

Investigation of Red and White Currant Varieties

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Abstract: The investigation was carried out over 2002-2005 at the Small Fruit Crops Department in Kostinbrod. It included six red currant varieties - Vierlanden rot (German), Jonkeer van Tets (Dutch), Heros (German), Red Lake (American), Versaillesy piro (unknown) and Krasnaya viksne (Latvian) and one white currant variety - White Versailles (French).

Most of the studied varieties had clusters of medium size, Red Lake being the only one having long clusters. Heros, Krasnaya viksne and Red Lake formed the largest number of blossoms and berries per cluster while Versaillesy piro formed the smallest number. As regards berry size and weight, all of the varieties may be classified as medium-sized, having the average weight of 0.59 g – 0.69 g. The average weight of the berries of Red Lake was close to that of the large-size ones.

Key words: red and white currant, variety study.

Introduction

As compared to the rest of the small fruit crops, the red currant is among the ones with the smallest berries. It has been given great attention due to its rich biochemical composition. The favourable combination of vitamins, sugars, organic acids and bioactive components determines the high nutritious importance of the red currant used as processed or fresh food.

Berry weight and berry number per cluster are main yield-affecting components. Intensified selection has resulted in an increase in the size of berries from 0.4 g (Shtedraya, Holandsko Cherveno) to 0.8 g (Red Lake, Laxton Perfection) (Ravkin *et al.* 1987, Golyaeva 2002). The negative correlation between the berry weight and fertility is used to determine the indications of the rest of the parameters (numbers of shoots, clusters, berries) (Kravtseva and Danilina 1972). The varieties with medium-length and long clusters have been given preference. According to Ogoltsova (1988), long clusters form more berries and, hence, higher yields are achieved. Rondon and Rote Spetlese have long clusters (7-10 cm), more blossoms

and about 20-25 berries per cluster. These varieties create the basis for the selection of new ones (Buchter 2002).

In Bulgaria, the red currant is cultivated generally by amateur fruit-growers. Upland regions with cool climate are the most favourable for red currant growing. High temperatures and insufficient humidity, in contrast, are limiting factors in the said cultivation.

The objective of the present investigation is to identify the varieties that are most suitable for cultivation under the existing climatic conditions and to recommend them, thereafter, to farmers and fruit-growers.

Materials and Methods

The investigation has been carried out at the Small Fruit Crops Department in Kostinbrod. It includes six red currant varieties - Vierlanden rot (German), Jonkeer van Tets (Dutch), Heros (German), Red Lake (American), Versailles piro (unknown) and Krasnaya viksne (Latvian) and one white currant variety - White Versailles (French). Soil type is chernozem with low acid to neutral pH (5,5 – 6,5) and the altitude is 560 m. The bushes have been established in 2.50 m x 0.80 m rows. Adopted technology of cultivation without irrigation has been used in the experimental orchard.

The methods employed include the Methods for studying the vegetative resources of fruit plants (Nedev *et al.* 1979) and Methods for conducting variety experiments on black currant for biological and economic characteristics (Boicheva *et al.* 2003).

The data on the quantitative characteristics have been statistically analyzed by Genchev *et al.* (1975). The average values (M), the standard errors (m), the coefficient of variation (CV %) and the index of accuracy (P %) have been used. The error of the trial has been estimated using the index of accuracy P % at level of significance $P \% = 5$. The data on each variety have been processed by χ^2 test in order to establish their homogeneity, enabling the data to be completed as a set of 20 replications.

Results and Discussions

Grown under specific climatic conditions of Kostinbrod region, the studied red and white currant varieties do not show their full potential in terms of major economic characteristics. This is due to higher summer temperatures, low humidity and insufficient soil moisture in the summer season.

Berries of red currant varieties are harvested by picking the very clusters. Hence the importance of cluster length (Table 1).

Cluster length varies from 4.05 cm (White Versailles) to 6.15 cm (Red Lake). Low variation coefficients (VC %) testify to the characteristic stability ranging from 2.05 % (Red Lake) to 17.18 % (Heros), supported by P % indications. Red Lake and White Versailles exhibit a minor variability, the variation being higher in Heros (17.81 %).

White Versailles (4.05 cm), a white currant variety, and Jonkher van Tets (4.68 cm) produce the shortest clusters while Red Lake has the longest ones. As regards the cluster length, White Versailles, Jonkher van Tets, Versaillesy piro, Vierlanden rot, Heros and Krasnaya viksne have medium-long clusters and Red Lake has longer ones.

