

CREC Scion Trial with Two Rootstocks, Lake Alfred

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CREC Citrus Plant Improvement*

CREC Scion and Rootstock Trial, Lake Alfred - Description

After an international search, 5 exceptional sweet orange cultivars were selected for desired traits such as canker tolerance [IAPAR 73, an early-season cultivar from Brazil], high juice quality [Berna, Salustiana, Peret and Peret burjasot from Spain] and yield. Seeds were introduced and sown in March 2010 to produce trees for testing in Florida on two size-controlling rootstocks. After germination, seedlings were grown for about 1.5 years then used as the source of buds for producing the trial trees. Replicated sets of trees were planted in the Spring of 2013 including seedlings of each scion.

CREC Scion and Rootstock Trial - Summary

- Location: CREC, Lake Alfred, Polk county.
- Scions: Berna, Salustiana, IAPAR, Peret, Peret burjasot
- Rootstocks: C-22 [Bitters] and Willits citrange
- Date planted: Spring 2013
- Design: Randomized complete-block; 1 - 3 replications
 - Plot size: 2 – 5 trees
 - Spacing: 10 x 20 ft. = 218 trees/acre
- Data:
 - 2017/18: HLB rating; yield [boxes/tree]; fruit drop; juice quality
 - 2018/19: Tree health and yield ratings
 - 2018/19: Tree yield [pounds fruit/tree] for Berna & Salustiana
 - 2018/19: PCR analysis re HLB
 - 2019/20: Yield and HLB rating
 - 2020/21: HLB rating and juice quality
 - 2021/22: HLB rating
- Trial Status: **ACTIVE**

Table 1. CREC Scion and Rootstock Trial - List of rootstocks, parentage and number of trees

Rootstock	Parentage	Number of Trees/Scion				
		Berna	IAPAR	Peret	Peret Burj.	Salustiana
C-22	Sunki x Swingle TF	6	6	6	7	5
Willits	Ruby swt. x TF	7	10	9	11	10

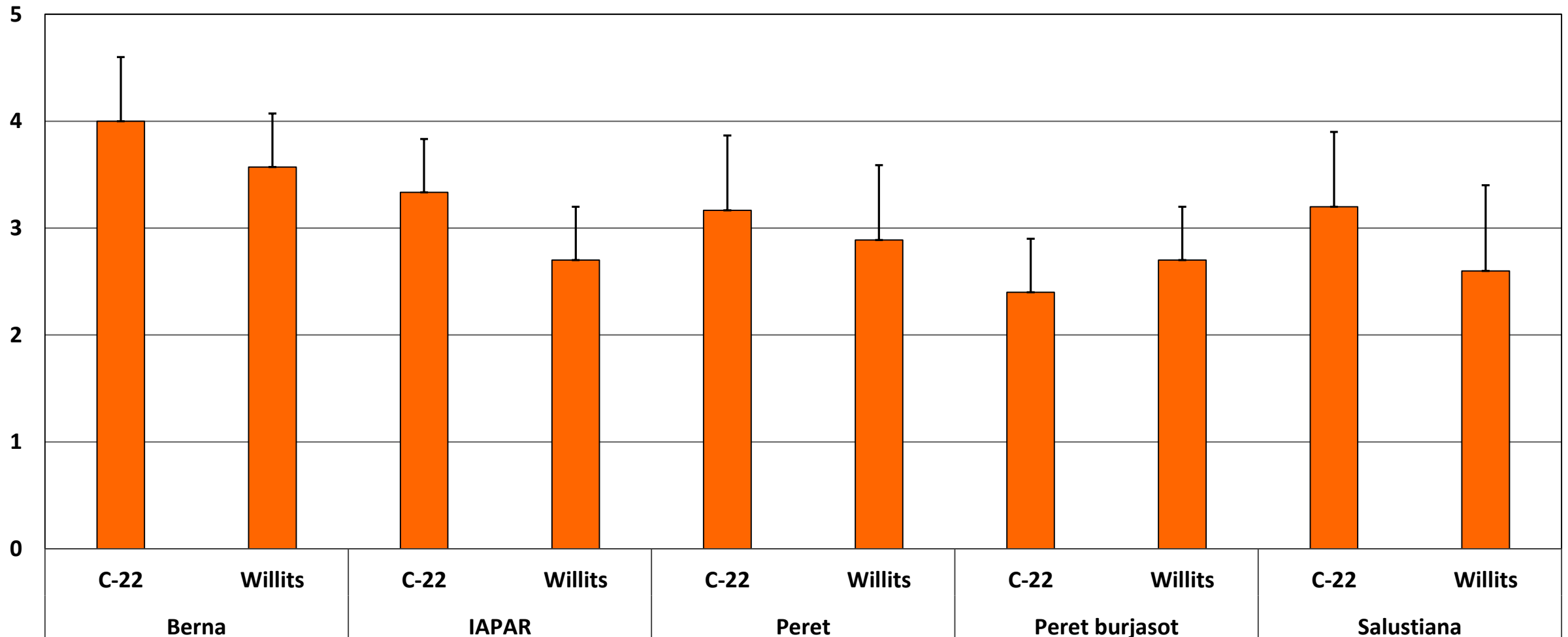
CREC Scion and Rootstock Trial - Interpretative summary [as of August 2021]:

- After 4 years in the field, the initial data and walk-through observations pointed to Salustiana and Berna as the most interesting scions among the five included in the trial.
- Salustiana and Berna were midseason in maturity based on Brix/acid ratio data which were not consistent enough to state that one cultivar was different from the other in that trait.
- Yield and HLB visible symptoms were similar.
- A PCR test showed that all trees were infected.
- Berna fruit juice generally was slightly better colored than Salustiana juice, but the fruit had a few seeds. Salustiana fruit were seedless.
- Among the fruit evaluated by the commercial processor, one Berna tree had high juice limonin and was excluded from further testing.

CREC Scion and Rootstock Trial - Interpretative summary [cont'd]:

- Budwood of one tree each of Salustiana and Berna was submitted to FDACS-Division of Plant Industry, Citrus Budwood Registration Office for cleanup and entry into the parent tree program. *Cleanup has been completed and buds are available.*
- **Rootstocks.** The differences between C-22 and Willits were small and inconsistent with regard to tree height, HLB response, yield and juice quality.
- **Conclusion.** The evidence obtained thus far supports further evaluation of Salustiana and Berna as commercial varieties of midseason maturity in fresh and processing channels. The fresh-fruit use of these varieties was not directly studied, but Salustiana, in particular, has promise because of its seedlessness and exceptional juice flavor as determined from random sampling in the field.
- **Caveat.** The trial trees were produced using young seedling buds; thus, they are relatively juvenile, a factor that may be contributing so far to their mild HLB reaction.

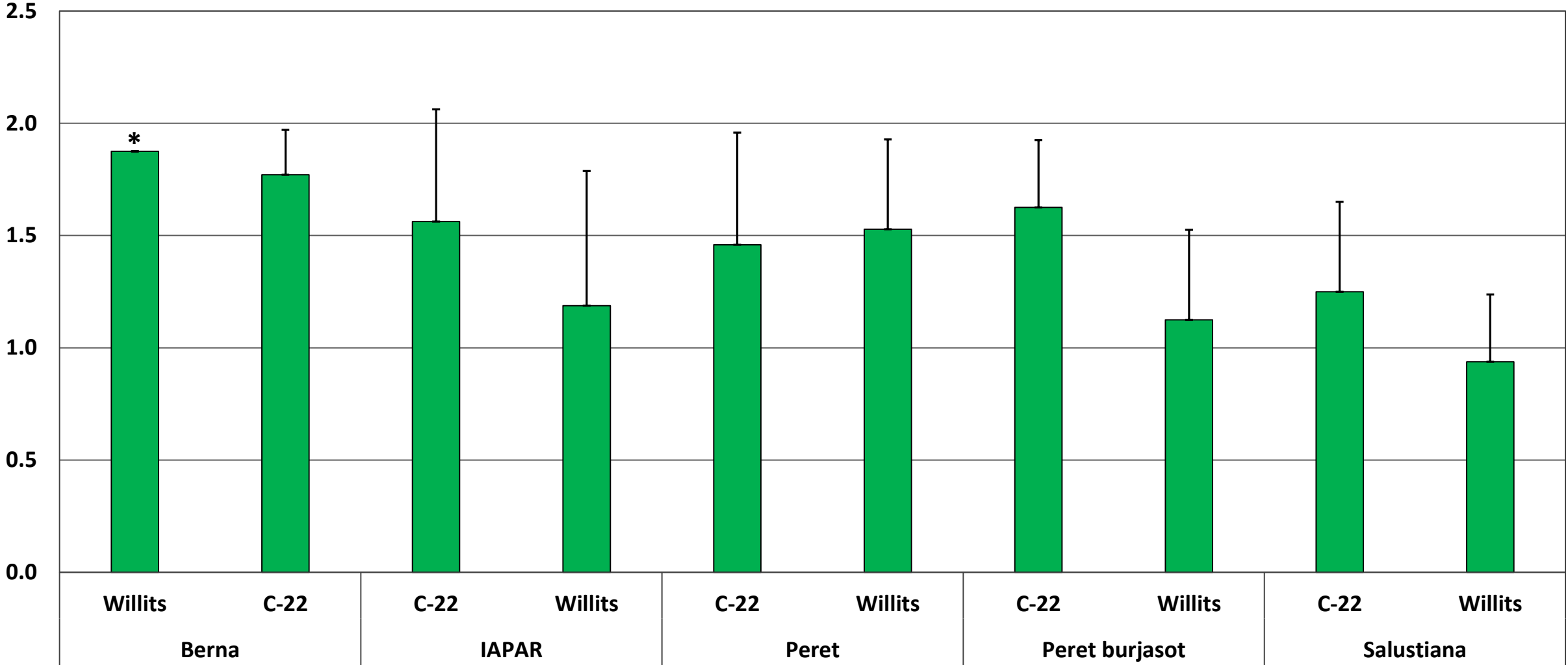
Fig. 1. CREC scion and rootstock trial – HLB rating: mean + std. dev. [March 2018].



