Julius Kühn-Institut
Bundesforschungsinstitut für Kulturpflanzen
Federal Research Centre for Cultivated Plants

Results of sweet Cherry Breeding at JKI in Dresden- Pillnitz

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Outline

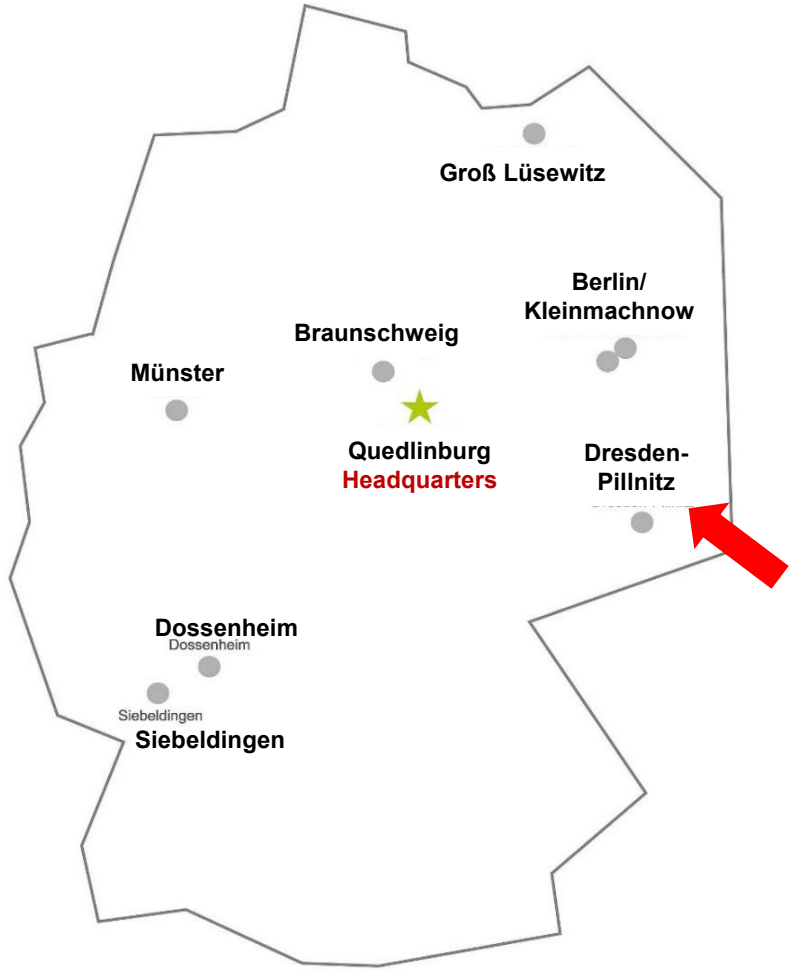
1. Brief information on the history of the breeding program
2. Short introduction to JKI and the Institute for Breeding Research on Fruit Crops Dresden-Pillnitz
3. Breeding goals and breeding scheme
4. Results of sweet cherry breeding since 2001 (new varieties)
5. Enlarging the genepool
6. New sweet cherries coming soon

Brief information on the history of the breeding program

1. Sweet cherry breeding in Germany was started in 1928 in Müncheberg
2. After the World War II, this work was continued in the former GDR until 1955
3. In 1953, a second program was started in the FRG in Jork (e.g. 'Oktavia', 'Regina‘ and 'Valeska‘)
4. From 1985 to 1999, this program was continued in Ahrensburg (close to Hamburg)
5. In the GDR, a second breeding program was started in 1958 in Naumburg and transferred to Dresden in 1971 (e.g. 'Naprumi', 'Namati', and 'Nadino‘)
6. In 2001, all plant material was transferred to Dresden-Pillnitz, where breeding has been continued until today (e.g. 'Areko', 'Polka‘ and Aria® 'PiSue 161')

Short introduction to JKI

- Federal Research Centre for Cultivated Plants in Germany
- 18 institutes, 9 locations
- 1,300 employees, 445 scientists
- JKI belongs to the Federal Ministry of Food and Agriculture
  - Advice to the ministry
  - Research in all areas of crop plants
  - Assessment of compliance with legal regulations and requirements

