

SW FL Scion and Rootstock Cooperative Higher Density Planting

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SW FL Scion and Rootstock Cooperative Higher Density Planting - Description

In response to the interest of the owner-cooperator, a project was planned involving a series of scion-rootstock combinations planted at higher density [see Table 1]. The site was prepared with standard 2-row beds with compost added to each row prior to planting. The main body of the project consisted of Hamlin or Valencia trees planted on commercial rootstocks in a standard 2-row bed or trees on size-controlling rootstocks planted in 3 rows on the standard bed. Of the 50 rows, 21 were planted with Hamlin and 20 with Valencia. Of the remaining 3 beds, one each was planted with 3 rows of Valquarius, Vernia or Folha Murcha [a late-season selection from Brazil].

Microsprinkler irrigation was installed on the 2-row beds; on the 3-row beds, microsprinklers and drip were used on the outside rows, but only drip on the middle row because of water volume limitations.

The trees in the 8 x 15 ft. rows grew well enough that topping and some hedging was commenced when they were about 2-3 years old.

Cropping began in the 2014-15 season.

Table 1. Layout of scion-rootstock combinations [treatments] in the SW FL Cooperative Planting.*

Bed no.	Scion	Rootstock	Spacing [ft.]	Row nos.	Total no. trees	No. reps**
1	Hamlin	Swingle	12 x 25	1	97	1
2	Hamlin	Swingle	12 x 25	2, 3	97/row=194	1
3N	Hamlin	C-22	8 x 15	4, 5, 6	72/row=216	2
3S	Hamlin	C-54	8 x 15	4, 5, 6	73/row=219	1
4N	Hamlin	C-57	8 x 15	7, 8, 9	72/row=216	2
4S	Hamlin	C-35	8 x 15	7, 8, 9	73/row=219	2
5N	Hamlin	US 897	8 x 15	10, 11, 12	72/row=216	2
5S	Hamlin	US 897	8 x 15	10, 11, 12	73/row=219	
6N	Hamlin	Swingle	8 x 15	13, 14, 15	72/row=216	2
6S	Hamlin	C-35	8 x 15	13, 14, 15	73/row=219	
7N	Hamlin	Willits	8 x 15	16, 17, 18	72/row=216	1
7S	Hamlin	Swingle	8 x 15	16, 17, 18	73/row=219	
8N	Hamlin	C-57	8 x 15	19, 20, 21	72/row=216	
8S	Hamlin	C-22	8 x 15	19, 20, 21	73/row=219	
9N	Valencia	Swingle	8 x 15	22, 23, 24	72/row=216	4
9S	Valencia	Swingle	8 x 15	22, 23, 24	73/row=219	
10N	Valencia	Kuharske	12 x 25	25, 26	49/row=98	1
10S	Valencia	US 812	12 x 25	25, 26	49/row=98	1
11N	Valencia	C-146	8 x 15	27, 28, 29	72/row=216	2
11S	Valencia	C-35	8 x 15	27, 28, 29	72/row=216	3
12N	Valencia	Swingle	8 x 15	30, 31, 32	72/row=216	
12	Valencia	C-22	8 x 15	30, 31, 32	25/row=75	2
12	Valencia	C-146	8 x 15	30, 31, 32	23/row=69	
12S	Valencia	C-57	8 x 15	30, 31, 32	25/row=75	2
13N	Valencia	US 897	8 x 15	33, 34, 35	72/row=216	3
13S	Valencia	Swingle	8 x 15	33, 34, 35	73/row=219	
14N	Valencia	C-22	8 x 15	36, 37, 38	31/row=62	
14	Valencia	C-57	8 x 15	36, 37, 38	32/row=96	
14	Valencia	US 897	8 x 15	36, 37, 38	9/row=27	
14S	Valencia	C-35	8 x 15	36, 37, 38	73/row=219	
15N	Valencia	C-35	8 x 15	39, 40, 41	72/row=216	
15S	Valencia	US 897	8 x 15	39, 40, 41	73/row=219	

* Beds are oriented North [N] - South [S] and numbered West to East.

