

## A Study of Red and White Currant Varieties

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### Abstract

This study was carried out during 2002-2005 at the Small-Fruit Department in Kostinbrod. The objective of the investigation was to determine the effect of climate on shoot growth, flower cluster formation, berry drop, and yield of six red currant varieties and one white currant variety – Vierlanden rot, Jonkheer van Tets, Versailles piro, Red lake, Heros, Krasnaya viksne and White Versailles. The variability of the varieties was evaluated. These varieties have been characterized as having a mid to high percentage of stable berries, those which do not drop off before harvest (60.00 % for White Versailles - 82.25 % for Krasnaya viksne). The number of basal shoots varied from 10.5 (White Versailles) to 18.7 (Krasnaya viksne) and the number of clusters, from 24.8 to 74.3. Krasnaya viksne, Jonkheer van Tets, Vierlanden rot and Red Lake formed the greatest number of clusters. Krasnaya viksne, Jonkheer van Tets and Red Lake were the most fruitful varieties in the existing climatic conditions.

**Keywords:** red and white currant, variety, yield, clusters, basal shoots, stable berries

### Introduction

For production of untraditional species such as red and white currant the choice of suitable varieties is very important. Red currant variety resources are poorer than black currant ones, and this makes the choice of variety very limited. Red currant has higher yield potential than black currant (Titova, 1996; Shestopal, 1998; Georgiev, 2006), from 74.4 -centner/ha to 148.6 -centner/ha (Titova, 1996; Golyaeva, 2002). The number of basal shoots and the clusters as well as the berry drop are the components responsible for the yield. Climate and variety are the main factors influencing berry yield (Bayanova, 1998).

A collection of red and white currant varieties established and maintained in Bulgaria allows a study of the factors influencing yield. The results of this characterization would be of great benefit for the recommendation of some varieties for specific geographical regions.

### Materials and methods

The investigation was carried out during 2002-2005 at the Small Fruit Department in Kostinbrod at an altitude of 560 m. Six red currant varieties and one white currant variety were included in experiments - Vierlanden rot (German), Jonkheer van Tets (Dutch), Heros (German), Red Lake (American), Versailles piro (unknown) Krasnaya viksne (Latvian), and White Versailles (French). The soil type is a vertisols with low acid reaction (pH – 5.5-6.5). The plants were established in rows 2.5 x 0.8 m. The field is not irrigated area with production technologies common for black currant. Methods for studying fruit crops (Nedev

et al., 1979) and for conducting variety comparisons of black currant for biological and economic characteristics (Boicheva et al., 2003) were used. The data concerning the quantitative characteristics was 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 ( $P\%$ ) were used. The error of the trial was estimated using the index of accuracy  $P\%$  at level of significance  $P\% = 2$ . The data of each variety was processed by  $\chi^2$  test in order to establish their homogeneity. This allowed the data to be completed as a set of 20 replications.

### Results and discussion

One of the reasons for lower yield of red current during some years is the sensitivity of blossoms and young berries to unsuitable climate conditions. As a result significant blossom and berry drop have been observed.

The average percent stable berries varied from 60.0% (White Versailles) to 82.25% (Krasnaya viksne) (Table 1). All of the varieties had an acceptably high percent of stable berries. The low variation coefficients ( $CV\%$ ) (2.69 - 5.86%) indicated a low variability over years, confirming trait stability. There was a low amplitude in variation also. The observed variety differences were not significant.

Berry drop is due not only to variety-dependent genetic differences but also to climatic conditions during bloom, fruit set and growth of the fruit. Yield is the most important biological outcome.

The average yield for the period varied from 1.25 kg/bush (White Versailles) to 2.66 kg/bush (Krasnaya viksne). The differences between varieties are more than 2-fold. The

Table 1 Main statistical indicators, characterizing berries remaining (stable berries) after drop (%) for red and white currant varieties

Variety	Average values $\pm$ standard errors (M $\pm$ m) %	Coefficient of variation (CV) %	Amplitude (min-max)	Index of accuracy (P) %
Vierlanden rot	69.25 $\pm$ 1.30	5.26	58.0-72.0	2.63
Jonkheer van Tets	63.25 $\pm$ 1.32	4.17	52.0-70.0	2.08
Vesaillesy piro	76.5 $\pm$ 1.03	2.69	72.0-82.0	1.35
Red Lake	75.75 $\pm$ 1.85	5.52	65.0-79.0	2.76
Heros	73.50 $\pm$ 1.30	4.20	67.0-79.0	2.10
Krasnaya viksne	82.25 $\pm$ 1.08	2.70	76.0-86.0	1.35
White Versailles	60.00 $\pm$ 2.01	5.86	53.0-65.0	2.93

Table 2 Main statistical indicators, characterizing yield per bush (kg) for red and white currant varieties