HLB Rating scale
 1= almost dead
 2= slight decline
 3= average
 4= above average
 5= outstanding

Scion - Rootstock

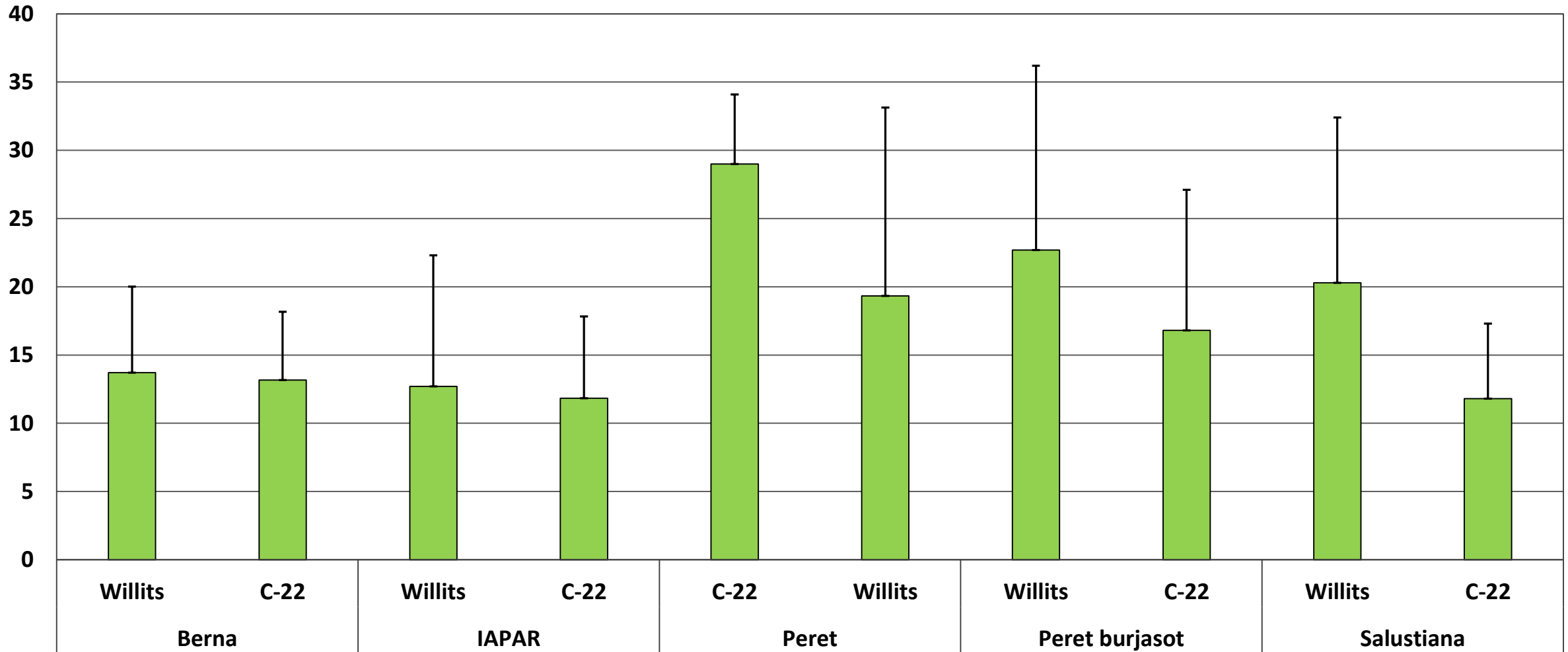
Fig. 2. CREC scion and rootstock trial – Yield: mean + std. dev. [boxes/tree, April 2018].
 Tree age: 5 years.



Scion - Rootstock

(*) std. dev. = 0

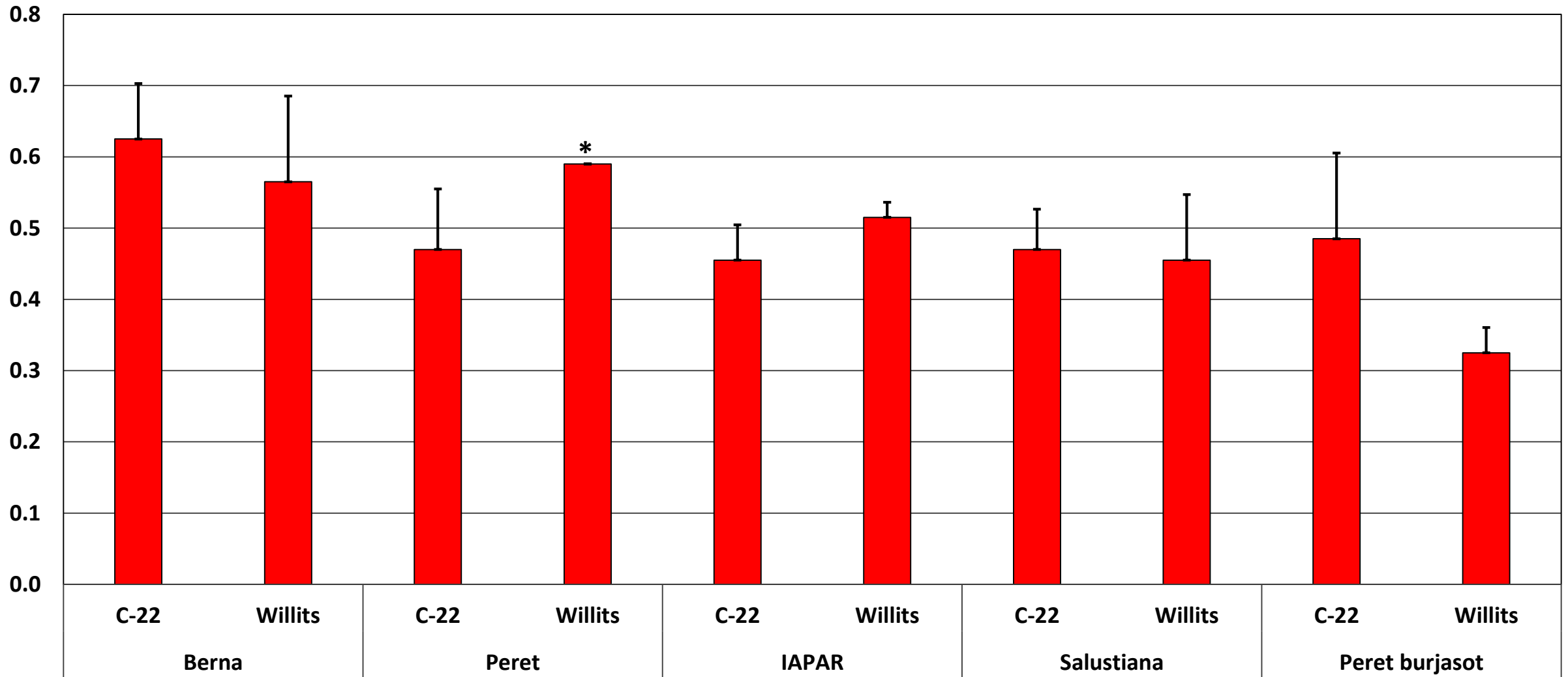
Fig. 3. CREC scion and rootstock trial – Fruit drop, %*: mean + std. dev. [April 2018].



(*)Amount of fruit on the ground as a % of total (ground + tree)