** Blank spaces are for treatments already counted.

Table 1 cont'd. Layout of scion-rootstock combinations [treatments] in the SW FL Cooperative Planting.*

Bed no.	Scion	Rootstock	Spacing [ft.]	Row nos.	Total no. trees	No. reps**
16N	Valquarius	C-35	8 x 15	42, 43, 44	27/row=81	1
16	Valquarius	C-146	8 x 15	42, 43, 44	23/row=69	1
16	Valquarius	C-22	8 x 15	42, 43, 44	26/row=78	2
16	Valquarius	Willits	8 x 15	42, 43, 44	20/row=60	1
16S	Valquarius	C-22	8 x 15	42, 43, 44	8/row=24	
17N	Folha Murcha	C-146	8 x 15	45, 46, 47	24/row=72	2
17	Folha Murcha	Willits	8 x 15	45, 46, 47	5/row=15	1
17	Folha Murcha	C-22	8 x 15	45, 46, 47	19/row=57	1
17	Folha Murcha	C-57	8 x 15	45, 46, 47	25/row=75	3
17	Folha Murcha	Swingle	8 x 15	45, 46, 47	19/row=57	1
17	Folha Murcha	C-57	8 x 15	45, 46, 47	4/row=12	
17	Folha Murcha	C-35	8 x 15	45, 46, 47	24/row=72	1
17	Folha Murcha	C-146	8 x 15	45, 46, 47	7/row=21	
17S	Folha Murcha	C-57	8 x 15	45, 46, 47	18/row=54	
18N	Vernia	Swingle	8 x 15	48, 49, 50	24/row=72	1
18	Vernia	C-35	8 x 15	48, 49, 50	25/row=75	1
18	Vernia	Willits	8 x 15	48, 49, 50	24/row=72	2
18	Vernia	C-22	8 x 15	48, 49, 50	24/row=72	2
18	Vernia	Willits	8 x 15	48, 49, 50	15/row=45	
18S	Vernia	C-22	8 x 15	48, 49, 50	10/row=30	

* Beds are oriented North [N] - South [S] and numbered West to East.

** Blank spaces are for treatments already counted.

SW FL Scion and Rootstock Cooperative Higher Density Planting - Summary

- Location: Hendry County
- Scions: Hamlin, Valencia, Valquarius, Vernia, Folha Murcha
- Rootstocks:
 - [See Table 1]
- Date planted: July-September 2012
- Site/soil: Where the Hamlin trees were planted is about 50% Winder fine sand, depressional and 50% Immokalee sand; the Valencia area is 60% Winder and 40% Wabasso fine sand, limestone substratum; the Valquarius, Folha Murcha and Vernia trees are in a mix similar to the Valencia trees.
- Design: 2- or 3-row beds; randomized complete-block; 1-4 replications [mostly 2-3; see Table 1]
 - Plot size: 62-219 trees
 - Spacing: 12 x 25 or 8 x 15 ft.
 - Irrigation: microsprinkler on 2-row beds; on 3-row beds, outside rows have drip and microsprinkler and middle row has drip only.

SW FL Scion and Rootstock Cooperative Higher Density Planting – Summary [cont'd]

➤ **Data:**

- 2014-15; 2015-16; 2016-17; 2017-18 & 2018-19: Yield [boxes/acre], [boxes/tree] and cumulative yield.

➤ **Caveat regarding data quality:** Virtually all the Hamlin and Valencia trees were planted between July and September 2012; thus, the yield data are completely valid for tree age and are comparable among scion-rootstock combinations. However, because of plant production problems, rootstock substitutions were made among the Valquarius, Folha Murcha and Vernia trees, and tree planting occurred over a longer time period than with the other trees. As a result, the yield data for those three scions are representative, but not as comparable to the Hamlin or Valencia data or to each other. Further, the onset of cropping was delayed among the Valquarius and Folha Murcha trees relative to the Vernia trees for reasons not obvious.

