*Bulletin of Botanical Gardens, **13**: 199–207, 2004*

OVERWINTERING OF HISTORICAL ROSES FROM THE COLLECTION OF THE BOTANICAL GARDEN OF THE POLISH ACADEMY OF SCIENCES IN WARSAW AFTER FROSTY WINTER 2002/2003

Marta Joanna MONDER

Botanical Garden – Center for Biological Diversity Conservation of the Polish Academy of Sciences, Prawdziwka 2, 02-973 Warsaw 76

SUMMARY

The observations of 33 species and varieties of historical roses in Botanical Garden after the long, frosty and snowy winter of 2002/2003 indicate a considerable resistance to frost in most of them, park roses in particular, which is a very important aspect of plant cultivation in the areas with reduced cultivation expenses. Damage was not noticed or was minimal to the shrub park roses descending from *Rosa x damascena* Mill, *Rosa alba* L., *Rosa x centifolia* L., *Rosa moyesii* Hems. & Wils. Insignificant frost damage to Bourbon, Portland and Hybrid Perpetual didn't have any negative impact on their development and ornamental qualities in vegetative season. The most severe damage was caused to climbers and ramblers and these suffered the heaviest loss of ornamental value.

Key Words: old roses, *Rosa* L., shrub roses, frost resistance.

INTRODUCTION

At present the collection of roses in Botanical Garden numbers over 386 rose varieties, including 77 species and varieties of roses now rarely grown. What was recognized as historical roses were the species and varieties grown in the early stages of the cultivation of this species as well as the varieties which appeared in the 19th and early 20th century. Many varieties which were cultivated then passed out of all knowing but a considerable part survived in rosaries, botanical gardens' collections and old parks mainly in France, Britain and Germany. In the Second World War Poland and after the war most of them vanished in old, forgotten manor gardens and devastated nurseries. Ousted by ever greater numbers of varieties, richer in form and color, only small numbers of old roses have stayed in general cultivation and these are enjoying their vintage status. Many of them show high resistance to frost and little proneness to diseases. Although most of them flower once only, their flowering is abundant and long and the flowers give off exquisite smell. Their thorns, shoot color, leaves and fruits are often an additional ornament.

For over 20 years now the varieties and species of the past have been growing in importance and are planted in parks and gardens, particularly in those of period character, or as low-requirement shrubs in naturalistic foundations along with other ornamental plants. They have been arousing the interest of plant lovers, nursery people and gardeners. In a few nurseries in Poland a small number of old rose varieties are being reproduced and demand is growing along with the trends from other European countries. The rising interest is confirmed by breeding direction in many foreign breeding companies. Varieties such as English Roses, (David Austin Roses), Romantica (Meilland), Renaissance (Poulsen Roser Aps), Rigo Rosen and Märchen Rosen (W. Kordes Söhne) have appeared, which are similar to old roses but have new colors, heightened resistance to diseases, recurring flowering and better growth. Unfortunately, most of them display significantly worse resistance to frost.

After the severe winter of 2002/2003 the collection underwent frost resistance observations aimed to find out more about historical roses and their application potential.

METEOROLOGICAL CONDITIONS IN WINTER

The winter of 2002/2003 came early and was long and frosty. The previous two winter seasons had been much milder. Mean month temperatures and precipitation from January to September in 2003 and in 2000-2002 in Botanical Garden are shown in Fig. 1 and 3. Mean 24-hour air temperature is shown in Fig. 2. Minimal and maximal temperatures in Meteorological Station in Agricultural University in Warsaw in October 2002 – April 2003 are shown in Fig. 4. October 2002 was cold and in early November 24-hour mean temperatures happened to be below 0°C. In mid-December –17,3°C was recorded and a few days later –19,8°C. The lowest 24-hour mean temperature was recorded in January (–22,5°C). In March and early April temperatures tended to be below or around 0°C. All winter long there was a thick snow cover although the 24-hour temperatures were above 0°C at times (Fig. 3). At the beginning of April, after the thaw and the melting of snow cover and a dozen of warm days with the temperature above 0°C a few-day cooler period returned and the temperature fell below 0°C. In the second half of April it warmed up fairly quickly and it was possible to begin the uncovering and cutting of shrubs (Fig. 2).

