

Development Vegetative and Generative Sphere of *Vaccinium angustifolium* Ait. Introduced under Conditions of Belarus

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Abstract: Lowbush blueberry is an absolutely new object of cultivation under soil-climatic conditions of Belarus. The possibility for reclamation of open cast peat pits could be the usage of *V. angustifolium*. The field experiment, grown on production plantation on open cast peat pits, was initiated to assess forms on lowbush blueberry plant growth and yield. Quite active increase in a vegetative mass of *V. angustifolium* was shown to take place during a vegetation season. A value of a year's increase, being from 18.5 to 28.3 cm depending on a form, indicated this. A basic difference of lowbush blueberry morphogenesis from its related highbush blueberry was revealed. Phytocenotic resistance and the pronounced ability for territorial expansion by clonal propagation point to validity of carrying out subsequent investigation for application of *V. angustifolium* L. in recultivation of exhausted peat lands.

Keywords: lowbush blueberry, vegetative sphere, generative sphere, introduction potential

I. INTRODUCTION

In the North-American continent, beside highbush blueberry (*Vaccinium corymbosum* L.), widely used for cultivation under European conditions, one more berry small shrub grows lowbush blueberry – (*Vaccinium angustifolium* Ait.). A major body of investigations on its agrotechnics and breeding is performed in the north-eastern part of the USA (Virginia, Illinois, Wisconsin) and Eastern Canada (from Newfoundland to Saskatchewan) where its economic application has a long-term history. It is noted *V. angustifolium* is the most important commercial species for fruit-canning industry in the mentioned regions (Galletta & Ballington, 1996; Janes & Percival, 2003).

This species is an absolutely new object of cultivation under our country conditions. This fact defines urgency, scientific and practical importance of the research work initiated by us the goal of which consists, in particular, in studying distinctions of lowbush blueberry vegetative and generative sphere development under new soil-climatic conditions.

In the collection of the laboratory for ecological physiology of plants at the Central Botanical Gardens of the National Academy of Sciences of Belarus 25 adult generative forms of lowbush blueberry. They were selected by O.V. Morozov in 2002 from the collection of the breeding material, about 300 seedlings in number of the best Canadian clones K510, ME3, K508, K70-62, developed at the above-mentioned agricultural station in Kentvill (Estabrooks, 1998). Primary selection was performed for traits of flowering and fruiting abundance of young generative individuals as well as of intensity of their vegetative organ development. *V. angustifolium* seeds, from which seedlings were produced, had kindly been supplied by Dr. T. Paal.

II. MATERIALS AND METHODS

The experiment was conducted during 2009 to 2010 on lowbush blueberry plants, growing on open cast peat pits in the district of Glubokoye in the northeast region of Belarus. The plantation was established in 2007. The plants were obtained from selected lowbush blueberry seedlings and planted with a spacing of 0.8×0.8 m.

The following parameters presenting morphobiological distinctions of the selected forms and the species as a whole under introduction experiment conditions were studied: length and width of leaf; leafiness; a year's linear increase of shoots; bush height and crown volume. Leafiness of shoots was estimated by counting the number of leaves in their upper 10-cm part.

To evaluate berry mass, the 100 berries were weighted from which a single berry mass was calculated (g). The yield from a single blueberry bush was weighted and expressed in (g bush⁻¹).

All determinations were performed with three biological replications and statistically processed according to G.F. Lakin's directions (1980). The root-mean-square error of the mean did not exceed 1.5-2%.

III. RESULTS AND DISCUSSION

As a result of the investigation performed, it was established that the cross-section of shoots, the diameter of which varied from 0.15 to 0.22 cm had a rounded or oval form that was more often observed. Quite active shoot growth takes place during a vegetative season. The value of a year's increase, being from 18.5 (N 25) to 28.3 cm (N 4) depending on the form, indicates this (Table 1). The crown diameter of the maternal bush, reaching a state of an adult generative individual, varies from 68 to 108 cm. The form N 4 is characterized by its highest value. This form has the highest crown volume – 33.4 dm³ that more than thrice exceeds the minimum value of this parameter – 11.7 revealed in the form N 9 (see Table 1). Thus, *V. angustifolium* life form is a deciduous low-growing shrub (small shrub) the height of which varies from 0.4 to 0.60 m and more.

Lowbush blueberry leaves, whose length is from 2.9 to 4.1 cm and the width – from 1.1 to 1.9 cm, are green with different variations, their shape is lancet, as a rule, however, it can approximate to ovate one in some studied plants (see Table 1). Narrow-leaved ability of lamina is sharply pronounced in the form N 6 whose leaf index value is 2.5. The lowest value of this parameter – 2.0, indicative of the more rounded shape of leaves, was noted in the forms N 5 and N 8. Leafiness of the upper part of shoots varies over a wide range. The minimum value of this parameter – 9.9 leaves per 10 cm was noted in the form N 2 and the maximum one – 15.8 in the form N 3. It should be noted that leafiness of the lower part of shoots is much less than of the upper one. It is well observed by sight.

Large-fruited is one of the major properties of berry plants. An average berry weight of the forms *V. angustifolium* was 0.6 g with a diameter of 0.7 cm. The minimum value of this parameter – 0.44 g was noted in the form N 10 and the maximum one – 1.0 in the form N 4 (Table 2). Berry plants lowbush blueberry of the form N 4 were characterized also by the maximum indicator of fruit-set – 61.5 percent.

