

Flowering performance of some Modern Rose Varieties in Hungary

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Summary: A variety trial has been accomplished to study the flowering performance of some modern roses. Blooming time and blooming intensity were studied in Hungarian and Western European varieties. 120 floribundas, polyanthas and climblings were observed. Our work shows that valuable Hungarian varieties can be found in all the three studied classes. The best Hungarian climbing roses at blooming intensity were 'Futótűz', 'Rozália', 'Sarolt' and 'Szent Erzsébet emléke'; best floribundas were 'Báthory István emléke', 'Munkács', 'Szent Margit emléke'; and the best Hungarian polyanthas were 'Csinszka', 'Domokos Pál Péter emléke'. Some really good flowering Western-European rose varieties have also been found, the best ones were 'Clg. Gertrude Westphal' climbing, 'La Sevillana' floribunda and 'Beauty of New South Wells', 'Happy' polyanthas. 'La Sevillana' and 'Picasso' were in strong bloom for the longest time. In Hungary, the floribunda and polyantha classes had good flowering intensity to the almost the same extent, floribundas had stronger, and polyanthas had longer flowering waves, but the ever-blooming ability of the climbing roses was moderate in the dry midsummer.

Key words: rose, floribunda, polyantha, climbing, flowering, Hungarian

Introduction

In Hungary, Research Institute for Fruitgrowing and Ornamentals has been maintaining a rose garden since the 1960's. The rich collection of nearly 1.5 thousand varieties provides excellent opportunity for variety evaluation on Hungarian and well-known foreign rose varieties. Unlike the experiments, which concentrate on hybrid varieties and greenhouse productions, like the work of *Palai et al.* (2003), we wanted to place the floribunda and polyantha classes in focus. This comparison helps garden designers select varieties, which are remarkably attractive under the Hungarian continental climate. It also provides help for breeders who look for bases for breeding. Scientific researches can confirm or reject the everyday observation that Hungarian bred rose varieties are excellent for planting in public parks and – at least in Hungary – some of them have better vegetative and generative production than the well-known and deservedly famous French and German roses.

In 2002 and 2003 several examinations were carried out to evaluate the blooming ability of some rose varieties. The evaluation of the blooming intensity was probably the most important out of them. The purpose of this examination was to select the best blooming varieties, to classify the varieties by their best flowering period, and by the length of their blooming time.

Beyond the examined characters there are a number of generative features, which are under strong influence of fashion, for example scent, shape and general colour of the flowers. These subjective characters have not been studied.

Material and method

This variety evaluation was carried out in Budapest, at Budatétény Rose Garden in the 2002 year. The following varieties were observed: Hungarian bred roses: 35 floribundas, 9 large-flowered climblings, 4 shrubs, 18 polyanthas, and as a control, Western-European roses from our collection: 34 floribundas, 7 climbing roses (6 large-flowered, and 1 climbing floribunda), 1 shrub (with climbing habit) and 12 polyanthas. Some of the Hungarian rose varieties are officially classified as shrubs, but 'Szent Erzsébet emléke' can be considered as a climbing rose, whereas the rest are actually tall floribundas. The names and classifications of rose varieties are according to the American Rose Society "ARS approved exhibition name" (*Cairns et al.*, 2000), Hungarian lists of varieties (*Rátkai*, 2001), and breeders' lists of the Hungarian variety candidates (*Márk*, 2004). First three columns in *Table 1* list all the assessed rose varieties in alphabetical order.

Table 1 List of rose varieties of the trial in alphabetical order and their score or their average blooming intensity (daily average of the 44 corrected rank values of blooming intensity). The detailed method of the calculation is described in the "Materials and methods" chapter under "Calculation of the 'score'" subtitle

