Recent situation in the blackcurrant production and breeding in Poland

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CENTRAL EUROPE
SWEDEN
DENMARK
Baltic Sea
LITHUANIA
(RUSSIA)
North Sea
BELARUS
POLAND
Berlin
Warsaw
Skierniewice
Lodz
THE NETHERLANDS
GERMANY
BELGIUM
LUXEMBOURG
Prague
CZECH REPUBLIC
UKRAINE
SLOVAKIA
Vienna
Budapest
FRANCE
LIECHTENSTEIN
AUSTRIA
HUNGARY
ROMANIA
SWITZERLAND
Geneva
SLOVENIA
Ljubljana
CROATIA
ITALY
250 kilometers
250 miles
BOSNIA & HERZEGOVINA
SERBIA
Adriatic Sea
BULGARIA

Established on January 1st, 2011
by a Decree of the Ministry of Agriculture and Rural Development
by merging

Research Institute of Pomology and Floriculture

Established in 1951

Institute of Vegetable Crops

Established in 1964

Professor Szczepan A. Pieniążek

Professor Emil Chroboczek

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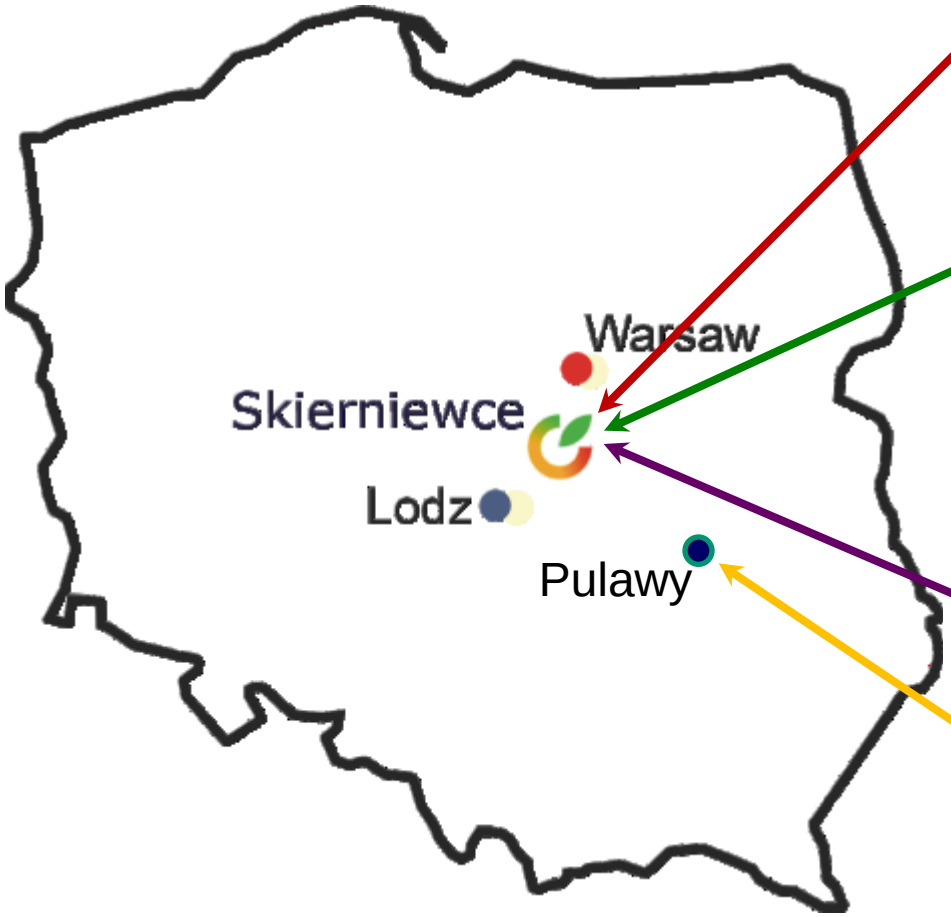
Lublin
Praha
Krakow
nberg
Brno
Regensburg
200 km
Kosice
Ivano Frankovsk