IV. CONCLUSIONS

The *V. angustifolium* Ait. life form under Belarussian conditions is a deciduous low-growing shrub, 0.4-0.6 m in height. Rather active increase in the blueberry vegetative mass takes place during a vegetative season and the value of a year's increase, being from 17.1 to 29.1 cm depending on the form, indicates this. The basic difference between morphogenesis of lowbush blueberry and that of its related highbush blueberry was revealed. The overground vegetative sphere of lowbush blueberry increases during ontogenesis, primarily in a horizontal direction as a result of emerging new formation shoots and partial bushes from dormant buds on rhizomes.

The data obtained by the comparative analysis of our own and literature information about the development of *V. angustifolium* vegetative sphere give good grounds for preliminary positive estimation of prospects for introducing this species in Belarus, even in spite of the difference in the methods used as well as investigations carried out independently in various countries and at different time.

V. LITERATURE CITED

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Tables

Table 1. Biometric parameters of current increase in lowbush blueberry (*V. angustifolium*) vegetative sphere in field experiment

N of form	Bush height, (cm)	Volume of bush crown, (dm ³)	Linear increase of shoots, (cm)		Leaf length (A), (cm)		Leaf width (B), (cm)		Leafiness of shoots leaves / 10 cm	
			$\bar{x} \pm s_x$	V, %	$\bar{x} \pm s_x$	V, %	$\bar{x} \pm s_x$	V, %	$\bar{x} \pm s_x$	V, %
1	50	25,1	22,1±1,8	43,4	3,8±0,07	10,3	1,6±0,04	12,0	14,4±0,4	17,3
2	50	17,5	20,1±1,4	37,0	3,7±0,07	10,8	1,7±0,04	11,6	9,9±0,3	16,5
3	45	13,3	18,5±1,4	41,5	3,2±0,06	10,5	1,4±0,04	15,2	15,8±0,6	16,7
4	60	33,4	28,3±2,1	41,2	3,9±0,10	14,1	1,7±0,05	16,9	13,2±0,3	14,2

5	40	15,7	24,4±1,6	35,1	3,4±0,07	11,3	1,7±0,03	11,1	13,8±0,2	9,7
6	40	12,6	27,6±1,6	32,5	3,7±0,07	10,3	1,5±0,05	16,9	15,5±0,4	14,1
7	45	23,9	24,5±1,7	38,2	3,5±0,08	13,0	1,5±0,04	15,9	13,8±0,3	13,1
8	45	21,4	21,8±1,6	39,1	3,1±0,08	13,3	1,5±0,04	16,1	14,0±0,3	12,7
9	45	11,6	20,7±1,5	40,7	3,4±0,10	16,3	1,4±0,04	14,1	12,0±0,4	18,2
10	40	14,8	23,9±1,2	27,5	3,0±0,05	10,1	1,4±0,02	9,4	12,6±0,3	14,7

Table 2. Parameters of development generative sphere of selection forms *V. angustifolium* in field experiment

N of form	Quantity generative buds in 1 shoot (piece)		Quantity racemes in 1 shoot (piece)		Quantity blooms in 1 raceme (piece)		Quantity berries in 1 truss (piece)		The percentage of fruit-set (%)	Berry mass (g)	
	$\bar{x} \pm s_x$	V, %	$\bar{x} \pm s_x$	V, %	$\bar{x} \pm s_x$	V, %	$\bar{x} \pm s_x$	V, %		$\bar{x} \pm s_x$	V, %
1	1,3±0,2	48,6	2,1±0,1	50,7	6,4±0,3	22,4	3,8±0,3	38,2	59,4	0,74±0,04	28,1
2	3,1±0,3	48,1	3,6±0,3	49,6	7,5±0,3	24,4	3,6±0,2	28,5	48,0	0,76±0,04	29,8
3	2,2±0,2	39,0	2,2±0,2	36,6	7,6±0,2	16,4	2,4±0,2	51,4	31,6	0,67±0,04	31,0
4	2,4±0,3	57,2	2,4±0,3	61,1	6,5±0,2	20,0	4,0±0,3	40,4	61,5	1,01±0,07	37,1
5	2,0±0,2	41,2	2,1±0,2	46,9	6,5±0,3	25,3	3,5±0,2	35,3	53,8	0,71±0,03	22,8
6	1,8±0,1	38,5	1,8±0,1	38,1	5,6±0,3	27,4	2,2±0,2	54,7	39,3	0,75±0,04	26,2
7	1,3±0,1	36,0	1,8±0,2	47,8	6,4±0,3	22,3	3,8±0,2	42,8	59,4	0,97±0,04	23,7
8	1,1±0,1	36,5	1,1±0,1	27,7	6,3±0,2	16,2	2,3±0,2	43,8	36,5	0,59±0,03	24,7
9	1,3±0,1	41,0	1,3±0,1	35,8	6,6±0,3	20,7	1,7±0,2	50,8	25,8	0,61±0,02	15,6
10	1,5±0,1	50,0	1,7±0,1	45,7	6,5±0,2	19,7	3,4±0,3	37,6	52,1	0,44±0,01	17,8