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Evaluation of the Morphological and Biological, And Regenerative Capacity of Stem Cuttings of Actinidia (*Actinidia* Lindl.) Cultivars, When Introduced Into Industrial Culture in the Right-Bank Forest-Steppe Zone of Ukraine

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ABSTRACT

The article deals with the results of studies on the research of the morphological and biological features of rhizogenesis of stem cuttings and optimization of distinct stages of self-rooted reproduction of promising introduced cultivars of actinidia for growing high quality seedlings in order to use them in landscaping residential areas of the Right-Bank Forest-Steppe Zone of Ukraine. The studied cultivars of actinidia are characterized by high vegetative productivity, which is the biological basis for their propagation by stem cuttings.

It has been demonstrated that self-root propagation by stem cuttings facilitates the acceleration of the cultivation of introduced cultivars of actinidia seedlings largely; however, the basis of adventive root formation of this garden culture is a weak ability to regenerate adventive roots from the stem parts of growth shoots. In addition, the propagation of actinidia by cuttings has its own technological features, which depend on the growth and development of parental plants, the selection of cuttings on the shoot, the dates of propagation, the use of biologically active substances, the creation of optimal rooting conditions, etc.

The results of green stem cuttings rooting of actinidia cultivars, depending on the dates of propagation, the type of shoot and its metameric structure are presented in the study. It was determined that green stem cuttings of the studied actinidia cultivars have a weak regenerative capacity and are medium-rooted. The use of α-naphthylacetic acid (α-NOA) at concentrations of 10-15 mg/l helps to increase their regenerative capacity, shorten the growing time and increase the yield of standard seedlings.

Keywords: actinidia, cultivar, phenological phases of plant development, parental plants, stem cuttings.

INTRODUCTION

Cultivars of the genus *Actinidia* Lindl. species — *Actinidia kolomikta* (Rupr. Et Maxim.) Maxim., *Actinidia arguta* (Siebold et Zucc.) Planch. ex Miq., *Actinidia purpurea* Rehd., *Actinidia polygama* (Siebold et Zucc.), *Actinidia chinensis* Planch. take a special place among the unconventional promising introduced plants because they are interesting not only for their biology, ecology, geography and history, but also for their great practical value. They are gaining great popularity due to their unpretentiousness to growing conditions, fast fertility, annual fruiting, high vitamin value of fruits, leaves and shoots.

The introduction of promising and new cultivars of actinidia into the practice of landscaping involves the development of techniques and methods for their reproduction. The development of effective technologies and methods of reproduction and cultivation contributes to obtaining high quality planting material in the required quantity. In solving this problem, a significant role belongs to the simplest and most accessible in wide industrial practice, artificial method of vegetative propagation by stem cuttings, which is the most efficient in terms of speed and quality of mass cultivation of planting material. Own-rooted planting material is genetically identical to the parental plant.

The process of adventive roots formation on stem cuttings of woody and shrub plants, especially of climbing plants, is complicated, insufficiently studied, and largely depends on climatic and weather factors. This kind of research is of a regional nature and plays an important role in the development of optimal propagation technologies for promising plants in new natural and climatic conditions. Optimization of distinct stages of own-rooted reproduction of new introduced actinidia cultivars and the development of complex technological methods are becoming relevant, in particular, for the cultivation of high-quality seedlings in order to use them in the creation of landscape designs in the conditions of the Right-Bank Forest-Steppe Zone of Ukraine. Treatment of the cuttings with biologically active substances, compliance with the optimal

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timing of their harvesting and planting for rooting, growing conditions, the dates of transplanting rooted cuttings, growing crops of own-rooted plants allows to get marketable seedlings much faster with their greater output per unit area.

