

CROPPING POTENTIAL OF DIFFERENT TYPES OF BEARING BRANCHES IN SWEET CHERRY UNDER THE CONDITIONS OF ČAČAK

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Abstract

The structure of one-year-old shoots on the tree and the share of generative and vegetative buds on different types of bearing branches was analyzed in six sweet cherry cultivars (Burlat, Sunburst, Lapins, Starking Hardy Giant, Durone Nero III and Early Van Compact) in the conditions of Čačak. The number of flower primordia in the generative buds on each category of the bearing branch was assessed during dormancy; the number of normal flowers was assessed at full bloom, and the fruit number on all types of bearing branches was assessed at ripening. On the basis of the data obtained, the coefficient of productivity was calculated, i.e. the realization of the cropping potential in the types of bearing branches studied.

1. Introduction

Under optimal conditions of growing, the cropping potential of a cultivar at a particular age depends on the type of organogenesis of the bearing wood and the predominant category of bearing branches. The type of organogenesis of bearing wood in stone fruit crops basically implies the time it takes for a vegetative bud to give rise to a bearing branch, and the dominant category of the bearing wood is primarily a cultivar-specific trait and is shown in the formation of a particular type of the bearing branch (Mičić and Đurić, 1994). However, the share of the individual categories of the bearing branches and their cropping potential can vary with the tree age and growing conditions (Isaeva, 1977), as well as with the rootstock used (Schaumberg and Gruppe, 1985; Kappel and Lichou, 1994).

The aim of this paper was to assess the realization of the cropping potential of all categories of bearing branches in six sweet cherry cultivars in the conditions of Čačak.

2. Materials and methods

Analyses were carried out in a collection sweet cherry orchard of the Fruit and Grape Research Centre in Čačak in 1995-1996. The cultivars Burlat, Starking Hardy Giant and Early Van Compact were planted in 1985, and Lapins, Sunburst and Nero III in 1987. All the cultivars were grafted on the *P. avium* seedling. During dormancy the structure of one-

year-old shoots was analysed on the two lower scaffold branches of the first order of branching (eastern and western sides) on 5 trees per cultivar, which were grouped as bearing branches and vegetative growths. The bearing branches are May bouquets, short fruiting branches (up to 10 cm in length) and long slender fruiting branches (over 10 cm in length), and the vegetative one-year-old growths include short shoots and long shoots. Thirty samples of all types of bearing branches were then collected from the trees and analyzed for the structure of buds along the nodes and the number of flower primordia in each generative bud by their opening under binocular. During the season, the number of normally developed flowers and the number of ripe fruits were assessed on 30 branches per each category of the bearing wood. The analyses were done in 1996, with no occurrence of spring frosts. The coefficient of productivity of all categories of bearing branches was calculated from the number of ripe fruits/number of flower primordia ratio.

3. Results and discussion

3.1. The share of one-year-old shoots on scaffold branches

In the total number of one-year-old shoots (Table 1), bearing branches predominate in all the cultivars evaluated, except for cv. Lapins, in which vegetative growth accounts for 52.4% of the total number of one-year shoots. In the structure of vegetative growth, the share of long shoots in all the cultivars evaluated was low, and therefore in the results all vegetative growths (short and long) were analyzed together. The cultivars Sunburst and Starking Hardy Giant had no long shoots in the overall structure of one-year growth, while with the other four cultivars the share of these shoots was below 0.8%.

3.2. The share of bearing branches and the number of vegetative and generative buds

In the total number of bearing branches, May bouquets are predominant in all the cultivars studied (Burlat - 75.49%; Sunburst - 60.85%; Starking Hardy Giant - 65.84%; Durone Nero III - 65.57% , and Early Van Compact - 67.25%), except for cv. Lapins which had approximately the same share of short fruiting branches and May bouquets (21.93% and 18.94%, respectively).