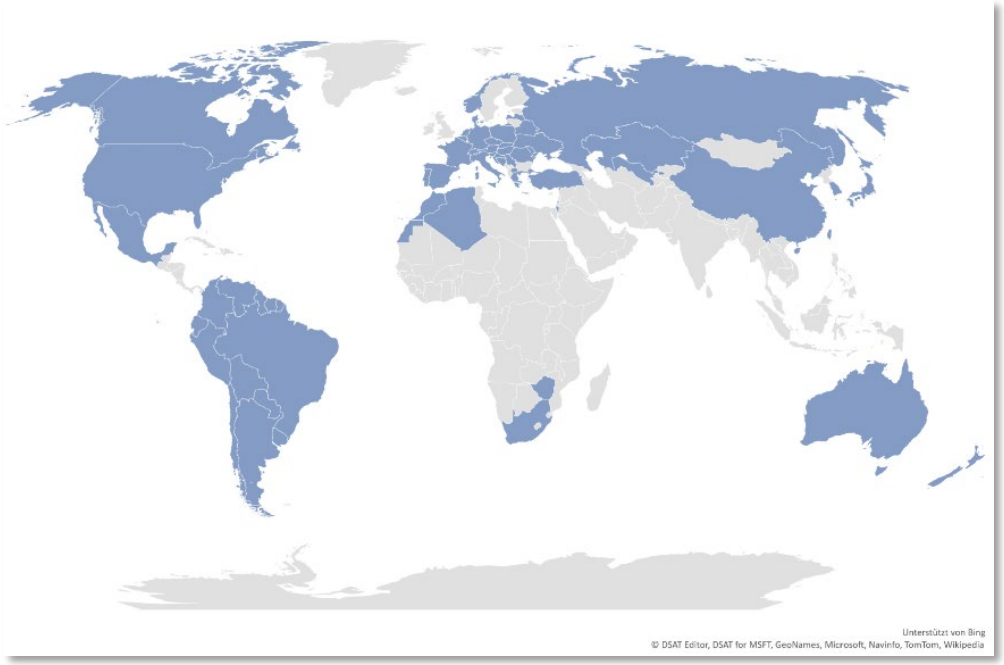


Short introduction to the Institute for Breeding Research on Fruit Crops

- Founded in 1922 as a higher state school for horticulture
- First director was Otto Schindler, who initiated breeding programs for strawberries and apple rootstocks
- In 1971, all fruit breeding activities of the former GDR were centralized in Pillnitz
- From 1992, the institute belonged to the Federal Centre for Breeding Research on Cultivated Crops
- Since 2008, it is part of the Julius Kühn-Institute (JKI)
  - 50 employees
  - 27 budget-funded (7 scientists, technicians, gardeners)
  - 43 ha orchards (10 ha genebank collections)
  - 1,600 m^2 glasshouse
  - storage facility

Current tasks and field of activities

- Preservation of fruit genetic resources
  - Genebank Fruit Dresden-Pillnitz
  - Network of the National Fruit Genebank
- Breeding research
  - Structural genomics
  - Functional genomics
  - Phytopathology
  - Digital phenotyping
- Breeding
  - Pome fruit breeding (apple, pear)
  - Stone fruit breeding (sweet cherry, sour cherry)



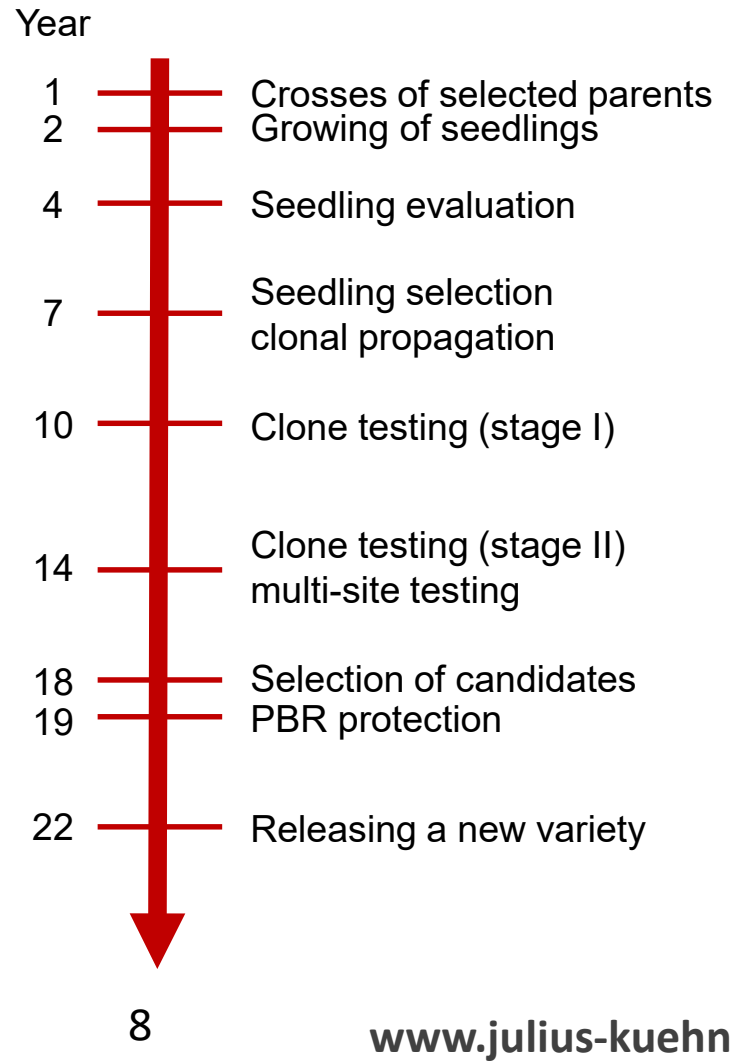
Test and license agreements for varieties in more than 50 countries (labelled blue) worldwide

Breeding goals (sweet cherry)

- ⇨ **Fruit quality** (size, firmness, sugar)
- ⇨ Fruit set
- ⇨ **Ripening time** (**early** + late)
- ⇨ Self-compatibility (SC)
- ⇨ Tolerance to fruit cracking
- ⇨ **Tolerance to biotic and abiotic stress** (cherry leaf spot, shot hole / spring frost)
- ⇨ Storage characteristics (Shelf-live)

Breeding scheme (sweet cherry)

- Selection of parents based on the breeding goals, performance of crosses
- Float test and cracking the stones
- Growing the seedlings in the greenhouse with reduced fertilization and pest control
- Grafting and cultivation in the nursery
- Extensive cultivation with reduced fertilization and pest control
- Selection is carried out in several steps
- Release of a new variety after about 22 years



Results of sweet cherry breeding since 2001

Seedlings

- 105 cross combinations
- 67 cultivars/clones used as parents
  - 49 crosses for early ripening
  - 14 crosses for late ripening
  - 25 crosses for Self-compatibility
  - 22 crosses for fruit size
  - 9 crosses for cracking tolerance

Breeding clones

- 20 breeding clones in multi-site tests (Germany / worldwide)
- 142 breeding clones under evaluation JKI

Results of sweet cherry breeding since 2001 (ripening time compared to 'Burlat')

