

Scion-Rootstock Trial, Waverly

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CREC Citrus Plant Improvement*



Scion-Rootstock Trial, Waverly - Description

This replicated trial, planted in Waverly, Polk County in 2013, consists of 'Hamlin,' 'Valquarius' and 'Valencia' on 11 rootstocks, including the best rootstocks from the Forner breeding program in Spain, C-series rootstocks from CA, and one tetraploid citrumelo from the UF/CREC breeding program. The goal is to identify superior sweet orange/rootstock combinations for the Ridge based on yield, juice quality and apparent HLB tolerance.

Scion-Rootstock Trial, Waverly - Summary

- Location: Waverly, Polk county.
- Scion - Rootstocks: Valquarius – Hamlin – Valencia on 11 rootstocks
- Date planted: June 2013
- Design: Randomized complete-block; 3 replications
 - Plot: 4-20 trees
 - Spacing: 12 x 22 ft. = 165 trees/acre
- Data:
 - 2015/16: Yield [boxes/tree].
 - 2016/17: Yield [boxes/tree]; HLB and fruit drop rating
 - 2017/18: Yield [boxes/tree]; tree size and HLB rating; juice quality data; PS/acre.
 - 2018/19: Yield [boxes/tree]; HLB rating.
 - 2019/20: Yield [boxes/tree]; HLB rating and tree height [ft.]
 - 2020/21: Yield [boxes/tree] and HLB rating; juice quality data.
 - 6-year cumulative yield [boxes/tree].
- Trial Status: **Terminated Spring 2021**

Scion-Rootstock Trial, Waverly – Interpretive Summary [from planting to termination, 8 years]

This replicated trial was planted on the Ridge in June 2013 and involved a relatively narrow range of rootstocks. It is one of a few trials planted about the same time throughout Florida to test the C-series from California and some of the Forner rootstocks from Spain along with Willits citrange. Harvesting to gather yield data usually took place once in the season at a compromise time of maturity considering the three scions. The trial was terminated in Spring 2021.

General. The trees got off to a strong start, growing well in the initial years. They began to fruit after 2-3 years and continued to look healthy.

Tree height. When the trial was about 6 years old, most trees were 6-8 feet tall [Fig. 18]. The largest trees overall were those with Valquarius scion reflecting its vigor associated with being a young [juvenile] line. Among the C-series, those on C-57 tended to be the largest regardless of scion.

HLB. In the four years HLB status was rated there was little change across the trial [Fig. 22]. Most trees displayed light visible symptoms. The one exception were the Hamlin trees on ES-2. In the Hamlin trees which are more susceptible, fruit drop was heavier as observed in March [past normal maturity for Hamlin].

Yield. Cumulative yield was highest among trees on C-22, C-57 and Willits citrange for 2 of the 3 scions [Fig. 5]. However, note that each scion was not grown on the same set of rootstocks.

Juice quality. The only full set of data was collected in the 2017-18 season at tree age 5 years. Valencia fruit samples were taken again in the 2020-21 season. Juice quality was reduced by HLB. Rootstock differences were not remarkable.

Table 1. Scion-rootstock trial, Waverly – Rootstock parentage and number of trees planted.

Valencia		
Rootstock	Parentage	Original # of Trees
C-22	Sunki x Swingle TF	8
C-57	Sunki x Swingle TF	8
Pumm x TF	Pumm x TF (Crocker)	11
ES-1	Cleo x Poncirus trifoliata (Spain)	15
ES-4	King mandarin x Poncirus	18
ES-8	Troyer citrange x Cleopatra mandarin	17
ES-9	Cleo x Poncirus trifoliata (Spain)	16
Forner 030126	Cleo x TF	23
Wgft + TF 50-7	White grapefruit + trifoliate orange	18
Willits	Ruby swt. x TF	26

Table 1 (cont'd). Scion-rootstock trial, Waverly – Rootstock parentage and number of trees planted.

Valquarius		
Rootstock	Parentage	Original # of Trees
C-57	Sunki x Swingle TF	28
Pumm x TF	Pumm x TF (Crocker)	22
ES-1	Cleo x Poncirus trifoliata (Spain)	78
ES-8	Troyer citrange x Cleopatra mandarin	25
Wgft + TF 50-7	White grapefruit + trifoliate orange	26
Hamlin		
Rootstock	Parentage	Original # of Trees
C-22	Sunki x Swingle TF	6
C-57	Sunki x Swingle TF	8
Pumm x TF	Pumm x TF (Crocker)	6
ES-1	Cleo x Poncirus trifoliata (Spain)	8
ES-2	Cleo x Poncirus trifoliata (Spain)	3
ES-4	King mandarin x Poncirus	8
ES-8	Troyer citrange x Cleopatra mandarin	8
ES-9	Cleo x Poncirus trifoliata (Spain)	7
Forner 030126	Cleo x TF	8
WGFT + 50-7	White grapefruit + trifoliate orange	8
Willits citrange	Ruby swt. x TF	8

Table 2 . Scion-rootstock trial, Waverly – Percentage of tree survival.

Hamlin	
Rootstock	% Survival
C-22	100%
C-57	50%
Pumm x TF	67%
ES-1	63%
ES-2	67%
ES-4	63%
ES-8	100%
ES-9	86%
Forner 030126	50%
Wgft + 50-7	75%
Willits citrange	100%

Valquarius	
Rootstock	% Survival
C-57	68%
Pumm x TF	82%
ES-1	95%
ES-8	96%
Wgft + 50-7	85%

Valencia	
Rootstock	% Survival
C-22	50%
C-57	100%
Pumm x TF	91%
ES-1	93%
ES-4	72%
ES-8	82%
ES-9	94%
Forner 030126	87%
Wgft + 50-7	94%
Willits citrange	96%

Fig. 1. Scion-rootstock trial, Waverly – Hamlin - Yield: mean [boxes/tree] from 2015/16 to 2020/21, 6 seasons.

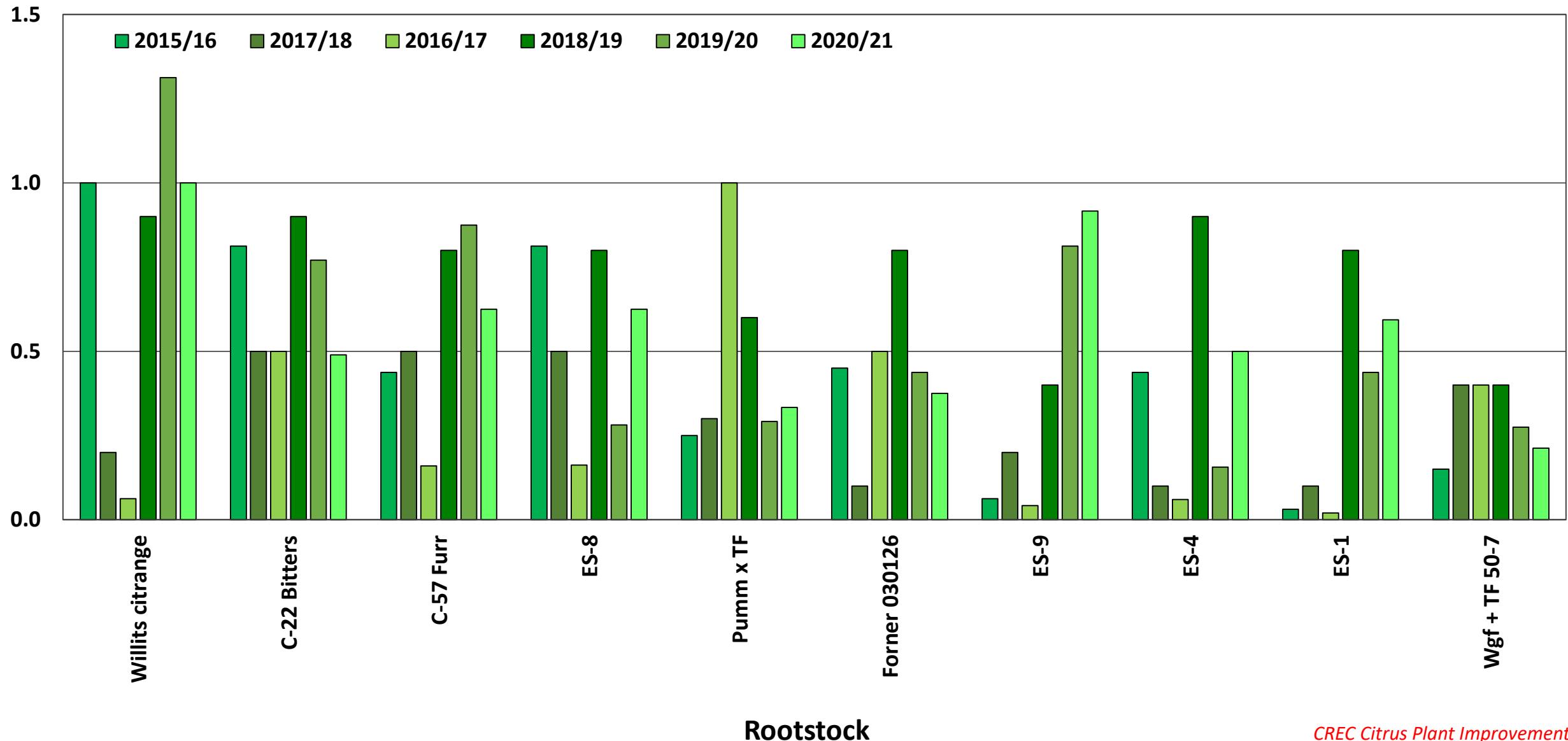


Fig. 2. Scion-rootstock trial, Waverly – Valencia - Yield: mean [boxes/tree] from 2015/16 to 2020/21, 6 seasons.

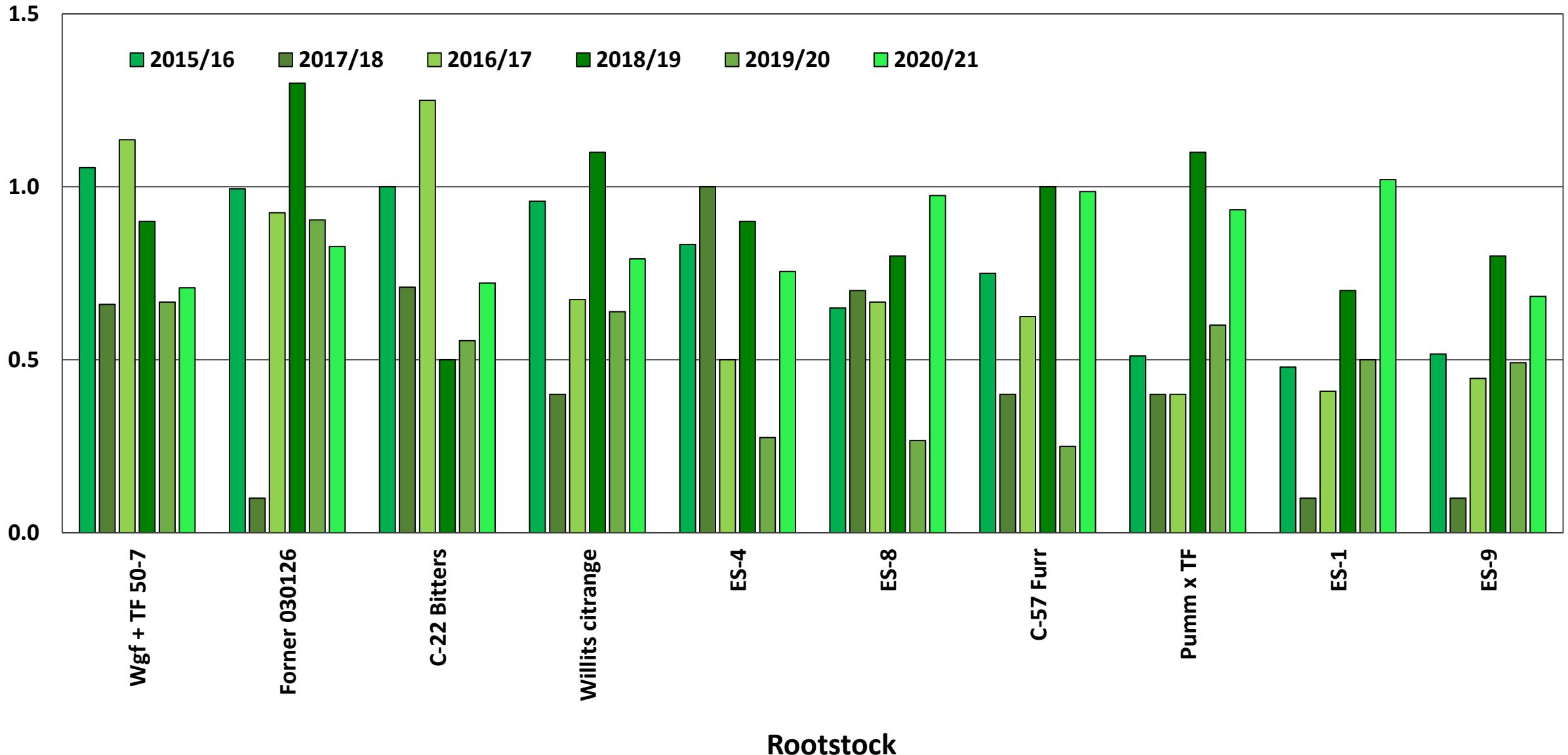


Fig. 3. Scion-rootstock trial, Waverly – Valquarius - Yield: mean [boxes/tree] from 2015/16 to 2020/21, 6 seasons.

