



Introduction

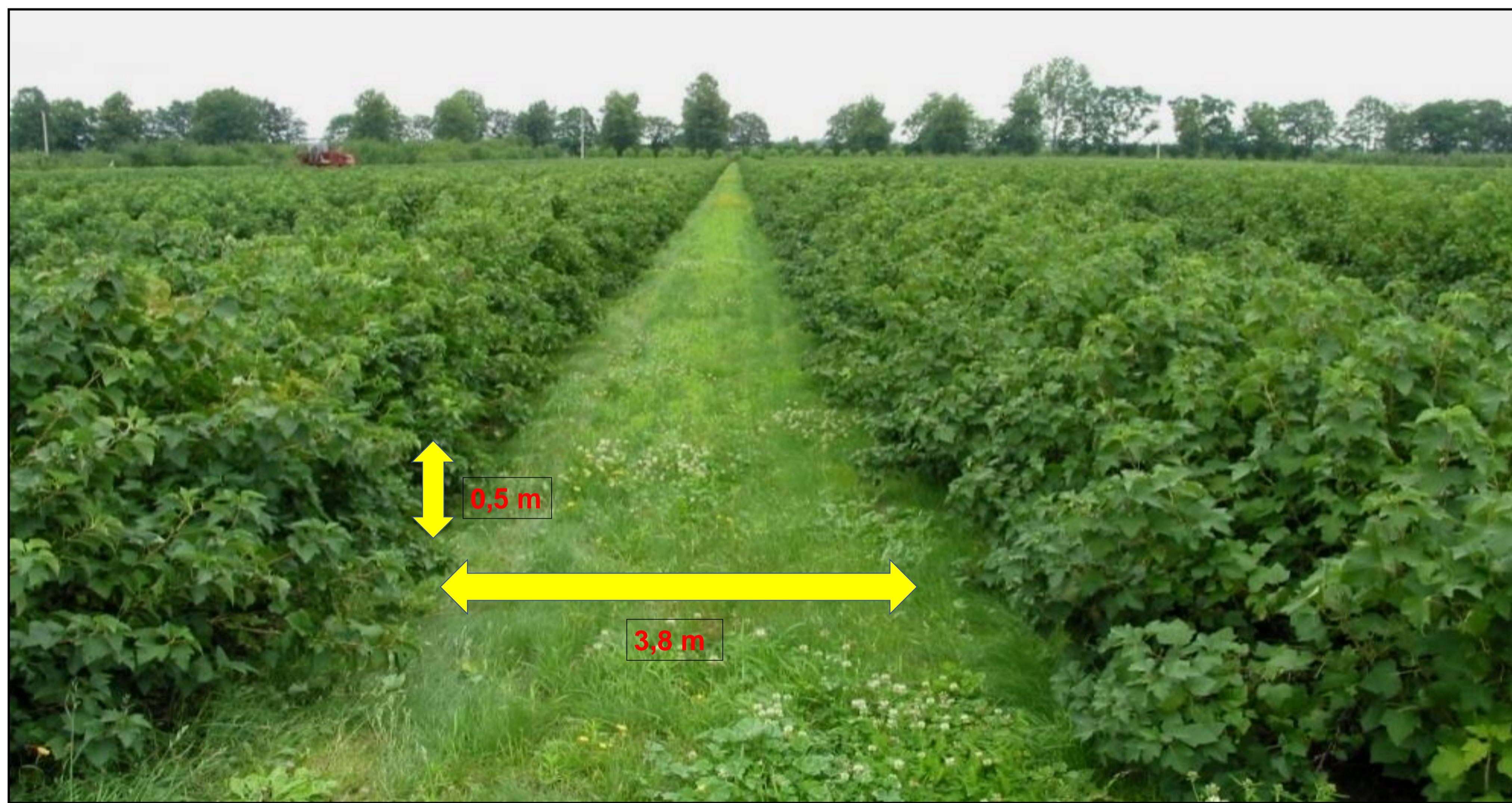
- **Blackcurrant** (*Ribes nigrum* L.) is a crop commonly cultivated in many countries and on several continents in the temperate climate zone. **Europe is the main producer of these fruits.**
- For many years Poland has been the largest producers and exporters of these fruits in Europe and in the world (55% and 58% of total blackcurrant fruit production, respectively).
- According to the data of the Central Statistical Office (GUS) and FAO (2022) in recent years the annual blackcurrant production in our country amounted to 95-140,000 M tons.
- The high production of these fruits and the position in the world ranking are, among others, the effect of biological progress in the form of blackcurrant cultivars bred at the National Institute of Horticultural Research (InHort) in Skierniewice, comprehensive agrotechnical treatments and modern production technologies, including combine harvesting of these fruits.
- So far, 10 blackcurrant cultivars ('Tisel', 'Tiben', 'Ores', 'Ruben', 'Tines', 'Gofert', 'Polares', 'Tihope', 'Polben' and 'Polonus') have been released at the ZHRO of the InHort in Skierniewice.
- All cultivars are registered into the Polish National List of the Research Centre for Cultivar Testing (COBORU) and also covered by the Community Right of Protection at the [Community Plant Variety Office](https://ec.europa.eu/eupat/) (CPVO) in Angers, FR in the EU countries.
- In addition, three cultivars ('Gofert', 'Polares' and 'Tihope') received the U.S. plant patent in 2016.
- Cultivars: 'Tisel', 'Ruben', 'Gofert', 'Tihope', 'Tiben' and recently 'Polben' are commercially grown in Poland and their share is currently over 80%.
- **Blackcurrants have very high nutritional and health-promoting values** (high content of antioxidants, including polyphenols, such as anthocyanins and L-ascorbic acid – vit. C, wealth of minerals and fiber).

