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## REPRODUCTIVE ABILITY ROSA L. IN LANDSCAPING PODILLYA OF UKRAINE

### **Abstract.**

*Rosa L. has long attracted the attention of researchers due to their great economic, social and multifunctional value and various areas of use in ornamental horticulture, industrial floriculture, essential oil production, vitamin industry. Numerous varieties and hybrids of species of the genus Rosa are presented in the conditions in the conditions of the botanical garden «Podillya» of VNAU. Today, species of the genus Rosa are the most popular representatives, characterized by high durability and reliability. As a perennial, roses produce annual stem growth during spring and summer, dying in the fall and remaining dormant during the winter. Growing varieties and hybrids of species of the genus Rosa will significantly enrich the ornamental flora on the basis of the botanical garden «Podillya» and the park area of Vinnytsia National Agrarian University.*

**Keywords:** *Rosa L., reproduction, garden group, landscaping, introduction, variants of use.*

**Formulation of the problem.** Growing roses by the method of green cuttings has long been known, but has not yet gained mass introduction in Ukraine. The work on the propagation of root roses is carried out by outdated methods and it needs improvement. Modern literary sources shed more light on the reproduction and agricultural techniques of grafted roses, which are traditionally used in ornamental landscaping.

Problems of grafting and cultivation at the present level of root roses are less studied. There is a lack of the latest technologies for their intensive reproduction and cultivation in Ukraine. Therefore, the improvement of traditional, the introduction of modern technologies for the production of root garden material of roses, the selection of the appropriate range for effective use in green building, the creation of sustainable durable flower and ornamental plants are very important.

### **Analysis of recent research and publications.**

Rosa L. – one of the most popular and oldest plants in the history of ornamental horticulture. Rose twists are an indispensable component in vertical landscaping. The study of the historical stages of introduction and cultivation of plants allows to analyze the main trends in culture, identify promising gene pool for further introduction and selection process and avoid negative consequences, thanks to centuries of experience in the genus Rosa L.

Wild roses, not inferior in beauty and aroma to the most exquisite garden varieties, grow in temperate and warm regions of the northern hemisphere. And in modern cultural gardening, a huge number of varieties and hybrids of roses are pleasing to the eye and delight not only florists and landscape designers, but also people who are far from these activities, who just know how to appreciate the beautiful. Cultivated species of this plant are divided into garden roses and park roses, and of all known groups of garden roses more than other popular shrub roses, tea-hybrid, floribunda roses, grandiflora,

polyanthus roses, climbing roses, miniature and ground cover.

The species composition of dog rose according to various authors is 180-400 species. The modern world assortment of ornamental roses has about 30,000 cultivars. Conservation, increase and rational use of this huge phytodiversity, as well as all biodiversity in general, is of great scientific and economic importance. Species of the genus Rosa are distributed in Europe, Asia, North America and North Africa within the Holarctic and Paleotropic kingdoms. Roses are known in the culture for about 5 thousand years, in the gardens of Ukraine the beginning of the cultivation of roses dates back to the XIX century. The first mention of roses in Ukraine dates back to the XVIII century.

Since the XIX century, the culture of roses has gained significant scale in Ukraine. A huge number of studies of species and varieties of the genus Rosa in different areas. The contribution of domestic scientists to the formation and development of these studies is significant. Due to the important economic and social importance of species and varieties of the genus Rosa, it is necessary to shed more light on the history of its research, many facts of research development, little-known biographies of many researchers of various aspects of the genus Rosa. Isolated essays in some areas and brief reviews on anniversaries do not give a general picture of the formation and development of research on the genus Rosa in Ukraine.

Literary sources, from the history of research of the genus Rosa, relate mainly to the world context - the history of culture, selection, classification.

Numerous varieties and hybrids of species of the genus Rosa are presented in the conditions in the conditions of the botanical garden «Podillya» of Vinnytsia National Agrarian University. Today, species of the genus Rosa are the most popular representatives, characterized by high durability and reliability. As a perennial, roses produce annual stem growth during spring

and summer, dying in the fall and remaining dormant during the winter. Growing varieties and hybrids of species of the genus *Rosa* will significantly enrich the ornamental flora on the basis of the botanical garden «Podillya» and the park area of Vinnytsia National Agrarian University.

**Presenting main material.** The material for the study were rose plants brought from natural places of growth. The following rose cultivars were observed in the study: 'Mein Muenchen', 'Red Intuition', 'Violette Parfume', 'Cordula', 'Rotilia', 'Scarlet Meilandecor'. The research was carried out by transferring live plants from nature and various botanical gardens, arboretums and private collections. Plant care was carried out in accordance with the agronomic requirements of the species on the basis of generally accepted methods. Plants were grown with minimal use of agricultural techniques, namely, weeding and watering.