DIVSIONS



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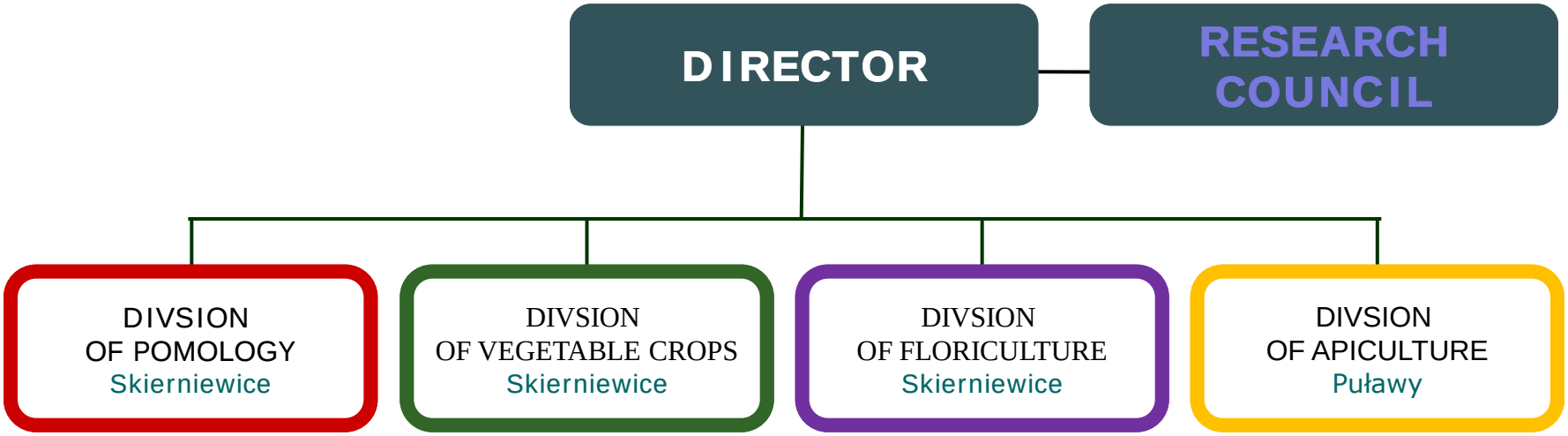
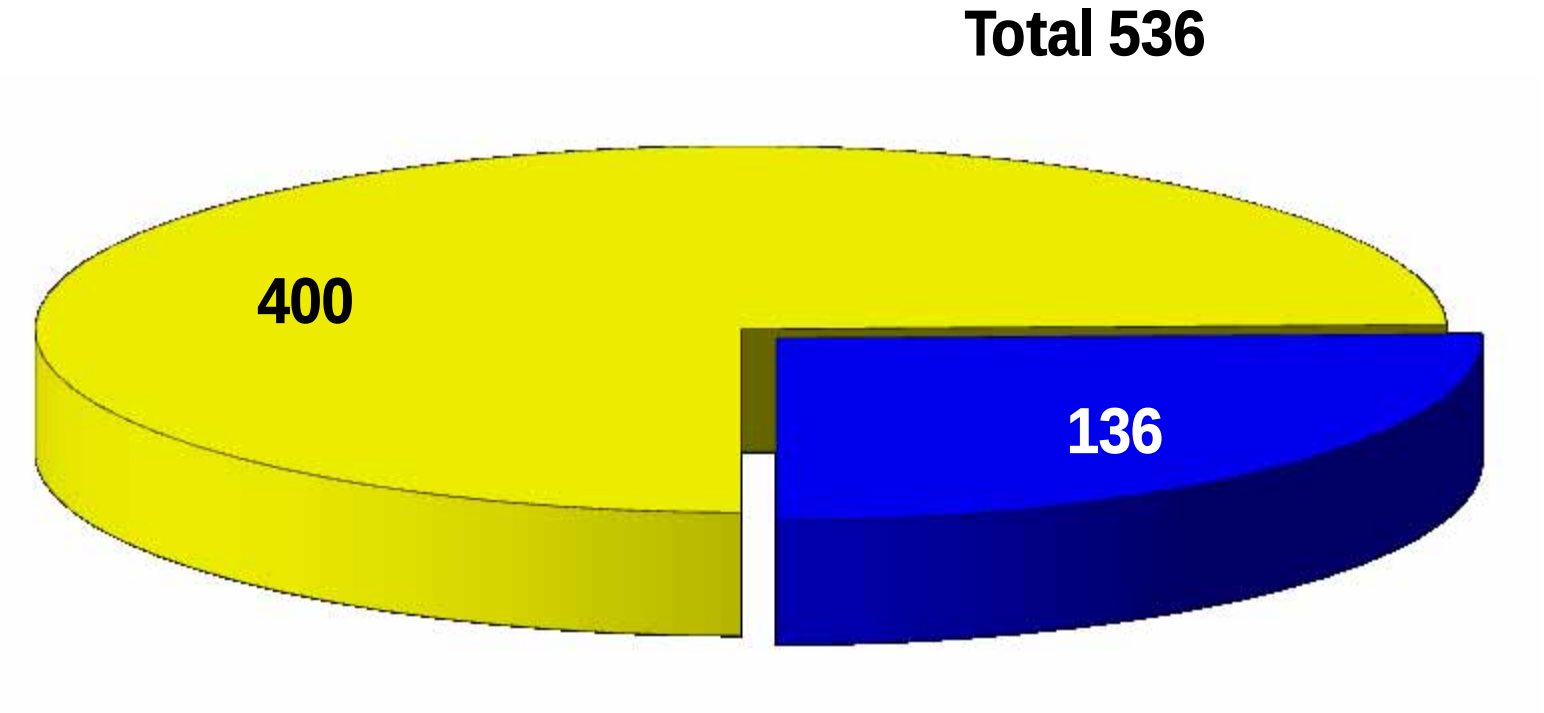
ORGANIZATIONAL STRUCTURE



	11	4	5	4
	19	10	6	2

Reaserch Departments Laboratories

EMPLOYMENT


Total 536
400
136
Researchers and lab technicians
Administration, maintenance staff and field workers