Scion - Rootstock

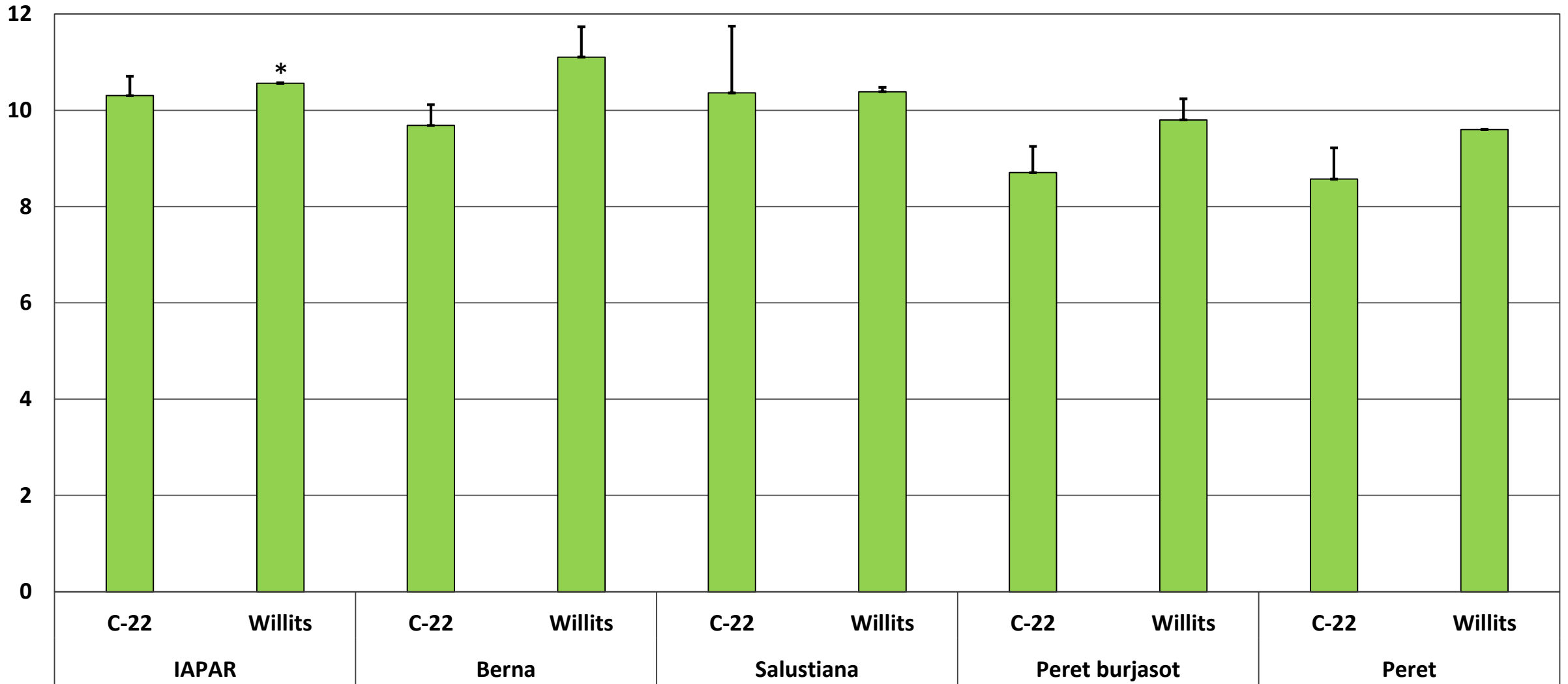
Fig. 4. CREC scion and rootstock trial – juice Acid: mean + std. dev. [February 2018].



Scion - Rootstock

(*) std. dev. = 0

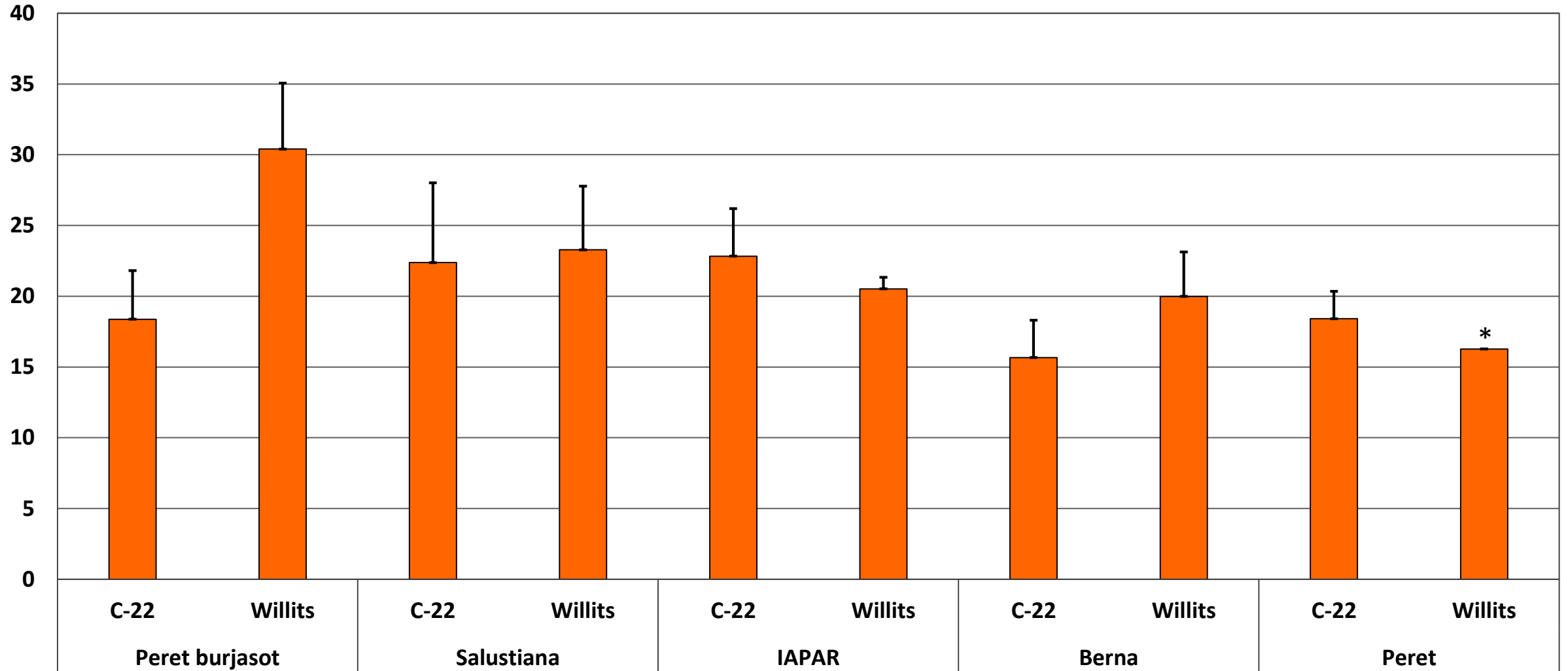
Fig. 5. CREC scion and rootstock trial – Juice Brix: mean + std. dev. [February 2018].



(*) std. dev. = 0

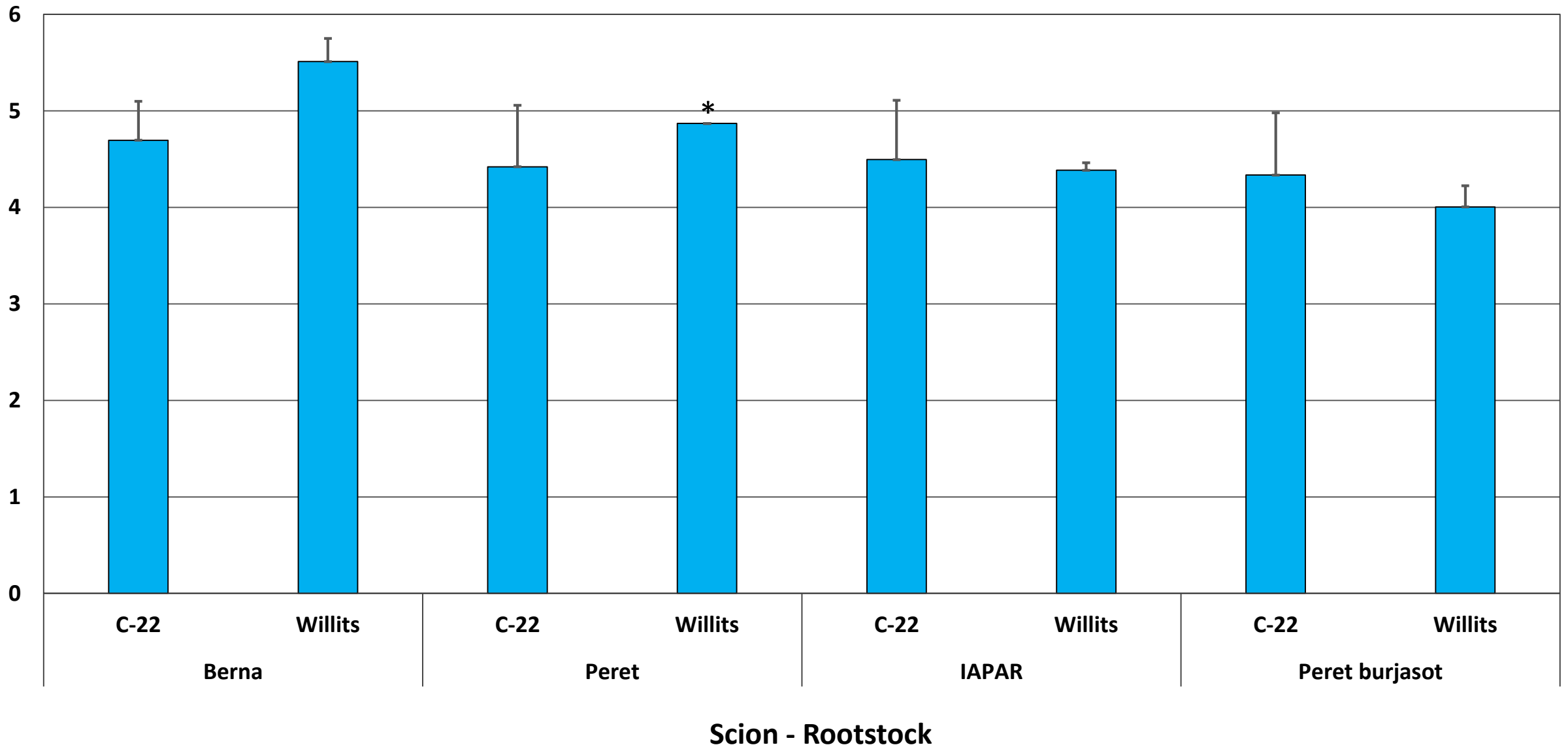
Scion - Rootstock

Fig. 6. CREC scion and rootstock trial – Juice Ratio: mean + std. dev. [February 2018].



