

Rootstocks for Valencia, Vernia and Hamlin Evaluated at Venus, FL

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Rootstock Evaluations, Venus - Description

The cooperator agreed to plant four trials identified herein by scion where H= Hamlin, V=Valencia and numbers indicating the year the trial was planted along with the grove [Block] location. All trees, with one noted exception, were raised in the cooperator's private nursery from seed provided from several sources, but mostly by the CREC Citrus Plant Improvement team.

1. **V2015/11.** This trial consists of Valencia trees.
2. **V2017/45.** This trial consists of a mixture of Valencia [mostly] and Vernia trees.
3. **H2016/59.** The trees for this trial were obtained as extras from the private nursery of another company.
4. **H2016/60.** Routine data are not being collected from this trial because of severe problems with HLB probably because of weak tree growth resulting from poor quality irrigation water.

Regarding data collection. A small, representative subset of trees in each replication of each trial was used for tree measurements. In a few instances, a tree declined or died within a subset and was replaced by another nearby similar tree. The substitution caused some variation and, thus, apparent anomalies in the data.

Rootstock Evaluations, V2015/11 - Summary

- Location: Venus, FL.
- Scion: Valencia
- Rootstocks: see Table 1.
- Date Planted: 2015
- Design:
 - Randomized complete-block
 - Replications: 3
 - Plot size: variable, 20-272 trees.
 - Spacing: 9 x 21 ft. = 230 trees/acre
- Data:
 - 2017/18: Trunk diameter, canopy diameter and volume.
 - 2018/19: Yield, tree height, trunk diameter, canopy diameter and volume.
 - 2019/20: Yield, tree height, trunk diameter, canopy diameter and volume.
 - 2020/21 & 2021/22: Yield, tree height, trunk diameter, canopy diameter and volume, productivity efficiency and juice quality: Brix, ratio and color. Correlation coefficient: Trunk diameter [ft.] vs Tree height [ft.], Trunk diameter [ft.] vs Canopy volume [ft³.] and Canopy diameter [ft.] vs Tree height [ft.].
- Trial status: **ACTIVE**

Table 1. V2015/11 list of rootstocks, parentage and number of trees.

Block 11 - Valencia		
Rootstock	Parentage	Number of Trees
46 x 20-04-31	Hirado Buntan pummelo x Cleopatra	63
6580x2071-01-02	[Sour orange+rangpur] x [Cleopatra+Argentine trifoliolate orange]	110
B11R3T24	Flying Dragon x Duncan	
B11R3T53	(Cleo x Ichang) x 17-47	17
B11R3T84	Duncan x DPI 9-6	22
B11R4T1	Flying Dragon x Obovoidea	6
B11R4T13	Flying Dragon x Obovoidea	13
B11R4T18	Flying Dragon x Obovoidea	17
B11R5T12	Flying Dragon x Duncan	20
B11R5T25	Flying Dragon x Duncan	11
B11R5T36	Flying Dragon x Duncan	5
B11R5T4	Flying Dragon x Obovoidea	12
B11R5T45	TBD	
B11R5T49	Flying Dragon x Ridge	27
B11R5T60	Flying Dragon x Ridge	5
B11R5T67	Flying Dragon x Ridge	9
B11R5T85	Flying Dragon x 17-47	13
C-146 [PLN1831]	Sunki x Swingle TF	1017
C-35	Ruby swt. x WF TF	844
C-54 [PLN1829]	Sunki x Swingle TF	1269
C-57 [PLN1830]	Sunki x Swingle TF	698
F14P37	<i>Citrus latipes</i> hybrids	69
F2P12	<i>Citrus latipes</i> hybrids	60
F4P2	<i>Citrus latipes</i> hybrids	5
F4P6	<i>Citrus latipes</i> hybrids	122
Murcott/Rub	Murcott+Rubidoux TF, MUR+RUB	50

Table 1 [cont'd]. V2015/11 list of rootstocks, parentage and number of trees.

Block 11 - Valencia		
Rootstock	Parentage	Number of Trees
N40R1T18	Flying Dragon x LB1-21	17
N40R1T2	Duncan x Dundee R22T24 (DPI 9-6)	15
N40R1T25	Flying Dragon x LB1-21	44
N40R1T26	Flying Dragon x LB1-21	29
N40R2T14	Flying Dragon x LB1-21	27
N40R2T19	Flying Dragon x LB1-21	23
N40R2T24	Flying Dragon x LB1-21	27
N40R3T23	Flying Dragon x LB1-21	17
N40R3T24	Flying Dragon x LB1-21	32
N40R3T26	Flying Dragon x (Clementine x Duncan)	22
N40R3T27	Flying Dragon x LB1-21	22
N40R4T25	Flying Dragon x LB1-21	8
Orange 14	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliolate orange]	95
Orange 16	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliolate orange]	68
UFR 16: 46x31-02-13	Hirado Buntan (HB) pummelo x Shekwasha	27
UFR 2: Orange 4	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliolate orange]	438
UFR 3: Orange 15	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliolate orange]	55
UFR 4: Orange 19	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliolate orange]	150
UFR-1	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliolate orange]	30
UFR-15	Hirado Buntan pummelo x Cleopatra	47
UFR-17	[Nova+HBPummelo] x [sour orange+Carrizo]	63
UFR-5	[Nova+HBPummelo] x [Succari+Argentine trifoliolate orange]	28
US-802	Pummelo x TF	874
US-812	Sunki x Benecke TF	393
White 1	[Nova+HBPummelo] x [Succari+Argentine trifoliolate orange]	78

Rootstock Evaluations, V2017/45 - Summary

- Location: Venus, FL.
- Scion: Valencia & Vernia.
- Rootstocks: see Table 2.
- Date Planted: 2017
- Design:
 - Randomized complete-block
 - Replications: 1
 - Plot size: variable, 12 – 20 trees.
 - Spacing: 9 x 21 ft. = 230 trees/acre
- Data:
 - 2020/21: Yield, trunk diameter, canopy diameter and volume and productivity efficiency. Correlation coefficient: Trunk diameter [ft.] vs Tree height [ft.], Trunk diameter [ft.] vs Canopy volume [ft³.] and Canopy diameter [ft.] vs Tree height [ft.].

- Trial status: **ACTIVE**

Table 2. V2017/45 list of rootstocks, parentage and number of trees.

Block 45 - Valencia		
Rootstock	Parentage	Number of Trees
2247x2075-02-26	Nova+HBP x Cleopatra+Swingle	20
2247x6070-02-2	Nova+HBP x sour orange+Flying Dragon	16
46x20-04-9	Hirado Buntan pummelo x Cleopatra	14
46x20-04-S13	Hirado Buntan pummelo x Cleopatra	22
B11R3T24	Flying Dragon x Duncan	12
B11R3T27	Flying Dragon x Duncan	16
B11R3T53	(Cleo x Ichang) x 17-47	18
B11R3T84	Duncan x DPI 9-6	16
B11R4T12	Flying Dragon x Obovoidea	18
B11R5T112	Flying Dragon x Sour orange	14
B11R5T20	Flying Dragon x Sour orange	14
B11R5T25	Flying Dragon x Duncan	14
B11R5T36	Flying Dragon x Duncan	14
B11R5T4	Flying Dragon x Obovoidea	20
B11R5T49	Flying Dragon x Ridge	14
B11R5T64	Flying Dragon x Ridge Pineapple	4
B11R5T87	Flying Dragon x Duncan	12
Gr6xOr14-09-05	TBD	10
N40R1T18	Flying Dragon x LB1-21	14
N40R3T25	Flying Dragon x LB1-21	6
N40R2T19	Flying Dragon x LB1-21	16
N40R3T23	Flying Dragon x LB1-21	16
SO+50-7	Sour orange+trifoliolate orange 50-7	18
WGFT+50-7	White grapefruit+trifoliolate orange	18
US-802	Pummelo x TF	3,120
US-812	Sunki x Benecke TF	3,120
US-897	Cleo x TF	2,964
US-942	Sunki x FDT	2,964

Table 2 [cont'd]. V2017/45 list of rootstocks, parentage and number of trees.

Block 45 - Vernia		
Rootstock	Parentage	Number of Trees
SWC	Swingle citrumelo	26
US-802	Pummelo x TF	10
US-812	Sunki x Benecke TF	10
US-897	Cleo x TF	10
US-942	Sunki x FDT	10

Rootstock Evaluations, H2016/59 - Summary

- Location: Venus, FL.
- Scion: Hamlin
- Rootstocks: see Table 3.
- Date Planted: 2016.
- Design:
 - Randomized complete-block
 - Replications: 4
 - Plot size: variable, 10 – 16 trees.
 - Spacing: 8 x 21 ft. = 259 trees/acre
- Data:
 - 2018/19: Tree height, trunk diameter, canopy diameter and volume.
 - 2020/21: Yield, Tree height, trunk diameter, canopy diameter and volume. Correlation coefficient: Trunk diameter [ft.] vs Tree height [ft.], Trunk diameter [ft.] vs Canopy volume [ft³.] and Canopy diameter [ft.] vs Tree height [ft.].
- Trial status: **ACTIVE**

Table 3. H2016/59 list of rootstocks, parentage and number of trees.

Block 59 - Hamlin		
Rootstock	Parentage	Number of Trees
6058+2071-02-2	[Sour orange+rangpur] x [Cleopatra+Argentine trifoliate orange]	9
Amb+Benton	Amblycarpa+Benton	21
Amb+Czo	Amblycarpa+Carrizo	30
B. Sour	Bittersweet sour orange	16
B11R3T27	Flying Dragon x Duncan	1
B11R4T18	Flying Dragon x Obovoidea	1
C-22 Bitters	Sunki x Swingle TF	30
C-54 Carpenter	Sunki x Swingle TF	30
C-57 Furr	Sunki x Swingle TF	22
Changsha+Benton	Changsha mandarin+Benton citrange	22
ES-1	Cleo x Poncirus trifoliata (Spain)	24
ES-10	Cleopatra x Trifol. Or.	8
ES-11	Troyer citrange x mandarin (Spain)	3
ES-2	Cleo x Poncirus trifoliata (Spain)	9
ES-3	Cleo x Poncirus trifoliata (Spain)	1
ES-4	King mandarin x Poncirus	12
ES-5	King Mandarin x Trifol	7
ES-6	King Mandarin x Trifol. Or	6
Green 3	[Nova+HBPummelo] x [sour orange+Carrizo]	20
Green 7	[Nova+HBPummelo] x [sour orange+Carrizo]	20
N40R1T18	Flying Dragon x LB1-21	20
N40R1T26	Flying Dragon x LB1-21	4

Table 3 [cont'd]. H2016/59 list of rootstocks, parentage and number of trees.

Block 59 - Hamlin		
Rootstock	Parentage	Number of Trees
N40R2T19	Flying Dragon x LB1-21	4
N40R2T24	Flying Dragon x LB1-21	6
N40R2T26	Flying Dragon x LB1-21	3
N40R3T26	Flying Dragon x (Clementine x Duncan)	4
N40R3T27	Flying Dragon x LB1-21	12
Orange 13	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliate orange]	8
Orange 14	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliate orange]	30
Sorp+Sh-991	TBD	20
UFR 1: Orange 3	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliate orange]	38
UFR 15: 46x20-04-37	Hirado Buntan pummelo x Cleopatra	9
UFR 16: 46x31-02-13	Hirado Buntan (HB) pummelo x Shekwasha	8
UFR 17: Green 2	[Nova+HBPummelo] x [sour orange+Carrizo]	29
UFR 2: Orange 4	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliate orange]	20
UFR 3: Orange 15	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliate orange]	4
UFR 3: Orange 15	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliate orange]	26
UFR 4: Orange 19	[Nova+HBPummelo] x [Cleopatra+Argentine trifoliate orange]	10
UFR 5: White 4	[Nova+HBPummelo] x [Succari+Argentine trifoliate orange]	44
UFR 6: Changsha+TF 50-7	Changsha mandarin+trifoliate orange 50-7	35
US-897	Cleo x TF	32
WGFT+50-7	White grapefruit+trifoliate orange	4
White 1	[Nova+HBPummelo] x [Succari+Argentine trifoliate orange]	12
White 3	[Nova+HBPummelo] x [Succari+Argentine trifoliate orange]	22

Rootstock Evaluations, H2016/60 - Summary

- Location: Venus, FL.
- Scion: Hamlin
- Rootstocks: see Table 4.
- Date Planted: 2016
- Design:
 - Randomized complete-block
 - Replications: 4
 - Plot size: 20 trees
 - Spacing: 8 x 21 ft. = 259 trees/acre

- Trial status: **INACTIVE**

Table 4. H2016/60 list of rootstocks, parentage and number of trees.

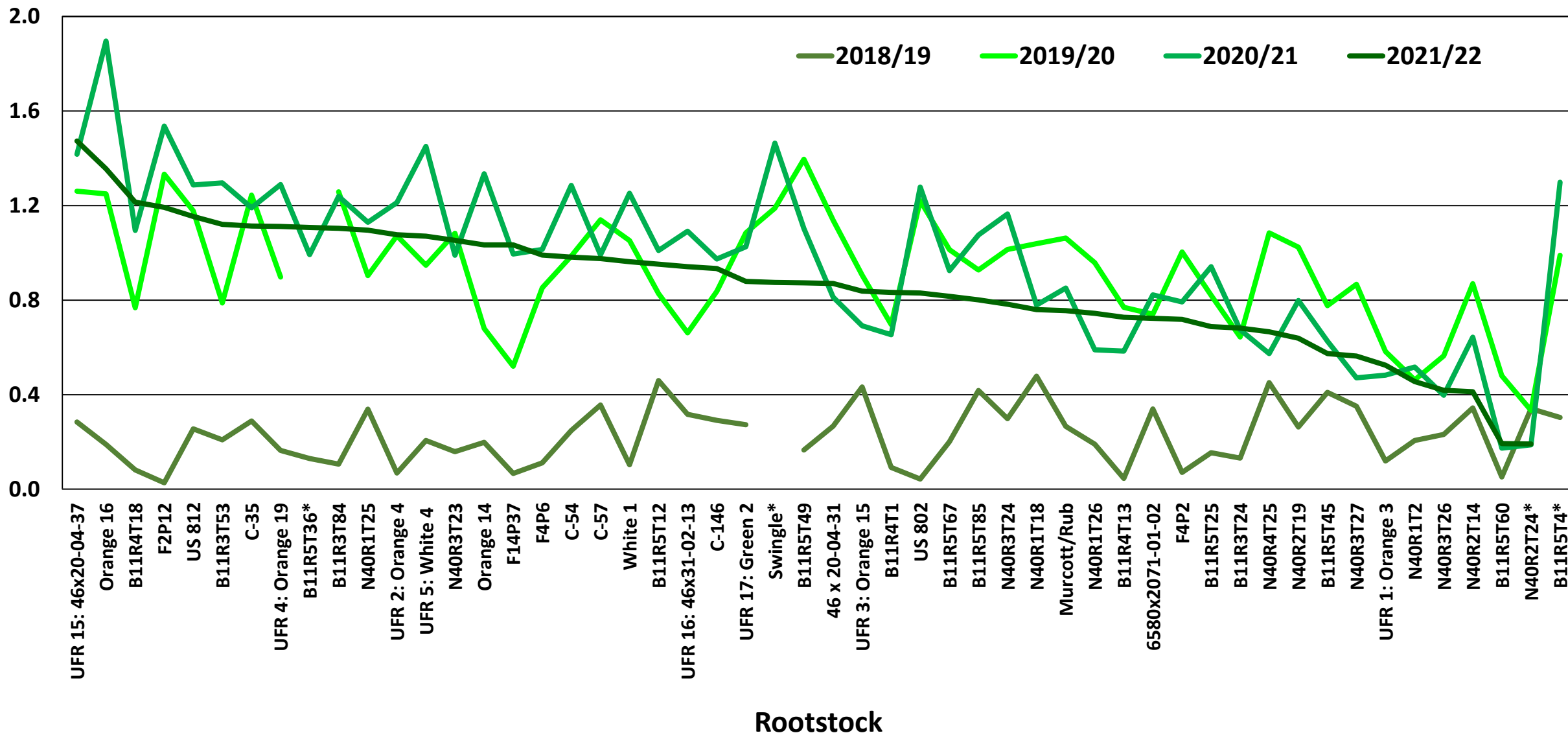
Block 60 - Hamlin		
Rootstock	Parentage	Number of Trees
2247X2075-02-26	Nova+HBP x Cleopatra+Swingle	81
2247X6070-02-2	Nova+HBP x sour orange+Flying Dragon	81
46X20-04-48	Hirado Buntan pummelo x Cleopatra	96
46X20-04-9	Hirado Buntan pummelo x Cleopatra	79
46X20-04-S13	Hirado Buntan pummelo x Cleopatra	86
B11R3T24	Flying Dragon x Duncan	72
B11R3T27	Flying Dragon x Duncan	56
B11R3T53	(Cleo x Ichang) x 17-47	50
B11R4T12	Flying Dragon x Obovoidea	79
B11R5T112	Flying Dragon x Sour orange	47
B11R5T25	Flying Dragon x Duncan	26
B11R5T36	Flying Dragon x Duncan	40
B11R5T4	Flying Dragon x Obovoidea	105

Table 4 [cont'd]. H2016/60I list of rootstocks, parentage and number of trees.