Aim of research was to evaluate the production value and fruit quality of 9 Polish blackcurrant cultivars and to determine their suitability for cultivation in the climatic and soil conditions of central Poland.

Material and Methods



The research was conducted in an experiment on the implementation plantation (0.78 ha) in the field of the **Experimental Orchard at Dabrowice /near Skierniewice, Central Poland** (51.9163°N; 20.1009°E)



Fot. 1. Experimental plantation in July 2021

The experiment – was established in spring 2014
9 cultivars were evaluated: 'Tisel', 'Tiben', 'Ores', 'Ruben', 'Gofert', 'Polares', 'Tihope', 'Polben' and 'Polonus'.

The experiment was set up according to the arrangement of random blocks, in 4 replications, 50 shrubs per plot, planted at the density of 3.80 x 0.50 m (5,000 plants/ha). The bushes of each cultivar grew in separate rows, approx. 170 m long.

The following traits were assessed:

In the years of studies (2016-2021):

1. Plant growth vigour (measuring of plant height and width)
2. Plant size (product of height x width in m²)
3. Plant habit index (as a quotient of plant height/plant width)
4. Fruit ripening (harvesting) date
5. Fruit yield in kg/bush (and in M tones/ha)
6. Fruit size (defined as the average weight on 4 samples of 100 randomly selected berries from each plot, in grams)

In 2020-2021:

7. Chemical composition of fruit (soluble solids, acidity, total anthocyanins, total polyphenols and L-ascorbic acid content).

The weather conditions were generally favorable for the growth and yield of blackcurrants in the years of experiment and research (2016-2021). The winters were rather warm (mild), with the exception of 2020/21, when the minimum temperature dropped to -22.4°C, no winter frost damage of blackcurrant bushes in the field experiment was noted. Annual precipitation was normal during the plants' growing season and ranged from 480 to 550 mm. The weather conditions in springs were typical for central Poland, but in two years (2017 and 2019) at the end of April and early May slight spring frost occurred, without causing major damage to buds and flowers. The beginning of blackcurrant plant vegetation was in the middle - end of March, flowering of plants - in the second half of April - beginning of May, ripening and harvesting of fruits started in the first half of July, depending the year and cultivar.

The research was carried out for 6 years (2016-2021) - 3rd - 8th year after planting of 1-year-old bushes)

The bushes grew on medium-fertile soil (IV^{a&b} ranking scale)

Integrated Production (IP) of fruit was applied according to Integrated Plant Protection (obligatory to EU regulation in 2014)

All agrotechnical treatments in the experiment were carried out in accordance with the recommendations for the commercial blackcurrant plantation in Poland.

Fruit harvesting by:

- in 2016 - manual,
- 2017-2018 by the half row "Arek" harvester (Fot. 2)
- 2019-2021 by the self-pulled "KPS 4b" harvester (Fot. 3)