Class*	Variety name*	Breeder	Year	Score	Score / best score%	Class*	Variety name*	Breeder	Year	Score	Score / best score%
fl	Ady Endre emléke	Márk	–	3.9	51.7%	fl	La Sevillana	Meilland	1978	7.5	100.0%
s	Alchemist	Kordes	1956	1.4	18.8%	fl	La Voulzie	Robichon	1953	3.6	47.9%
po	Apor Péter emléke	Márk	–	1.9	24.8%	fl	Laborfalvi Róza emléke	Márk	–	2.6	34.7%
po	Árpád	Márk	2002	3.7	50.1%	fl	Lágymányos	Márk	2000	2.8	37.6%
fl	Athos	Laperriere	1965	2.2	30.0%	fl	Leila	Márk	–	4.6	60.9%
fl	Attila	Márk	–	1.9	25.4%	fl	Lilli Marleen	Kordes	1959	3.1	41.5%
lf cl	Badacsony	Márk	–	1.3	17.5%	fl	Liu	Márk	–	3.3	44.1%
fl	Barbecue	Dickson	1961	2.0	27.2%	lf cl	Looping	Meilland	1977	1.1	14.6%
fl	Báthory István emléke	Márk	–	6.8	90.8%	fl	Max Holder	Márk	2000	4.2	55.6%
po	Beauty of New South Wales	Knight	1931	5.1	68.1%	po	Mikszáth Kálmán emléke	Márk	–	3.4	44.8%
fl	Bem Apó emléke	Márk	2000	2.4	31.8%	fl	Millecentenarium'96	Márk	1996	5.0	66.7%
fl	Bethlen Gábor emléke	Márk	1997	3.8	51.1%	fl	Minuette	Lammerts	1969	3.7	50.0%
po	Bodor Péter emléke	Márk	1998	3.1	41.2%	fl	Montijo	Dot	1954	2.6	35.0%
po	Border King	deRuiter	1952	3.6	48.7%	po	Mothers'day	Grootendorst	1949	1.6	21.8%
fl	Borsod	Márk	–	4.8	64.5%	po	Mrs. Joseph Hiess	Shepherd	1943	3.9	52.1%
fl	Brilliant Star	Watkins Roses	1965	0.0	0.0%	fl	Munkács	Márk	–	7.5	100.0%
fl	Chanalle	McGredy	1959	1.1	14.8%	s	Nagybacon	Márk	–	1.6	21.4%
cl fl	Chic Parisien	Delbard-Chabert	1956	0.4	5.1%	po	Nagyvárad	Márk	–	2.9	38.2%
cl fl	Cig. Gertrud Westphal	Buisman	1961	4.1	54.9%	fl	New Daily Mail	Tantau	1972	5.4	72.3%
lf cl	Cig. Orfeo	Leenders	1963	0.9	12.0%	fl	Nina Weibul	Poulsen	1962	4.1	54.8%
fl	Colisée	Gaujard	1965	4.0	52.9%	fl	Nouvelle Europe	Gaujard	1964	3.4	45.7%
po	Csinszka	Márk	2002	5.0	67.2%	fl	Okályi Iván emléke	Márk	1997	4.9	65.9%
po	Csl Cerveny Kriz	Böhm	1937	4.2	56.4%	lf cl	Október 23.	Márk	1997	1.0	12.9%
lf cl	Delbard's Orange Climber	Delbard-Chabert	1966	1.0	13.0%	po	Orange Triumph Improved	Cant	1960	3.5	46.5%
fl	Déryné	Márk	–	5.9	78.9%	fl	Örség	Márk	–	3.2	42.3%
po	Déva	Márk	–	5.2	69.2%	fl	Pernille Poulsen	Poulsen	1965	2.4	32.4%
fl	Diabolo	Gaujard	1958	2.0	26.4%	fl	Pest	Márk	1993	1.5	20.5%
po	Dick Koster Fulgens	Koster	1940	3.6	48.5%	fl	Picasso	McGredy	1971	5.3	71.1%
fl	Domokos János emléke	Márk	1997	1.9	25.0%	fl	Poppy Flash	Meilland	1971	4.4	58.9%
po	Domokos Pál Péter emléke	Márk	1998	6.2	83.0%	fl	Ráskai Lea	Márk	2002	2.3	30.4%
po	Dsida Jenő emléke	Márk	1996	4.0	52.8%	fl	Régen	Márk	2000	2.5	33.4%
fl	Eisberg	McGredy	1966	2.2	29.1%	fl	Rekordblüher	Tantau	1965	4.2	56.0%
po	Elsbeth Meyer	Vogel	1940	2.4	31.7%	fl	Reményik Sándor emléke	Márk	–	4.1	54.6%
fl	Erzsébet királyné emléke	Márk	–	1.1	15.1%	fl	Rosali	Tantau	1983	1.4	19.1%
po	Fairy Damsel	Harkness	1982	3.2	42.4%	lf cl	Royal Lavender	Morey	1961	0.7	9.1%
fl	Fresco	deRuiter	1968	0.4	6.0%	lf cl	Rozália	Márk	1998	1.7	22.8%
lf cl	Futótűz	Márk	1995	1.8	23.6%	fl	Sanktflorian	Meilland	1971	1.9	25.5%
fl	Garden Princess	Leenders	1961	1.4	18.2%	lf cl	Sarolt	Márk	1992	1.6	20.8%
fl	Gelence	Márk	–	0.8	11.3%	po	Savaria	Márk	–	4.9	65.3%
fl	Gold Badge	Paolino	1978	3.0	40.4%	fl	Scania	deRuiter	1965	1.7	22.3%
fl	Golden Perfume	Leenders	1959	1.6	20.9%	fl	Sunsprite	Kordes	1977	1.2	15.8%
lf cl	Golden Showers	Lammerts	1956	0.5	7.0%	fl	Szabó Dezső emléke	Márk	1998	5.3	70.5%
fl	Golden Slippers	Von Abrams	1961	0.9	12.5%	lf cl	Szaffi	Márk	–	1.3	16.9%
lf cl	Goldener Olymp	Kordes	1984	0.6	8.4%	fl	Szárzajta	Márk	–	0.3	4.3%
po	Gustav Strobel emléke	Márk	–	1.9	25.6%	po	Szendrey Júlia emléke	Márk	–	3.8	50.4%
fl	Gül Baba	Márk	2000	5.3	70.7%	lf cl	Szent Erzsébet emléke	Márk	1995	2.5	33.4%
po	Happy	deRuiter	1954	3.7	49.4%	fl	Szent Gellért	Márk	1998	1.5	20.6%
fl	Happy Event	Dickson	1964	0.5	6.5%	fl	Szent László	Márk	2002	1.6	21.0%
lf cl	Háros	Márk	–	1.1	14.2%	fl	Szent Margit	Márk	1997	7.0	93.3%
po	Háry János	Márk	–	2.5	32.8%	po	Táncsics Mihály emléke	Márk	–	5.1	68.5%
po	Hollandia	deRuiter	1958	3.3	43.6%	fl	Tantau's Surprise	Tantau	1951	1.3	17.6%
fl	Hungaria	Müller	1965	2.5	33.0%	fl	Taranga	Tantau	1982	0.7	9.6%
fl	Iceberg	Kordes	1958	5.0	66.5%	po	Tihany	Márk	–	3.1	42.1%
fl	Ilma	Márk	–	2.8	37.4%	fl	Tornado	Kordes	1973	4.8	64.8%
po	Ingrid Stenzig	Hassefras Bros.	1951	3.8	50.2%	lf cl	Torockó	Márk	1997	1.3	17.3%
fl	Insel Mainau	Kordes	1959	2.4	32.6%	fl	Vak Bottyán emléke	Márk	–	0.6	7.6%
fl	János vitéz	Márk	–	1.8	23.6%	po	Verecke	Márk	–	5.2	69.9%
po	Jókai Mór emléke	Márk	–	3.3	43.7%	fl	Violet Carson	McGredy	1964	2.0	26.7%
lf cl	Kistétény	Márk	2002	1.5	19.5%	fl	Vörössipkások emléke	Márk	1998	3.1	41.9%
fl	Kovácszna	Márk	–	0.9	12.4%	fl	Zágon	Márk	–	1.7	22.8%
fl	Kund Abigél	Márk	–	3.0	40.5%	po	Zirc	Márk	–	3.2	43.2%