Block 60 - Hamlin		
Rootstock	Parentage	Number of Trees
B11R5T49	Flying Dragon x Ridge	81
B11R5T60	Flying Dragon x Ridge	11
B11R5T64	Flying Dragon x Ridge Pineapple	26
F5P12	Citrus latipes hybrids	70
F6P12	Citrus latipes hybrids	40
F6P13	Citrus latipes hybrids	65
Gr6xOr14-09-05	TBD	84
N40R1T18	Flying Dragon x LB1-21	80
N40R2T19	Flying Dragon x LB1-21	95
N40R3T25	Flying Dragon X LB1-21 (Clementine x Duncan)	80
SO+50-7	Sour orange+trifoliolate orange 50-7	98
WGFT+50-7	White grapefruit+trifoliolate orange	12

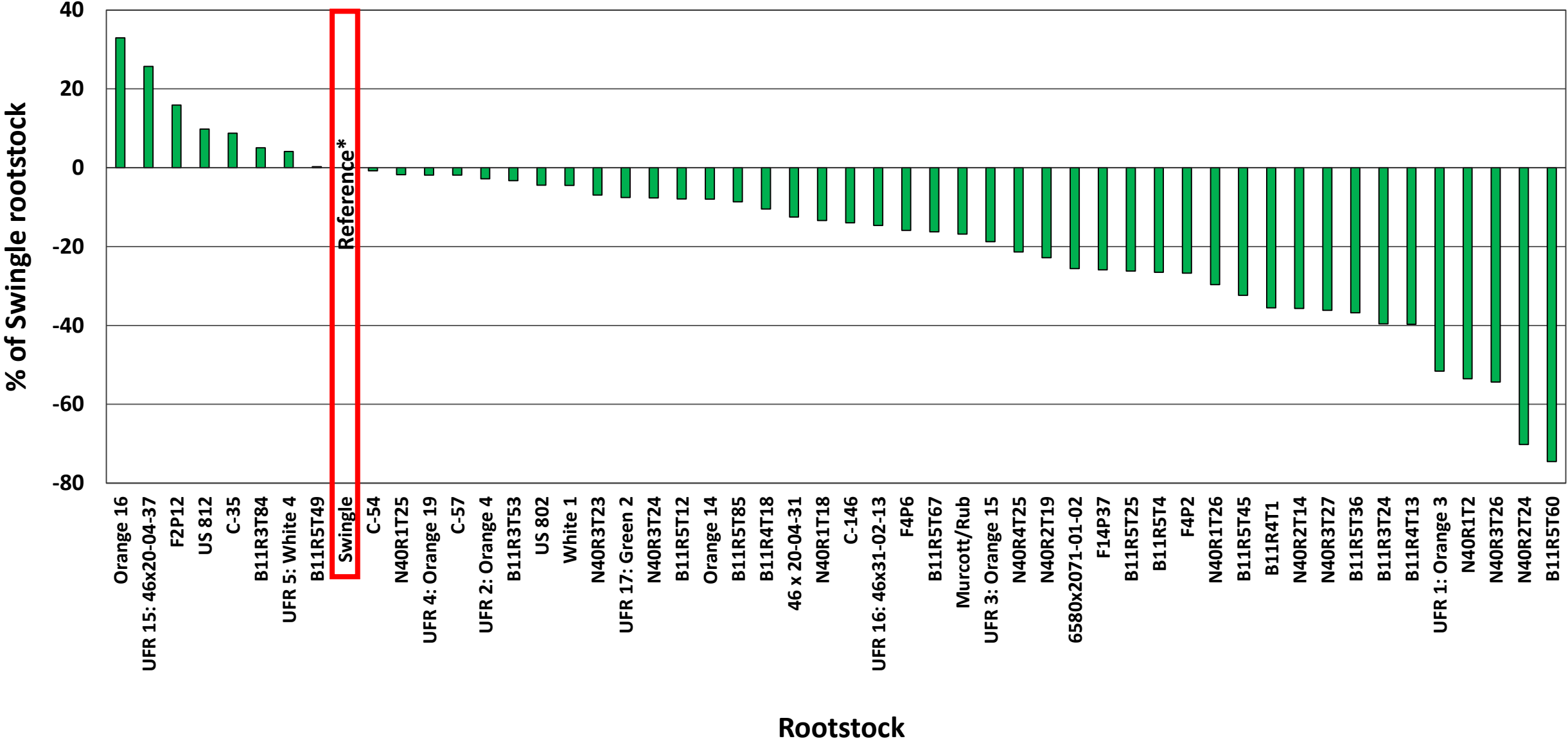
Valencia 2015/11

Fig. 1. V2015/11 – Yield: mean + std. dev. [boxes/tree, March/19, November/19, March/21 and March/22].



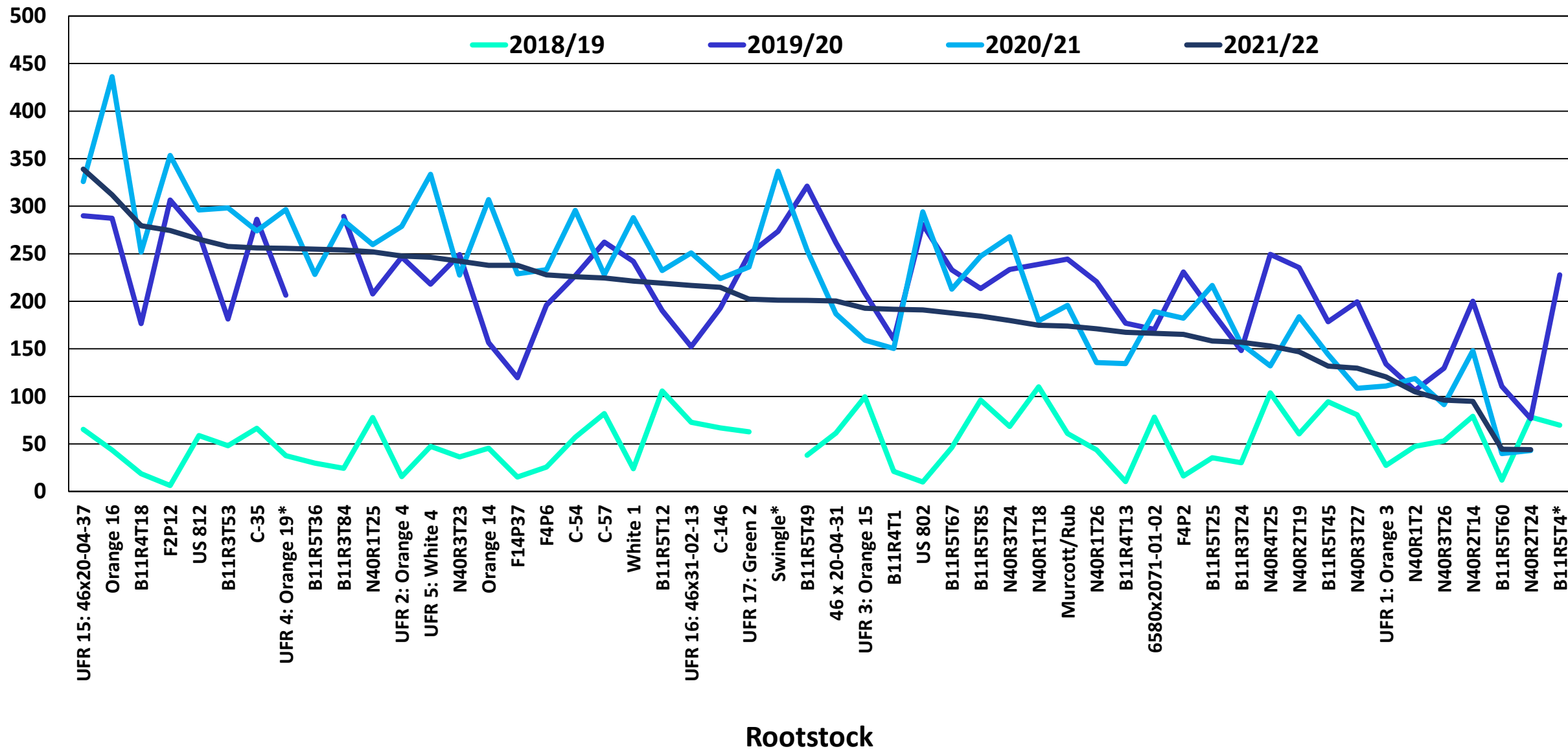
(*) No data collected

Fig. 2. V2015/11 – Cumulative yield as % of Swingle [boxes/tree, March/19, November/19, March/21 and March/22].



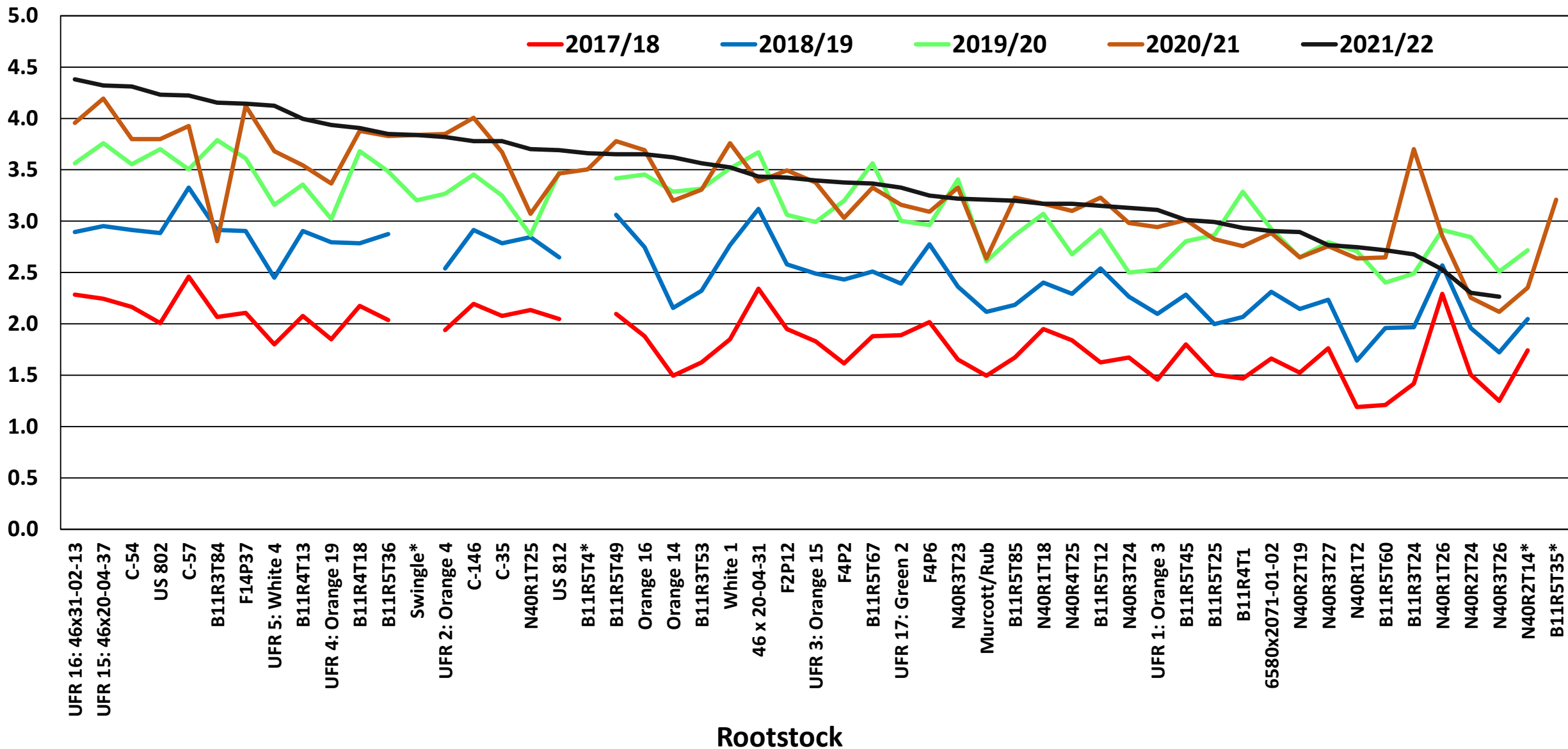
(*) Data from trees on Swingle rootstock located in adjacent beds and of the same age as the trial trees.

Fig. 3. V2015/11 – Yield: mean + std. dev. [boxes/acre, March/19, November/19, March/21 & March/22].



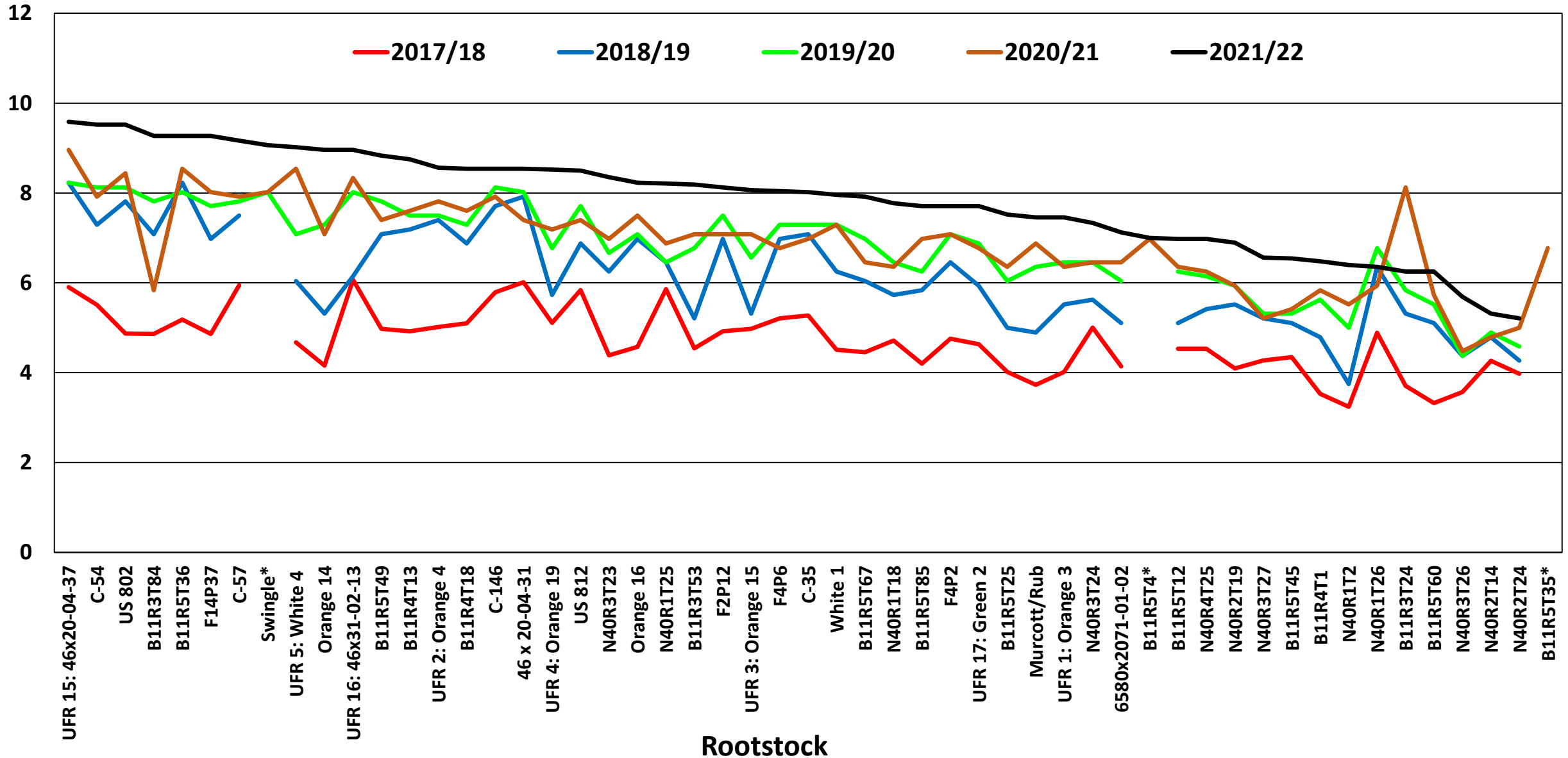
(*) No data collected

Fig. 4. V2015/11 – Trunk diameter: mean \pm std. dev. [in., Nov/17, Nov/18, Nov/19, May/21 & April/22].



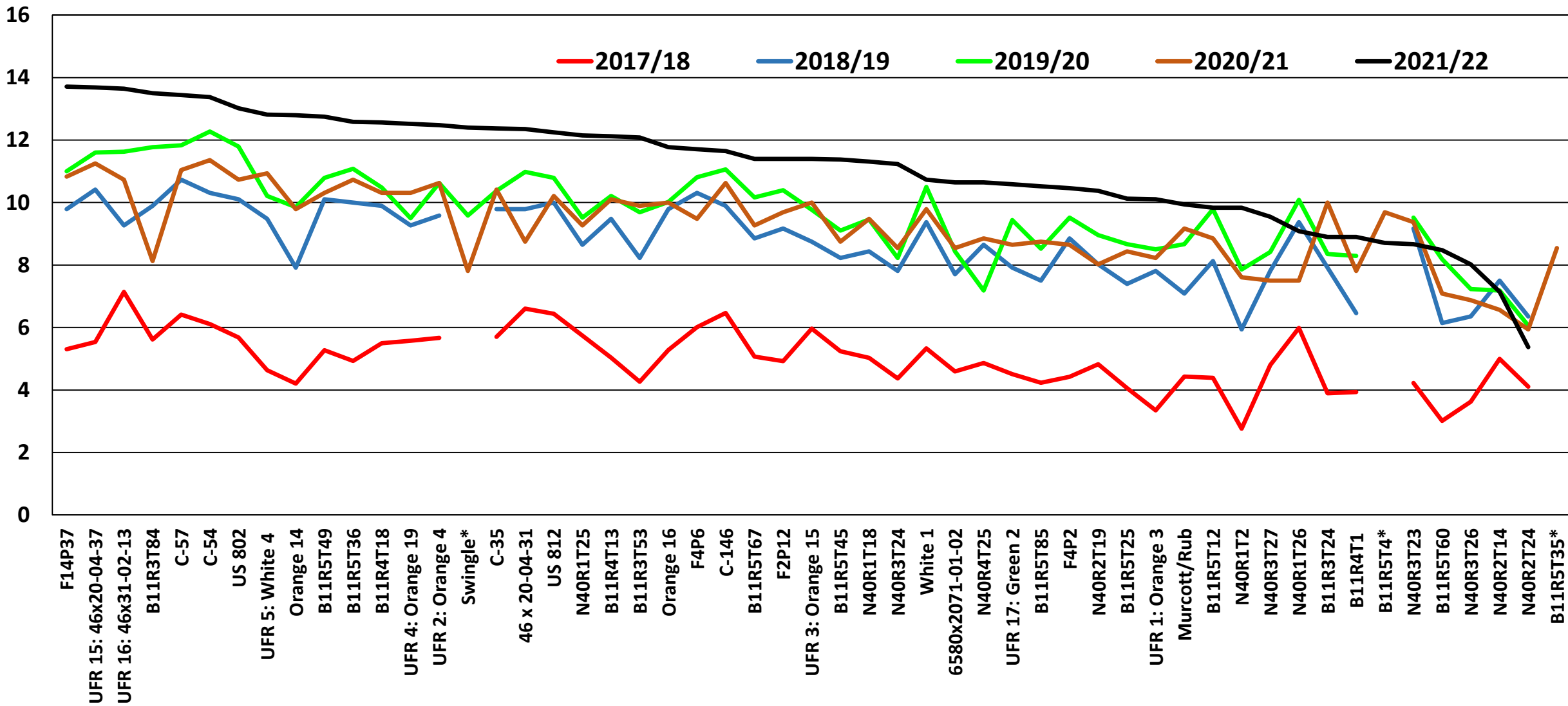
(*) No data collected

Fig. 5. V2015/11 – Tree height: mean \pm std. dev. [ft., Nov/17, Nov/18, Nov/19, May/21 & April/22].