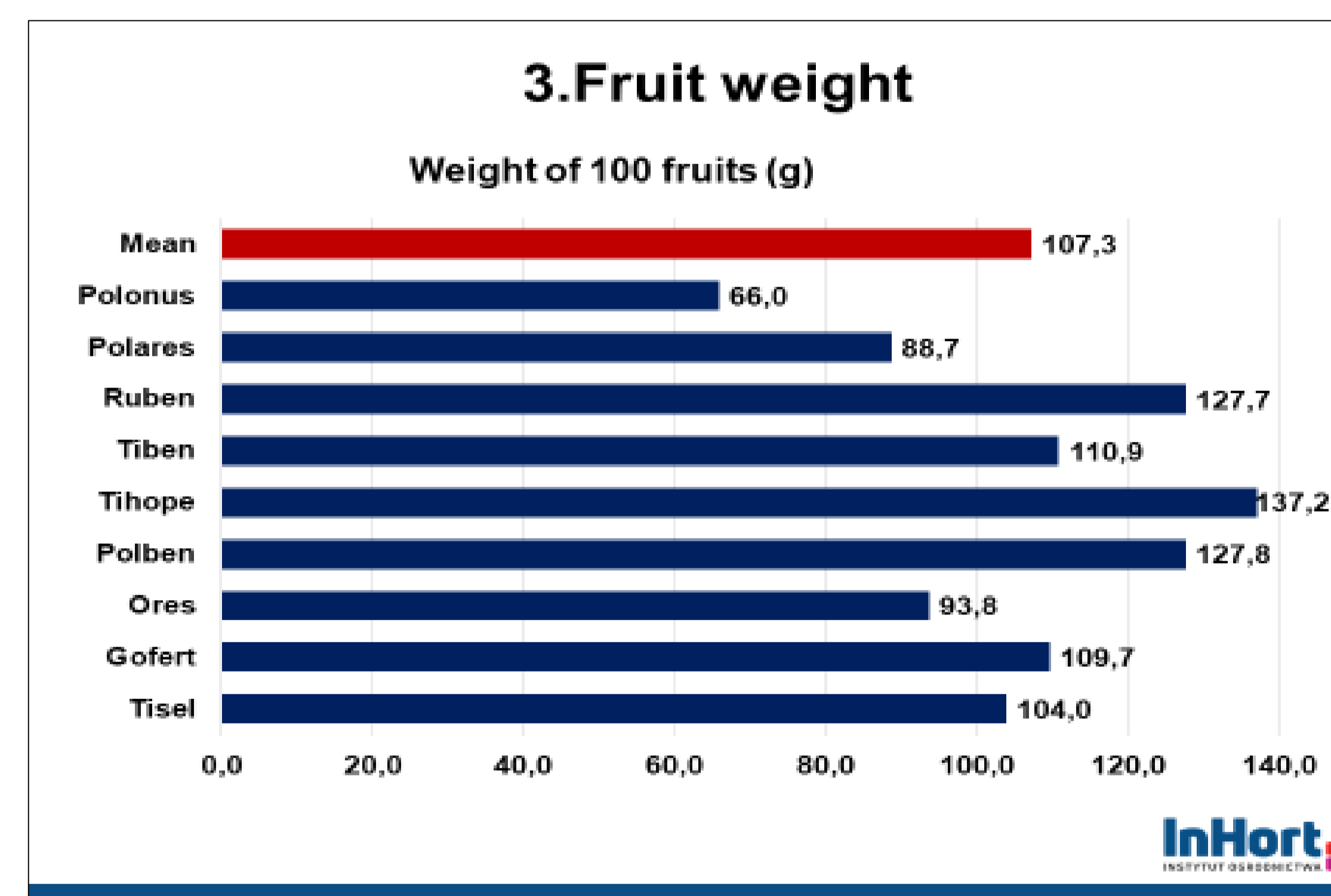
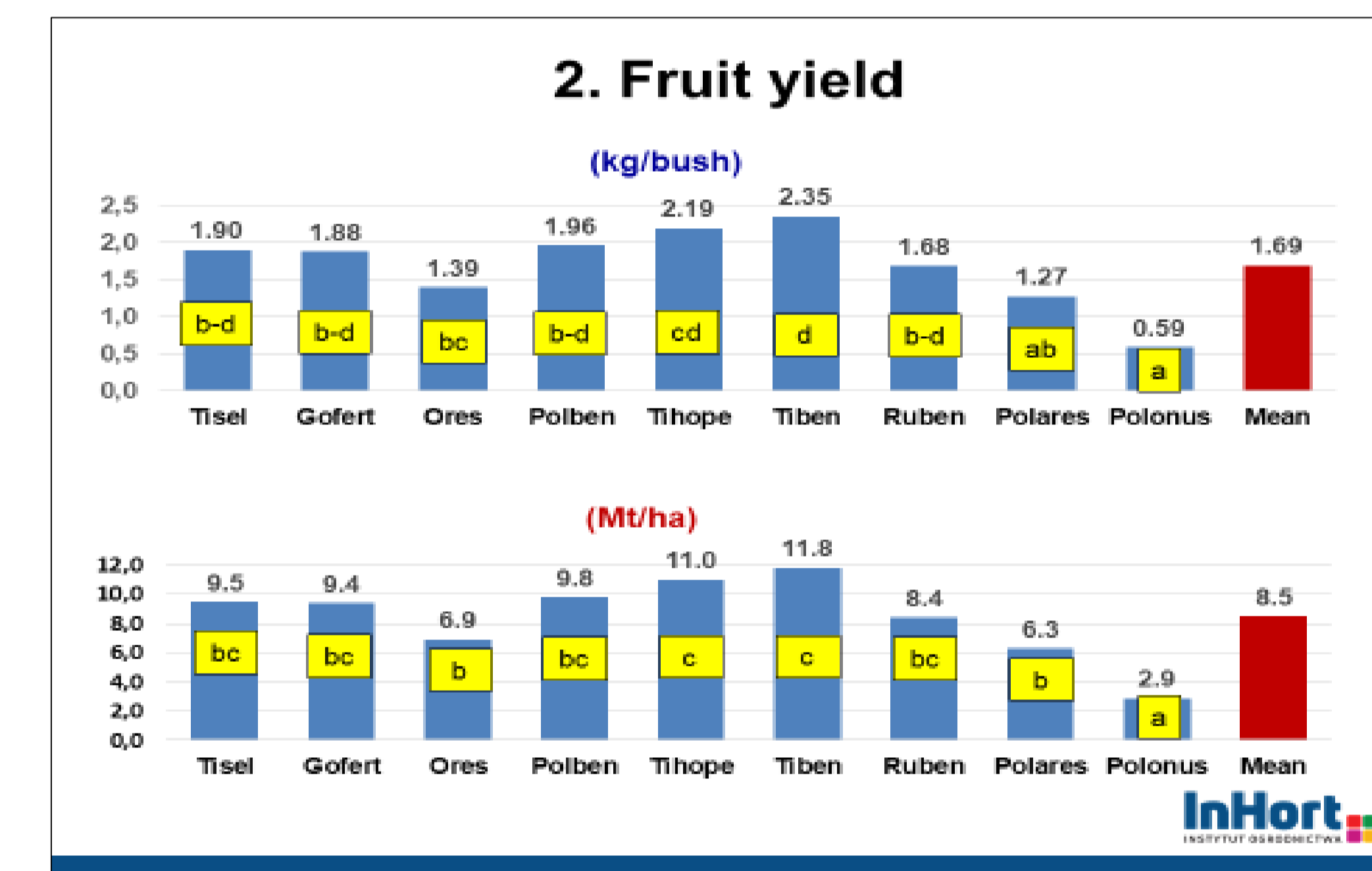