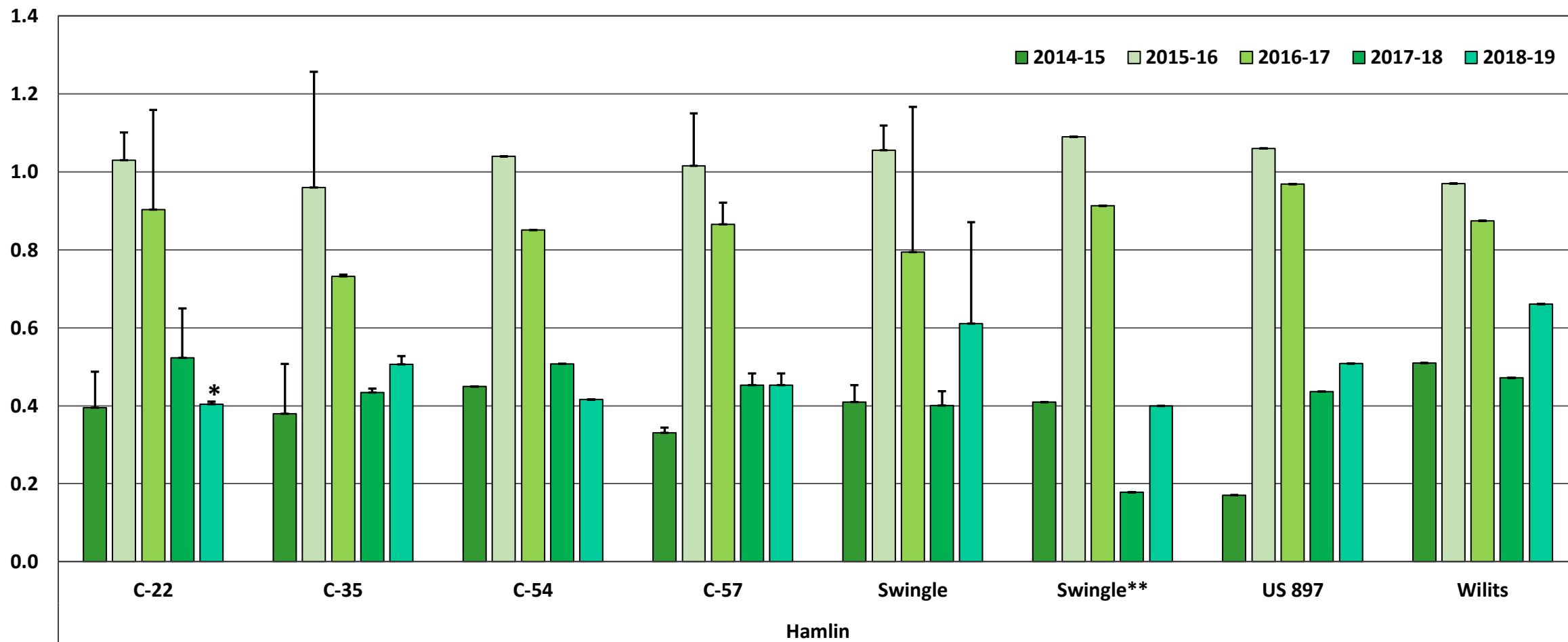
➤ **Trial status: ACTIVE**

Hurricane Irma [Sep 2017] caused considerable damage and flooding particularly of the south half of the trial. Some data collection continues using the trees of the north half.

Interpretive summary, a consensus overview of the project outcomes developed from discussions between the cooperator and the scientists as of the 2019-20 season.

- Tree growth and development: The Hamlin and Valencia trees were planted first and have, for years, been at containment size. Thus, their performance in recent years reflects yield as essentially “mature” trees.
- Tree size: Among those at 8 x 15 ft., tree size ranges from the taller ones being on C-57 and C-54 to intermediate ones on Swingle and C-35 to the shortest trees being on C-22 and C-146. The most compact [shortest] trees are those on Willits citrange.
- Tree spacing: 10-12 x 20 or 22 ft. would be a more appropriate spacing when using C-54 or C-57 in the flatwoods. Otherwise, 8 x 15 ft. is suitable so far for trees on the remaining rootstocks.
- HLB: Visible symptoms indicate the trial is mostly infected; however, the trees on all rootstocks appear to be tolerating the disease except less so among those on Swingle, Kuharske and US 812.
- Fruit drop has clearly been heavier among the Hamlin versus Valencia trees regardless of rootstock which is consistent with commercial observations.
- Practical application:
 - The trees on the C-series in particular along with those on the other rootstocks are performing as in other trials elsewhere in Florida especially regarding tolerance to HLB.
 - The grower-cooperator has ordered trees on C-57.
 - Trees on C-35 generally performed satisfactorily except in those areas of the trial where the soil was calcareous in nature.
 - For the first 8 years, the trees of various combinations planted 8 x 15 ft. significantly outyielded [boxes/acre] those at 12 x 25 ft.

Fig 1. SW FL Cooperative Planting – Hamlin, Yield [boxes/tree], mean + std. dev., 5 seasons: 2014-15 through 2018-19.