(*) No data collected

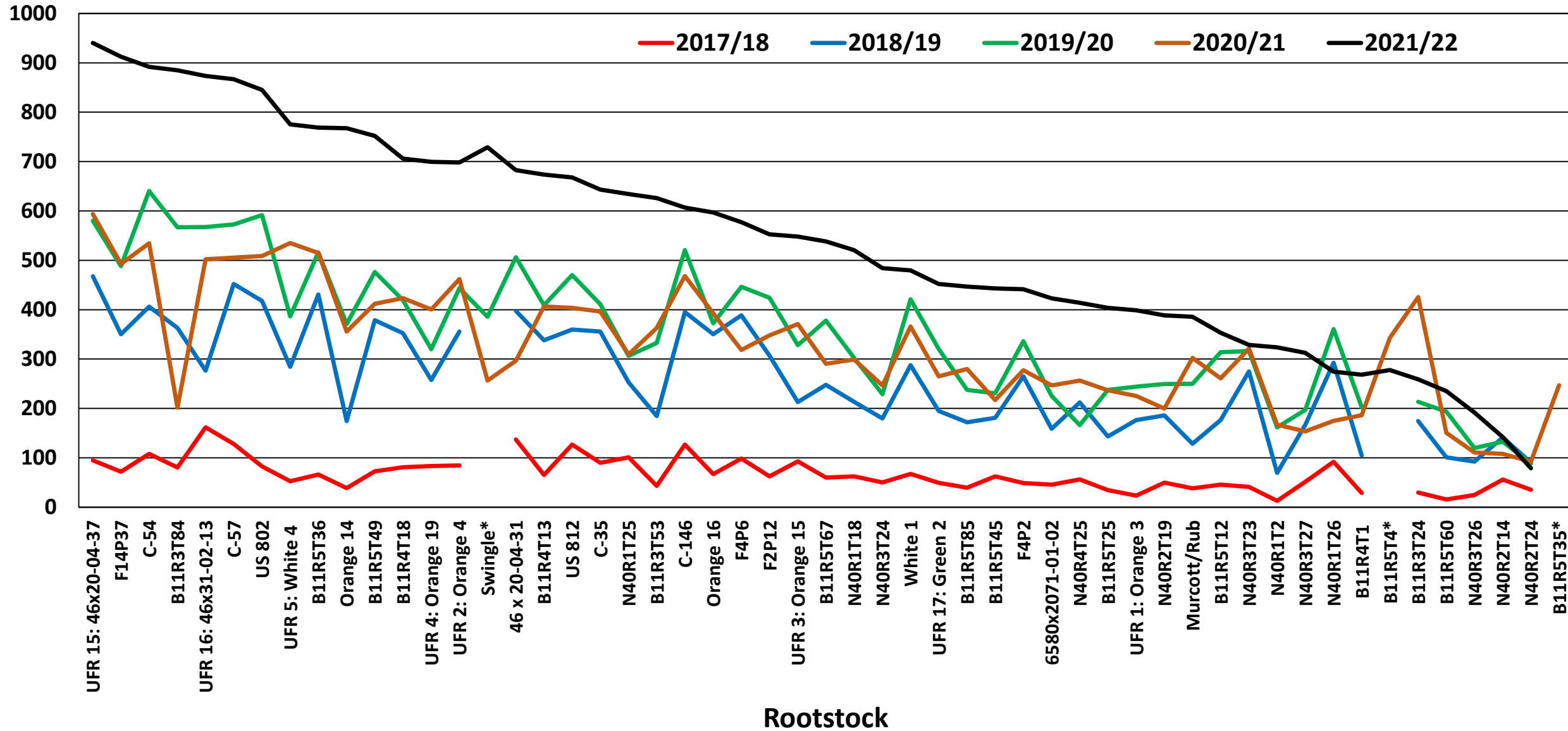
Fig. 6. V2015/11 – Canopy diameter: mean \pm std. dev. [ft., Nov/17, Nov/18, Nov/19, May/21 & April/22].



(*) No data collected

Rootstock

Fig. 7. V2015/11 – Canopy volume: mean [ft³., Nov/17, Nov/18, Nov/19, May/21 & April/22].



(*) No data collected

Fig. 8. V2015/11 – Yield efficiency: mean. [lb./ft³., March/20, May/21 & April/22].

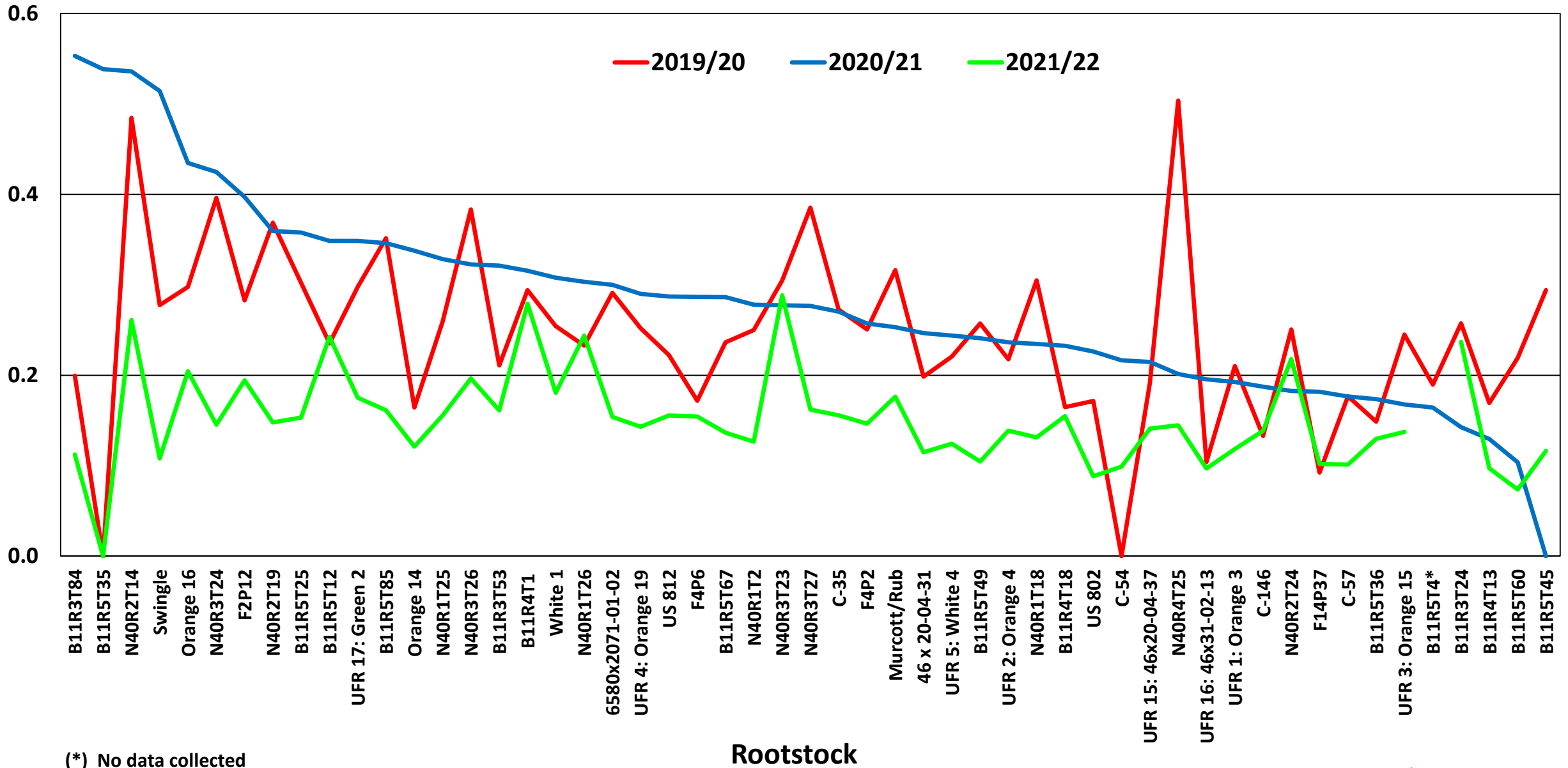
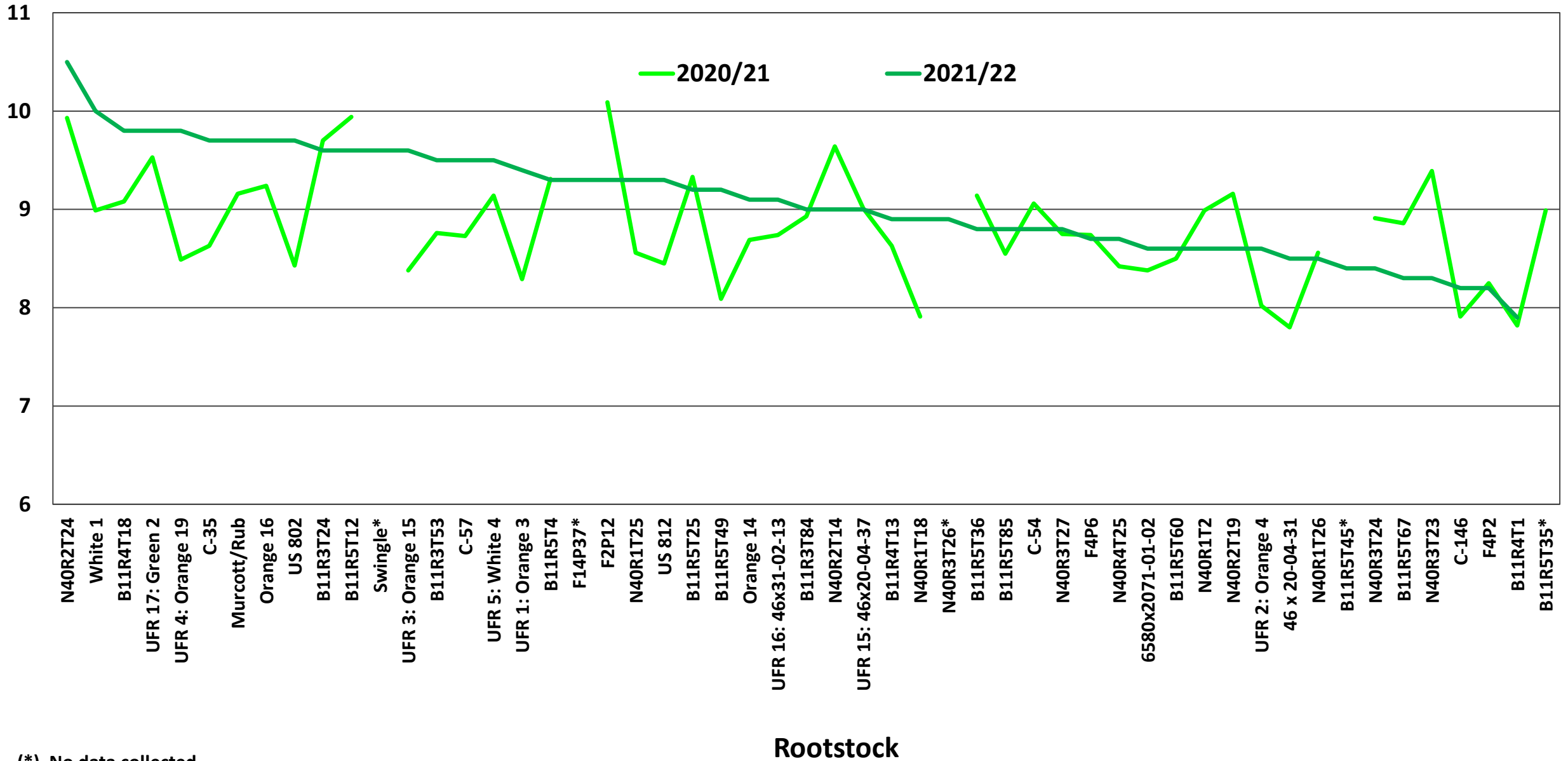
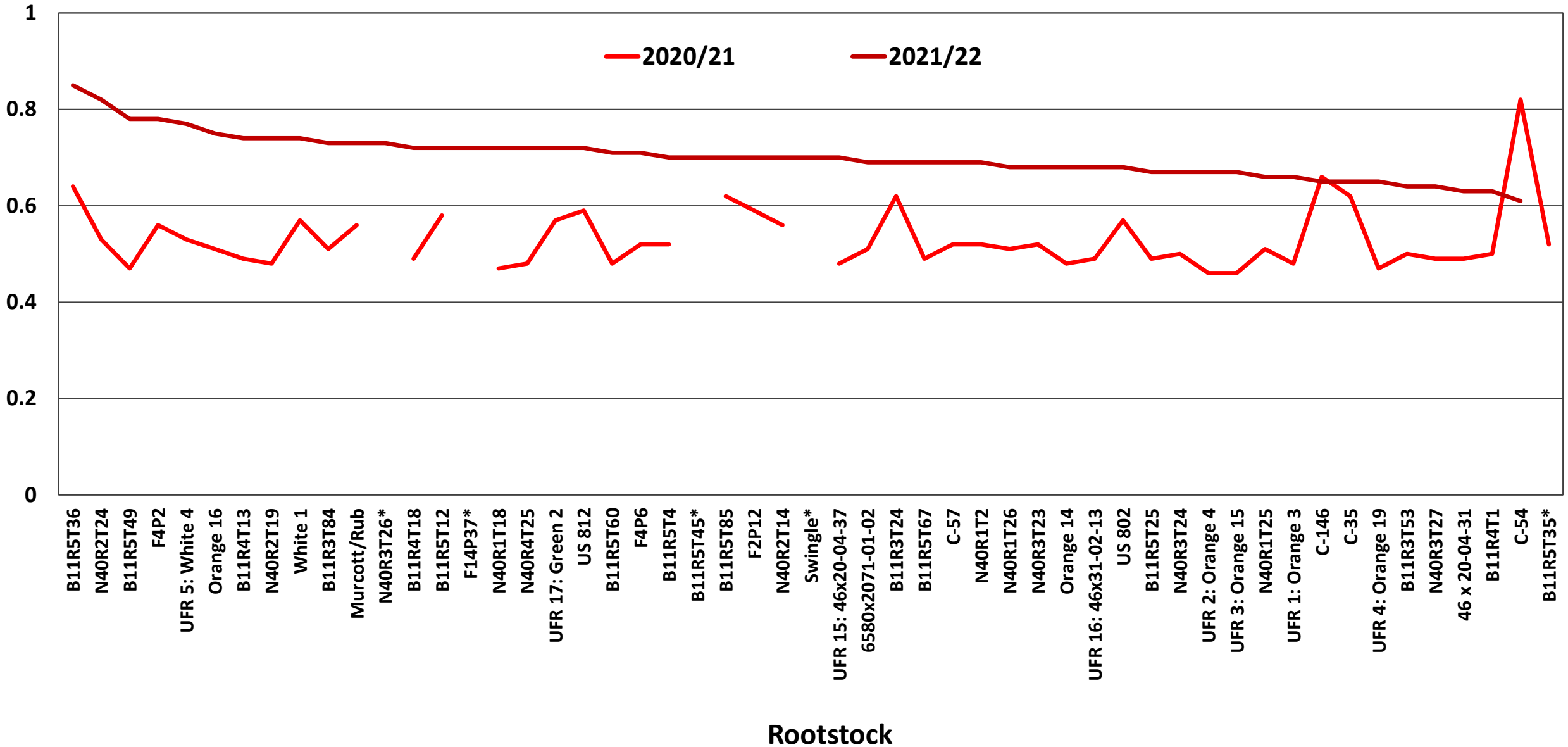


Fig. 9. V2015/11 – Juice Brix, mean. [May/21 & April/22].



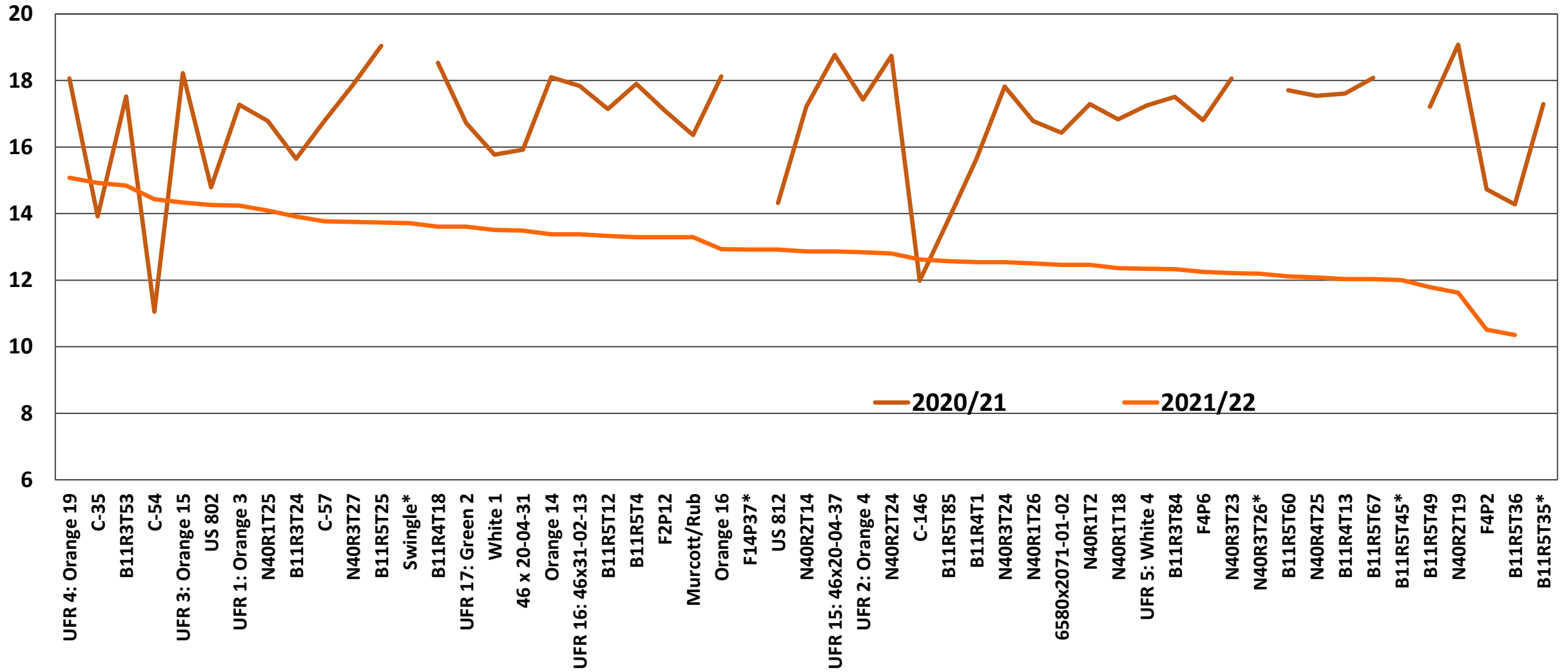
(*) No data collected

Fig. 10. V2015/11 - Juice acid, mean. [May/21 & April/22].