Cultivation of planting material of species and cultivars of *Actinidia* Lindl. from stem cuttings has its specific features. Therefore, the study of the regenerative capacity of green stem cuttings with the development of distinct agro-technological methods of reproduction in the conditions of the Right-Bank Forest-Steppe Zone of Ukraine aroused considerable interest. In the process of work, it was supposed to do the following: to assess the regenerative capacity of green stem cuttings depending on the biological characteristics of the cultivar, to define the optimal dates of harvesting and planting them for rooting, to determine the effect of the type of cuttings and its metameric structure, and to determine the optimal doses of biologically active substances of auxin nature on the process's adventive root formation.

Actinidia is still a rare crop in ornamental gardening and forestry. The factors that retard the widespread introduction of cultivars, forms and hybrids of actinidia into ornamental gardening are insufficient study of the biological characteristics of the growth and development of these plants, the lack of scientifically substantiated recommendations for their reproduction and cultivation of planting material, as well as of the use in landscaping of residential areas. Thus, the study of bioecological characteristics of species and cultivars of the genus *Actinidia* Lindl. in cultural conditions, assessing their prospects, developing effective techniques and methods of reproduction, determining and substantiating the main directions of enrichment of decorative plantings with their participation in the research region are relevant [1, 2, 7, 12, 13, 17].

Introduced cultivars, being grown outside of their ecological optimum, can largely respond to fluctuations in environmental factors, which in itself can change the regenerative abilities of paternal plants as well as shoots harvested from them for cuttings [1, 3, 4, 7, 10, 12–16, 19, 21]. In order to increase the efficiency of growing planting material of cultivars of actinidia and other woody and shrub plants from green stem cuttings, the study of the optimal timing of their harvesting, determination of the type of shoot and its metameric structure, as well as the establishment of optimal concentrations of biologically active substances during rooting is carried out. Literature data on the influence of these factors of own-rooted reproduction of garden plants are contradictory [1, 3, 5–10, 12, 14,15, 18–22].

The morphogenesis of rooting stem cuttings significantly depends on the influence of biologically active substances of auxin nature — β-indolyl-3-acetic acid (β-IVA), β-indolylbutyric acid (β-IMA) and α-naphthylacetic acid (α-NOC). At the same time, activation or inhibition of the processes of formation of adventitious roots and the growth of the aboveground part of rooted cuttings with high and low regenerative capacity is observed [3–6, 9, 14–16, 19].

Carrying out a comlex comparative study of the growth, development and reproduction features of actinidia *A. kolomikta*, *A. arguta*, *A. purpurea*, *A. polygama* cultivars when introduced in the conditions of the Right-Bank Forest-Steppe Zone of Ukraine will contribute to substantiating the possibilities of their widespread introduction into landscaping and gardening.

THE AIM OF THE STUDY

The study aims at researching of morphological and biological characteristics and properties, as well as the regenerative capacity of stem cuttings and paternal plants of cultivars of the genus *Actinidia* Lindl. species — *Actinidia kolomikta* (Rupr. Et Maxim.) Maxim., *Actinidia arguta* (Siebold et Zucc.) Planch. ex Miq., *Actinidia purpurea* Rehd., *Actinidia polygama* (Siebold et Zucc.), *Actinidia chinensis* Planch. under introduction of them into industrial culture in the soil-climatic and agro-ecological conditions of the Right-Bank Forest-Steppe Zone of Ukraine in order to determine the appropriateness and prospects of their use in landscape gardening; optimizing of distinct stages of self-rooted reproduction and developing of complex methods for accelerated cultivation of planting material.

