



NEW ADVANCED CLONES FROM THE STRAWBERRY BREEDING PROGRAM AT THE NATIONAL INSTITUTE OF HORTICULTURAL RESEARCH, POLAND

INTRODUCTION

In recent years, the annual production of strawberries in Poland amounts to approx. 180-200 thousand tons, and our country ranks second in Europe and eighth in the world. In order to maintain such a high position, research work on improving the quality of strawberries should be considered of European trends, among which the most important is currently improving the quality of life and health of its residents. In horticulture, special emphasis is placed on improving the nutritional and health-promoting properties of fruits by increasing their content of bioactive compounds.

The main goal of the breeding program carried out at the National Institute of Horticultural Research (InHort) in Skierniewice, Central Poland is obtaining new productive genotypes with an increased content of bioactive compounds in the fruit and tolerant to the changing climate.

MATERIALS AND METHODS

Advanced strawberry breeding clones under evaluation:

- T-201219-02 ('Filon' × 'Grandarosa'),
- T-201221-12 (No 378 × 'Grandarosa')
- T-201221-14 (No 378 × 'Grandarosa')
- T-201224-05 ('Salsa' × 'Pink Rosa')
- T-201224-08 ('Salsa' × 'Pink Rosa')
- Reference cultivar 'Honeoye'

Experiment design:

- 4 replicates with 15 plants on each plot
- Planting density: 1,2 x 0,3 m

Years of the assessment: 2021-2022

Traits assessed:

- Yield (g/plant)
- Average fruit weight (g)
- Fruit attractiveness (ranking scale 1-5)
- Fruit firmness (N; by INSTRON 5542 penetrometer)
- Soluble solids content (mg/100 g)
- Ascorbic acid content (mg/100 g)
- Anthocyanin content (mg/100 g)
- Total phenols content (mg/100 g)

CONCLUSIONS

- Most of the advanced strawberry clones bred at InHort outperform the standard cultivar 'Honeoye' in terms of yield and fruit quality.
- The clone T-201221-12 seems to be the most prospective for commercial strawberry fruit production for the fresh market, due to the high yield, good firmness and attractiveness of the fruit, and a satisfactory level of bioactive compounds in the fruit.
- The breeding clones: T-201219-02, T-201221-14, T-201224-05 and T-201224-08 should be useful for further breeding programs as valuable parental genotypes due to their high values of important utility features.

RESULTS

It was found, that clone T-201221-12 was characterized by the highest yield and the largest fruit in 2021 and 2022. Moreover, in 2022 the clone produced the firmest fruits (Tab. 1). On average, in both years of the research, the fruits of this clone were the richest in ascorbic acid and also contained a large amount of anthocyanins (Tab. 2).

In turn, fruits of the clone T-201224-08 were the richest in anthocyanins and phenolic compounds in both years of the study, as well as in ascorbic acid in 2022 and contained average level of soluble solids (Tab. 2). Unfortunately, this clone was moderately productive and produced small fruit (Tab. 1).

Fruits of the clone T-201224-05 contained the most ascorbic acid in 2021, while the least content of this bioactive compound in 2022. They were also very rich in phenolic compounds (Tab. 2).

The clone T-201219-02 was the least productive (Tab. 1), but its fruits were characterized by the highest level of soluble solids as well as the large ascorbic acid and total phenols contents on average in both years of the research (Tab. 2).

Table 1. Characteristics of fruit yield and their external quality of advanced strawberry clones from the breeding program at InHort.

Cultivar/ clone	Marketable yield (g/plant)			Average fruit weight (g)			Fruit attractiveness (ranking scale 1-5)			Fruit firmness (N)		
	2021	2022	Mean	2021	2022	Mean	2021	2022	Mean	2021	2022	Mean
Honeoye	234	185	209.5	8.76	9.12	8.94	4.5	4	4.25	1.46	1.38	1.42
T-201219-02	111	172	141.5	9.53	9.93	9.73	4	4	4.00	2.74	1.31	2.03
T-201221-12	577	601	589.0	10.88	12.15	11.52	5	4	4.50	1.03	2.69	1.86
T-201221-14	203	296	249.5	10.49	10.70	10.60	4.5	5	4.75	1.42	2.04	1.73
T-201224-05	163	141	152.0	10.61	9.72	10.17	4.5	3	3.75	2.04	1.75	1.90
T-201224-08	273	269	271.0	7.60	8.44	8.02	5	4,5	4.75	1.60	1.82	1.71

Table 2. Internal fruit quality of advanced strawberry clones from the breeding program at InHort.

Cultivar/ clone	Soluble solids content (mg/100 g)			Ascorbic acid content (mg/100 g)			Anthocyanin content (mg/100 g)			Total phenols content (mg/100 g)		
	2021	2022	Mean	2021	2022	Mean	2021	2022	Mean	2021	2022	Mean
T-201219-02	9.32	7.25	8.29	77.3	63.5	70.4	11.0	11.1	11.05	410.6	428.4	419.5
T-201221-12	6.71	6.56	6.64	78.7	63.4	71.05	16.4	16.7	16.55	391.2	397.2	394.2
T-201221-14	7.85	6.78	7.32	72.5	53.8	63.2	12.3	12.6	12.45	402.9	409.3	406.1
T-201224-05	5.19	7.50	6.35	88.7	41.5	65.1	13.9	14.2	14.05	423.4	433.7	428.6
T-201224-08	7.14	7.50	7.32	69.3	66.8	68.05	19.9	20.5	20.02	427.1	439.1	433.1

Overall fruit description of the tested clones:

- T-201219-02 – large fruit, regular in shape - conical or cordiform, with intensive red skin color with a strong gloss, very firm; inserted calyx position and moderately strong calyx adherence to the fruit.
- T-201221-12 - large fruit, conical in shape, sometimes slightly ribbed, with intensive red skin with a strong gloss, very firm, inserted calyx position and strong calyx adherence to the fruit.
- T-201221-14 - large and medium fruit, regular in shape - broad-conical, orange-red skin with a strong gloss, very firm, calyx position at the level with fruit and moderately strong calyx adherence to the fruit.
- T-201224-05 - medium size fruit, conical or wedged in shape, dark red with medium gloss, uneven in color, very firm, slightly inserted calyx position and moderately strong calyx adherence to the fruit.
- T-201224-08 - large and medium size fruits, regular in shape - broad-conical or cordiform, orange-red skin with a strong gloss, very firm, calyx position at the level with fruit and moderately strong calyx adherence to the fruit.



T-201219-02



T-201221-12



T-201221-14



T-201224-05



T-201224-08

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