Tab. 1. Main statistical indicators of cluster length of red and white currant varieties (2002-2005)

Variety	Average standard errors (M±m), (cm)	Coefficient of variation (VC), %	Amplitude min-max	Index of accuracy (P), %
Vierlanden rot	4.76±0.15	6.23	3.89-5.19	3.11
Jonkheer van Tets	4.68±0.24	9.95	3.75-6.04	4.97
Vesaillesy piro	4.56±0.20	8.65	3.91-5.69	4.28
Red Lake	6.15±0.07	2.05	5.80-6.40	1.02
Heros	5.73±0.51	17.81	4.09-8.63	8.91
Krasnaya viksne	4.85±0.08	3.37	4.70-5.28	1.68
White Versailles	4.05±0.05	2.47	3.80-4.29	1.23

Productivity is dependent on the bud formation capacity of the plant (Table 2).

Tab. 2. Main statistical indicators of the number of blossoms per cluster in red and white currant varieties (2002-2005)

Variety	Average standard errors (M±m) (number)	Coefficient of variation (VC), %	Amplitude min-max	Index of accuracy (P), %
Vierlanden rot	10.62±0.07	1.18	10.70-12.44	0.59
Jonkheer van Tets	11.58±0.36	6.17	9.60-12.88	3.09
Vesaillesy piro	10.46±0.82	15.64	8.56-15.34	7.82
Red Lake	13.22±0.36	5.45	11.52-14.75	2.72
Heros	13.86±0.35	5.07	12.2-15.16	2.53
Krasnaya viksne	13.79±0.56	8.06	10.72-16.0	4.03
White Versailles	11.31±0.54	9.53	9.20-14.0	4.76

The data reveal insignificant variety differences in relation to the number of blossoms. Heros (13.86), Krasnaya viksne (13.79) and Red Lake (13.22) have the highest concentration of blossoms, the lowest one being registered with Versaillesy piro (10.46). Throughout the research years, the amplitude varies from 9.20 blossoms (White versaillese) to 16.0 blossoms (Krasnaya viksne). The registered maximum of 16 blossoms is evidence of higher potential of the variety. The lowest potential is that of Jonkheer van Tets and White Versailles (9.60 and 9.20, respectively).

Versaillesy piro (10.46), Vierlanden rot (10.62), White Versailles (11.31) and Jonkheer van Tets (11.58) produce relatively few blossoms per cluster.

The low variation coefficients ranging from 1.18 % (Vierlanden rot) to 15.64 (Versaillesy piro) show an insignificant trait variability and evidence the stability of the studied varieties. The analysis of the varieties reveals close indications regarding the blossom number per cluster (ranging from 10 to 15 over the years of study).

The number of berries per cluster is of high importance for the yield. The studied varieties differ in the berry number per cluster (Table 3).

Tab. 3. Main statistical indicators of the number of berries per cluster in red and white currant varieties (2002-2005)

Variety	Average standard errors (M±m), (number)	Coefficient of variation (VC), %	Amplitude min-max	Index of accuracy (P) %
Vierlanden rot	6.40±0.41	12.63	5.00-8.60	6.31
Jonkheer van Tets	7.84±0.50	12.76	5.40-10.30	6.38
Versaillesy piro	7.03±0.50	11.94	5.68-9.37	5.97
Red Lake	8.60±0.36	8.26	6.56-9.64	4.13
Heros	10.10±0.49	9.72	7.70-12.30	4.86
Krasnaya viksne	9.01±0.41	8.94	7.08-11.00	4.47
White Versailles	7.30±0.40	10.83	5.90-9.20	5.41

Low variation coefficients (VC%) ranging from 8.26 % (Red Lake) to 12.76% (Jonkheer van Tets) and good reliability indications (P%) serve as evidence of the slight trait variability and stability of the varieties over the research years. The highest number of berries per cluster is given by Heros (10.10), followed by Krasnaya viksne (9.01) and Red Lake (8.6), as opposed to Vierlanden rot (6.4) and Versaillesy piro (7.03). The maximum values reached in some research years – 12.3 (Heros), 11.0 (Krasnaya viksne) and 10.30 (Jonkheer van Tets) – suggest higher potential of the varieties studied.

Vierlanden rot, Versaillesy piro and White Versailles produce fewer berries per cluster.

The analysis reveals the predominance of the varieties having a medium number of berries (5-10), Heros being the only one producing a comparatively higher number of berries, i.e. over 10.

Average weight is a component that makes up the yield. The average weight of berries is genetically determined and is dependent on climatic conditions. Large-sized berry varieties (0.7-1.0 g) are given preference (Table 4).