RESEARCH METHODOLOGY

The experimental part of the work was performed during 2018–2020 in the field, vegetation and laboratory conditions at the Department of Landscape Gardening of the Uman National University of Horticulture, as well as in the nurseries of the National Arboretum "Sofiyivka" NAS of Ukraine and LLC "Brusvyana" (Zhytomyr region, Brusilovsky district, village of Kostovtsy). As the research material, the authors took cultivars of actinidia promising for the conditions of the Right-Bank Forest-Steppe Zone of Ukraine — 'Lasunka', 'Pomaranceva', 'Kyivs'ka Hibrydna', 'Kyivs'ka Krupnoplidna', 'Purpurna Sadova', 'Sentiabr's'ka', 'Samoplidna', 'Figurna' and 'Don Zhuan' (male form). For rooting of green stem cuttings,

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glass greenhouses with finely dispersed humidification were used. A mixture of peat (pH 6.0–6.5) with clean river sand ratio 4:1 was used as a substrate. The air temperature in the rooting environment was 28–30 °C, the substrate temperature — 18–22 °C. The relative humidity of the air was in the range of 80–90%, and the intensity of optical radiation was 200–250 J/(m^2·s). Before planting for rooting, cuttings were treated with distilled water (control) and an aqueous solution of α-naphthylacetic acid (α-NOC) at a concentration of 5, 10, 15, 20, 25, and 30 mg/L with an exposure of 12 hours. Rooting was carried out in accordance with traditional technologies [3, 11, 14, 15]. In each variant of the experiment, cuttings prepared from the apical (A), medial (M) and basal (B) parts of the shoot with one, two, three, and four nodes were used. Observations of the course of root formation processes were carried out every five days. The experiment was repeated four times, in each repetition of 25 cuttings. The rooting rate was taken into account at the end of the season of vegetation, while the percentage of rooted cuttings, the number of roots and the length of the root system, as well as the size of the aboveground part of the self-rooted plant were determined.

RESULTS

The introduction of various species actinidia cultivars into landscape gardening and widespread use in green building is practically limited by absence of planting material. In addition, the effectiveness of the introduction of actinidia cultivars and the prospects for expanding their use in culture largely depend on the course of the phenological phases of plant development and on the methods of reproduction and cultivation of the plants. The study of the biological and ecological characteristics of parental plants of actinidia cultivars and the development of effective methods of their vegetative propagation in culture based on stem cuttings ensures not only their existence, but also their introduction into landscape gardening.

The results of the studies carried out indicate that one of the effective methods of propagation of actinidia cultivars is propagation by green stem cuttings — semi-lignified cuttings with leaves; the regenerative capacity of the cuttings is a variety-specific feature. It was found out that during the period of intensive growth of shoots, the studied varieties of actinidia had unequal regenerative capacity due to biological characteristics, namely the strength of growth. Optimal rooting for all types of cuttings under the conditions of the region was observed in June. The dates of cuttings, the type of cutting and its metameric structure had a significant effect on the rooting of stem cuttings of the studied actinidia cultivars under the conditions of finely dispersed humidification without treatment with biologically active substances (Tab. 1).

Table 1: Rooting of three-node green stem cuttings of actinidia cultivars, depending on the dates of cutting and part of the shoot (average for 2018–2020),%

Cultivar	Part of the shoot	Dates of cutting		
		1–10.VI	1–10.VII	1–10.VIII
‘Lasunka’	A*	19.5	15.1	1.5
	M	33.8	26.1	1.,9
	B	45.3	36.6	3.1
‘Kyivs'ka Hibrydna’	A	15.9	11.1	1.6
	M	26.8	23.4	2.4
	B	34.4	25.1	3.5
‘Kyivs'ka Krupnoplidna’	A	10.2	8.7	1.4
	M	14.7	14.1	2.7
	B	22.5	21.2	3.0
‘Purpurna Sadova’	A	22.9	19.9	2.2
	M	38.9	28.2	3.4
	B	48.4	36.2	4.7
‘Sentiabr's'ka’	A	23.3	18.2	1.0
	M	34.9	24.1	1.5
	B	46.6	35.4	1.4
‘Samoplidna’	A	16.3	15.8	1.6
	M	13.6	12.1	2.1
	B	18.7	18.0	3.2
‘Figurna’	A	8.6	4.8	1.6
	M	10.1	8.8	2.0
	B	16.9	16.0	3.1
‘Don Zhuan’	A	9.2	8.3	1.3

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(male form)	M	13.3	10.1	1.8
	B	18.4	13.5	2.1
SSD_{05}		*1.2*	*0.9*	*0.2*

* A — cuttings harvested from the apical part of the shoot; M — medial; B — basal.