MATERIALS AND METHODS

To estimate resistance to frost, several-year-old shrubs of 33 historical rose varieties from the collection of Botanical Garden were used (all the shrubs of the variety examined were used, which means that in some cases the observations were done on single shrubs) (table 1). The shrubs came from various sources and were budded on various rootstocks (*Rosa multiflora, Rosa rubiginosa, Rosa laxa, Rosa canina*).

Prior to the frosty winter the shrubs had been treated with a small dose of mineral manure with microelements (1–2 kg/100 m^2 of "Azofoska") and after flowering with a liquid fertilizer "Florogama" into soil and "Ekolist" onto the leaves, the dose as prescribed by the producer. For the winter 2002/2003 most roses were covered with a small pile of soil to protect their basal parts up to 25–30 cm. A few had their crowns covered with straw or paper (table 1). In the preceding years (1999–2001) the borders had been littered with bark.

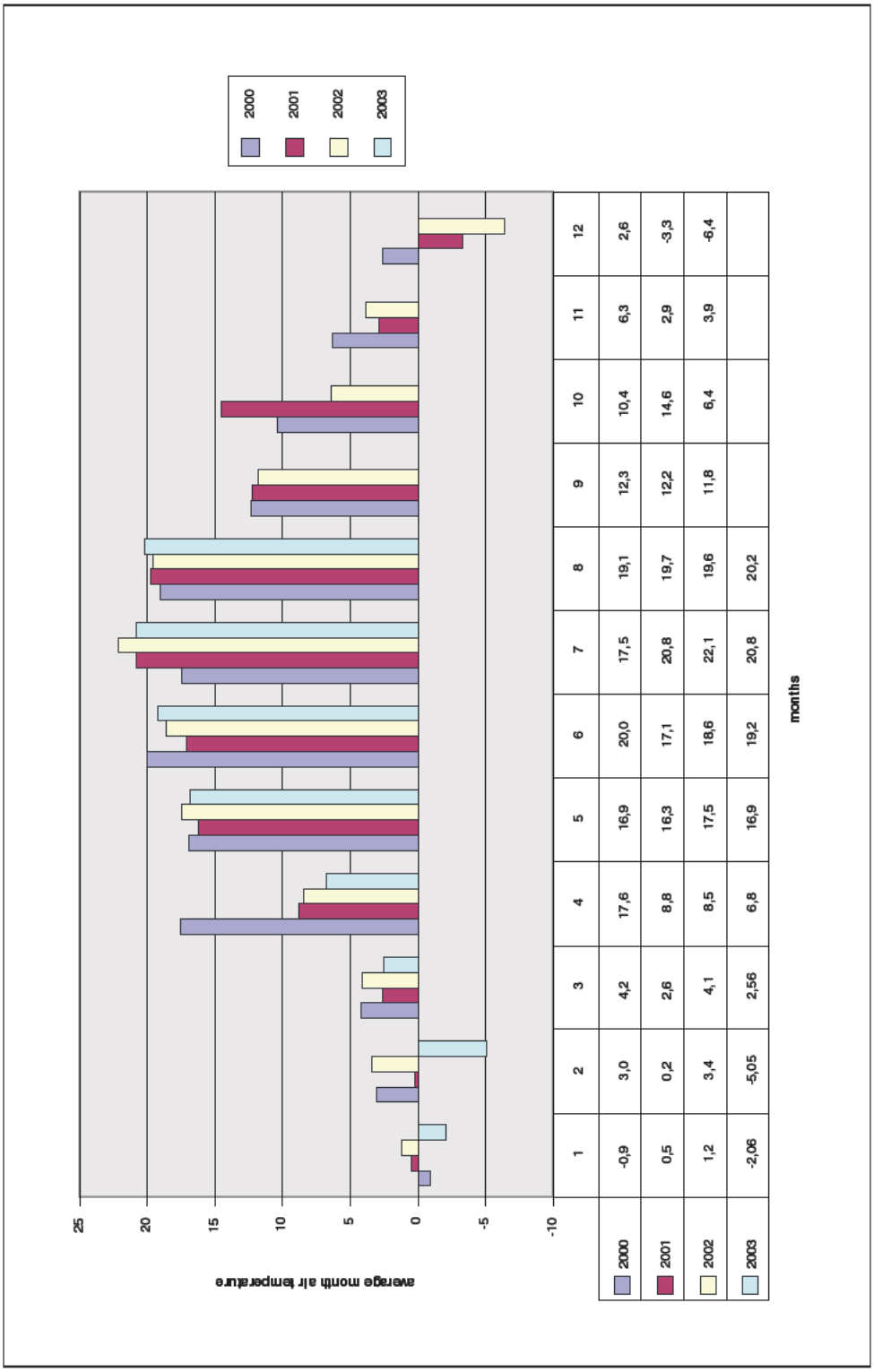
In spring frost damage to shrubs was estimated and the number of shrubs damaged by frost and those which needed to have their shoots cut out was expressed in percentage and the losses were assessed according to the scale by Łukasiewicz (1992) for deciduous plants, omitting 2, 8 and 9 as they were not applicable in this case.

