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Health status of 25 year old sweet cherry trees with different interstock

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ABSTRACT

Health status and longevity of 'Van' and 'Büttners Red'– two cultivars of sweet cherry trees with different interstocks grafted on Mazzard seedlings were investigated at the Experimental Station in Lipowa (southern Poland). Two sour cherry cultivars – 'Northstar' and English cherry from Kent F442, two types of *Prunus fruticosa* – No 8, syn. 'Frutana' and No 9, and *Prunus avium* F12/1 were used as interstocks. Trees of each cultivar without interstock were used as control. Tree sizes and their health status after 25 years in the orchard were recorded. Interstock modified the tree size and architecture of trunk. The healthiest and mostly productive were tress with 'Frutana' interstock and the worst – with interstock of 'F12/1' cherry. Remaining interstocks did not have any significant influence on the longevity and health status of trees.

INTRODUCTION

Results of many authors showed that vigor of sweet cherry trees could be limited by using dwarfing rootstocks or interstock (Grzyb et al. 1985, 1996, 1998, Hrotko et al. 1998, Rozpara et al. 1998). Fruit picking, disease and pest control, pruning and other treatments on such trees are easier and cheaper than in traditional cherry orchard (Ogasanović et al. 1996, Stehr 1998, Webster 1998, Rozpara and Grzyb 1999). There is an existing opinion that sweet cherry trees on dwarf rootstocks are not long living trees (Kloutvor 1991, Webster 1998). Partial results of these experiments regarding the tree growth and yields were already published twice, first in the seventh year after planting (Grzyb et al. 1985), and second time in the sixteenth year after establishing orchard (Rozpara et al. 1998).

The aim of this study was to investigate the effect of different promising interstock as substitute of dwarf rootstocks on trees, health status and their longevity in the orchard.

MATERIAL AND METHODS

Cherry cultivars – 'Van' and 'Büttners Red' were grafted on Mazzard seedling. 'Northstar' (*P. cerasus*), F442 (*P. cerasus* from Kent), F12/1 (*P. avium*), Frutana (*P. fruticosa* No 8) and *P. fruticosa* No 9 were used as interstocks. Trees without interstock were used as controls. Twenty five year-old sweet cherry trees grown at the distance of 6.5 × 4.5 m were evaluated at the Lipowa Experimental Station during years 1976 – 2001. Trees were planted on the loess soil in randomized plots with four replications, three trees per plot. Only those combinations with at least eight trees were taken for evaluation of healthiness status of sweet cherry trees in 2001. The following observation and measurements were done: general appearance of a tree, general state of tree health, and interstock health status. The 6-point ranking scale (5 - 0) was used as follows: 5 - very good, 4 - good, 3 - middle, 2 - poor, 1 - very poor, 0 - bad. For leaf spot record the scale 0 - 5 was used, where 0 - no symptoms, 1 - symptoms on single leaves, 2 - symptoms on about of 10% leaves, 3 - symptoms on about of 30% leaves, 4 - symptoms on about half leaves, 5 - symptoms on above half leaves. Necroses and cancers were evaluated in the scale 0 - 3, where 0 - none, 1 - single small necroses, 2 - above five small necroses and cancers or one large cancer, 3 - two or more large cancers leading to death of tree.

Results were elaborated statistically by Duncan's multiple range tests at the 5 percent level of significance.

RESULTS

General appearance of ‘Van’ and ‘Büttner’s Red’ sweet cherry trees was not influenced by investigated interstock except for ‘Frutana’ (Table 1). This interstock improved significantly tree condition of both investigated cherry cultivars. Trees with ‘Frutana’ interstock had also darker green leaves than trees on remaining interstocks. Symptoms of cancer places on woody part of cherry trees were not determined by types of interstems. It seemed that cultivar ‘Van’ was slightly more infected by necroses and cancers than ‘Büttner’s Red’.