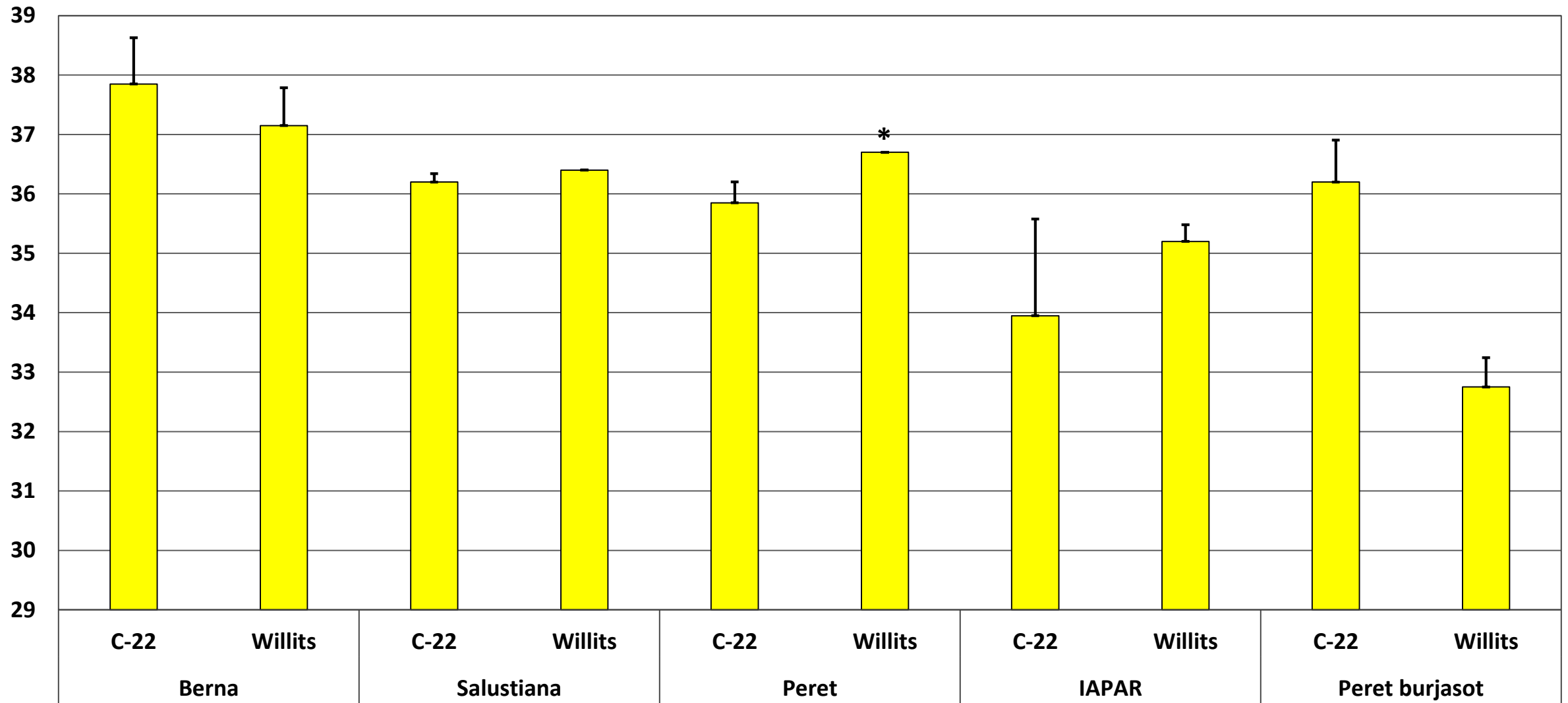
(*) std. dev. = 0

Fig. 7. CREC scion and rootstock trial – PS/box: mean + std. dev. [February 2018].



(*) std. dev. = 0

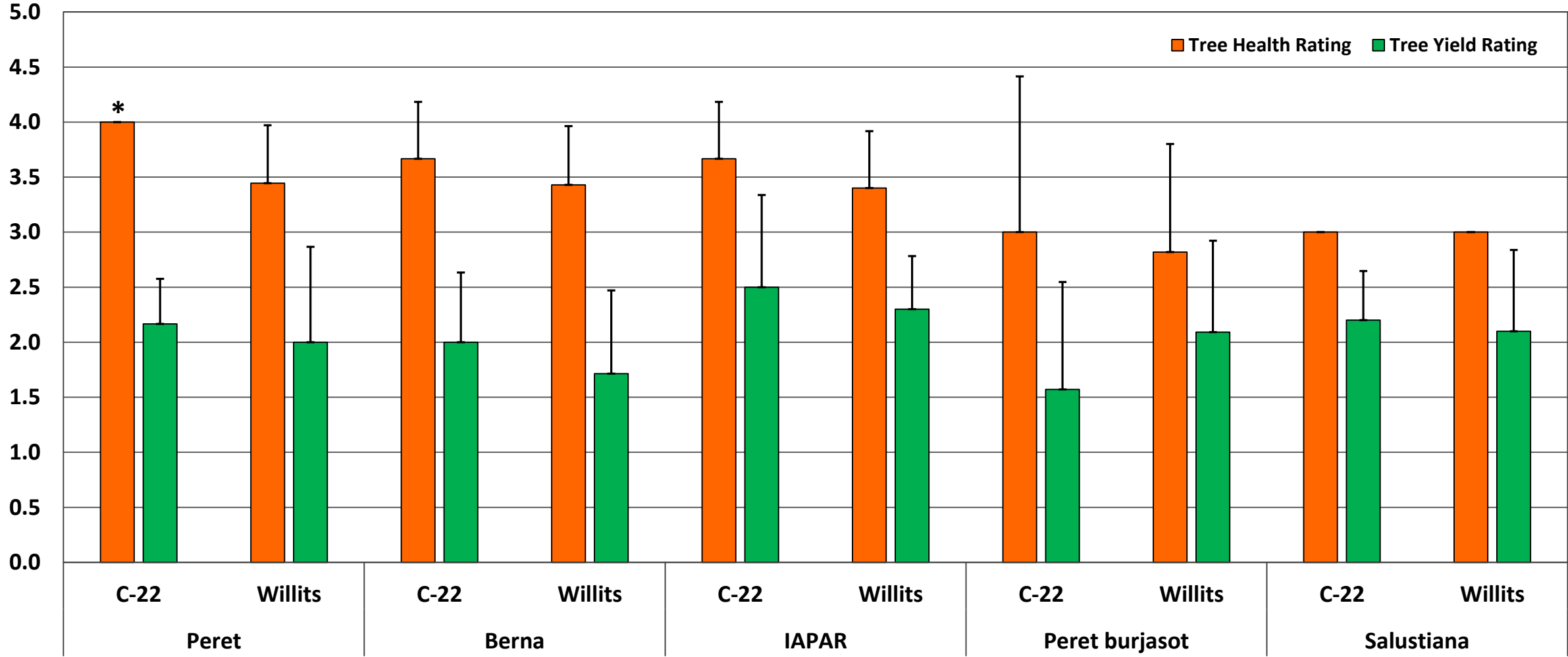
Fig. 8. CREC scion and rootstock trial – Juice Color: mean + std. dev. [February 2018].



(*) std. dev. = 0

Scion - Rootstock

Fig. 9. CREC scion and rootstock trial – Tree health and yield ratings: mean + std. dev. [October 2018].



<u>Tree health rating</u>	<u>Tree yield rating</u>
0= dead	0= no fruit
1= heavy decline	1= few fruit
2= mild decline	2= medium crop
3= healthy	3= heavy crop
4= very healthy	

(*) std. dev. = 0

Scion - Rootstock

Fig. 10. CREC scion and rootstock trial – tree Yield: mean [pounds fruit/tree, April 2019].

