



Assessment of growth and yielding of the Saskatoon berry (*Amelanchier alnifolia* Nutt.) genotypes in central Poland

INTRODUCTION

The Saskatoon berry (*Amelanchier alnifolia* Nutt.) is a new crop with valuable fruits that is gaining recognition in commercial cultivation in Poland. The number of cultivars suitable for growing in our conditions is limited. So the applied breeding program of new cultivars of this species was initiated in 2012 at the National Institute of Horticultural Research (InHort) in Skierniewice, Poland. The breeding work has been financed by the Ministry of Agricultural and Rural Development.

Fruits of the Saskatoon berry have high nutritional and health properties for humans, making this crop an attractive option for cultivation. The introduction of foreign and new Polish cultivars may contribute to the diversification of berry fruit production by our growers and give future prospects in the markets.

The aim of our study was to evaluate the plant growth and habit, productivity, and fruit quality of selected Saskatoon berry genotypes in the field trial.

MATERIALS AND METHODS

1. Plant material. Bushes of five Canadian cultivars ('Honeywood', 'Martin', 'Northline', 'Smoky' and 'Thiessen'), a new Polish cultivar named 'Amela', and a breeding clone 5/6 released at the InHort were planted in the field trial in 2014. The plants were spaced at a density of 4.0 x 0.60 meters (4,166 plants/ha). The cultivar trial was established in the randomized block design, with four replications, and five plants per plot. The trial was conducted at the Experimental Orchard (EO) belonging to the InHort, located at Dąbrowice, near Skierniewice, central Poland.

2. Method. Studies were carried out in 2021-2022, focusing on an evaluation of selected traits of tested genotypes:

- 2.1. The plant height and width measurements - allow to assess the growth vigor and the overall size and structure of the bushes.
- 2.2. The plant habit – the ratio of height to width of the shrub, describes bush growth shape.
- 2.3. Fruit harvesting time.
- 2.4. The productivity - recording the fruit yield per plant (tones/ha).
- 2.5. Fruit weight – 100 berries randomly chosen in 3 replications.
- 2.6. Fruit quality – soluble solids (extract) and vitamin C content using standard methods.

3. Statistic analyses - The STATISTICA 13.1 (TIBCO Software Inc., Tulsa, OK, USA) program was used to perform the statistical evaluation. To analyze the data statistical analysis of variance (ANOVA) and mean separation tests were employed to identify significant differences among the tested genotypes.

These analyses allow to compare the performance of different cultivars and breeding clone in terms of growth, productivity, and fruit quality.

RESULTS

Our studies conducted in 2021-2022 showed that the bushes of 'Honeywood' and 'Martin' grew strongest, while the weakest bushes had 'Thiessen' and 'Smoky' (Fig. 1). The highest bush habit index (indicating the most upright habit) was determined for clone 5/6 and cv. 'Honeywood'. The most spreading bush habit was found for the cv. 'Smoky' (Fig. 2).

