Dwarfing Rootstocks for Stone Fruit

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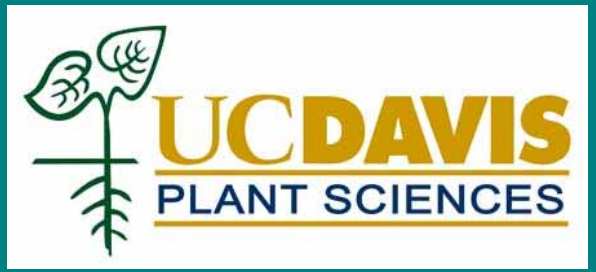


Nemaguard

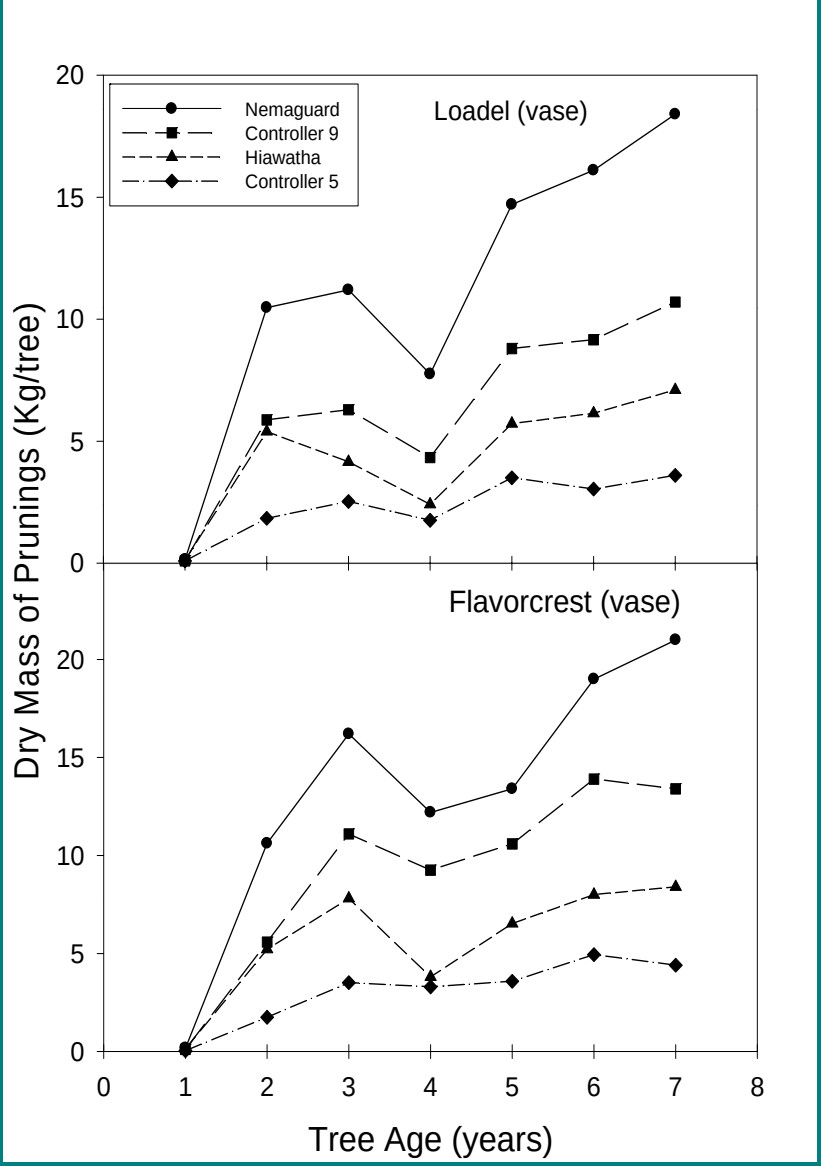
Controller 9 (P30-135)