The studied varieties of different origin, grown without irrigation over the years characterized by relatively similar climatic conditions exhibit a low variation in the berry weight, ranging from 0.50 to 0.69 g. This is evidence of both the trait stability and the preserved individuality of the varieties. Vierlanden rot (1.47 %) and Krasnaya viksne (1.72 %) show low berry weight variations (VC%). The rest of the varieties also have low variation coefficients (4.31 %-7.02 %).

Tab. 4. Main statistical indicators of the average weight of berries of red and white currant varieties (2002-2005)

Variety	Average standard errors ($M \pm m$), (g)	Coefficient of variation (VC), %	Amplitude min-max	Index of accuracy (P), %
Vierlanden rot	0.62 $\pm$ 0.01	1.47	0.59 - 0.64	0.74
Jonkheer van Tets	0.67 $\pm$ 0.02	4.31	0.62 - 0.76	2.15
Versaillesy piro	0.67 $\pm$ 0.01	4.31	0.62 - 0.70	2.15
Red Lake	0.69 $\pm$ 0.02	4.18	0.64 - 0.73	2.09
Heros	0.65 $\pm$ 0.03	7.02	0.56 - 0.77	3.51
Krasnaya viksne	0.53 $\pm$ 0.00	1.72	0.51 - 0.56	0.86
White Versailles	0.50 $\pm$ 0.01	5.77	0.45 - 0.59	2.89

The average weight ranges from 0.50 g (White Versailles) to 0.69 g (Red Lake). The smallest berries are produced by White Versailles, followed by Krasnaya viksne (0.53 g). Large-sized berries of 0.7 g are not produced by any of the studied varieties. In fact, all of the varieties have small-sized berries, the weight thereof ranging from 0.50-0.70 g. In certain years of study, Heros, Jonkheer van Tets, Red Lake and Versaillesy piro produce larger berries of 0.77g, 0.76g, 0.73 g and 0.70 g, respectively, evidencing their higher potential associated with the berry weight and size. In the region of Kostinbrod, the varieties fail to show their full capacity regarding the above characteristic (berry weight and size) due to lower humidity and higher summer temperatures. During cooler and humid spring-summer season, Red Lake, Heros, Jonkheer van Tets and Versaillesy piro produce impressively larger berries of 0.7-0.8 g, thus showing their higher potential.

Overall, as regards berry weight and size, the studied red and white currant varieties may be characterized as small-sized (0.50-0.69 g). However, the varieties of small and medium sized berries have high fertility levels. This fact defines the role of the rest of the parameters associated with the yield formation.

Conclusion

The average weight of berries ranges from 0.50 g to 0.69 g. Most of the studied varieties have medium-sized berries of 0.50 g – 0.70 g, Red Lake being the only one producing large-sized berries.

Regarding the cluster length, White Versailles, Jonkheer van Tets, Vierlanden rot, Versaillesy piro, Krasnaya viksne and Heros have medium clusters while Red Lake produces long ones. Our attention is to be focused on the varieties having 6-10 cm long clusters as they produce more fruits and consequently increase the yield.

Heros (13.86), Krasnaya viksne (13.79) and Red Lake (13.22) form the largest number of blossoms per cluster as opposed to Versaillesy piro (10.46) giving the smallest number.

The largest number of berries per cluster are formed by Heros (10.10) followed by Krasnaya viksne (9.01) and Red Lake (8.60) and the smallest number by Vierlanden rot (6.40) and Versaillesy piros (7.03).

The varieties Red Lake, Krasnaya viksne and Jonkheer van Tets exhibit the most favourable combination of the following parameters: cluster length, berry number and average weight.

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ISPITIVANJE SORTI CRVENE I BELE RIBIZLE

- originalni naučni rad -

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Rezime

Istraživanje je izvršeno u periodu od 2002-2005. godine u Odseku za proučavanje jagodičastog voća u Konstinbrodu. Ispitano je šest sorti crvene ribizle - Vierlanden rot (poreklom iz Nemačke), Jonkeer van Tets (poreklom iz Holandije), Heros (poreklom iz Nemačke), Red Lake (poreklom iz Amerike), Versaillesy piros (nepoznatog porekla) i Krasnaya viksne (poreklom iz Litvanije) i jedna sorta bele ribizle - White Versailles (poreklom iz Francuske).

Većina proučavanih sorti imala je grozdove srednje veličine, a samo je sorta Red Lake imala krupne grozdove. Sorte Heros, Krasnaya viksne i Red Lake formirale su najveći broj cvetova i bobica po grozdu, a sorta Versaillesy piros najmanji. U pogledu veličine i težine bobica, sve sorte mogu se uvrstiti u grupu sorti srednje veličine bobica, čija je prosečna težina iznosila 0,59 g-0,69 g. Prosečna težina bobica sorte Red Lake bila je približna prosečnoj težini krupnih bobica.