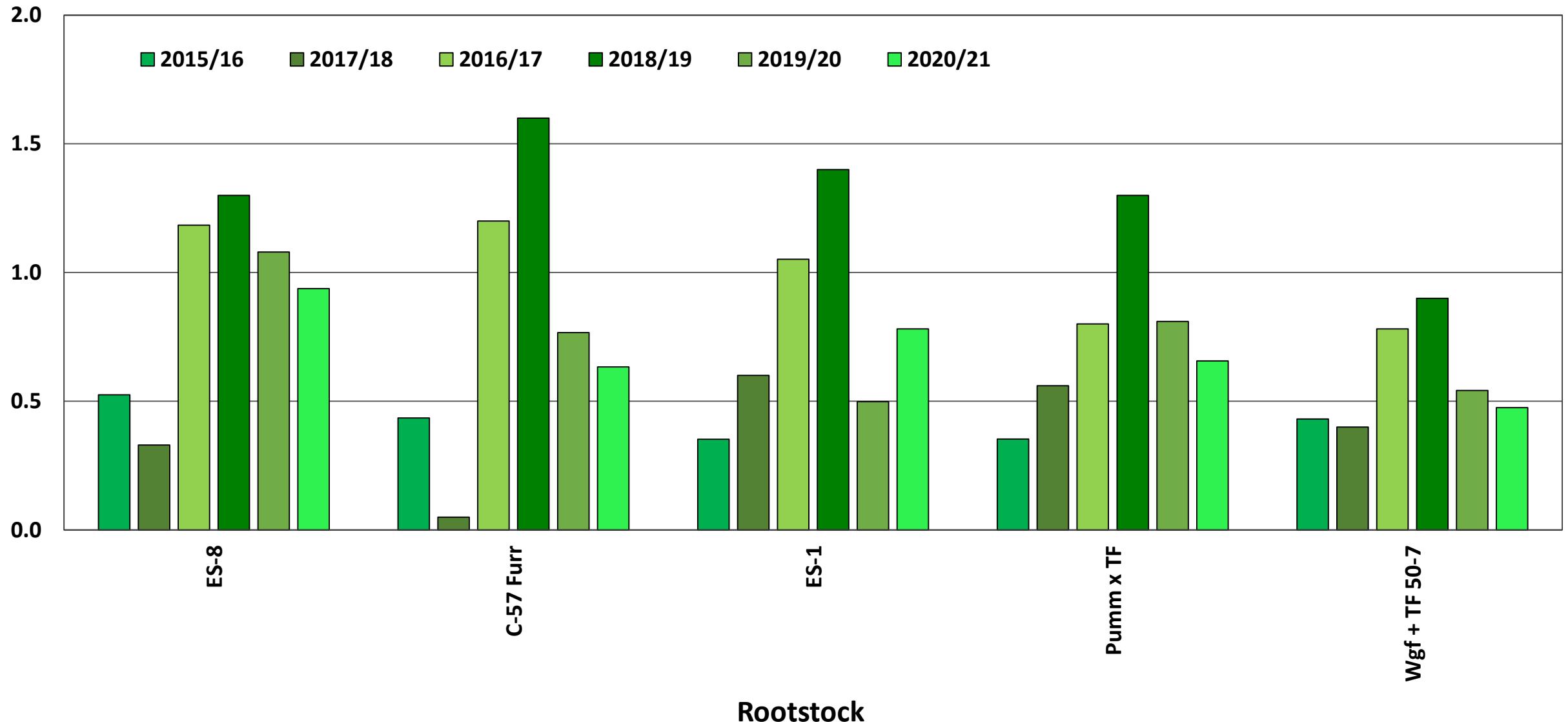


Fig. 4. Scion-rootstock trial, Waverly – 6-year cumulative yield: mean [boxes/tree] by scion for all rootstocks from 2015/16 to 2020/21.

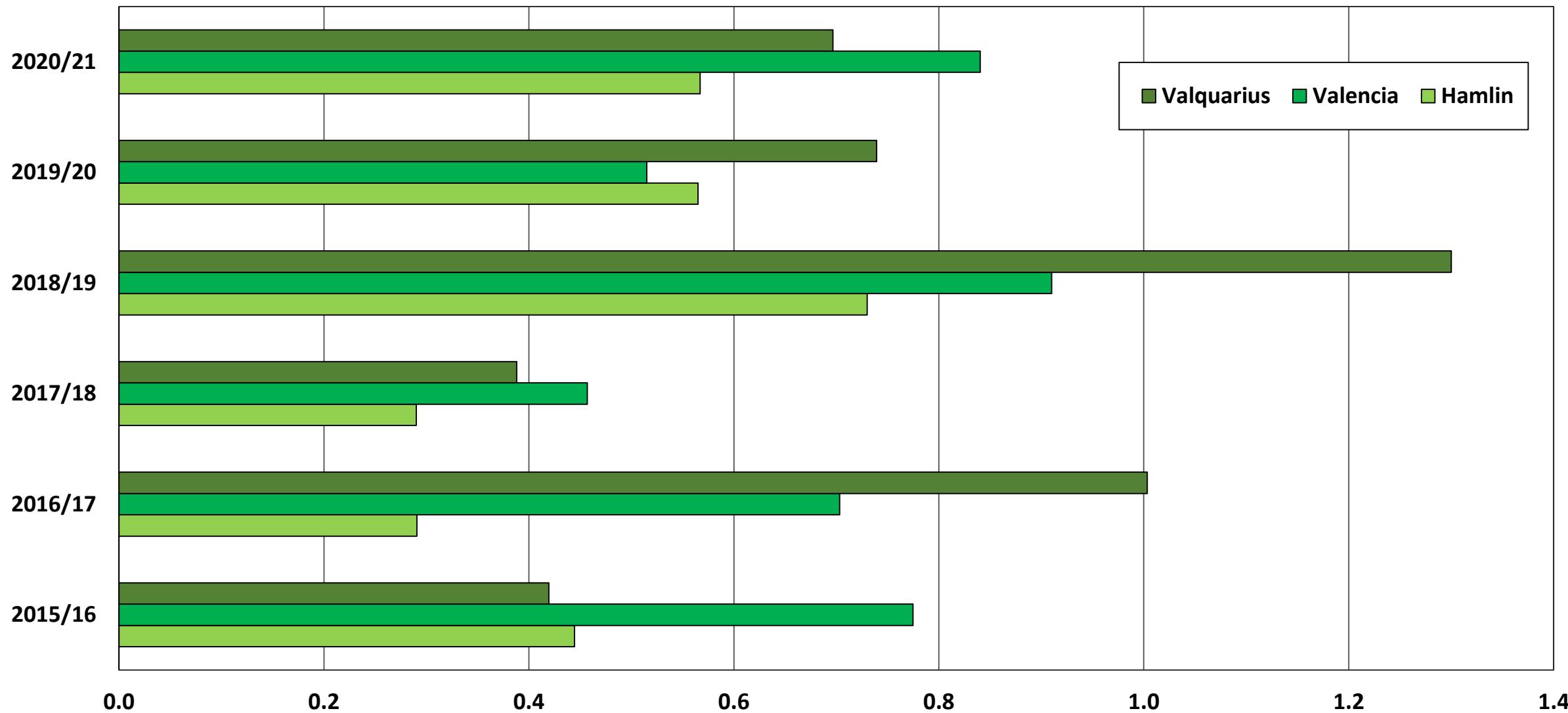


Fig. 5. Scion-rootstock trial, Waverly – 6-year cumulative yield [boxes/tree] by rootstock from 2015/16 to 2020/21.

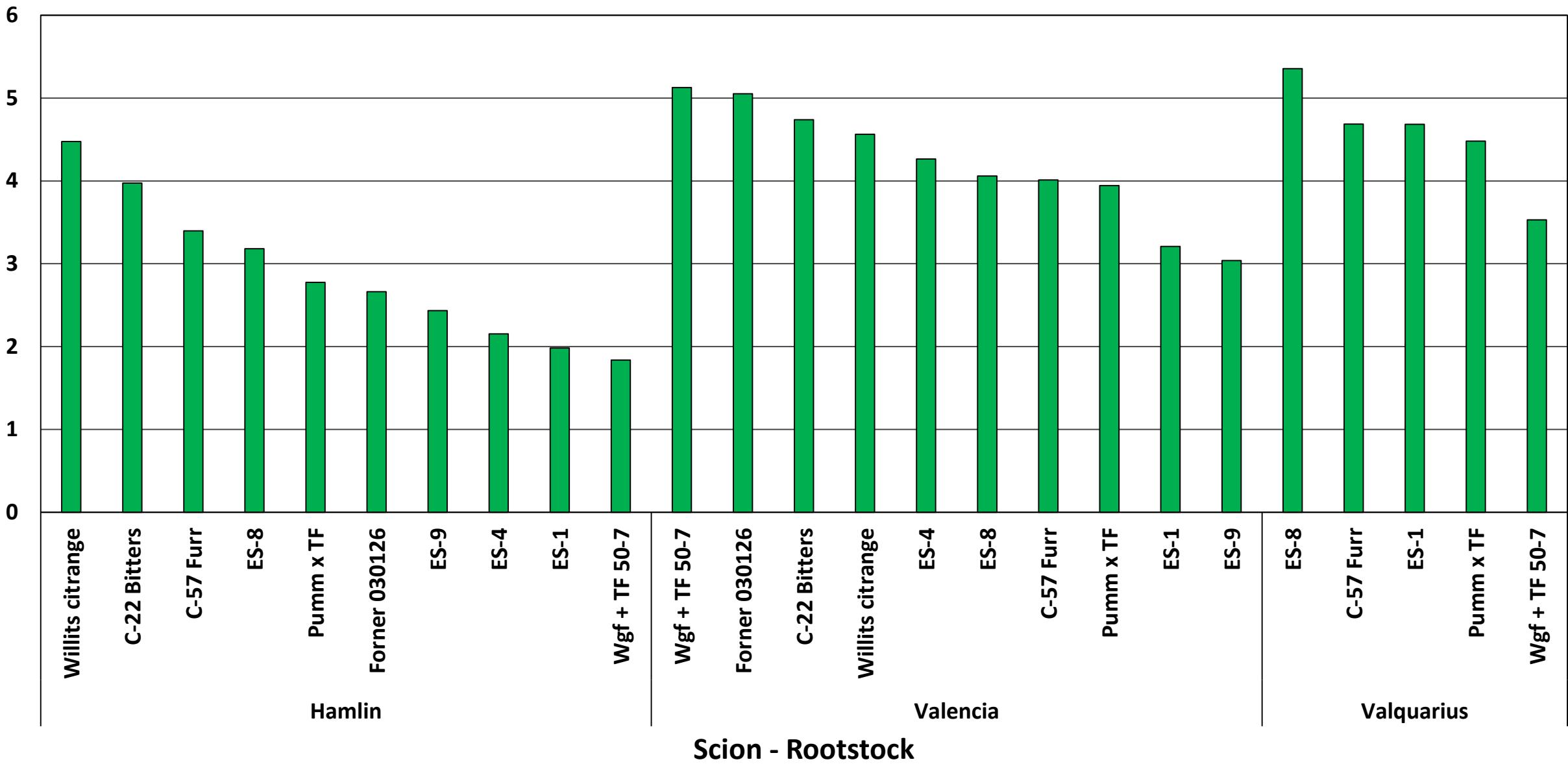
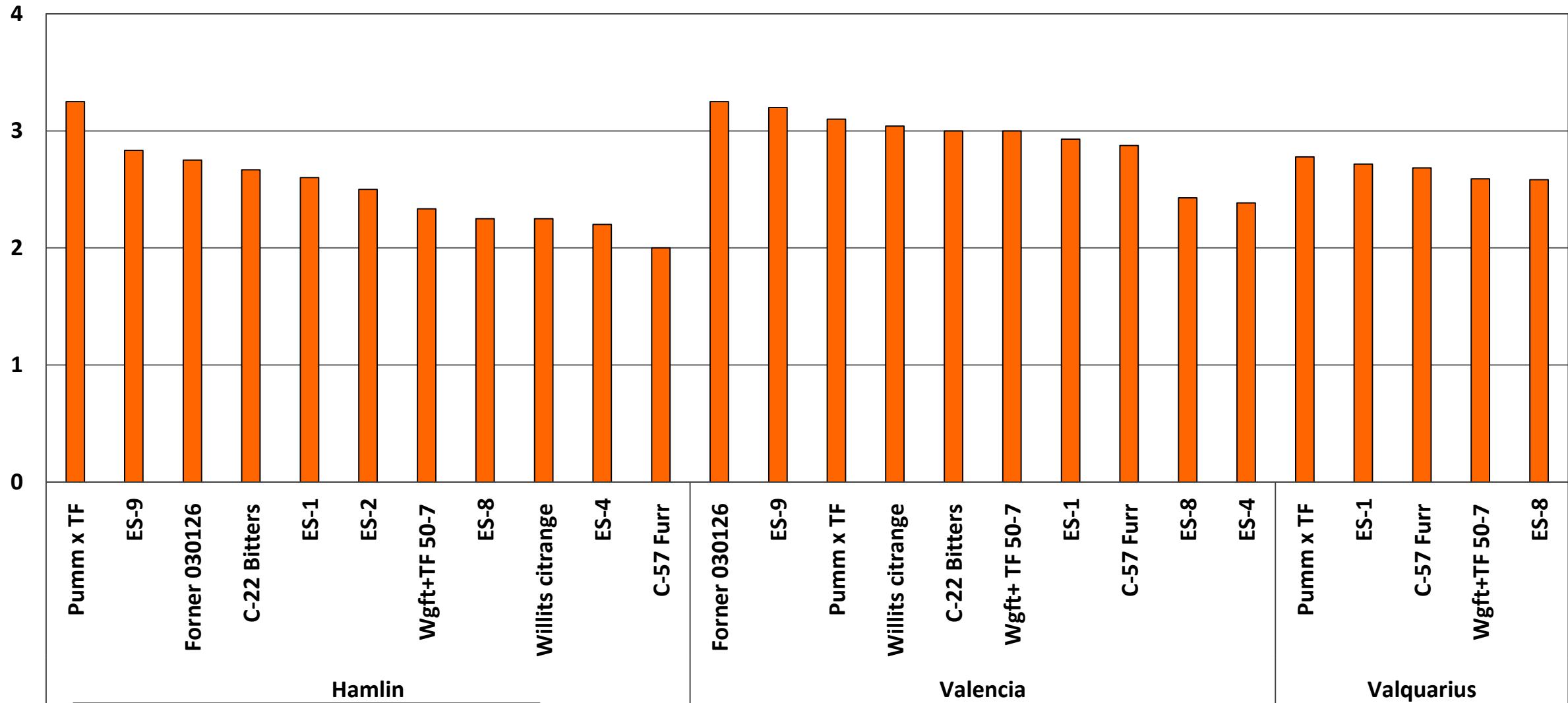


Fig. 6. Scion-rootstock trial, Waverly – HLB rating [March 2017].



