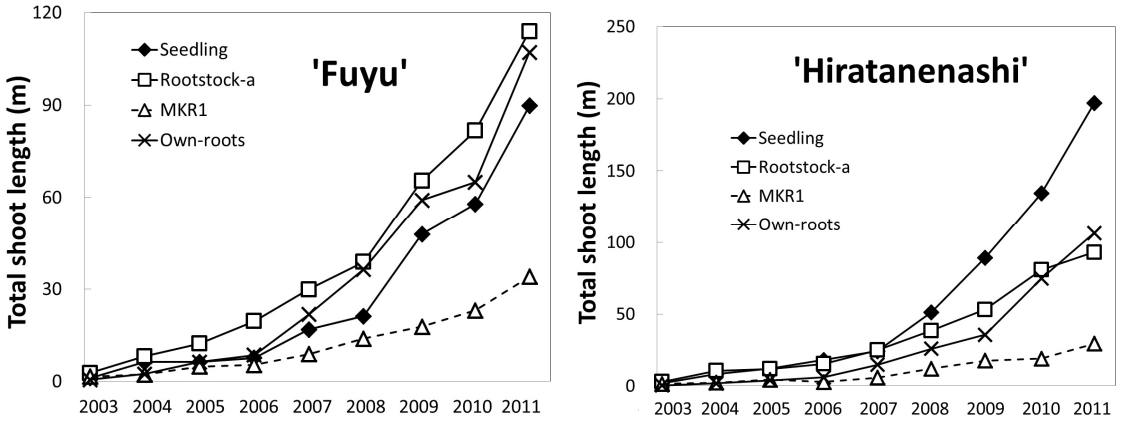

Fig. 1. Effects of rootstock on total shoot length in *Diospyros kaki* 'Fuyu' and 'Hiratanenashi'.

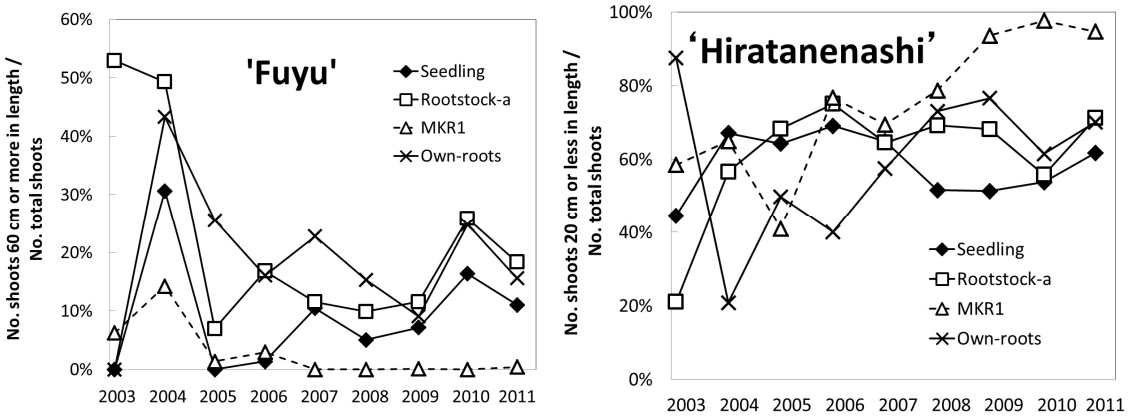

Fig. 2. Effects of rootstock on tree vigor indexes, number of shoots 60 cm or more in length per total shoot number and number of shoots 20 cm or less in length per total shoot number, in *Diospyros kaki* 'Fuyu' and 'Hiratanenashi'.

