

BIOLOGICAL CHARACTERIZATION OF THE PLUM CULTIVARS 'GABROVSKA' AND 'GOULYAEVA'

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A B S T R A C T

From 1995 to 2003, two new Bulgarian plum cultivars, 'Gabrovska' and 'Goulyaeva', were evaluated at the Plum Experimental Station in Dryanovo, Bulgaria. The cultivar 'Stanley', which is widely grown in Bulgaria, was used as the standard.

'Gabrovska' had an average yield of 22.6 tons per hectare, and 'Goulyaeva' had an average yield of 18.4 tons per hectare. Both cultivars grow vigorously and form large crowns. They bear delicious, very high quality fruits with a higher soluble solids content and sugar content than 'Stanley'. In addition, 'Goulyaeva' is resistant to drought. Both cultivars are resistant to the *Plum Pox Virus*, *Monilinia laxa* and *Monilinia fructigena*. Both cultivars can be recommended for commercial production in Bulgaria.

Key words: Plum, cultivars, blossoming, growth, yield

INTRODUCTION

The plum is a traditional fruit crop in Bulgaria, and is surpassed only by the apple in terms of the number of established orchards.

The main goal of plum breeding programs in Bulgaria is to develop varieties which produce abundant yields even in the poor soils characteristic for the mountainous regions of the country (Kumanova et al., 1991; Vitanova and Ivanova, 1995).

The most widely grown plum cultivars in Bulgaria are 'Stanley' and 'Kjustendilska sinia sliva'. Recently, there has been a trend to plant new orchards with 'Stanley' (Djouvinov and Vitanova, 2000). However, this limits the variety of plums available on the market. Plum supply is high when

'Stanley' ripens, but is low at other times of the year. Diversifying the plum stock in Bulgaria will ensure ample supplies over a longer period, while providing plums suited for various special uses such as eating fresh, drying, and compote, jelly, jam, marmalade and brandy production.

Two new cultivars, 'Gabrovska' and 'Goulyaeva', were developed by M. Vitanov and P. Marinov at the Plum Experimental Station in Dryanovo by crossing 'Kjustendilska sinia sliva' with 'Monfort'. They were bred to produce abundant yields even in the poor soils characteristic for the mountainous regions of the country.

'Gabrovska' ripens at the beginning of August, and 'Goulyaeva' ripens in the middle of August (Vitanov, 1977). Although 'Gabrovska' is sensitive to drought, 'Goulyaeva' is highly resistant to drought. Both cultivars are resistant to the *Plum Pox Virus*, *Monilinia laxa* and *Monilinia fructigena*.

'Gabrovska' is grown in other countries, especially the Czech Republic, where it makes up 10% of the plum stock in the cooler regions of the country (Krska, 2000).

The aim of this study was to evaluate growth and fruit quality in 'Gabrovska' and 'Goulyaeva' in Bulgaria over an eight year period.

MATERIAL AND METHODS

From 1995 to 2003, two new Bulgarian plum cultivars, 'Gabrovska' and 'Goulyaeva', were evaluated at the Plum Experimental Station in Dryanovo in the Central Balkan Massif, the main plum growing region in Bulgaria. The cultivar 'Stanley', which is widely grown in Bulgaria, was used as the standard.

In the spring of 1990, sixteen trees of each cultivar grafted on Myrobalan rootstock were planted 5 x 7 meters apart in a pseudopodzolic gray forest soil. Myrobalan is a *Prunus cerasifera* Ehrh. seedling rootstock. The trees were trained with free growing crowns, and were treated with the same agrotechnical methods without the use of irrigation.

The following data were recorded: beginning, end and duration of the full blossoming period, blossoming intensity, crown volume, trunk cross-sectional area, angle of skeletal branches, yield, average fruit weight, average stone weight, and stone to fruit ratio. Soluble solids content, glucose content, fructose content, sucrose content and organic acids content were also measured.

Blossoming intensity was recorded on a scale from 1 to 5, where 5 equals very intense blossoming.

Fruit parameters were recorded as the average for three kilograms of fruit from each tree.