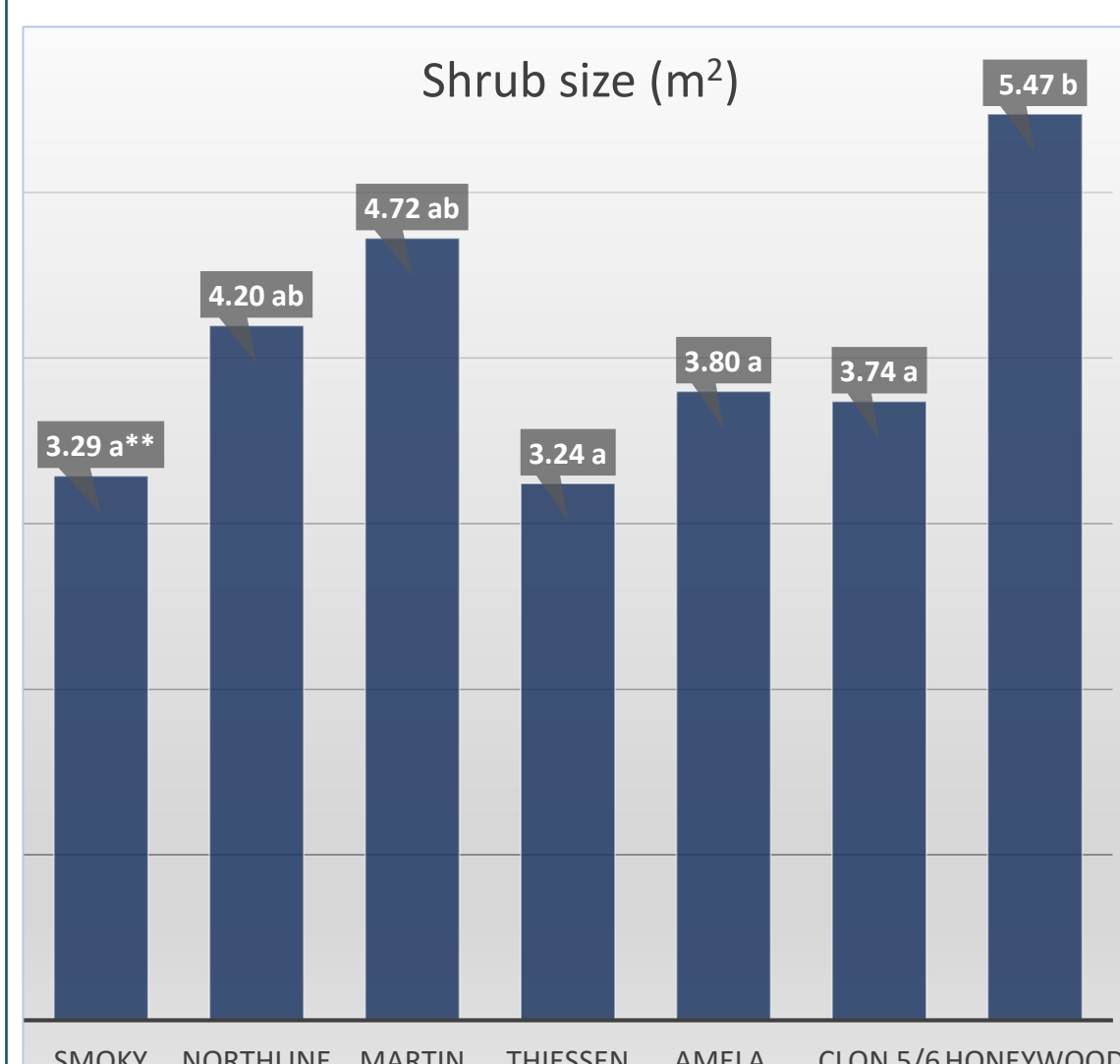


Fig. 1. Size of bushes (m²) of the studied genotypes grown in the field trial, Experimental Station at Dąbrowice, (for averages from 2021-2022)

*Height x width; in m² **Means followed by the same letter in columns are not significantly different at the p = 0,05 level of significance

