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Introduction

Short history of the blackcurrant breeding

- 1954-1967 – eng. K. Somorowski (cvs. 'Bzura', 'Dunajec', 'Łódka', 'Ner', 'Warta' i 'Wisła')
- 1968-1985 – Dr. J. Gwozdecki (cvs. 'Bona' i 'Ceres')
- 1986 – Prof. Dr. S. Pluta (Dr. Lukasz Seliga). Ten cvs. ('Tisel', 'Tiben', 'Ores', 'Tines', 'Ruben', 'Gofert', 'Polares', 'Tihope', 'Polben' and 'Polonus') were released and registered into National List of Cultivars of the Research Centre for Cultivar Testing (COBORU) and protected by common Plant Variety Rights at the [Community Plant Variety Office \(CPVO\)](http://www.cpvo.europa.eu), Angers, France.



Hybridization – traditional cross combination

Blackcurrant (*Ribes nigrum* L.):
'Foxendown', 'Ceres', 'Tiben', 'Ores', 'Gofert' and others

Blackcurrant (*Ribes nigrum* L.):
'Ben Gaim', 'Ben Hope', 'Foxendown', 'Ceres', 'Ruben' and others



APPLIED BREEDING OF BLACKCURRANTS

1. Stage I – Crossing of parental forms; 1 year
2. Stage II – Seedling population (3-5.000 and >); 1-2 years
3. Stage III – Mass selection (1-2%); 2-3 years
4. Stage IV – Advanced selection (1-2%); 2-3 years
5. Stage V – Assessment of clones in the field experiments (3-10 clones); 3-4 years
6. Stage VI – Application for national registry at the COBORU and/or PBR at the CPVO (1-3 clones); 3-4 years
7. Stage VII – New cultivar, registration; 1-2 years

Breeding cycle – releasing of a new blackcurrant cultivar – 10-12, up to 15 years



Achievements

ACHIEVEMENTS

Blackcurrant cultivars released and register into the National List of Cultivars and Plant Breeding Rights (PBR)



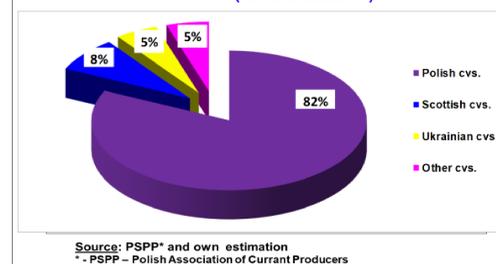
Cultivars are also protected by the PBR on territory of UE till 2025-2035

Ten Polish cultivars were released 1986-2022

LP.	CULTIVAR	Year of registration	Share in production in Poland (%)
1	TISEL	2000	50
2	TIBEN	2000	6
3	ORES	2005	2
4	TINES	2005	0.5
5	RUBEN	2005	10
6	GOFERT	2010	4
7	POLARES	2014	0.5
8	TIHOPE	2014	8
9	POLBEN *	2019	1
10	POLONUS *	2019	-

=82,0%

Actual share of blackcurrant cultivars in the commercial plantation in Poland (%) (Recent situation)



US PLANT PATENT - 2016

United States Patent
GOFERT
POLARES
TIHOPE

BLACKCURRANT (*RIBES NIGRUM* L.) BREEDING PROGRAM at the InHort, Skierniewice, Poland

Applied breeding of new blackcurrant cultivars is conducted at the Department of Horticultural Crop Breeding of the National Institute of Horticultural Research (InHort) in Skierniewice, central Poland:

- high tunnels and the *Ribes* collection in the Pomological Orchard
- greenhouse facilities
- breeding & selection fields in the Pomological and Experimental Orchard in Skierniewice and Dąbrowice (7 km away).



Crossing programs



50-60 crossing combinations are mainly done under cover (high-plastic tunnel) on bush or potted plants and also grafted on rootstock - at the end of March to mid- or at the end of April (since 2014 every other 2nd year)



Production of seedlings in the glasshouse from the end of January – to the end of April



4. Planting and evaluation of F₁ seedlings in breeding (selection) fields



Seedlings produced in the greenhouse (after hardening off outside) are planted in the breeding-selection field. Planting density: 1.5 m x 0.30 m.



5-6. Selection of seedlings, propagation of the best individuals and evaluation of clones in the collection

- Phenotypic assessment and selection of fruiting seedlings in the selection fields
- Vegetative propagation (cloning) of the best individuals and obtaining breeding clones marked (PC-...)