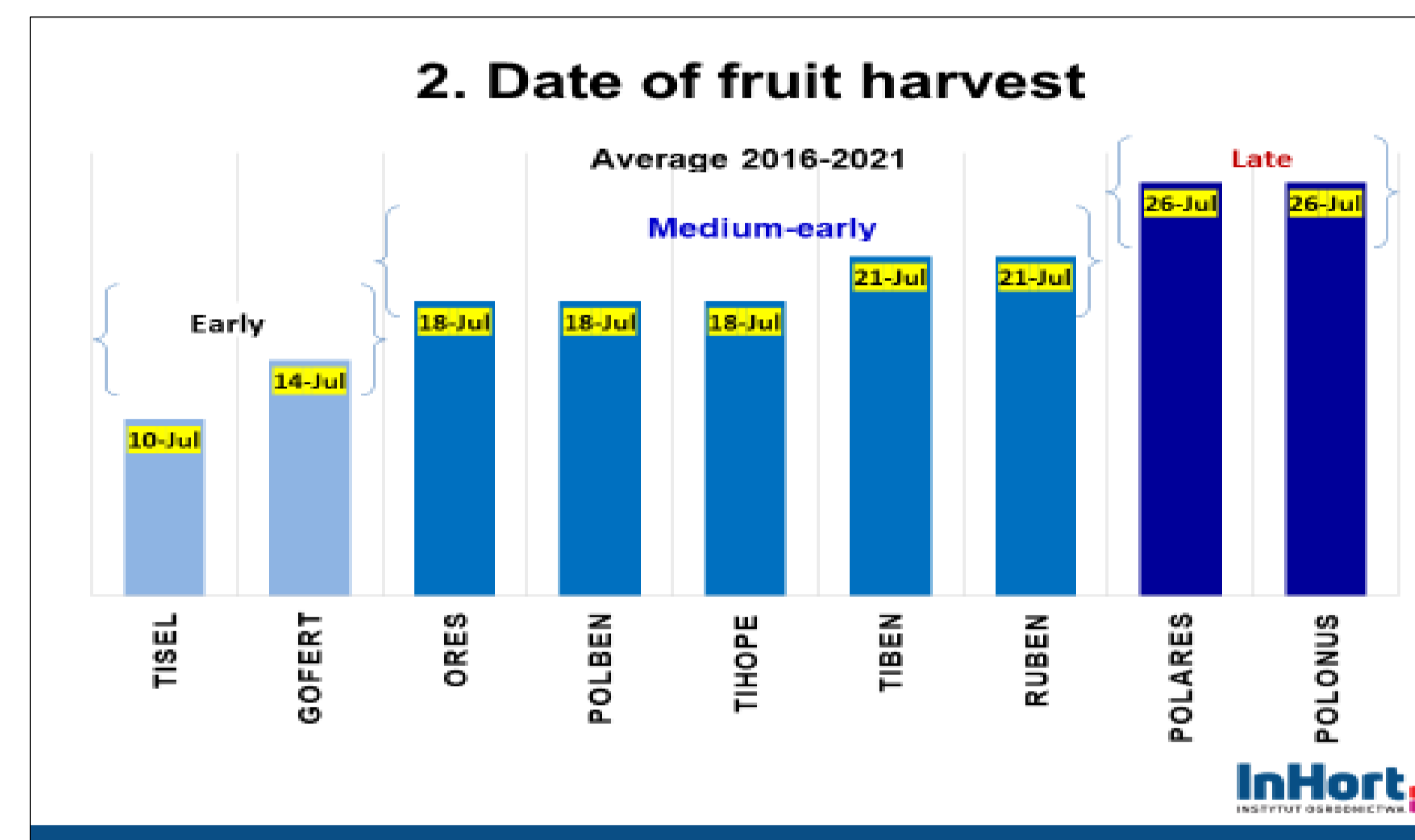