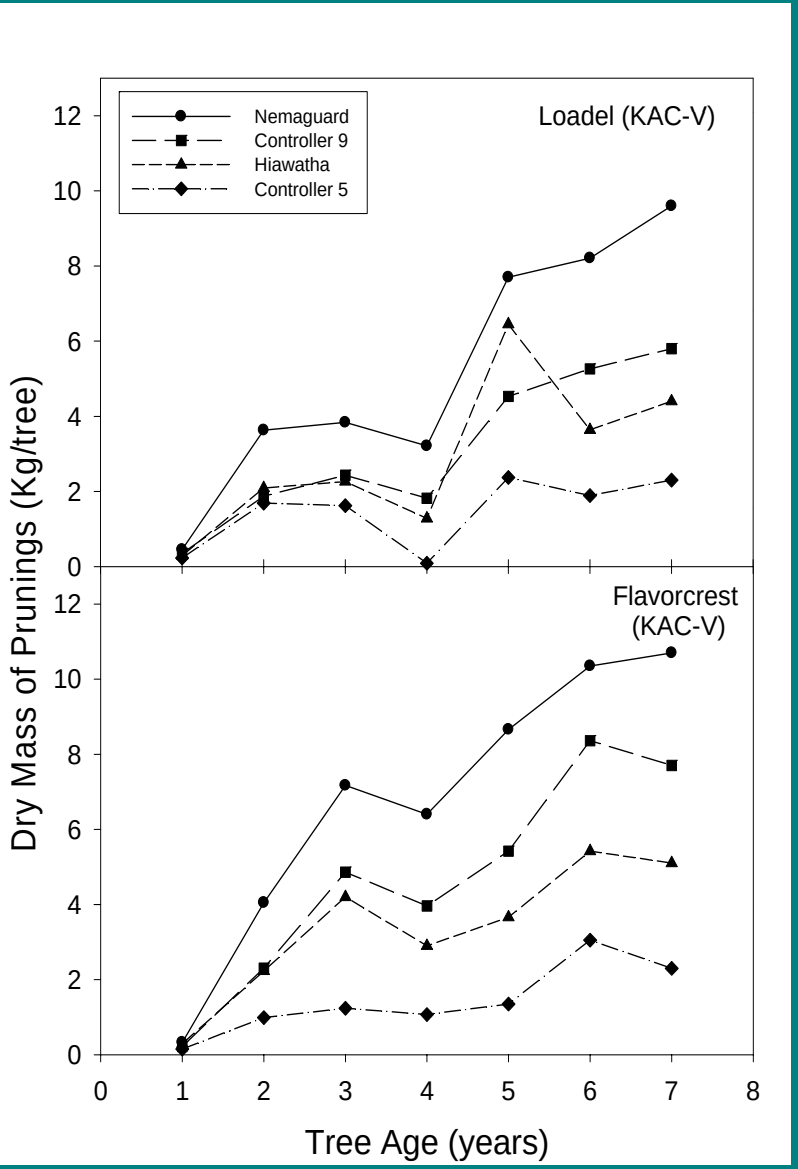
Hiawatha

Controller 5 (K146-43)

After 12 growing seasons trees on Controller 9 had trunk circumferences (cm) that were nearly the same as trees on Nemaguard but trees on Hiawatha and Controller 5 were substantially smaller. Trunk circumferences of the KAC-V trees were also smaller than open vase trees.

Rootstock	Loadel		Flavorcrest	
	Open Vase	KAC-V	Open Vase	KAC-V
Nemaguard	78.1±0.68	54.6±0.96	90.2±1.97	62.6±1.17
Controller 9	72.2±2.11	52.6±2.21	86.3±2.59	63.4±3.75
Hiawatha	63.0±1.28	45.8±1.34	68.7±2.24	49.4±2.31
Controller 5	53.0±0.36	38.1±1.69	61.7±1.18	41.6±0.39



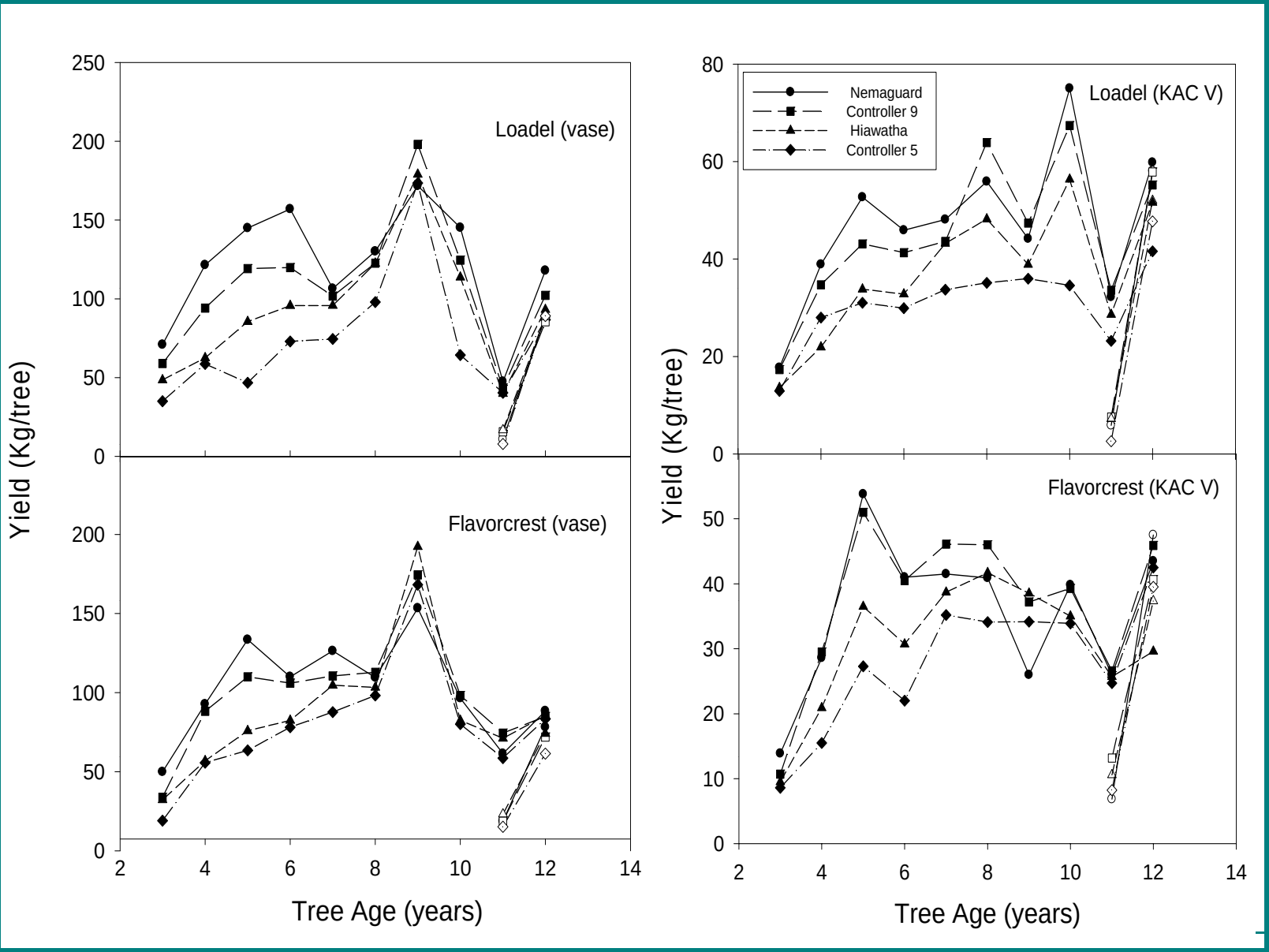


Differences in vegetative vigor (as reflected by pruning weights) among trees on different rootstocks were apparent very early in the trial and remained fairly consistent. The differences in vigor are essentially the selling points of the size-controlling rootstocks.

