GROWTH, YIELD AND FRUIT QUALITY IN EIGHT SWEET CHERRY CULTIVARS GRAFTED ON 'TABEL EDABRIZ' ROOTSTOCK

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A B S T R A C T

From 1997 to 2003, a trial of eight sweet cherry cultivars grafted on the dwarfing rootstock 'Tabel Edabriz' was carried out at the Poznan Agricultural University Research Station in Przybroda. The cultivars evaluated were: 'Badacsony', 'Belge', 'Burlat', 'Duroni 3', 'Garnet', 'Stark Hardy Giant', 'Noire de Meched' and 'Summit'.

Health, vigor, harvest time, yield, productivity, mean fruit weight, and total soluble solids content were monitored.

When grafted on 'Tabel Edabriz' rootstock, 'Duroni 3', 'Noire de Meched' and 'Burlat' trees grew the strongest, and 'Belge' by far the weakest. 'Garnet' and 'Stark Hardy Giant' were the most productive, and 'Belge' was by far the least productive. 'Duroni 3', 'Noire de Meched', 'Badacsony' and 'Belge' had the largest fruits. 'Garnet' the highest total soluble solids content.

Key words: sweet cherry cultivars, growth, yield, fruit quality

INTRODUCTION

In Poland, annual sweet cherry production has averaged 27,200 tons over the past twenty years. Sweet cherries exports have increased over the past four years, arousing the interest of Polish producers (Kubiak, 2002). The strong, vigorous rootstocks now in use in most Polish orchards do not lend themselves to intensive production. In western Poland, the effect of dwarfing rootstocks on fruit quality has not yet been adequately studied. Because dwarfing rootstocks have some drawbacks, only the highest quality and most stress-resistant cultivars can be grafted on dwarfing rootstocks. The aim of this trial was to examine how eight new, dark red sweet cherry cultivars grew on the dwarfing rootstock 'Tabel Edabriz' in western Poland.

MATERIAL AND METHODS

From 1997 to 2003, a trial of eight sweet cherry cultivars grafted on the dwarfing rootstock 'Tabel Edabriz' was carried out at the Poznan Agricultural University Research Station in Przybroda. The cultivars evaluated were: 'Badacsony', 'Belge', 'Burlat', 'Duroni 3', 'Garnet', 'Noire de Meched', 'Stark Hardy Giant', and 'Summit' (Albertini, 1996, Lichou et al., 1990). The local soil is a heavy, post-glacial podsolic clay.

In the spring of 1997, one-year-old maiden trees grafted on 'Tabel Edabriz' rootstock were planted 5 x 3 m apart in a randomized block design with ten replicates of two blocks of five trees each. After planting, double sectorial pruning was carried out (Brunner, 1972). Over the next few years, the trees were trained to have crowns with a central leader (Zahn, 1990). The experimental plot was not irrigated except for occasional sprinkler irrigation during the dry seasons of 1997 and 2003.

Health, vigor and productivity were monitored. Fruit quality was assessed on the basis of morphology, mean fruit weight, and total soluble solids content.

Results were elaborated by analysis of variance followed by Duncan's multiple range t-test at $P = 0.05$.

RESULTS AND DISCUSSION

When grafted on 'Tabel Edabriz', all of the cultivars grew well with no losses of trees except for 'Belge', which was by far the least vigorous. 'Duroni 3', 'Noire de Meched' and 'Burlat' had the highest increase in trunk cross-sectional area from 1997 to 2003, and 'Belge' by far the least (Tab. 1). This is consistent with earlier reports (Marti et al., 1998).

Harvest varied from June 3 to July 11, depending on year and cultivar. 'Burlat' ripened the earliest. 'Summit', 'Garnet', 'Stark Hardy Giant' and 'Duroni 3' ripened in mid-season. 'Belge', 'Noire de Meched' and 'Badacsony' ripened the latest.

The trees started bearing in 2000. 'Belge' consistently had very low yields. With the other varieties, yield varied significantly from year to year, although this was not reflected in the four-year cumulative yields (Tab. 2). In a trial of six cultivars in southern France, Edin et al. (1998) found that 'Burlat' and 'Badacsony' had the highest yields, and 'Duroni 3' the lowest. In western Poland, however, early-blooming, early-bearing 'Burlat' often had lower yields because of frequent spring frosts.

'Garnet' and 'Stark Hardy Giant' had the highest productivity indices, and 'Burlat' and 'Noire de Meched' had the lowest productivity indices (Tab. 2). Marti et al. (1998) had previously reported that 'Stark Hardy Giant' was more productive than 'Burlat' and 'Duroni 3'.

Mean fruit weight varied from 4.9 to 7.9 grams, depending on year and cultivar (Tab. 3). 'Duroni 3' had by far the highest four-year mean (8.1 g), and 'Burlat' the lowest (5.2 g). Edin's et al. (1998) had previously reported that, when grafted on 'Tabel Edabriz' rootstock, 'Duroni 3' and 'Badacsony' had larger fruits than 'Burlat'. Druart (1996)

Table 1. Vigor of eight sweet cherry cultivars on ‘Tabel Edabriz’ rootstock as expressed by trunk cross-sectional area (TCSA)

Cultivar	TCSA [cm^2] spring 1997		TCSA [cm^2] fall 2003		Increase in TCSA 1997-2003	
‘Badacsony’	1.5	b*	99.6	bc	98.0	bc
‘Belge’	0.8	a	60.2	a	59.4	a
‘Burlat’	1.1	a	103.9	c	102.9	c
‘Duroni 3’	1.6	b	117.3	c	115.7	c
‘Garnet’	1.6	b	79.0	ab	77.4	ab
'Noire de Meched’	1.5	b	114.6	c	113.1	c
‘Stark Hardy Giant’	1.7	b	81.7	b	80.0	ab
‘Summit’	1.7	b	82.4	b	80.7	ab