The purpose of this study was to determine the effect of growth regulator Kornevin on the process of rooting cuttings.

The use of roses of different groups in the exhibitions of the Podillya Botanical Garden was studied on the basis of the analysis of archival documents, monographic materials and the existing condition of the plantations of the architectural and exposition area of VNAU.

**Results.** Growing roses by the method of green cuttings has long been known, but has not yet gained mass introduction in Ukraine. The work on the propagation of root roses is carried out by outdated methods and it needs improvement. Modern literature sources shed more light on the breeding and farming techniques of grafted roses, which are traditionally used in ornamental landscaping. Analysis of research on this prob-

lem. The work is based on our own results of determining the influence of growth regulator "Kornevin" on the process of rooting cuttings of roses ('Mein Muenchen', 'Red Intuition', 'Violette Parfume', 'Cordula', 'Rotilia', 'Scarlet Meilandecor') on the basis of Kremenets botanical garden.

The cuttings were cut according to the standard method and immersed for 15 min in a pale pink  $KMnO_4$  solution for disinfection. After that, half of the cuttings of each variety were placed for 16 hours in the growth regulator "Kornevin" lower sections. The solution was prepared in a plastic vessel, dissolving with water according to the instructions. Cuttings that were not treated with growth stimulant were placed in a vessel with water.

After 16 hours, the cuttings were removed from the solution, washed their lower sections and planted in a greenhouse with a pre-prepared substrate. The further process of care of cuttings was carried out according to the generally accepted method of green grafting.

The main stages that were recorded during the experiment were:

- the beginning of yellowing of leaves;
- the beginning of callus formation and the number of cuttings that formed the callus;
- the beginning of root formation and the number of plants that have taken root.

Passage of these stages is the main sign of the beginning of the process of rooting.

The duration of this stage is the same for both groups and is eight days from the start of cultivation. Upon further observation, it was noted that the yellowing and death of leaves was faster in plants of the floribunda group, and more intense in specimens treated with growth regulator. The next stage in rooting cuttings – the process of callus formation (Table 1).

Table 1

**The period of rooting of cuttings of roses during processing growth regulator «Kornevin» (2018-2020)**

Variety	Cuttings treated with a regulator		Control	
	substrate - peat + sand + deciduous soil	substrate - deciduous soil	substrate - peat + sand + deciduous soil	substrate - deciduous soil
Number of days				
'Mein Muenchen'	17	30	14	21
'Red Intuition'	17	30	14	21
'Violette Parfume'	17	30	14	21
'Cordula '	24	33	20	22
'Rotilia'	23	33	20	22
'Scarlet Meilandecor'	23	33	20	22

Based on the obtained data (Table 1), we can conclude that the fastest callus formation process took place in groups of varieties of twisted roses treated with Kornevin, which were cultivated in the substrate peat + sand + deciduous soil. In specimens not treated with growth regulator, the process of callus formation occurred three days earlier than in treated. When cultivating cuttings treated with the regulator in a deciduous soil substrate, callus was formed more slowly and nine days later in control cuttings. It should also be noted that the callus in the treated cuttings in the substrate of deciduous soil was formed eight days later than in the substrate peat + sand + deciduous soil, and the difference between the control cuttings in different substrates was 13 days.

In the group of floribunda roses, the process of callus formation was slower, but the same pattern was observed - better callus formation in the substrate peat + sand + deciduous soil and its faster formation in untreated cuttings.

Callus formed faster in 'Scarlet Meilandecor' and 'Rotilia' varieties – after 20 days on cuttings of control (substrate – peat + sand + deciduous soil) and 23 days – on cuttings treated with "Kornevin" (substrate – peat + sand + deciduous soil), and 22 days – when cultivated in a substrate of deciduous soil, 33 – when treated with a regulator (Table 2).

**Callus formation of rose cuttings during processing  
growth regulator «Korenevin» (2018-2020)**

Variety	Cuttings treated with a regulator				Control			
	substrate - peat + sand + deciduous soil		substrate - deciduous soil		substrate - peat + sand + deciduous soil		substrate - deciduous soil	
	quantity, items.	%	quantity, items	%	quantity, items.	%	quantity, items	%
'Mein Muenchen'	9	90	7	70	9	90	8	80
'Red Intuition'	10	100	9	90	8	80	7	70
'Violette Parfume'	9	90	8	80	10	100	7	70
'Cordula '	10	100	9	90	10	100	10	100
'Rotilia'	10	100	8	80	10	100	9	90
'Scarlet Meilandecor'	10	100	10	100	10	100	10	100

Therefore, the highest rate of callus formation was in the floribunda group, 'Scarlet Meilandecor', and the lowest – in the twisted rose 'Mein Muenchen'. Among

other roses, most specimens formed a callus in the variety 'Red Intuition', 'Cordula' – 9-10 pieces.