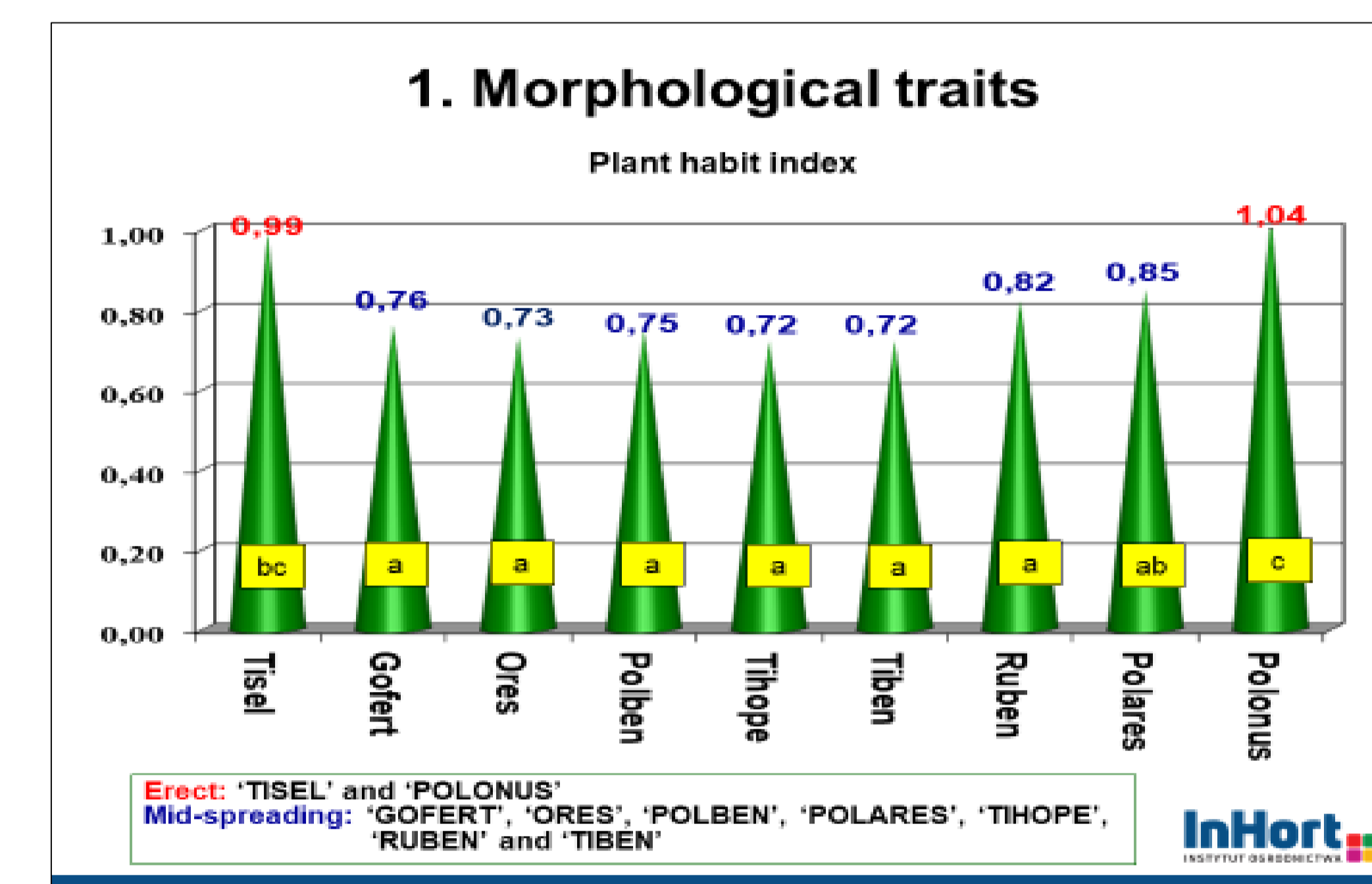
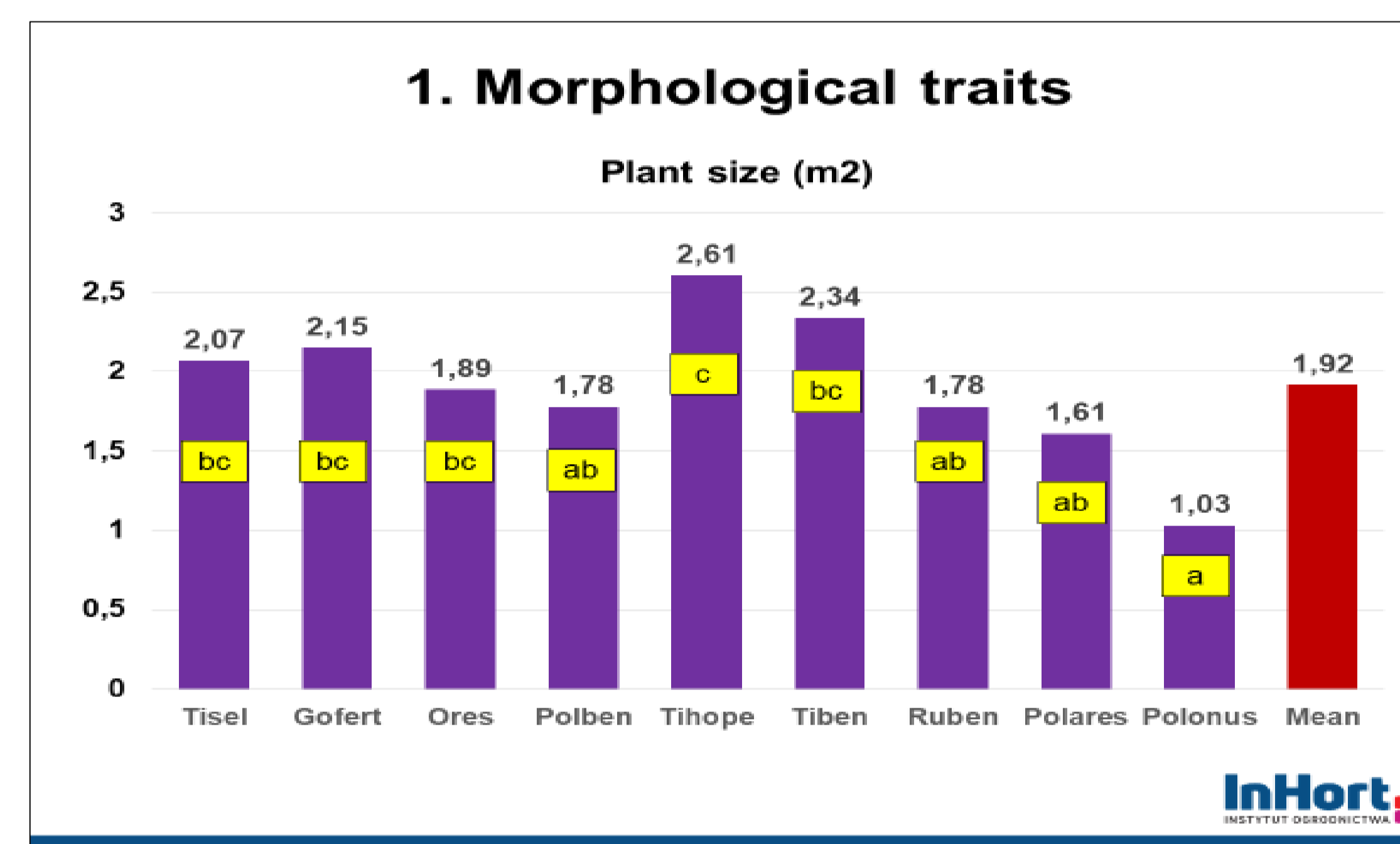