BLACKCURRANT
– recent situation with fruit production

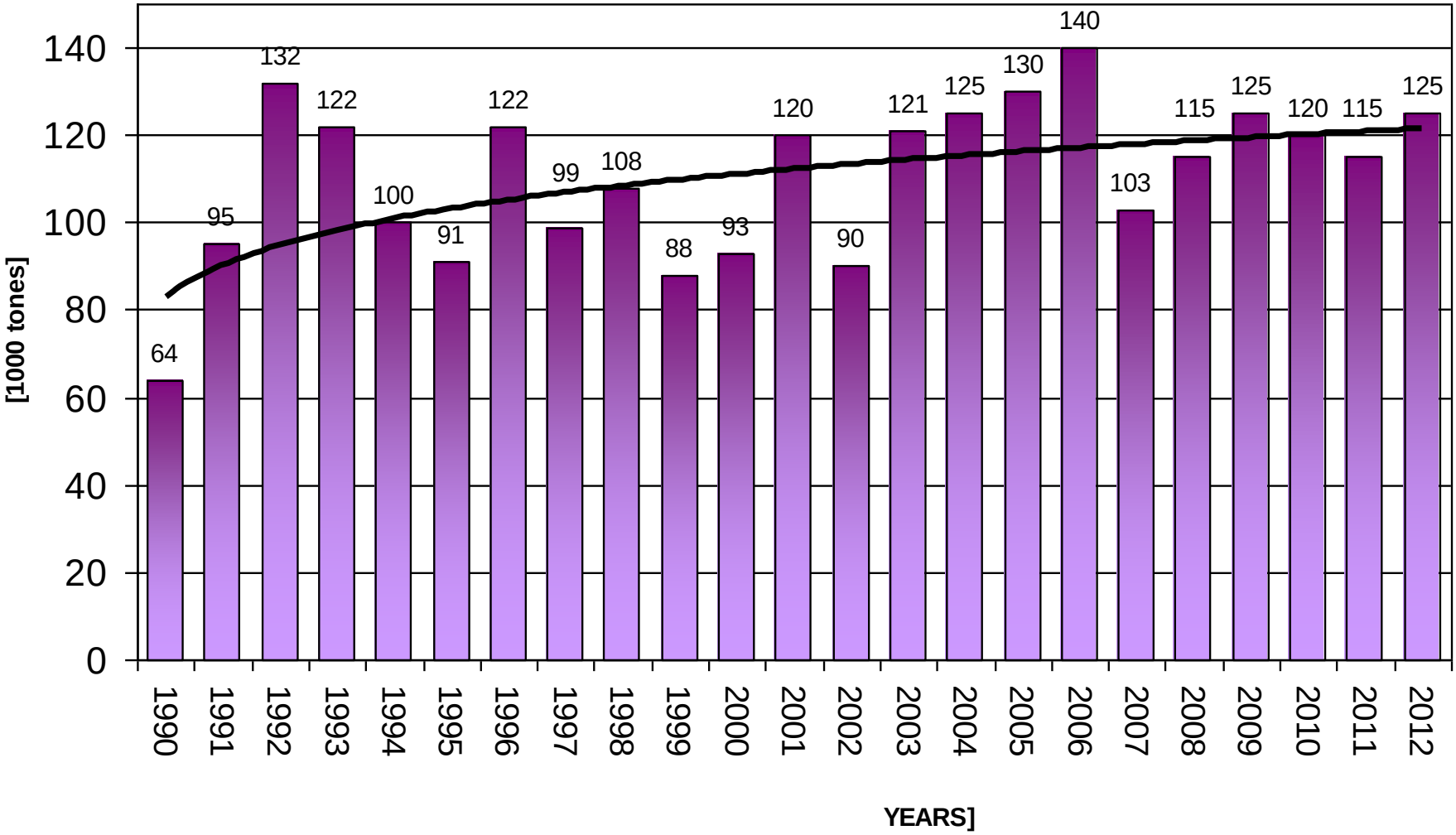
Commercial plantations with fruit collecting by harvesters

Different types of harvested used in Poland

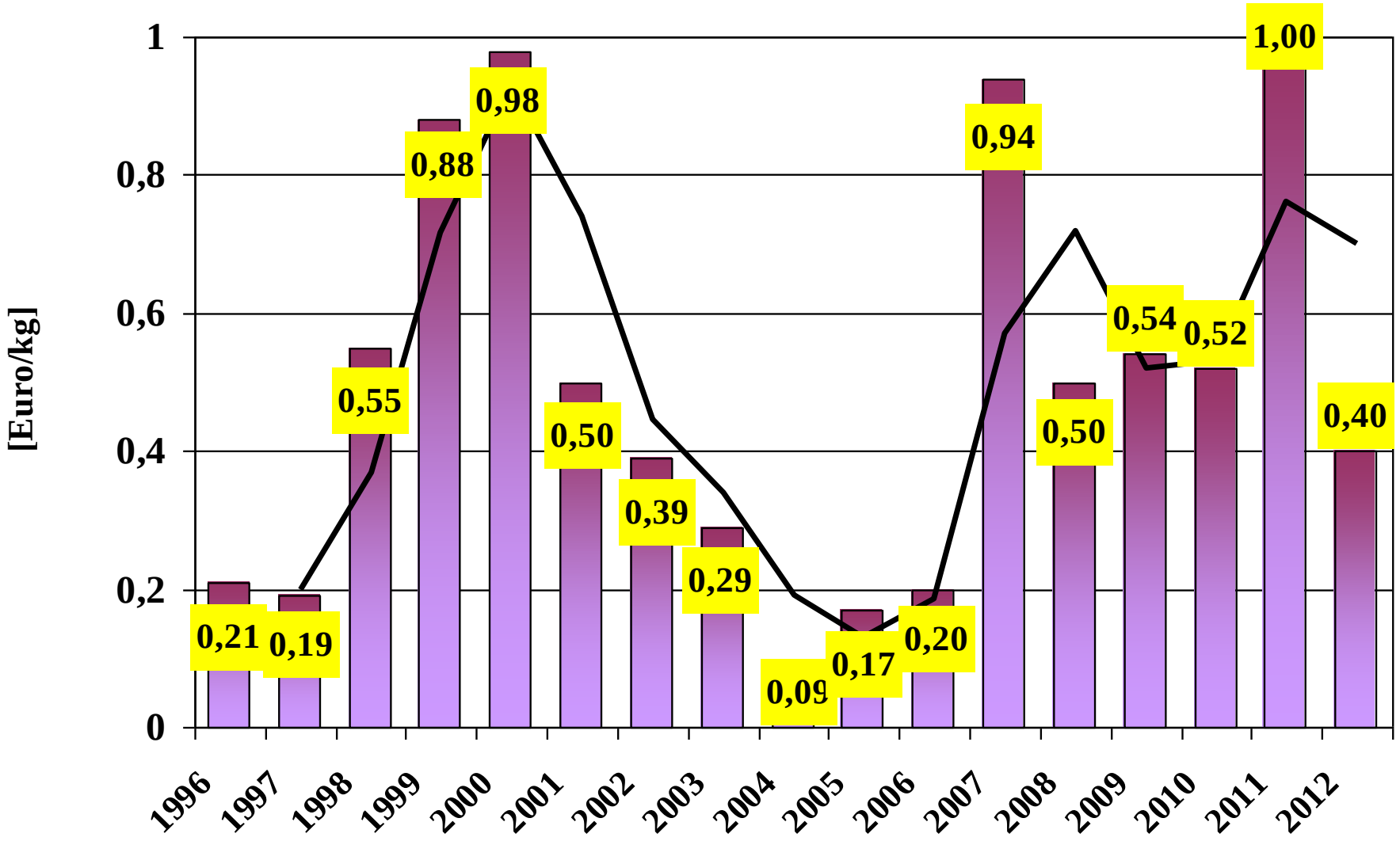
INTODUCTION – the blackcurrants

- **Big economic importance (1st place in the world in the fruits production, about 30% of the world production of the blackcurrants),**
- **Great interest in the commercial and amateur cultivation,**
- **High nutrient and health benefit value of fruits and good usefulness for the processing and freezing industries, as well as for fresh market and consumption**
- **Construction and production of different types of harvesters in Poland,**
- **Working out the technology of cultivation and maintaining plantations established for fruit picking by harvests,**
- **Good weather and soil conditions for blackcurrant growing in Poland.**
- **Long tradition in the blackcurrant production in Poland**