0 – no damage to plants
1– darkened vascular bundles on the shoots but the buds develop
2– flower buds frozen
3 – leaf buds frozen
4 – one-year-old shoot tips frozen
5 – one-year-old shoots frozen or with living bases only
6 – two and more-year-old shoots frozen
7– shoots frozen to the ground (snow) but the undamaged parts (bases of shoots or roots) grow new shoots
8 – cracked trunks
9 – trunk or branch rot
10 – the entire plant frozen (no sings of regeneration).

Additionally, it was noted how high from the ground the damaged shoots needed to be pruned. At the beginning of May the selected varieties had the number and length of their new growths measured. In vegetative season the flowering time of the shrubs was noted.

RESULTS AND REMARKS

Polish winters happen to be very frosty and rose shrubs, particularly more sensitive varieties can be badly affected or even die. The least resistant to frost are thea hybrids, while floribundas and polyanthas are less susceptible. After the severe winter of 1986/87, 260 roses were badly damaged, which accounts for 76.9% of the 338 thea hybrids and floribundas tested in the collection of ground roses from the Division of Ornamental Plants of Agricultural Academy in Poznań. Among the varieties which can be regarded as resistant, provided the shrubs are covered with a small pile of soil, there are old varieties, which makes them noteworthy again. (Czekalski et al. 1990). Most roses, even if only slightly damaged by frost need to be pruned to



	1	2	3	4	5	6	7	8	9	10	11	12
2000	-0,9	3,0	4,2	17,6	16,9	20,0	17,5	19,1	12,3	10,4	6,3	2,6
2001	0,5	0,2	2,6	8,8	16,3	17,1	20,8	19,7	12,2	14,6	2,9	-3,3
2002	1,2	3,4	4,1	8,5	17,5	18,6	22,1	19,6	11,8	6,4	3,9	-6,4
2003	-2,06	-5,05	2,56	6,8	16,9	19,2	20,8	20,2				

Fig. 1. Average mont air temperature [°C] in 2001–2003 in Botanical Garden.

