Scientific Papers. Series B, Horticulture. Vol. LIX, 2015
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

PRELIMINARY RESULTS OF SOME EARLY RIPENING SWEET CHERRY CULTIVARS ON SOME HUNGARIAN BRED MAHALEB ROOTSTOCKS

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Abstract

Evaluation of ten cherry rootstocks ('Bogdány', Cerasus mahaleb 'Cemany' (control), 'Egervár', 'Érdi V', 'Korponay', 'Magyar', 'SM 11/4', 'Vadcseresznye C. 2493', 'GiSelA 6', 'INRA SL 64') combined with early ripening sweet cherry cultivars ('Petrus®', 'Vera®', 'Carmen®') has been studied among non-irrigated conditions in Hungary. Trials were set up at Research Station of Érd of Fruitculture Research Institute of National Agricultural Research and Innovation Centre. Aim of our study was to find suitable rootstock for novel bred Hungarian sweet cherry varieties. It can be stated after seven years investigation that 'Petrus' was the most vigorous varieties, which is followed by 'Vera' and 'Carmen'. The 'GiSelA 6' rootstock had low vigor among examined rootstocks and 'INRA SL 64' was the most vigorous one in our trial. 'Petrus' produced the biggest yield and the smallest fruit size among observed cherry varieties. Yield of 'Carmen' grafted on 'Érdi V', 'Egervár', and 'GiSelA 6' was the highest but only 'Érdi V' had a positive effect on fruit size because more than 40% of examined fruits were larger than 28,1 mm in diameter. 'Vera' yielded well on 'Érdi V' and 'Egervár', the best fruit size was produced by 'Érdi V'. On the basis of value –yield index, which was calculated by actual market price per fruit size category, 'Carmen' produced the highest income per tree on 'Egervár' and 'GiSelA 6' and 'Vera' was the most valuable on other rootstocks.

Key words: *fruit size, sweet cherry, rootstocks, rootstock-scion interactions*.

INTRODUCTION

A lot of cherry rootstocks have been released around the world over the last two or three decades therefore there are wide range cherry rootstocks available for growers. Other factor is, that there are 26 state approved sweet cherry cultivars in the Hungarian assortment therefore it is still not easy for the growers to choose the best rootstock-scion combinations. Based on previous studies the different rootstock-scion interactions can make more difficult the growers' rootstock choice.

There are two different trends in Europe. In a wider sense north half of Europe low or medium vigor rootstocks are preferred because of mild and more humid climate conditions. The climate is drier in the South Europe therefore the cherry rootstock usage still focuses on medium or strong vigorous rootstocks mostly (Bujdosó and Kállayné, 2004).

Growers prefer planting on vegetative-propagated rootstocks in order to achieve medium vigorous and homogenous tree population in the orchard. However, the Hungarian growers still use generative-propagated Mahaleb rootstocks (Hrotkó et al., 2006) because of its drought and lime tolerance. The new, vegetative-propagated Mahaleb rootstocks (Hrotkó and Magyar, 2004) should be evaluated with the newly bred Hungarian cultivars (Apostol, 2008).

MATERIALS AND METHODS

Three early sweet cherry varieties were tested in the trial: 'Petrus®', 'Carmen®', and 'Vera®' on different Mahaleb stocks selected at Department of Fruit Growing of Corvinus University of Budapest ('Bogdány', 'Egervár', 'Magyar', 'SM 11/4', 'Korponay') and at Research Institute for Fruit Growing and Ornamentals ('Erdi V'). Cerasus avium

'C 2493', 'INRA SL 64' and 'GiSelA 6' were also involved in the trial. Control of the trial was 'Cemany' Mahaleb rootstock, which is about 10 % less vigorous compared to F 12/1. Number of rootstocks was different by each scion varieties because of available plant material.

Based on literate data 'Cemany' and Cerasus avium 'C. 2493' are very vigorous, the growth of 'Bogdány', 'Kornopay' and 'SL 64' is vigorous. Furthermore, 'Magyar' and 'Egervár' have moderate vigor and 'GiSelA 6' has low vigor (Franken-Bembenek, 1995, Hrotkó, 1999, 2003, Hrotkó and Magyar, 2004, Hrotkó et al., 2009).

The trial was planted in spring of 2004 at Experimental Fields of the Research Institute on chernozem soil with high lime content (K_A=40, pH=8, total lime content in the top 60 cm layer 5%, humus content 2,3-2,5 %). Site conditions are the following: average yearly sunshine hours: 1981; average yearly temperature: 10,7°C; average yearly temperature in the vegetation period: 16,6°C; average yearly precipitation: 515 mm. Canopy was trained to spindle, the orchard is non irrigated.