HLB Rating
 0= dead or severely declined.
 1= overall poor condition; lt. crop; small fruit, most dropped.
 2= some leaf symptoms and decline with significant fruit drop.
 3= average-fair condition; good crop; little drop.
 4= good tree condition; few leaf symptoms; good crop; little drop.
 5= excellent tree condition/crop

Scion Rootstock

Fig. 7. Waverly scion-rootstock trial – Fruit drop*, %, [March 2017].

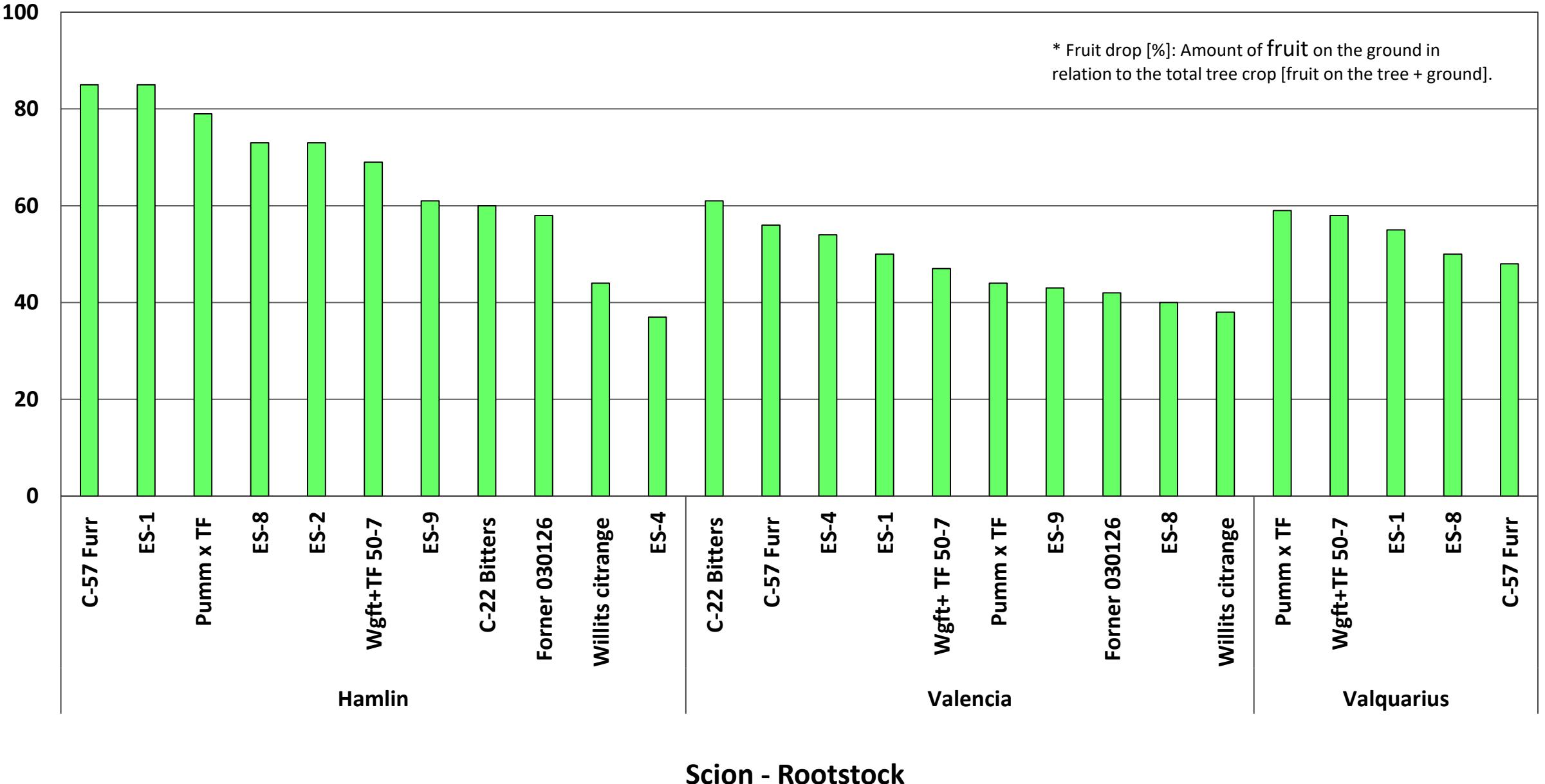
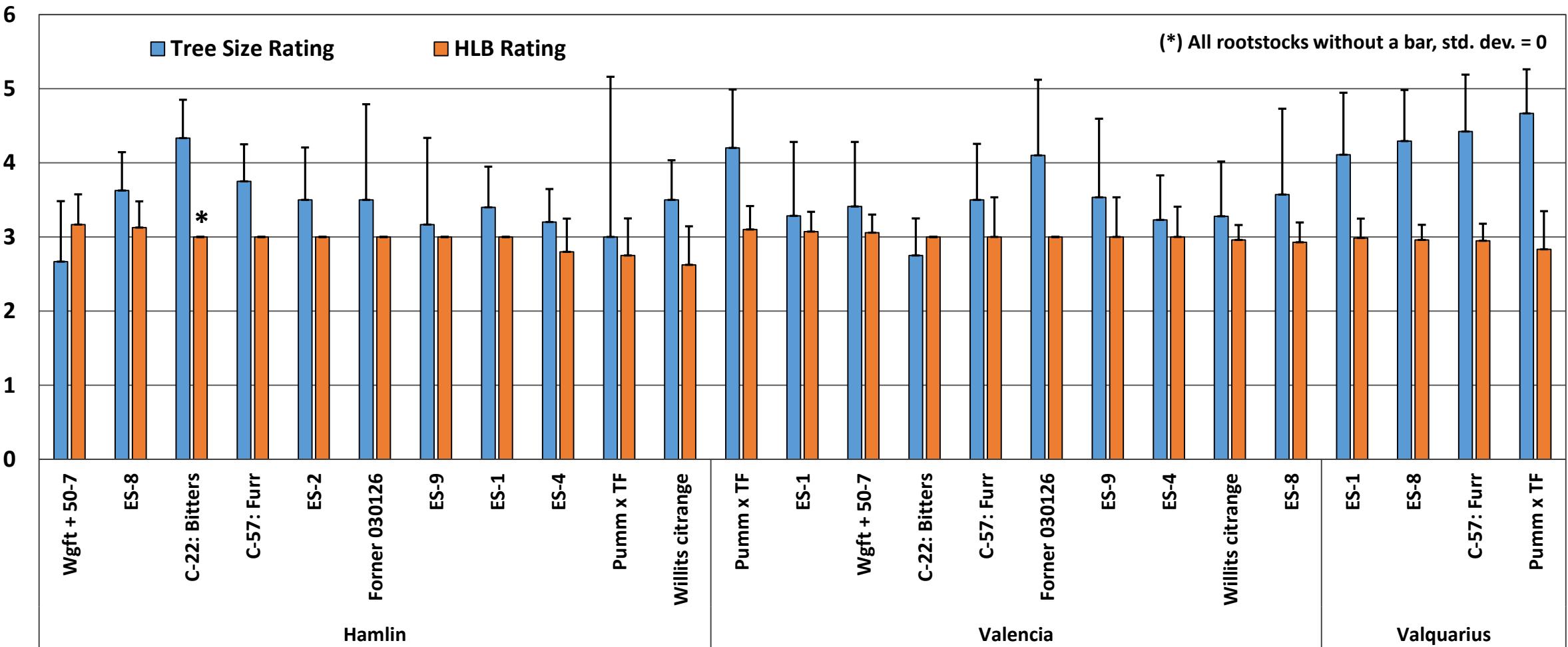


Fig. 8. Scion-rootstock trial, Waverly – Tree size and HLB rating: mean + std. dev. [October 2017].



HLB Rating

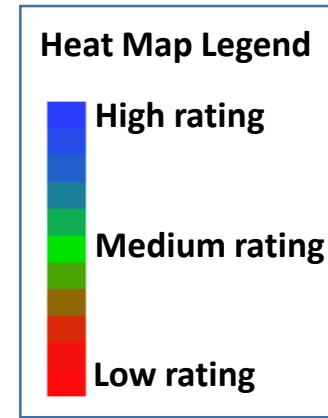
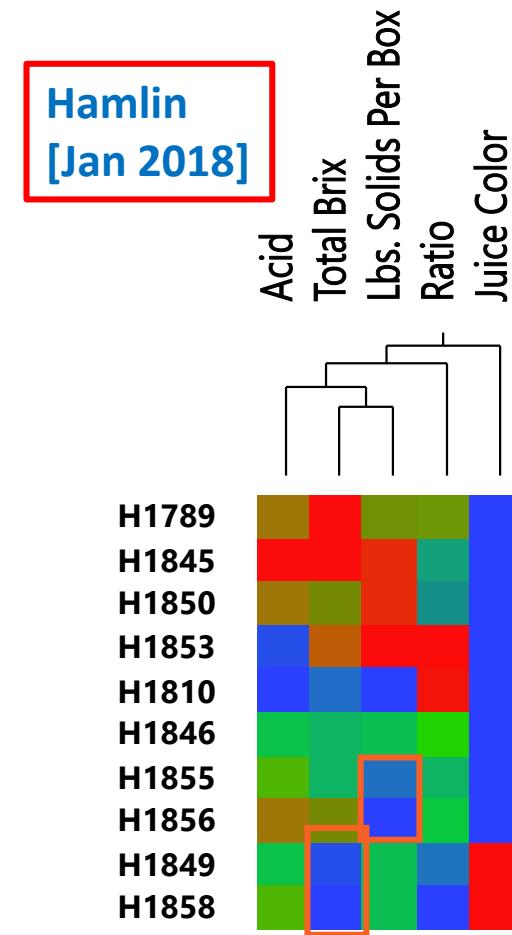
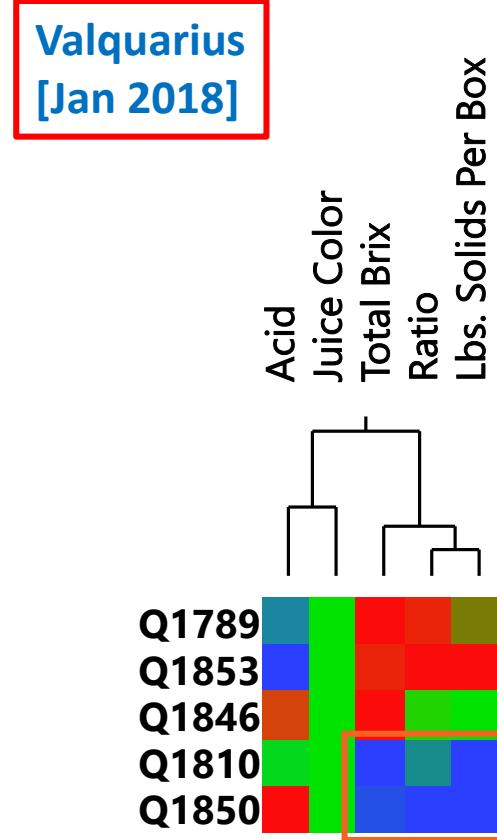
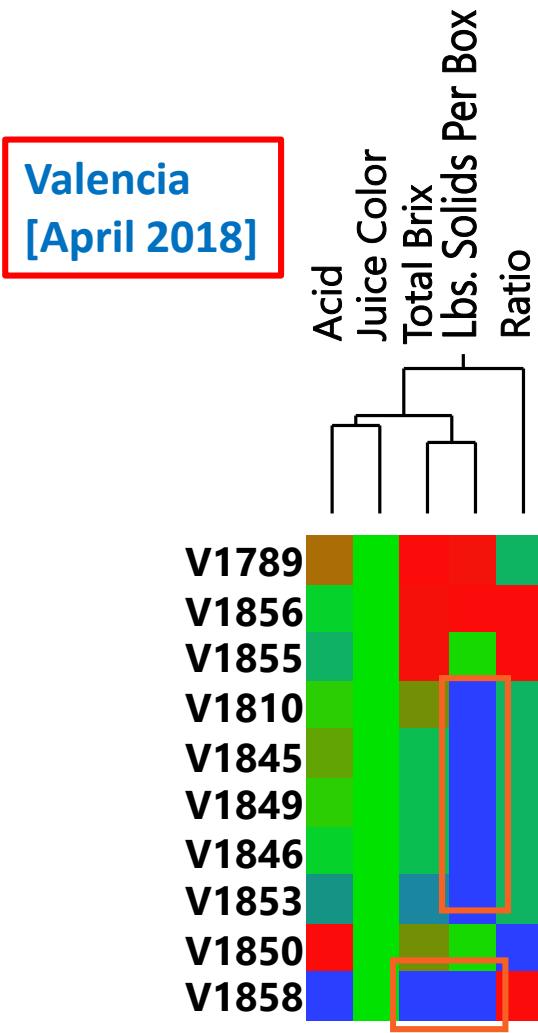
0= dead or severely declined.
1= overall poor condition; lt. crop; small fruit, most dropped.
2= some leaf symptoms and decline with significant fruit drop.
3= average-fair condition; good crop; little drop.
4= good tree condition; few leaf symptoms; good crop; little drop.
5= excellent tree condition/crop

Tree Ht. Rating

1 = < 4 ft.
2 = 4 – 6 ft.
3 = 6 – 8 ft.
4 = > 8 ft.

