

Performance of pear trees of the cv. 'Uta' on their own roots propagated from green cuttings in a field trial in Eastern Austria

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Abstract

Between 2008-2018 trees of the pear Cultivar Uta obtained from self-rooted green long cuttings were observed in a field trial at the University of Natural Resources and Life Sciences in Vienna and compared with own rooted trees from in vitro propagation and grafted trees on the rootstocks Kirchensaller Mostbirne (seedling) and Fox 11. The treatments of the trees were according to organic production rules. The own rooted trees came later into bearing compared to the grafted ones. After eleven years, the trees on seedling showed the highest vigour and yield, followed by Fox 11 and the own rooted trees from in vitro propagation. The own rooted long cuttings grew clearly weaker. There were no differences in the specific yield, which was between 1.1 und 1.2 kg per m². The own rooted trees showed larger fruits than the grafted ones. To avoid plant losses in the first years, it is recommended to plant own rooted trees in autumn.

Keywords: Seedling, Fox 11, own rooted trees from in vitro propagation, own rooted trees from long cuttings.

Introduction

In the organic pear production in Northern Italy apart from seedling rootstocks also own rooted scions from in vitro propagation are successfully used (Tibiletti 2001). They are comparable with the seedling, as well late bearing and known as robust to abiotic stress and diseases, since staying on their proper root (Tibiletti 2001). The specific yield is high (Thibault & Hermann 1982, Carrera & Gomez-Apparisi 2000, Stanica et al. 2000), with a higher fruit size compared to the seedling (Thibault & Hermann 1982).

There are so far no experiences about the suitability of own rooted pear trees obtained from own rooted from green long cuttings (Mbabu & Spethmann 2005), especially in organic production.

Material and Methods

In autumn 2007, trees of the cv. Uta grafted on seedling Kirchensaller and Fox 11 and trees from in vitro propagation and from rooted green cuttings, in total 15 trees per variant were planted in the research orchard of the University in Vienna with a planting distance of 4 x 2 m. The trees were cultivated according to the organic production rules. All assessments were done following scientific rules.

Results and Discussion

In the first year two trees from Fox 11 and own rooted long cuttings died, and one from the own rooted from in vitro propagation and were replaced with reserve trees. By autumn 2018, again two trees of Fox 11 and two from own rooted long cuttings plus one from in vitro propagation were lost. In addition, one tree of Fox 11 and one seedling showed symptoms of pear decline.

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The grafted seedlings showed the strongest vigor, followed by Fox 11 and the own rooted trees from in vitro propagation. The own rooted long cuttings grew clearly weaker (table 1). Both own rooted tree variants came later into bearing compared to the grafted ones (data not shown). The trees on seedling (83.8 kg) had a significantly higher single tree yield compared to Fox 11 (60.8 kg), own rooted in vitro (55.1 kg) and own rooted long cuttings (40.5 kg), which did not differ significantly from each other (table 1). The specific yield of all variants was in the range between 1.1 and 1.2 kg/cm² (table 1).

Table 1: Stem cross section in November 2018, sum of yields 2009-18, specific yield and mean fruit weight of Uta on different rootstocks.

	Stem cross section Nov. 2018		sum of yields 2009-18		spec. yield sum		fruit weight
	cm ²	*	kg/tree	*	kg/cm ²	*	g/fruit **
Fox 11	54,6	b	60,8	a	1,14	a	186
Seedling Kirchensaller	68,0	c	83,8	b	1,22	a	198
own rooted in vitro	53,3	b	55,1	a	1,12	a	219
own rooted long cuttings	31,8	a	40,5	a	1,23	a	226
* different letters show significance (ANOVA with post hoc S-N-K- test, p<0.05)							
** mean from 2015, 2017 & 2018							

Conclusions

The own rooted trees from in vitro propagation grew less than the seedlings comparable to Fox 11. However, they come later into bearing compared to the grafted trees. This corresponds to results with in vitro propagated trees (cv. Bosc's, Uta, Williams) on their own roots compared to grafted ones from other trials (Wurm et al. 2014, Spornberger & Schüller 2016) and is probably due to the juvenile characteristic of these trees. The own rooted trees from long cuttings were small when planting and grew obviously weaker compared to the other variants. Nevertheless, they came later into bearing compared to the grafted trees.

The fruit size of the own rooted trees was partly higher compared to the grafted ones. Besides, in contrast to the grafted trees, we found no pear decline. Especially the long cuttings need a longer period of tree nursery to get stronger trees. The own rooted trees from in vitro propagation were showing only few fine roots at planting in another trial (Spornberger & Schüller 2016). This makes them very sensitive when planted in dry years, why it is recommendable to plant them in autumn.

References

- Carrera M., Gomez-Aparisi J. (2000). Pear rootstocks trials. Proceedings of the ISHS-8th International Pear Symposium, Ferrara-Bologna, Italy 4-9.9.2000: 100
- Mbabu P., Spethmann W. (2005). Effect of length of cuttings, substrate pH and mineral nutrition on rooting of *Pyrus communis* cultivars. *Europ. J. Hort. Sci.* **70**: 189-194
- Spornberger A., Schüller, E. (2016). Influence of Rootstocks Compared to Own-Rooted Pear Trees on Vegetative and Generative Characteristics Under Organic Production Conditions in Eastern Austria. *Erwerbsobstbau* **58**: 1-9
- Stanica F., Dumitrascu M., Peticila A. (2000). Behavior of three pear varieties propagated "in vitro" and self-rooted on Tatura Trellis Canopy. Proceedings of the ISHS- 8th International Pear Symposium, Ferrara-Bologna, Italy 4-9.9.2000: 202-203

- Thibault B., Hermann L. (1982). Comportement agronomique de poiriers "Williams" cultivés sur leurs propres racines. *Revue Horticole* **230**: 57-60
- Tibiletti E. (2001). Pero, dall'impianto alla raccolta. *AZ Bio* **2**: 44-48
- Wurm L., Spornberger A., Gantar E.-M., Kieler M. (2014). Vergleich von selbstbewurzelten mit auf gängige Unterlagen veredelten Birnbäumen. *Mitteilungen Klosterneuburg* **64**:137-147

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