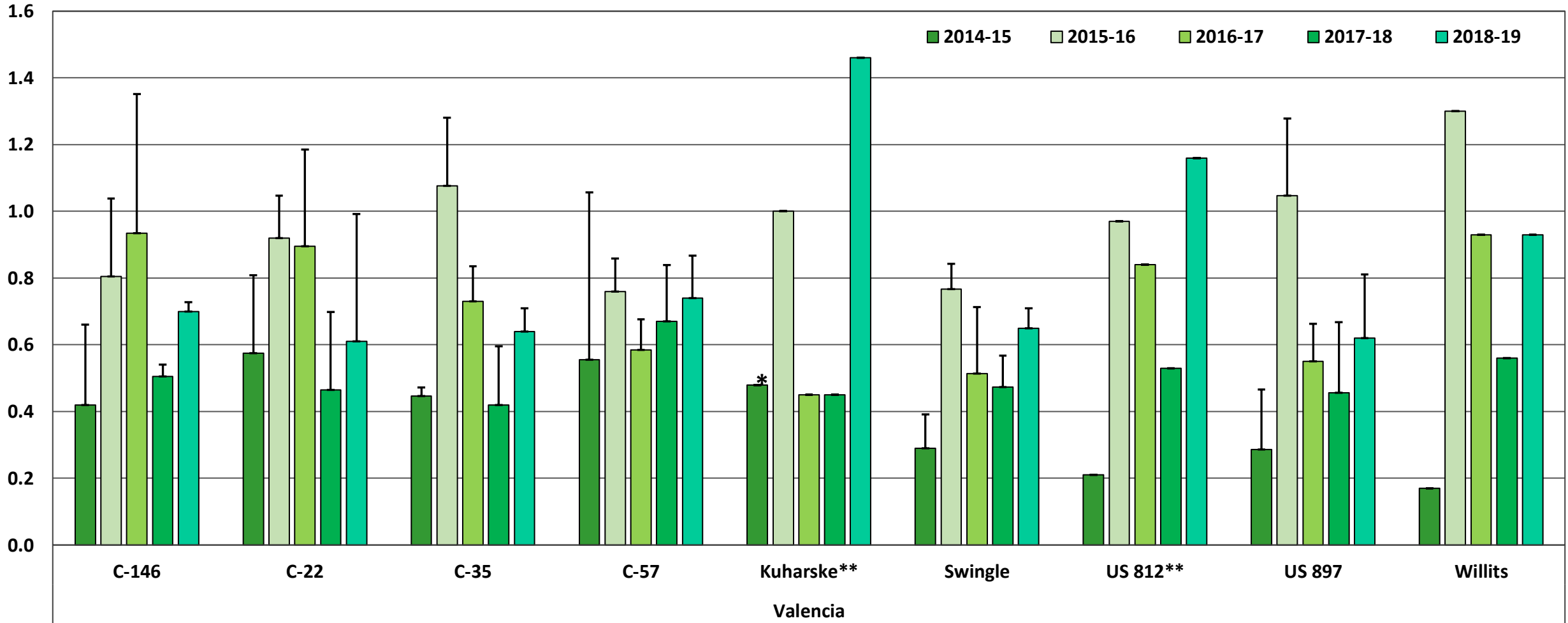


(*) Rootstock without bar, std. dev. = 0

(**) Spacing 12 x 25 ft.

Scion - Rootstock

Fig 2. SW FL Cooperative Planting – Valencia, Yield [boxes/tree], mean + std. dev., 5 seasons: 2014-15 through 2018-19.