Sweet cherry	very early							early							medium								late							very late	
	2. Cherry week							3. Cherry week							4. Cherry week								5. Cherry week							6. Cherry week							7. CW.	
	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
'Narana'				-1																																	
'Burlat'					0																																
Swing® 'PiSue 192'													8																								
'Polka'															10																						
Aria® 'PiSue 161'																			14																		
'Areko'																						17															
'Kordia'																							18														
'PiSue 177'																								19													
'Habunt'																									20												
'Regina'																													26								

* mean 2009-2022

'Narana'

Swing® 'PiSue 192'

'Polka'

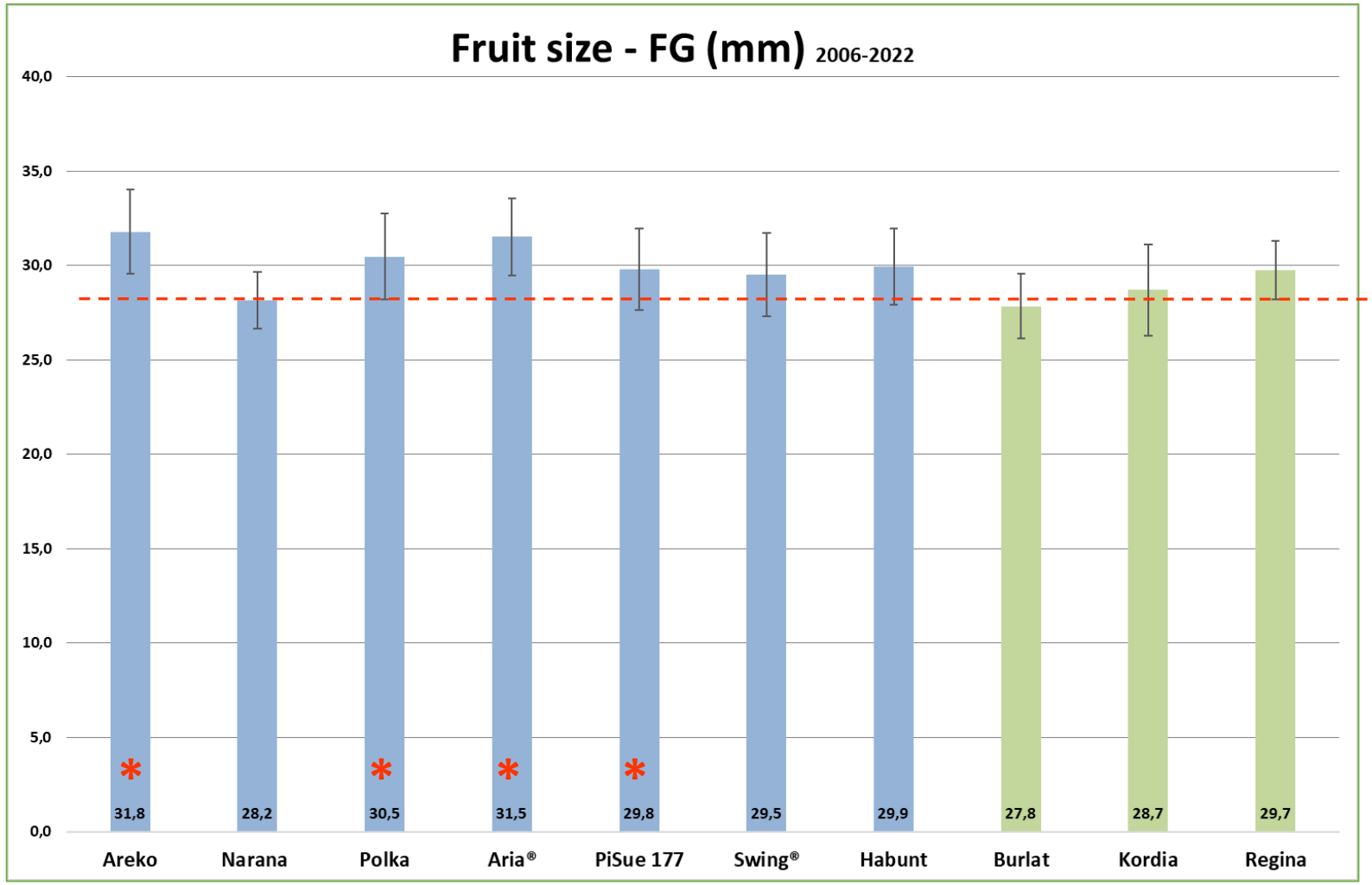
Aria® 'PiSue 161'

'Areko'

'PiSue 177'

'Habunt'