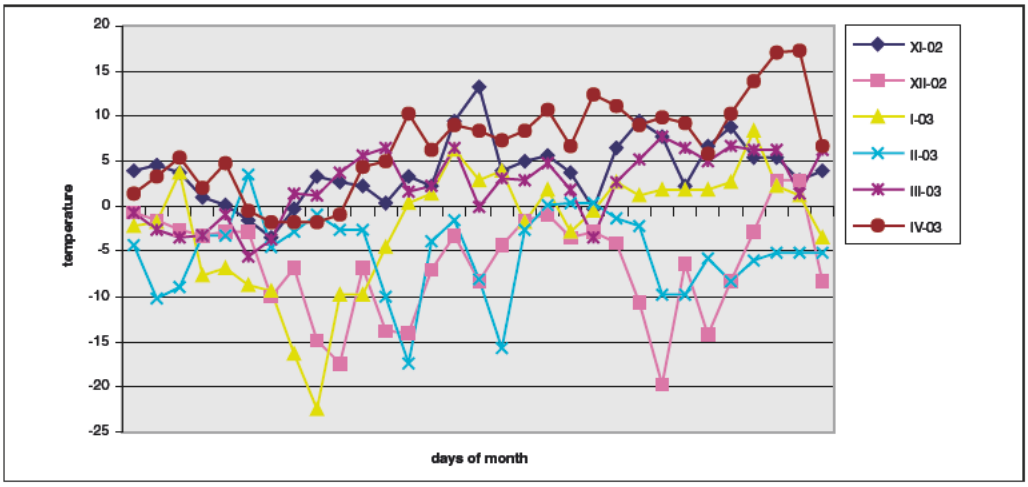
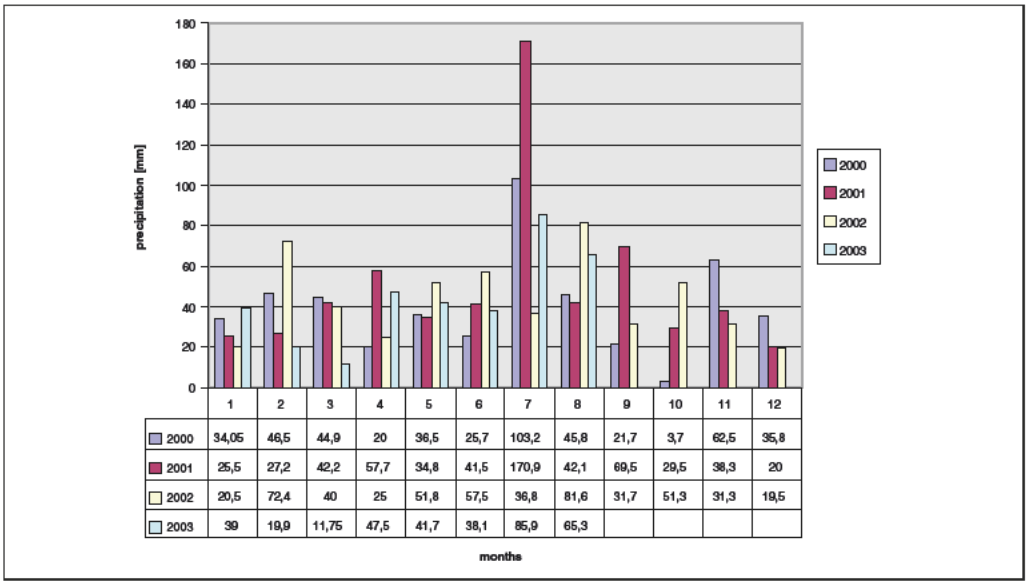


Fig. 2. Average twenty-four hour air temperature [°C] from November 2002 to April 2003 in Botanical Garden.



	1	2	3	4	5	6	7	8	9	10	11	12
2000	34,05	46,5	44,9	20	36,5	25,7	103,2	45,8	21,7	3,7	62,5	35,8
2001	25,5	27,2	42,2	57,7	34,8	41,5	170,9	42,1	69,5	29,5	38,3	20
2002	20,5	72,4	40	25	51,8	57,5	36,8	81,6	31,7	51,3	31,3	19,5
2003	39	19,9	11,75	47,5	41,7	38,1	85,9	65,3				

Fig. 3. Month precipitation [mm] in 2001–2003 in Botanical Garden.

the healthy point, and frost damage 6 according to Łukasiewicz (1992) scale requires cutting to the ground. Leaving behind the shoots which are insignificantly affected by frost, especially in the case of more sensitive varieties, results in their drying up in vegetative season. Moreover, they are prone to fungal diseases, infecting the post-cutting injuries, mechanical damages induced by pests and frost (Wojdyła and Wiśniewska-Grzeszkiewicz 2002).