Table 1. Health status of 25 year old trees of two sweet cherry cultivars ‘Van’ and ‘Büttner’s Red’ with different interstocks

Treatments	Appearance of tree (scale 5 - 0)	General tree health status (scale 5 - 0)	Necrosis and evidence of cancer (scale 0 - 3)	Interstock health status (scale 5 - 0)	Leaf spots (scale 0 - 5)
			‘VAN’		
Control – without interstock	2.5 b*	2.8 a	2.1 a	-	4.4 a
‘Northstar’	2.6 bc	3.0 a	2.4 a	2.5 a	4.5 a
F442	3.0 bc	2.8 a	2.4 a	4.1 b	4.0 a
F12/1	1.1 a	2.5 a	2.4 a	4.4 b	4.4 a
‘Frutana’	4.0 c	3.8 b	1.6 a	4.5 b	4.3 a
P. fruticosa No 9	3.5 bc	2.6 a	1.8 a	3.5 ab	3.8 a
			‘BÜTTNER’ S RED’		
Control – without interstock	3.9 ab	3.9 b	1.9 a	-	4.5 b
‘Northstar’	4.0 ab	3.9 b	1.5 a	4.6 a	4.1 ab
F442	3.3 a	3.3 ab	1.6 a	4.3 a	4.1 ab
F12/1	3.8 ab	2.6 a	1.9 a	4.5 a	4.5 b
‘Frutana’	4.4 b	4.1 b	1.4 a	4.4 a	4,6 b
P. fruticosa No 9	3.9 ab	2.6 a	2.1 a	3.9 a	3.6 a

*Values within columns and cultivars followed by the same letter are not significantly different (p = 0.05) using Duncan’s multiple range test

Health condition of all interstocks with ‘Van’ cultivar was generally worse and more differentiated by types of interstock than that with ‘Büttner’s Red’ cultivar. The best healthiness of tree trunk of ‘Van’ cultivar was on ‘Frutana’ interstock and the worst one on ‘Northstar’ interstock. In case of ‘Büttner’s Red’, trees looked very healthy regardless of interstock types.

Types of interstock used for both investigated cherry cultivars did not affect the intensity of tree infection by leaf spot (*Blumeriella jaapi* Rehm.). Cherry trees of ‘Büttner’s Red’ with interstock of *P. fruticosa* No 9 had fewer leaves with spots than trees with other investigated interstock.

DISCUSSION

Experiments conducted in Poland since 1976 by Grzyb et al. (1985, 1996, 1998), Rozpara et al. (1998), Rozpara and Grzyb (1999), Sitarek et al. (1999) showed that those cherry trees with interstock grew as well as trees without interstock. Differences were mostly evident in the intensity of tree growth and start of fruit bearing. Also in other experiments interstock modified growth of trees to the same degree as those on vegetatively propagated dwarf rootstocks (Ogasanović et al. 1996, Hrotko et al. 1998, Webster 1998). Trees were big or small depending on types of rootstocks or interstock (Hrotko et al. 1998). Big differences were noted in tree architecture, mainly in the part where tree trunk was build by interstock (Rozpara et al. 1998). In some trees with interstock, the part of trunk formed from interstock had a smaller diameter than trunk of the cultivar above interstock (Figs 1 and 2).

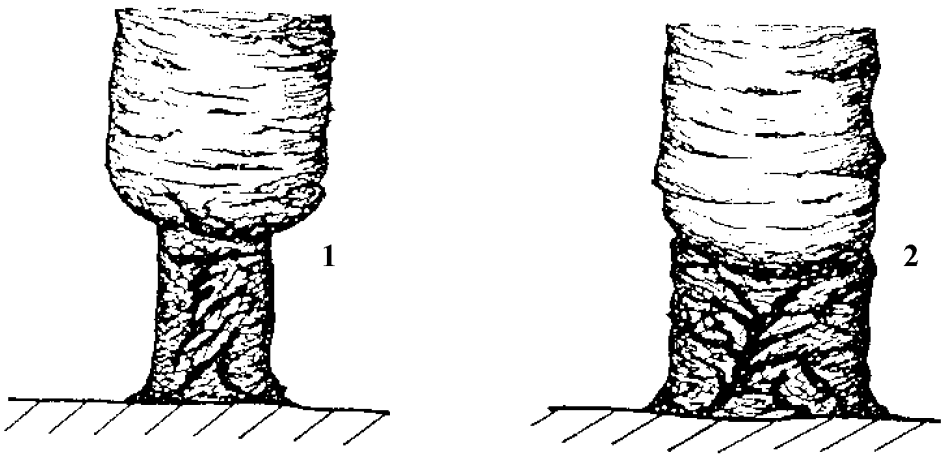

Figure 1. Classification of sweet cherry trees ‘Van’ in regard of the trunk thickness in grafting place of cultivar and interstock:

1. Trunk of grafted cultivar clearly thicker than trunk of interstock; observed at trees with sour cherry ‘Northstar,’ cherry from Kent F442, ‘Frutana’, *Prunus fruticosa* No 9 interstocks