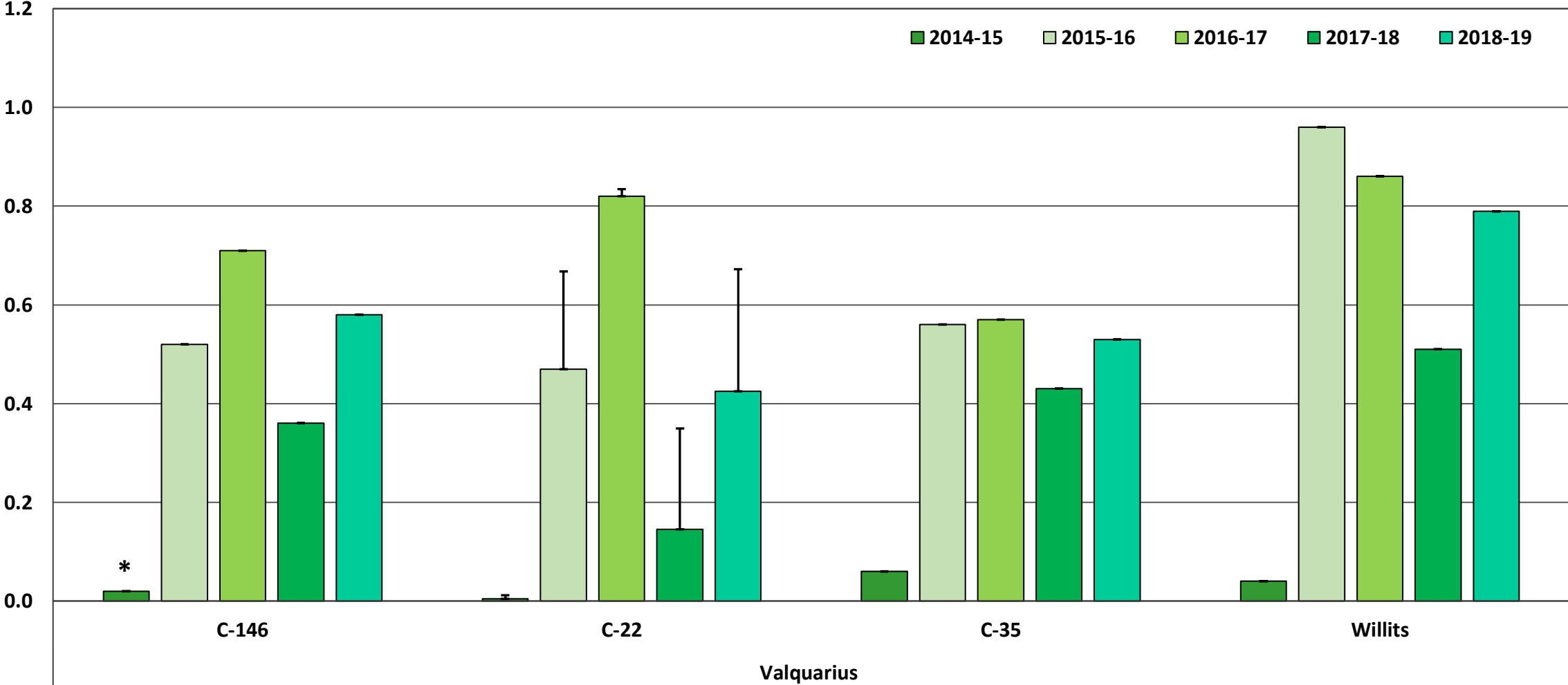


(*) Rootstock without bar, std. dev. = 0

(**) Spacing 12 x 25 ft.