After harvest in the 10th season one-half of the trees in each treatment were cut back to ~2.4 m.

Nemaguard

Controller 5



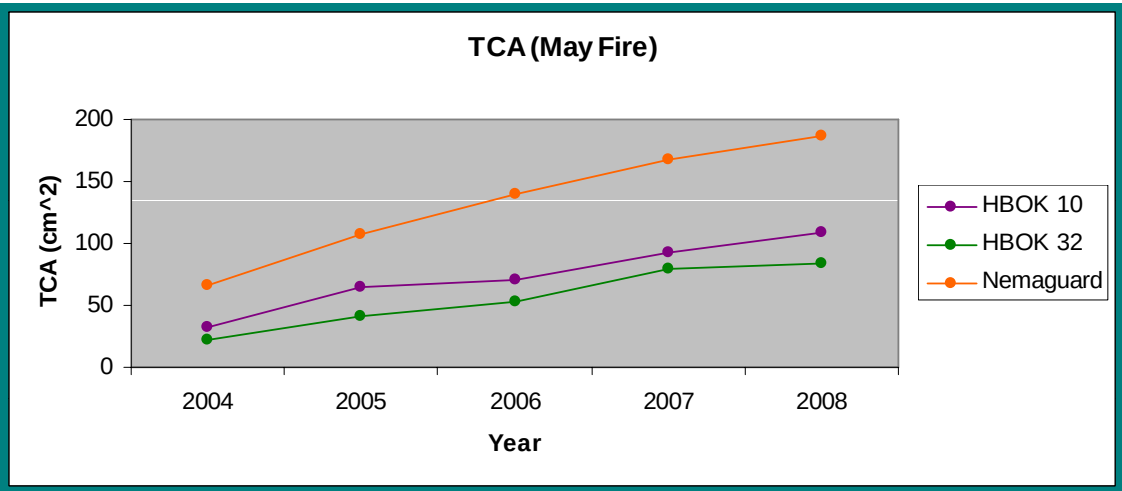
Yield differences among trees on the 4 rootstocks were most apparent before trees reached the heights that they were limited to by pruning (~8 yrs). Severe topping to ~2.4m (open symbols) drastically reduced yields in yr 11 but they recovered in year 12. The severe topping treatment indicated that the size-controlling rootstocks may be of particular value in "pedestrian" orchards.

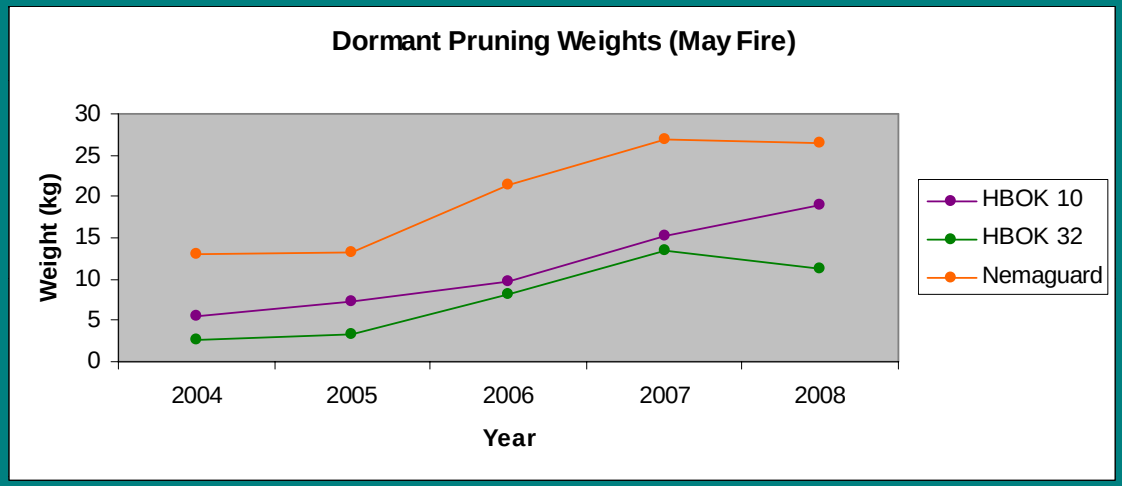
Rootstock		KAC-V							
		LOADEL				FLAVORCREST			
	Topping Treatment	Crop wght/tr (kg)	Mean fruit weight (gm)	Mean crop load (#fruit/tr)	Fruit wght/TCA (kg/cm^2)	Crop wght/tr (kg)	Mean fruit weight (gm)	Mean crop load (#fruit/tr)	Fruit wght/TCA (kg/cm^2)
Nemaguard	Topped 3.3m	59.8	156.0	384	0.25	43.5	138.8	314	0.14
	Topped 2.4m	58.1	142.2	409	0.24	47.5	132.2	359	0.15
Controller 9	Topped 3.3m	55.2	146.0	378	0.25	45.9	124.6	369	0.14
	Topped 2.4m	57.9	132.0	437	0.26	40.6	128.4	317	0.13
Hiawatha	Topped 3.3m	51.6	146.7	352	0.31	29.6	129.5	228	0.15
	Topped 2.4m	52.0	129.8	400	0.31	37.4	126.4	296	0.19
Controller 5	Topped 3.3m	41.6	136.2	305	0.36	42.5	117.8	360	0.31
	Topped 2.4m	47.7	110.6	432	0.41	39.5	111.7	354	0.28
		OPEN VASE							
Nemaguard	Topped 3.3m	117.9	148.4	795	0.24	88.4	143.9	614	0.14
	Topped 2.4m	88.7	175.2	506	0.18	78.2	146.6	534	0.12
P-30-135	Topped 3.3m	102.2	124.9	818	0.25	84.9	116.8	727	0.14
	Topped 2.4m	85.0	142.5	600	0.20	72.0	113.7	633	0.12
Hiawatha	Topped 3.3m	93.13	125.4	742	0.29	85.5	116.1	736	0.23
	Topped 2.4m	88.56	133.9	661	0.28	74.1	106.6	695	0.20
K-146-43	Topped 3.3m	86.76	122.0	711	0.38	83.4	120.5	692	0.27
	Topped 2.4m	89.09	125.0	713	0.39	61.4	118.6	518	0.20