It was found that not all the cultivars of actinidia are characterized by high regenerative capacity under rooting of stem cuttings in the conditions of finely dispersed humidification. According to the research results, the yield rates of rooted green stem cuttings during the first period harvesting cuttings (June 1–10) varied from 8.6 to 48.4%, depending on which part of the shoot they were harvested from; when the cuttings were cut on July 1–10 — from 4.8% to 35.4%; when the cuttings were cut on August 1–10 — from 1.0 to 4.7%.

The highest rate of rooting was recorded in the first period of cutting of the cultivars 'Purpurna Sadova' (48.4%), 'Sentiabr's'ka' (46.6%) and 'Lasunka' (45.3%), for the cuttings harvested from the basal part of the three-node shoot. The cuttings of cultivars 'Kyivs'ka Hibrydna', 'Kyivs'ka Krupnoplidna' and 'Samoplidna' rooted weaker, 34.4, 22.5, 18.7%, respectively. The cuttings of cultivars 'Figurna' and 'Don Zhuan' (male form) rooted the weakest — 16.9, 18.4% respectively. The yield of the rooted cuttings from the medial part of the shoots of the cultivars 'Lasunka', 'Sentiabr's'ka' and 'Purpurna Sadova' was 33.8, 34.9 and 38.9%, 'Kyivs'ka Hibrydna' and 'Kyivs'ka Krupnoplidna' — 26.8 and 14.7%, 'Samoplidna' and 'Figurna' — 13.6 and 10.1% and 'Don Zhuan' — 3.3%. The percentage of rooting of cuttings from the apical part of the shoot varied on average from 8.6 to 23.3%, depending on the cultivar. Among single-node cuttings, the cuttings harvested from the basal part of the shoot had the best rooting rate — 1.5 times more than the apical and medial ones.

A significantly higher rate of rooting was shown by three-node cuttings, regardless of the part of the shoot from which they were harvested. The rooting rate of three-node cuttings of the cv 'Purpurna Sadova', harvested from the apical part of the shoot, averaged 22.5% over three years, medial — 38.6%, basal — 47.0%, and the rooting rate for cv 'Figurna' was less: apical — 8.2, medial — 9.5 and basal — 16.3%.

With a further increase in the number of nodes to four, the regenerative capacity of green stem cuttings of the studied actinidia cultivars did not deteriorate, but was at the level of the experimental variant when cuttings with three nodes were used. With an increase in the number of nodes of green stem cuttings to five or more, the regenerative capacity decreased by 12–18%.

The best in terms of the number of roots per cutting without treatment with a biologically active substance were such cultivars as 'Lasunka', 'Purpurna Sadova', 'Sentiabr's'ka', and 'Kyivs'ka Hibrydna': they developed more roots of the 1st and 2nd orders of ramification with the greatest total length (Tab. 2). Less stable results were obtained when rooting stem cuttings of such cultivars as 'Kyivs'ka Krupnoplidna', 'Samoplidna' and 'Figurna'. The most developed adventive root system among the cuttings of the studied actinidia cultivars harvested in the phase of intensive shoot growth (June 1–10) was recorded in cuttings from the basal part of the shoot.