FRUIT PRODUCTION OF BLACKCURRANTS IN POLAND [1000 tones]

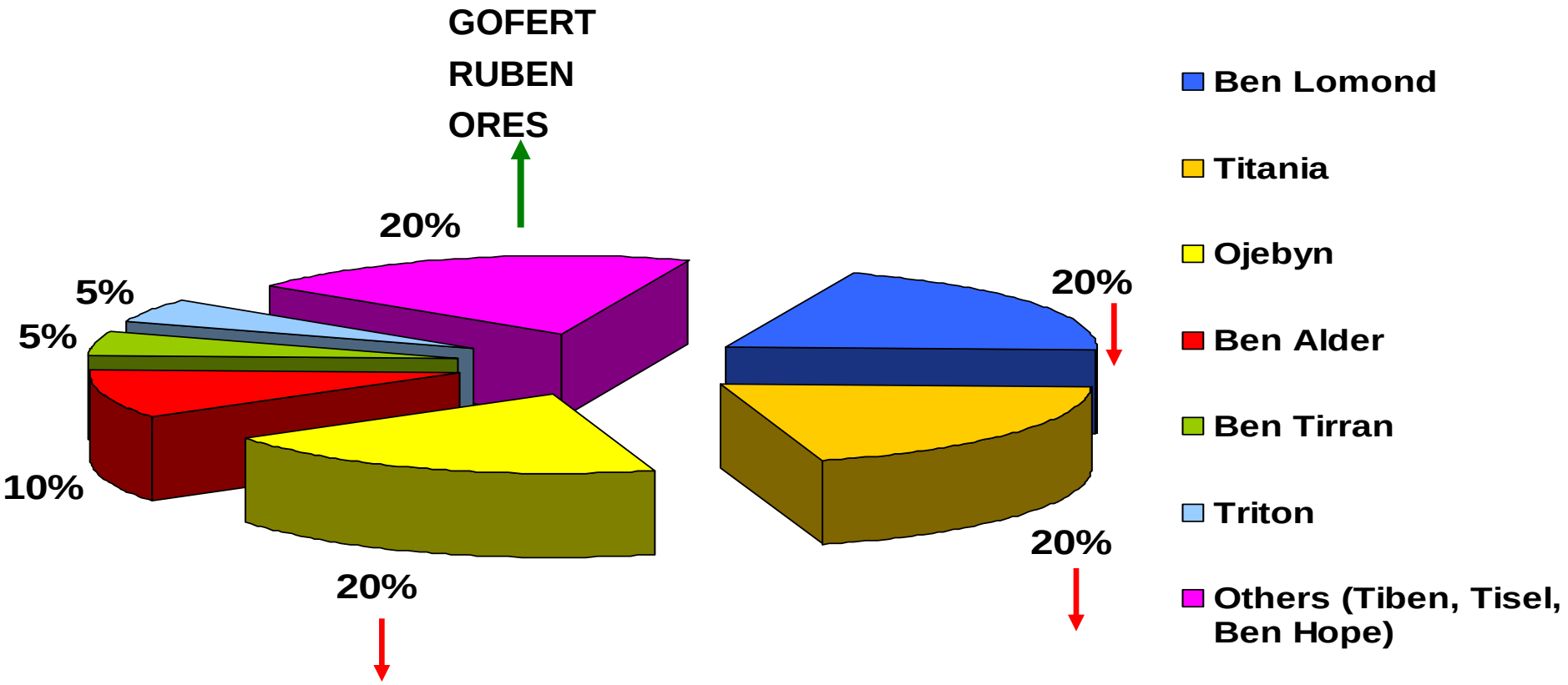


Average prices of blackcurrants for growers in Poland in 1996-2012, [Euro/kg]



Structure of blackurrant cultivars

Grown recently on commercial plantations in Poland.



Further development (1)

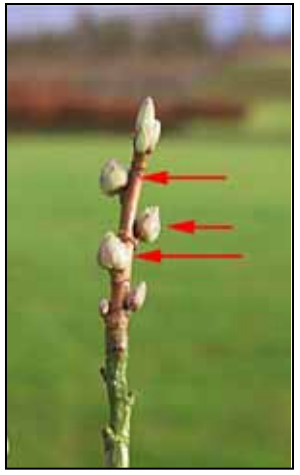
- ✓ **The present blackcurrant production (acreage and fruit crop) is rather steady because of three reasons:**

1. the plantations are getting older and older, so the yield potential of plants is decreasing !!!