Our data base contains data on trunk diameter, estimated yield, fruit diameter by size fraction from 2008. Trunk diameter was measured 20 cm above graft union in every November. Yield data were estimated after measuring 1 kg full ripen cherries. Sixteen fruits per rootstock-scion combinations were picked randomly to determine the fruit diameter of the combinations. Unfortunately, there was no crop on rootstock-scion combinations in 2012 because of late spring frosts. The cumulated yield efficiency index was calculated as cumulated yield between 2008 and 2014 / trunk cross sectional area of 2013.

Value equivalent Yield Efficiency (average fruit weight of the cultivars x No. of fruit by size fraction x yield x price of size fraction in EUR/kg) was also calculated. Average fruit weight of 'Petrus®' was 5 g, of 'Vera®' 8 g, of 'Carmen®' 11 g.

Following farmer prices of different fruit size fractions were taken into consideration: up to 23,9 mm in diameter 0,6 EUR/kg, 24,0 to 25,9 mm in diameter 0,75 EUR/kg, 26,0 to 27,9 mm in diameter 1,1 EUR/kg, 28,0 to 29,9 EUR/kg 1,5 EUR/kg, more than 30,0 mm in diameter 2 EUR/kg.

Statistical evaluation was made by PSAW 18 program's Duncan's homogeneity evaluation of ANOVA analysis for one factor. There aren't any significant differences in the data marked by same letters.

RESULTS AND DISCUSSIONS

The vigorous variety was 'Petrus®' grafted on different rootstocks, followed by 'Vera®' and 'Carmen®'. The largest vigor was produced by trees grafted on 'SL 64' and trees on 'GiSelA 6' were the lowest. 'Petrus®' grafted on control showed significant difference to those trees grafted on 'Magyar', 'C. 2493', 'Egervar', 'GiSelA 6'. There was no significant difference in growth of 'Carmen®' except trees on 'GiSelA 6'. Growth of 'Vera®' grafted on 'Cemany' was significant vigorous than those grafted on 'Egervar', 'Korponay' and 'GiSelA 6' (Figures 1., 2., 3.).

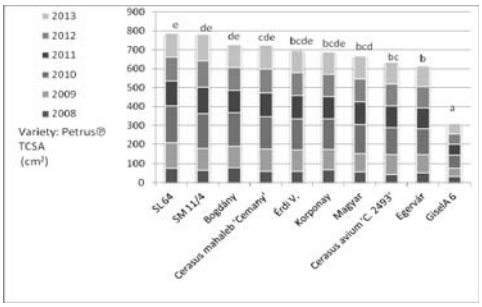

Figure 1. Effect of different rootstocks on trunk cross sectional area of 'Petrus®' (Érd-Elvira major, 2008-2013)

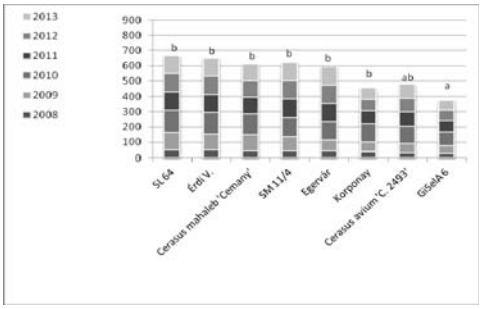

Figure 2. Effect of different rootstocks on trunk cross sectional area of 'Vera®' (Érd-Elvira major, 2008-2013)

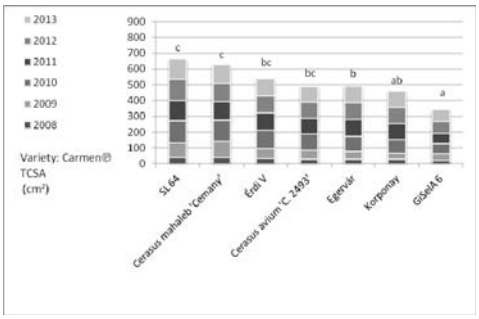

Figure 3. Effect of different rootstocks on trunk cross sectional area of 'Carmen®' (Érd-Elvira major, 2008-2013)

Suckers haven't been appeared in the trial yet. The highest cumulated yield was produced by 'Petrus®', followed by 'Vera®' and 'Carmen®'. 'Petrus®' on 'Magyar', 'Cemany' and 'Bogdany' rootstocks produced the highest yield (Figure 4).