Variety	Average values $\pm$ standard errors (M $\pm$ m) kg	Coefficient of variation (CV) %	Amplitude (min-max)	Index of accuracy (P) %
Vierlanden rot	1.919 $\pm$ 0.24	22.40	1.100-2.463	11.25
Jonkheer van Tets	2.323 $\pm$ 0.26	22.31	1.200-3.356	11.16
Vesaillesy piro	1.401 $\pm$ 0.24	33.50	0.300-2.533	16.75
Red Lake	2.231 $\pm$ 0.23	20.81	1.180-3.250	10.40
Heros	1.908 $\pm$ 0.35	36.48	0.750-3.930	18.24
Krasnaya viksne	2.661 $\pm$ 0.43	32.38	1.265-4.900	16.19
White Versailles	1.250 $\pm$ 0.13	20.80	0.800-2.000	10.40

variation coefficients (CV %) are between 20.8% (White Versailles) to 36.48% (Heros), indicating Heros is most sensitive to soil moisture availability. The variability among the rest of the varieties was evidence for the fact that they also were influenced by climatic conditions. Based on yield varieties can be grouped as follows: unsatisfactory fruitfulness - White Versailles and Versaillesy piro; medium fruitfulness - Vierlanden rot and Heros; good fruitfulness Jonkheer van Tets and Red Lake; very high fruitfulness Krasnaya viksne. Krasnaya viksne was more productive than the variety which is widely spread across Europe - Jonkheer van Tets. In certain years some varieties (Jonkheer van Tets, Red Lake and Heros) had very high yields up to 4.900 kg/bush for Krasnaya viksne. It is evident that this variety has high yield potential under suitable climatic conditions. The unsatisfactory fruitfulness

of Versaillesy piro and White Versailles was probably due to their genetic characteristics. They form a smaller number of clusters per stem and White Versailles forms a small number of fruitful shoots.

The average yield per bush indicated that the best combinations of factors that result in a high yield were observed for Krasnaya viksne and Jonkheer van Tets.

The test varieties formed differing numbers of shoots.

Krasnaya viksne (18.67) and Jonkheer van Tets (15.67) have the greatest number of basal shoots compared by the rest of the studied investigated varieties (Table 3). Low variability of this trait was observed, from 11.54% (Versaillesy piro) to 22.03% (Red Lake). The highest variation in the number of shoots were noted with Red Lake (22.03%) followed by White Versailles (21.82%), demonstrating a greater dependence on growth conditions. This

Table 3 Main statistical indicators, characterizing number of basal shoots for red and white currant varieties

Variety	Average values $\pm$ standard errors (M $\pm$ m)	Coefficient of variation (CV) %	Amplitude min-max	Index of accuracy (P) %
Vierlanden rot	14.00 $\pm$ 1.33	16.50	10.00-18.00	9.54
Jonkheer van Tets	15.67 $\pm$ 1.20	13.95	13.00-20.00	8.06
Vesaillesy piro	12.53 $\pm$ 0.84	11.54	10.00-15.00	6.67
Red Lake	12.50 $\pm$ 1.59	22.03	9.50-15.00	12.73
Heros	11.83 $\pm$ 0.95	13.88	9.50-15.0	8.02
Krasnaya viksne	18.67 $\pm$ 1.87	17.39	15.0-25.0	10.05
White Versailles	10.50 $\pm$ 1.32	21.82	7.50-15.0	12.61

Table 4 Main statistical indicators, characterizing number of clusters on basal shoots for red and white currant varieties

Variety	Average values $\pm$ standard errors (M $\pm$ m)	Coefficient of variation (CV) %	Amplitude min-max	Index of accuracy (P) %
Vierlanden rot	54.87 $\pm$ 3.70	11.66	44.0-66.2	7.74
Jonkheer van Tets	66.73 $\pm$ 6.32	16.38	45.5-82.0	9.47
Versaillesy piro	24.80 $\pm$ 1.68	11.73	19.0-28.2	6.78
Red Lake	50.33 $\pm$ 3.97	13.67	42.0-64.0	7.90
Heros	42.9 $\pm$ 6.83	27.57	24.5-65.0	15.94
Krasnaya viksne	74.33 $\pm$ 6.81	15.86	51.0-89.0	9.17
White Versailles	26.2 $\pm$ 1.33	8.82	21.6-29.0	5.09

may have been due to the greater pruning of the bushes during one of the years of the study (2002). The number of basal shoots varied from 10.5 (White Versailles) to 18.67 (Krasnaya viksne). The range in amplitude is comparatively wide, from 7.5 (White Versailles) to 25.0 (Krasnaya viksne). Krasnaya viksne had the greatest number of basal shoots.

The results demonstrated a strong dependence on genetic variation among varieties and response to agricultural techniques. Increasing the number of clusters on basal shoots is a possible means to enhancing yield. The test varieties differed in the cluster number on a basal shoot (Table 4). The variation was lowest and stable for White Versailles (8.82%) while Heros (27.57%) had the highest variation. For other varieties the CV was comparatively low.

The average number of clusters on fruitful shoots varied from 24.80 (Versaillesy piro) to 74.33 (Krasnaya viksne). Versaillesy piro (24.80) and White Versailles (26.20) formed the smallest number of clusters and their low variability showed their limited potential. Krasnaya viksne (74.33) and Jonkheer van Tets (66.73) have the greatest number of clusters a shoot.

Krasnaya viksne, Jonkheer van Tets, and Red Lake are the varieties that formed the greatest number of clusters per shoot.

### Conclusions

The red and white currant varieties in this study had a medium to high percent of stable berries (60.0%-82.25%), with Krasnaya viksne (82.25%), Versaillesy piro (76.50%) and Red Lake (75.75%) showing the greatest percentage of stable berries. The number of fruitful shoots is medium (10.5) to high (18.67) and the number of clusters on them varied from 24.80 to 74.33.

The varieties Krasnaya viksne and Jonkheer van Tets gave the highest yield under the production and climatic

conditions of the study, and they can be suggested for enriching the variety list for commercial potential.

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