Scion - Rootstock

Fig. 9. Scion-rootstock trial, Waverly. Heat Map of juice data. Data collected from 4-year-old trees.



Code	Rootstock
1789	Crocker pummelo x TF
1810	WGFT + 50-7
1845	C-22: Bitters
1846	C-57: Furr
1849	Willits citrange
1850	ES-8
1853	ES-1
1854	ES-2
1855	Forner (030126) Cleo x TF
1856	ES-9
1858	ES-4

Fig. 10. Scion-rootstock trial, Waverly – juice Brix: mean + std. dev. [Hamlin and Valq. sampled January 2018; Valencia April 2018].

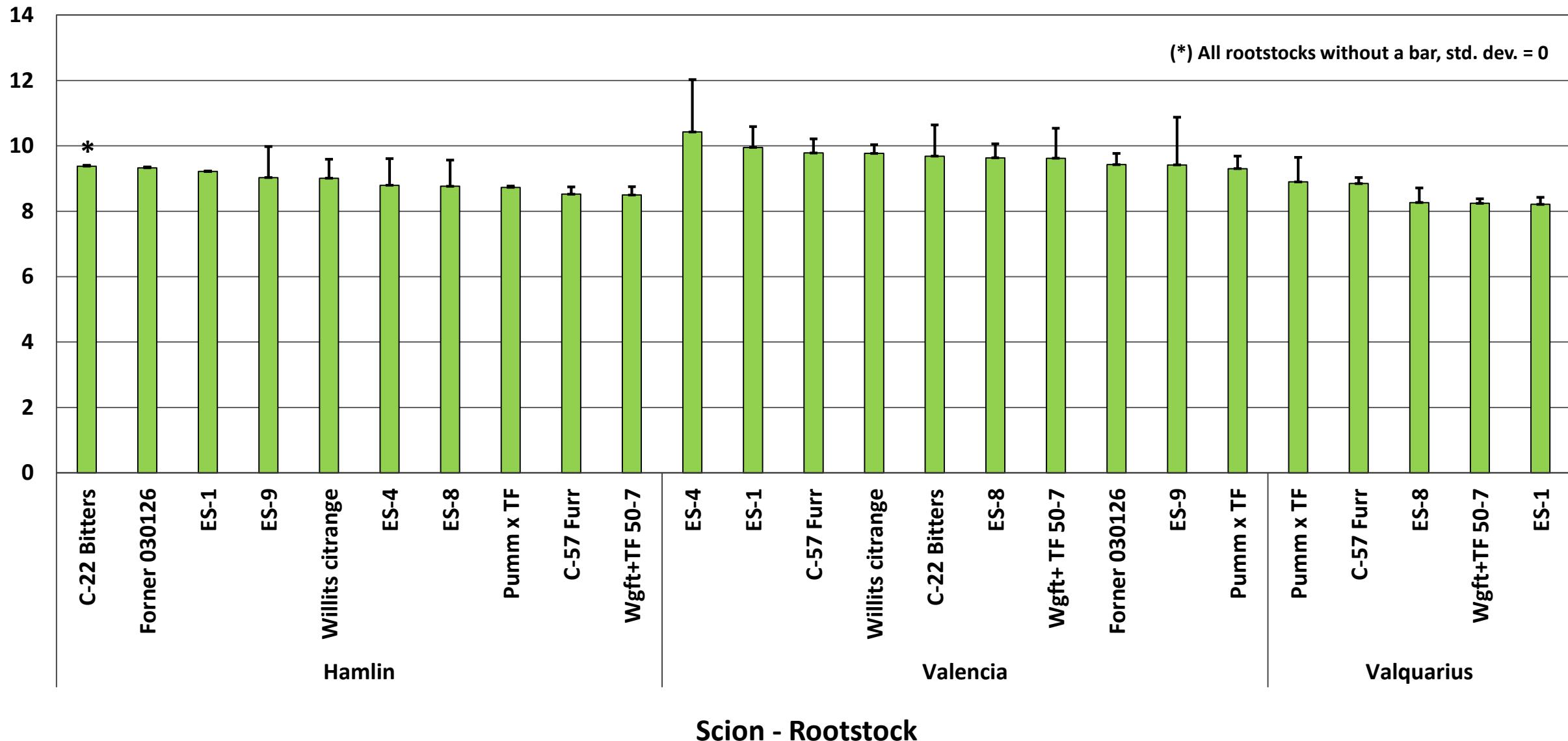


Fig. 11. Scion-rootstock trial, Waverly – juice Acid: mean + std. dev. [Hamlin and Valq. sampled January 2018; Valencia April 2018].

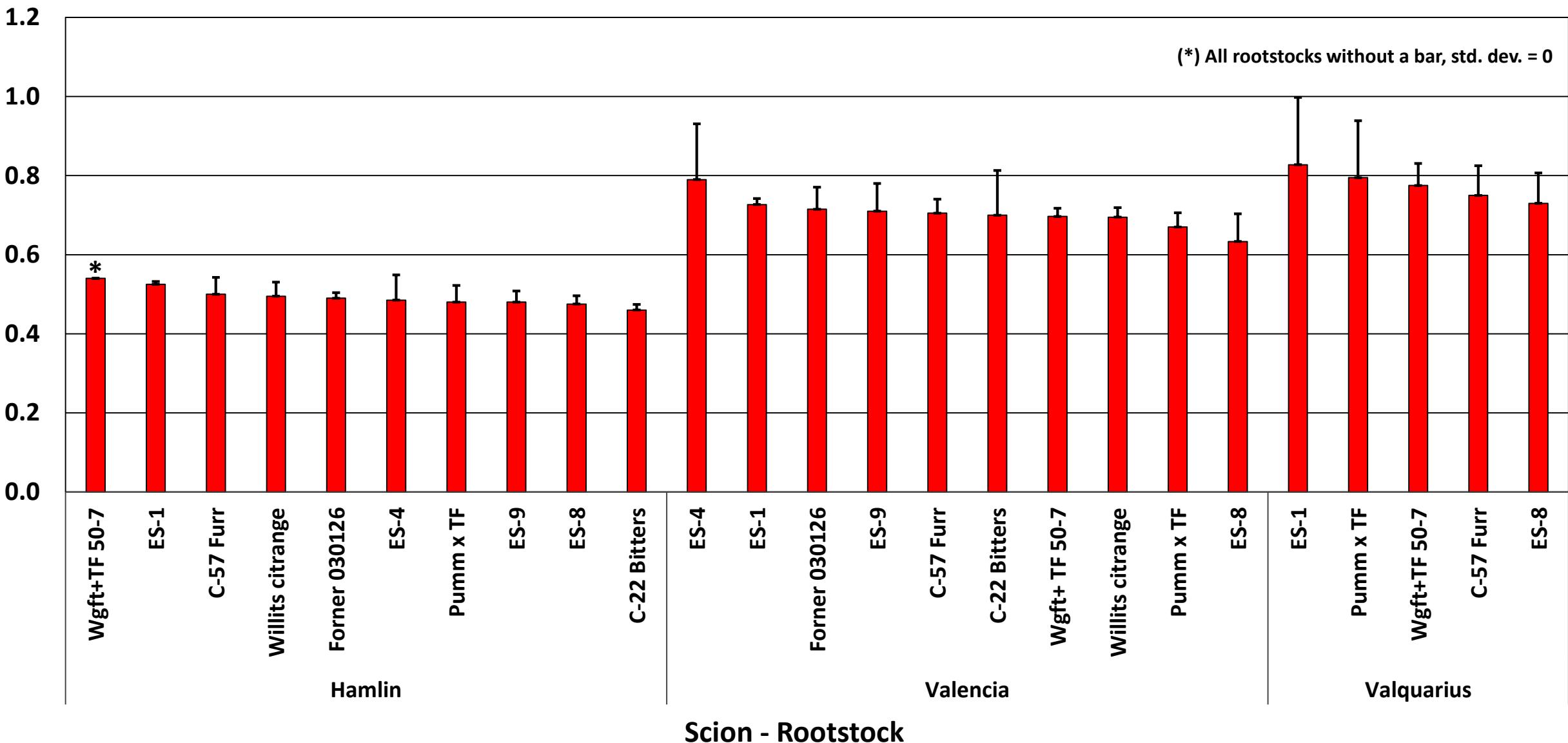


Fig. 12. Scion-rootstock trial, Waverly – juice Ratio: mean + std. dev. [Hamlin and Valq. sampled January 2018; Valencia April 2018].

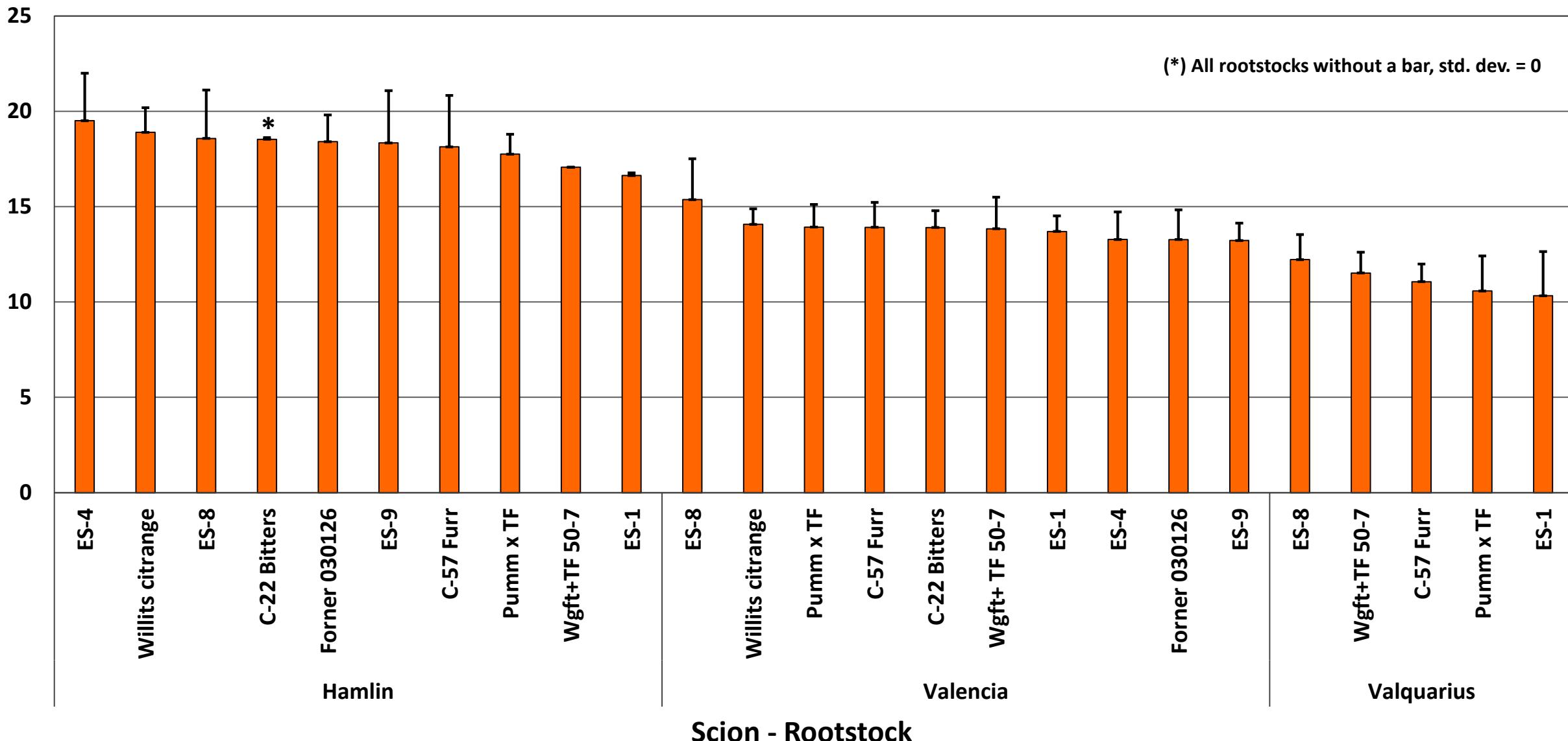


Fig. 13. Scion-rootstock trial, Waverly – juice Color: mean + std. dev. [Hamlin and Valq. sampled January 2018; Valencia April 2018].