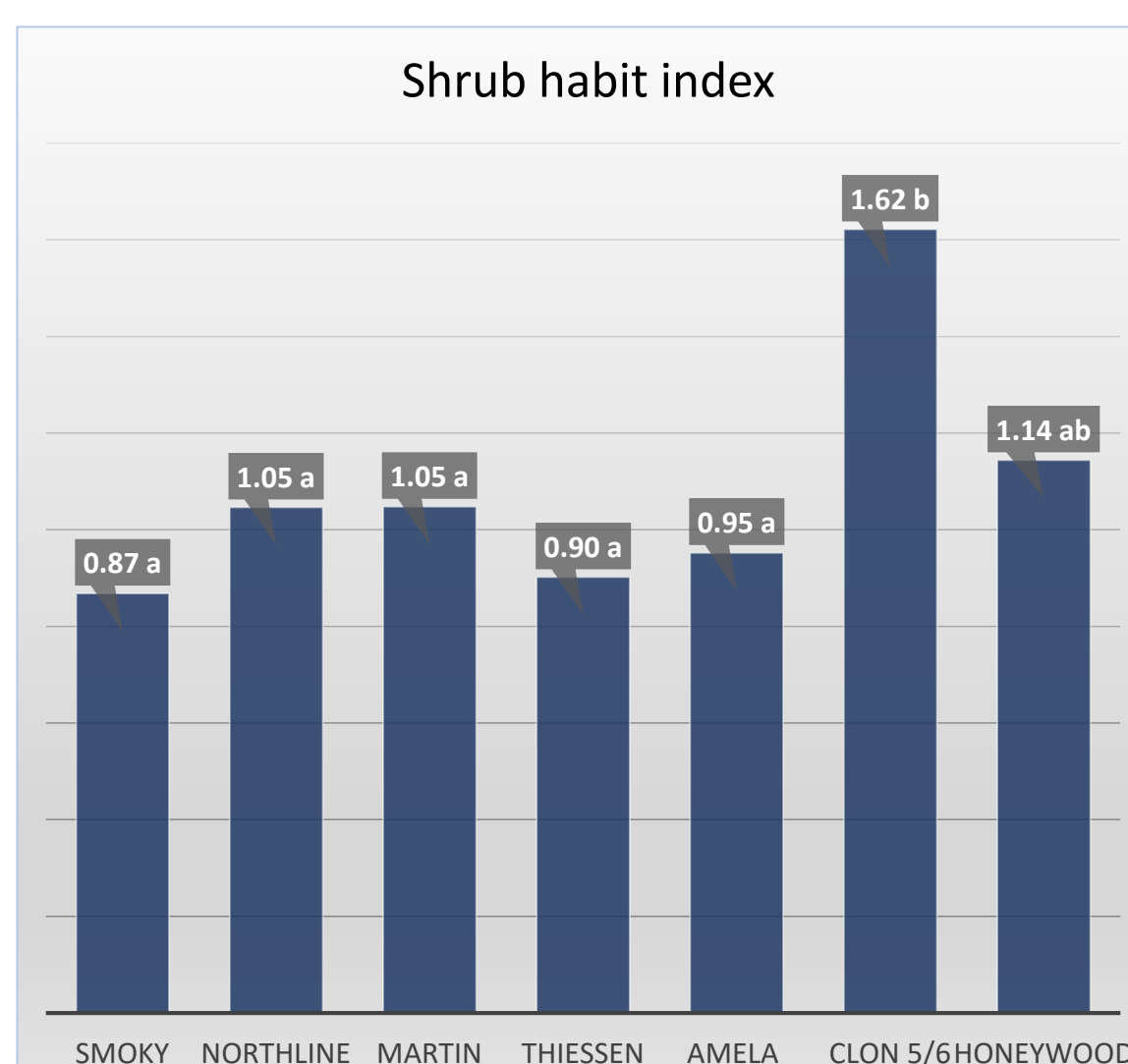


Fig. 2. The bush habit index* of the studied genotypes grown in the field trial, Experimental Station at Dąbrowice, (for averages from 2021-2022).

*Shrub habit indicator = the ratio of height to width of the shrub; the higher the value, the more erect the shrub habit

Fruit harvesting at consumptive maturity started from 3rd to 12th July, depending on the genotype and year. Fruits of the cv. 'Martin' ripened the earliest and clone 5/6 the latest in both years of the study. The statistically significant highest fruit yield was harvested from bushes of the new Polish cv. 'Amela'; the average yield was 4.33 kg/bush (18.0 t/ha). The remaining Canadian cultivars and the clone yielded on average from 2.24 to 2.99 kg/bush, which in conversion gave from 9.3 to 12.5 t/ha (Tab. 1).

Table 1. Harvesting time, productivity of tested Saskatoon berry genotypes, Experimental Orchard, Dąbrowice, central Poland, 2021–2022

Genotype	Origin	Harvesting time (2021-2022)	Average fruit yield			
			2021	2022	(kg/bush)	ton/ha ^A
Smoky	Canada	06. July	2.66 ab*	2.80 c	2.74 a	11.4 a
Northline	Canada	07. July	3.34 bc	2.73 bc	2.99 a	12.5 a
Martin	Canada	04. July	3.89 cd	1.57 a	2.56 a	10.7 a
Thiessen	Canada	06. July	2.93 b	2.10 ab	2.45 a	10.2 a
Honeywood	Canada	06. July	2.05 a	2.39 bc	2.24 a	9.3 a
Amela	Poland	07. July	4.34 d	4.33 c	4.33 b	18.0 b
Clone 5/6	Poland	11. July	3.10 bc	2.75 bc	2.90 a	12.1 a