*Results followed by the same letter do not differ significantly at P = 0.05 according to Duncan’s t-test

Table 2. Yield and productivity index of eight sweet cherry cultivars on ‘Tabel Edabriz’ rootstock

Cultivar	Yield [kg per tree]								Productivity index [kg/cm^2]	
	2000		2001		2002		2003		Cumulative yield 2000-2003			
‘Badacsony’	2.0	a*	11.2	b	11.3	c	14.5	cd	38.9	b	0.39	bcd
‘Belge’	0.6	a	4.9	a	4.2	a	6.7	a	16.4	a	0.30	ab
‘Burlat’	2.9	ab	8.6	ab	10.0	bc	7.7	ab	29.2	b	0.28	a
‘Duroni 3’	7.3	cd	4.7	a	12.4	cd	12.7	bcd	37.1	b	0.33	abc
‘Garnet’	5.9	bc	8.2	ab	7.0	ab	17.3	d	38.4	b	0.48	d
‘Noire de Meched’	1.3	a	11.1	b	9.4	bc	10.4	abc	32.1	b	0.28	a
‘Stark Hardy Giant’	8.8	cd	11.8	b	3.7	a	12.4	bcd	36.7	b	0.44	d
‘Summit’	9.6	d	8.5	ab	6.4	ab	8.7	ab	33.2	b	0.41	cd

*Statistical analysis was calculated separately for each year. Results followed by the same letter do not differ significantly at P = 0.05 according to Duncan’s t-test

reported that fruit weight of ‘Garnet’ can be higher than 7 grams in better climatic conditions.

Total soluble solids content varied significantly from year to year (Tab. 3). ‘Garnet’ had the highest four-year mean of total soluble solids content (17.1%), and ‘Burlat’ the lowest (13.2%).

‘Tabel Edabriz’ is a good rootstock for sweet cherry production in western Poland. Of the cultivars tested, ‘Duroni 3’ is the most promising because of its large fruit size and high yield.

Table 3. Mean fruit weight and total soluble solids content of eight sweet cherry cultivars on 'Tabel Edabriz' rootstock

Cultivar	2000	2001	2002	2003	Mean 2000 – 2003
Mean fruit weight [g]					
'Badacsony'	7.1 d*	6.4 b	6.7 bc	5.9 abc	6.5 c
'Belge'	6.6 c	7.6 c	5.2 a	6.6 cd	6.5 c
'Burlat'	4.9 a	5.1 a	5.8 a	5.2 ab	5.2 a
'Duroni 3'	6.3 bc	9.8 d	8.2 d	7.9 e	8.1 e
'Garnet'	6.1 b	6.5 b	5.8 a	5.3 ab	5.9 b
'Noire de Meched'	7.1 d	6.6 b	6.6 b	7.6 de	6.9 d
'Stark Hardy Giant'	5.0 a	5.4 a	8.1 d	6.3 bc	6.2 bc
'Summit'	5.8 a	4.9 b	6.4 c	5.9 a	5.8 b
Total soluble solids content [%]					
'Badacsony'	17.0 e	13.6 bc	15.3 b	14.9 ab	15.2 c
'Belge'	15.5 d	13.3 bc	14.8 ab	16.8 c	15.1 c
'Burlat'	13.1 a	11.2 a	13.3 a	15.3 abc	13.2 a
'Duroni 3'	15.1 c	14.3 cd	14.1 ab	16.8 c	15.1 c
'Garnet'	20.0 f	15.1 d	13.4 a	20.0 d	17.1 d
'Noire de Meched'	16.9 e	13.0 b	14.9 ab	16.5 c	15.3 c
'Stark Hardy Giant/	15.0 c	11.4 a	14.8 ab	16.3 bc	14.3 b
'Summit'	14.0 b	11.2 a	13.5 ab	14.6 a	13.3 a

* For explanation, see Table 2

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WZROST, PLONOWANIE ORAZ JAKOŚĆ OWOCÓW OŚMIU ODMIAN CZEREŚNI NA PODKŁADCE ‘TABEL EDABRIZ’

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S T R E S Z C Z E N I E

Badania prowadzono w Stacji Doświadczalnej Akademii Rolniczej w Poznaniu w latach 1997-2003. Drzewa czereśni odmian ‘Badacsony’, ‘Belge’, ‘Burlat’, ‘Duroni 3’, ‘Garnet’, ‘Stark Hardy Giant’, ‘Noire de Meched’ oraz ‘Summit’ rosnące na podkładce ‘Tabel Edabriz’ oceniano pod względem żywotności, siły wzrostu, terminu dojrzewania owoców, obfitości plonowania, średniej masy owoców oraz zawartości ekstraktu w ich soku.

Najgorszą żywotnością, spośród badanych, wyróżniały się drzewa odmiany ‘Belge’. Drzewa odmian ‘Duroni 3’, ‘Noire de Meched’ oraz ‘Burlat’ rosły najsilniej. Najwyższy współczynnik plenności osiągnęły drzewa odmian ‘Garnet’ i ‘Stark Hardy Giant’. Największą średnią masę owocu stwierdzono u odmian ‘Duroni 3’, ‘Noire de Meched’, ‘Badacsony’ oraz ‘Belge’, a najwyższą zawartość ekstraktu w owocach odmiany ‘Garnet’.

Słowa kluczowe: czereśnia, siła wzrostu, plonowanie, jakość owoców