(*) No data collected

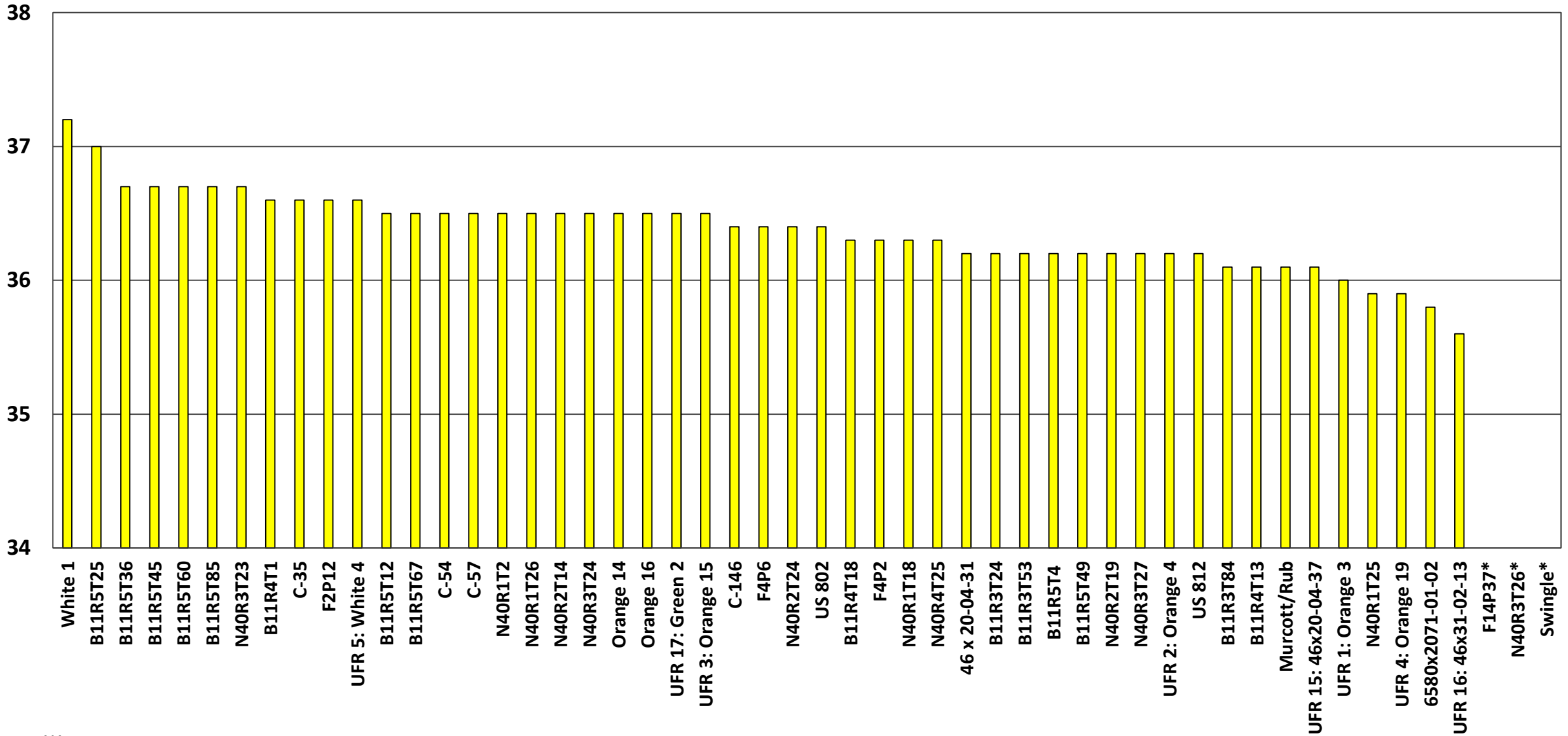
Fig. 11. V2015/11 - Juice ratio, mean. [May/21 & April/22].



(*) No data collected

Rootstock

Fig. 12. V2015/11 - Juice color, mean. [May/21].

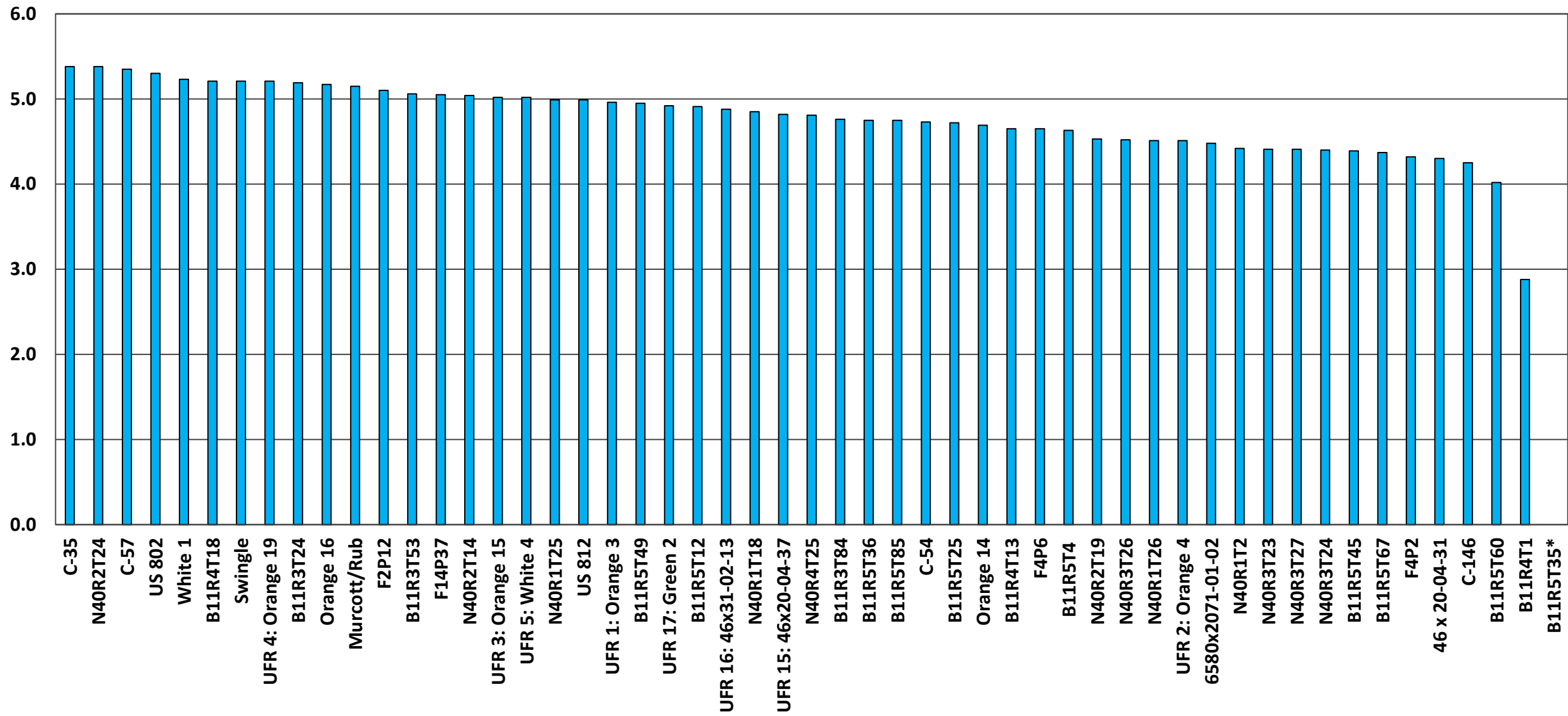


(*) No data collected

Rootstock

CREC Citrus Plant Improvement

Fig. 13. V2015/11 – PS/box, mean. [April/22].



(*) No data collected

Rootstock

Valencia/Vernia 2017/45

Fig. 14. V2017/45 – Yield: mean + std. dev. [boxes/tree, March/21].

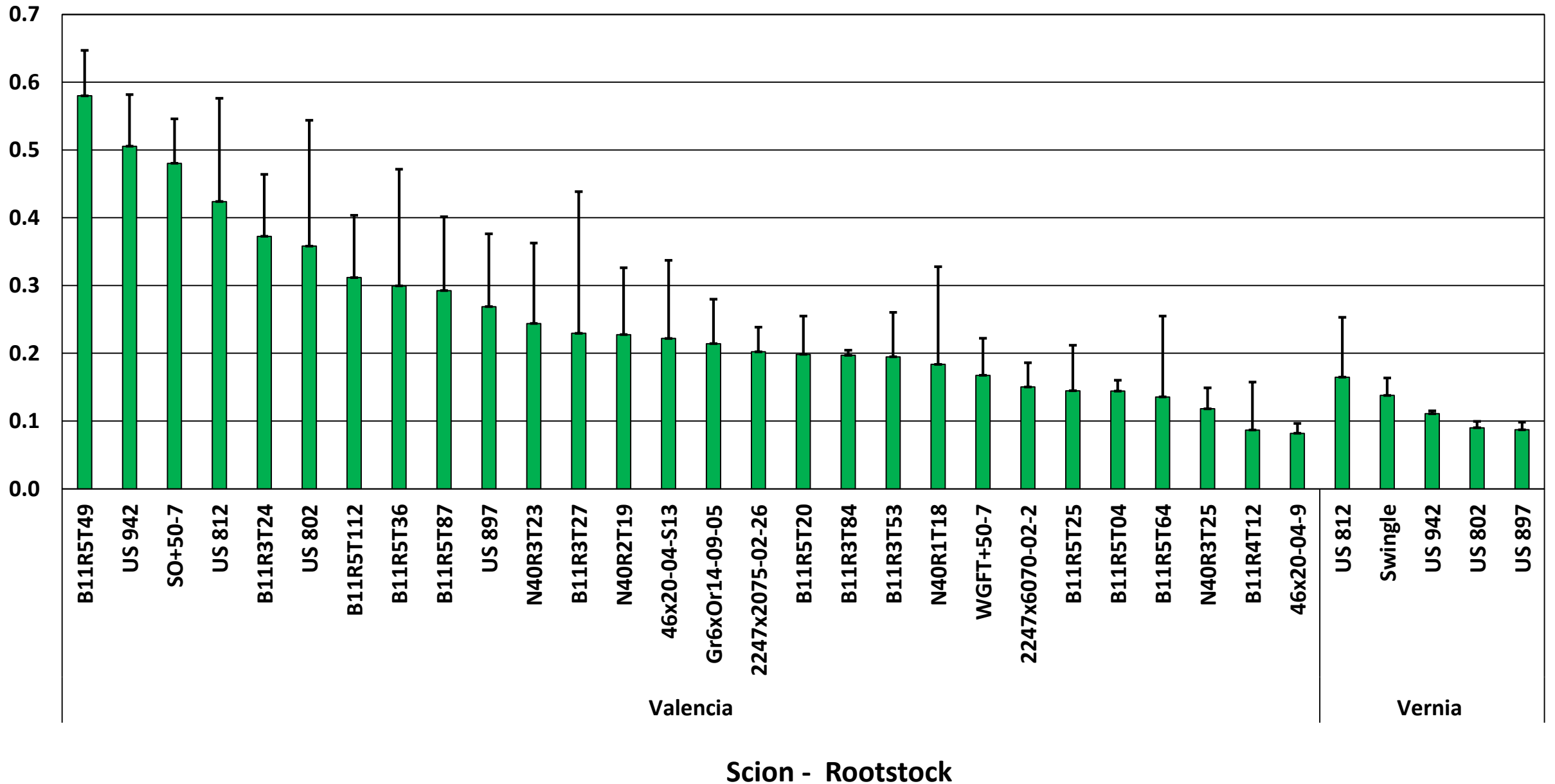


Fig. 15. V2017/45 – Yield: mean + std. dev. [boxes/acre, March/21].

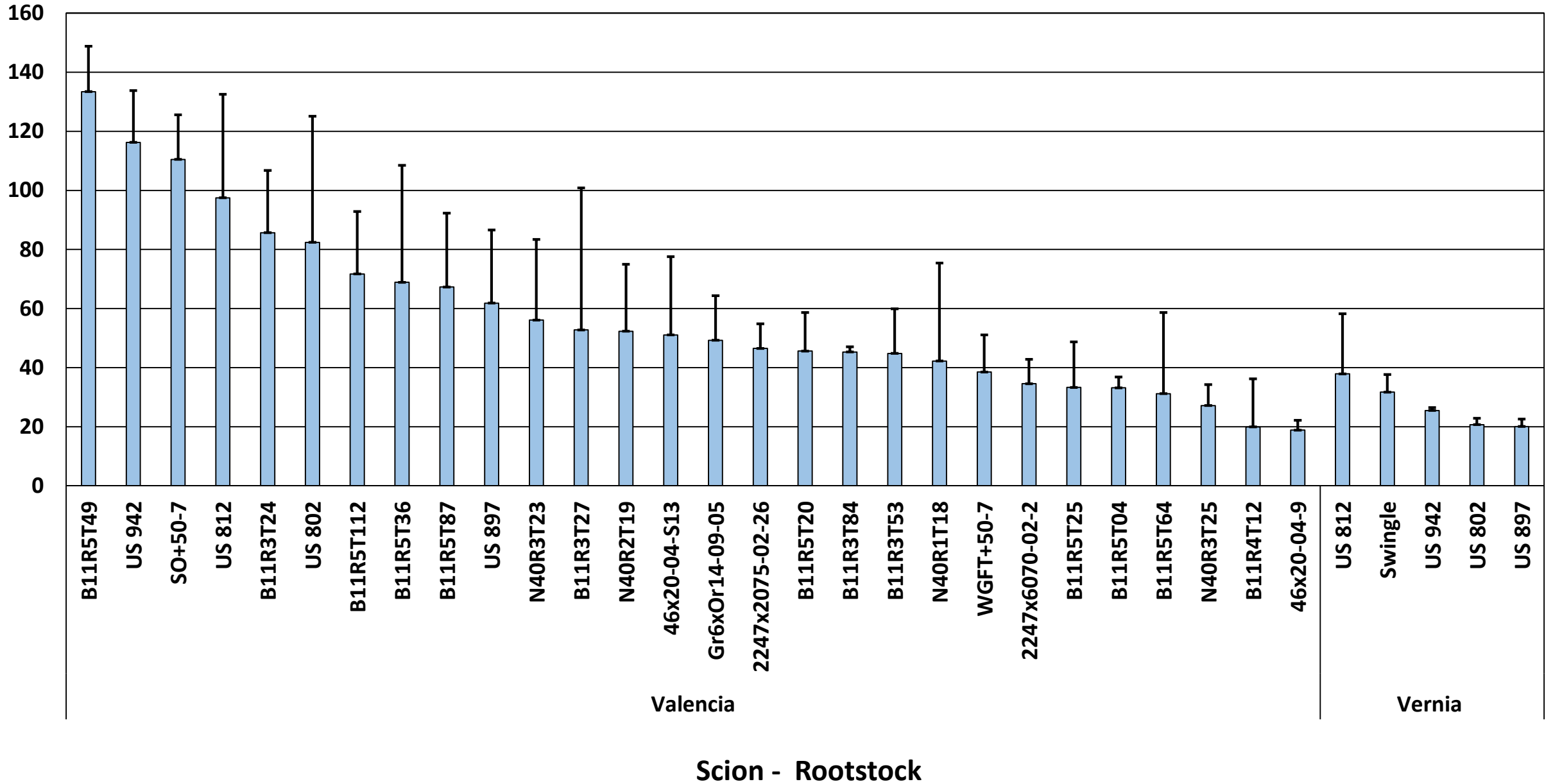


Fig. 16. V2017/45 – Trunk diameter: mean + std. dev. [in., May/21].

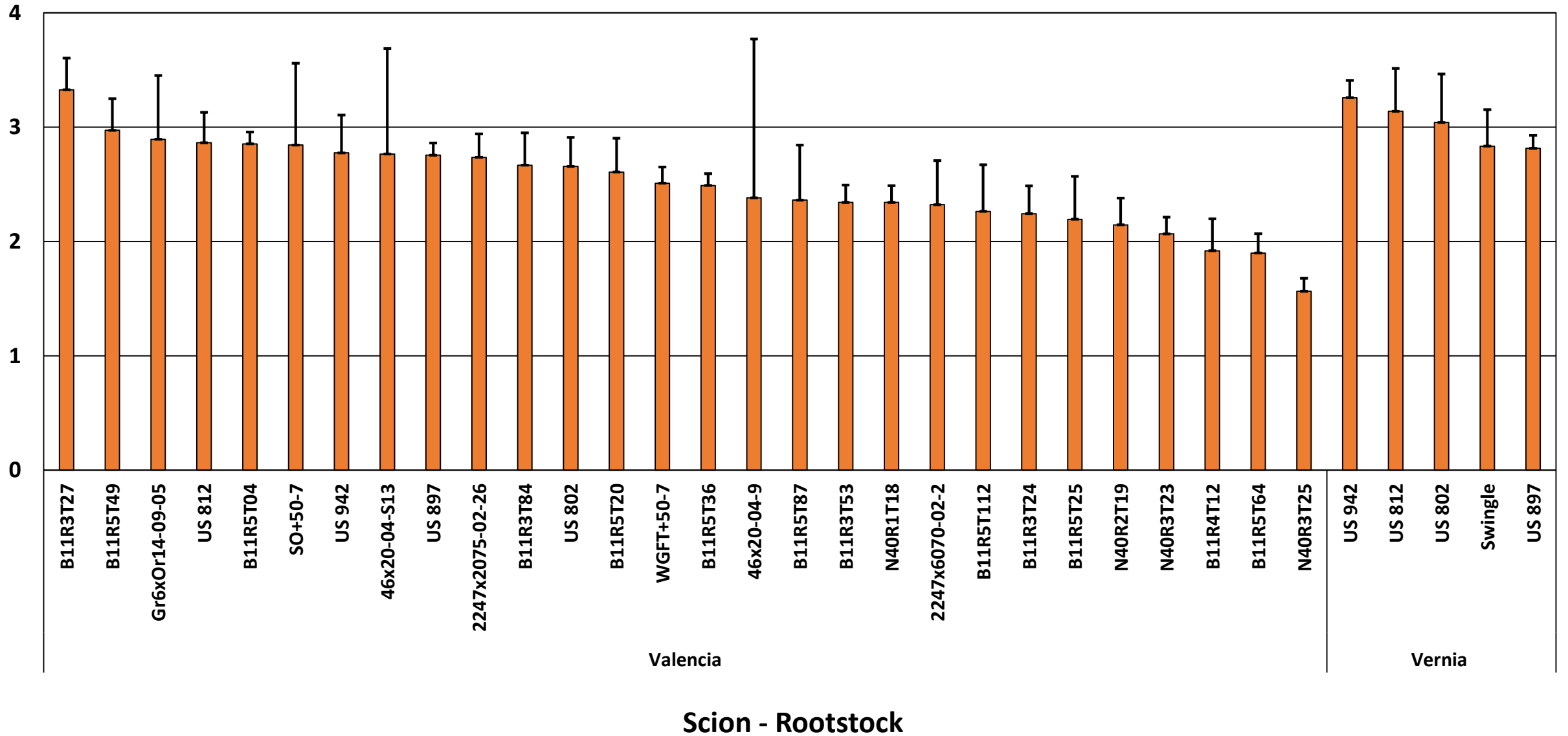


Fig. 17. V2017/45 – Tree height: mean + std. dev. [ft., May/21].