Table 2: Influence of the propagation dates and part of the shoot on the number of roots in the process of rooting of three-node green stem cuttings of actinidia cultivars, pcs./cutting (average for 2018–2020)

Cultivar	Part of the shoot	Dates of cutting		
		1–10.VI	1–10.VII	1–10.VIII
'Lasunka'	A	19.6	18.4	7.3
	M	31.3	30.2	14.2
	B	42.1	39.8	19.5
'Kyivs'ka Hibrydna'	A	18.6	17.4	6.0
	M	29.3	25.6	12.6
	B	37.2	35.1	16.4
'Kyivs'ka Krupnoplidna'	A	10.3	9.2	6.1
	M	19.1	16.7	10.5
	B	25.4	23.8	13.1
'Purpurna Sadova'	A	19.1	17.5	5.6
	M	32.3	30.6	14.5
	B	43.1	40.8	21.2

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‘Sentiabr's'ka’	A	19.9	16.4	7.1
	M	34.5	31.5	16.8
	B	46.3	42.7	19.6
‘Samoplidna’	A	14.2	12.5	4.2
	M	18.9	15.4	8.7
	B	21.3	18.3	10.5
‘Figurna’	A	12.4	10.5	4.6
	M	16.7	14.2	7.2
	B	24.1	21.1	12.6
‘Don Zhuan’ (male form)	A	11.9	8.9	3.1
	M	15.6	12.1	5.2
	B	23.7	19.5	8.3
SSD_{05}		*2.9*	*2.1*	*1.4*

Depending on the type of green stem cutting and its metameric structure, a significant difference was observed in the length of adventive roots during rooting. The length of the roots on cuttings increased significantly with an increase in the number of nodes. In three-node cuttings, the most ramified root system was noted (Tab. 3).

Table 3: Influence of the propagation dates and part of the shoot on the length of the roots in the process of rooting of three-node green stem cuttings of actinidia cultivars, cm/cutting (average for 2018–2020)

Cultivar	Part of the shoot	Dates of cutting		
		1–10.VI	1–10.VII	1–10.VIII
‘Lasunka’	A	54.3	51.2	21.3
	M	80.1	79.5	40.5
	B	115.6	91.6	51.6
‘Kyivs'ka Hibrydna’	A	41.2	38.3	17.4
	M	68.3	64.1	12.6
	B	112.5	102.5	49.2
‘Kyivs'ka Krupnoplidna’	A	37.2	31.8	15.3
	M	56.4	49.1	28.6
	B	82.6	72.4	40.1
‘Purpurna Sadova’	A	60.4	54.2	17.6
	M	87.2	81.4	42.2
	B	132.6	118.7	62.5
‘Sentiabr's'ka’	A	71.4	54.2	20.4
	M	99.5	69.5	42.8
	B	139.5	110.8	58.6
‘Samoplidna’	A	45.8	36.5	12.4
	M	60.2	48.1	21.6
	B	72.8	57.9	25.4
‘Figurna’	A	37.9	28.2	11.9
	M	51.4	41.4	20.4
	B	81.4	62.3	38.2
‘Don Zhuan’ (male form)	A	30.1	21.5	10.2
	M	46.7	32.1	15.8
	B	78.5	59.6	24.3
SSD_{05}		*4.6*	*3.8*	*3.2*

Thus, the ability of green stem cuttings to form adventive roots and their total length depends on the dates of cutting and the part of the shoot from which they were harvested, as well as of the cultivar characteristics. The highest percentage of rooting and development of the root system of cuttings are obtained by cutting during the period of intensive shoot growth, when the plants are most capable of regeneration processes. The "pomological cultivar" and "part of the shoot" had dominant influence on the rooting of cuttings in all the studied periods of cutting.

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A certainly high rooting rate of basal cuttings of actinidia cultivars was established in comparison with apical and medial cuttings under conditions of finely dispersed humidification, without treatment with biologically active substances. The change in rooting rates over the years did not exceed ± (1.5–3.5)%. Analyzing the rooting rate of different types of cuttings selected during the period of slowing shoot growth, it should be noted that basal three-node cuttings also had a significant advantage over other cuttings.

When characterizing the average annual data on the biometric indices of the aboveground growth of rooted green cuttings of the studied cultivars in terms of propagation time and shoot type, it should be noted that the basal cuttings have a significant advantage.