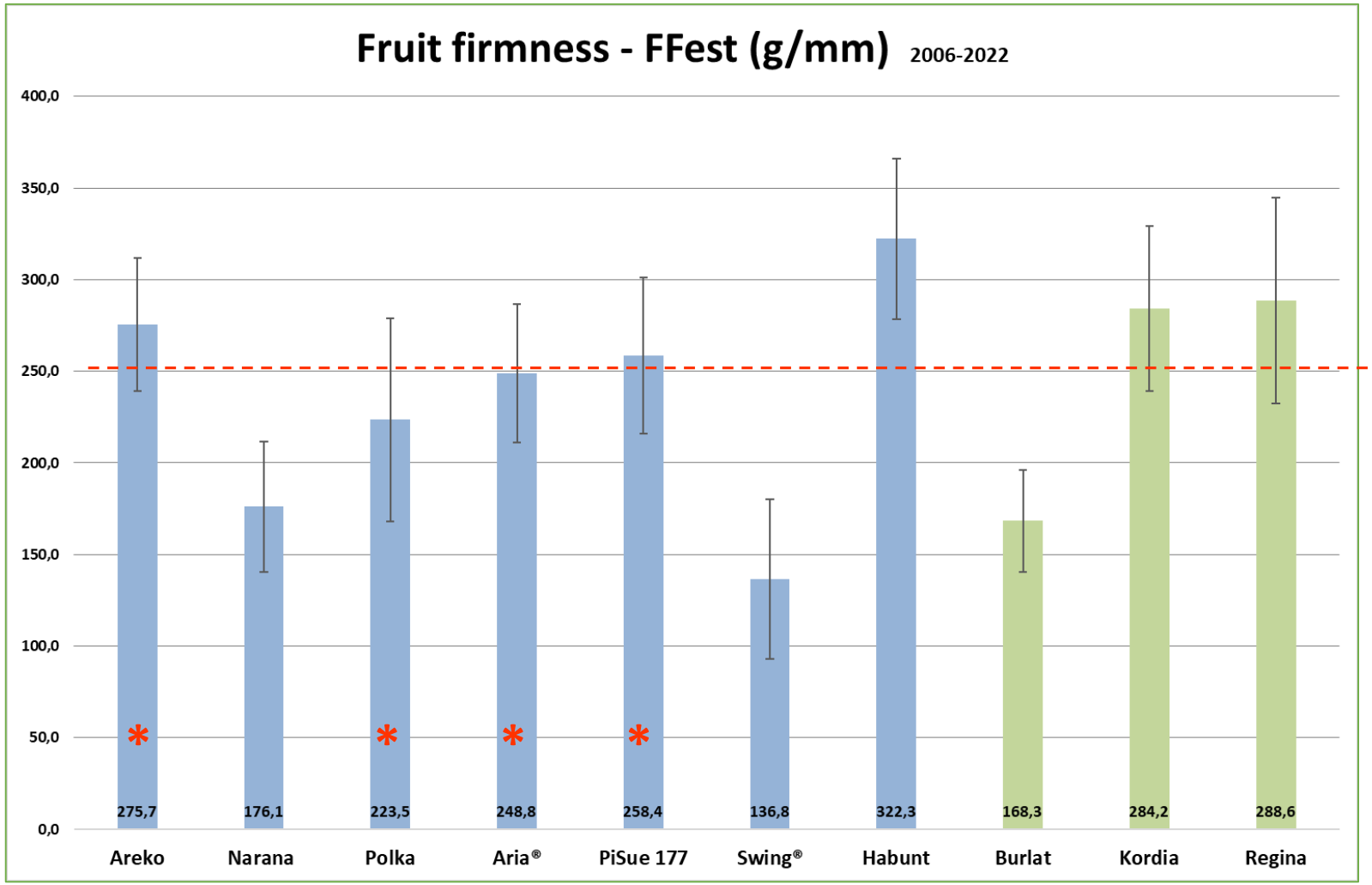
Results of sweet cherry breeding since 2001 (new varieties)



28 mm

* New cultivars: 'Areko', 'Polka', Aria®, 'PiSue 177'

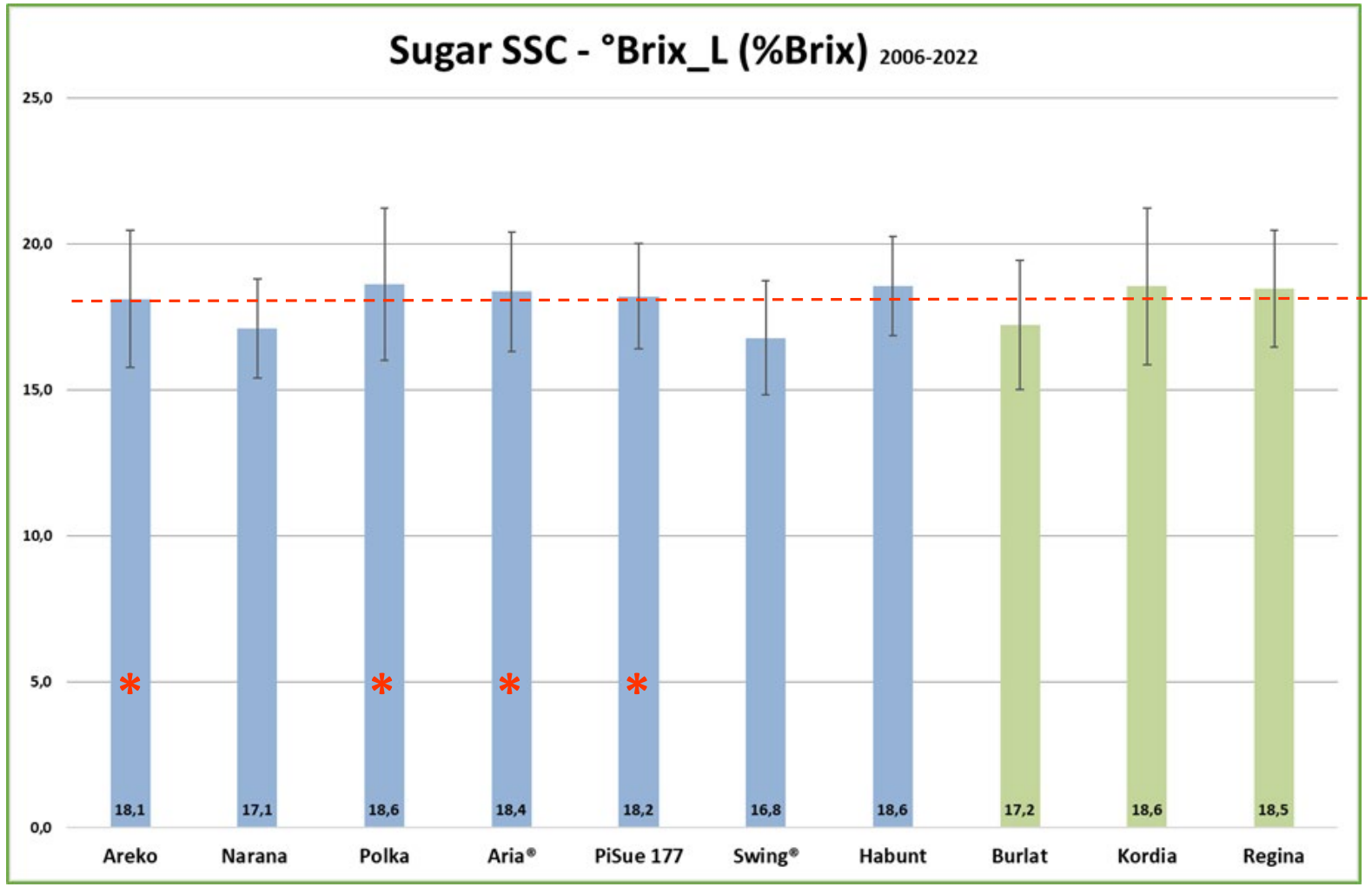
Results of sweet cherry breeding since 2001 (new varieties)