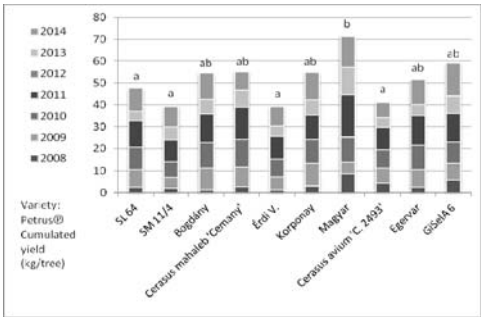

Figure 4. Effect of different rootstocks on cumulated yield of 'Petrus®' (Érd-Elvira major, 2008-2014)

There was small difference in cumulated yield of 'Vera®', the largest yield was produced on 'Erdi V' and 'Egervar' rootstocks (Figure 5.).

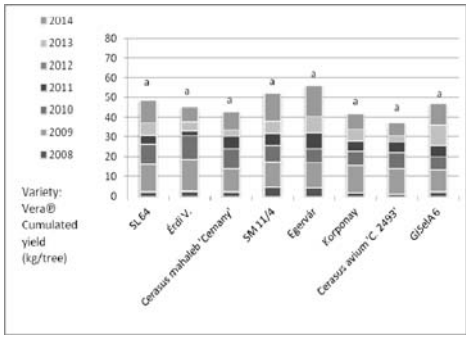

Figure 5. Effect of different rootstocks on cumulated yield of 'Vera®' (Érd-Elvira major, 2008-2014)

'Carmen®' grafted on 'GiSelA 6' was the most productive followed by 'Egervár' and 'Cemany' (Figure 6).

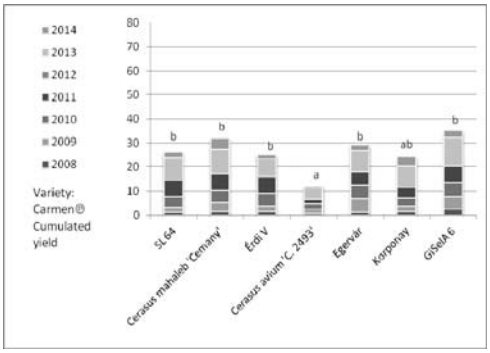

Figure 6. Effect of different rootstocks on cumulated yield of 'Carmen®' (Érd-Elvira major, 2008-2014)

'Petrus®' grafted on 'GiSelA 6' rootstock produced the best fruit size; 60 % of fruits reached 22 mm in diameter (Figure 7.).

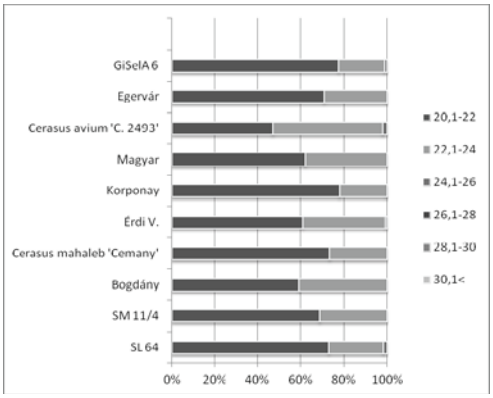

Figure 7. Effect of different rootstocks on fruit size of 'Petrus®' (Érd-Elvira major, 2010-2014)

Vera®' fruits were significant larger compared to 'Petrus®'. 50 % of 'Vera®' fruits picked from trees on 'Erdi V' and 'SM 11/4' reached 26 mm in diameter (Figure 8).

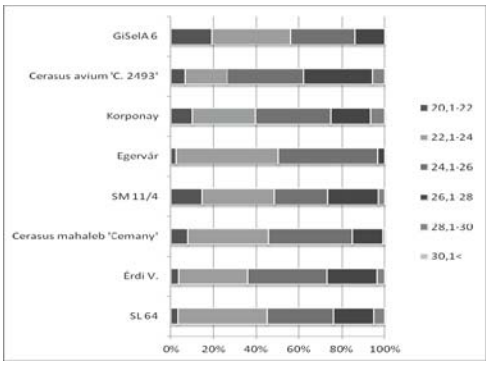

Figure 8. Effect of different rootstocks on fruit size of 'Vera®' (Érd-Elvira major, 2010-2014)

'Carmen®' trees grafted on 'Erdi V' produced the best fruit size because 60 % of picked fruit were equal or larger than 28 mm in diameter (Figure 9.).