Scion - Rootstock

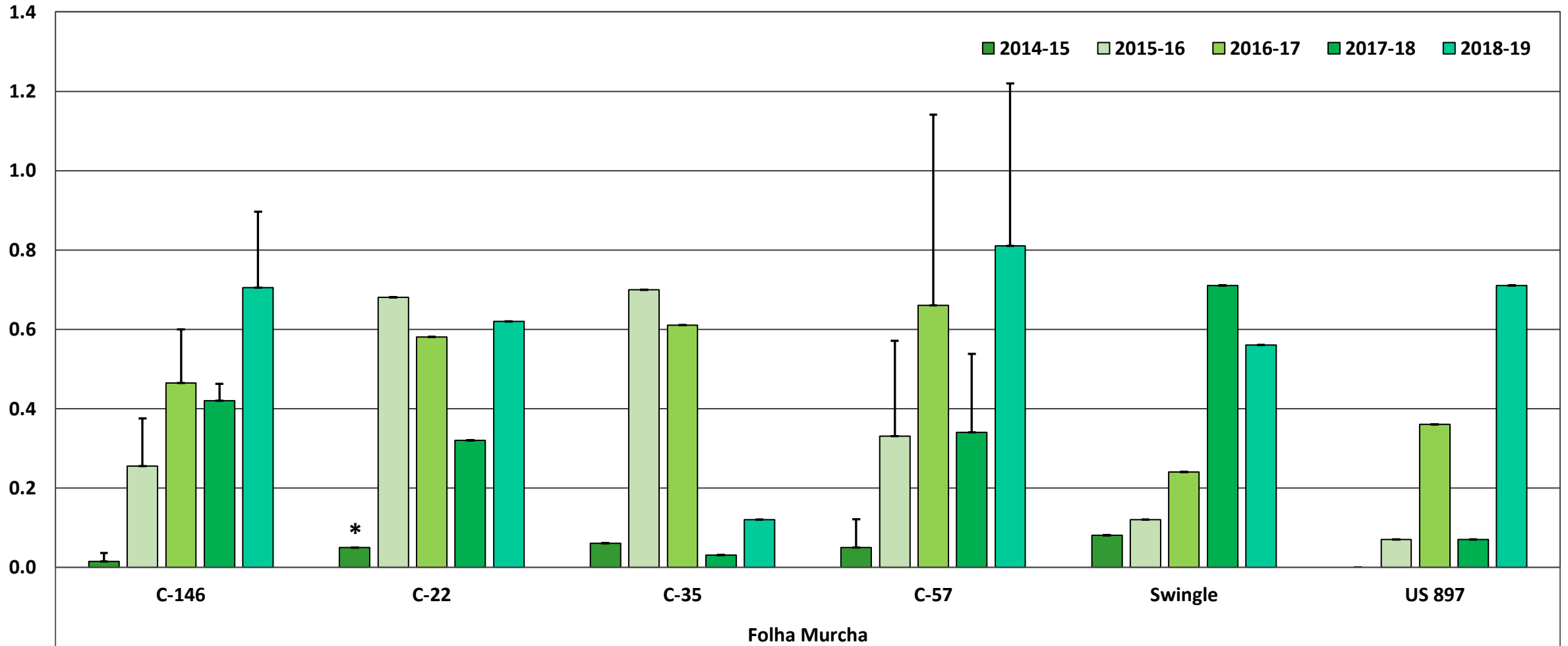
Fig 3. SW FL Cooperative Planting – Valquarius, Yield [boxes/tree], mean + std. dev., 5 seasons: 2014-15 through 2018-19.



(*) Rootstock without bar, std. dev. = 0

Scion - Rootstock

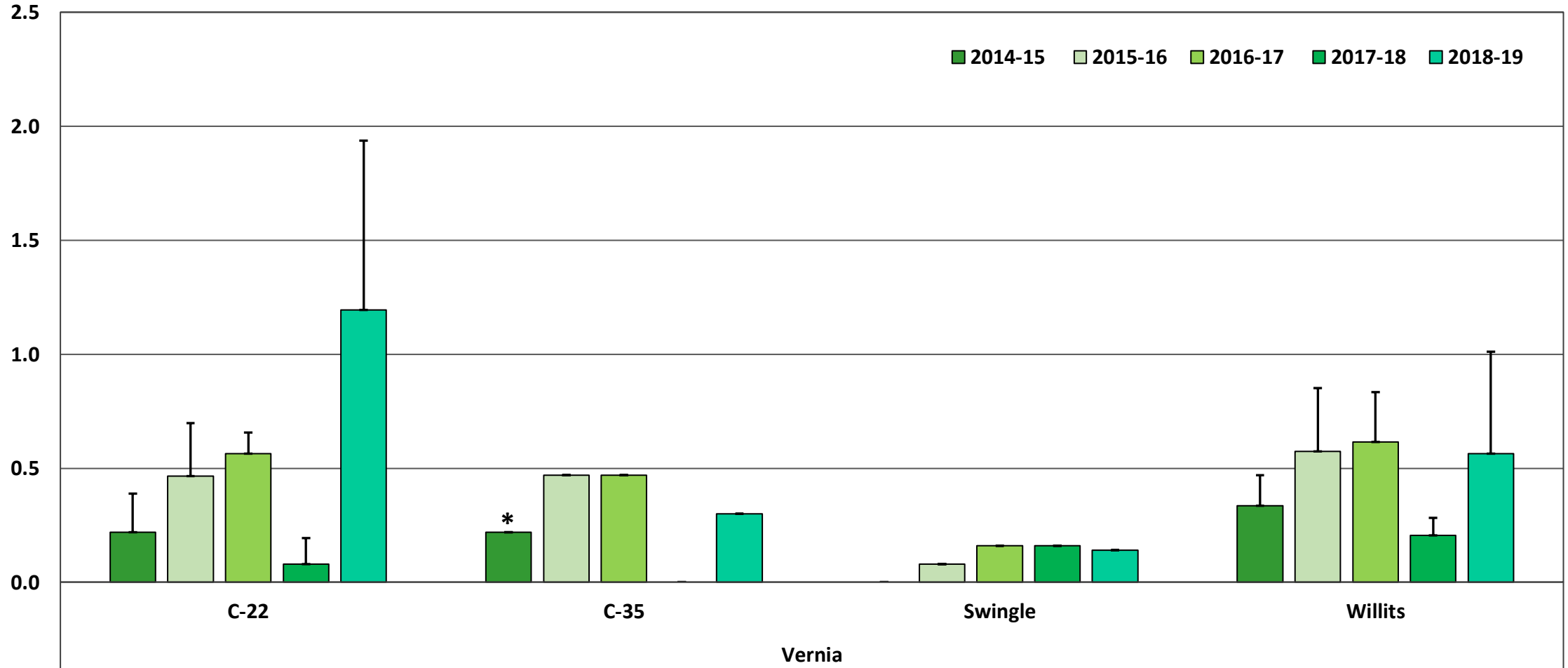
Fig 4. SW FL Cooperative Planting – Folha Murcha, Yield [boxes/tree], mean + std. dev., 5 seasons: 2014-15 through 2018-19.