250 g/mm

* New cultivars: 'Areko', 'Polka', Aria®, 'PiSue 177'

Results of sweet cherry breeding since 2001 (new varieties)



18% Brix

* New cultivars: 'Areko', 'Polka', Aria®, 'PiSue 177'

Results of sweet cherry breeding since 2001 (new varieties)

Sweet cherry – Areko (92/31-22; Hamid)

'Kordia' x 'Regina'

Blooming time:	late, 'Regina' 0 days	**Ripening time:**	medium, 'Burlat' +17 days
***S*-alleles:**	S_1S_3		

Fruit*:

Size / Weight:	31,8 mm / 14,4 g	**Taste:**	very good
Shape:	cordate	**Stone:**	oval, medium
Colour:	brown red	**Sugar (SSC):**	18,1 %Brix
Flesh colour:	brown red	**Acidity:**	10,3 g/L malic acid
Firmness:	firm (275,7 g/mm)	**Stalk:**	long

* Mean 2006-2022, JKI Dresden-Pillnitz

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Your International Best Partner

- ⇨ Possible alternative to Kordia
- ⇨ Very good fruit characteristics
- ⇨ Late blooming time
- ⇨ Good fruit set

Results of sweet cherry breeding since 2001 (new varieties)

Sweet cherry – Polka (K8c,194; PiSue 194)

'Krupnoplodnaja' x 'Moldavskaja tschernaja'

Blooming time: early, 'Regina' -8 days
Ripening time: early, 'Burlat' +10 days
***S*-alleles:** S_6S_9

Fruit*:

Size / Weight:	30,5 mm / 12,3 g	Taste:	very good
Shape:	flat round	Stone:	round, medium
Colour:	brown red	Sugar (SSC):	18,6 %Brix
Flesh colour:	dark red	Acidity:	10,7 g/L malic acid
Firmness:	firm (223,5 g/mm)	Stalk:	medium

* Mean 2006-2022, JKI Dresden-Pillnitz

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- ⇨ Ripening time, early
- ⇨ High fruit set
- ⇨ Very good fruit characteristics
- ⇨ Good shelf-life

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Results of sweet cherry breeding since 2001 (new varieties)

Sweet cherry – Aria® ('PiSue 161'; Bolero)

'Krupnoplodnaja' x 'Moldavskaja tschernaja'

Blooming time: early, 'Regina' -7 days
Ripening time: medium, 'Burlat' +14 days
***S*-alleles:** S_1S_9

Fruit*:

Size / Weight:	31,5 mm / 13,5 g	Taste:	very good
Shape:	reniform	Stone:	oval, medium
Colour:	brown red	Sugar (SSC):	18,4 %Brix
Flesh colour:	dark red	Acidity:	11,3 g/L malic acid
Firmness:	firm (248,8 g/mm)	Stalk:	long, green

* Mean 2006-2022, JKI Dresden-Pillnitz

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- ⇨ Ripening time, medium
- ⇨ High fruit set
- ⇨ Very good fruit characteristics
- ⇨ Very good shelf-life

Licensee:

ARTEVOS
OBSTNEUHEITEN DER ARTUS-GEVO-GROUP

Results of sweet cherry breeding since 2001 (new varieties)

Sweet cherry – 'PiSue 177' (K8c,177)

'Krupnoplodnaja' x 'Moldavskaja tschernaja'

Blooming time: medium, 'Regina' -5 days
Ripening time: medium, 'Burlat' +19 days
***S*-alleles:** S_1S_9

Fruit*:

Size / Weight:	29,8 mm / 12,6 g	Taste:	very good
Shape:	reniform	Stone:	oval, large
Colour:	red	Sugar (SSC):	18,2 %Brix
Flesh colour:	light red	Acidity:	9,0 g/L malic acid
Firmness:	firm (258,4 g/mm)	Stalk:	long, green

* Mean 2006-2022, JKI Dresden-Pillnitz

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- ⇨ Ripening time, medium
- ⇨ High fruit set
- ⇨ Very good fruit characteristics
- ⇨ Good shelf-life

Enlarging the genepool

***Prunus canescens* - Greyleaf Cherry** (2n=2x=16)

F_2-fruits (Namati x F5,18,167)

Breeding goals:

- Resistance to cherry leaf spot, *Blumeriella jaapii*

Material:

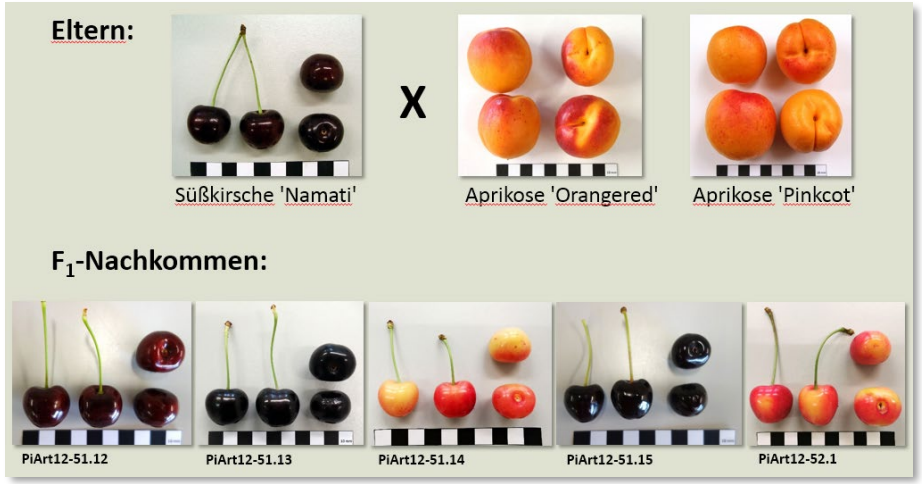
- 33 F_2-seedlings
- 330 F_3-seedlings

⇨ **Goal** - New basic material with

- Resistance to leaf diseases
  - Cherry leaf spot / Shot hole

Enlarging the genepool

***Prunus armeniaca* - Apricot** (2n=2x=16)



Breeding goals:

- Fruit size, spring frost tolerance, Shelf live, ?

Material:

- 22 F_1-seedlings
- 477 F_2-seedlings
  - F_1-seedlings x sweet cherry = 85 seedlings
  - F_1-seedlings x apricot = 5 seedlings
  - F_1-seedlings x open pollinated = 387 seedlings

⇨ **Goal** - New basic material with

- Tolerance to spring frost
- Good Fruit characteristics – size, firmness, shelf-life
- Utilisation as rootstocks for apricot

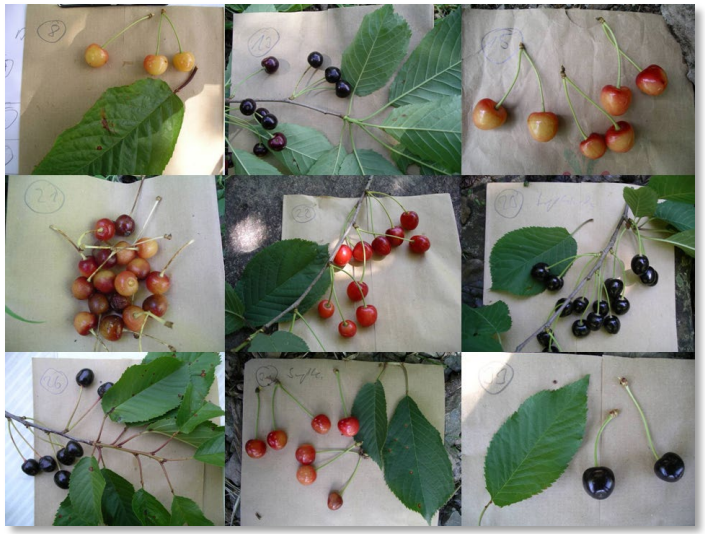
Enlarging the genepool

Material from the centre of origin:

- ca. 600 seedlings (Turkey + Iran + Azerbaijan)

⇨ **Goal** - Evaluation of new basic material

- with new tree and fruit characteristics



Turkey 2008

Iran 2011

Azerbaijan 2013/14

New sweet cherries coming soon (16 clones of 11 combinations)

'Kordia' +18 d* | 'Regina' +27 d*

*+2 d / +4 d 'Kasandra' / 'Bellise'	*+12 d / +10 'Giorgia' / 'Samba'	*+14 d / +16 d 'Grace Star' / 'Adriana'	*+17 d 'Henriette' / 'Schneiders'	*+19 d / +20 d 'Tamara' / 'Rubin'	*+22 d / +25 d 'Lapins' / 'Fertard'
 **JKI-20**	 **JKI-10****	 **JKI-05****	 **JKI-09****	 **JKI-07****	 **JKI-25** (SC)
	 **JKI-03****	 **JKI-02**** (SC)	 **JKI-01****	 **JKI-04****	 **JKI-26** (SC)
	 **JKI-08****	 **JKI-06****			
		 **JKI-21****			
		 **JKI-23**			
		 **JKI-27****			