* Abbreviations:

Class: po – polyantha, fl – floribunda, s – shrub, lf cl – large flowered climbing, cl fl – climbing floribunda Variety name: "emléke" means "memory of"

Site of experiments

The experimental ground is situated in the southern part of Budapest, in Budatétény district. It is on the margin of the north-western region of the Hungarian Great Plain, which is the most characteristic geographical part of the country. The typical climate of the Great Plain is continental, characterised by cold winters, frosty springs, hot and dry summers. The rainiest months are May and June. The meteorological and geographical data of Budatétény are the following: 102–110 metres above sea level, the soil is rendzina; the relief type is dissected plain. The mean January temperature is -2 – -1 °C, the mean July temperature is 18 – 20 °C. The mean annual absolute minimum temperature is -15 – 16 °C, while the mean annual absolute maximum temperature is 33 °C. The average annual precipitation is 600 mm. (Pécsi, 1989)

Meteorological conditions

The weather of this year was almost "perfect" for evaluating dry-climate tolerant varieties, because the year of 2002 showed many extremities. Especially the temperature (hot and very cold) and the precipitation were critical. This is the reason why the result emphasises the stress tolerance of these rose varieties.

The winters in this period (2001–2002 and 2002–2003) were very severe, (about -20 °C minimum) which were harmful for Mediterranean and subtropical plants. After the hard winter, there was a strong frost in April, which damaged the soft texture of the newly sprouted shoots.

The spring and the summer were extremely hot, and arid. In addition, due to the wind, the surface of the soil was continuously dry, and atmospheric drought could be observed: the air was very dry throughout the year. See Figure 1 on the weather of Budapest in 2002.

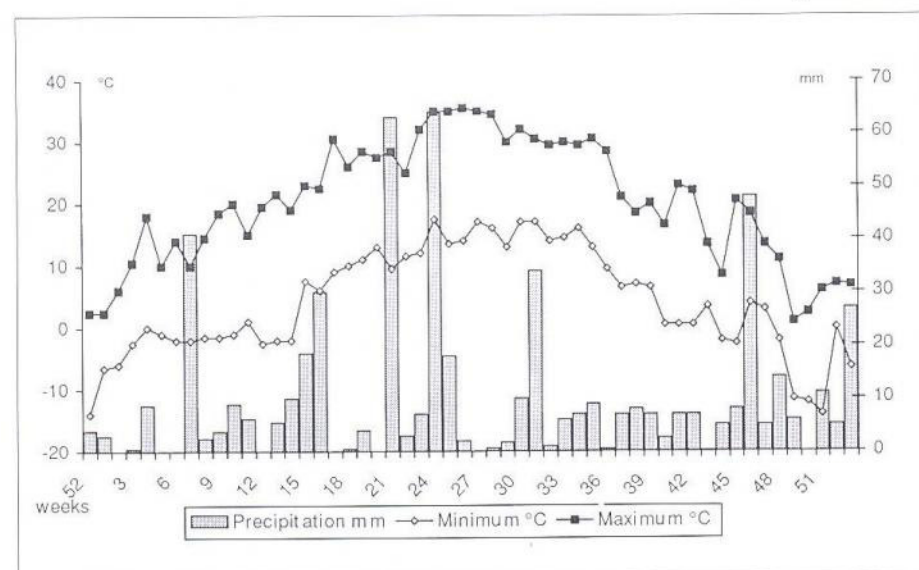


Figure 1 Weekly maximum and minimum temperature and precipitation of Budapest in the year 2002. Source: WeatherOnline (2006 online)