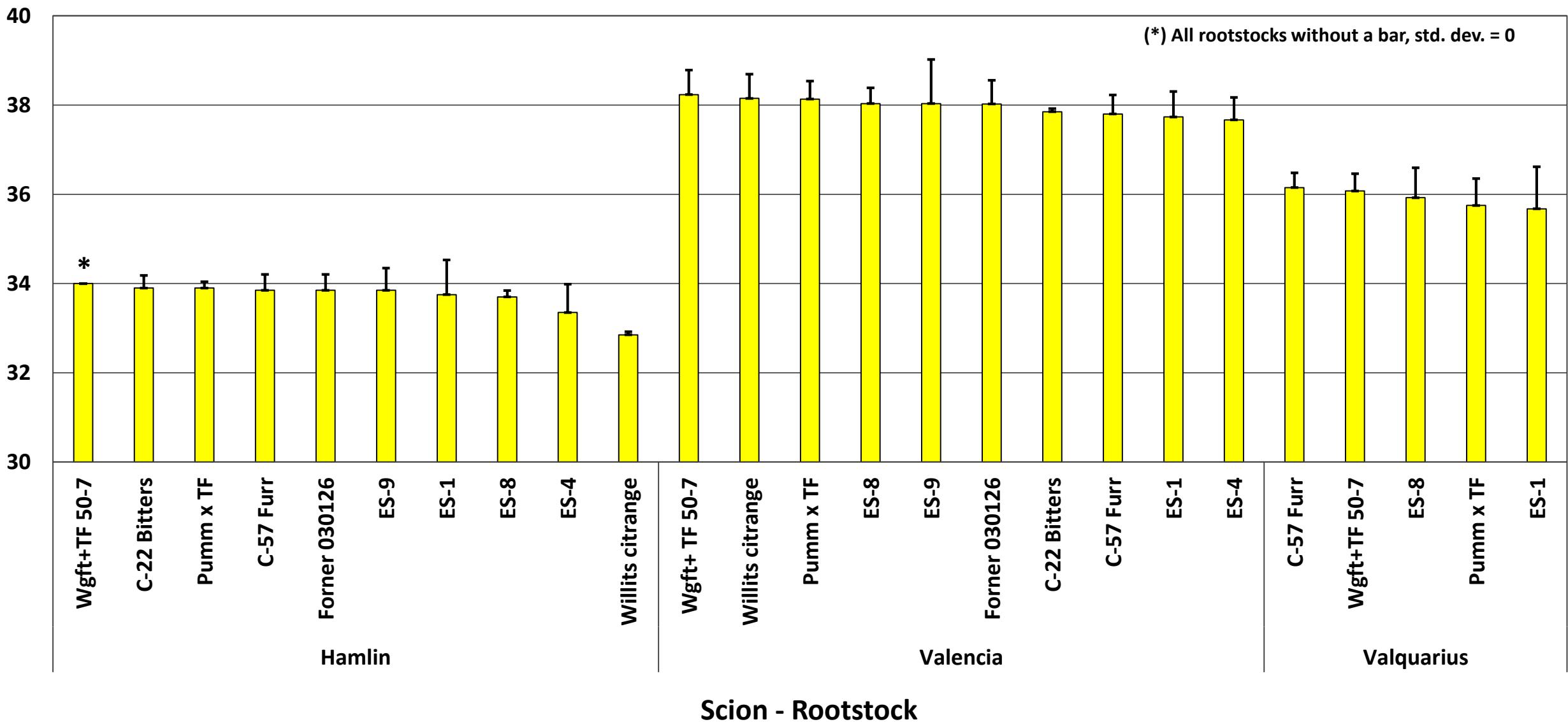


Fig. 14. Scion-rootstock trial, Waverly – juice PS/box: mean + std. dev. [Hamlin and Valq. sampled January 2018; Valencia April 2018].

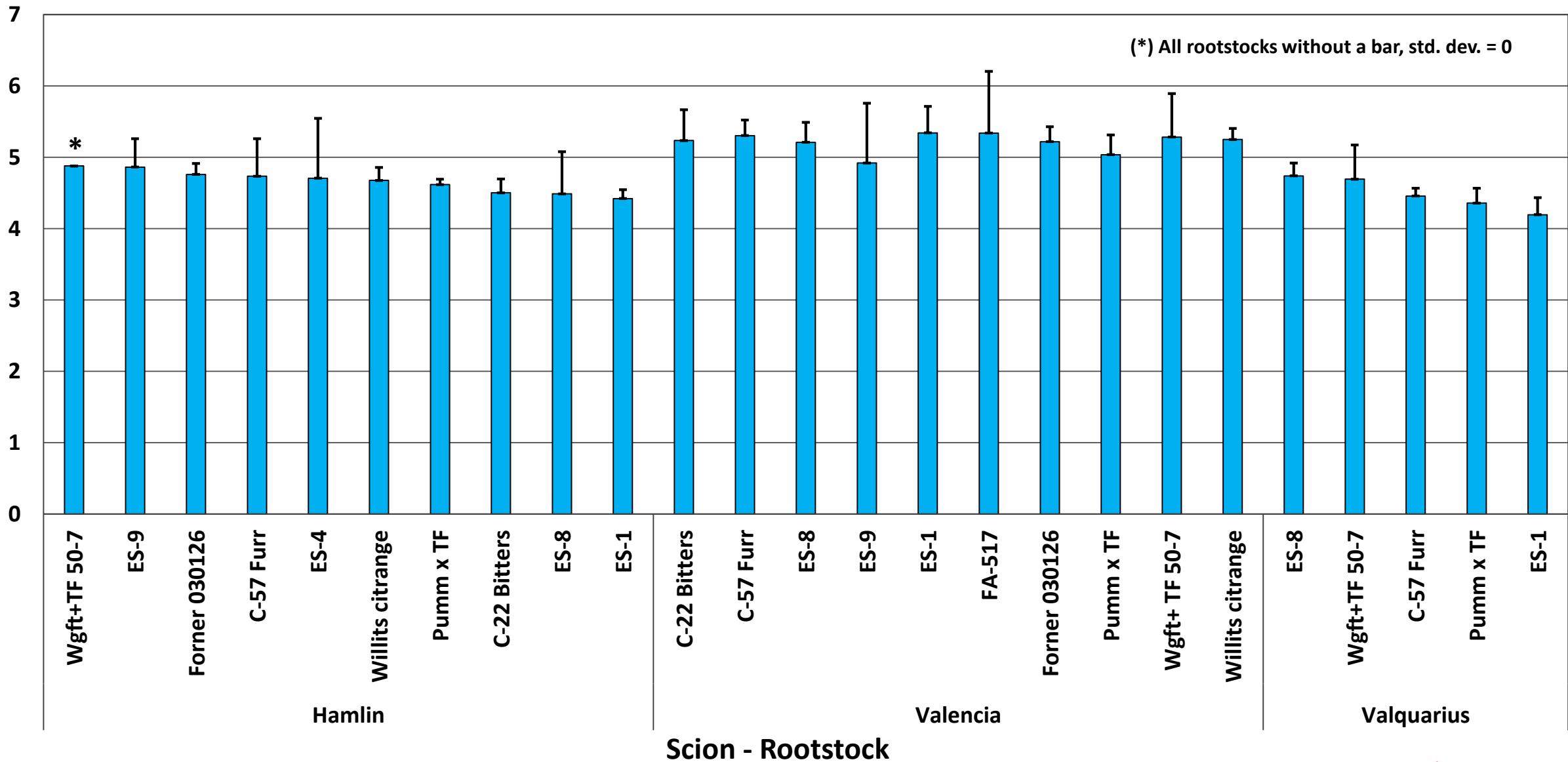


Fig. 15. Scion-rootstock trial, Waverly – PS/acre: mean + std. dev. [Hamlin and Valq. sampled January; Valencia April 2018].

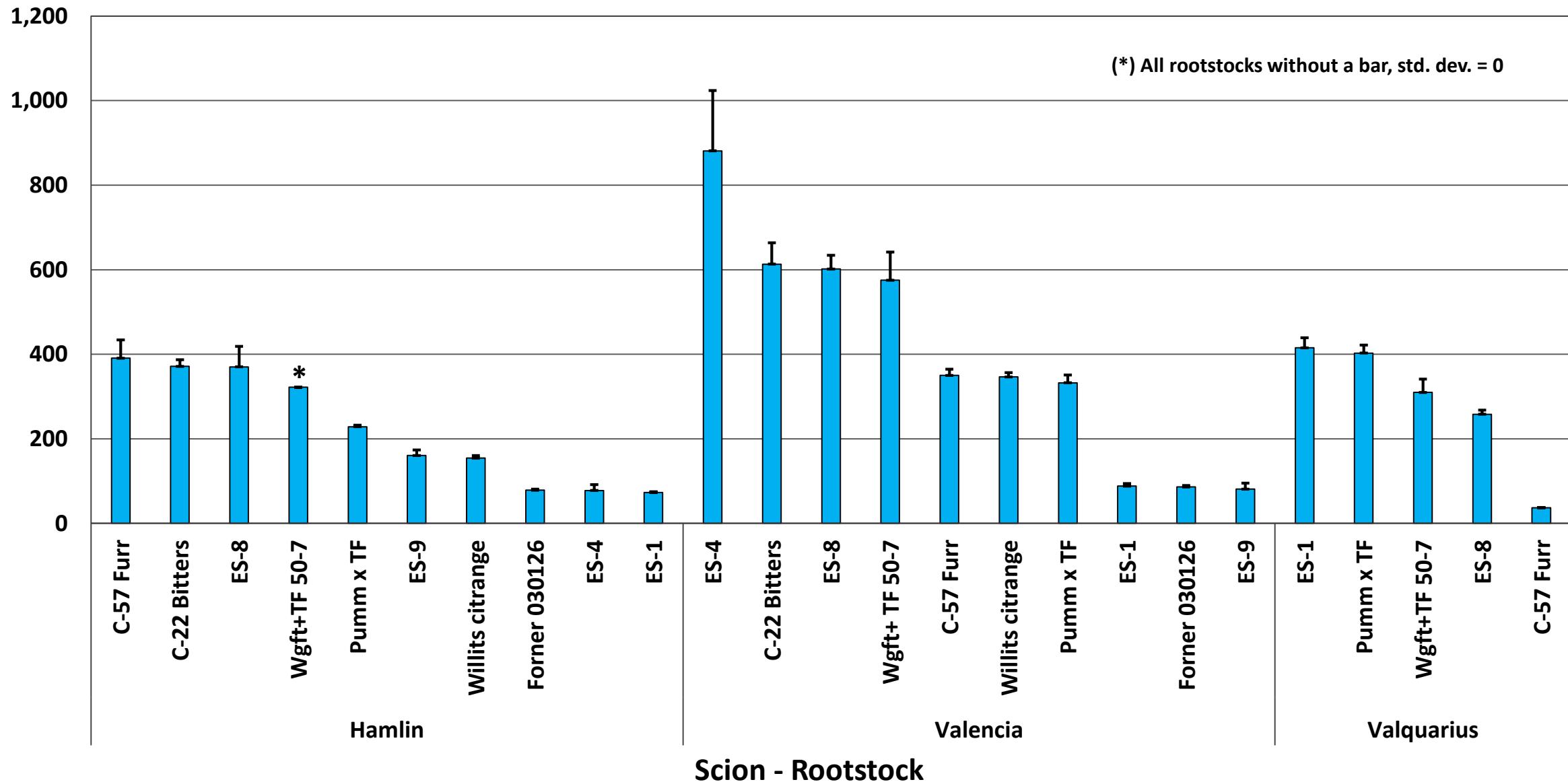
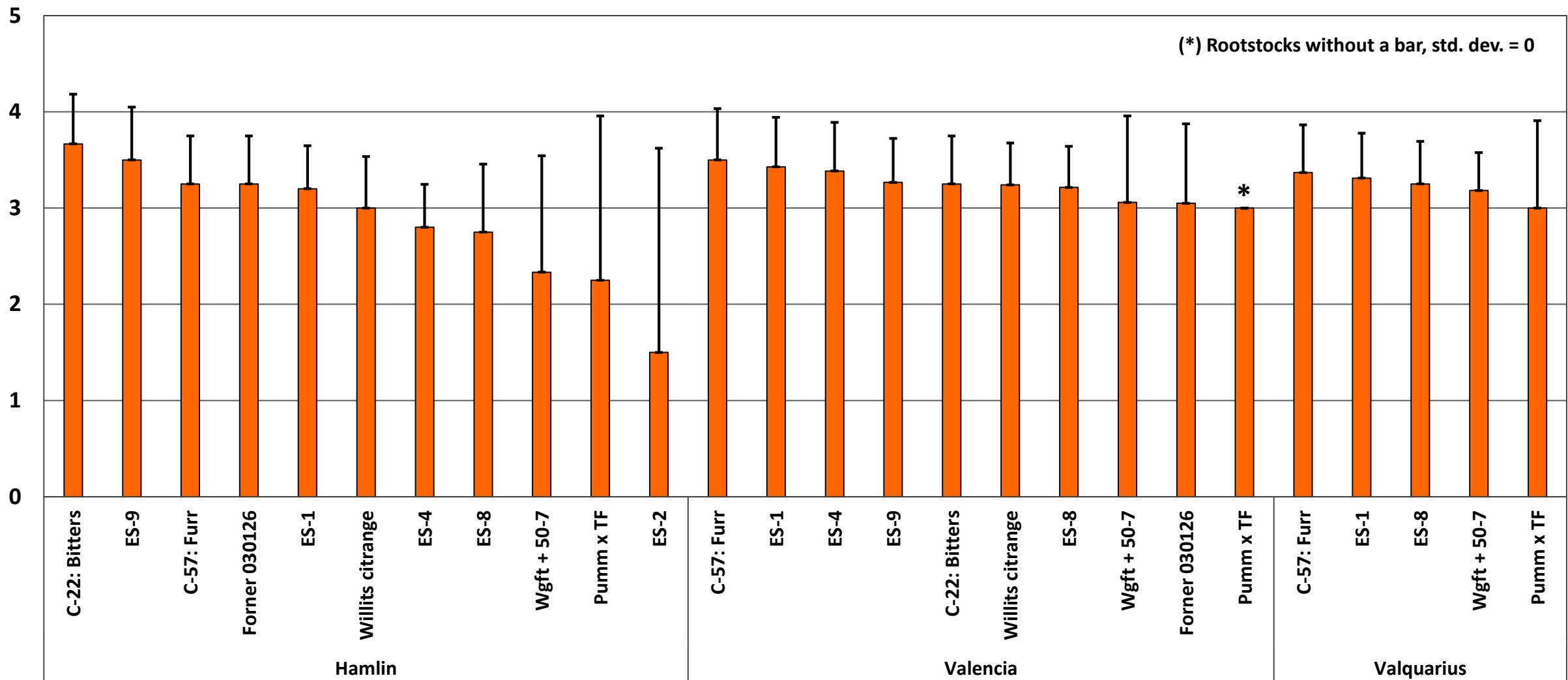


Fig. 16. Scion-rootstock trial, Waverly – HLB rating: mean + std. dev. [October 2018].