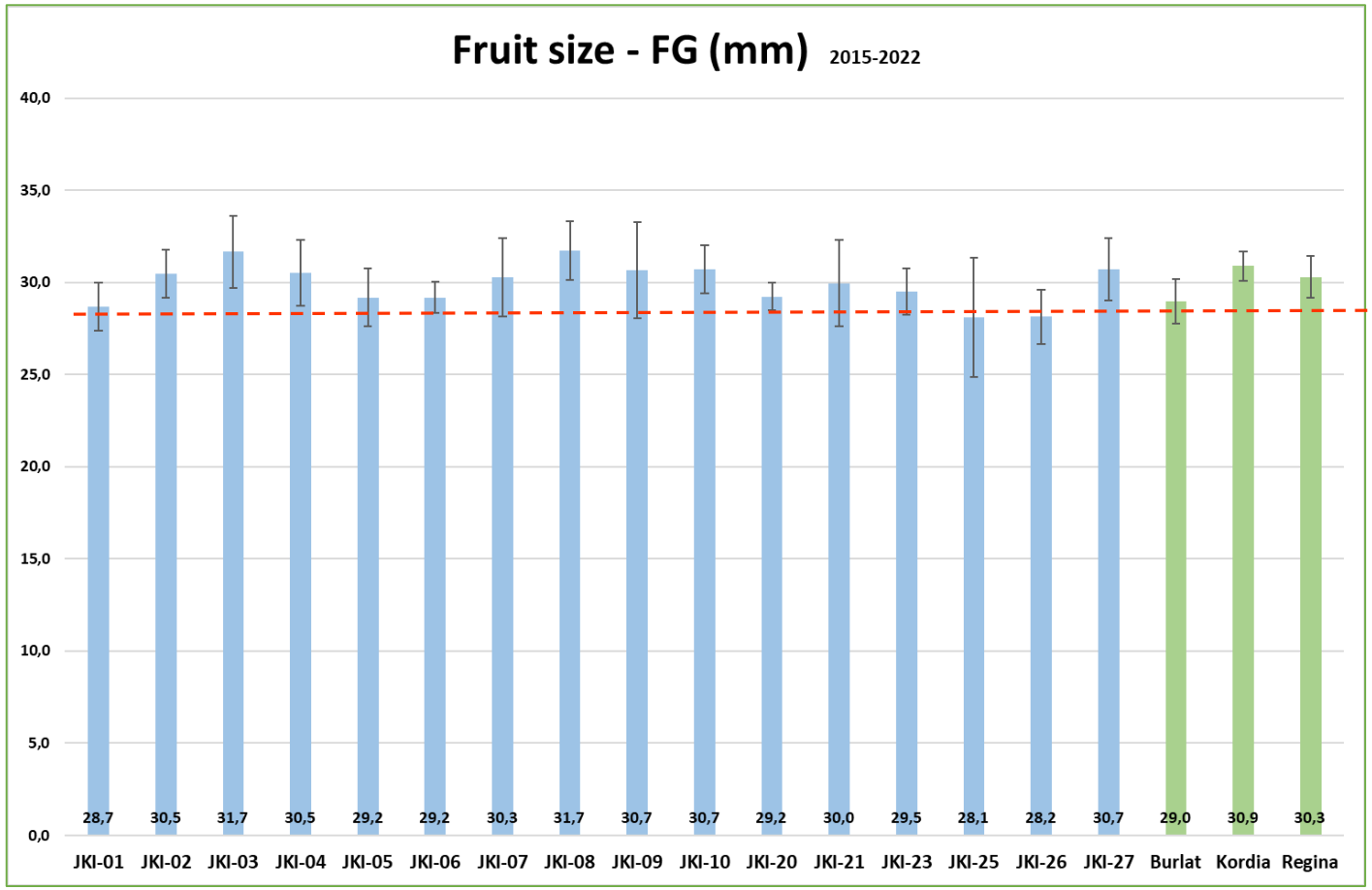
* Ripening time, days to 'Burlat'
** under multi-site testing

Main selections objectives:

- ⇨ High fruit size
- ⇨ Good fruit firmness (low cracking)
- ⇨ Ripening time until Kordia (+18 d)
- ⇨ Good shelf-live

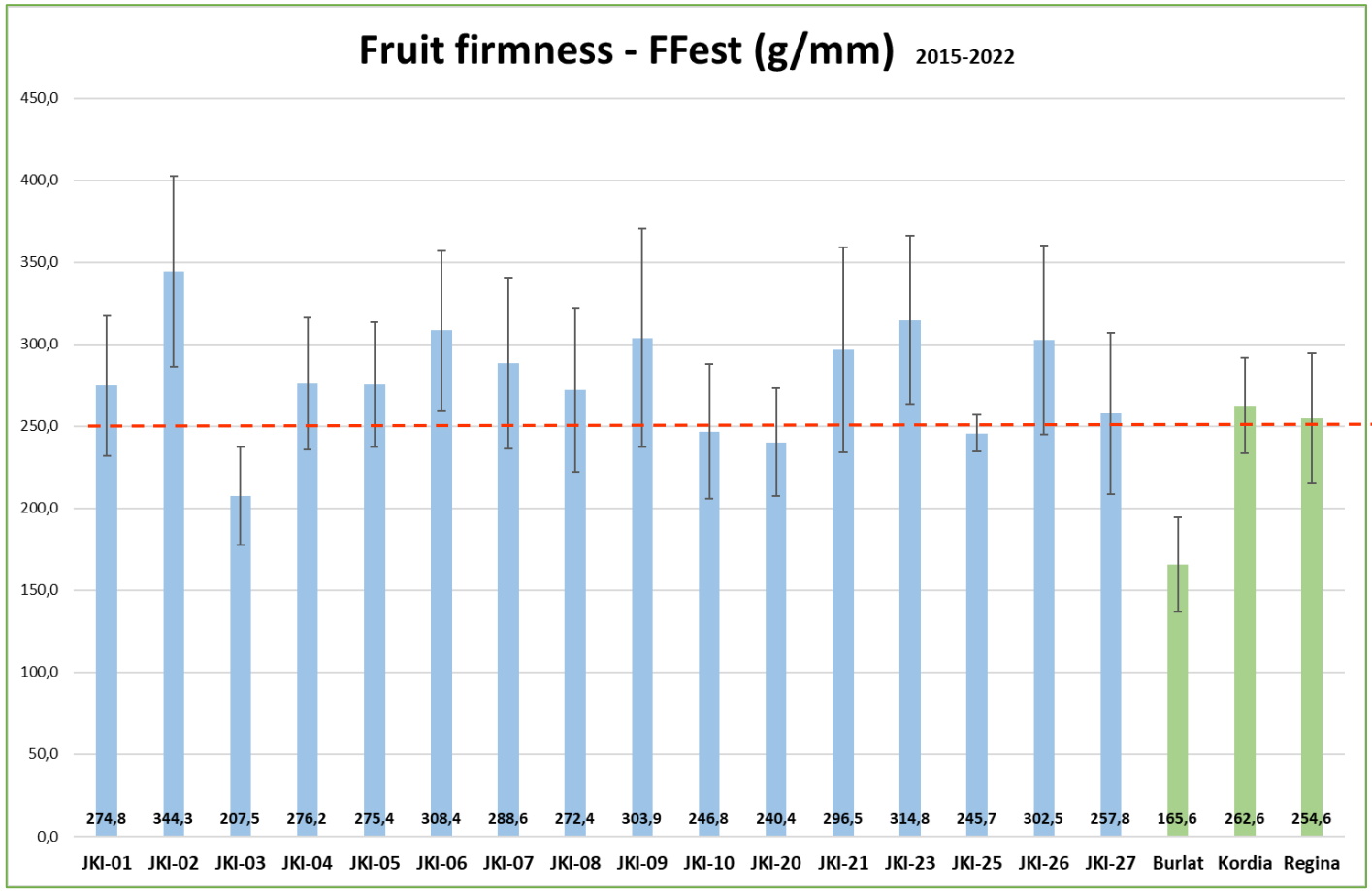
➢ **ca. 140 new breeding clones in stage II**
(1st clone evaluation)