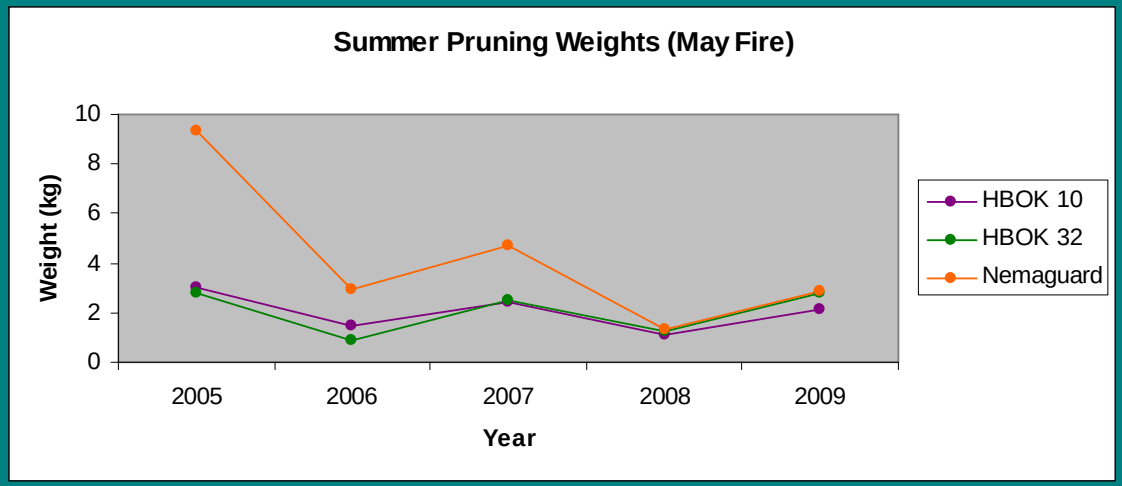
New Series of Rootstocks

- HBOK 32 (Controller 7)
- HBOK 10 (Controller 8)
- HBOK 50 (Controller 9.5)
  - All of these are hybrids between “Harrow Blood” and “Okinawa” peach
  - Therefore they are 100% peach
  - They are all resistant to root-knot nematode
  - They must be vegetatively propagated
  - They will be available for commercial propagation in 2010 and sale in 2011

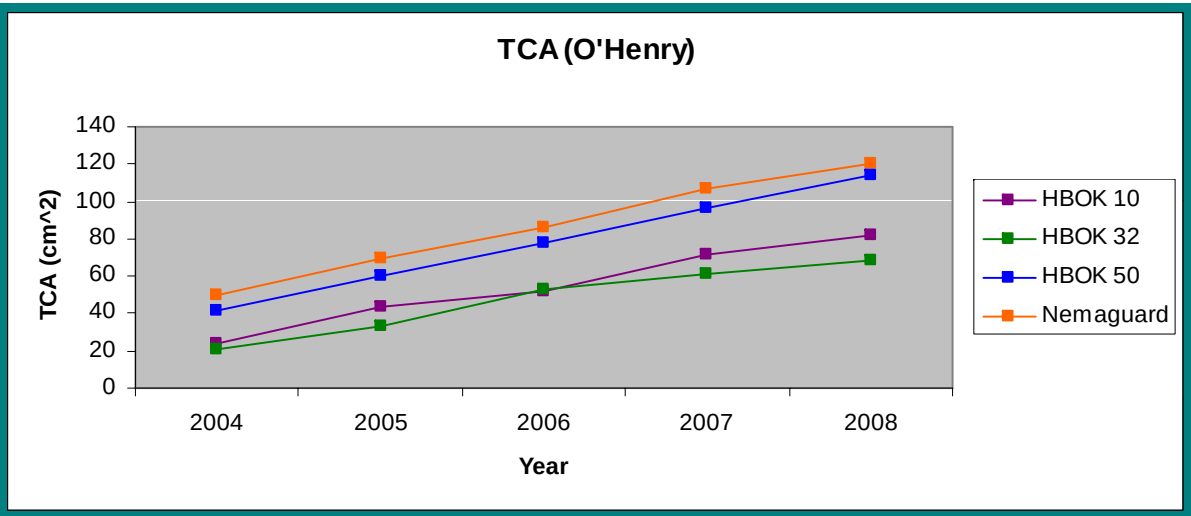
May Fire Nectarine on HBOK 10 HBOK 32 Nemaguard