After the process of callus formation, the process of rooting began, its results are shown in table 3.

Table 3

**The level of rooting of rose cuttings during processing  
growth regulator «Korenevin» (2018-2020)**

Variety	Cuttings treated with a regulator постр «Корневін»				Control			
	substrate - peat + sand + deciduous soil		substrate - deciduous soil		substrate - peat + sand + deciduous		substrate - deciduous soil	
	term of formation, days	quantity, items.	term of formation, days	кількість, шт.	term of formation, days	quantity, items.	term of formation, days	quantity, items.
'Mein Muenchen'	48	6	60	3	52	3	60	2
'Red Intuition'	34	7	44	7	34	4	46	3
'Violette Parfume'	34	5	56	2	40	3	60	2
'Cordula '	24	6	34	6	24	2	37	2
'Rotilia'	24	6	34	5	24	2	37	1
'Scarlet Meilandecor'	20	9	28	8	21	5	34	4

The highest level of root formation was observed in cuttings of all varieties that were cultivated in the substrate peat + sand + deciduous soil when treated with growth regulator "Kornevin".

The best results were shown by the variety 'Scarlet Meilandecor': in 20 days nine cuttings in the substrate of peat + sand + deciduous soil using a growth regulator and five cuttings after 21 days in the control. In the treated cuttings, which were cultivated in a substrate of deciduous soil, the roots were formed in eight specimens on day 28, in the control - on day 34 in four cuttings. "Rotilia" when treated with a growth regulator took root in a substrate of peat + sand + deciduous soil by 60% in 24 days of cultivation, without treatment in the same substrate, the percentage of rooting was 20% in 24 days. While in the deciduous soil substrate, these figures were only five cuttings in 34 days when treated with "Kornevin" and one cutting in 37 days without treatment.

Six 'Cordula' cuttings were rooted in 24 days using a growth regulator and two in 24 days without treatment in a substrate of peat + sand + deciduous soil. Only after 34 days, the cuttings treated with Kornevin formed roots in the substrate of deciduous soil, and in the control – two cuttings in 37 days.

For twisted roses, the best results were observed in the variety 'Red Intuition' – seven cuttings in 34 days in a substrate of peat + sand + deciduous soil when treated with growth regulator, while in the variety 'Mein Muenchen' only 48 days later formed roots on six cuttings under the same cultivation conditions. Without treatment in this substrate, these varieties showed the following results: in 'Red Intuition' – four cuttings in 34 days and three – in 52 days in 'Mein Muenchen'. In the deciduous soil substrate for 'Red Intuition' the following data were obtained: when treated with a growth regulator, seven cuttings formed roots in 44 days and only three – without treatment in 46 days. In 'Mein Muenchen' in the control substrate for 60 days the roots appeared in two cuttings and only one more – when treated with "Kornevin". In 'Violette Parfume', the rooting results are five cuttings in 34 days in the substrate of peat + sand + deciduous soil in the treated cuttings and three – in 40 days in the control. In the control substrate of deciduous soil of this variety, the percentage of cuttings that formed roots without treatment was two in 60 days of cultivation, and with treatment - three on the 56th day.

It is established that *I.pumila*, *I.hungarica* (end of April – beginning of May) differ in early flowering. *I.*

*orientalis* and *I. ensata* bloom relatively late (bloom until July). Thus, with the help of a group of studied roosters, you can ensure continuous flowering from late April to July. It was found that the total duration of flowering in the studied species was observed from 6-10 days in *I. hungarica*, to 16-20 days in *I. japonica* with the maximum number of flowers on the peduncle from 1 pc. in *I. pumila*, up to 3-4 pcs. in *I. musulmanica*. Due to the variety of colors, different flowering periods, ecological diversity, the studied species are quite valuable plants for landscaping: group and solitary plantings, flowerbeds, mixborders, borders, in rosaries, to create Japanese gardens, ponds and monosad. The created collection of species and varieties of irises can be used for further study of their biological features, reproduction and wide use in landscaping and partly as a gene pool of species in need of protection. Rare, in particular, endemic species bloom profusely and bear fruit, which is the basis for their possible use to restore natural populations.

**Conclusions.** Thus, the highest results were observed in the variety 'Red Intuition', and the lowest – 'Violette Parfume'. It should also be noted that the process of rooting took place faster in all varieties in the substrate of peat + sand + deciduous soil, and in cuttings treated with "Kornevin", the rooting process was faster and more cuttings were rooted. After analyzing the obtained data, we can conclude that the varieties in which the processes (yellowing of leaves, callus and root formation) were more intense, gave greater survival, and in others – vice versa. Callus was the first to form on the roses of a group of twisted roses. This process was also faster in plants treated with "Kornevin".

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