

Scots roses in Northern Ukraine

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Abstract: The article presents the results of the evaluation of eleven Scots rose cultivars in the northern part of Ukraine due to its severe winter conditions. A range of variations regarding the bloom colour, bloom size, bloom type, flowering incidence, plant size was noticed. The evaluation showed the decorative value and considerable frost resistance of the varieties ‘Double White’, ‘Dunwich Rose’, ‘Frühlingsduft’, ‘Frühlingsgold’, ‘Frühlingsmorgen’, ‘Karl Forster’, ‘Mon Amie Claire’, ‘Red Nelly’, ‘Stanwell Perpetual’, ‘Suzanne’, and ‘William III’. The varieties studied can be used for decorative purposes in urban landscapes in the northern part of Ukraine.

Keywords: *spinosissimas*; ornamental qualities; winter damage; drought tolerance; Ukraine

Most rose cultivars successful in cold climate were derived from the following species: *Rosa rugosa* Thunb., *R. setigera* Michx., *R. laxa* Retz., *R. centifolia* L., as well as *R. spinosissima* L.

R. spinosissima and its cultivars are called Scots roses. Older *R. spinosissima* cultivars were also known as ‘Burnet roses’ (“burnet” is an English word for Pimpinella) (Krussman 1981). *R. spinosissima* has a European-Caucasian-Central Asian disjunctive areal with a disjunction in the Aral-Caspian lowlands (Meusel et al. 1965).

The disjunctivity of the areal indicates that it has been formed for quite a long time over several geological periods. The flowers of *R. spinosissima* are usually coloured white, but can sometimes be pink or yellow; with a size of 3–5 cm, they are single, cupped, opening flat, borne on short branches along the stems, the stamens are yellow and multiple; the foliage is small, smooth, fern-like, with 7–9 leaflets. Flowering

is early, abundant, but short (10–15 days). The hips are globular, black. The plant is erect, 2 m high, winter-hardy and drought-resistant. The plant spreads by suckers.

Based on *R. spinosissima* (syn. *R. pimpinellifolia*), Scots roses have been known since 1600.

Analysis of “The Comprehensive List of Roses in Cultivation or of Historical or Botanical Importance” (Modern roses 2007) showed that, in the 19th century, Jean Pierre Vibert (France), André Dupont (France), Louis-Joseph-Ghislain Parmentier (Belgium), Robert Austin (Scotland), Jacques-Louis Descemet (France) and, from 1819, Director of the botanical garden and nurseries of the Czar of Russia at Odesa, now – Ukraine (Rubtsova et al. 2007) were engaged in the selection of *R. spinosissima*, as well as Rudolf Geschwind, an Austro-Hungarian rose breeder of the beginning of the 20th century. Presumably by the beginning of the 20th century, more than

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1 200 cultivars derived from *R. spinosissima* had originated (Monder 2010, 2011; Boyd 2016). In the 1930s–1940s, Wilhelm Kordes bred eight varieties of Scottish roses of the Frühlings series in Germany: ‘Frühlingsanfang’, ‘Frühlingsduft’, ‘Frühlingsgold’, ‘Frühlingsmorgen’, ‘Frühlingsschnee’, ‘Frühlingss-tunde’, ‘Frühlingstag’, and ‘Frühlingszauber’. Griffith J. Buck in the USA is an author of seven varieties of the series “Prairie”: ‘Prairie Princess’, ‘Prairie Sailor’, ‘Prairie Squire’, ‘Prairie Star’, ‘Prairie Sunrise’, ‘Prairie Sunset’, and ‘Prairie Valor’ (1946–1985).

R. spinosissima was intensively used in breeding in Canada, resulting in twenty new varieties.

The selection of spinosissima hybrids continued in the 20th and 21st centuries; interest in them is due to their winter hardiness and low water needs. Breeders in Scandinavia actively breed new hybrids of Scots roses with more and more interesting new varieties appearing on the market every year (for example, the Tove Jansson variety of the Finnish selection) (Boyd 2016).

Breeders not only used the original species *R. spinosissima*, but *R. spinosissima* ‘Altaica’ was used most often – as the pollen parent and seed parent (Modern roses 2007).

Our goal was to study *R. spinosissima* and its cultivars in the conditions of Kiev (Northern Ukraine).