The average number of generative buds was lowest on May bouquets (Table 2) with all the cultivars studied (Burlat - 4.40; Sunburst - 3.56; Lapins - 1.56; Starking Hardy Giant - 3.73; Durone Nero III - 4.53; Early Van Compact - 4.93). The highest number of generative buds in cvs Burlat (6.33), Starking Hardy Giant (5.20) and Early Van Compact (6.96) was found on short fruiting branches, and in cvs Sunburst, Lapins and Durone Nero III on long slender fruiting branches (4.70, 3.03 and 6.93, respectively).

3.3. The number of floral primordia, flowers and fruits on the bearing branches and the coefficient of productivity

The average number of flower primordia on all categories of bearing branches was lowest in cv. Lapins (May bouquets - 4.44; short fruiting branches - 5.63 and long slender fruiting branches - 10.63), and highest in cv. Early Van Compact (May bouquets - 14.06; short fruiting branches - 19.26; long slender fruiting branches - 17.46) (Table 3). The average number of normal flowers was again lowest in Lapins with all three categories of

bearing branches (4.43; 5.46 and 7.33, respectively), and highest on May bouquets in cv. Starking Hardy Giant (10.06), on short fruiting branches in cv. Durone Nero III (15.46), and on long slender fruiting branches in cv. Early Van Compact (14.46) (Table 4). However, the order of cultivars according to the average number of ripe fruits on all bearing branches is different. Thus the highest number of ripe fruits on all bearing branches was recorded in cv. Burlat: May bouquets - 6.96; short fruiting branches - 7.46; long slender fruiting branches - 6.70, whereas the lowest number of ripe fruits on all bearing branches was found in cv. Durone Nero III: May bouquets - 2.13; short fruiting branches - 2.86; long slender fruiting branches - 2.96 (Table 5).

The coefficient of productivity in the individual categories of bearing branches, calculated as the number of ripe fruits/number of floral primordia on a branch, was presented in Table 6. In cv. Burlat the coefficient of productivity amounts to 0.67 for May bouquets; 0.54 for short fruiting branches and 0.65 for long slender fruiting branches, which means that on average every 2nd or 3rd flower primordium formed a fruit. Similar coefficients of productivity were observed in cv. Lapins (0.63; 0.66 and 0.41; respectively), but in this case the average number of generative buds on bearing branches should be considered (Table 2), which is lower in this cultivar than in the other five: May bouquets - 1.56; short fruiting branches - 2.26 and long slender fruiting branches - 3.03, as well as the overall structure of its one-year-old growth (Table 1). The coefficients of productivity in cvs Durone Nero III and Early Van Compact are exceptionally low, although they had the highest number of floral primordia per branch (Table 3).

The knowledge of the share of buds on branches and the branches in the crown, as well as of the coefficient of productivity of individual categories of bearing branches in a cultivar/rootstock combination under particular growing conditions is important for the proper application of cultural practices for establishing an optimal growth : cropping ratio.

References

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Table 1 - The structure of one-year-old shoots on scaffold branches

Cultivar	Bearing branches						Vegetative growth	
	May bouquets		Short fruiting branches		Long slender fruiting branches		%	± S%
	%	± S%	%	± S%	%	± S%		
Burlat	75.49	± 0.61	13.39	± 0.48	6.34	± 0.34	4.75	± 0.30
Sunburst	60.85	± 0.77	14.44	± 0.55	8.34	± 0.43	16.35	± 0.58
Lapins	18.94	± 0.88	21.93	± 0.93	6.72	± 0.56	52.4	± 1.12
Starking Hardy Giant	65.84	± 0.97	14.62	± 0.73	8.14	± 0.56	11.38	± 0.65
Durone Nero III	65.57	± 0.98	13.31	± 0.70	9.17	± 0.59	11.93	± 0.67
Early Van Compact	67.25	± 0.72	16.71	± 0.57	11.68	± 0.49	4.34	± 0.31

Table 2 - The average number of generative and vegetative buds on bearing branches