^A - Fruit yield in metric tons per ha as the product of average yield per shrub x number of shrubs planted per 1 ha
*Means followed by the same letter in columns are not significantly different at the p = 0,05 level of significance



Fot. 1. Flowering shrubs of Saskatoon berry



Fot. 2. Fruits of the cv. 'Amela'



Fot. 3. Fruits of the cv. 'Martin'

The highest average significant fruit weight was recorded for the cv. 'Martin' (143.8 g) followed by the cvs. 'Thiessen' (112.9 g), 'Honeywood' (112.1 g), 'Amela' (105.3 g), 'Northline' (103.7 g) and 'Smoky' (95.4 g). Definitely the smallest significant fruit weight had the clone 5/6 (66.9 g) (Tab. 2). The highest soluble solids content was analyzed in fruit of the cvs. 'Martin' (18.00°Brix) and 'Thiessen' (17.77°Brix). The fruit of the cv. 'Honeywood' had the lowest extract content (14.62°Brix) (Tab. 3). The highest vitamin C content in fruits was recorded for the cv. 'Smoky' (4.90 mg/100g) and 'Martin' (4.79 mg/100g). The lowest content of this compound was found in fruits of the clone 5/6 (3.95 mg/100g) (Tab. 4).

Table 2. Weight of 100 fruit (g) of tested Saskatoon berry genotypes (EO Dąbrowice 2021–2022)

Genotype	2021	2022	Average weight of 100 fruit (g)
Smoky	102.7 b	90.0 b	95.4 b
Northline	126.7 cd	86.5 b	103.7 b
Martin	146.0 d	142.2 d	143.8 c
Thiessen	112.0 bc	113.7 c	112.9 b
Honeywood	108.0 bc	115.0 c	112.1 b
Amela	115.3 bc	97.8 b	105.3 b
Clone 5/6	64.0 a	69.0 a	66.9 a

Table 3. Soluble solids of tested Saskatoon berry genotypes (EO Dąbrowice 2021–2022)

Genotype	2021	2022	Average soluble solids (°Brix)
Smoky	19.20	15.58	17.39
Northline	18.40	12.30	15.35
Martin	20.40	15.60	18.00
Thiessen	20.70	14.84	17.77
Honeywood	15.40	13.84	14.62
Amela	18.90	11.92	15.41
Clone 5/6	15.80	12.42	14.11

Table 4. Vitamin C content in fruit of tested Saskatoon berry genotypes (EO Dąbrowice 2021–2022)

Genotype	2021	2022	Average vitamin C (mg·100 g ⁻¹)
Smoky	5.62	4.18	4.90
Northline	5.74	3.18	4.46
Martin	6.04	3.53	4.79
Thiessen	5.04	3.29	4.17
Honeywood	5.02	3.05	4.04
Amela	6.08	2.91	4.50
Clone 5/6	5.55	2.35	3.95

SUMMARY

The results of our studies indicated that the tested genotypes of the Saskatoon berry showed good adaptation and suitability for cultivation in central Poland. The shrubs of the Canadian cv. 'Martin' and the clone 5/6 grew most vigorously. The new Polish cv. 'Amela' produced significantly higher fruit yield, than the tested Canadian cultivars ('Thiessen', 'Smoky', 'Martin' and 'Honeywood'). The fruits of the cv. 'Amela' could be used in the processing and freezing (IQF) industries and they could also be recommended for the fresh fruit market due to its fairly large fruits.

These results suggested that the commercial cultivation and fruit production of this new crop would enable an increase in the diversity of the supply of berry fruits on the market, reduce the risk of the production, improve the profitability of producers and make better use of the tractor and cooperating machines, including the combine-harvesters for picking fruit, such as for the blackcurrant one.

From the consumer point of view, these valuable, nutritional attributes of fresh fruits and products of the Saskatoon berry could be beneficial for the human health and food diet.

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Fot. 4. Fruits of the cv. 'Martin'



Fot. 5. Fruits of the 'Amela' cultivar



Fot. 6. Fruits of the clone 5/6