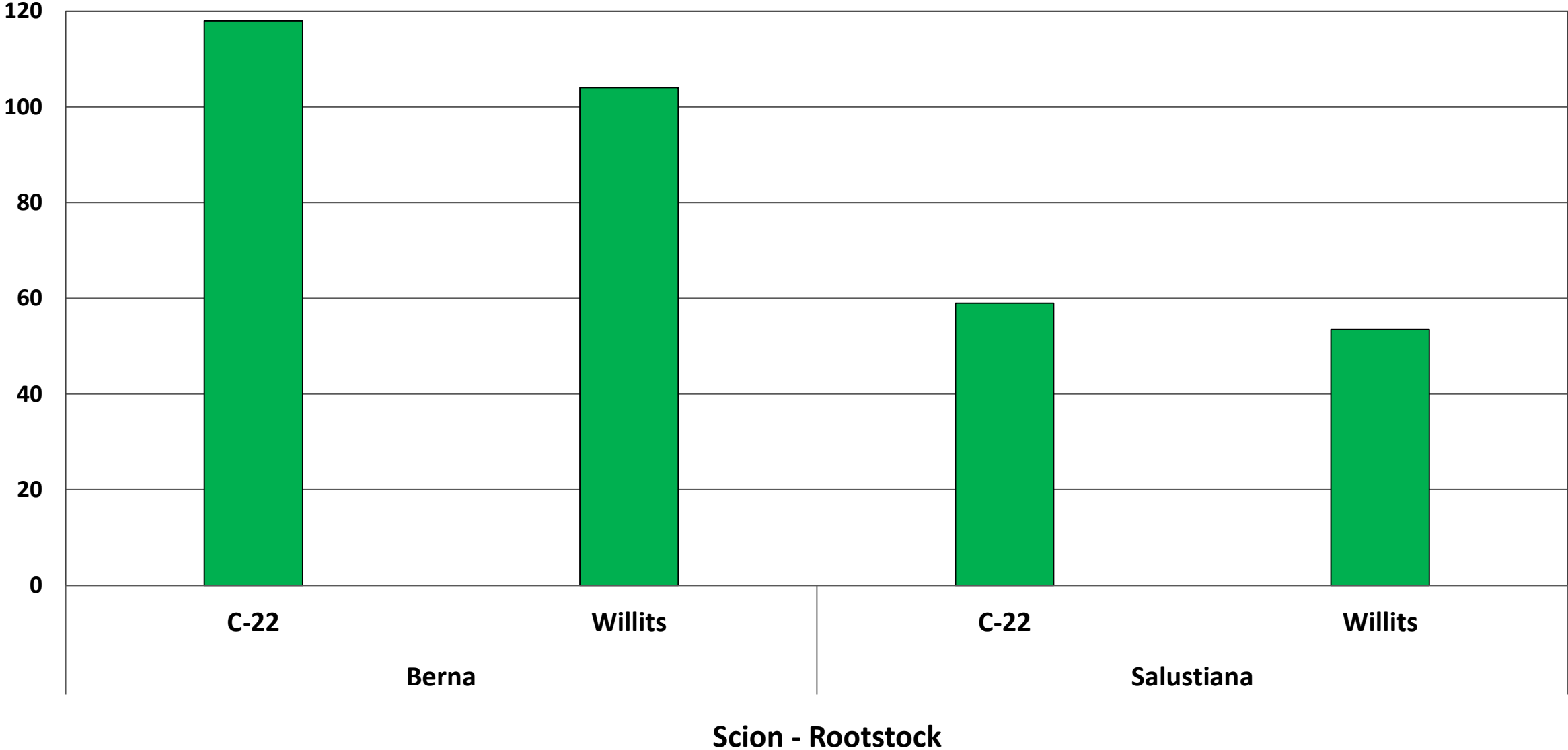


Fig. 11. CREC scion and rootstock trial – Fruit drop: mean + std. dev. [no. fruit/tree, March 2019].

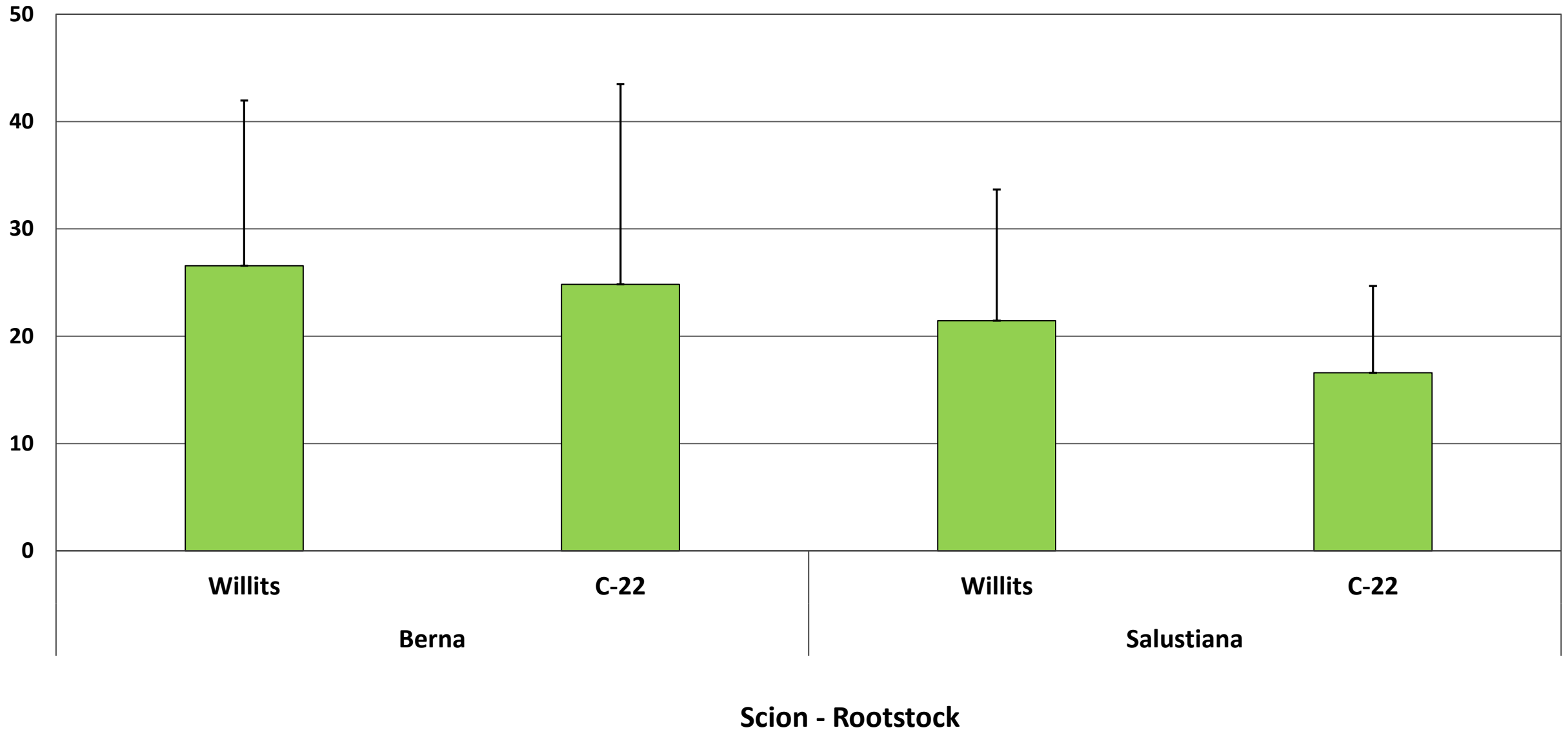


Table 2. CREC scion and rootstock trial – PCR analysis [April 2019].

Sample ID	Scion	Rootstock	Ct value	Status
R2T6*	Berna	C-22	25.5	HLB +
R4T17	Berna	C-22	28.2	HLB +
R5T5	Berna	Seedling	25.5	HLB +
R1T9	Berna	Willits	24.8	HLB +
R5T2	Berna	Willits	26.9	HLB +
R3T14	IAPAR	C-22	27.2	HLB +
R4T6	IAPAR	C-22	30.3	Unclear
R2T12	Salustiana	C-22	25.7	HLB +
R2T14	Salustiana	C-22	26.9	HLB +
R2T4	Salustiana	Seedling	25.5	HLB +
R2T3	Salustiana	Willits	24.3	HLB +
R4T14	Salustiana	Willits	26.1	HLB +

(*) Row and tree number.

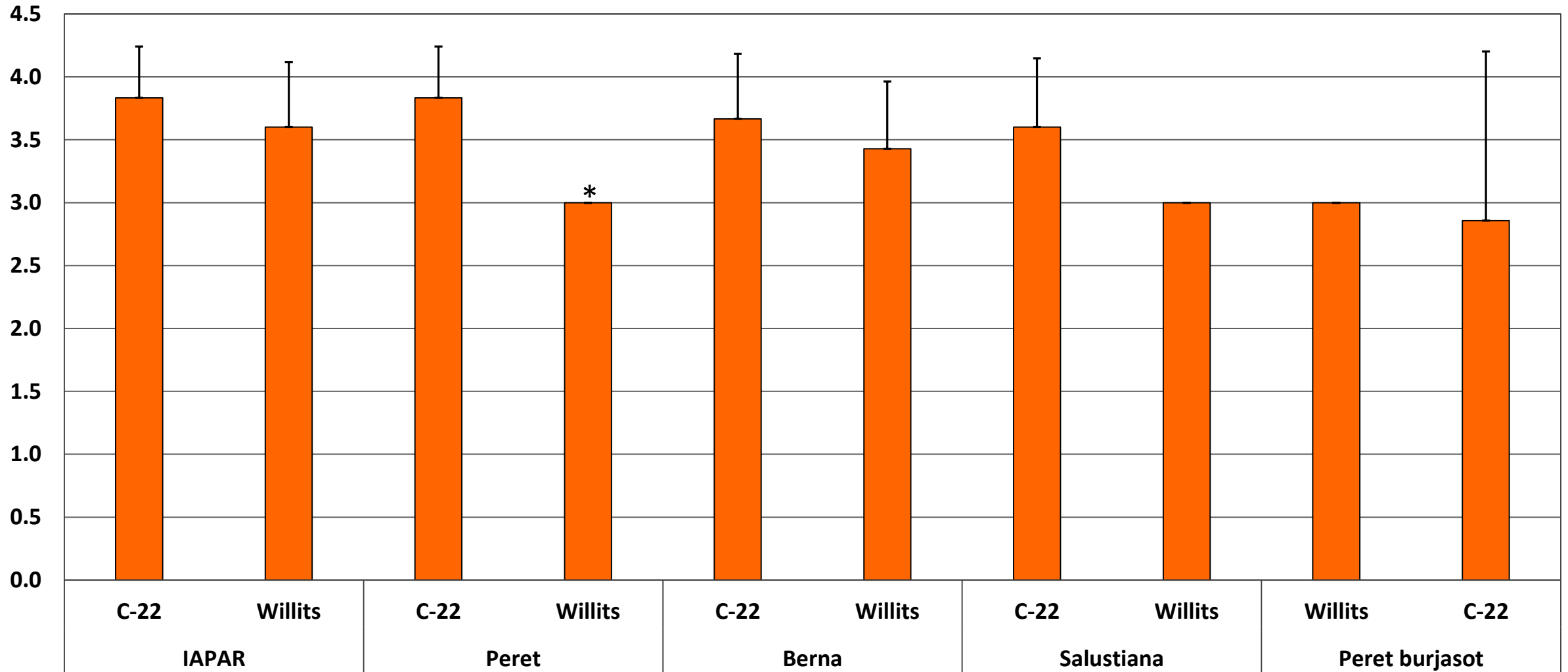
Juice quality of selected trees of Berna and Salustiana [see Table 3]:

- The Berna and Salustiana cultivars emerged as promising oranges for juice and fresh use.
- Their potential was investigated commercially in the 2018/19 season by choosing 3 trees of each cultivar that were judged to be the healthiest and best performing trees within the cultivar.
- One sample of 50+ fruit was collected about every 2-4 weeks from each tree during January to February and delivered to the Quality Control lab of a processing facility for analysis.
- A similar sample from either comparable Hamlin or Vernia trees was also collected for comparison.