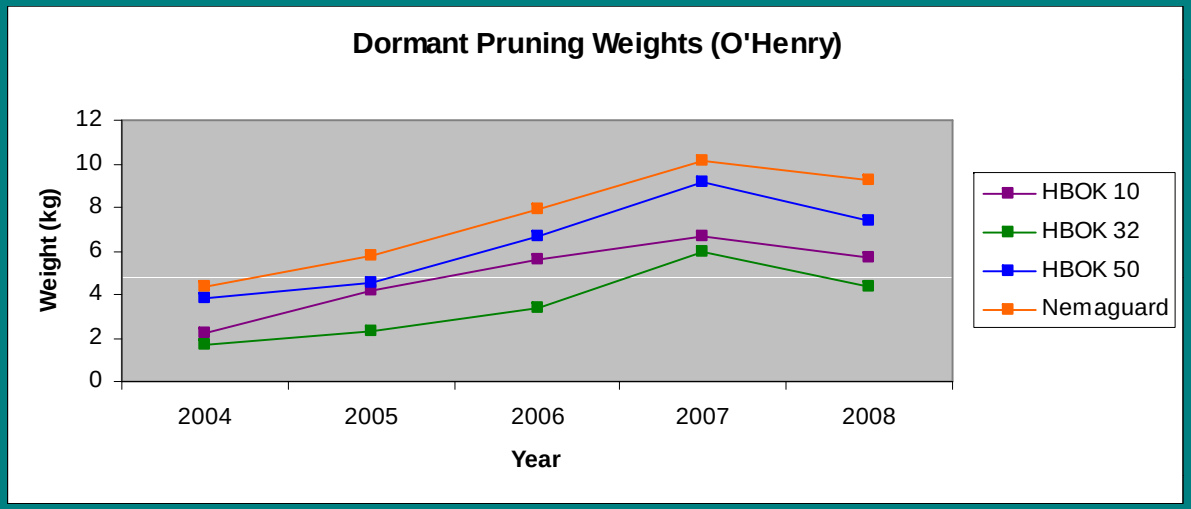


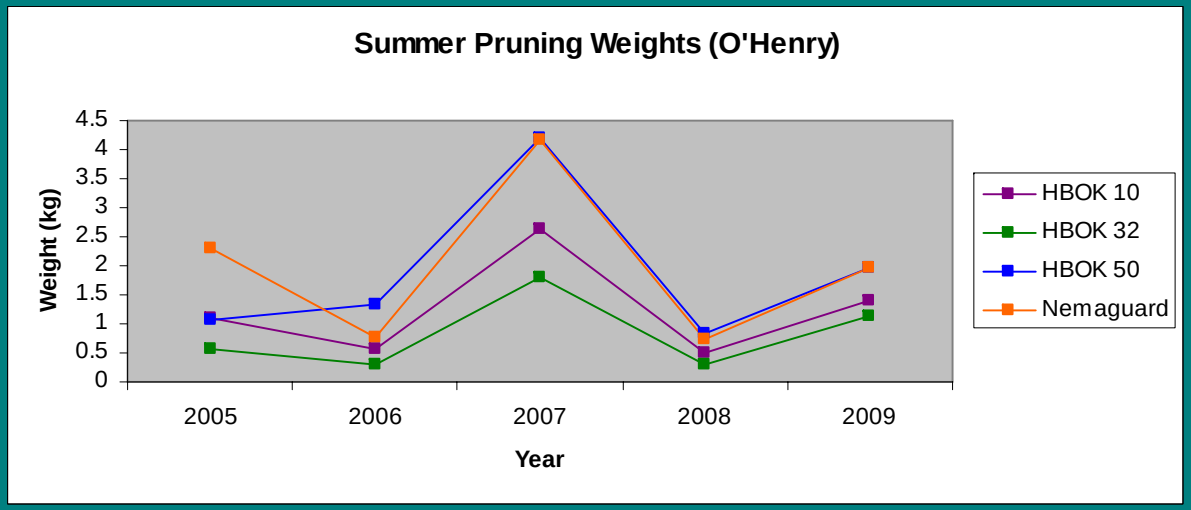




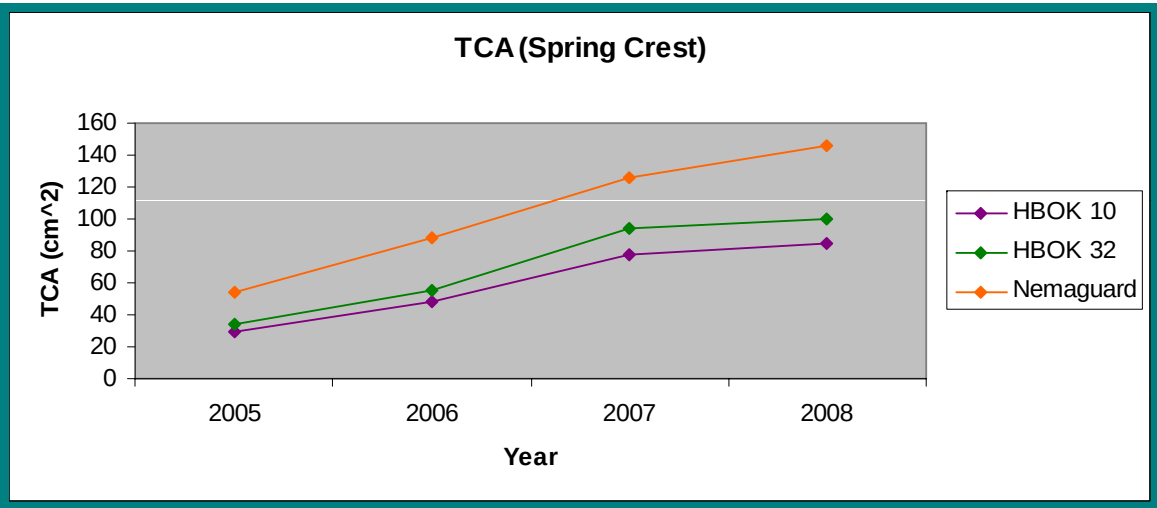
O’Henry
Peach
on
HBOK 10
HBOK 32
HBOK 50
Nemaguard