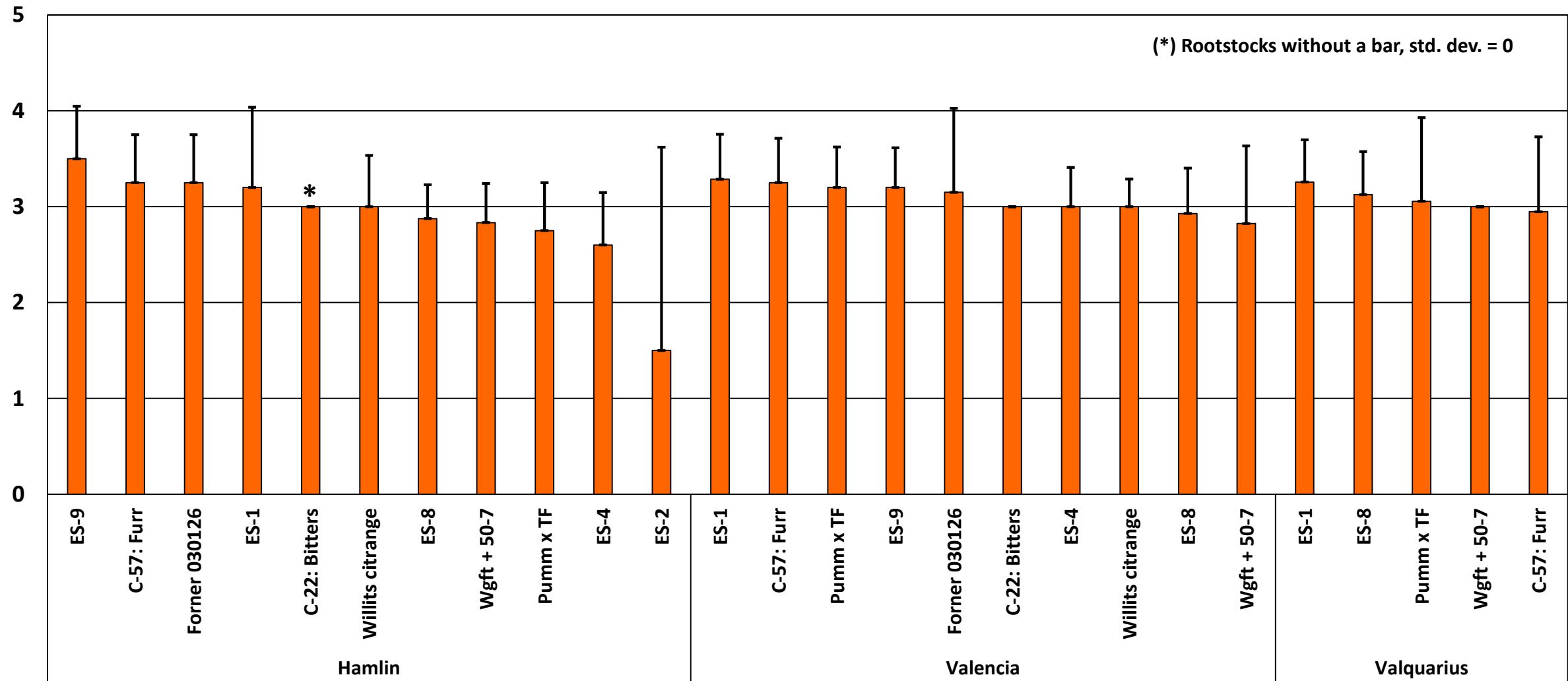


HLB Rating

- 0= dead or severely declined.
- 1= overall poor condition; lt. crop; small fruit, most dropped.
- 2= some leaf symptoms and decline with significant fruit drop.
- 3= average-fair condition; good crop; little drop.
- 4= good tree condition; few leaf symptoms; good crop; little drop.
- 5= excellent tree condition/crop

Scion - Rootstock

Fig. 17. Scion-rootstock trial, Waverly – HLB rating: mean + std. dev. [October 2019].



HLB Rating

- 0= dead or severely declined.
- 1= overall poor condition; lt. crop; small fruit, most dropped.
- 2= some leaf symptoms and decline with significant fruit drop.
- 3= average-fair condition; good crop; little drop.
- 4= good tree condition; few leaf symptoms; good crop; little drop.
- 5= excellent tree condition/crop

Scion - Rootstock

Fig. 18. Scion-rootstock trial, Waverly – Tree height, ft.: mean + std. dev. [October 2019].

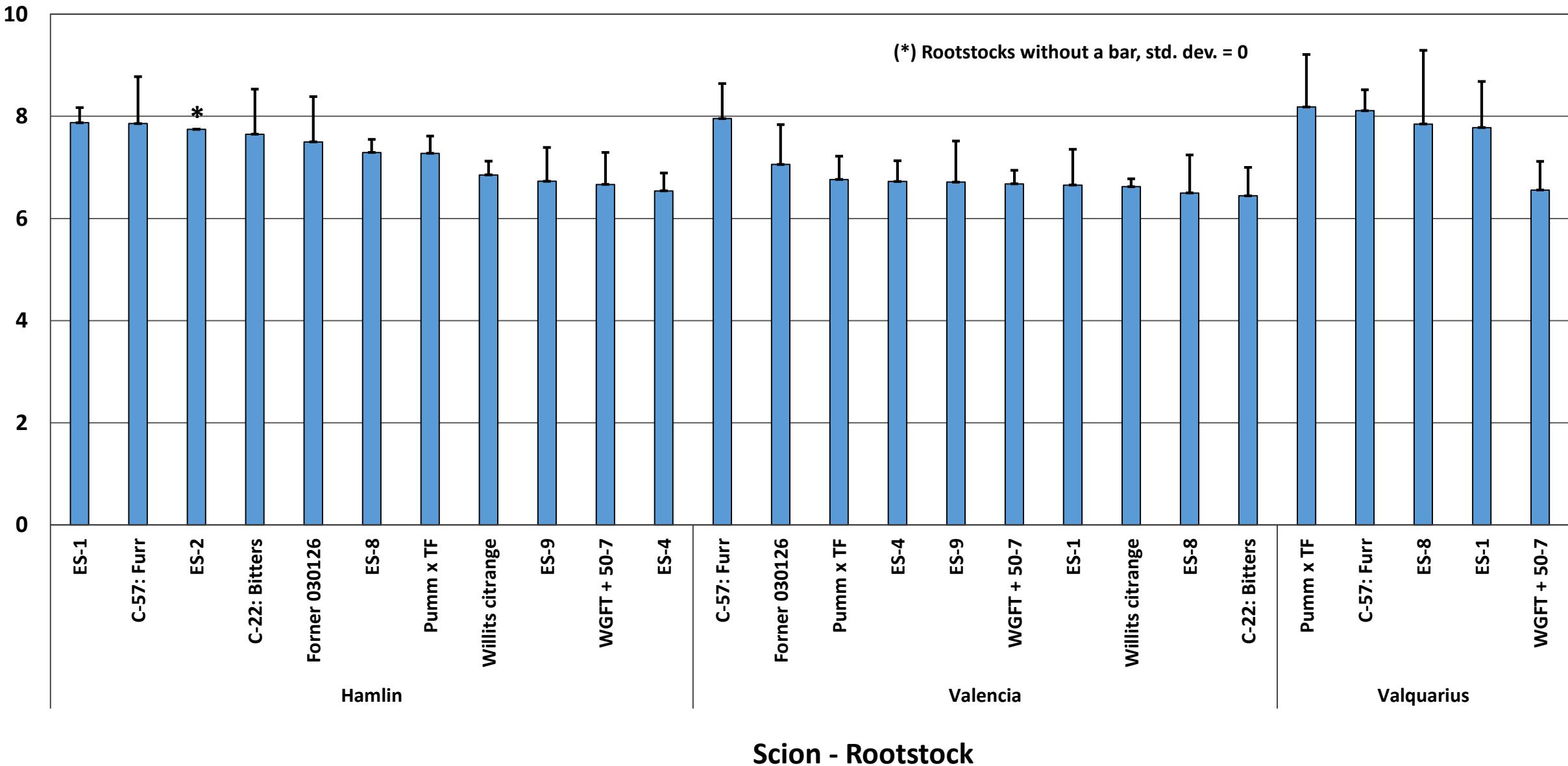
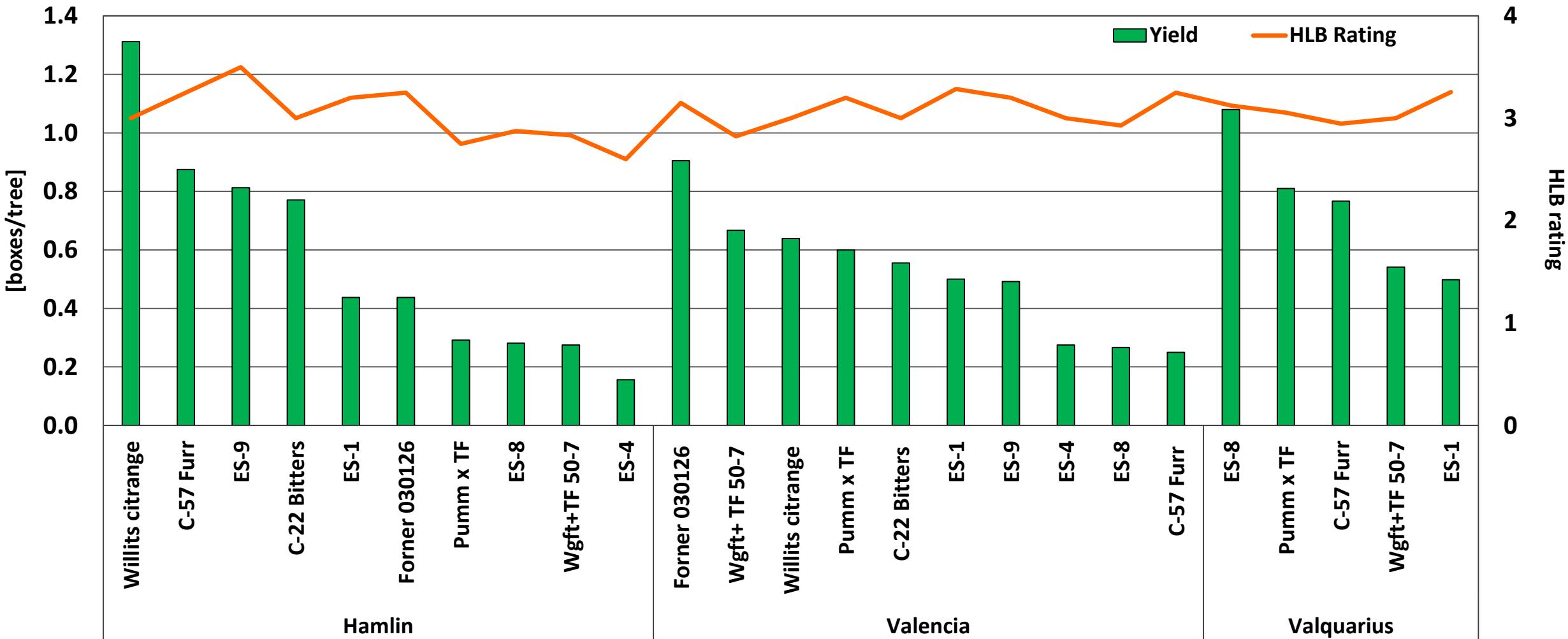


Fig. 19. Scion-rootstock trial, Waverly – Yield [boxes/tree] and HLB rating [October 2019].



HLB Rating

0= dead or severely declined.

1= overall poor condition; lt. crop; small fruit, most dropped.

2= some leaf symptoms and decline with significant fruit drop.

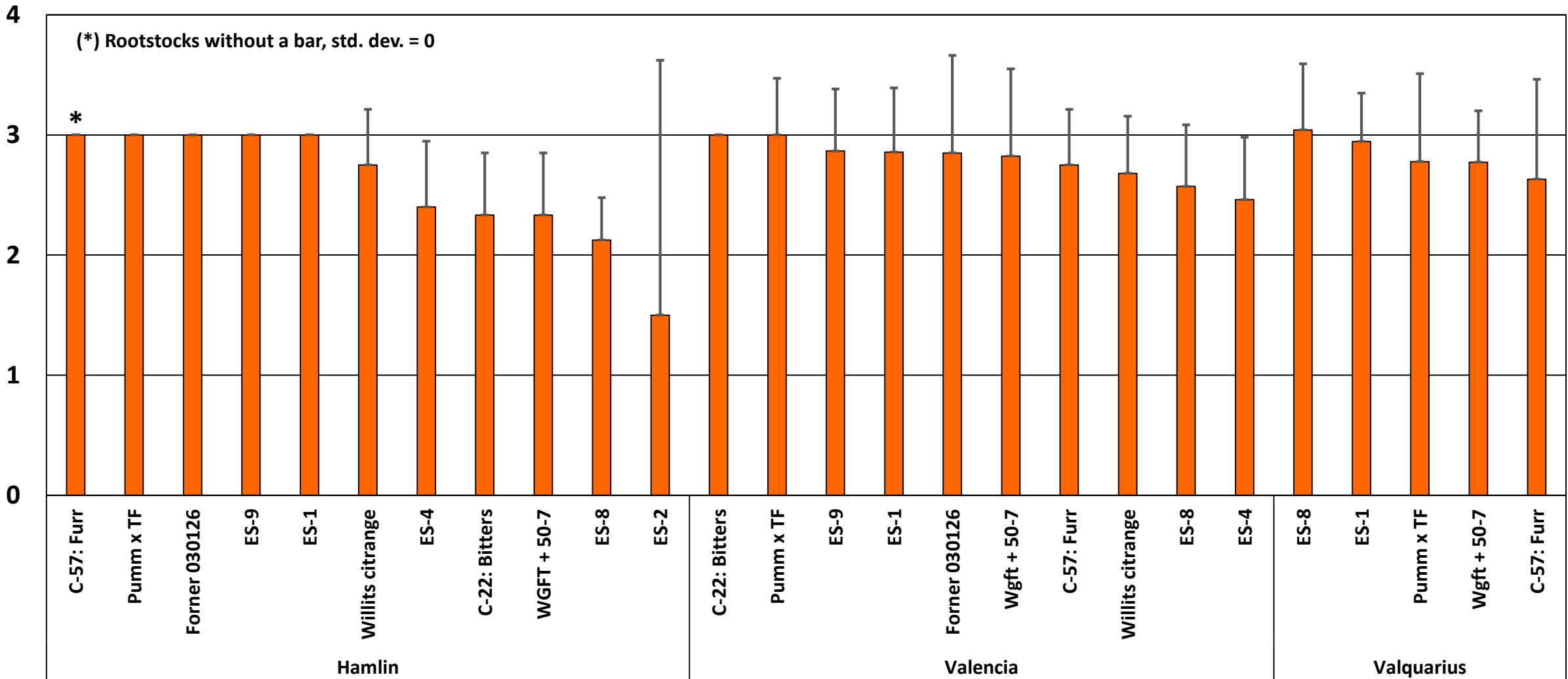
3= average-fair condition; good crop; little drop.