2. the reduction (or lack) of effective pesticides for plant protections against the most serious fungal diseases and pests

3. spreading out the main pests and disease, mainly gall mite („big bud”) and Blackcurrant Reversion Virus (BRV)

Blackcurrant Reversion Virus (BRV)



Gall mite („big bud").
(Cecidophyopsis ribis)

American powdery mildew
(*Sphareotheca mors-uvae)*

Further development (2)

✓ **The most important matters to be arranged:**

- well organized Polish growers (group of growers, production organization - regional or/and on the National level

  - National Blackcurrant Grower's Association was established in April 2012 by the initiative group of growers

- better cooperation between growers and processing /freezing industries resulting in signed contracts on „fair-play" conditions

Further development

- **PROMOTION** needed for increasing the consumption of the valuable blackcurrant products.
- Annual increase of consumption of **only 1 litre** of juice/nectar per person in EU countries could improve the profitability of blackurrant fruit production in Poland and EU.
- The people/consumers should change their thinking: **„Blackcurrant juice or nectar is pretty expensive, because it is very healthy and beneficial for the health”.**

Acreage and fruit crop of blackcurrants in EU countries in 2009-2011 *according to IBA* data*

CONUNTRY	Share in fruit crop - 2009 (%)	2009		2010		2011	
		Acreage (ha)	Crop (t)	*Acreage (ha)*	Crop (t)	*Acreage (ha)*	Crop (t)
1. Poland	69,8	*25 000*	125 000	*25 000*	110 000	*25 000*	80 000
2. U.K	8,0	*2 300*	14 250	*2 250*	12 300	*2 400*	10 750
3. Denmark	4,7	*1 600*	8 500	*1 600*	10 900	*1 600*	8 400
4. France	5,0	*2 000*	9 000	*2 200*	7 500	*2 000*	7 500
5. Lithuania	4,5	*4 000*	8 000	*3 500*	7 000	*3 500*	7 000
6. Germany	3,1	*1 100*	5 500	*1 600*	6 000	*1 600*	4 500
7. Holland	1,7	*450*	3 000	*470*	2 800	*420*	2 000
8. Finland	1,1	*1 860*	2 000	*1 730*	2 200	*1650*	2 500
9. Hungary	0,7	*300*	1 200	*350*	1 200	*300*	900
10. Sweden	0,7	*300*	1 200	*300*	700	*300*	1 000
11. Latvia	0,2	*648*	318	*848*	301	*878*	351
12. Estonia	0,2	*300*	350	*350*	400	*420*	200
13. Norway	0,4	*150*	700	*160*	320	*160*	520
UE TOTAL	100	*38 710*	156 150	*39 510*	166 600	*39 350*	125 270

Acreage and fruit crop of blackcurrants in selected worlds' countries in 2009-2011, *according to IBA data*

CONUNTRY	2009		2010		2011	
	Acreage (ha)	Crop (t)	Acreage (ha)	Crop (t)	Acreage (ha)	Crop (t)
New Zealand	1 600	6 500	1 600	6 350	1 500	9 000
Australia	78	496	78	500	78	450
China	4 000	14 500	2 500	13 500	3 300	15 000
Canada	140	650	140	700	140	800
USA	85	175	100	250	120	300
UKRAINE	-	-	5 200	30 000	5350	30 000

IBA – **I**nternational **B**lackcurrant **A**ssociation; **www.internationalblackcurrantassociation.com/**

Acreage and fruit crop of blackcurrants in EU countries in 2012 *according to IBA* data*

CONUNTRY	2012 (Forecast)	
	Acreage (ha)	Crop (t)
1. Poland	*26 000*	90 000
2. U.K	*2 400*	10 000
3. Denmark	*1 600*	7 500
4. France	*2 000*	6 500
5. Lithuania	*2 890*	6 000
6. Germany	*1 600*	4 500
7. Holland	*370*	2 100
8. Finland	*1600*	2 500
9. Hungary	*300*	600
10. Sweden	*300*	300
11. Latvia	*878*	300
12. Estonia	*440*	250
13. Norway	*160*	560
UE TOTAL	*40 538*	131 110

CONUNTRY	2012 (Forecast)	
	Acreage (ha)	Crop (t)
New Zealand	1 500	7 700
Australia	78	500
China	3 300	13 500
Canada	140	800
USA	120	300
UKRAINE	5650	30 000

RUSSIA – no official statistic data available NOW !!!

The blackcurrant breeding programme in Poland –
Aims and recent achievements

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FRUIT BREEDING DEPARTMENT
(2 Laboratories)

1. Genetics and Breeding Laboratory

2. Laboratory of Unconventional Breeding Methods (*Biotechnology*)

Main activities:

- Genetic, methodological and molecular studies
- **Development of new cultivars**

The blackcurrant breeding has been carried out at the Fruit Breeding Department, in different facilities:

1. Working „breeding collection (germplasm)
2. High plastic tunnel,
3. Glasshouses

4. Selection fields at the Experimental Station at Dabrowice, near Skierniewice

Traditional cross combination:

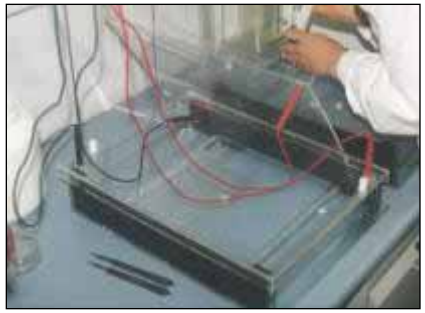
a/ direct hybridization, b/ interspecific hybridization

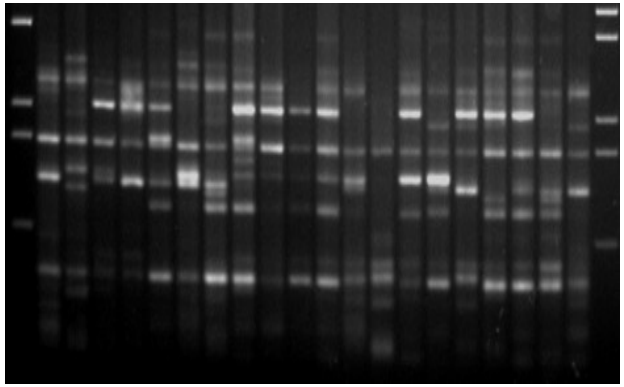
Supported by:

- methodological studies on breeding value (GCA and SCA effects) of parental forms, inheritance and variability of selected traits,

- the molecular biology (*in vitro*, embryo rescue and DNA fingerprinting, markers, MAS – Marker Assisted Selection – in the nearest future)

2. Mutation (small scale in the past)





Crossing programs – under cover

Hybridization – traditional cross combination

X

Blackcurrant
(Ribes nigrum* L.*):