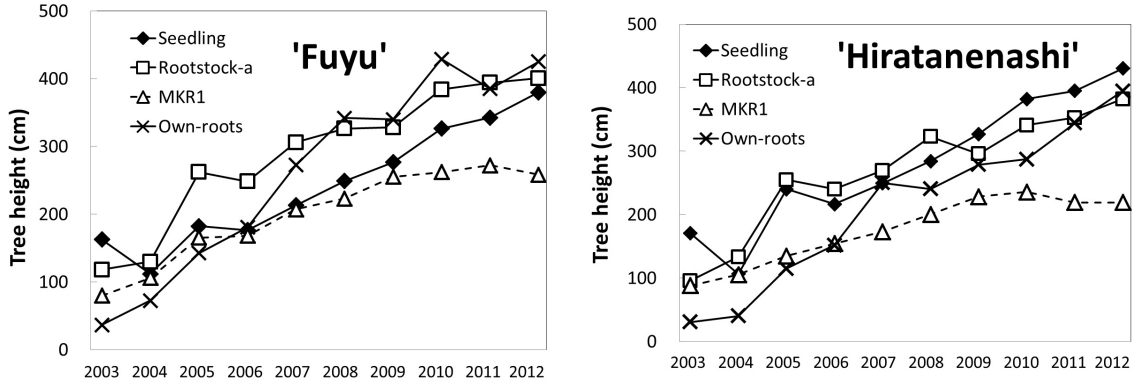

Fig. 3. Effects of rootstock on tree height in *Diospyros kaki* 'Fuyu' and 'Hiratanenashi'.

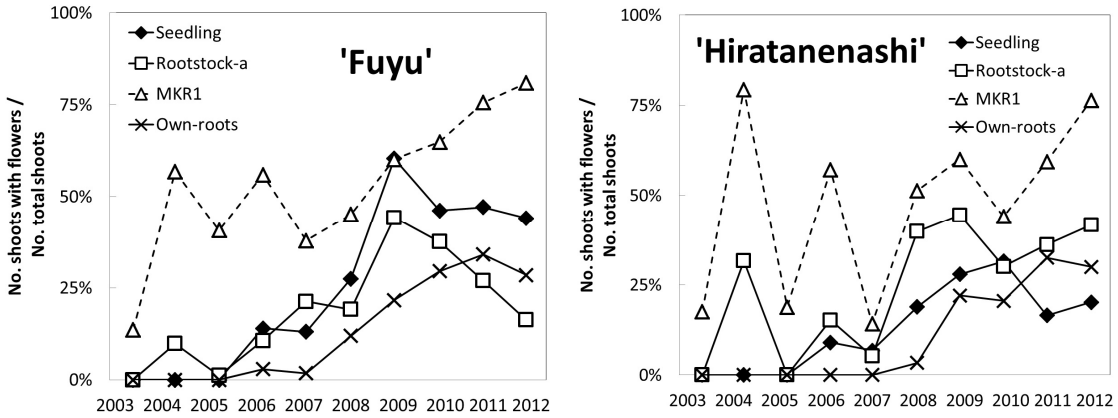

Fig. 4. Effects of rootstock on number of shoots with flowers per number of total shoots in *Diospyros kaki* 'Fuyu' and 'Hiratanenashi'.

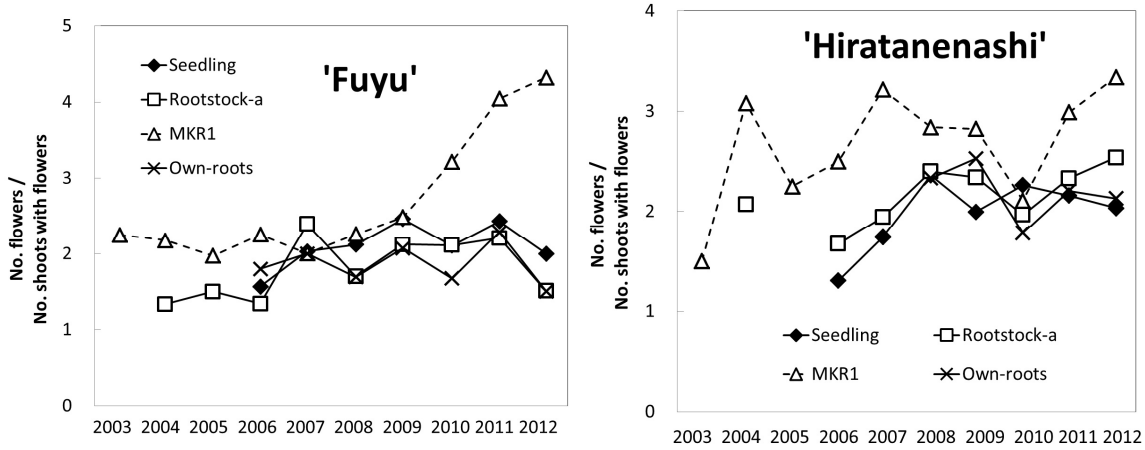

Fig. 5. Effects of rootstock on number of flowers per number of shoots with flowers in *Diospyros kaki* 'Fuyu' and 'Hiratanenashi'.

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