Park roses have always been recommended for green areas and gardens due to their resistance to frost and other difficult conditions and their low requirements (Sieber 1989, Jerzy et al 1992, Grimm at al 1996, Gustavsson 1999), which is important in terms of cultivation and application potential. Such species as Damask (*Rosa x damascena* Mill), Albas (*Rosa alba* L.), Centifolias (*Rosa x centifolia* L.), Scotch Rose (*Rosa pimpinellifolia* L.) have always been

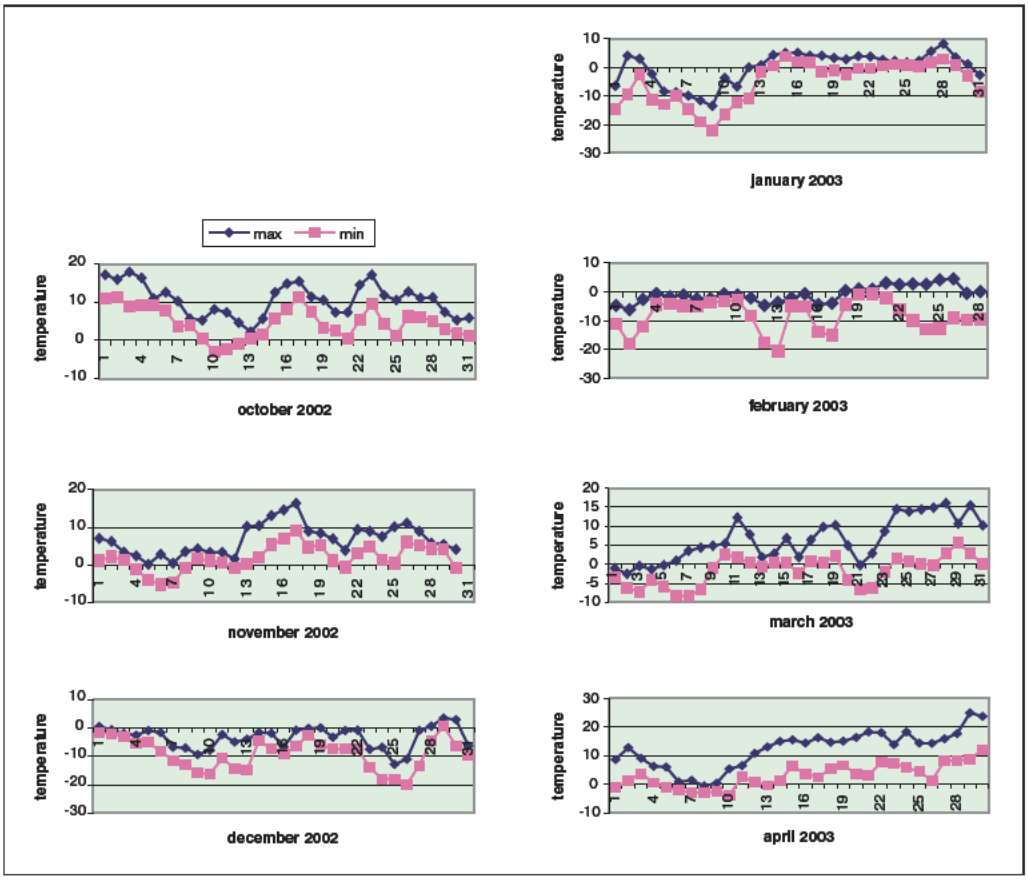


Fig. 4. Minimal and maximal temperatures [°C] in winter season 2002/2003 in Meteorogical Station of Agricultural Academy in Warsaw.

recognized as remarkably frost resistant like most of the varieties originating from wild roses (Jerzy at al. 1992), whereas the varieties cultivated in the 19th and 20th century, e.g. Bourbons, Hybrid Perpetuals display lesser resistance to frost.

