The productive value of new apple (*Malus domestica* Borkh.) genotypes bred at the National Institute of Horticultural Research, Skierniewice, Poland

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1. Objectives

One of the aims of the apple breeding program conducted at the National Institute of Horticultural Research in Skierniewice, Poland, is to develop new genotypes either resistant or showing low susceptibility to apple scab (*Venturia inaequalis*), apple powdery mildew (*Podosphaera leucotricha*) and fire blight (*Erwinia amylovora*). New cultivars should produce high yields of a good fruit quality and should be well adapted to climatic conditions of Poland. Cultivation of such cultivars is enabling the production of apples without or with very low level of chemical residues harmful to human health at markedly reduced production costs.

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2. Material and methods

- Productive value of eleven new apple breeding clones: J-2002-05 ('Melfree' x 'J-79'), J-2002-25-03 ('Sawa' x 'Rubin'), J-2003-11-01 ('Gold Milenium' x 'Szampion'), J-2003-11-04 ('Gold Milenium' x 'Szampion'), J-2002-21-01 ('Rubin' x 'Gold Milenium'), J-2002-14-01 ('J-79' x 'Szampion'), J-2002-10-01 ('J-79' x 'Topaz'), J-2004-13 ('Melfree' x 'Retina'), J-2002-15-02 ('J-79' x 'Lobo'), J-2002-15-01 ('J-79' x 'Lobo'), J-2004-29 ('J-79' x 'Rubinola') was evaluated at the National Institute of Horticultural Research (InHort), Skierniewice, Central Poland.
- The clones were compared to the standard cultivars 'Szampion' and 'Gold Milenium'.
- The plant material was produced by the hand-winter grafting of genotypes on M.9 rootstock.
- Trees, about 1.5 m height single shoots, were planted in 2016 in a medium fertile soil in the orchard.
- Trees in the experimental trial were planted at the density of 3.5 m x 1.0 m in the randomized block design (3 replications, 3 trees per plot).
- Studies and observations were conducted during six consecutive seasons (2018-2023).
- The trees vigour, flower intensity, ripening time, fruit yield and fruit quality (including: weight, skin color, shape, attractiveness and taste) were assessed.

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3. Results and discussions

Table 1

List of apple clones and traits of trees and fruits evaluated in the comparative experiment (Skierniewice, Sad Pomologiczny 2023)

Lp.	Clone (Cultivar)	Pedigree	Flowering intensity	Yield (kg/tree)	Fruit weight (g)	Trunk diameter (mm)
1	Szampion	standard	4,3*	12,1	205	41,5
2	Gold Milenium	standard	3,7	8,6	195	47,6
3	No. 21 (J-2002-05)	Melfree x J-79	3,9	7,0	200	44,0
4	No. 23 (J-2002-25-03)	Sawa x Rubin	3,5	9,2	225	46,1
5	No. 24 (J-2003-11-01)	Gold Milenium x Szampion	3,2	7,6	210	45,4
6	No. 28 (J-2003-11-04)	Gold Milenium x Szampion	4,9	13,8	192	46,4
7	No. 36 (J-2002-21-01)	Rubin x Gold Milenium	3,9	9,6	212	46,7
8	No. 41 (J-2002-14-01)	J-79 x Szampion	4,4	7,4	200	44,1
9	No. 44 (J-2002-10-01)	J-79 x Topaz	4,3	7,1	191	44,6
10	No. 46 (J-2004-13)	Melfree x Retina	3,8	8,4	191	45,1
11	No. 47 (J-2002-15-02)	J-79 x Lobo	3,5	7,4	206	45,3
12	No. 52 (J-2002-15-01)	J-79 x Lobo	3,7	8,2	215	45,0
13	No. 58 (J-2004-29)	J-79 x Rubinola	3,9	8,5	188	44,5

Explanation: * – Point scale 1 – 5: 1 – lack of flowers, 5 – very abundant flowering

4. Conclusions and perspectives

- The most promising genotype, was the late ripening clone (J-2002-25-03), obtained from the cross combination of 'Sawa' and 'Rubin'.
- Its fruit yield was approximately 20 % lower in comparison to 'Szampion' standard cultivar, but surpassed it in fruit taste and attractiveness.
- Moreover, it is resistant to apple scab (*Venturia inaequalis*) and low susceptible to other economically important pathogens and pests.
- This clone was named 'Wars' and was submitted as the new apple cultivar to the Polish National List of Fruit Plant Varieties in 2022.

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