Care of plants

The Rose Garden of Budatétény is a public park like variety collection with lawn and flower-beds. The varieties were planted in rows into the beds in 1993–1995, each row contained 8–10 stocks. During the experiment, the rose plantation received only the essential maintenance, the plants were not protected in winter, and were not watered in summer either. The garden received as much pruning, weeding and plant-protection spraying as Hungarian parks usually do.

Blooming intensity

The yearly change in the overall impression of the flower colour of the varieties, which is practically identical with the mass of the flowers in each variety was measured by ranking.

In 2002, ranking lasted from the earliest days of the blooming period until the autumn frosts. The date of the first record was 3rd May 2002 and the last one was on 19th November, altogether 44 surveys were made. The rank categories, which describe the intensity of the blooming, ranged from 0 to 8 with 0.5 steps. Each of the assessed variety consisted of 8–10 stocks in a row as a hedge. The rank categories were the followings:

- 0 – no flowers at all in the row
- 1 – only 1 medium sized flower or 2 small ones in the row
- 2 – 2–4 medium sized flowers, 4–8 small or 1–3 big flowers in the row
- 3 – flowers are very scattered, or one large cluster of flowers in the row
- 4 – flowers are scattered, the row is more or less green with small colourful spots
- 5 – mediocre blooming, the row is more or less colourful, but the carpet of the petals is not continuous
- 6 – good blooming, the row is brightly coloured, the roses are in full bloom
- 7 – very strong blooming, the petals almost cover the foliage
- 8 – extreme strong blooming, leaves are invisible under the flowers

Calculation of the "score" (daily average of the corrected rank values)

After recording the raw rank values, two conversions were performed:

1. Correction: The purpose of the correction was to get a value which indicates the performance of the blooming more precise, because the connection is not linear between flowering production and the ranking values. Our own exponential $Y=X^{3.5}/35$ model was used, where X is the original rank value, Y is the

Table 2 The original rank values and the result after the $Y=X^{3.5}/35$ correction

Rank value (X)	Corrected value (Y)
0	0.00
1	0.03
2	0.32
3	1.34
4	3.66
5	7.98
6	15.12
7	25.93
8	41.38

Table 3 The seven periods of the whole blooming time to emphasize the blooming characteristics of the varieties

Period	Length of the period	Description of the period (approximately)
I	May 3–May 14.	The earliest two weeks from the first opening flowers
II	May 17–May 30.	Blooming time of the early varieties
III	June 3–June 12.	Middle of the first blooming wave of floribundas and polyanthas
IV	June 17–June 27.	Blooming time of the late flowering varieties of floribundas and polyanthas
V	July 1–August 13.	Midsummer without strong flowering waves
VI	August 16–September 16.	End of the summer with uncertain flowering waves
VII	September 25–November 19.	Last weeks of the whole flowering time to the first frost

corrected value (Boronkay & Jámor-Benczúr, 2005). Table 2 describes the result of the correction in the main rank categories:

2. The number of days between the rank surveys was moderately different, so simple average wasn't enough to get the daily average of the corrected values, instead a standard weighting method was used. The weight numbers was the number of days between the consecutive rank observations. The computing method of each weight number was $(A-B)/2$, where A = the days between the previous and the current observation, B = the days between the current and the next observation. Every corrected rank value were multiplied by the number of the days (the weight number), then were added up by varieties and divided by the total days of the 44 rank survey (208 days).

In this study, "score" means the daily average of the blooming intensity that is the previously mentioned weighted average of the corrected rank values.

There were big differences between the blooming times of the varieties. To emphasize the blooming characteristics, seven flowering periods were created by dividing the whole vegetation period, and averages of the blooming intensity were calculated by the periods for each variety. Each period has different lengths to reflect the blooming waves of the assessed 120 varieties in the year 2002 (Table 3).

Results

In Figure 2 the change of blooming intensity of all the assessed 120 varieties can be seen in 2002, where the central line represented the average of corrected rank values of all the evaluated roses. In this year the blooming process was a little unusual, as the chart shows. After the first blooming wave, which was strong and regular, the midsummer blooming failed to come about, due to the extremely hot and dry summer, though an irregular, early autumn wave could be observed, thanks to a

rainy period. This type of weather influenced the results of the examination: the flower production of the late flowering varieties was slightly better than that of the summer flowering ones.