(*) Rootstock without bar, std. dev. = 0

Scion - Rootstock

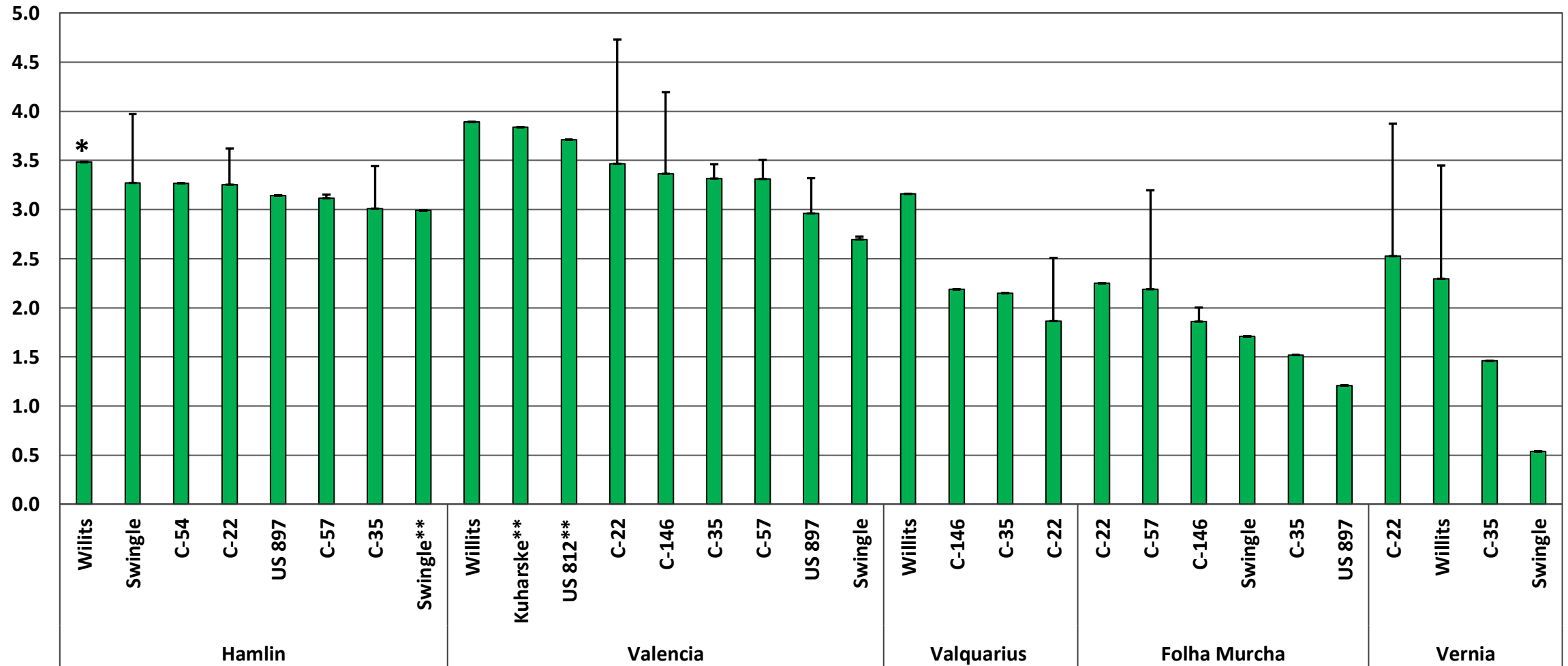
Fig 5. SW FL Cooperative Planting – Vernia, Yield [boxes/tree], mean + std. dev., 5 seasons: 2014-15 through 2018-19.