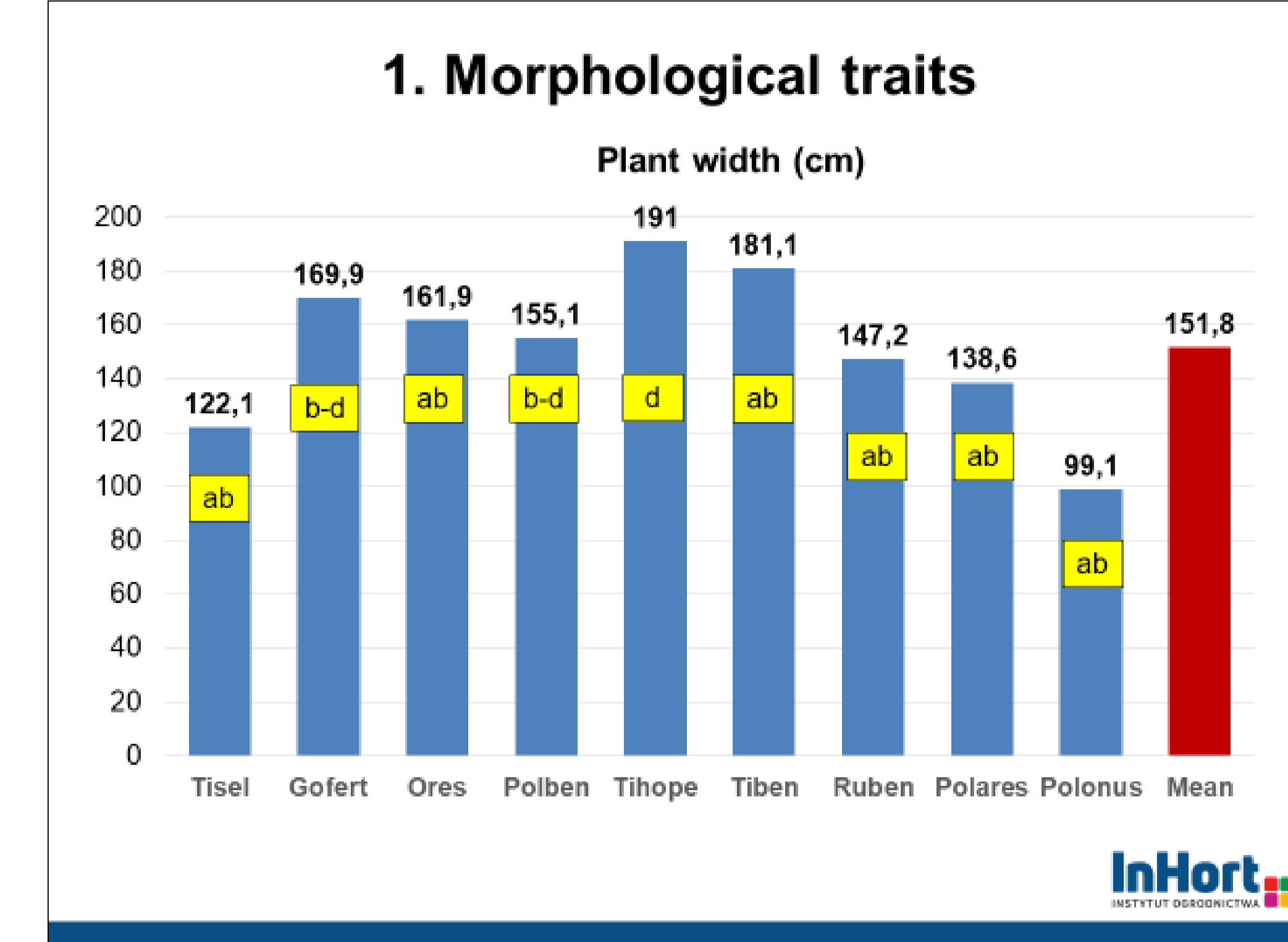