Table 1 4th and 5th columns show the results of the observations on blooming intensity. Following the variety names, their score (their daily average of blooming intensity) is presented, that is the weighted average of the 44 corrected rank values. The detailed method of the score in the 4th column is the following: Each variety was ranked 44 times in the year of 2002. The rank values were corrected with the $Y=X^{3.5}/35$ model, where X is the rank value. After the computation, averages of each variety were calculated from the 44 sets of corrected rank values. The last column shows the scores as a percent of the highest score ('La Sevillana' and 'Munkács' had the highest value, their score were 7.5). In general, according to Table 1 the ten most floriferous varieties was the following in the Rose Garden at Budatétény in descending order:

Climbing roses: 'Clg. Gertrude Westphal', 'Szent Erzsébet emléke', 'Futótűz', 'Rozália', 'Nagybacon', 'Sarolt', 'Kistétény', 'Alchymist', 'Torockó', 'Szaffi', 'Badacsony'.

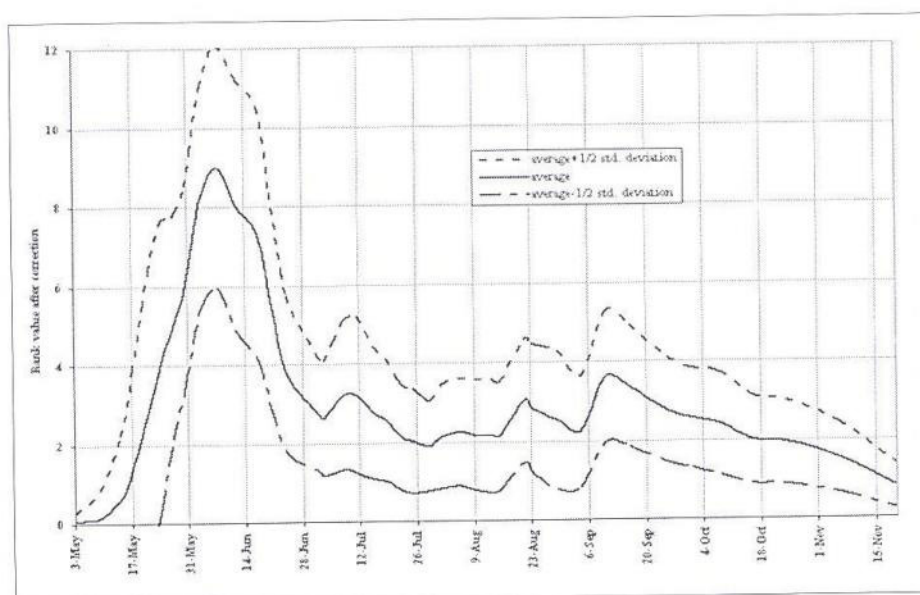


Figure 2 Blooming intensity of the studied rose varieties at Rose Garden of Budatétény, in 2002. Average and standard deviation.

Floribundas: 'Munkács', 'La Sevillana', 'Szent Margit', 'Báthory István emléke', 'Déryné', 'New Daily Mail', 'Szabó Dezső emléke', 'Picasso', 'Gül Baba', 'Millecentenárium'.

Polyanthas: 'Domokos Pál Péter emléke', 'Verecke', 'Déva', 'Táncsics Mihály emléke', 'Beauty of New South Wales', 'Csinszka', 'Savaria', 'Csl Cerveny Kríz', 'Dsida Jenő emléke', 'Mrs. Joseph Hiess'.

Out of the 30 best flowering roses, 22 were Hungarian bred varieties, which means that a lot of Western-European varieties cannot adapt to the hot dry summers, while many Hungarian roses successfully survived this extreme year.

The 5 roses, which have the highest average score, were 'Munkács' and 'La Sevillana', 'Szent Margit emléke', 'Báthory István emléke', 'Domokos Pál Péter emléke'. Except the last one, all of them are floribundas. This fact seems to indicate that in Hungary floribundas are more reliable than polyanthas or climbing in their flowering intensity thorough the year.

To emphasize the big differences between the blooming times of the varieties, seven flowering periods were created by dividing the whole vegetation period. For each variety, daily averages of the blooming intensity were calculated by the periods.

Table 4 shows the best rose varieties in each period by classes. There is little difference between the best floribunda and polyantha varieties, but it can be observed that the ever-blooming ability of the climbing roses is moderate in general, especially in midsummer. Each flowering period has their own characteristic varieties, and although there are some really excellent roses, no universal variety can be found that would be excellent throughout the whole year.

The strong flowering capability of the Hungarian varieties was remarkable. In the floribunda class, in 5 periods out of 7 the best varieties were Hungarian ones, here only one

Table 4 Best varieties at blooming, by classes and by flowering periods (Hungarian varieties are in italics). Score means daily average of rank values after correction

P.	Length of the period	Best polyanthas	Score	Best floribundas	Score	Best climblings	Score
I	V.3-V.14.	<i>Csinszka</i>	0.4	<i>Gül Baba, Vörössipkások emléke</i>	0.4	Clg. Gertrud Westphal	13.0
II	V.17-V.30.	<i>Csinszka</i>	15.2	<i>Vörössipkások emléke</i>	14.0	Clg. Gertrud Westphal	24.1
III	VI.3-VI.12.	Happy	29.2	<i>Munkács</i>	25.9	Goldener Olymp	7.
IV	VI.17-VI.27.	Happy	18.1	<i>Borsod, Nina Weibul</i>	19.8	<i>Október 23.</i>	8.6
V	VII.1-VIII.13.	<i>Domokos Pál Péter</i>	6.9	<i>La Sevillana emléke</i>	9.1	<i>Sarolt, Fuiótűz</i>	1.3
VI	VIII.16-IX.16.	Beauty of S. New West	11.6	<i>Szent Margit</i>	12.5	Clg. Gertrud Westphal	3.4
VII	IX. 25-XI.19.	<i>Domokos Pál Péter</i>	6.1	<i>La Sevillana</i>	8.9	Clg. Gertrud Westphal	2.3