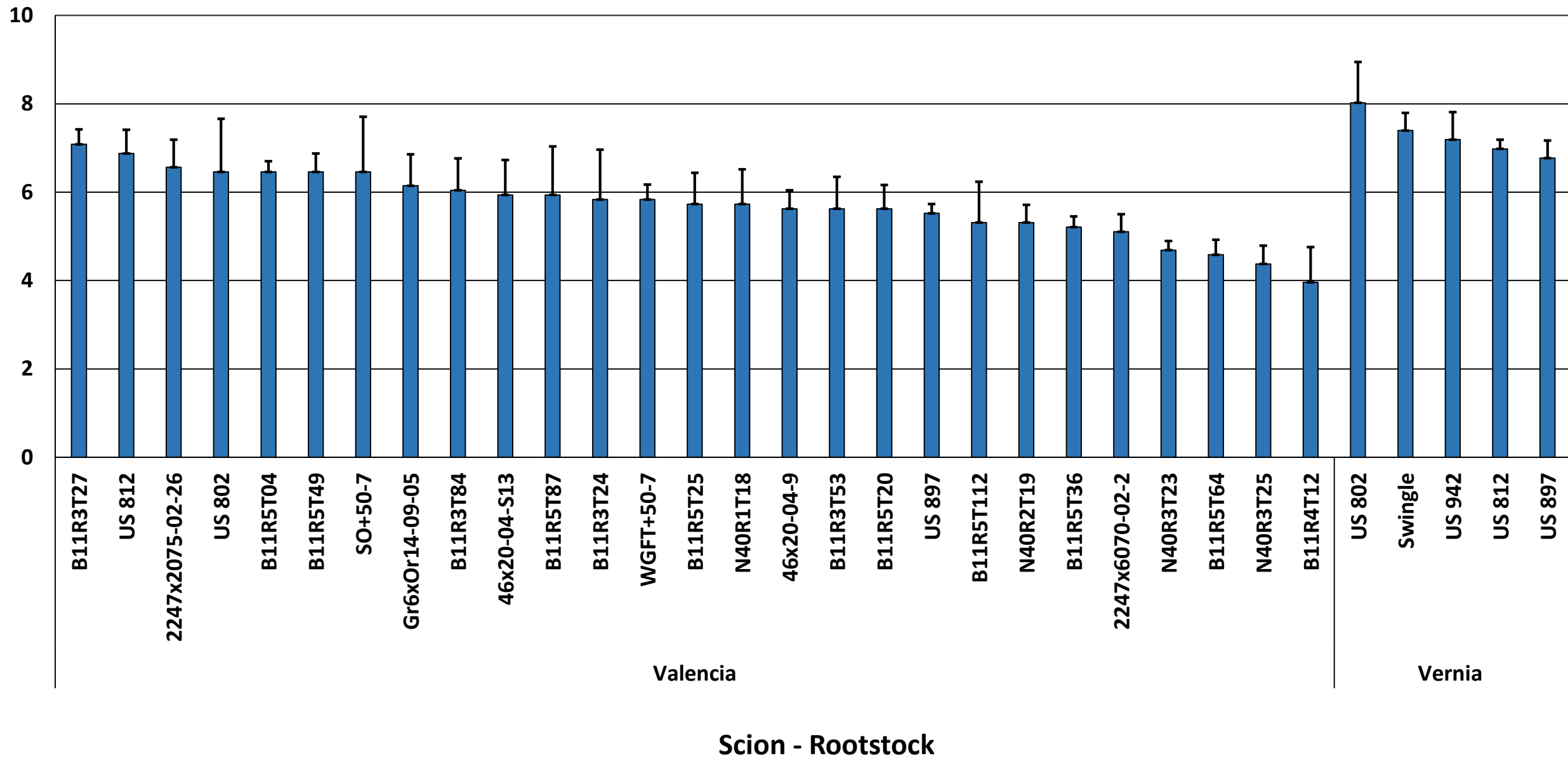


Fig. 18. V2017/45 – Canopy diameter: mean + std. dev. [ft., May/21].

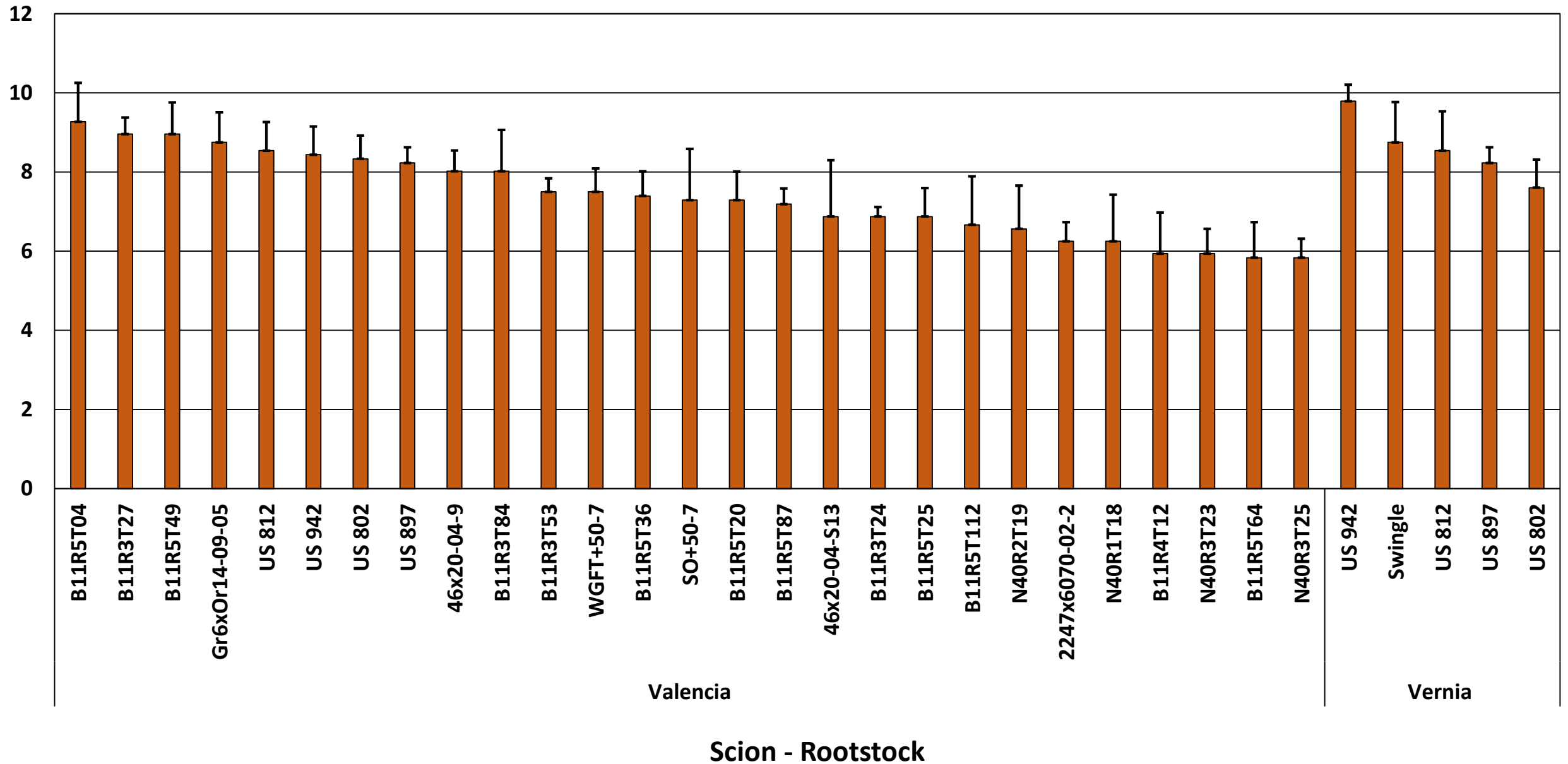


Fig. 19. V2017/45 – Canopy volume: mean [ft³., May/21].

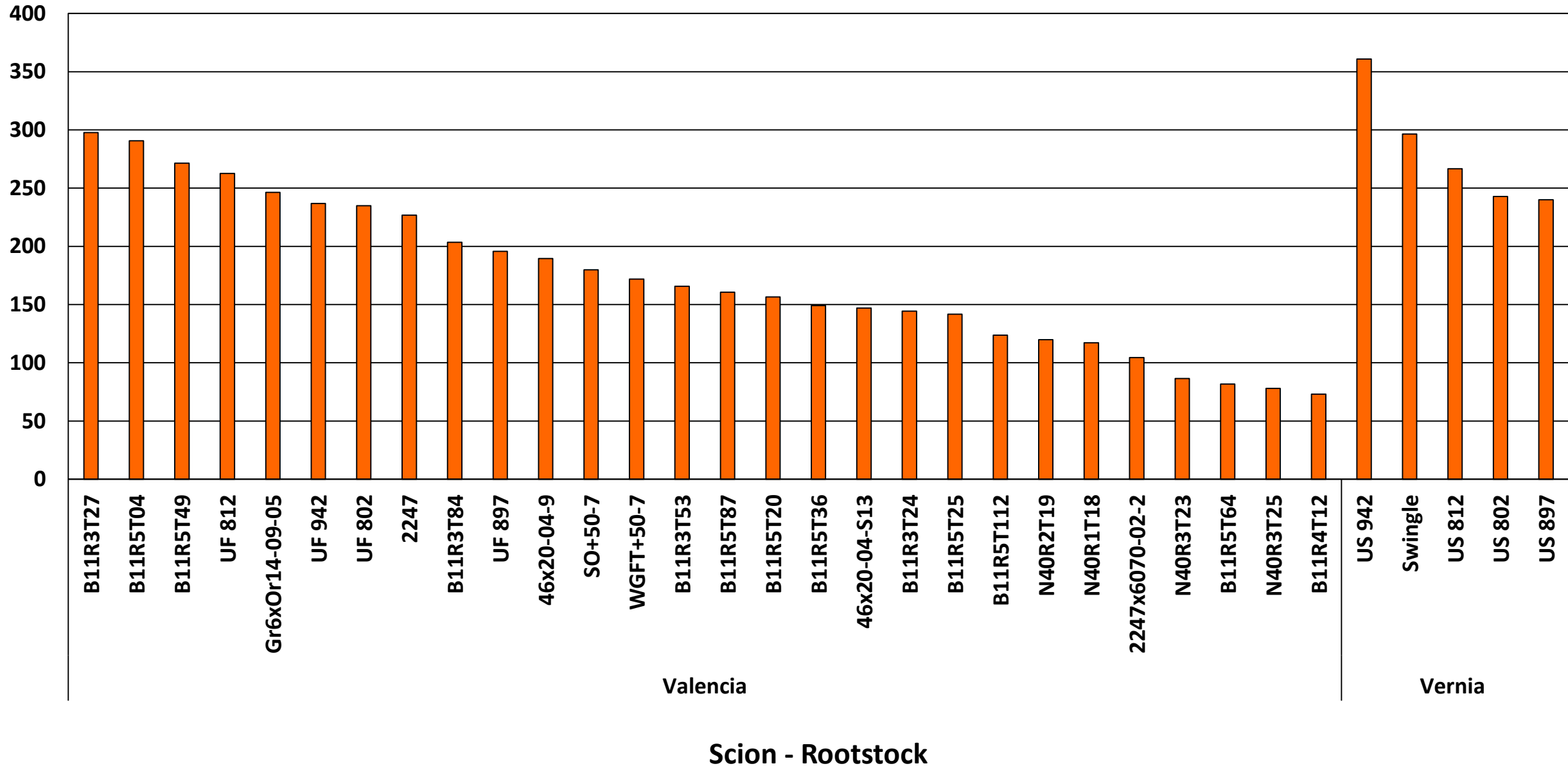
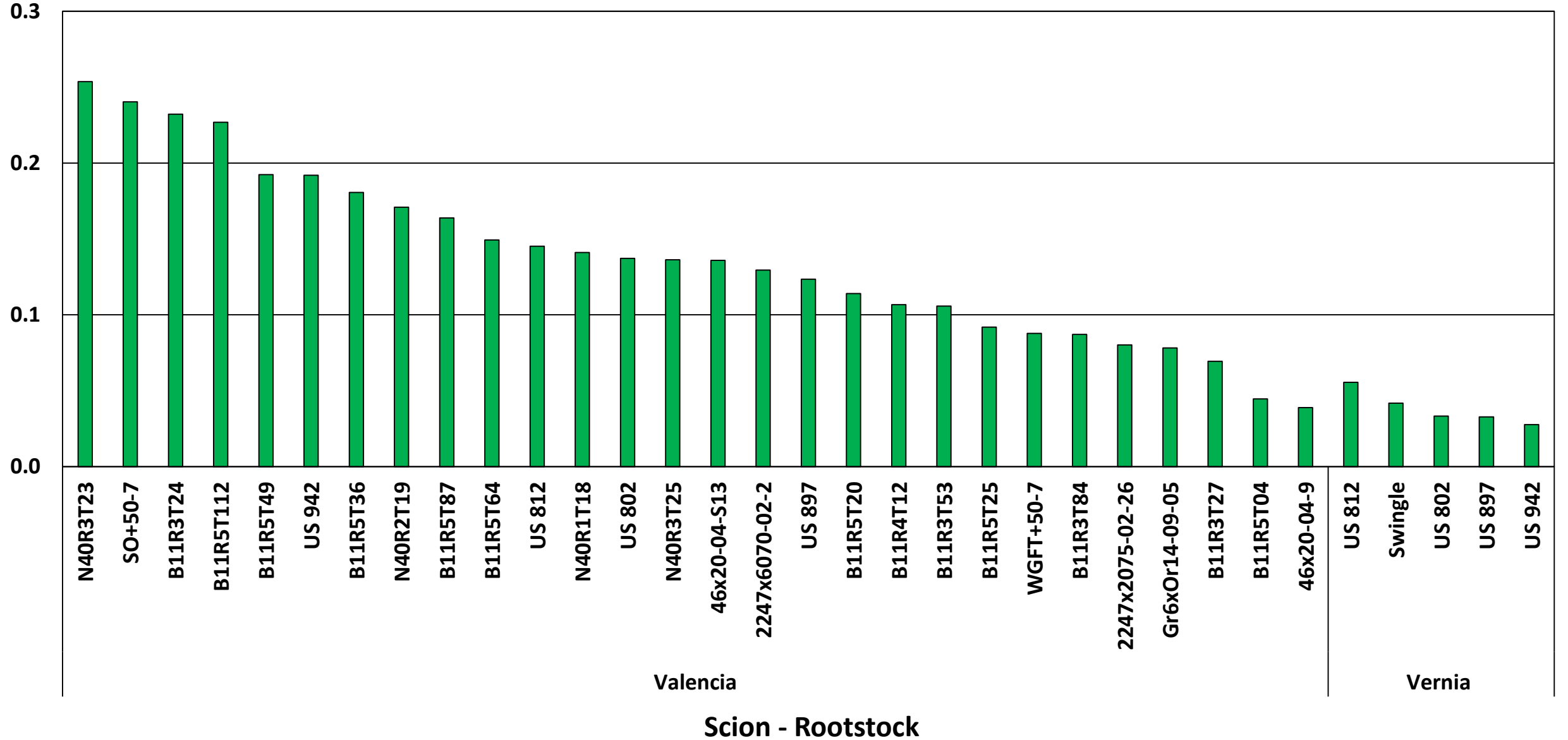


Fig. 20. V2017/45 – Yield efficiency: mean [lb./ft³., May/21].



Hamlin 2016/59

Fig. 21. H2016/59 – Trunk diameter: mean + std. dev. [in., June/21].

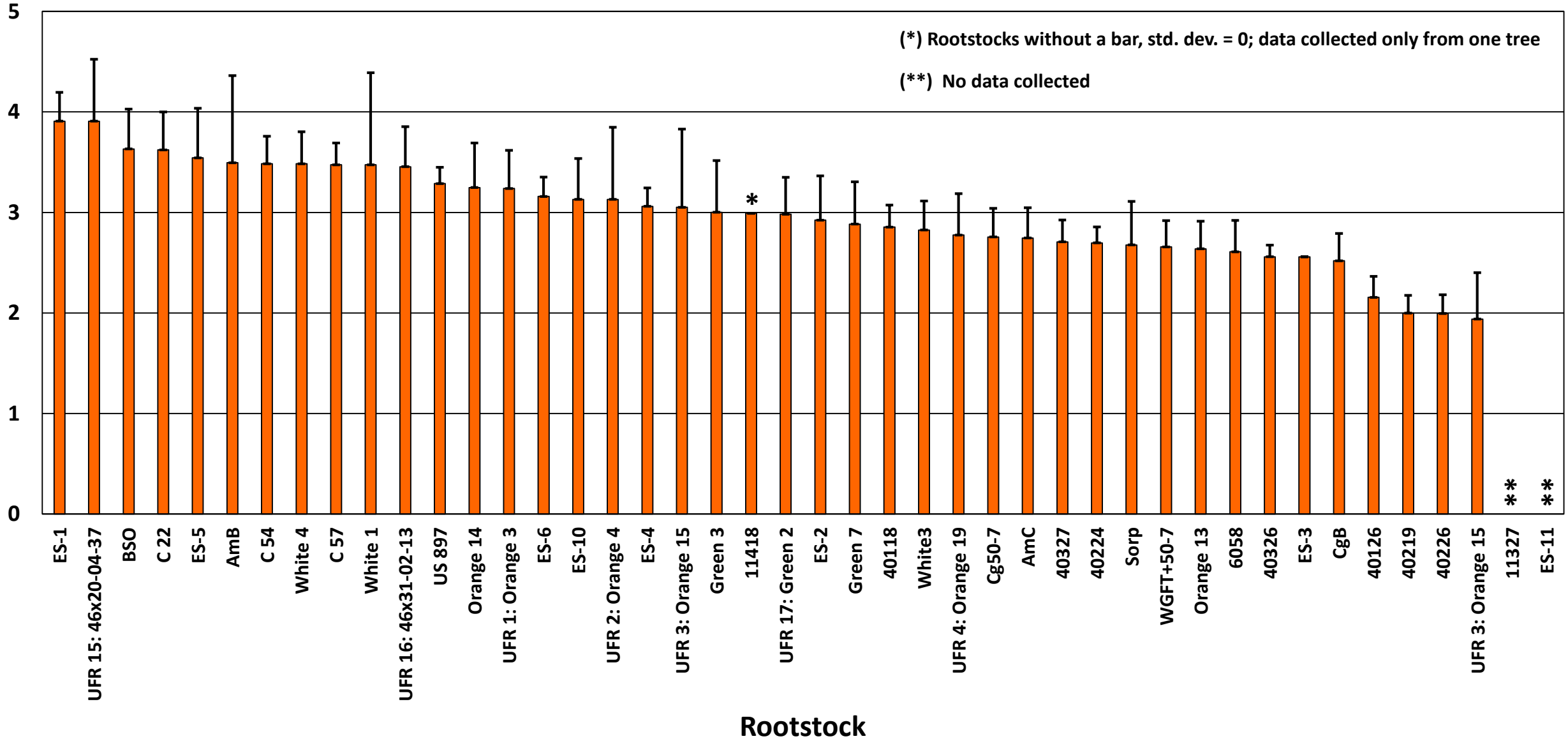


Fig. 22. H2016/59 – Tree height: mean + std. dev. [ft., June/21].