The majority of historical park roses from the collection of Botanical Garden overwintered exceptionally well, only some of them sustaining minimal damage which had no bearing on their development and flowering. These were the varieties originating from *Rosa rugosa, Rosa gallica, Rosa moyesii, Rosa beggeriana, Rosa alba, Rosa damascena* and *Rosa centifolia*. Bourbon, Portland and Hybrid suffered greatly as a result of frost, however these varieties have their shoots drastically shortened in spring which means that the frost damage didn't diminish their ornamental value.

Most affected by the winter were climbers and ramblers. Severe frost damage was observed in the roses originating from *Rosa muliflora* Thunb. for example 'Veilchenblau', which needed to have its shoots cut out at the base and out of 4 shrubs in the collection only one began to grow. For 'Zephirine Drouhin (Bourbon) the winter was also very hard and its thick shoots needed cutting when the base of the shrub was uncovered but out of 4 plants all survived. 'Excelsa', 'Léontine Gervais', 'François Juranville', all originating from *R. wichuraiana* Crép. found the winter hard and the variety 'American Pillar' was likewise badly damaged, but drastic cutting was, in this case, necessitated by fungal infection causing shoot decay (table 1).

Table. 1. Evaluation of damage to historical rose shrubs caused by frost 2002/2003

Variety	Origin and grower	Rootstock	Year of planting in collection	Number of shrubs	Percentage of frost damage to shoots	Scale of frost damage*	Height of cutting from the ground [cm]	Average number of young shoots per shoot	Average length of young shoots	Note	Time of the first flowering
1	2	3	4	5	6	7	8	9	10	11	12
F. J. Grootendorst	*Rosa rugosa* Thunb., de Goey 1918	no data	spring 1998	3	slightly	4	normal cutting	22.5	23.4	uncovered	1.06–5.07
Agnes	*Rosa rugosa* Thunb., Saunders 1900	*R. laxa*	spring 2001	1	slightly	4	normal cutting	–	–	uncovered	20.05–7.07
Mrs Anthony Waterer	*Rosa rugosa* Thunb., Waterer 1898	*R. multiflora*	autumn 2001	2	slightly	4	normal cutting	113 5	11.1	uncovered	5.06–18.06
Rugeaux du Japon	*Rosa rugosa* Thunb.	*R. multiflora*	autumn 2001	1	slightly	0	normal cutting	76.5	21.3	uncovered	25.05–17.07
Nevada	*Rosa moyesii* Hems. et Wils., P. Dot 1927	on own roots	spring 1998	3	slightly	0	normal cutting	–	8.9	uncovered	25.05-10.07
Cardinal de Richelieu	*Rosa gallica* L., Laffay 1840	*R. laxa*	spring 1998	1	slightly	0	normal cutting	–	–	uncovered	25.05–15.07
Camaïeux	*Rosa gallica* L., Vibert 1830	*R. multiflora*	autumn 2000	2	slightly	4	normal cutting	205.0	13.2	covered with soil	1.06–10.07
Belle Hermine	*Rosa gallica* L., Vibert 1830	*R. multiflora*	autumn 2000	1	slightly	0	normal cutting	–	11.6	uncovered	1.06–20.07
Hurdalsrosen	Rosa x alba L., wprow. w 1858	on own roots	autumn 1999	4	slightly	0	normal cutting	–	14.6	uncovered	25.05–7.06
Maiden's Blush	*Rosa x alba* L.	*R. laxa*	spring 1998	1	slightly	0	normal cutting	–	13.7	uncovered	25.05–17.07
Shailer's White Moss	*Rosa x centifolia* var. *muscosa* 'Alba'	*R. laxa*	spring 1998	1	slightly	0	normal cutting	–	13.3	uncovered	25.06–25.07
Henri Matin	*R. x centifolia* var. *muscosa*, Laffay 1863	*R. laxa*	spring 2000	1	slightly	5	normal cutting	–	–	covered with soil	18.06–16.07
Polstjärnan	*Rosa beggeriana* Boiss., Wasastjärna 1937	on own roots	autumn 1999	3	slightly	0	normal cutting	–	19.5	uncovered	25.05–17.06