The length of the aboveground growth of cuttings harvested from the basal part of the shoot averaged from 16.1 cm to 26.5 cm for cultivars, from the medial part — 12.1–15.3 cm and from the apical part — 3.5–5.2 cm. Reliably better indices were noted for the cultivars 'Lasunka', 'Purpurna Sadova', 'Sentiabr's'ka' when cutting on June 1–10.

The results of the study suggest that during the June and July terms of cutting, the development of rooted cuttings of the studied cultivars of actinidia were influenced the most by the factors "part of the shoot" — 35% and "metameric structure of the shoot" — 40%. Significantly higher indices of the root system and the level of rooting were generally observed in cuttings harvested from the basal part of the shoot as compared with the medial and apical ones. Longer aboveground growths were also noted for basal three-node cuttings and amounted to 16.2 cm, medial — 8.9 cm, apical — 1.2, while for single-node and two-node cuttings, there was no increase in the aboveground part of rooting cuttings.

It was found that the biologically active substance α-NOC has a positive effect on the regenerative capacity of all the studied cultivars of actinidia under cutting during the phase of intensive shoot growth (Tab. 4).

Table 3: Influence of the biologically active substance α-NOK on the regenerative capacity of green stem cuttings of actinidia

Cultivar	α-NOK, mg/L	Part of the shoot	Number of rooted cuttings,%	Number of roots per cutting, pcs.	Root system length, cm
'Lasunka'	10	A	42.6	31.6	99.8
	10	M	64.2	62.2	141.5
	10	B	91.7	88.5	189.6
'Kyivs'ka Hibrydna'	10	A	37.5	42.3	87.8
	10	M	52.4	61.3	129.5
	10	B	81.7	79.5	172.4
'Kyivs'ka Krupnoplidna'	15	A	31.5	25.6	65.2
	15	M	42.6	38.9	108.3
	15	B	66.4	59.6	156.8
'Purpurna Sadova'	10	A	45.2	32.1	101.5
	10	M	71.3	61.1	153.9
	10	B	93.8	92.5	201.6
'Sentiabr's'ka'	10	A	46.1	45.6	132.5
	10	M	68.9	79.4	178.6
	10	B	95.1	101.8	215.9
'Samoplidna'	15	A	36.7	30.1	84.6
	15	M	41.3	41.6	109.2
	15	B	62.9	52.2	139.6
'Figurna'	15	A	24.1	26.7	71.2
	15	M	36.4	38.2	101.3
	15	B	51.6	52.9	156.5
'Don Zhuan' (male form)	15	A	28.4	23.7	63.8
	15	M	42.5	35.0	88.1
	15	B	60.8	50.6	145.1
SSD_{05}			*3.2*	*2.9*	*4.1*

The data in the table indicate that the concentration of α-naphthylacetic acid 10-15 mg/L in the phase of

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intensive growth of shoots (June 1-10) significantly contributed to an increase in rooting of cuttings of all the studied cultivars compared to the control: in apical cuttings by 23.0–33.8 %, medial — by 34.7–36.6%, and basal — by 42.3–48.9%. Among the concentrations that were used during this period (0–30 mg/L), such that significantly increased the proportion of rooted cuttings, were: for the cultivars ‘Lasunka’, ‘Kyivs'ka Hibrydna’, ‘Sentiabr's'ka’, ‘Purpurna Sadova’ — the concentration 10 mg/L, and for the cultivars ‘Kyivs'ka Krupnoplidna’, ‘Samoplidna’, ‘Figurna’, ‘Don Zhuan’ (male form) — 15 mg/L.