‘ Foxendown’, ‘Ceres’, ‘Tiben’, ‘Ores’, ‘Czereszniewa’ breeding lines and others

Blackcurrant
(Ribes nigrum* L.*):

‘ Ben Gairn’, ‘Ben Hope’, ‘Foxendown’, ‘Ruben’ , ‘Gofert’ and others

Interspecific hybridization

♀

Blackcurrant
(Ribes nigrum L.):

‘ Foxendown’, ‘Ceres’,
‘Tiben’, ‘Ores’,
‘Czeresznieva’,
‘Ben Gairn’

X

♂

GOOSEBERRY
Ribes grossularia

RED CURRANT
Ribes rubrum

R. sanguineum

PRODUCTION OF SEEDLINGS IN GLASSHOUSE

(January 15 - May 30)

Aims and breeding efforts

Breeding for resistance

to main pests and diseases, including gall mite, BRV and fungal diseases

Breeding for fruit quality

and suitability for processing and freezing as well as fresh market

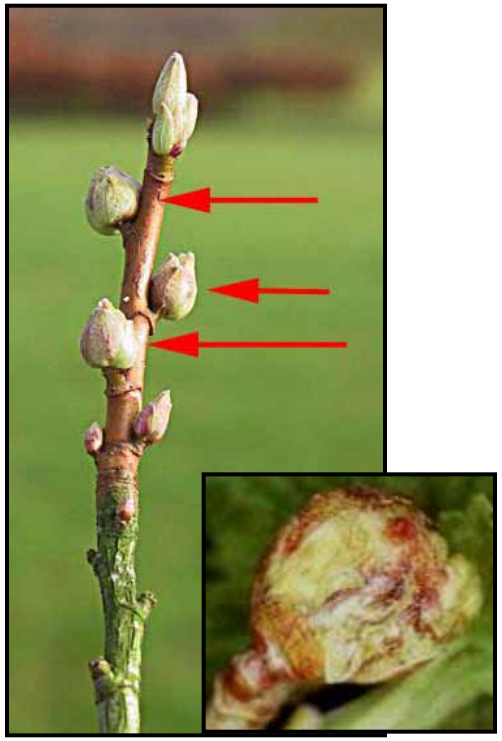
Good adaptation

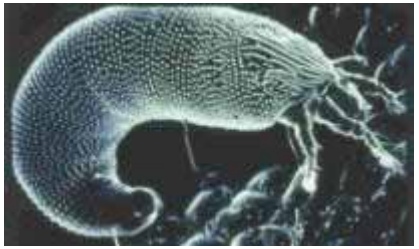
to local environmental conditions (winter hardiness, spring frost tolerance, chilling requirements and machine fruit harvest).

Aims and breeding efforts

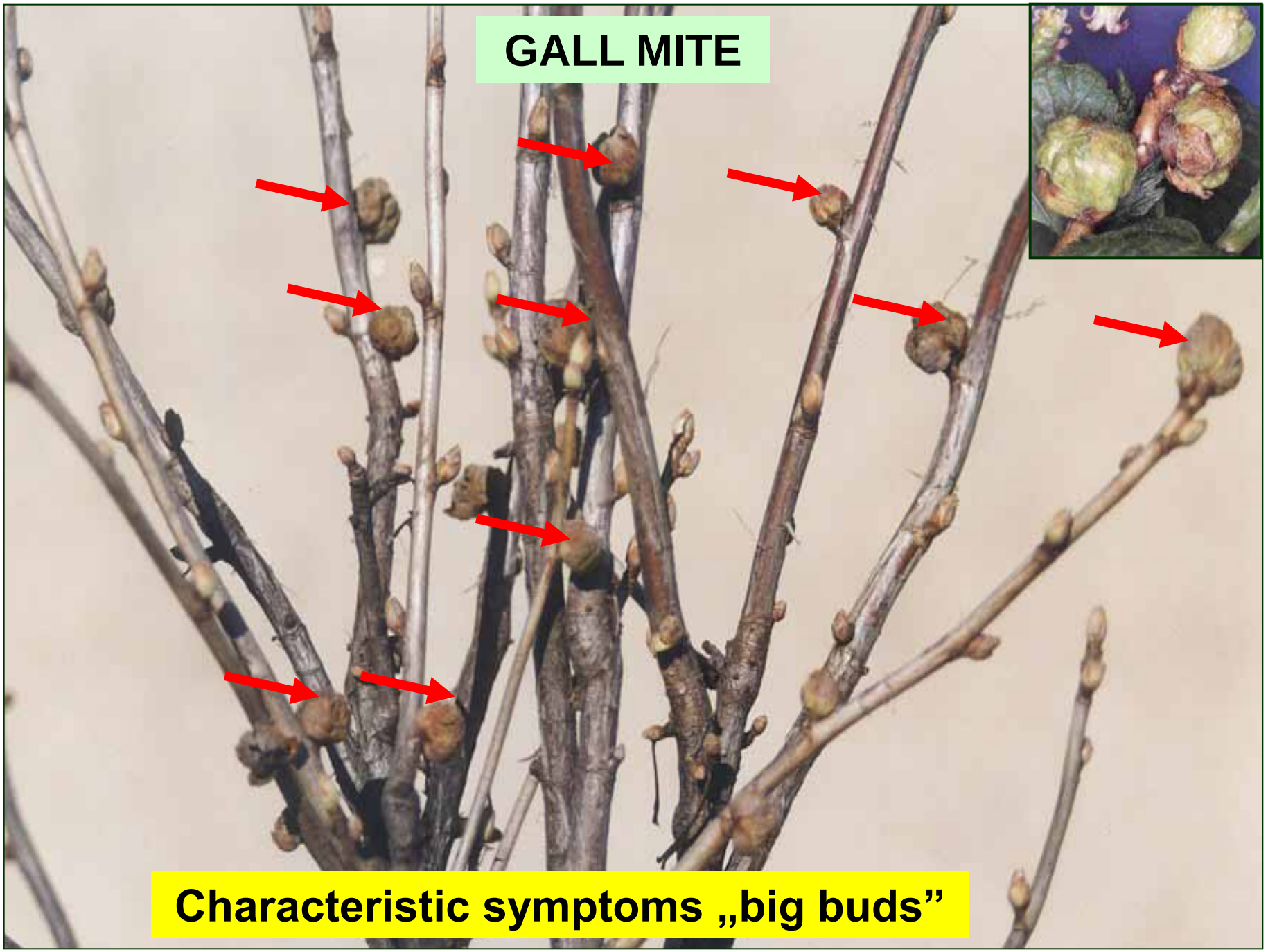
Breeding for resistance to:

- the most harmful pest - **gall mite** (*Cecidophyopsis ribis* Westw.)
- and **Blackcurrant Reversion Virus** (*BRV*) transmitted by the gall mite (vector) remains a high priority.