2. Trunk of grafted cultivar and interstock of the similar thickness; observed at trees with interstock of F12/1

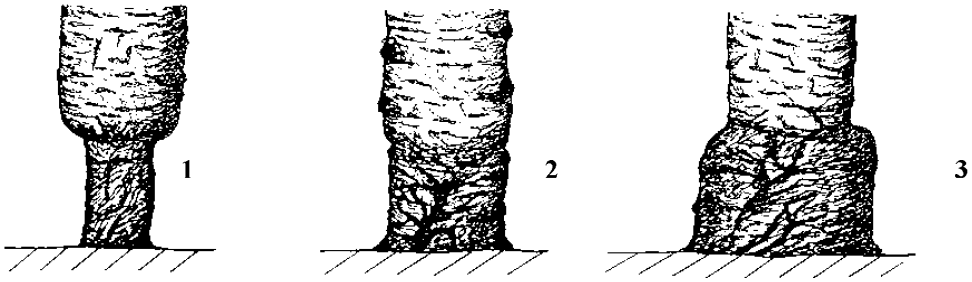

Figure 2. Classification of sweet cherry trees 'Büttner's Red' in regard of the trunk thickness in grafting place of cultivar and interstock:

1. Trunk of grafted cultivar clearly thicker than trunk of interstock with cherry from Kent F442, 'Frutana', *Prunus fruticosa* No 9

2. Trunk of grafted cultivar and interstock of the similar thickness; observed at trees with interstock of cherry 'Northstar'

3. Trunk of grafted cultivar thinner than trunk of interstock; observed at trees with interstock of F12/1

However, in those cases, when trunk was formed from a strongly growing interstock, differences in tree architecture (i.e. thickness of interstock trunk and cultivar) were not significant. Many authors underlined that the longevity and healthiness of cherry trees is very important (Sobiczewski and Bystydzieńska 1984, Kloutvor 1991, Stehr 1998, Webster 1998). Trunk is most frequently attacked by cancer and other diseases. Results from our experiments showed that by the application of interstock, mainly 'Frutana', it was possible to obtain very healthy, profitable and early bearing cherry trees (Grzyb et al. 1985, Rozpara et al. 1998). Results from our experiments gave also very useful information. Investigated interstocks should be grafted on rootstocks higher than in the common nursery practice. In other case, the link of both elements rootstocks and interstock in old orchards can very often be covered by soil, which is not favorable for tree health. This experiment did not confirm fears of those authors who in their scientific papers expressed concerns about short longevity of trees with interstock. As shown in this paper, such trees have already been grown for 25 years and all indications are that they will still remain in good conditions for following years.

CONCLUSIONS

1. Earlier published results of this experiment show clearly that interstock could give a good possibility to obtain weak growing, long living and very productive sweet cherry trees.

2. Interstock resistant to cancer and split bark might positively affect healthiness of sweet cherry trees.
3. Obtained results showed that ‘Frutana’ and ‘Northstar’ were good interstocks for both investigated sweet cherry cultivars.
4. For trees with interstock it is important that the first grafting of interstock on the rootstock should be done on adequate height above the ground, because over a long period of time many of necessary agro technical treatments in the orchard lead to soil accumulation around trees and covering up of grafting of both elements.

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ZDROWOTNOŚĆ 25 LETNICH DRZEW CZEREŚNI Z RÓŻNYMI WSTAWKAMI

Streszczenie: W Sadowniczej Stacji Doświadczalnej w Lipowej k/Opatowa Kieleckiego (w południowej części Polski) na glebie lessowej badano zdrowotność i długowieczność 25 letnich drzew dwóch odmian czereśni – 'Van' i 'Büttnera Czerwona' z różnymi wstawkami szczepionymi na siewkach czereśni ptasiej. Na wstawki stosowano pędy wiśni odmiany 'Northstar' i wiśni angielskiej selekcji z Kent 'F 442', dwa typy wiśni stepowej (*Prunus fruticosa* Pall) Nr 8 syn. 'Frutana' i Nr 9 oraz czereśnię 'F 12/1'. Drzewa obu odmian czereśni bez wstawek stanowiły kombinację kontrolną. Badane wstawki modyfikowały siłę wzrostu drzew i miały wpływ na architekturę pnia. Najlepszą zdrowotnością i najwyższą produktywnością odznaczały się drzewa ze wstawką wiśni stepowej 'Frutana', a najgorszą ze wstawką czereśni 'F 12/1'. Pozostałe wstawki nie miały praktycznie żadnego wpływu na długowieczność drzew ani na ich zdrowotność.

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