4= good tree condition; few leaf symptoms; good crop; little drop.

5= excellent tree condition/crop

Scion - Rootstock

Fig. 20. Scion-rootstock trial, Waverly – HLB rating: mean + std. dev. [October 2020].

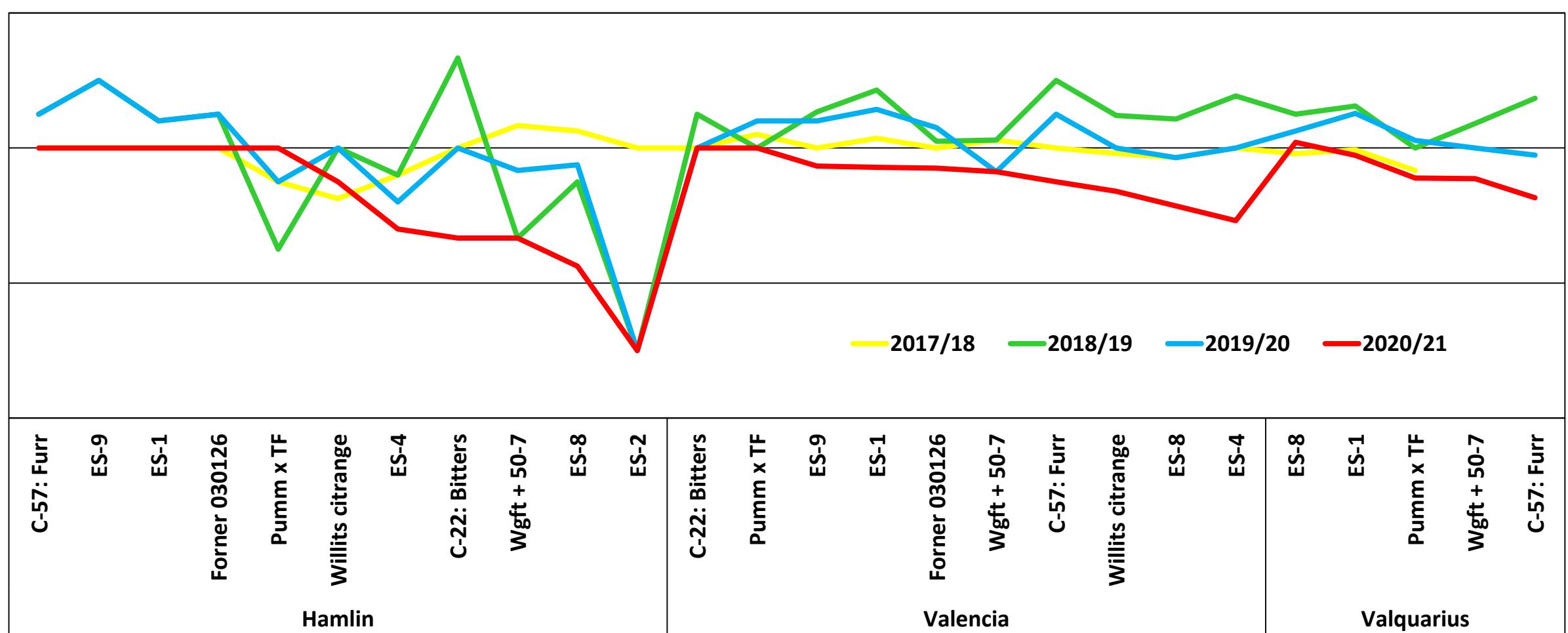


HLB Rating

- 0= dead or severely declined.
- 1= overall poor condition; lt. crop; small fruit, most dropped.
- 2= some leaf symptoms and decline with significant fruit drop.
- 3= average-fair condition; good crop; little drop.
- 4= good tree condition; few leaf symptoms; good crop; little drop.
- 5= excellent tree condition/crop

Scion - Rootstock

Fig. 21. Scion-rootstock trial, Waverly – HLB rating: mean + std. dev. [October 2018, 2019 and 2020].

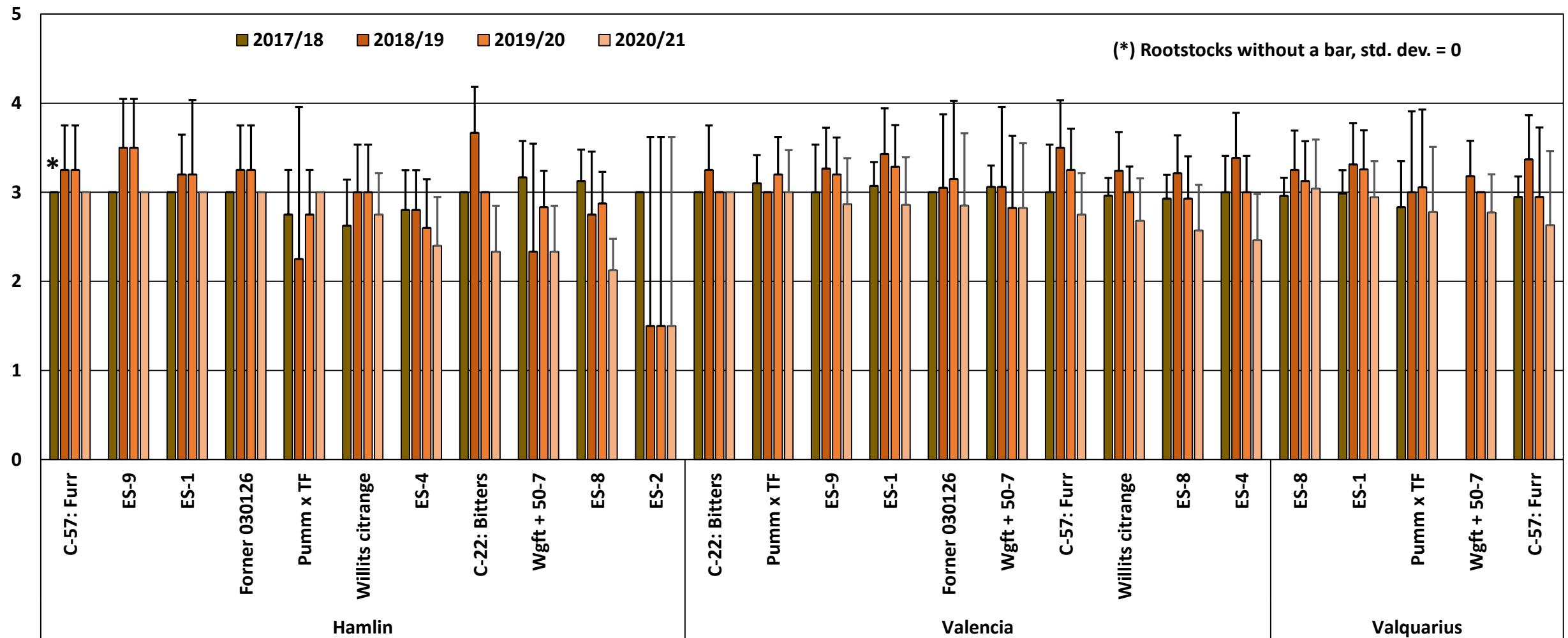


HLB Rating

- 0= dead or severely declined.
- 1= overall poor condition; lt. crop; small fruit, most dropped.
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Scion - Rootstock

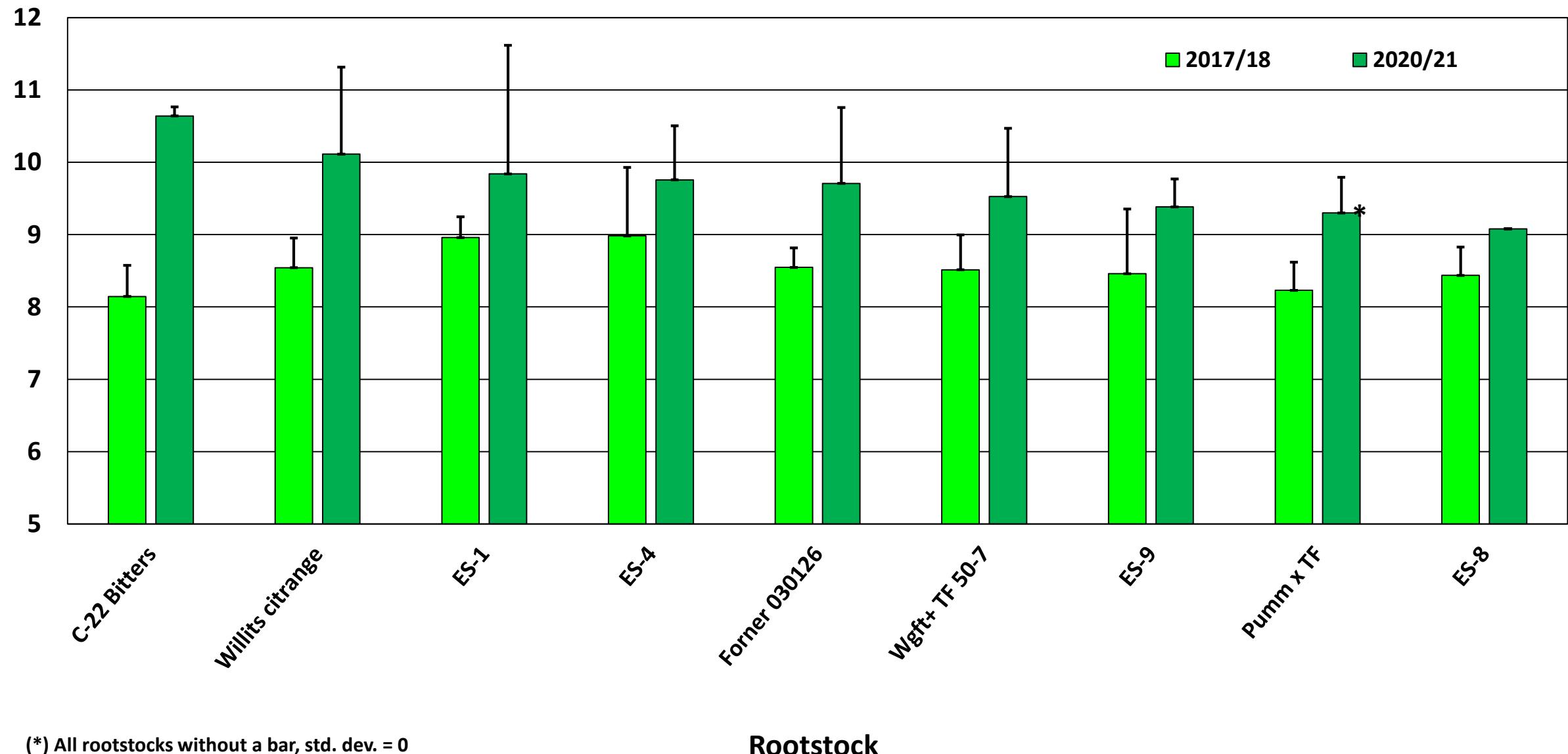
Fig. 22. Scion-rootstock trial, Waverly – HLB rating: mean + std. dev. [October 2018, 2019, and 2020].



HLB Rating	
0=	dead or severely declined.
1=	overall poor condition; lt. crop; small fruit, most dropped.
2=	some leaf symptoms and decline with significant fruit drop.
3=	average-fair condition; good crop; little drop.
4=	good tree condition; few leaf symptoms; good crop; little drop.
5=	excellent tree condition/crop

Scion - Rootstock

Fig. 23. Waverly scion-rootstock trial – juice Brix: mean + std. dev. [Valencia – January 2018 and February 2021].



(*) All rootstocks without a bar, std. dev. = 0

Rootstock

Fig. 24. Scion-rootstock trial, Waverly – juice Acid: mean + std. dev. [Valencia – January 2018 and February 2021].