(*) Rootstock without bar, std. dev. = 0

Scion - Rootstock

Fig. 6. SW FL Cooperative Planting – 5-year cumulative Yield [boxes/tree], mean + std. dev.: seasons, 2014-15 through 2018-19.

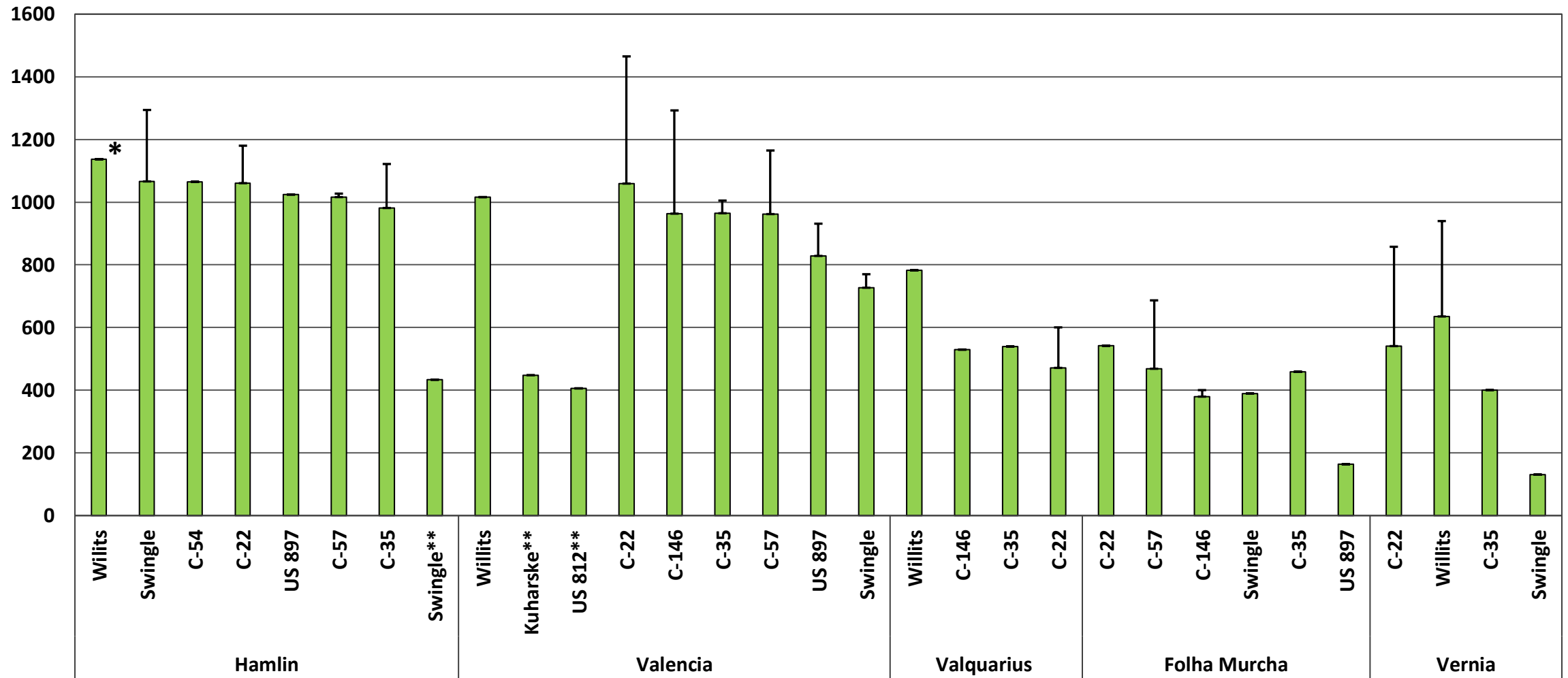


(*) Rootstock without bar, std. dev. = 0

(**) Spacing = 12 x 25 ft.

Scion - Rootstock

Fig. 7. SW FL Cooperative Planting – 5-year cumulative Yield [boxes/acre], mean + std. dev.: seasons, 2014-15 through 2018-19.



(*) Rootstock without bar, std. dev. = 0

(**) Spacing = 12 x 25 ft.

Scion - Rootstock