Table 5 Best roses at blooming by periods according to their standardised scores (standardised daily average of the corrected rank values of the periods)

	Periods							IIV*
	I	II	III	IV	V	VI	VII	
Climbing roses	Standardised scores							
Clg. Gertrud Westphal	7.98	4.25	-1.51	-1.12	-1.21	0.00	0.34	7.98
Rozália	0.94	2.91	-1.37	-1.02	-1.18	-1.12	-0.88	2.91
Alchymist	0.10	2.54	-1.08	-1.13	-1.21	-1.12	-1.05	2.54
Szent Erzsébet emléke	-0.02	2.31	-0.62	-1.09	-1.13	-0.44	0.02	2.31
Toroekó	0.56	2.29	-1.55	-1.13	-1.21	-1.12	-0.97	2.29
Looping Floriundas	-0.16	2.04	-1.45	-1.13	-1.21	-1.12	-1.05	2.04
La Sevillana	-0.17	-0.59	0.31	0.76	3.35	1.55	3.95	3.95
Szent Margit emléke	-0.17	0.96	1.00	1.14	2.59	3.71	0.30	3.71
Munkács	-0.17	0.79	3.25	2.50	0.41	0.62	3.23	3.25
Borsod	-0.17	0.21	1.06	3.01	0.94	0.15	0.42	3.01
Nina Weibul	-0.17	-0.59	0.80	3.01	-0.45	-0.03	0.61	3.01
New Daily Mail	-0.17	-0.78	-0.76	0.00	2.41	2.96	1.21	2.96
Picasso	-0.17	-0.08	1.55	-0.06	1.61	2.51	0.03	2.51
Báthory István emléke	-0.17	0.59	1.30	0.93	1.16	2.44	2.29	2.44
Millecentenárium'96	-0.17	-0.50	0.56	-0.29	1.27	2.16	1.20	2.16
Vörössipkások emléke	0.11	2.16	-0.38	0.33	-0.90	-0.50	0.17	2.16
Déryné	-0.17	1.67	2.15	0.71	0.08	1.15	1.53	2.15
Okályi Iván emléke	-0.17	1.09	0.51	-0.79	1.46	2.09	0.39	2.09
Szabó Dezső emléke	-0.17	-0.66	-0.38	0.50	1.76	2.05	1.58	2.05
Liu	-0.17	-0.63	1.00	0.11	-0.89	-0.67	1.97	1.97
Tornado	-0.17	-0.37	0.75	0.20	1.21	0.43	1.97	1.97
Gül Baba	0.10	0.76	0.80	1.80	1.51	-0.02	1.36	1.80
Poppy Flash	-0.17	-0.75	0.05	-0.06	1.70	1.33	0.82	1.70
Colisée	-0.17	-0.38	1.55	0.52	1.66	-0.64	0.05	1.66
Polyanthas								
Happy	-0.17	-0.33	3.76	3.03	-0.99	-0.80	-0.64	3.76
Beau. of New S. Wales	-0.17	0.76	0.31	1.14	-0.37	3.52	0.12	3.52
Verecke	-0.17	0.78	2.58	1.36	0.29	0.91	0.37	2.58
Csinszka	0.10	2.52	0.16	0.20	0.59	-0.05	1.45	2.52
Domokos Pál Péter emléke	-0.17	-0.42	0.86	2.34	2.23	0.40	2.37	2.37
Táncsics Mihály emléke	-0.17	-0.74	0.41	1.68	2.02	0.60	1.39	2.02
Border King	-0.17	-0.08	0.51	1.95	0.34	0.50	-0.47	1.95
Savaria	-0.17	-0.18	1.00	1.95	1.87	0.68	0.15	1.95
Déva	-0.17	0.03	0.51	0.20	1.22	1.09	1.86	1.86
Mrs. Joseph Hiess	-0.17	-0.30	1.85	1.80	-0.35	0.43	-0.05	1.85

* The highest value of the seven periods.