Table 3. CREC scion and rootstock trial – 2018/19 seasonal juice quality as measured in the Quality Control lab of a commercial processing facility.

Sampling date	Sample ID	Brix	Acid	Ratio	pH	Juice color	Vit C	Scott oil	Limonin (ppm)
1/9/2019	HAMLIN	7.8	0.41	19.2	4.2	32.7	219	0.010	<1
1/9/2019	SALUSTIANA - 1	9.9	0.47	21.0	4.2	32.4	200	0.021	5.5
1/9/2019	SALUSTIANA - 2	8.3	0.49	16.8	4.2	33.9	162	0.018	3.2
1/9/2019	SALUSTIANA - 3	9.1	0.50	18.2	4.2	32.8	193	0.019	4.9
1/9/2019	BERNA - 1	10.6	0.66	15.9	3.9	35.9	192	0.013	11.7
1/9/2019	BERNA - 2	8.9	0.66	13.5	3.9	36.1	170	0.010	4.2
1/9/2019	BERNA - 3	11.1	0.65	17.2	3.9	35.9	204	0.015	11.8
1/25/2019	HAMLIN	11.7	0.74	15.8	3.8	34.1	270	0.013	0.4
1/25/2019	SALUSTIANA - 1	9.6	0.51	19.0	4.0	33.6	204	0.018	3.4
1/25/2019	SALUSTIANA - 2	8.2	0.49	16.9	4.2	33.5	155	0.021	3.5
1/25/2019	SALUSTIANA - 3	9.3	0.56	16.7	4.1	32.4	195	0.017	4.0
1/25/2019	BERNA - 1	10.6	0.65	16.4	4.0	35.7	169	0.013	9.3
1/25/2019	BERNA - 2	9.1	0.62	14.7	4.0	35.2	162	0.008	2.5
1/25/2019	BERNA - 3	11.2	0.66	16.9	3.9	36.2	209	0.012	11.0
1/25/2019	VERNIA	10.1	0.66	15.4	3.9	35.7	172	0.017	2.4
2/21/2019	SALUSTIANA - 1	10.7	0.46	23.2	4.3	34.0	185	0.022	3.9
2/21/2019	BERNA - 2	9.6	0.60	15.9	4.2	35.8	186	0.012	1.9
3/14/2019	BERNA	9.8	0.46	21.4	4.0	36.05	195	0.009	0.5

Fig. 12. CREC scion and rootstock trial – HLB rating: mean + std. dev. [October 2019].

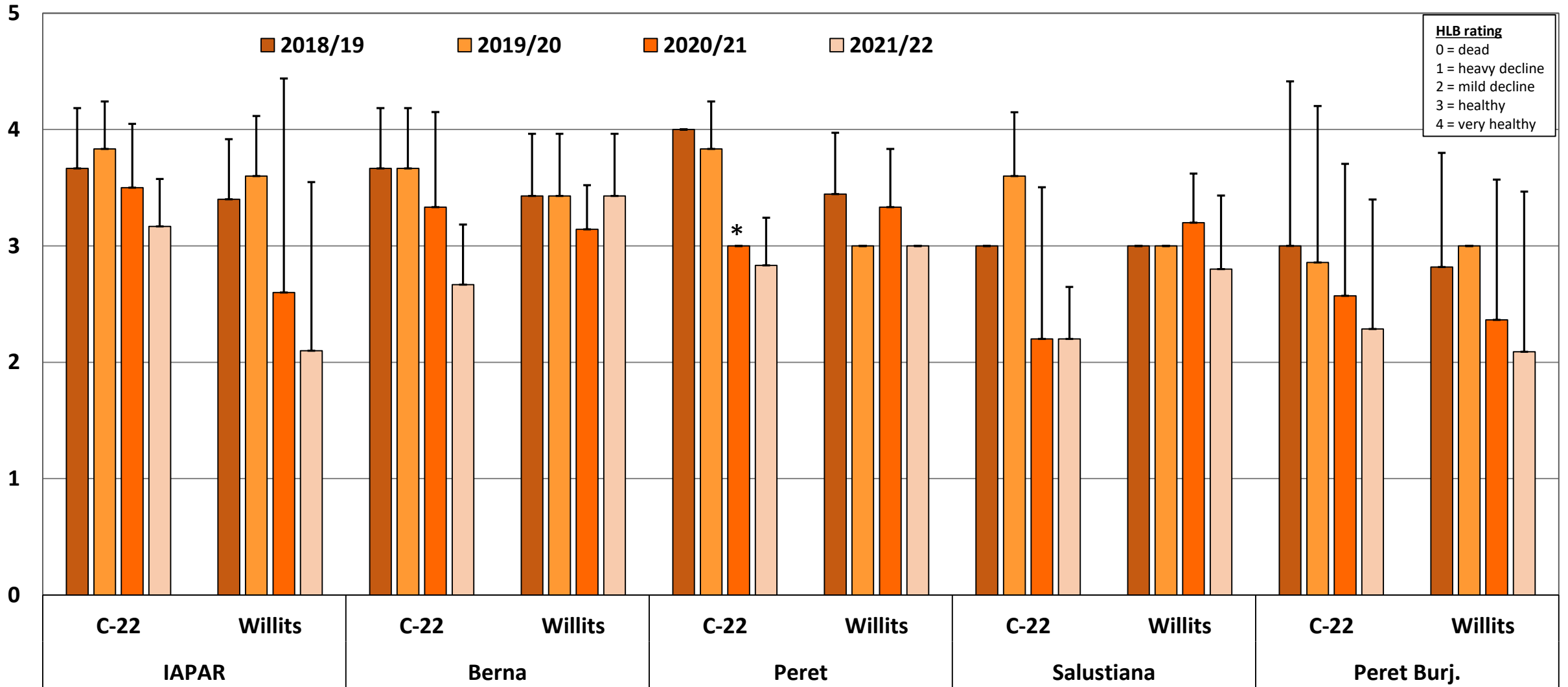


HLB rating
 0 = dead
 1 = heavy decline
 2 = mild decline
 3 = healthy
 4 = very healthy

(*) std. dev. = 0

Scion - Rootstock

Fig. 13. CREC scion and rootstock trial – HLB rating: mean + std. dev. [October 2018, October 2019, November 2020 & October 2021].



(*) std. dev. = 0

Fig. 14. CREC scion and rootstock trial – Yield rating: mean + std. dev. [October 2018 & February 2020].