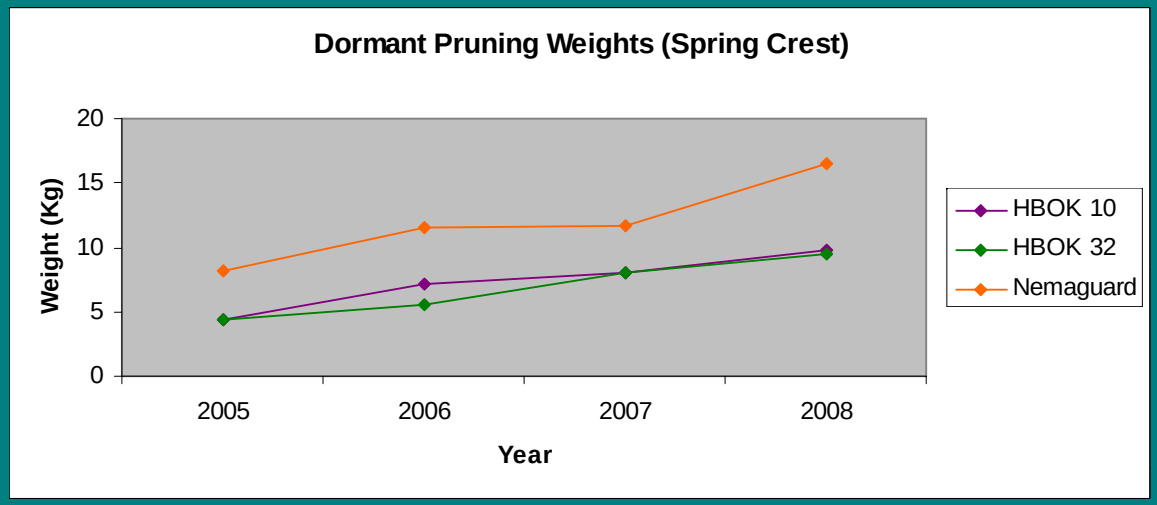


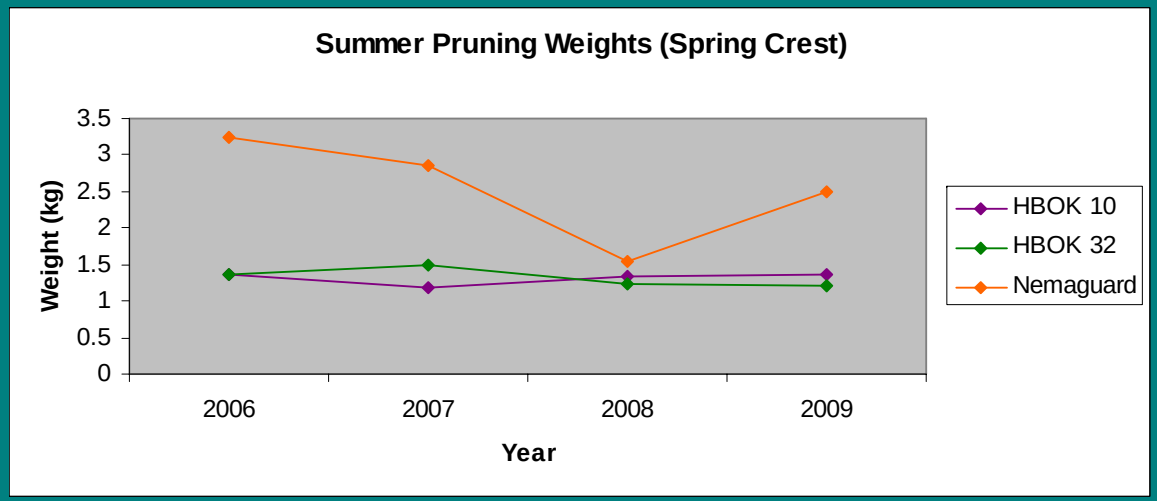




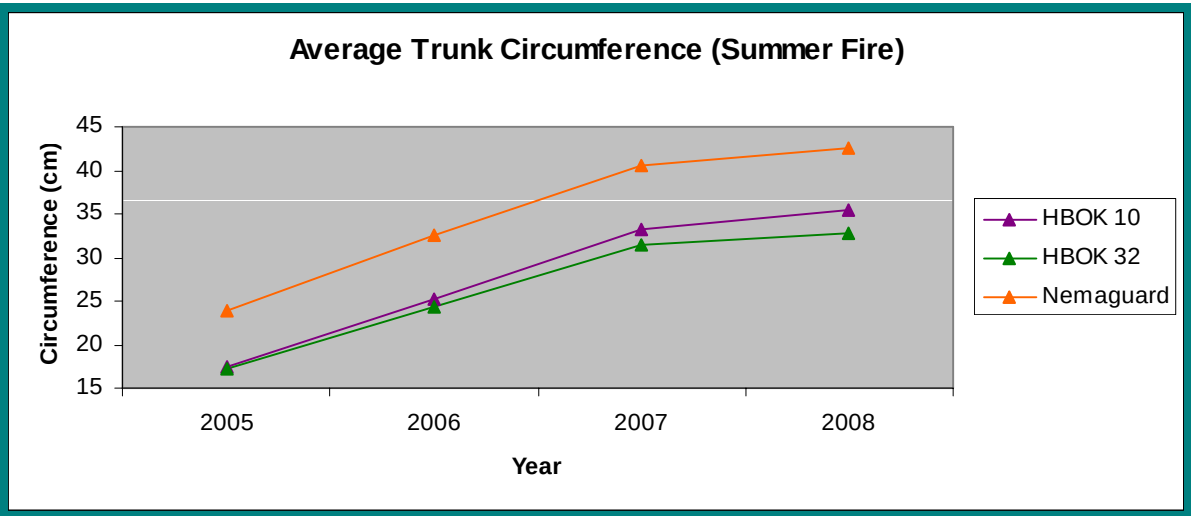
Springcrest Peach on HBOK 10 HBOK 32 Nemaguard