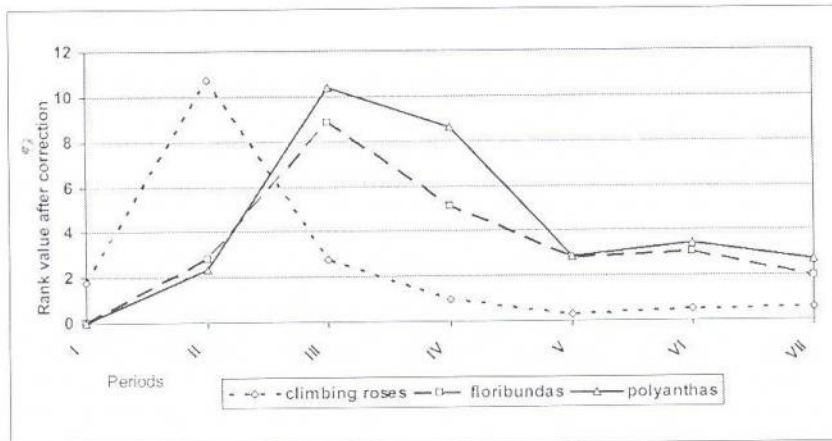


Figure 3 Average blooming intensity of the three rose classes

Western-European rose variety could compete: 'La Sevillana' was the best at blooming in midsummer and before the autumn frost days. In Hungary it shows as good performance as it did in the rigorous ADR tests (Sieber, 1984). Among climbing roses 'Clg. Gertrude Westphal' is worth mentioning, because it was by far the earliest rose among the 1500 varieties of our Rose Garden (if we prune moderately). Usually its autumn flowering period is not noticeable, but in this year it was in bloom, due to the unusually strong rainy days in August.

When different sets of variables are compared, standardising is a useful method. After standardising a set of values, the average of the new variable is always 0, its standard deviation is 1, and it hasn't got any unit of measurement. Because the average of the blooming intensity of the seven periods are different, if we would like to compare the flowering ability of the varieties, standardised scores must be used. Table 5 shows the standardised scores (daily average of the corrected rank values of each period) of the best varieties in the 7 periods. The varieties are arranged by class and ordered by their highest standardised scores. 'Clg. Gertrud Westphal' has the highest value, 7.98. It means that its blooming intensity was 8 times the standard deviation of the own period higher than the average blooming intensity

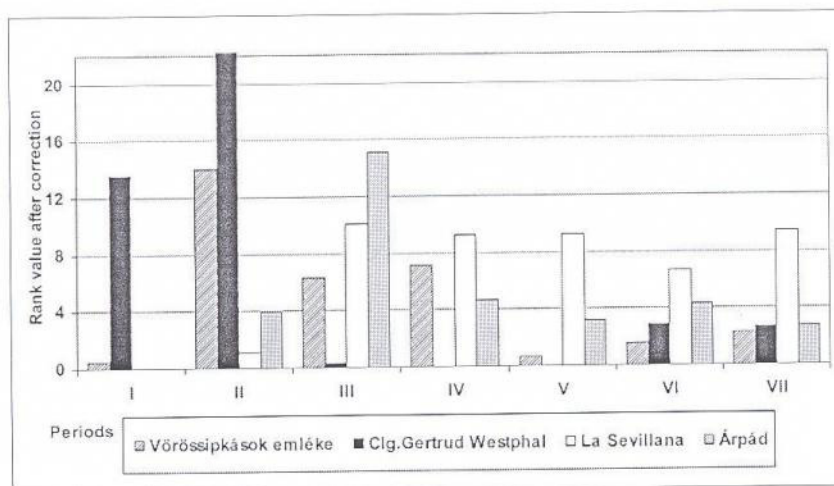


Figure 4 Examples of blooming types of rose varieties

of that period. It was the most prominent variety in any period, and by far the earliest rose. All the climbing roses had negative values in midsummer, which means that their flowering production was below the average in summer. While this climbing floribunda was the only really good climbing rose in that year, in the floribunda class 'La Sevillana', 'Szent Margit emléke', 'Munkács', 'New Daily Mail', 'Picasso', 'Báthory István emléke', 'Szabó Dezső emléke', 'Gül Baba', 'Coliseé' were outstanding, their standardised values were higher than 1.5 in more than one period. Although 'Picasso' wasn't the best in its class, it has very good blooming intensity throughout three periods, and it shows at least

average production in the rest of the year. In our study, the cv. 'Iceberg' showed good, though not excellent blooming, as it did in India (Murugesan et al., 1991). In the polyantha class only one, a Hungarian rose has high values through three periods, it was 'Domokos Pál Péter emléke'. Other good polyanthas were 'Happy', 'Táncsics Mihály emléke', 'Savaria', 'Mrs. Joseph Hiess', 'Csl Cerveny Kriz'. Their standardised value was higher than 1.5 through two periods.

If the earliness of the blooming is examined, the following rose varieties are worth mentioning: all climbings were early, 'Clg Gertrude Westphal' was the earliest, although it was still in bloom in the second period also. The earliest good floribundas were 'Vörössipkások emléke', 'Déryné' and 'Domokos János emléke', all of them are Hungarian. More roses were late flowering, the best of them was 'La Sevillana', 'Szent Margit emléke', 'Munkács', 'New Daily Mail', 'Picasso', 'Báthory István emléke', etc. Déryné was not only one of the earliest roses, it was one of the latest too. In the polyantha class only 'Csinszka' was really early, the best varieties – which were in flower mostly in autumn – were 'Beauty of New South Wells' and 'Domokos Pál Péter emléke'.

