Application of polyploidy genotypes in breeding in genus *Ribes* and *Lonicera* at the National Institute of Horticultural Research, Skierniewce, Poland

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1 Objectives

The polyploidization and intra and interspecific hybridization are the most important sources of phenotypic diversification in the cultivated crop plants. Polyploid individuals usually show higher plant vigor, a more compact growth habit and enlarged organ then diploid progenitors. The common consequence of polyploidy is the reduction of fertility and low rate of seed production. The aim of the presented study was the preliminary assessment of the usefulness of polyploids for the applied breeding in honeyberry syn. Haskap (*Lonicera* sp.) and blackcurrant (*Ribes nigrum* L.).

EHC 12-16 May 2024 Bucharest, Romania
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2. Material and Methods

Ribes nigrum L *Lonicera caerulea* L.

Plant Material

For the breeding program of the honeyberry (*Lonicera caerulea L.*) six tetraploid cultivars (2n=4x=36) were used: Russian cvs. ('Jugana', 'Sinij Utes',) Canadian cvs. ('Boreal Blizzard', 'Boreal Beast') and American cvs. ('Colin' and 'Lori'). The breeding program of blackcurrant (*Ribes nigrum* L.) included diploid (2n =2x=16) and tetraploid (2n=4x=32) clones of Polish cultivars 'Gofert' and 'Polares'. The studies have been conducted in the field at the Pomological Orchrd belonging to the National Institute of Horticulture (InHort), Skierniewice, Central Poland.

Pollen Viability was assessed based on cytoplasm stainability with Alexander's reagent and the germination on medium with 15% sucrose.

Cross-pollination of honeyberry cultivars (*L. caerulea*)

In spring 2023, in total, 36 crossing combinations were made and 1,796 flowers were hand-pollinated.

Breeding program of Blackcurrant (*R. nigrum*)

Twelve cross combinations (2x × 4x, 4x × 2x, 4x × 4x) were made in the 2023. In total, 416 flowers were hand-pollinated.

3. Results and Discussions

Table 1. Pollen viability of tetraploid *Lonicera* and *Ribes* genotypes

Genotype	Jugana	Sinij Utes	Boreal Blizzard	Boreal Beast	Colin	Lori	Polres	Gofert
Staining %	97.1	97.5	99.0	99.8	98.6	97.2	84.8	86.9
Germination %	8.3	44.1	61.7	73.8	13.3	72.7	42.8	51.7

The applied breeding program of honeyberry (*L. caerulea*)

470 fruits were produced from 1,796 pollinated flowers (ca. 3,300 seeds). Seed were germinated in the early spring afer stratification (2 months in the cooled incubator). 2,500 F_1 seedlings were produced in glasshouse conditions. Their hybrid status is being analyzed by molecular marker.

The applied breeding program of blackcurrants (*R. nigrum*)

62 fruits were obtained from 416 pollinated flowers (ca. 264 seeds). 49 seedlings obtained from the 4x × 4x crosses were tetraploids. Fruits from 4x × 2x crosses died at the early stage of development. The diploid seedlings were obtained from 2x × 4x crosses - probably resulting from the apomixis process.

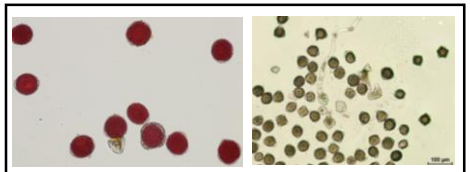

Fig. 1. Pollen viability in 4x honeyberry cv. Jugana

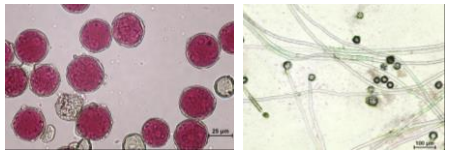

Fig. 2. Pollen viability in 4x blackcurrant cv. Polares

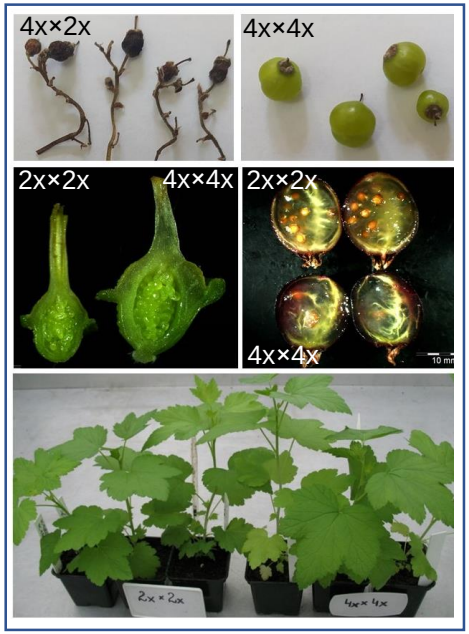

Fig. 3. Breeding of blackcurrant at polyploid level

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4. Conclusions and Perspectives

1. The staining of pollen grains with Alexander's reagent is not a reliable method for the assessment the pollen viability of honeyberry (*Lonicera* sp.) and blackcurrant (*Ribes nigrum* L.).
2. The applied breeding in honeyberry and blackcurrant can be successfully carried out at a higher ploidy level than diploid.
3. In blackcurrant breeding - the barrier of interploid crossability (pre- or postzygotic interploid crossability) is difficult to overcome, which may limit the possibility of producing triploid cultivars.
4. The obtained results are the basis for further developing of applied breeding programs of both species.

Acknowledgements

This research was supported by the special-purpose subsidy of the Ministry of Agriculture and Rural Development - **Task 3.7**: "Production of initial materials of blackcurrant with dessert-quality fruit, useful for trellising system cultivation and resistant to gall mite, leaf and shoot diseases" and **Task 3.16.** “Production of initial materials of honeyberry (*Lonicera caerulea*) with different ripening times, high-quality fruit and tolerance to fungal diseases, drought and sunburn”.