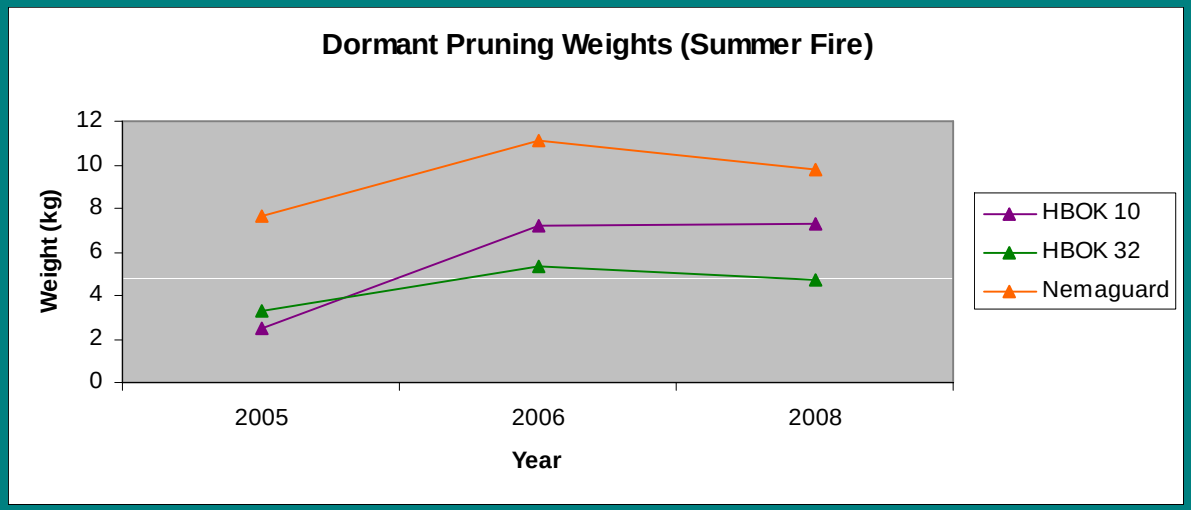


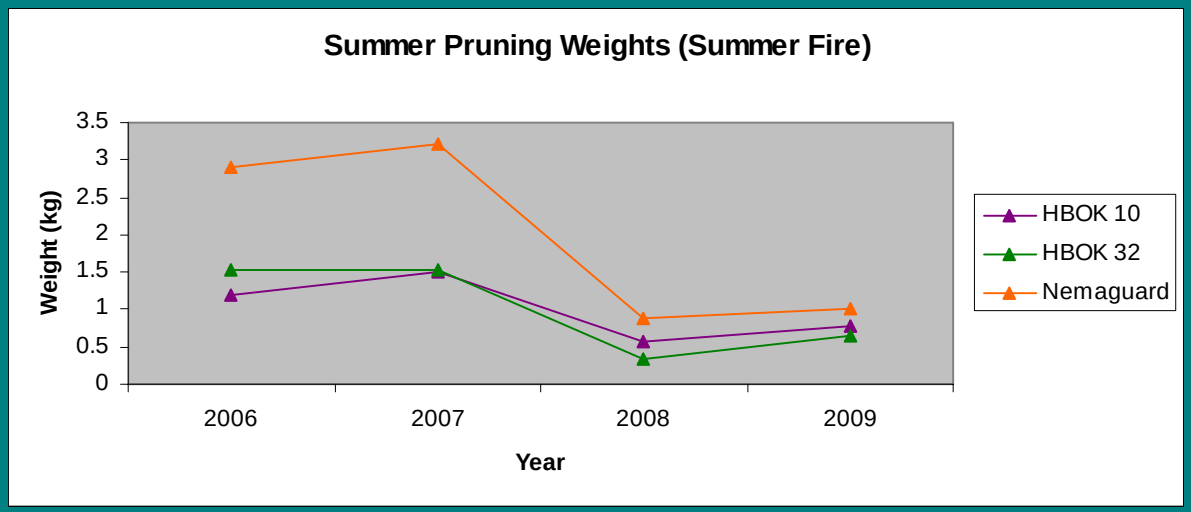




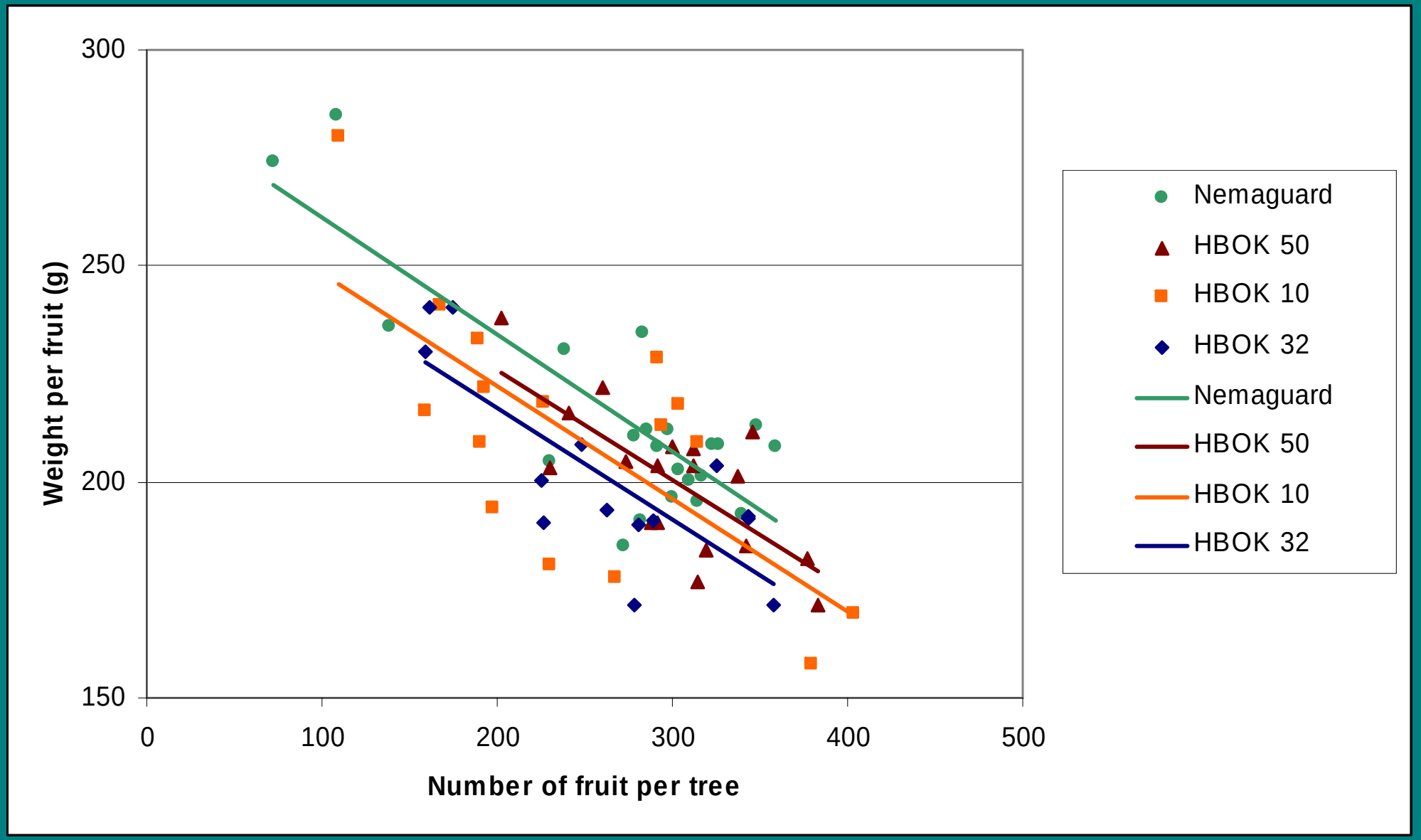
Summer Fire Nectarine on HBOK 10 HBOK 32 Nemaguard