The northern border of the European part of *R. spinosissima*’s area lies in Ukraine. The variety is widespread in western, central and southern Ukraine, where it mainly grows on rocky slopes (Flora URSR 1954), indicating its winter hardiness, drought resistance and unpretentiousness to soil fertility. The drought tolerance mechanisms of this

species include small leaves and leaflets, the vegetative spread and early flowering (Waleed 2019).

MATERIAL AND METHODS

In 2013–2018, we monitored bushes of eleven rose cultivars derived from *R. spinosissima* (‘Double White’, ‘Dunwich Rose’, ‘Frühlingsduft’, ‘Frühlingsgold’, ‘Frühlingsmorgen’, ‘Karl Forster’, ‘Mon Amie Claire’, ‘Red Nelly’, ‘Stanwell Perpetual’, ‘Suzanne’, and ‘William III’) gathered in the collections of roses in the M.M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine and the National University of Life and Environmental Sciences of Ukraine in Kiev, Ukraine.

The varieties were obtained in the form of cuttings from the Main Botanical Garden, Moscow. The plants were bud-grafted onto the rootstock type *Rosa canina* L. Each cultivar was represented by 10–15 plants.

The shrubs were planted as single specimens in a space to allow them freedom of growth (Figure 1 – ‘Frühlingsduft’ and Figure 2 – ‘Karl Forster’).

The plants grew in dark grey podzolised soils with a rather deep cultivated layer enriched with compost (in the fall) and a complete inorganic fertiliser ($\text{NH}_4\text{H}_2\text{PO}_4 + \text{NH}_4\text{NO}_3 + \text{KCL}$ (NPK) 16 : 16 : 16) every 4 weeks during the growing season.

The irrigation frequency was 14 days between the irrigation during periods without rainfall.

Pruning was usually minimal. The bushes were not covered for winter.

The climate of the described area is continental (Table 1).



Figure 1. ‘Frühlingsduft’



Figure 2. ‘Karl Forster’



Figure 3. Hips of 'Red Nelly'



Figure 4. Hips of 'Frühlingsgold'

The average annual rainfall in Kiev is 641 mm, in some years, it varies from 400 to 795 mm.

The present study of the cultivars was conducted for the following traits: bloom colour, bloom size, bloom type, flowering incidence, plant size, and winter hardiness. During the flowering period, we randomly chose ten flowers from every cultivar and made the measurements.

The winter hardiness was determined by the 5-point method of Besschetnova (Besschetnova 1975), where 0 – the plant is completely frozen, 5 – the plants are not damaged.

RESULTS AND DISCUSSION

The varieties studied exhibited phenotypic divergence for the quantitative and qualitative parameters, namely the bloom colour, bloom size, bloom type, flowering incidence, and plant size (Table 2). The bloom colour varied from white to cherry-red, the bloom size from 5 to 10 cm, and the bloom type from single to very-double.

Table 1. The minimum and maximum temperature (t , °C) in 2013–2018

Year	Min t (°C)	Max t (°C)
2013	–14.5	32.5
2014	–23.4	34.6
2015	–11.0	33.0
2016	–19.4	34.0
2017	–18.4	33.0
2018	–22.0	32.8

Scots roses have different growth habits. The cultivars 'Frühlingsduft', 'Frühlingsgold', 'Frühlingsmorgen', and 'Karl Forster' have a considerable rose bush height. The plants of 'Frühlingsduft' and 'Stanwell Perpetual' are spreading. The shrubs of 'Double White', 'Karl Forster', and 'Red Nelly' form thick colonies with root suckers.

'Double White' showed a tendency to vegetatively expand beyond the experimental area.

Most of the examined spinosissimas had a flowering period starting almost a month earlier in comparison with Hybrid Tea, Floribunda, Grandiflora, Miniature, and Climbing roses. The earliest-flowering cultivars were 'Double White', 'Red Nelly', 'Frühlingsmorgen', and 'Frühlingsduft'.

The flowering of the examined cultivars derived from *R. spinosissima* began early, in mid-May to the beginning of June. Five cultivars ('Frühlingsduft', 'Karl Forster', 'Mon Amie Claire', 'Stanwell Perpetual', and 'Suzanne') had repeated flowering. The first flower dates were recorded as: 'Double White' – 09. 05. 2018, 'Dunwich Rose' – 17. 05. 2016, 'Frühlingsmorgen' – 10. 05. 2018, 'Frühlingsgold' – 18. 05. 2016, 'Red Nelly' – 12. 05. 2018, 'Karl Forster' – 16. 05. 2019, 'Frühlingsduft' – 13. 05. 2016, 'Mon Amie Claire' – 20. 05. 2018, 'William III' – 18. 05. 2018, 'Suzanne' – 25. 05. 2019, and 'Stanwell Perpetual' – 29. 05. 2019.