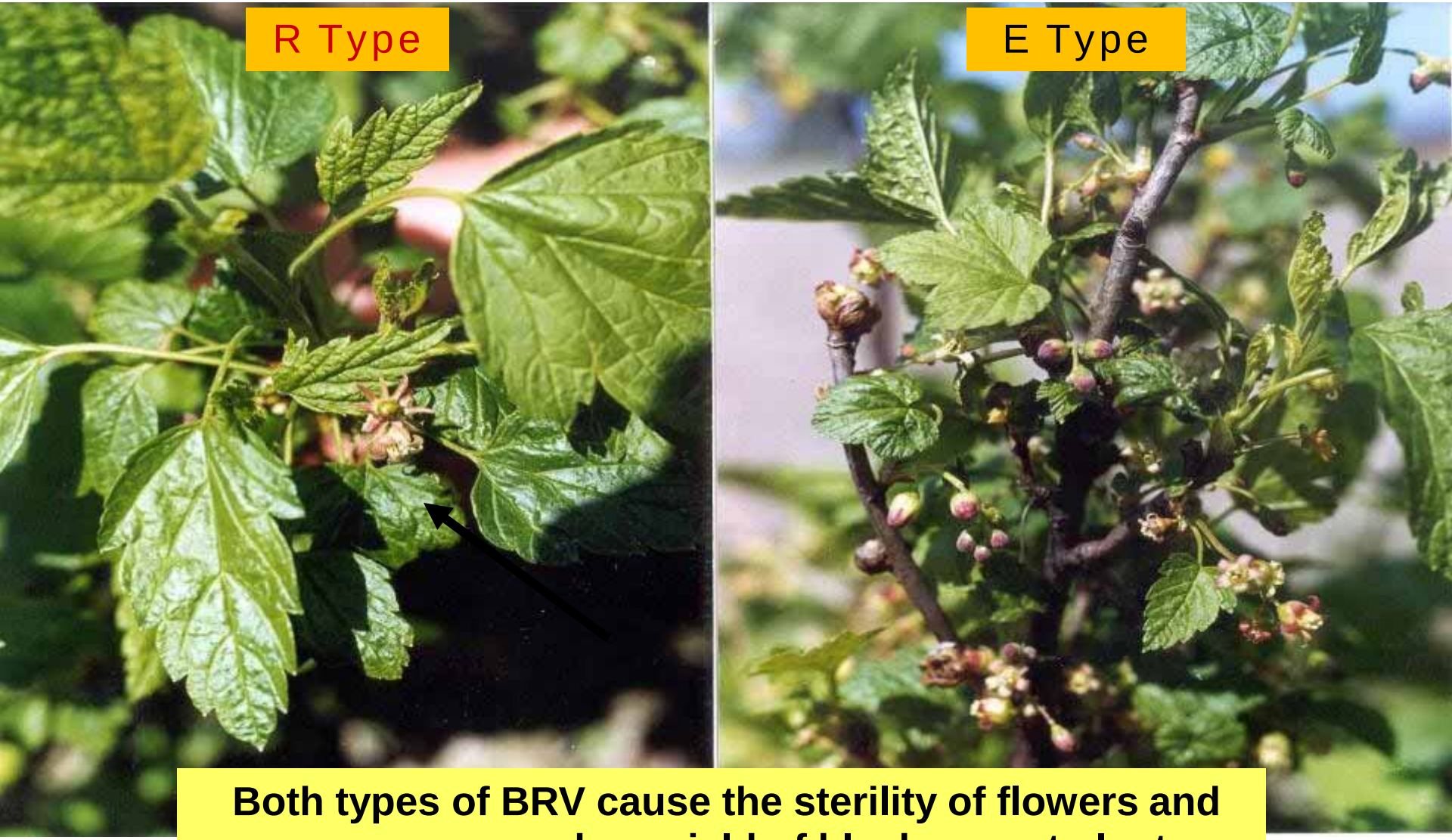




5-7 000 mites/buds


GALL MITE
Characteristic symptoms „big buds”

Blackurrant Reversion Virus (*BRV*)



Both types of BRV cause the sterility of flowers and consequence reduce yield of blackcurrant plants

Powdery mildew
(*Sphareotheca mors-uvae)*

Leafspot
(Drepanopeziza ribis Kleb.

White Pine Blister Rust - WPBR,
(*Cronartium ribicola* Fisch.)