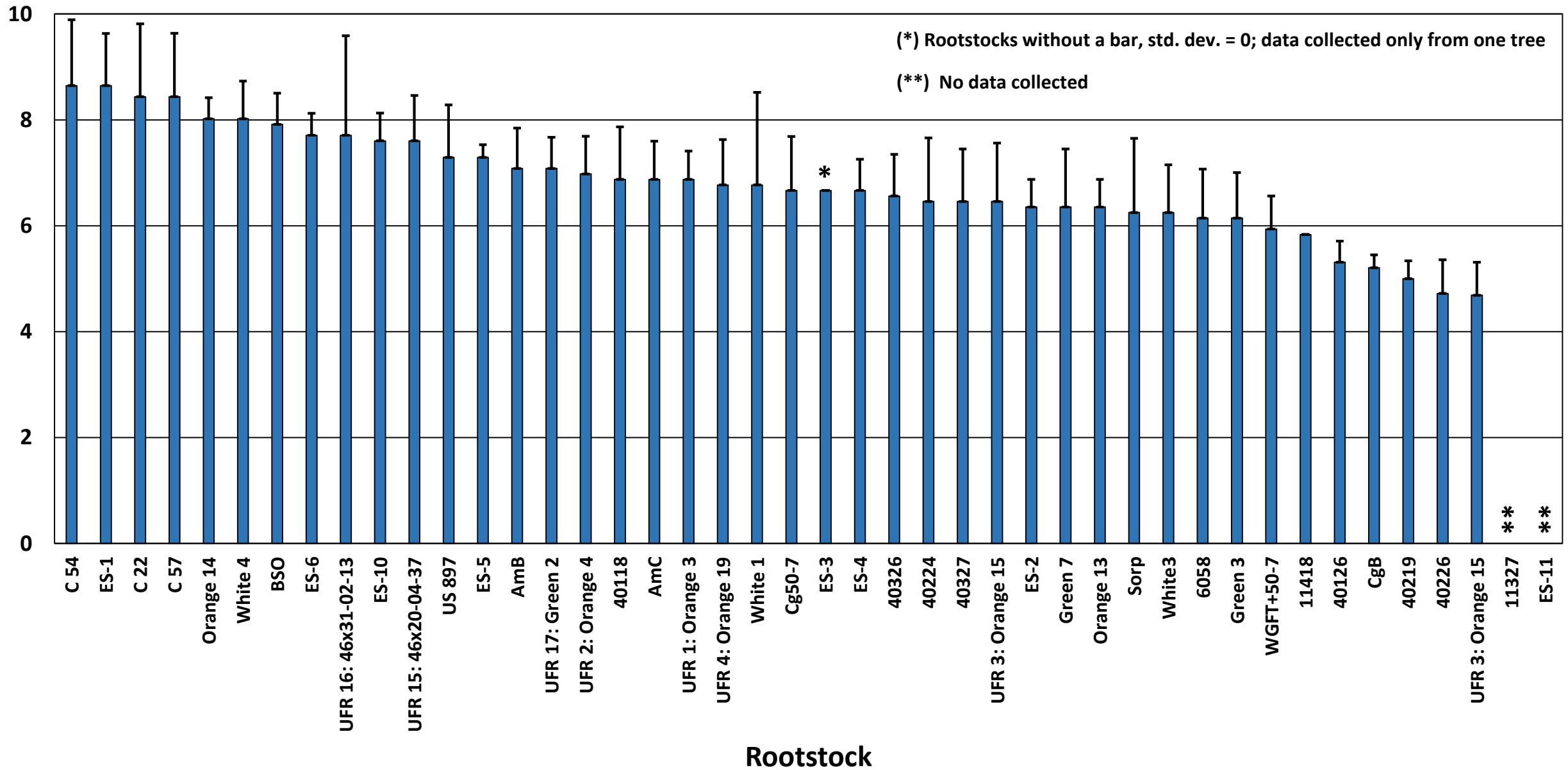


Fig. 23. H2016/59 – Canopy diameter: mean + std. dev. [ft., June/21].

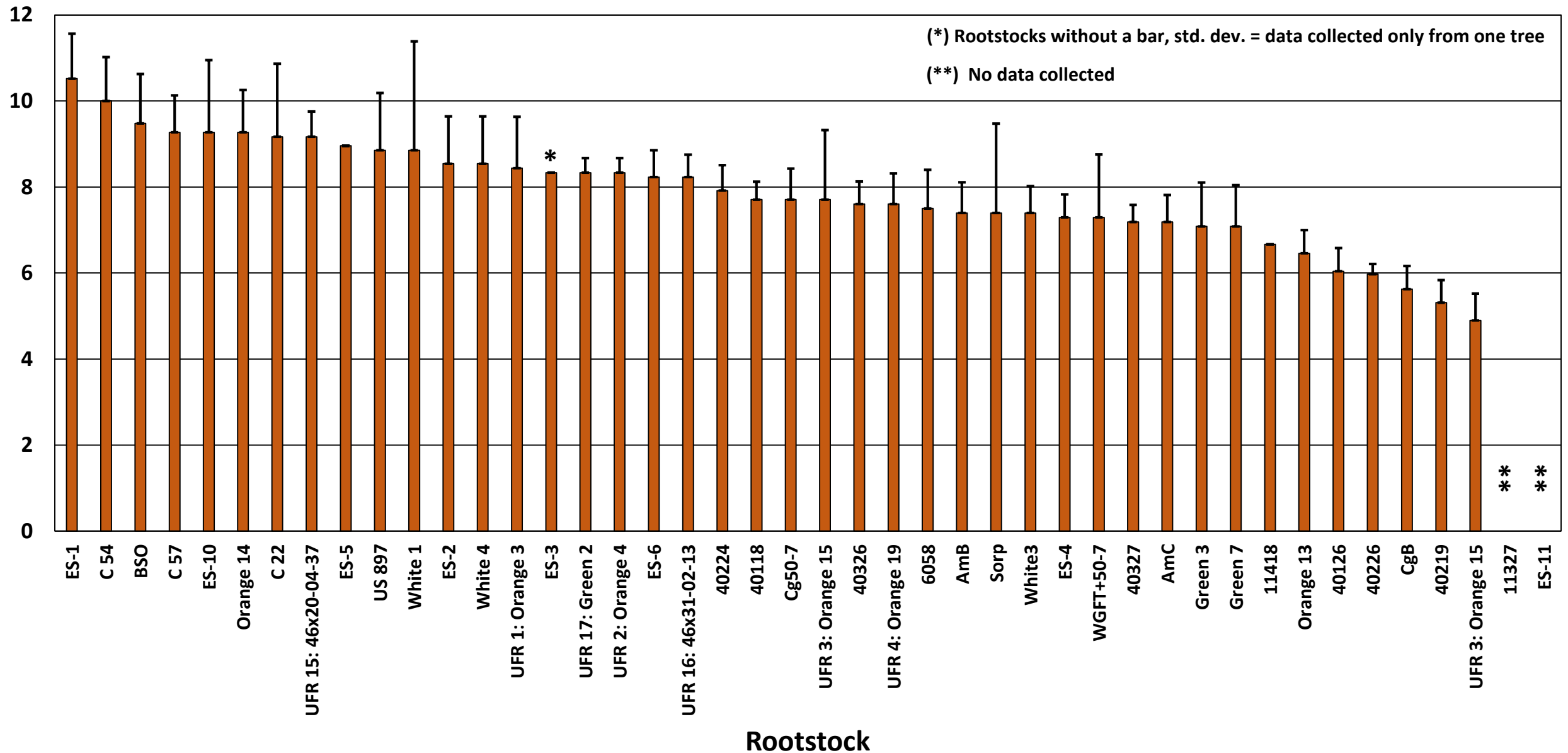
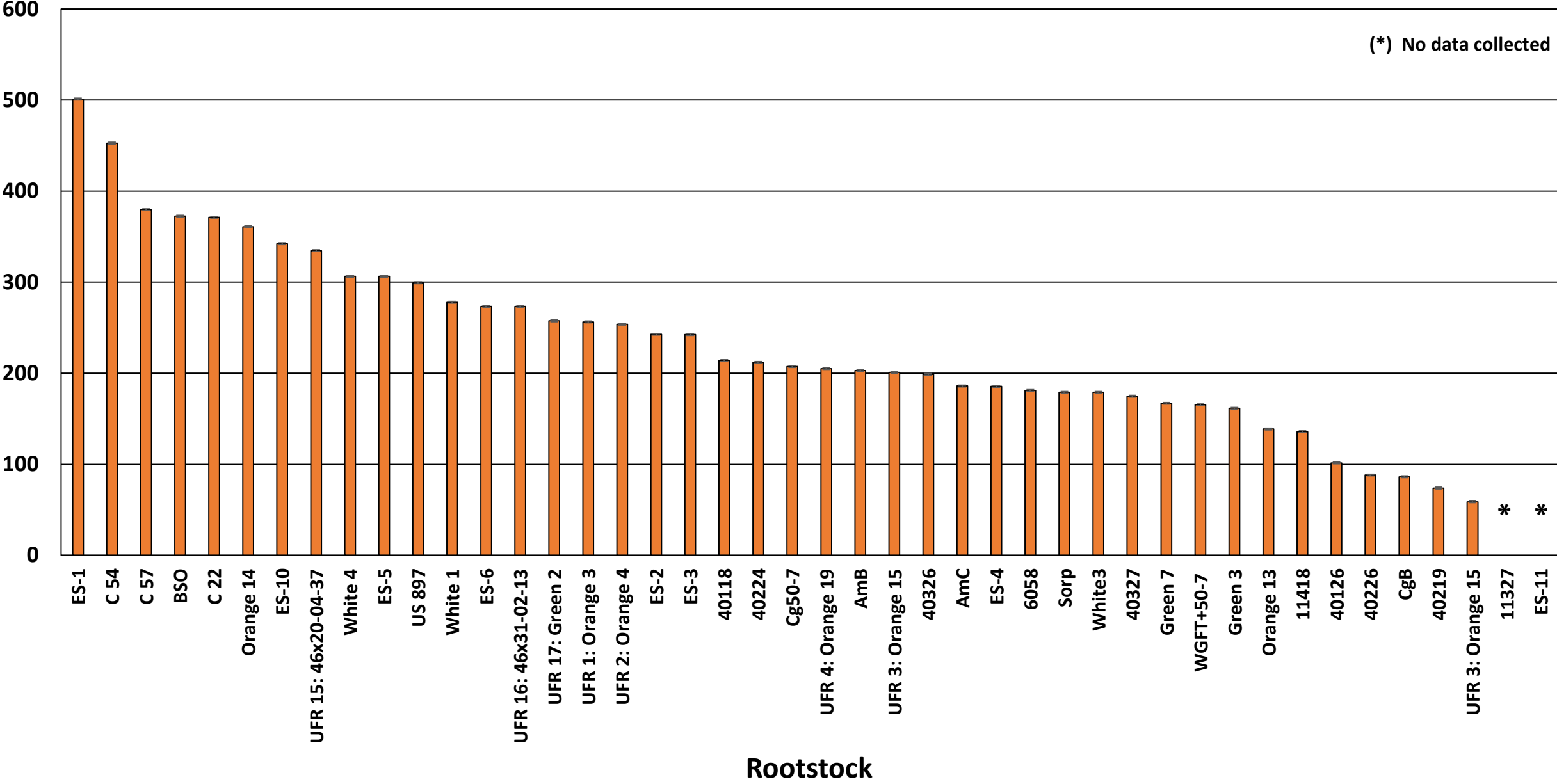


Fig. 24. H2016/59 – Canopy volume: mean [ft³., June/21].



Correlation Data

Table 5. Rootstock Evaluations - Correlation coefficients.

Block	Scion	Season	Rootstocks evaluated	Correlation [r]			
				Trunk diameter [ft.] vs. Canopy volume [ft ³ .]	Trunk diameter [ft.] vs. Tree height [ft.]	Canopy diameter [ft.] vs. Tree height [ft.]	Canopy volume [ft ³ .] vs. Tree height [ft.]
V2015/11	Valencia	2017/18	50	0.88	0.91	0.88	0.92
V2015/11	Valencia	2018/19	50	0.91	0.88	0.90	0.97
V2015/11	Valencia	2019/20	51	0.84	0.79	0.91	0.94
V2015/11	Valencia	2020/21	53	0.90	0.92	0.87	0.93
V2015/11	Valencia	2021/22	52	0.92	0.93	0.93	0.95
V2017/45	Valencia	2020/21	28	0.89	0.88	0.83	0.89
H2016/59	Hamlin	2020/21	42	0.85	0.88	0.91	0.94

Fig. 25. V2015/11 – Correlation: Trunk Diameter [ft.] vs Tree Height [ft.], 2021/22.

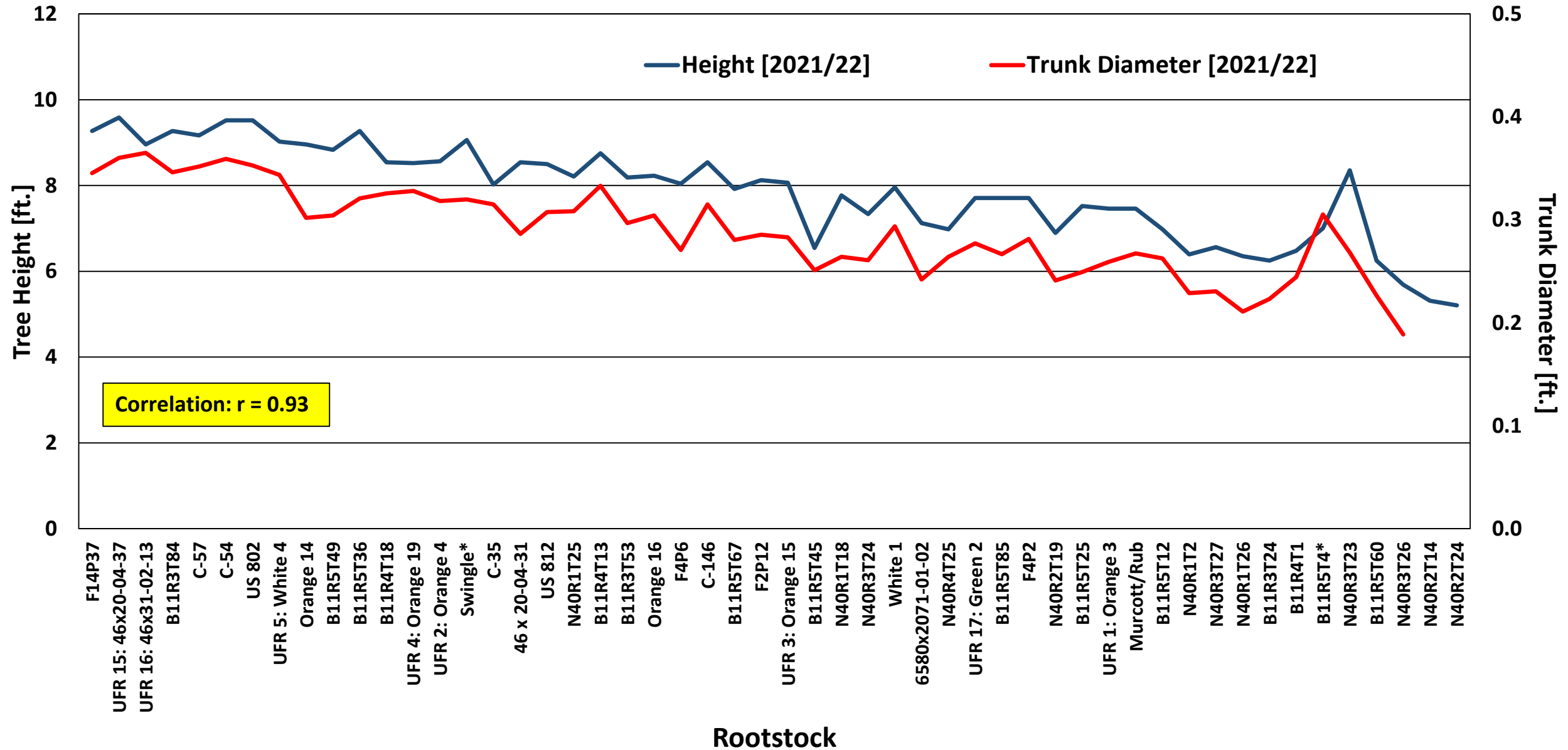


Fig. 26. V2015/11 – Correlation: Trunk Diameter [ft.] vs Canopy Volume [ft³.], 2021/22.