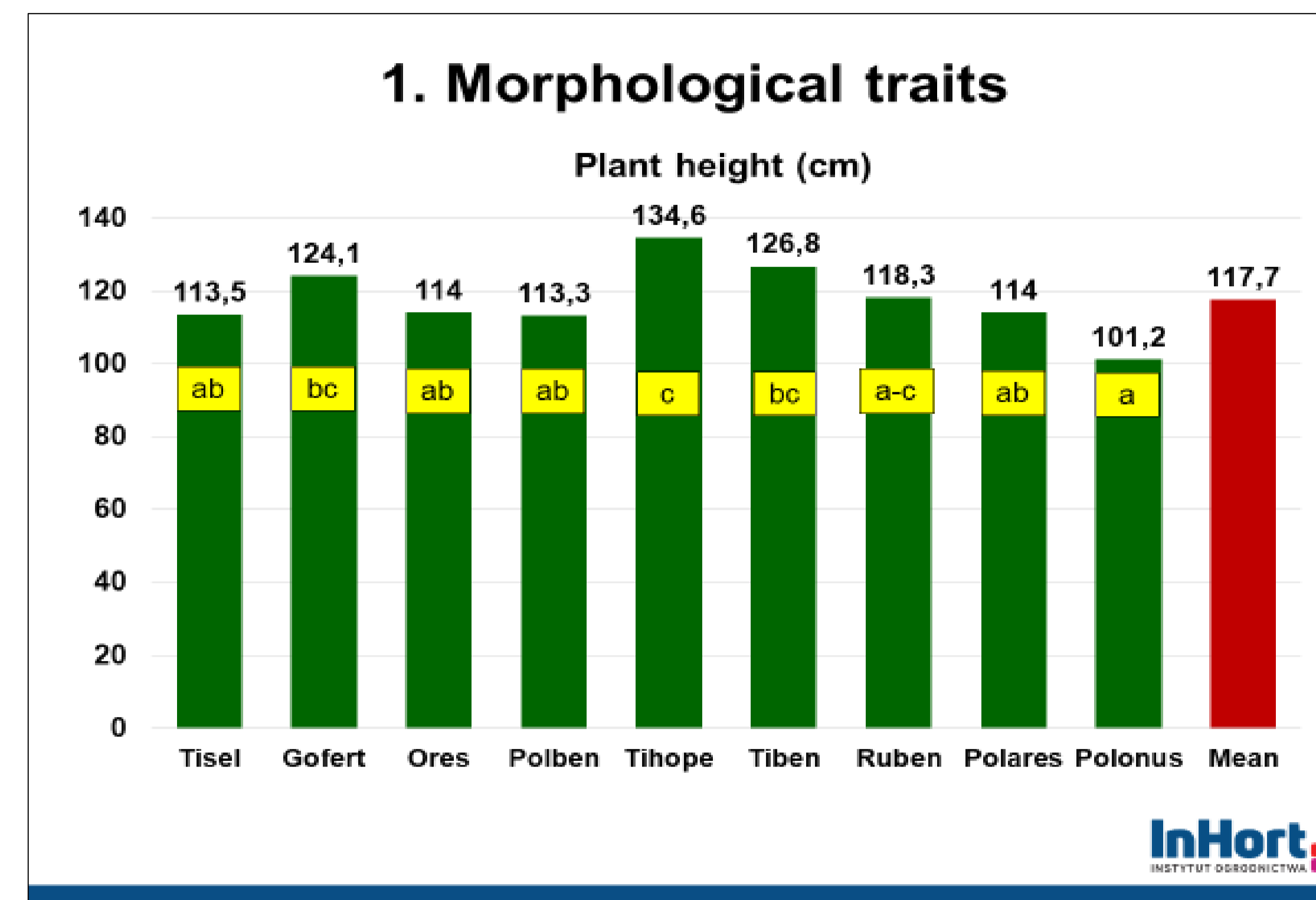
Fot. 2. Half-row "Arek" harvester