Cultivar	Fruit bearing branches											
	No. of generative buds					No. of vegetative buds						
	May bouquets		Short		Long slender		May bouquets		Short		Long slender	
	X	± Sx	X	± Sx	X	± Sx	X	± Sx	X	± Sx	X	± Sx
Burlat	4.40	± 0.22	6.33	± 0.29	5.03	± 0.33	1.03	± 0.03	1.66	± 0.17	5.23	± 0.37
Sunburst	3.56	± 0.21	4.33	± 0.22	4.70	± 0.19	1.10	± 0.05	3.00	± 0.17	5.80	± 0.21
Lapins	1.56	± 0.15	2.26	± 0.19	3.03	± 0.24	1.06	± 0.04	2.43	± 0.17	6.20	± 0.27
Starking Hardy Giant	3.73	± 0.21	5.20	± 0.33	4.70	± 0.23	1.03	± 0.03	2.30	± 0.21	6.83	± 0.31
Durone Nero III	4.53	± 0.23	5.56	± 0.19	6.93	± 0.26	1.10	± 0.05	2.30	± 0.21	6.83	± 0.31
Early Van Compact	4.93	± 0.29	6.96	± 0.27	6.60	± 0.35	1.00	± 0	1.46	± 0.16	8.00	± 0.37

Table 3 - The average number of flower primordia on bearing branches

Cultivar	Bearing branches					
	May bouquets		Short fruiting branches		Long slender fruiting branches	
	X	± Sx	X	± Sx	X	± Sx
Burlat	10.26	± 0.53	13.66	± 0.73	10.70	± 0.72
Sunburst	10.76	± 0.71	13.5	± 0.85	13.56	± 0.63
Lapins	4.46	± 0.39	5.63	± 0.49	10.63	± 0.67
Starking Hardy Giant	10.40	± 0.55	14.03	± 0.75	14.10	± 0.84
Durone Nero III	12.06	± 0.76	16.4	± 0.69	16.20	± 0.72
Early Van Compact	14.06	± 0.87	19.26	± 0.83	17.46	± 0.95

Table 4 - The average number of normal flowers on bearing branches

Cultivar	Bearing branches					
	May bouquets		Short fruiting branches		Long slender fruiting branches	
	X	± Sx	X	± Sx	X	± SX
Burlat	8.53	± 0.54	12.93	± 0.55	9.70	± 0.56
Sunburst	8.00	± 0.63	10.66	± 0.61	9.63	± 0.73
Lapins	4.43	± 0.41	5.46	± 0.53	7.33	± 0.63
Starking Hardy Giant	10.06	± 0.59	13.96	± 0.99	12.10	± 0.65
Durone Nero III	8.93	± 0.72	15.46	± 0.73	13.90	± 0.68
Early Van Compact	9.72	± 0.81	13.16	± 0.64	14.46	± 0.79

Table 5 - The average number of ripe fruits on bearing branches

Cultivar	Bearing branches					
	May bouquets		Short fruiting branches		Long slender fruiting branches.	
	X	± Sx	X	± Sx	X	± Sx
Burlat	6.96	± 0.43	7.46	± 0.39	6.70	± 0.46
Sunburst	5.30	± 0.46	4.58	± 0.33	4.53	± 0.32
Lapins	2.80	± 0.28	3.76	± 0.35	4.40	± 0.45
Starking Hardy Giant	3.56	± 0.27	5.66	± 0.47	4.03	± 0.40
Durone Nero III	2.13	± 0.21	2.86	± 0.30	2.96	± 0.27
Early Van Compact	2.73	± 0.34	3.43	± 0.33	3.76	± 0.41

Table 6 - Coefficient of productivity of bearing branches (number of ripe fruits/number of floral primordia)

Cultivar	Bearing branches		
	May bouquets	Short fruiting branches	Long slender fruiting branches
Burlat	0.67	0.54	0.65
Sunburst	0.49	0.34	0.33
Lapins	0.63	0.66	0.41
Starking Hardy Giant	0.35	0.40	0.28
Durone Nero III	0.17	0.17	0.18
Early Van Compact	0.19	0.17	0.21