7. Submission of new cultivar to:

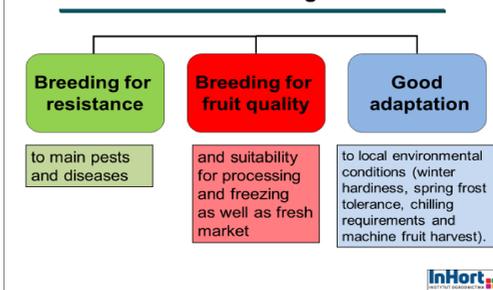
- An application to the national register (KR) and/or book of protection of exclusive rights (KO, PBR) in COBORU, Poland - COBORU (www.coboru.pl) - the Research Centre for Cultivar Testing;
- An application to community legal protection in EU countries - CPVO (www.cpvo.europa.eu) Community Plant Variety Office, Angers, France

8. Decision to enter new cultivars:

into the national register (KR) and the book of protection of exclusive rights (KO) COBORU – for 25 years for blackcurrants
OR
to grant a community variety rights – legal protection within the EU for 25 years for blackcurrants



Aims and breeding efforts



Aims and breeding efforts, e.g

Breeding for resistance to main pests and diseases

1. Gall mite (*Cecidophyopsis ribis*)
2. Blackcurrant Reversion Virus (BRV)

Typical symptoms – „big buds”
„Russian type”
„European, common type”



Aims and breeding efforts, e.g

Breeding for resistance to main pests and diseases

Powdery mildew (*Podosphaera mors-uvae*)
Anthracnose, Leaf spot (*Drepanopeziza ribis*)
White Pine Blister White (*Cronartium ribicola*)

Seedlings and breeding clones and genotypes in working collection are evaluated by specialist from the Department of Plant Protection (Phytopathology and Entomology Laboratories)



Aims and breeding efforts, e.g

Breeding for fruit quality and suitability for processing and freezing (IQF) as well as fresh market

Chemical composition of fruits

- Extract content,
- Acidity,
- Total anthocyanins,
- Total phenolic compounds
- Ascorbic acid (vitamin C)
- Antioxidant capacity.

20-25 annually fruit samples are analyzed in a cooperation with the Department of Processing and Storage of Fruit and Vegetables of the InHort.



Blackcurrant Breeding – Desert cultivars for Fresh Market

Progress in increasing of fruit size

0.8-1.0 g: Ojebyn, Titania, Ben Alder, Ben Lomond
1.2-1.5 g: Ben Hope, Tines, Ruben, Czereszniawa
2.5-3.0 g: Bona, Big Ben, D 13 B/11



BLACKCURRANT BREEDING - 1986

NEW CULTIVARS SUITABLE FOR:
- 75% for processing and freezing (machine harvest),
- 25% dessert – fresh market (hand picked)



BREEDING METHODS:

TRADITIONAL CROSSING (HYBRIDISATION) NO-GMO

Crossing of selected parental forms and evaluation & selection within hybrid offsprings (F₁ seedlings) (bred cultivars have their pedigrees)

Traditional breeding is supported by molecular methods (biotechnology) – Molecular Biology Laboratory



Stages of in breeding work:

1. Selection of parental forms
2. Preparing plants for crossing and pollination
3. Fruit picking, stratification and sowing of seeds
4. Production, planting and evaluation of F₁ seedlings in breeding (selection) fields (1-2%)
5. Evaluation & selection of individuals (1-2%) and their vegetative propagation (hardwood cuttings) - clones
6. Clone evaluation (collection and preliminary field experiments)
7. Submitting of new cvs. for registration tests at the COBORU¹
8. Decision to enter new cvs. in the national register (KR) and the PBR protection (KO) COBORU or in the CPVO², Angers, FR - obtaining community legal protection in EU countries

¹ COBORU - the Research Centre for Cultivar Testing; ² CPVO – Community Plant Variety Office

1. Selection of parental forms (1):

- Phenotypic assessment in the *Ribes* breeding collection,
- Breeding value (GCA and SCA effects) of potential parental forms in crossing programs,
- Genetic polymorphism (DNA fingerprinting analysis)
- Knowledge of genetic determination and inheritance of traits,



1. 'BONA' (PL)
2. 'BEN SAREK' (U.K.)
3. 'LENTAJ' (RUS)



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