Fot. 3. Self-pulled "KPS 4b" harvester

Results

IMPLEMENTATION EXPERIMENT 2016-2021



4. Chemical composition of fruit

Cultivar	Soluble solids (°Brix)	Titrateable acidity (%)	Total polyphenols content (mg/100g)	Total anthocyanins (mg/100g)	L-ascorbic acid (mg/100g)
Tisel	16.5 b	3.18 cd	353.6 a	262.7 ab	247.7 d
Gofert	16.5 b	2.93 bc	313.6 a	216.5 a	195.2 c
Ores	13.2 a	3.82 fg	407.4 ab	307.9 a-c	214.5 cd
Polben	14.1 ab	3.17 cd	348.9 a	239.4 ab	106.5 a
Tihope	16.1 b	3.57 ef	401.9 ab	266.4 ab	137.1 ab
Tiben	16.4 b	4.03 g	403.2 ab	320.8 a-c	111.1 a
Ruben	15.6 ab	3.44 de	417.7 ab	326.8 bc	152.9 b
Polares	14.1 ab	2.70 b	562.7 bc	394.4 cd	209.5 cd
Polonus	16.7 b	1.88 a	698.8 c	461.0 d	217.0 cd
Mean	15.5	3.19	434.2	310.7	176.8

Conclusions

1. Blackcurrant cultivars bred at the InHort in Skierniewice ('Tisel', 'Ruben', 'Gofert', 'Tihope', 'Tiben' and 'Polben') confirmed their high production value in the implementation experiment established in central Poland.
2. Most of the tested cultivars produce large or medium-sized fruit with a significant amount of both soluble solids and acidity.
3. Weakly growing cultivars 'Polares' and 'Polonus' genetically resistant to the gall mite (big bud) yielded at a medium level or poorly, plants of these cultivars require more fertile soils for good yielding.
4. Cultivars 'Polares' and 'Polonus' produce small to medium sized fruits with high levels of phenolic compounds, anthocyanins and L-ascorbic acid (vitamin C).
5. These blackcurrant cultivars are an important carrier of biological progress, they contribute to maintaining the high position and competitiveness of Polish fruit growing industry, considering the requirements of environmental protection and the principles of safe food production, in accordance with current requirements in the EU.