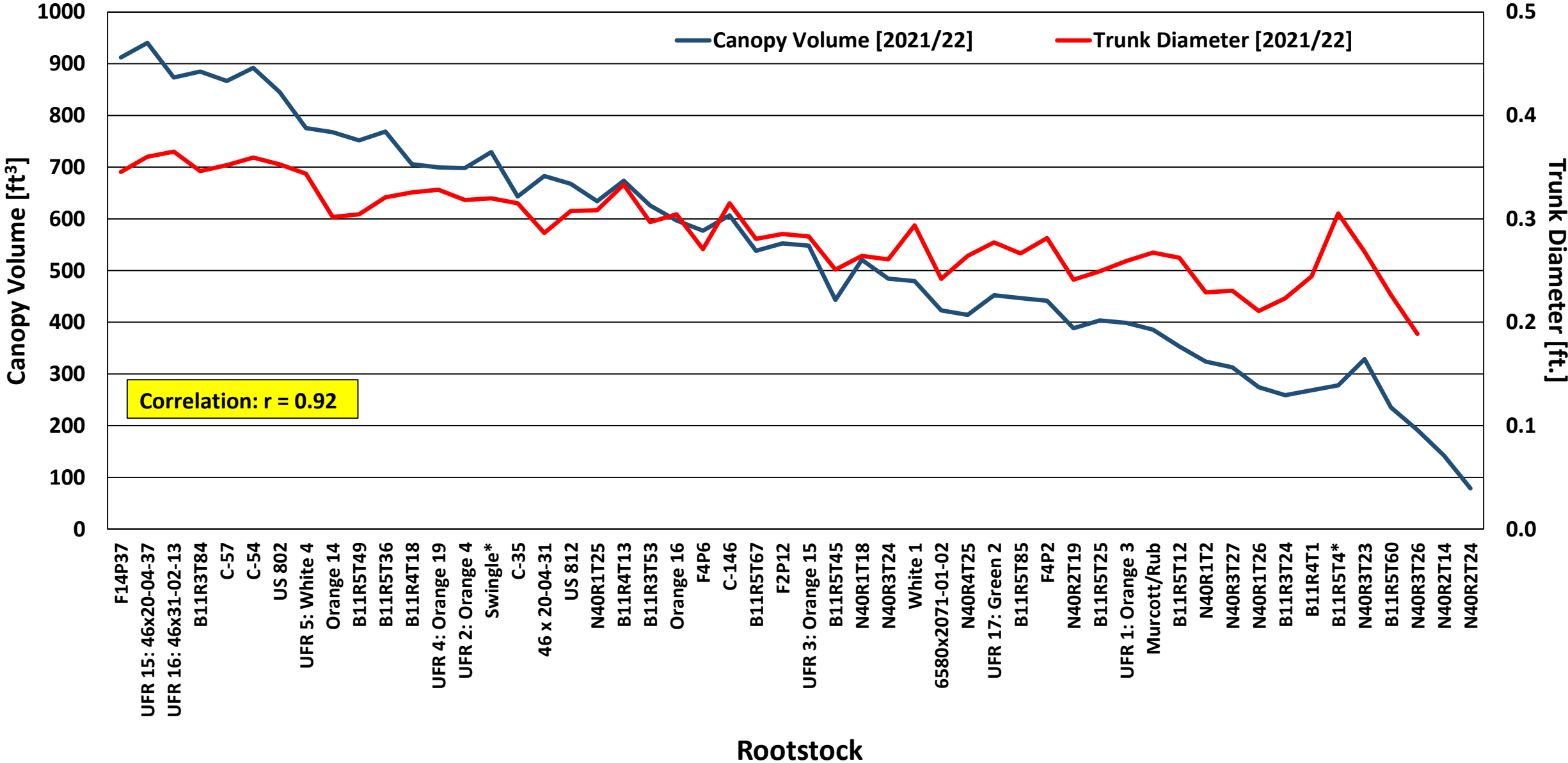


Fig. 27. V2015/11 – Correlation: Canopy Diameter [ft.] vs Tree Height [ft.], 2021/22.

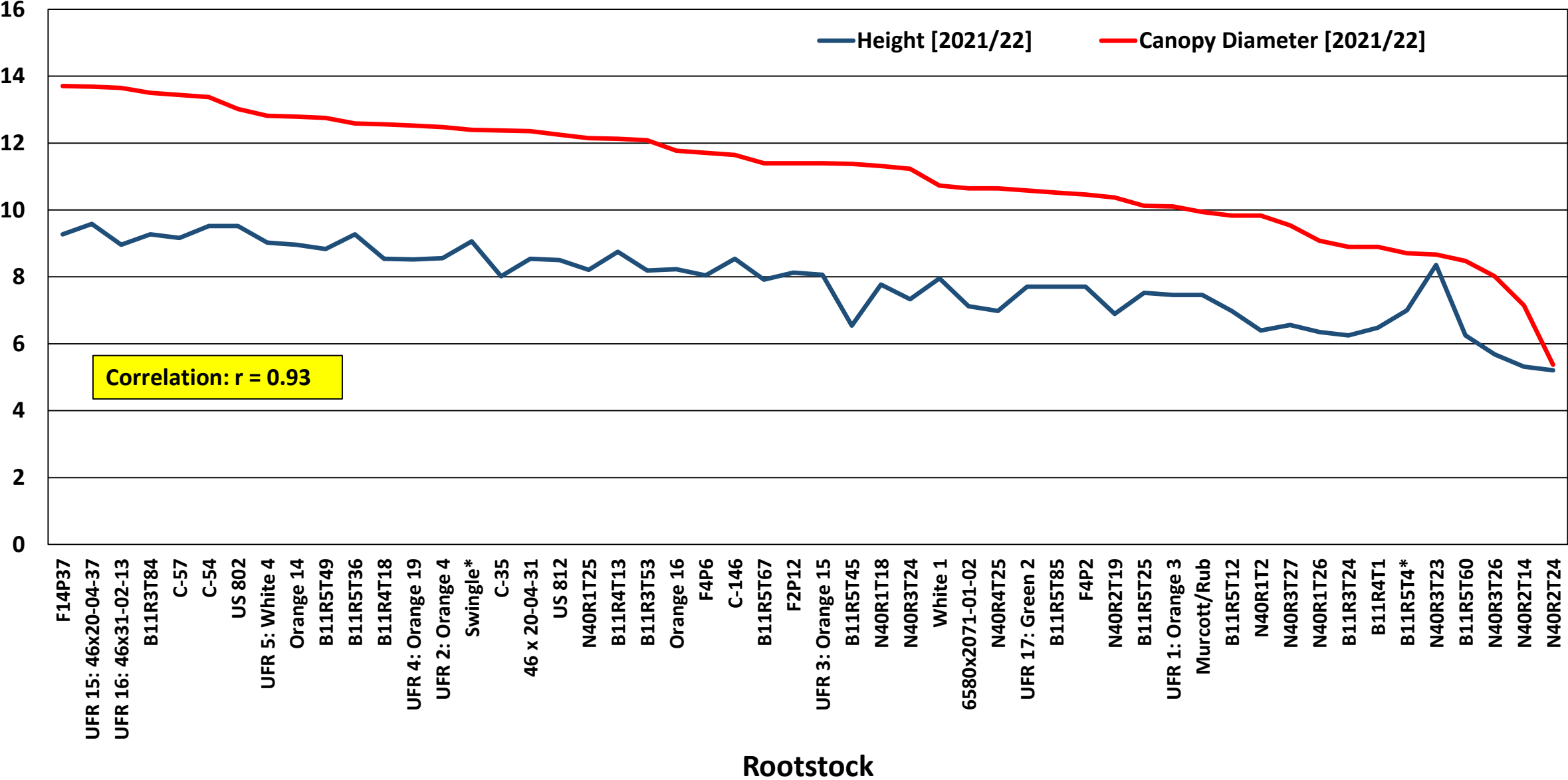


Fig. 28. V2015/11 – Correlation: Canopy Volume [ft³.] vs Tree Height [ft.], 2021/22.

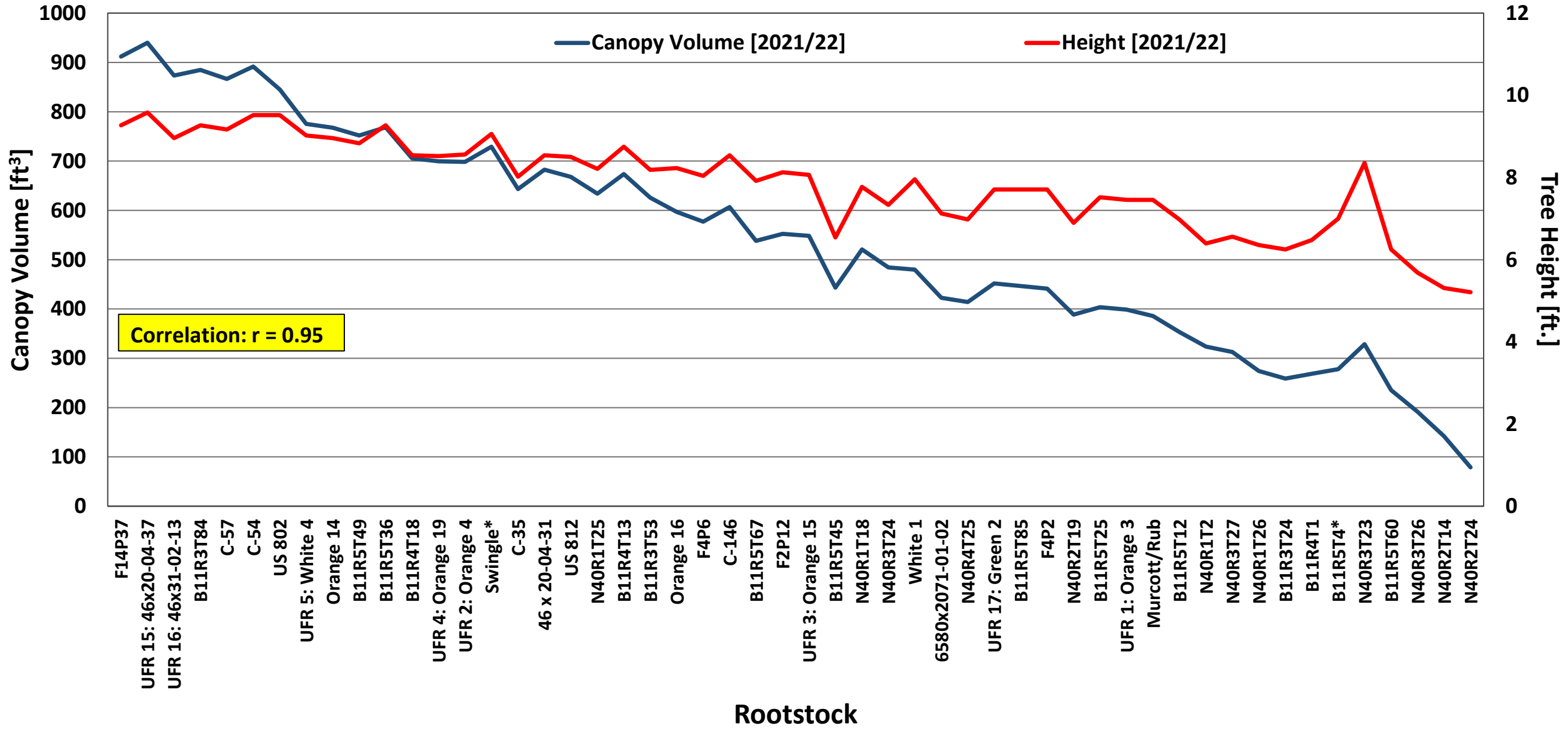


Fig. 29. V2017/45 – Correlation: Trunk Diameter [ft.] vs Tree Height [ft.], 2020/21.

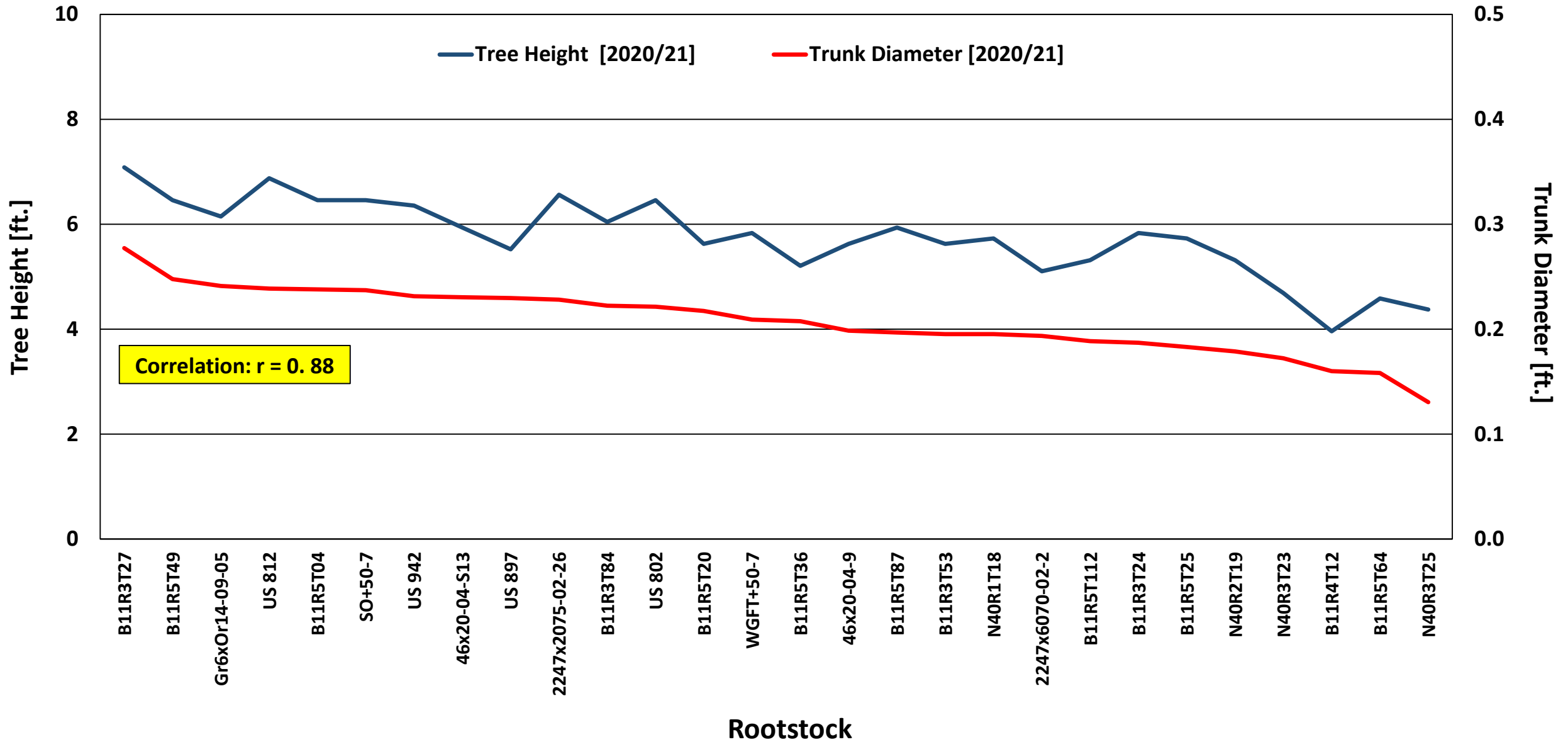


Fig. 30. V2017/45 – Correlation: Canopy Volume [ft³.] vs Trunk Diameter [ft.], 2020/21.

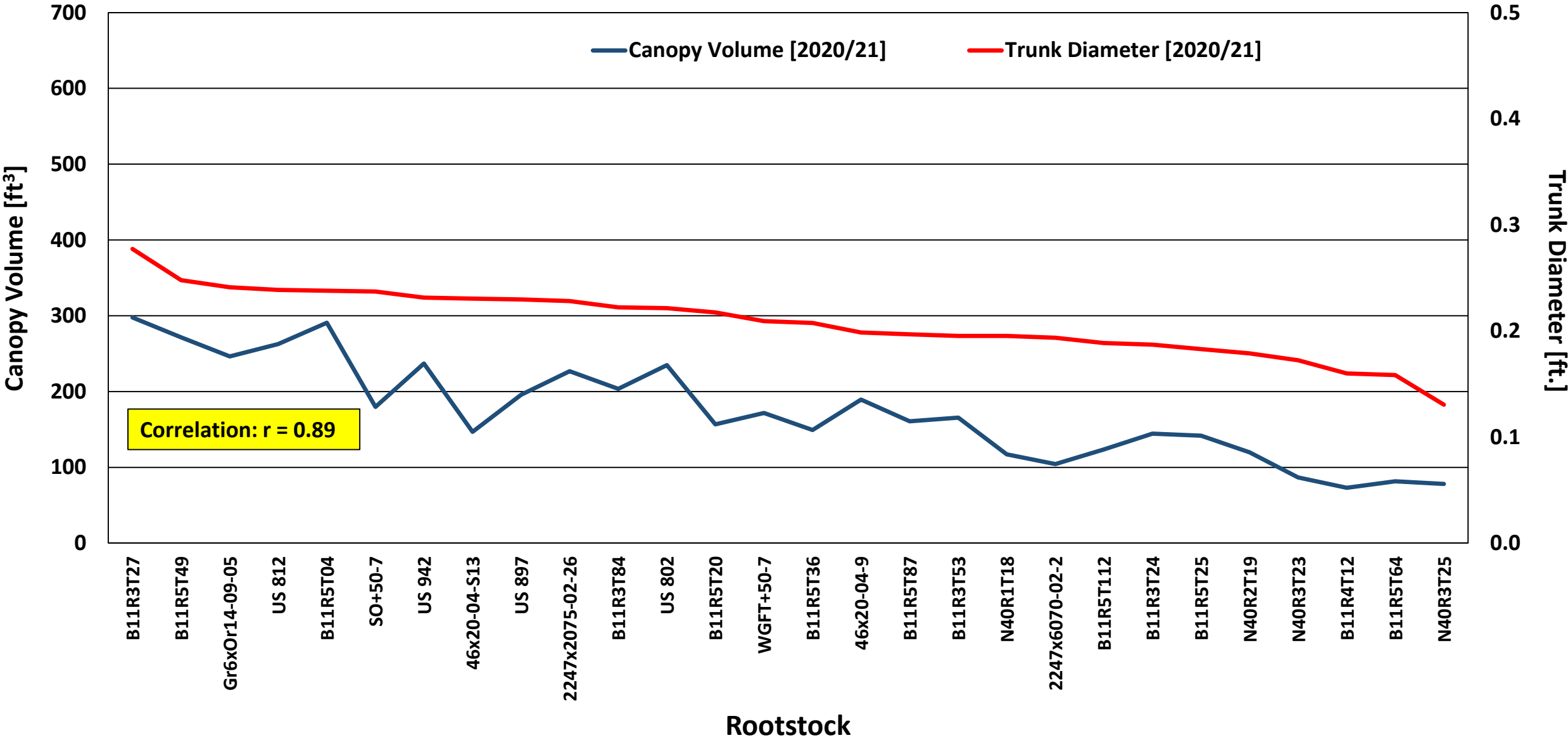


Fig. 31. V2017/45 – Correlation: Canopy diameter [ft.] vs Tree Height [ft.], 2020/21.