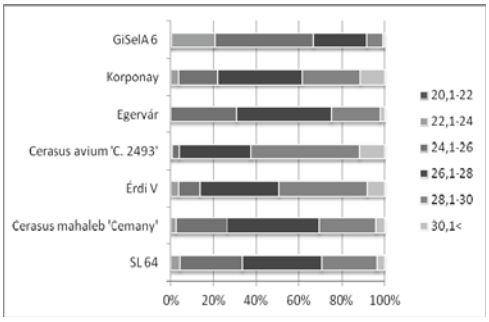

Figure 9. Effect of different rootstocks on fruit quality of 'Carmen®' (Érd-Elvira major, 2010-2014)

The best cumulated yield efficiency index was produced by scions grafted on 'GiSelA 6' followed by trees grafted on 'Egervár' and 'Korponay' (Figures 10, 11, 12).

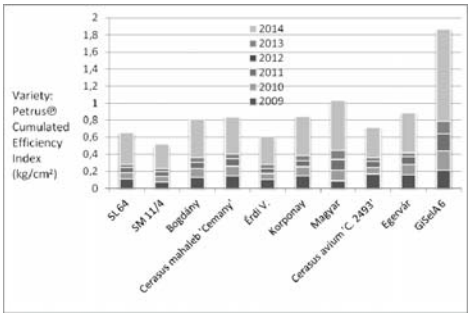

Figure 10. Cumulated yield efficiency index of 'Petrus®' grafted on different rootstocks (Érd-Elvira major, 2009-2014)

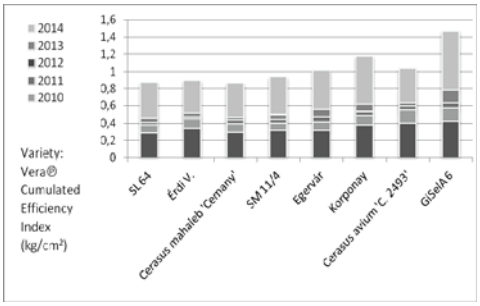

Figure 11. Cumulated yield efficiency index of 'Vera®' grafted on different rootstocks (Érd-Elvira major, 2010-2014)

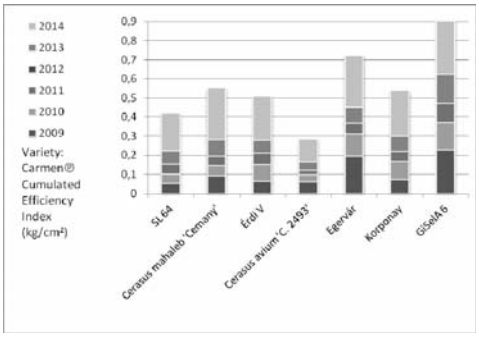

Figure.12. Cumulated yield efficiency index of 'Carmen®' grafted on different rootstocks (Érd-Elvira major, 2010-2014)

Based on value equivalent yield efficiency there was a lot of big difference in rootstock-scion combination studied in the trial. 'Petrus®' performed the lowest value equivalent yield efficiency followed by 'Vera®' and 'Carmen®' (Figure 13.).

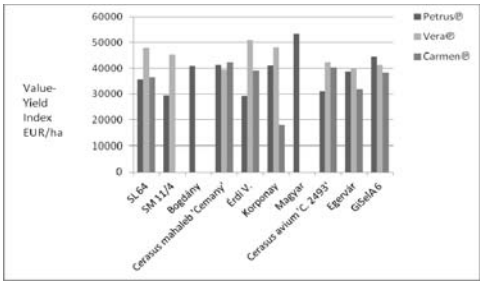

Figure 13. Value equivalent Yield Efficiency of different rootstock/scion combinations (Érd-Elvira major, 2008-2013)

CONCLUSIONS

Rootstocks tested in our trial can be categorized by vigor as follows:
- vigorous rootstocks: 'INRA SL 64', 'Cemany', 'Érdi V', 'SM 11/4' and 'Bogdány',
- moderate vigorous rootstocks: Korponay' seedling, 'Magyar' and 'Egervár',
- semi dwarfing rootstock 'GiSelA 6'.

'Petrus®' is a self fertile cultivar; therefore this variety produced the highest yield. 'Vera®' and 'Carmen®' are self sterile varieties so their yields depend - among others - on the weather conditions under blooming time (Apostol, 2008).

'Petrus®' produced small fruit size and rootstocks did not affect its fruit size. Fruit size of 'Vera®' and 'Carmen®' was excellent and the chosen rootstocks didn't have any negative effect on their fruit size. 'Carmen®' produced the largest fruit size in the tested cherry assortment.

Since 'Vera®' produced higher yield than 'Carmen®', 'Vera®' reached the best value equivalent yield efficiency. The larger fruit size of 'Carmen®' couldn't compensate the difference in yield.

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