As indicated by the research results, among the cuttings of the studied actinidia cultivar harvested in the phase of intensive shoot growth (June 1-10), a better developed adventive root system was recorded in cuttings from the basal part of the shoot. The yield of rooted green cuttings of the studied cultivars, harvested from different parts of the shoot during cutting on June 1–10, positively correlated with the number of roots of the 1st ramification order and had a strong direct relation with the effect of α-naphthylacetic acid (0-30 mg/L) ($r = 0.95 \pm 0.04$ and $r = 0.96 \pm 0.03$), and the number of roots of the 2nd order of ramification positively correlated with the length of roots of the 1st order of ramification and had a strong direct relation with the influence of α- NOK (0–30 mg/L) ($r = 0.96 \pm 0.03$ and $r = 0.95 \pm 0.04$). The length of the roots of the 2nd order of ramification positively correlated with the average length of the aboveground growth and had a strong direct relation with the influence of α-NOC (0-30 mg/L) ($r = 0.94 \pm 0.06$). During the phase of intensive growth of shoots in the control variant of the experiment in terms of the number of roots per cutting, the cuttings harvested from the basal part of the shoot had a significant advantage.

In the phase of active growth of shoots, a high effect of stimulation of root formation under the influence of α-NOC was observed in all studied types of cuttings. The concentration of α-NOK 10-15 mg/L significantly contributed to the increase in the number of roots of all orders of ramification in comparison with the control for all the cultivars.

Among the other investigated factors, the influence of the factors "propagation period" (25%), "part of the shoot" (35%) and "concentration of α-NOK" (35%) on the formation of the root system of the cuttings harvested in the phase of intensive growth of shoots was the greatest; the factor "variety" had a less significant influence — 5%. It should be noted that there is a significant advantage in the development of the root system of basal cuttings in comparison with the apical and medial ones.

The study of the effect of different concentrations of aqueous solutions of α-NOC allowed to identify variants of the experiment with 10-15 mg/L, which significantly contributed to an increase in the number of roots of all orders of ramification of cuttings harvested from the basal part of the shoot compared to other variants.

During the study period, the basal cuttings significantly exceeded the apical and medial ones in the number of roots of all ramification orders and their length. An increase in the concentration of an aqueous solution of α-NOC to 30 mg/L and higher led to inhibition of the formation of adventive roots and a decrease in their length in all studied cultivars.

When the cuttings were harvested on June 1–10, the yield of rooted green cuttings positively correlated with the total number of roots of all orders of ramification and had a strong direct relation with the aboveground part of the shoot, and the total number of roots positively correlated with the total root length and had a strong direct relation with the aboveground part of the shoot. When using the optimal rates consumption of the biologically active substance α-NOK (10-15 mg/L), the biometric indices of the total amount and length of roots of all orders of ramification in rooting cuttings harvested from different parts of the shoot improved significantly in all studied varieties.

CONCLUSIONS

The studied cultivars of actinidia ‘Lasunka’, ‘Kyivs'ka Hibrydna’, ‘Kyivs'ka Krupnoplidna’, ‘Purpurna Sadova’, ‘Sentiabr's'ka’, ‘Samoplidna’, ‘Figurna’ and ‘Don Zhuan’ (male form) are characterized with high vegetative productivity, the number of ramification shoots formed annually due to the development parameters of each plant and cultivar specifics. Green stem cuttings of all the cultivars have a weak regenerative capacity, which significantly depends on the pomological cultivar and the individual development of the shoot itself and of its structural elements.

The regenerative capacity of green stem cuttings depends on the dates of cuttings, the type of shoot and its metameric structure, as well as the influence of biologically active substances. The optimal term for harvesting green stem cuttings and planting them for rooting is the phase of intensive shoot growth. The cuttings from the basal part of the shoot have a significantly higher rooting rate and other indices in comparison with the cuttings harvested from the apical and medial parts. The optimal type of cutting for the studied actinidia cultivars is a basal three-node cutting.

Growing seedlings of actinidia cultivars from green stem cuttings with rooting during the period of intensive shoot growth and treatment with α-naphthylacetic acid of the optimal consumption rate of 10–15 mg/L provides an increase in the yield of rooted cuttings by 23.0–48.9%, that contributes to the introduction new and promising varieties in the Right-Bank Forest-Steppe Zone of Ukraine for use in landscape gardening.

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