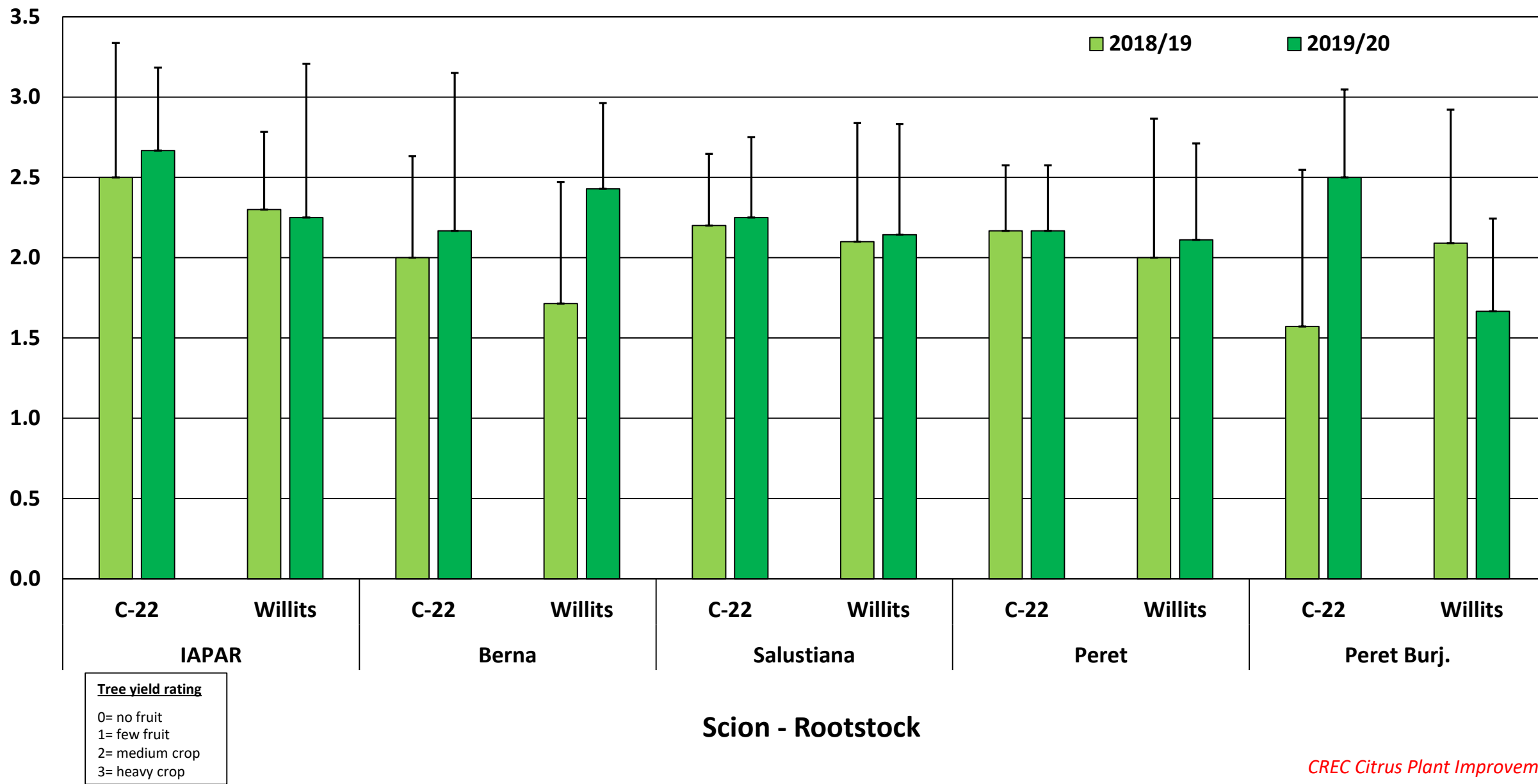
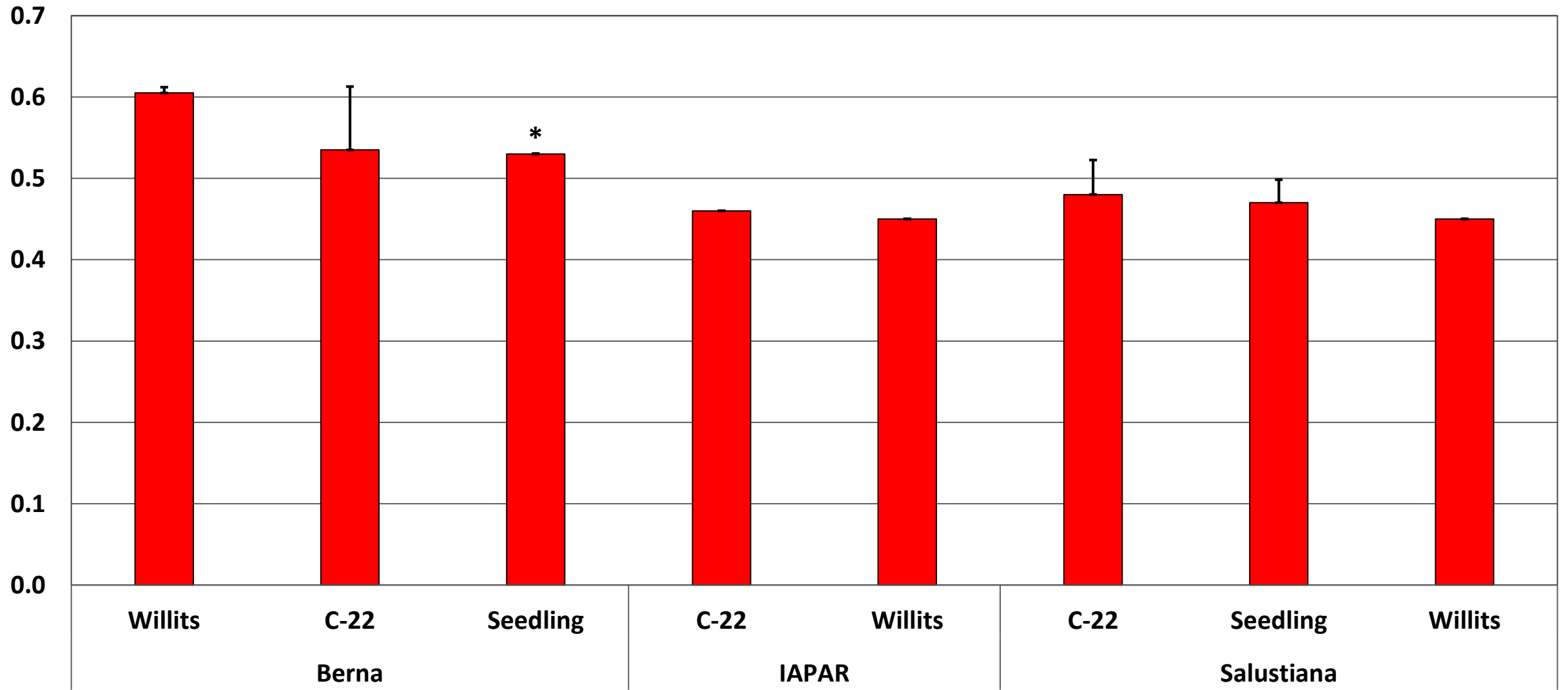


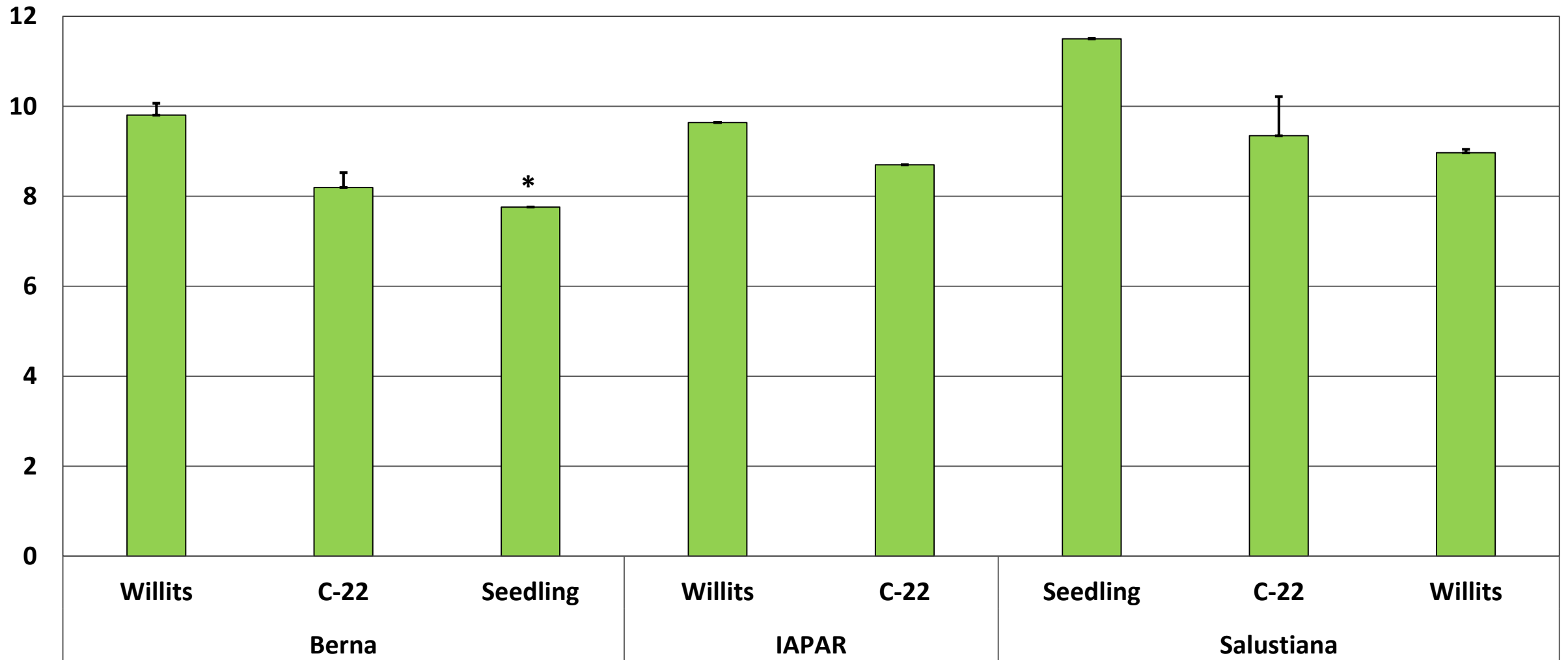
Fig. 15. CREC scion and rootstock trial – juice Acid: mean + std. dev. [January, 2021].