Main breeding directions

- **Breeding for fruit quality:**

  1. <u>Processing and freezing</u>:

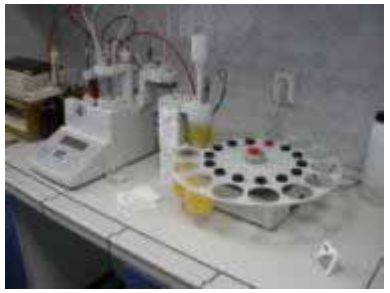
  - high content of anthocyanins, ascorbic acids, acidity and soluble solids – Brix and polyphenols)

  2. <u>Fresh market</u> (increasing interest, related to health benefits)

  - large and attractive fruits, long and green strigs, sweet taste, aroma, uniform ripening, good shelf-life,

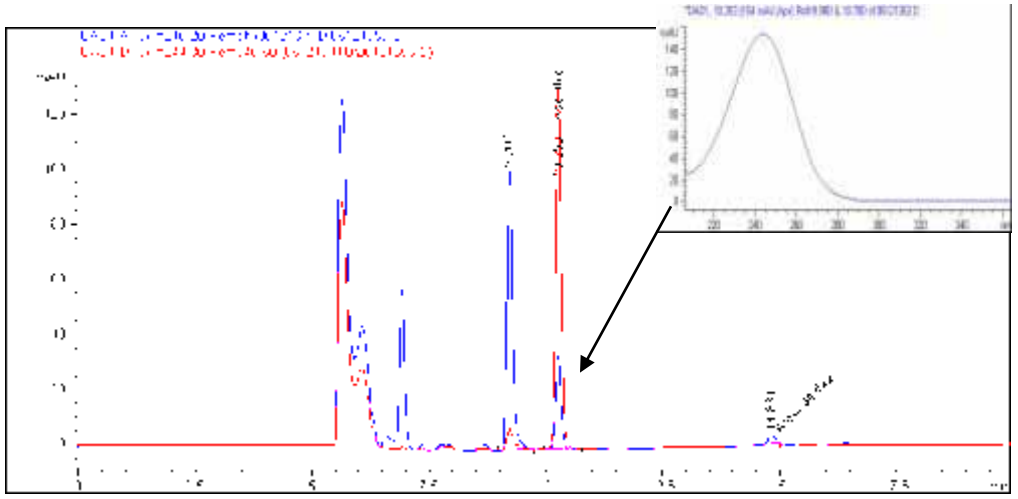
  - hand picked on strig
  - different cultural practices :
    - open field cultivation
    - protected cropping in the high-tunnels, on wires

Analytical methods



- **Soluble solids content** – by refractometer, according to Polish Standard PN-90/A-75101/02
- **Titratable acidity** – according to Polish Standard PN-90/A-75101/04, expressed as citric acid
- **Anthocyanins** – by pH differential method (Wrolstad, 1976);
- **Ascorbic acid**

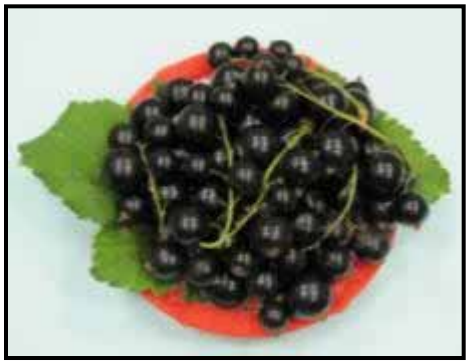
– by an HPLC method



DESSERT BLACKCURRANT CULTIVARS
„NEW FASION or JUST LIFE”

Blackcurrant	- 181,0
Strawberry	- 58,8
Orange	- 53,2
Lemon	- 53,0
Blueberry	- 37,0
Grapefruit	- 34,4
Raspberry	- 26,2
Blackberry	- 21,0
Grapes	- 10,8
Apricot	- 10,0
Sour cherry	- 10,0
Plum	- 9,5
Bananas	- 8,7
Sweet cherry	- 7,0
Peach	- 6,6
Apple	- 4,6
Pear	- 4,2

Average ascorbic acid (vit. C) content in fruit (mg/100g fresh weight)



Progress in increasing of fruit size

(dessert type blackcurrant cultivars)

BONA
(1,8 g)

CZERESZNIEWA
(1,4 g)

D 13B/11
(2,4 g)

ADVENTAGES OF BLACKURRANT FRESH FRUIT PRODUCTION

CONSUMERS

- Enhancing the fresh fruit market
- Enriching the human diet in a very healthy fresh fruit

FRUIT GROWERS

- Increasing profitability of blackcurrant production
- Allowing the growers to introduce innovative technology of blackcurrant production (open field, protected cultivation, off season production)

ACHIVMENTS

25 YEARS OF BREEDING

(1986-2011)

The Research Institute of Pomology and Floriculture (***since 2011 Research Institute of Horticulture***) in Skierniewice, Poland is the main centre of top and small fruits breeding, including **blackurrant *(Ribes* nigrum L.) breeding programme**

Year of staring the breeding programme	**1986 -**
Who finances the breeding	**Government**
How many crosses are done per year	**60-80**
How many seedlings are produced a year	**5.000-10.000**
How many seedlings have been under evaluation in the selection fields for 25 years	**>105.500**
How many advanced clones were selected during last five years	**70**
How many genotypes/cultivars are maintained in the „working” breeding collection	**125**
How many new cultivars have been in the final evaluation	**2 (‘Polares’ and ‘Tihope’)**
Name of cultivars which were released and registered in Poland or UE	**‘Tisel’, ‘Tiben’, ‘Ores’, ‘Ruben’, ‘Tines’, ‘Gofert’**

Blackcurrant cultivars bred at the Research Institute of Horticulture in Skierniewice, Poland

- grown on commercial plantations since:

2000

2010

2005

Plant Breeding Rights on EU territory till 2030

The newest blackurrant cultivars submitted in 2009 for the final evaluation before registration
at the National Research Centre for Cultivar Testing (COBORU)

‘POLARES’

Breeding clone PC-7/13

‘TIHOPE’

Breeding clone PC-425

‘POLARES’ – late cultivar

- Productive
- Fruits – medium size and small
- Suitable for processing(high content of acidity, anthocyanins and ascorbic acid)
- **Resistant to the gall mite**, powdery mildew and medium susceptible to WPBR
- The suitability to machine fruit harvest is being under investigation.

‘TIHOPE’ – medium-early cultivar

- Productive
- Fruits – large and medium size
- Suitable for processing and freezing (high content of extract, acidity, and anthocyanins, medium content of ascorbic acid)
- Resistant to the powdery mildew, WPBR , but susceptible to gall mite
- The suitability to machine fruit harvest is being under investigation.

Thank you for your attention