New sweet cherries coming soon (16 clones of 11 combinations)



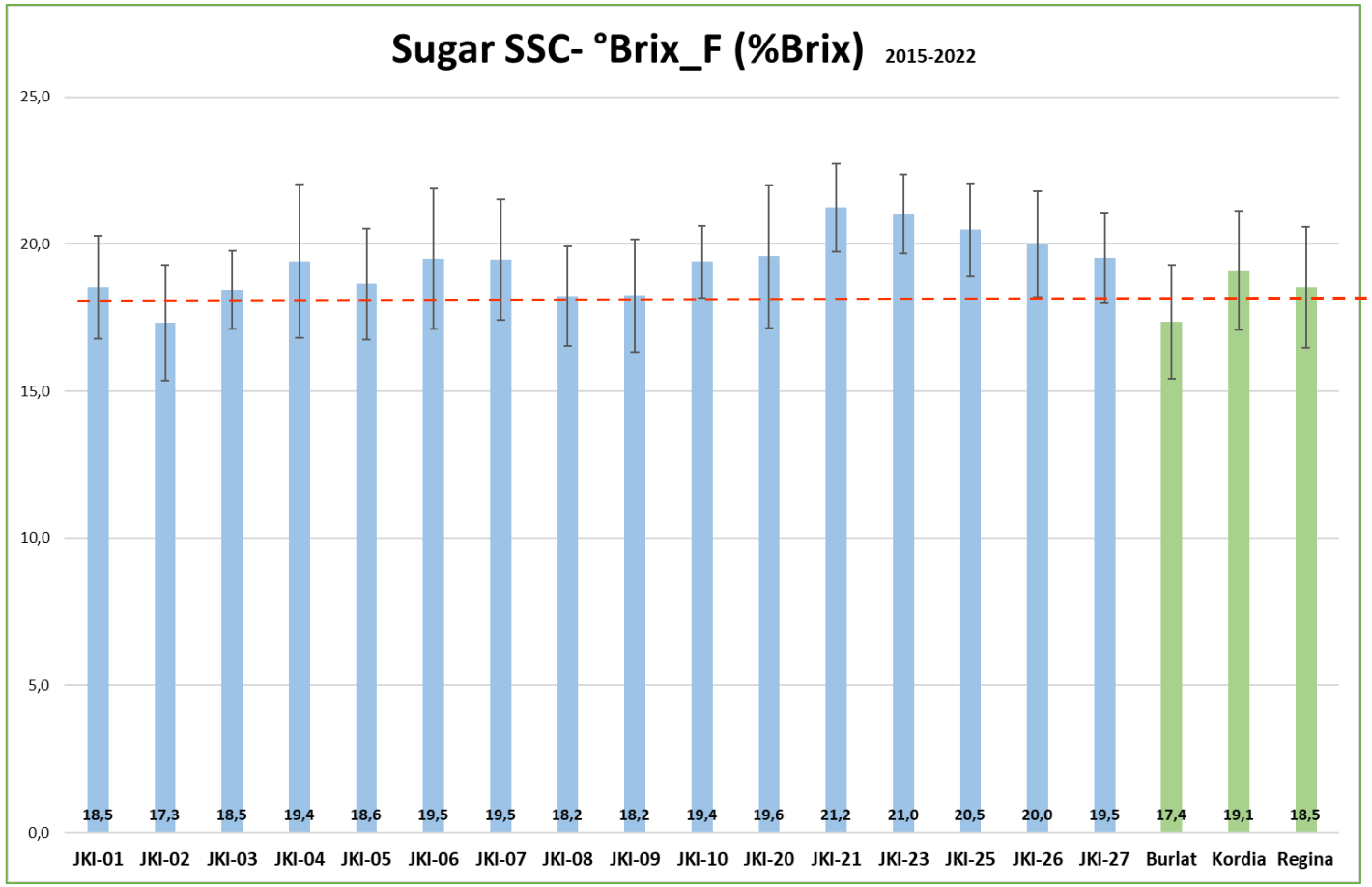
28 mm

New sweet cherries coming soon (16 clones of 11 combinations)



250 g/mm

New sweet cherries coming soon (16 clones of 11 combinations)



18% Brix

We are curious to see what fulfils your expectations!

Thank you for your attention

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Federal Research Centre for Cultivated Plants

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