(*) std. dev. = 0

Scion - Rootstock

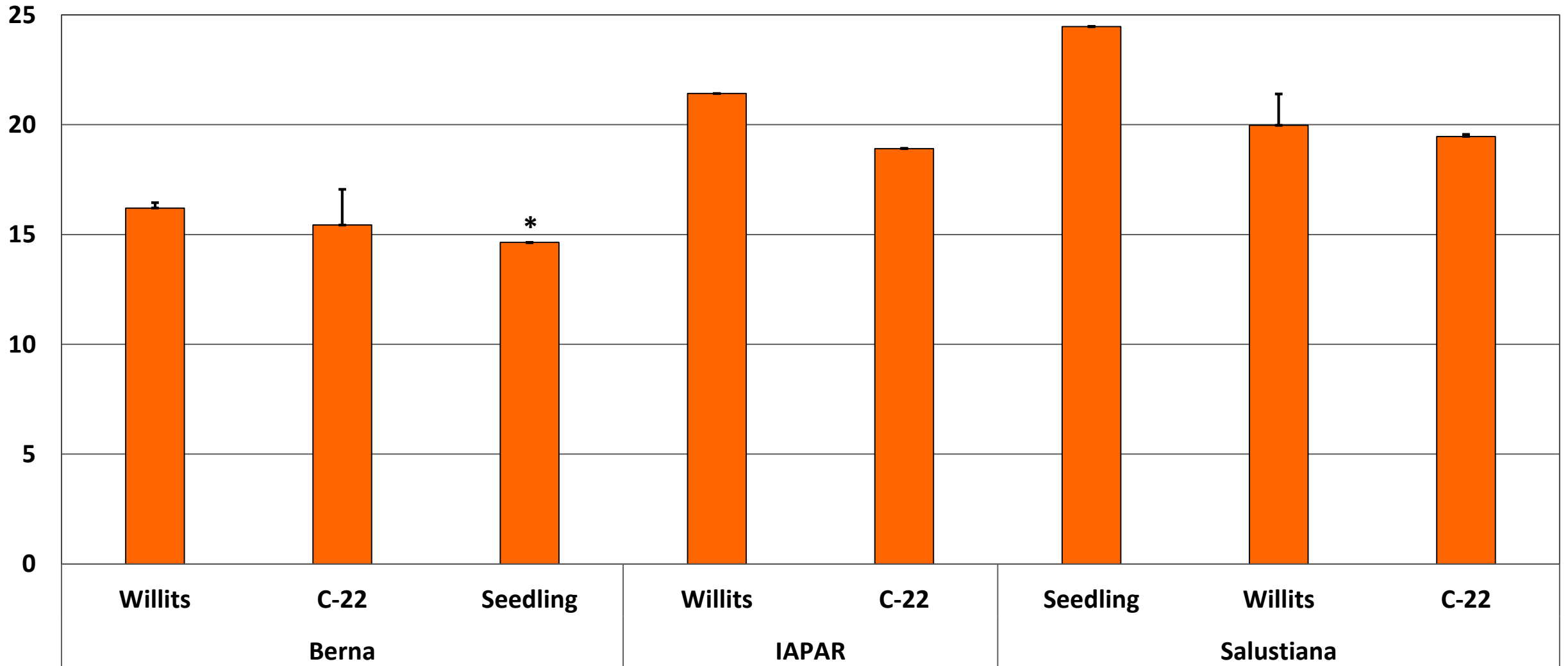
Fig. 16. CREC scion and rootstock trial – juice Brix: mean + std. dev. [January 2021].



(*) std. dev. = 0

Scion - Rootstock

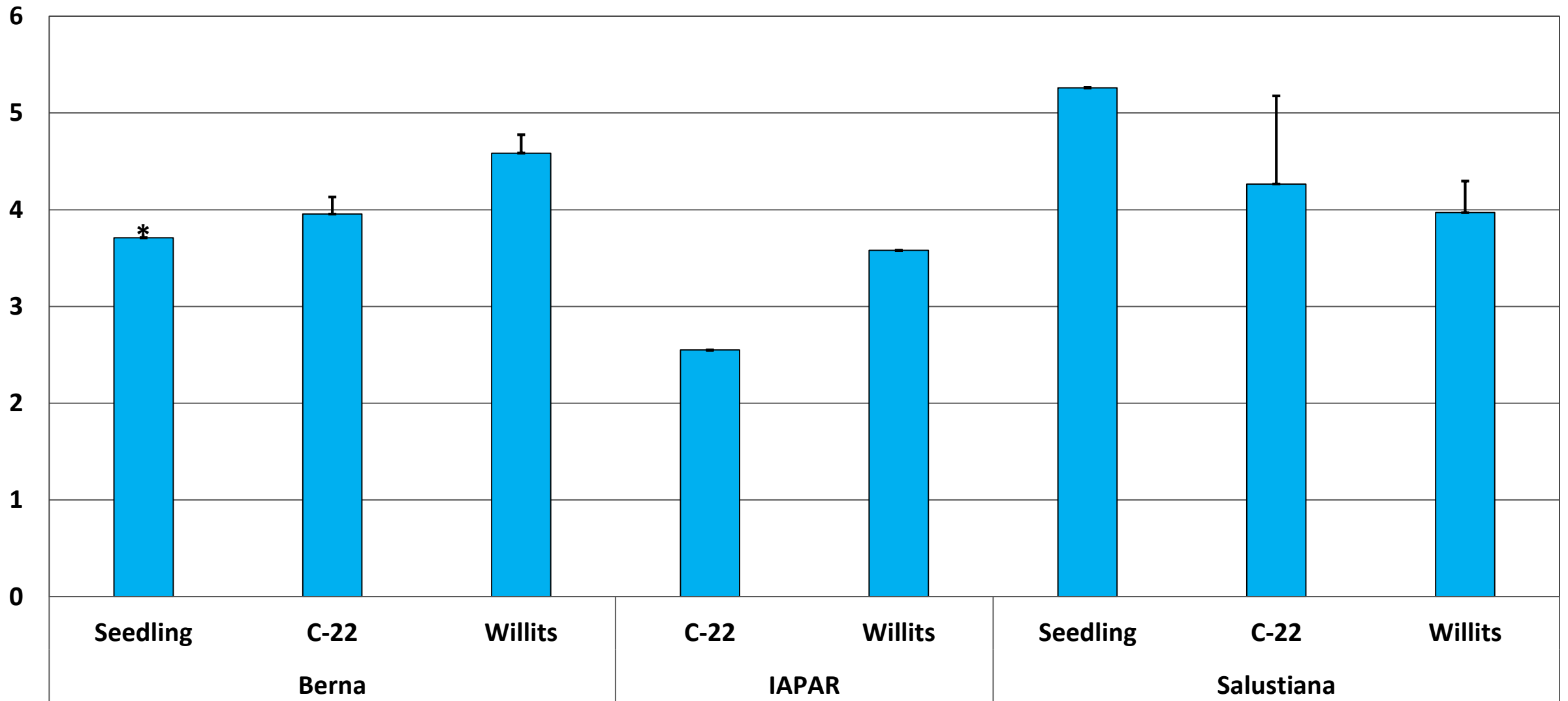
Fig. 17. CREC scion and rootstock trial – juice Ratio: mean + std. dev. [January, 2021].



(*) std. dev. = 0

Scion - Rootstock

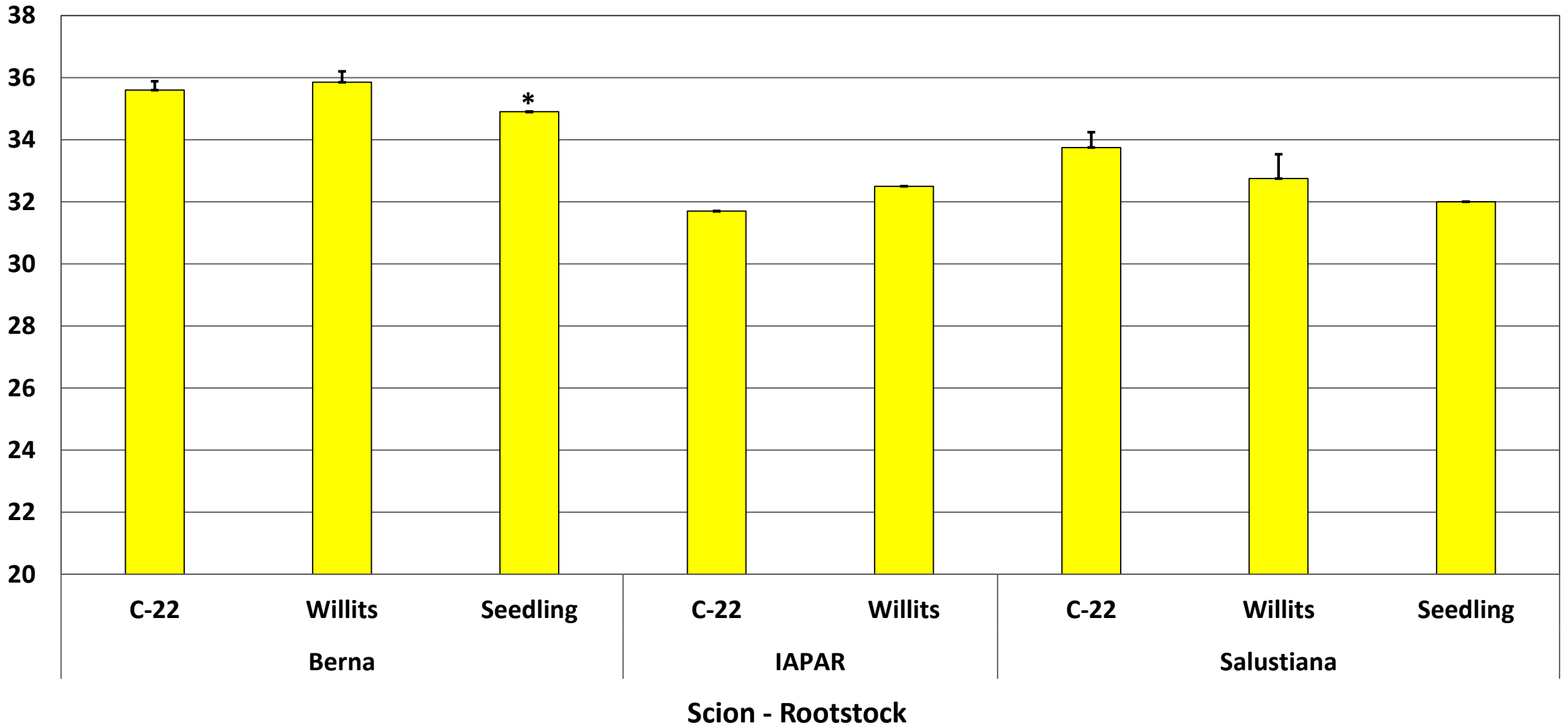
Fig. 18. CREC scion and rootstock trial – PS/box: mean + std. dev. [January 2021].



(*) std. dev. = 0

Scion - Rootstock

Fig. 19. CREC scion and rootstock trial – juice Color: mean + std. dev. [January, 2021].



(*) std. dev. = 0