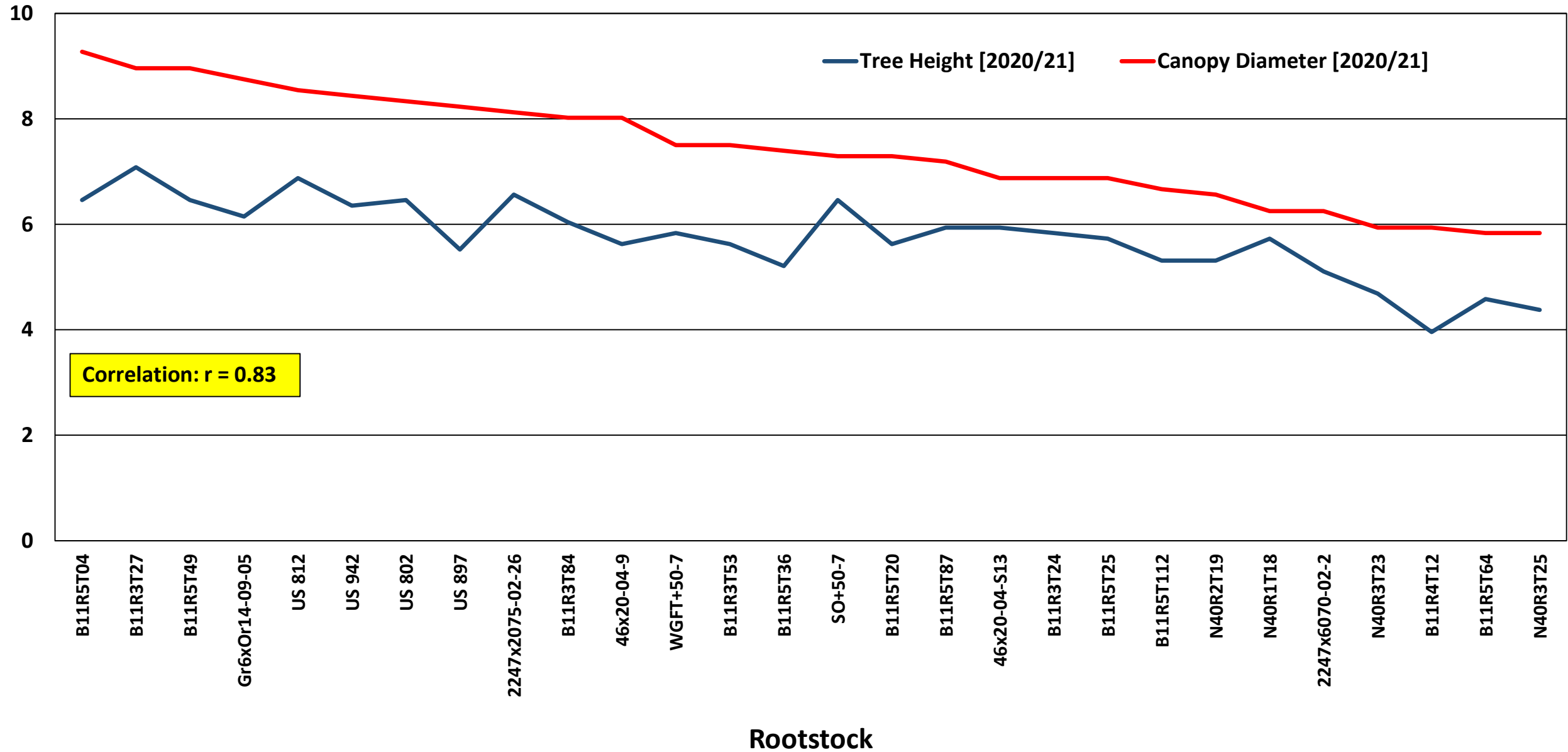


Fig. 32. V2017/45 – Correlation: Canopy Volume [ft³.] vs Tree Height [ft.], 2020/21.

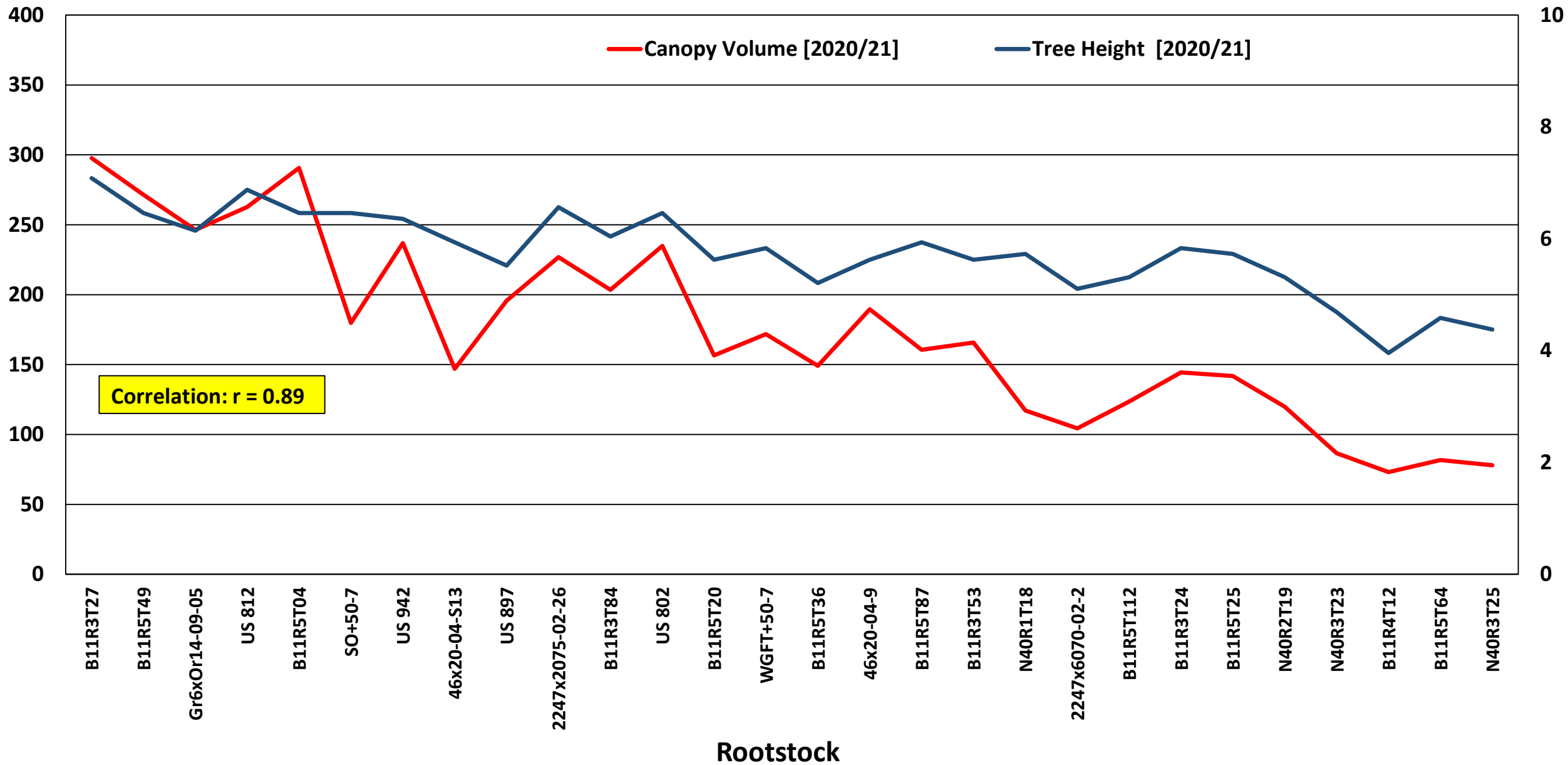


Fig. 33. H2016/59 – Correlation: Trunk diameter [ft.] vs Tree Height [ft.], 2020/21.

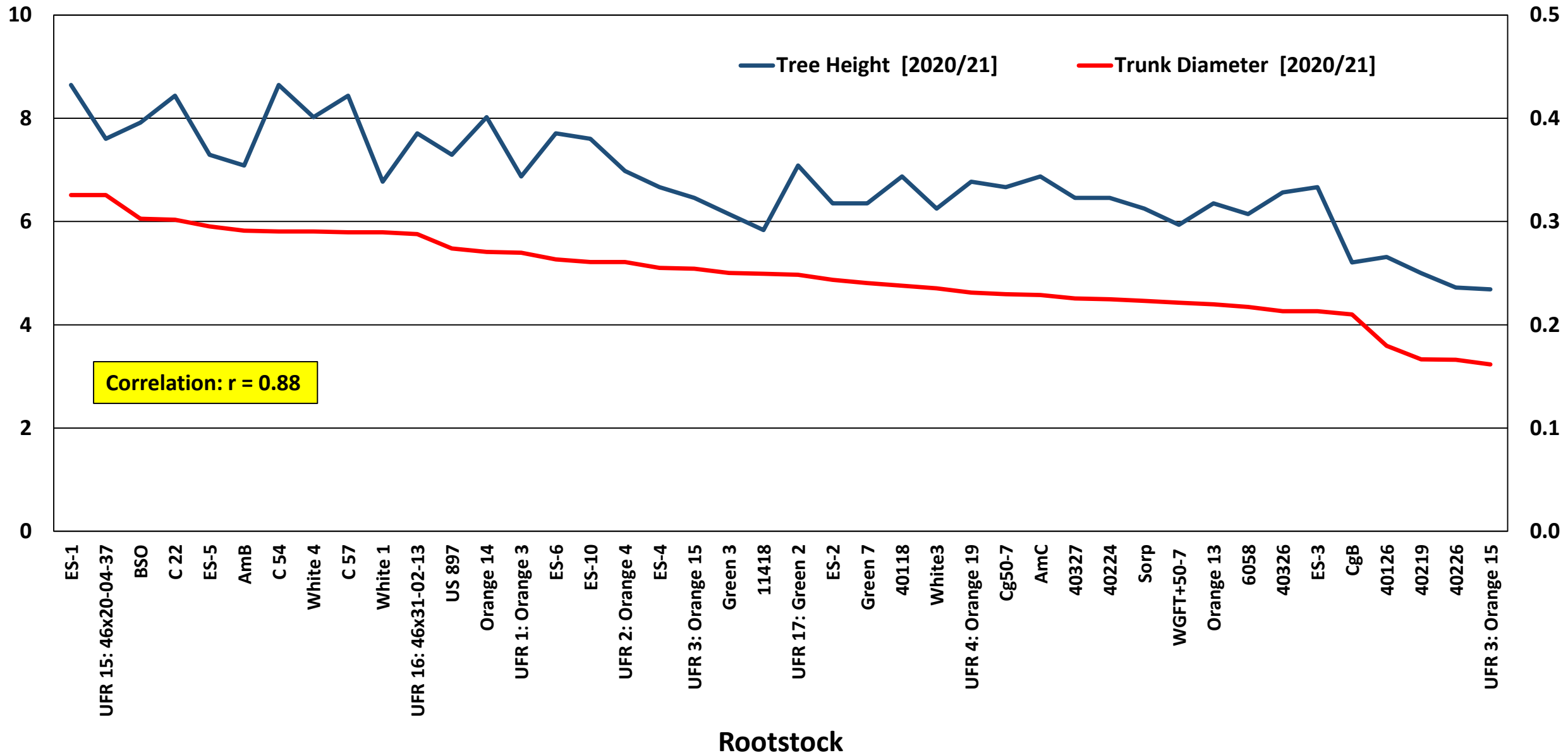


Fig. 34. H2016/59 – Correlation: Trunk diameter [ft.] vs Canopy Volume [ft³.], 2020/21.

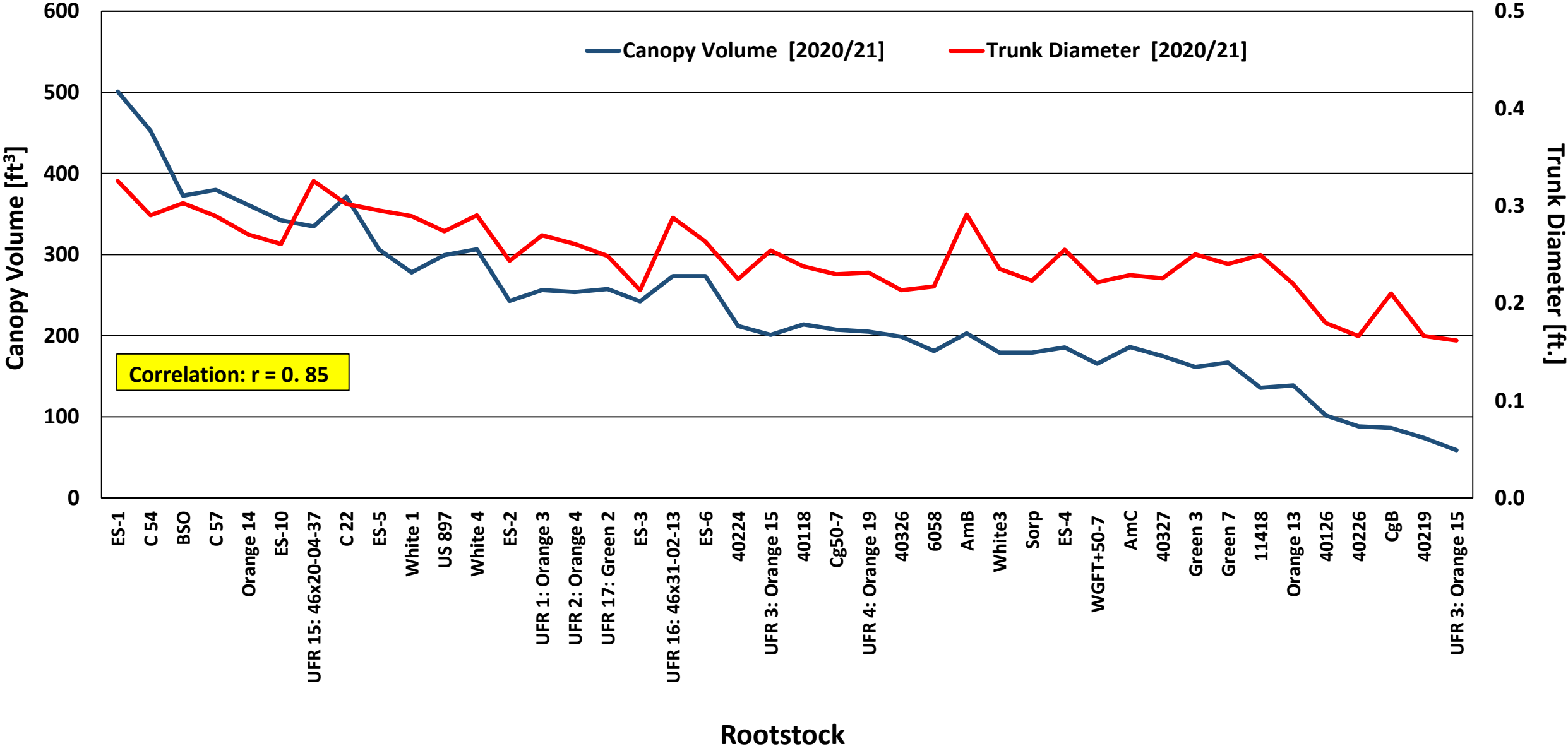


Fig. 35. H2016/59 – Correlation: Canopy Diameter [ft.] vs Tree Height [ft.], 2020/21.

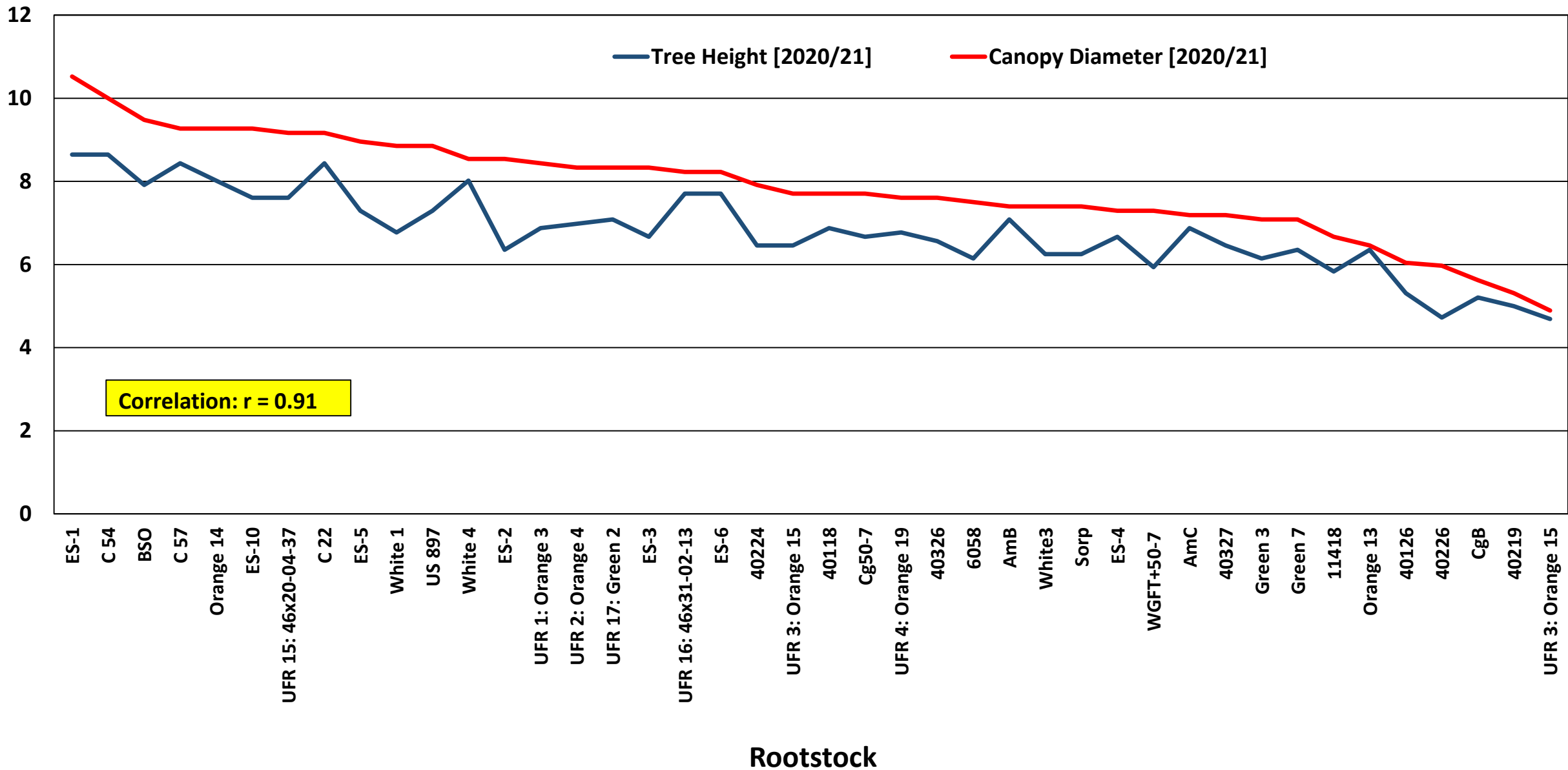


Fig. 36. H2016/59 – Correlation: Canopy Volume [ft³.] vs Tree Height [ft.], 2020/21.