Soluble solids content was determined by refractometry. Glucose content and sucrose content were measured by Bertran's method. Fructose content

was measured by Kolthoff's method. Organic acids content was measured by titration with 0.1 N NaOH.

RESULTS

'Gabrovska' and 'Goulyaeva' both blossomed early, at the same time as 'Stanley'. The duration of the blossoming period was six days for 'Gabrovska', eight days for 'Goulyaeva', and seven days for 'Stanley'. Blossoming in all three cultivars was very intense (Tab. 1).

Table 1. Blossoming in the plum cultivars 'Gabrovska', 'Goulyaeva' and 'Stanley'

Cultivar	Beginning of full blossoming		End of full blossoming		Duration of blossoming	Intensity of blossoming
	x	±Sx	x	±Sx		
'Gabrovska'	April 20	10.9	April 25	11.5	6 days	5.0
'Goulyaeva'	April 19	9.8	April 26	10.8	8 days	5.0
'Stanley'	April 20	9.2	April 26	9.8	7 days	5.0

Results for crown volume, trunk cross-sectional area, and angle of skeletal branches are presented in Table 2.

Table 2. Tree size and angle of the skeletal branches in the plum cultivars 'Gabrovska', 'Goulyaeva' and 'Stanley'

Cultivar	Crown volume [m ³]	Trunk cross-sectional area [cm ²]	Angle of skeletal branches
'Gabrovska'	25.4	177	46 ⁰
'Goulyaeva'	27.8	190	46 ⁰
'Stanley'	21.6	166	47 ⁰

'Gabrovska' and 'Goulyaeva' had higher crown volumes and higher trunk cross-sectional areas than 'Stanley'. This agrees with a previous study, in which 'Gabrovska' and 'Goulyaeva' grew more vigorously than 'Stanley' (Vitanova et al., 1998).

The angle of skeletal branches in both 'Gabrovska' and 'Goulyaeva' was 46°, about the same as 'Stanley'. The branches were well attached and did not break under the weight of the fruit.

Both 'Gabrovska' and 'Goulyaeva' had very high yields (Tab. 3). Average annual yield was 22.6 tons/ha for 'Gabrovska', and 18.4 tons/ha for 'Goulyaeva'. This compares favourably with 'Stanley', which had an average annual yield of 18.4 tons/ha. 'Goulyaeva' was also drought resistant. During

the severe summer drought of 2003, when rainfall in June and July was very low, 'Goulyaeva' had a yield of 2.2 tons/ha.

Table 3. Mean yield and physical properties in the plum cultivars 'Gabrovska', 'Goulyaeva' and 'Stanley'

Cultivar	Yield [t/ha]	Mass of fruit [g]	Mass of stone [g]	Stone to fruit ratio [%]
'Gabrovska'	22.5	28.7	1.0	3.31
'Goulyaeva'	18.4	26.4	1.1	4.16
'Stanley'	18.4	32.8	1.6	4.88

Both 'Gabrovska' and 'Goulyaeva' had medium to large fruits (Tab. 3). Average fruit weight was 28.7 g for 'Gabrovska', and 26.4 g for 'Goulyaeva', lower than for 'Stanley', which had an average fruit weight of 32.8 g.

The stones of 'Gabrovska' and 'Goulyaeva' were smaller than the stones of 'Stanley' (Tab. 3). Stone to fruit ratio was 3.3% for 'Gabrovska', and 4.2% for 'Goulyaeva', lower than for 'Stanley', which had a stone to fruit ratio of 4.9%. The stone separates easily from the flesh in both 'Gabrovska' and 'Goulyaeva'.

Soluble solids content was 19.2% for 'Gabrovska', and 18.9% for 'Goulyaeva', which is significantly higher than for 'Stanley', which had a soluble solids content of 17.2%.

Glucose content was 3.82% for 'Gabrovska', and 4.18% for 'Goulyaeva', higher than for 'Stanley'.

Fructose content was 3.66% for 'Gabrovska', and 3.53% for 'Goulyaeva', higher than for 'Stanley'.

Sucrose content was 4.02% for 'Gabrovska', and 3.45% for 'Goulyaeva', higher than for 'Stanley'.