Significant advantages of the Scots Roses include numerous decorative hips ('Red Nelly' (Figure 3), 'Frühlingsgold' (Figure 4), 'Frühlingsmorgen' (Figure 5), and 'Karl Forster', 'Suzanne' (Figure 6).

One of the basic factors guaranteeing the success of the cultivation is a sufficient tolerance to win-

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Table 2. Qualitative and quantitative traits of Scots roses (years 2013–2018, $\pm$ standard deviation, sample size, $n = 10$)

Name	Bloom colour	Bloom type	Flowering incidence	Bloom size (cm)			Plant size (height) (m)		
				M $\pm$ m	Min–max	CV (%)	M $\pm$ m	Min–max	CV (%)
'Double White'	white	semi-double	once	4.00 $\pm$ 0.17	3.7–4.3	4.25	1.50 $\pm$ 0.08	1.40–1.62	5.3
'Dunwich Rose'	light yellow	semi-double	once	5.02 $\pm$ 0.17	4.7–5.3	3.39	0.58 $\pm$ 0.10	0.48–0.74	17.24
'Frühlingsduft'	pink with yellow centre	double	repeat	7.99 $\pm$ 0.17	7.7–8.2	2.13	2.94 $\pm$ 0.46	2.20–3.60	15.64
'Frühlingsgold'	yellow	semi-double	once	10.11 $\pm$ 0.33	9.8–10.3	3.26	1.97 $\pm$ 0.26	1.65–2.30	13.20
'Frühlingsmorgen'	pink	single	once	8.00 $\pm$ 0.17	7.7–8.2	2.13	2.18 $\pm$ 0.30	1.85–2.66	13.76
'Karl Forster'	white	double	repeat	10.12 $\pm$ 0.37	9.6–11.0	3.65	2.52 $\pm$ 0.30	2.20–3.00	11.90
'Mon Amie Claire'	pink	semi-double	repeat	6.04 $\pm$ 0.26	5.6–6.5	4.30	0.98 $\pm$ 0.10	0.85–1.14	10.20
'Red Nelly'	cherry-red	single	once	7.02 $\pm$ 0.25	6.7–6.5	3.56	1.01 $\pm$ 0.14	0.84–1.20	13.86
'Stanwell Perpetual'	light pink	very double	repeat	7.98 $\pm$ 0.27	7.6–6.4	3.38	1.49 $\pm$ 0.16	1.24–1.72	10.74
'Suzanne'	pink	double	repeat	5.07 $\pm$ 0.19	4.8–5.3	3.75	1.84 $\pm$ 0.18	1.65–2.15	9.78
'William III'	magenta	semi-double	once	6.98 $\pm$ 0.26	6.7–7.6	3.72	0.80 $\pm$ 0.09	0.68–0.90	11.25

Note: min – minimum values; max – maximum values; CV – coefficient of variance



Figure 5. Hips of 'Frühlingsmorgen'

ter conditions. In the northern part of Ukraine, all spinosissima cultivars showed high and stable frost resistance (5 points by the method of Besschetnova (1975)).

Our results confirm the decorative value and outstanding frost tolerance of eleven spinosissima cultivars ('Double White', 'Dunwich Rose', 'Frühlingsduft', 'Frühlingsgold', 'Frühlingsmorgen', 'Karl Forster', 'Mon Amie Claire', 'Red Nelly', 'Stanwell Perpetual', 'Suzanne', and 'William III').

The studied varieties can be used for decorative purposes in urban landscapes of Northern Ukraine.

There are few cultivars derived from *R. spinosissima* in the M.M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine and the National University of Life and Environmental Sciences of Ukraine in Kiev. We aimed to increase



Figure 6. Hips of 'Suzanne'

the collection of Scots roses in these institutions. Furthermore, we are planning to introduce varieties bred by Jacques-Louis Descemet, the Director (1818–1833) of the botanical garden in Odesa in Ukraine, as well as modern breeding varieties.

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