1	2	3	4	5	6	7	8	9	10	11	12
Zéphirine Drouhin	*Rosa x borboniana* Desp., Bizot 1868	*R. multiflora*	spring 1998	4	95	7	cutting under the surface of ground	11.5	3.3	regenerates well enough, poor flowering	–
Louise Odier	*Rosa x borboniana* Desp., Margottin 1851	no data	spring 1998	3	50	6	normal cutting	101 3	20.4	uncovered	1.06–5.07
Commandant Beaupereire	*Rosa x borboniana* Desp , Moreau et Robert 1874	*R. multiflora*	autumn 2001	2	90	6	3–4 buds, 10cm	35.5	10.9	covered with paper, regenerates well	1.06–20.07
Variegata di Bologna	*Rosa x borboniana* Desp., Bonfiglioli 1909	*R. multiflora*	autumn 2001	5	10	4	normal cutting	205.0	13.2	covered with soil	5.06–2.07
Prince Charlez	*Rosa x borboniana* Desp., wprow. 1842	*R. multiflora*	autumn 2000	3	70	6	7–8 buds	23.4	20.0	70% of the shoots damaged by shoot diseases	15.06–10.07
Léontine Gervais	*Rosa wichuraiana* Crép , Barbier 1903	*R. laxa*	spring 2000	1	60	6	40	–	–	covered with paper, no flowering	–
François Juranville	*Rosa x wichuraiana* Crép , Barbier 1906	*R. laxa*	spring 2000	1	60	6	40	–	–	covered with paper, regenerates well, no flowering	–
American Pillar	*Rosa wichuraiana* Crép., van Fleet 1902	*R. laxa*	spring 2001	1	60	6	40	–	–	the shoots damaged by shoot diseases, poor flowering	25.06–20.07
American Pillar	*Rosa wichuraiana* Crép., van Fleet 1902	*R. canina* ‘ Schmid’s Ideal’	autumn 1999	4	60	6	40	–	–	the shoots damaged by shoot diseases, poor flowering	29.06–20.07
Excelsa	*Rosa wichuraiana* Crép., Walsh 1909	*R. multiflora*	spring 1998	4	85	7	5 to 10	33.0	13.6	no flowering	–
Comte de Chambord	*Rosa x portlandica* West., Moreau – Robert 1860	*R. multiflora*	autumn 2000	1	70	6	7–8 buds	16.0	7.5	70% the shoots damaged on shoots diseases	15.06–15.07
Jacques Cartier	*Rosa x portlandica* West., Moreau – Robert, 1868	*R. rubiginosa*	autumn 1999	5	70	4	normal cutting	21.4	6.8	covered of soil	30.05–1.07
Ghislaine de Féligonde	*Rosa multiflora* Thunb., Turbat 1916	*R. laxa*	spring 2000	1	50	6	40	–	–	covered of paper	15.06–29.07