Organic acids content was 0.85% for 'Gabrovska', and 1.15% for 'Goulyaeva', higher than for 'Stanley'.

Both 'Gabrovska' and 'Goulyaeva' were resistant to the *Plum Pox Virus*, which caused only minor damage to the base of one or two branches and did not damage the fruits. Both 'Gabrovska' and 'Goulyaeva' were resistant to *Monilinia laxa* and *Monilinia fructigena* during the course of the trial.

DISCUSSION AND CONCLUSIONS

'Gabrovska' and 'Goulyaeva' are self-sterile, and need a pollinator. Fortunately, they blossom at the same time as 'Stanley', one of the most widely grown plum cultivars in Bulgaria. Our results on the blossoming

period in 'Gabrovska' and 'Goulyaeva' agree with earlier reports (Vitanov, 1983; Vitanova et al., 1998).

'Gabrovska' and 'Goulyaeva' grow vigorously and form large crowns. This has to be taken into account when laying out new orchards.

'Gabrovska' and 'Goulyaeva' have very high yields. In addition, 'Goulyaeva' is drought resistant and can be recommended for commercial production in more arid areas.

'Gabrovska' and 'Goulyaeva' bear delicious, very high quality fruit with a high soluble solids content, sugar content and organic acids content. Fruit quality in 'Gabrovska' and 'Goulyaeva' is superior to fruit quality in 'Stanley'.

The new plum cultivars 'Gabrovska' and 'Goulyaeva' can be recommended for commercial plum cultivation in the Central Balkan Massif in Bulgaria.

REFERENCES

- Djouvinov V., Vitanova I. 2000. Production, processing and marketing of plums in Bulgaria, Intern. Sci. Symp. Production, processing and marketing of plums and plum products, September 9 to 11, Kostunici, Yugoslavia, p. 18.
- Krska B. 2000. Plum production in the Czech Republic, Intern. Sci. Symp. Production, processing and marketing of plums and plum products, Kostunici, Yugoslavia, 9-11 September, pp. 19-20.
- Kumanova P., Vitanova I., Grozdin A. 1991. State and trends in the development of plum growing. ECON. MANAG. AGRIC. 1-8: 106-115.
- Vitanov M. 1977. Genetic investigations concerning *Prunus domestica* L., cultivar hybridisation. Bulg. Sci. Acad., Sofia, pp. 107-141.
- Vitanov M. 1983. Investigations on the effective period of pollination and on the fertility of plum (*Prunus domestica* L.) cultivars. HORT. VITICUL. SCI. 6: 23-34.
- Vitanova I., Ivanova D. 1995. Trends in the development in plum growing. AGRIC. SCI. 2-3: 5-6.
- Vitanova I., Ivanova D., Dimkova S. 1998. Some biological characteristics of selected plum cultivars. ACTA HORT. 478: 305-308.

CHARAKTERYSTYKA BIOLOGICZNA ŚLIWY ODMIAN 'GABROVSKA' I 'GOULYAEVA'

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

Śliwy hodowli bułgarskiej 'Gabrovska' i 'Goulyaeva' ze Stacji Doświadczalnej Dryanovo badano w latach 1995-2003. Drzewa tych odmian są bardzo plenne. Średni plon odmiany 'Gabrovska' wynosił 22,6 t/ha, a odmiany 'Goulyaeva' – 18,4 t/ha. Drzewa obu badanych odmian rosną silnie i tworzą duże, rozłożyste korony. Owoce są dobrej jakości, smaczne, mają wysoką zawartość suchej masy i cukrów. Pod tym względem przewyższają odmianę 'Stanley'. Śliwa odmiany 'Goulyaeva' dobrze znosi suszę, podczas gdy 'Gabrovska' tego nie toleruje. Obie odmiany są tolerancyjne na szarkę (*Plum Pox Virus*) i mało podatne na brunatną zgniliznę drzew pestkowych (*Monilinia*). Wyniki badań wskazują, że obie odmiany mogą być w Bułgarii polecane do sadów towarowych.

Słowa kluczowe: śliwa, odmiana, kwitnienie, wzrost, plon