The average blooming vigour of the three classes (climbing rose, floribunda, polyantha) is shown in Figure 3. The shapes of the blooming waves of floribundas and polyanthas are similar, but the polyantha class had longer first flowering wave. This could mean better quality, but shows also that polyantha varieties are more heterogeneous, as they are a mixture of earlier and later flowering varieties. Climbing roses were the earliest, due to the moderate pruning method. Our result contradicts a variety trial in Tajikistan, where floribundas were more valuable than polyanthas, and the climbing rose class was the best group (Bazavlutskaya, 1983).

In Figure 4 some clearly distinguishable blooming types are shown. A typical very early variety was 'Clg. Gertrud Westphal' with a strong first, and a small autumn flowering wave. 'Vörössipkások emléke' is an earlier and 'Árpád' is a later flowering form of

Table 6 The best blooming roses in our variety trial in 2002 at Budatétény. Meanings of the header are below the table

variety name, breeder, year	1	2	3	4
climbing roses				
Alchemist (Kordes, 1956)			x	
Clg. Gertrud Westphal (Buisman, 1961)	x	x	x	x
Futótűz (Márk, 1995)	x	x		
Goldener Olymp (Kordes, 1984)		x		
Nagybacon (Márk, -)	x			
Október 23. (Márk, 1997)		x		
Rozália (Márk, 1998)		x	x	
Sarolt (Márk, -)	x	x		
Szent Erzsébet emléke (Márk, 1995)		x	x	
Torockó (Márk, 1997)			x	
floribundas				
Báthory István emléke (Márk, -)				x
Borsod (Márk, -)		x	x	
Colisée (Gaujard, 1965)				x
Déryné (Márk, -)	x			x
Gül Baba (Márk, 2000)		x		x
La Sevillana (Meilland, 1978)	x	x	x	x
Nina Weibul (Poulsen, 1962)		x	x	
New Daily Mail (Tantau, 1972)				x
Munkács (Márk, -)	x	x	x	x
Picasso (McGredy, 1971)				x
Szent Margit (Márk, 1997)	x	x	x	x
Szabó Dezső emléke (Márk, 19989)				x
Vörössipkások emléke (Márk, 1998)		x		
polyanthas				
Beauty of New south Wells (Knight, 1931)	x	x	x	
Csinszka (Márk, 2002)		x	x	
Csl Cerveny Kriz (Böhm, 1937)				x
Déva (Márk, -)	x			
Domokos Pál Péter emléke (Márk, 1998)	x	x	x	x
Happy (deRuitter, 1954)		x	x	x
Mrs. Joseph Hiess (Shepherd, 1943)				x
Savaria (Márk, -)				x
Táncsics Mihály emléke (Márk, -)	x			x
Verecke (Márk, -)	x		x	

Meaning of the header of Table 6:

- 1 – Best varieties at blooming intensity (yearly average), according to Table 1 (5 varieties)
- 2 – Best varieties at blooming intensity in any period, according to Table 4 (7 varieties, one for each period)
- 3 – Best varieties with the highest standardised score, means highest blooming intensity in one period, according to Table 5 (5 varieties)
- 4 – Best varieties with long blooming time (their standardised scores are higher than 1.5 in at least two periods), according to Table 5

a type, which was in bloom throughout the summer with strong first wave. 'La Sevillana' is an example for a well-balanced, but not early rose.

Discussion

In general, as Table 1 shows, Hungarian roses proved to be well adapted to the weather of the experimental years, that were even more extreme than the typical continental climate. Furthermore, some well applicable foreign roses were found to be suitable for Hungarian climate, and they may be good additions to the Hungarian rose cultivars. Table 6 summarizes the best varieties of this experiment. "X" means that the variety was one of the best in each observation.

The varieties that have at least two "X" in the Table 6 considered as excellent roses at blooming. 80% of the

outstanding climbing roses were Hungarian, but the best one was a foreign variety: 'Clg. Gertrud Westphal' It had the highest score of all the climbers, and it was the best blooming climber in early summer and autumn also. The flowering period of this variety was longer than the rest of the class. 6 excellent floribunda roses could be selected, and only one of them is not Hungarian 'La Sevillana'. The red 'La Sevillana', 'Munkács' and the white 'Szent Margit emléke' were outstanding in all the 4 parameters. The two red varieties were the two best blooming roses in the Floribunda class, and they blooming time were extraordinary long: This two rose varieties were outstanding in 3 flowering periods out of the seven. While 'La Sevillana' was better in the second half of the vegetation period, 'Munkács' were in bloom in summer and late autumn. Foreign polyanthas seem to be slightly better than the Hungarian ones (the best of them are 'Happy' and 'Beauty of New South Wells'), but 'Domokos Pál Péter emléke' was outstandingly the best, its quantity of blooming production was very high. Comparing to the other varieties, its most valuable flowering time was the middle of the summer and the end of the autumn.

Although the evaluation has been successful, further examinations are needed on additional sites of experiments to assess the flowering ability under different meteorological conditions and on different soil types. Two similar experiments are being planned in the area of Budapest: one on fluvial soil (Margitsziget), and one in a soil with high subsoil water (Törökbalint).

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