1	2	3	4	5	6	7	8	9	10	11	12
Veilchenblau	*Rosa multiflora* Thunb., Schmidt 1909	*R. multiflora*	autumn 1998	4	90	7/10	cutting under the surface of ground	–	–	3 shrubs were frozen, 1 poor regenerates, lack flowering	–
Mme Victor Verdier	*Rosa hybrida bifera*, Verdier 1863	*R. rubiginosa*	autumn 1999	4	70	4	normal cutting	26.7	10.8	covered of soil	30.05–1.07
Frau Karl Druschki	*Rosa hybrida bifera,* Lambert 1901	*R. canina* 'Schmid's Ideal'	autumn 1999	4	50	4	normal cutting	13.2	13.1	covered of soil	3.06–10.07
Rose de Rescht	*Rosa x damascena* Mill., upr. w Iranie	*R. rubiginosa*	autumn 1999	4	slightly	0	normal cutting	45.0	12.1	covered of soil	30.05–1.07
Poppius	*Rosa x stenbergii*, wprow. XIX wieku	on own roots	autumn 1999	6	slightly	0	normal cutting	–	8.8	uncovered	15.05–5.06
Persian Yellow	*Rosa foetida* var. *persiana* Rehder	on own roots	autumn 1999	4	10	4	normal cutting	116.0	8.0	10% the shoots damaged on shoot's diseases	25.05–7.06
Harisons Yellow	*Rosa x harrisonii* Rivers, wprow. 1830	on own roots	autumn 1999	7	30	4	normal cutting	336.0	10.2	uncovered	25.05–7.06
Mme Caroline Testout	*Rosa thea hybrida*, Pernet-Ducher 1890	*R. multiflora*	autumn 2000	2	60	6	6–8 buds, 30 cm	15.0	18.9	covered of paper	10.06–10.07

*scale of frost damage for deciduous plants by Łukasiewicz (1992)

In 2003 warmer days came around mid-April, which delayed vegetation. In May the greatest number of shoots were observed in park varieties e.g. 'Mrs Anthony Waterer', 'Harrisons Yellow', Variegata di Bologna while the smallest number of shoots were observed in more intensely pruned Hybrid Perpetual, Portland, Hybrid Tea, that is in the group characterized by lesser growth intensity and tillering and those roses which were badly damaged by frost. The same applies to the length of young shoots that grew in spring (Table 1). The shrubs of all the varieties except 'Zephirine Drouhin' and 'Veilchenblau' grew intensively.

Late spring affected flowering as well, which started later that year and was therefore shorter by a few days for the varieties flowering the earliest (early May). The varieties which failed to blossom that year were: 'Zéphirine Drouhin', 'Excelsa', 'François Juranville', 'Léontine Gervais', 'Veilchenblau' (Table 1). These blossom on two-year-old or older shoots, which had been cut out as a result of frost damage. 'Zéphirine Drouhin' had some flowers late summer (it blooms once only, in late June), which didn't have any ornamental value.

REFERENCES

Czekalski M., Oszkinis K., Żyła S. 1990. Uszkodzenia mrozowe róż powstałe podczas zimy 1986/1987. Ogrodnictwo 1-3: 44-45.

Grimm H. i W., Mielke H., Vemmer E. 1996. Rosensammlung zu Wilhelmshöhe. Rosenkreis des Vereins Deutscher Rosenfreude e. V. und Verein Roseninsel Park Wilhelmshöhe. Kassel.

Gustavsson Lars-Ake 1999. Rosenlexikon. Rosinante Forlag A/S. Kopenhaga.

Jerzy M., Żyła S., Czekalski M. 1992. Róże. PWRiL, Warszawa.

Łukasiewicz A. 1992. Zahamowanie rozwoju pąków u niektórych drzew iglastych po surowej zimie 1986/1987 i wynikająca stąd potrzeba uzupełnienia skali przemrożeń u drzew i krzewów. Biuletyn Ogrodów Botanicznych, Muzeów i Zbiorów, vol.1: 53-57.

Sieber J. 1989. Rosen für den ländlichen Siedlungsraum. Deutsche Baumschule, 9: 446-447.

Wojdyła A., Wiśniewska-Grzeszkiewicz H. 2000. Występowanie zamierania pędów na gatunkach i odmianach róż. Ogólnopolska Konferencja Różana „Róże w szkółce i pod osłonami", Skierniewice, 47-51.