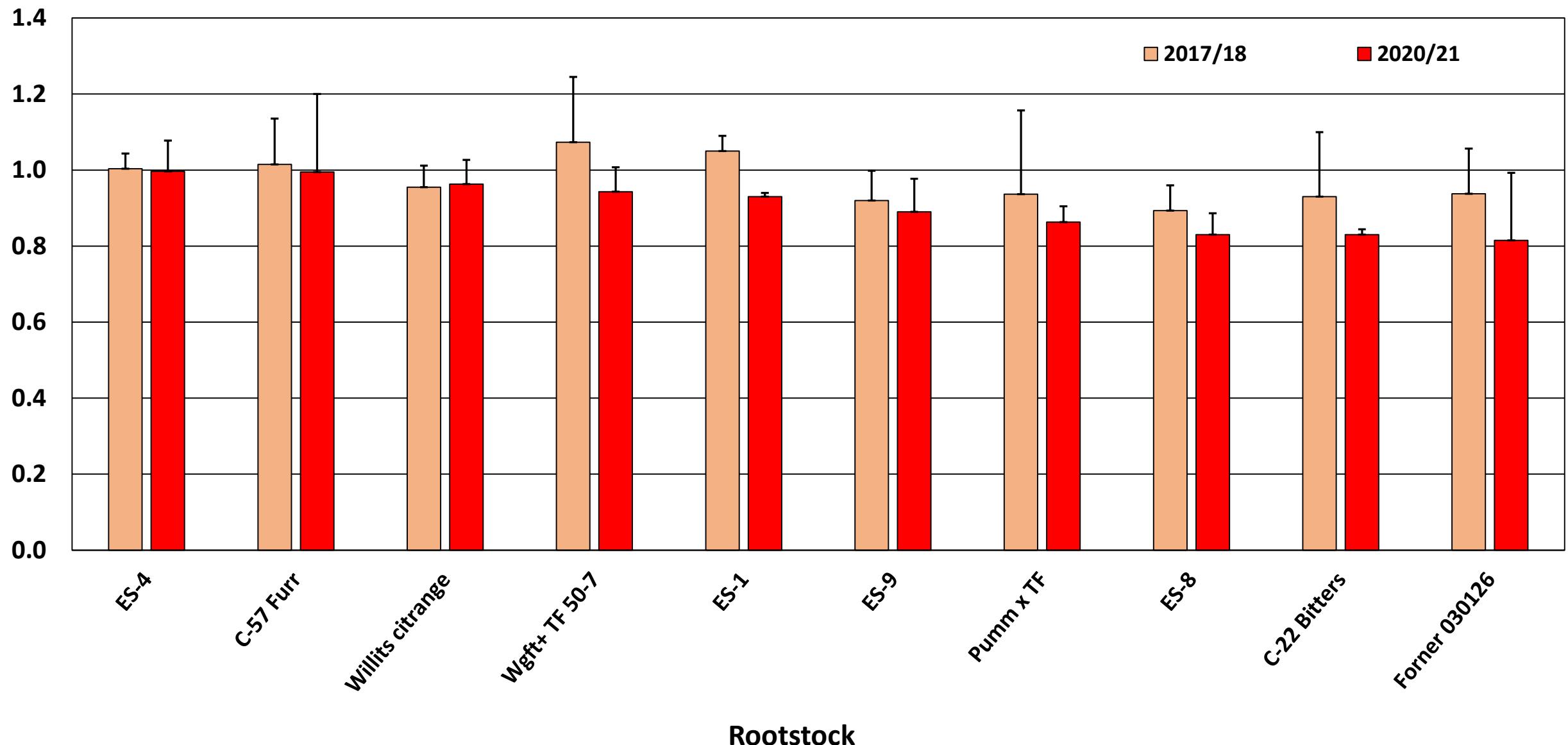


Fig. 25. Scion-rootstock trial, Waverly – juice Ratio: mean + std. dev. [Valencia – January 2018 and February 2021].

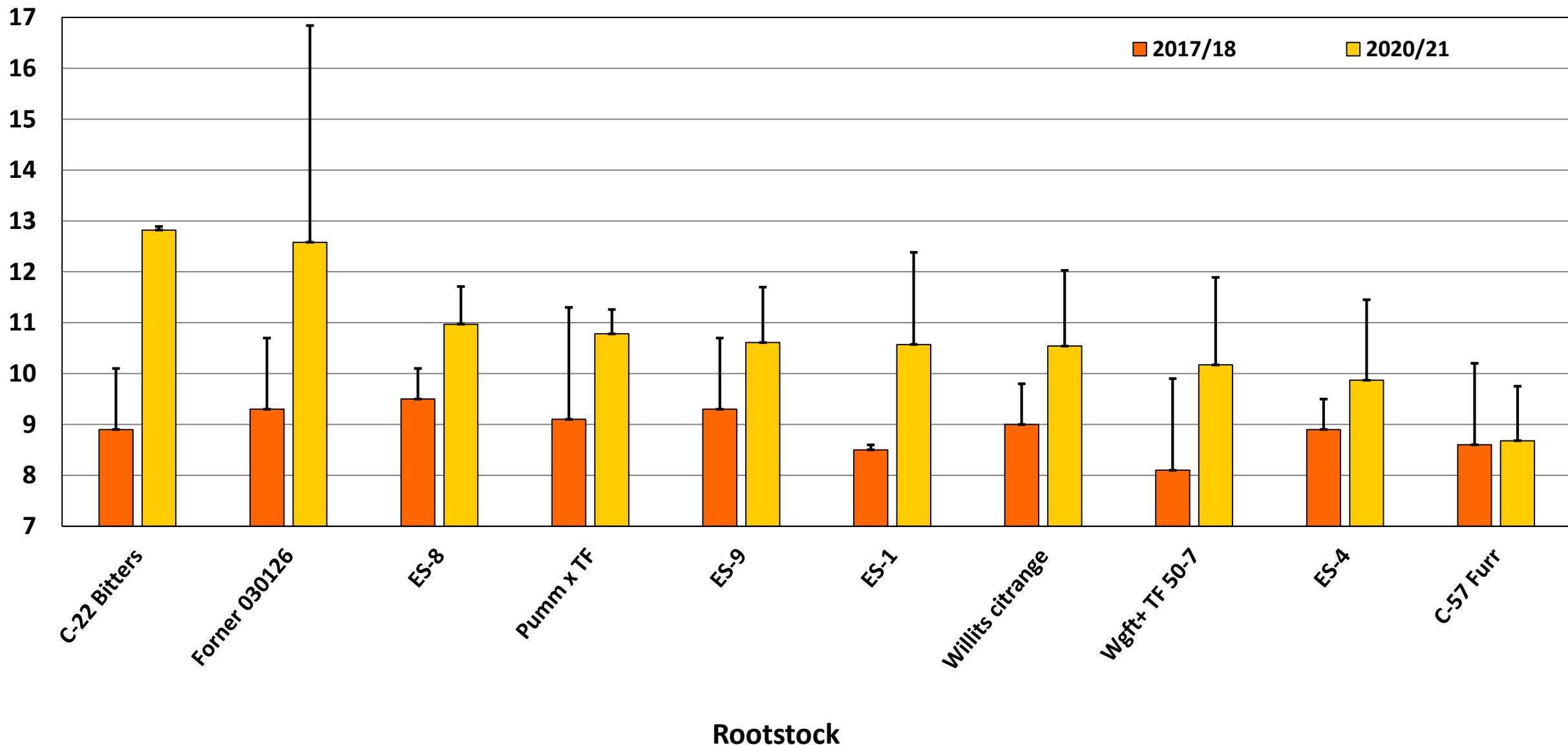
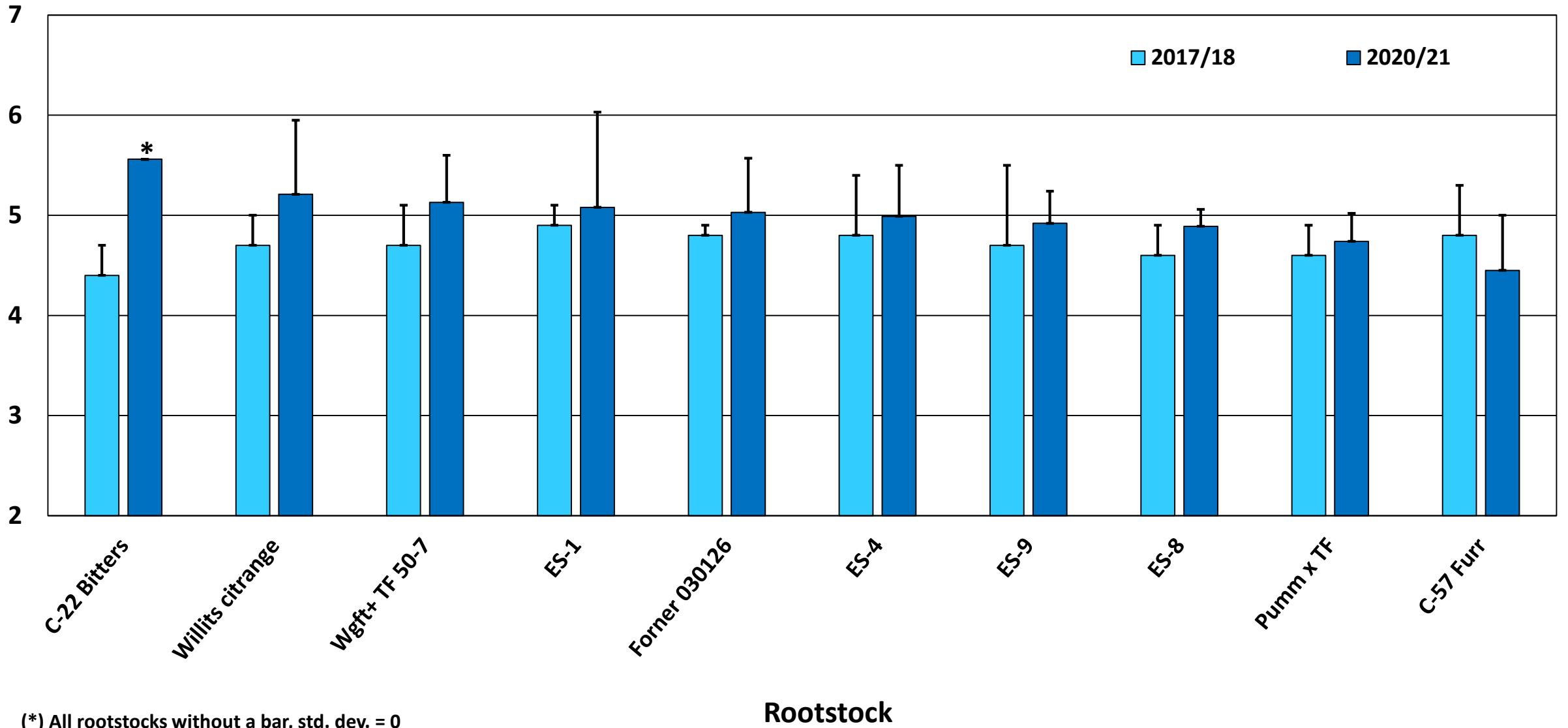
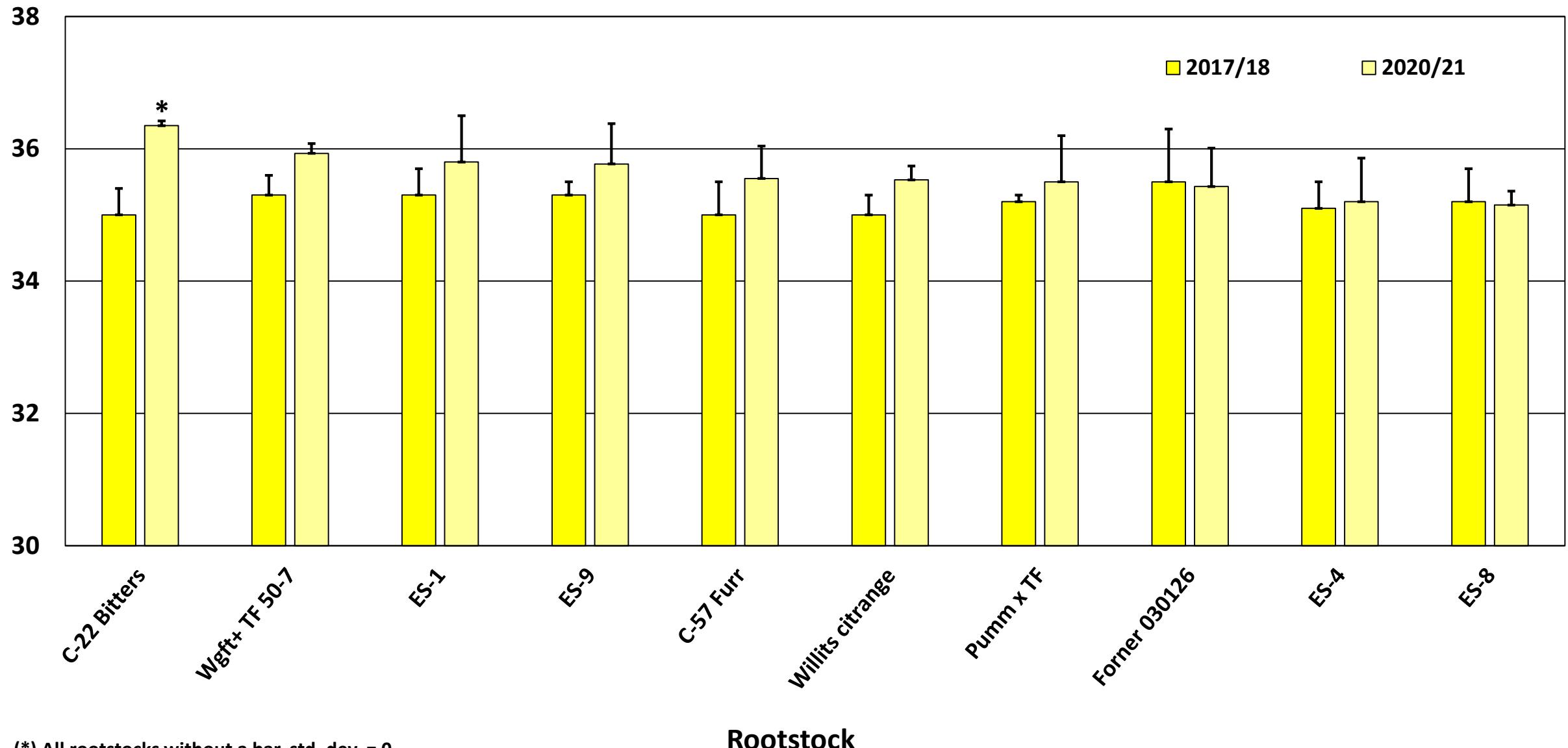


Fig. 26. Scion-rootstock trial, Waverly – juice PS/box: mean + std. dev. [Valencia – January 2018 and February 2021].



(* All rootstocks without a bar, std. dev. = 0)

Fig. 27. Scion-rootstock trial, Waverly – juice Color: mean + std. dev. [Valencia – January 2018 and February 2021].



(*) All rootstocks without a bar, std. dev. = 0

Rootstock