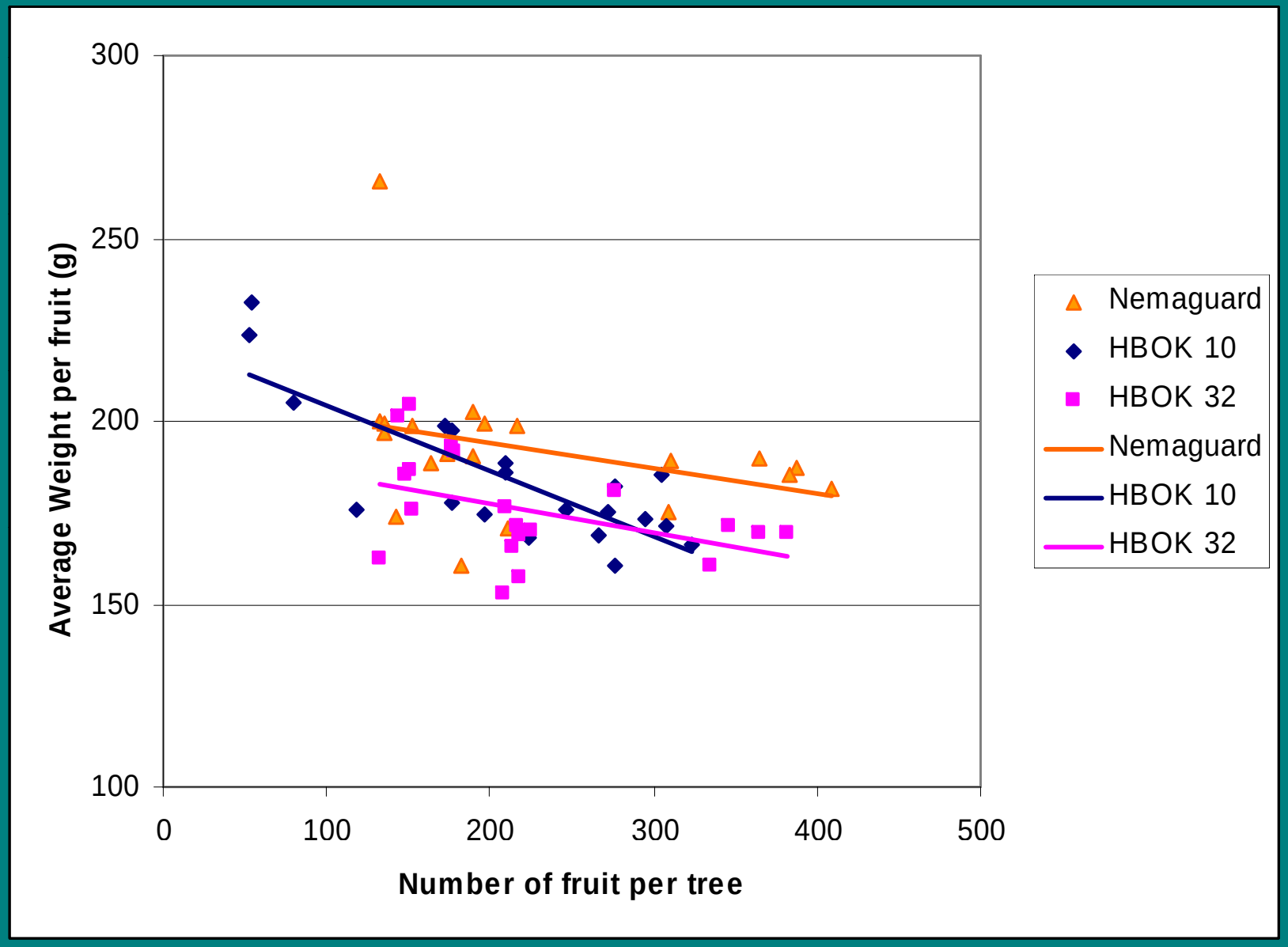




O’Henry Fruit Size



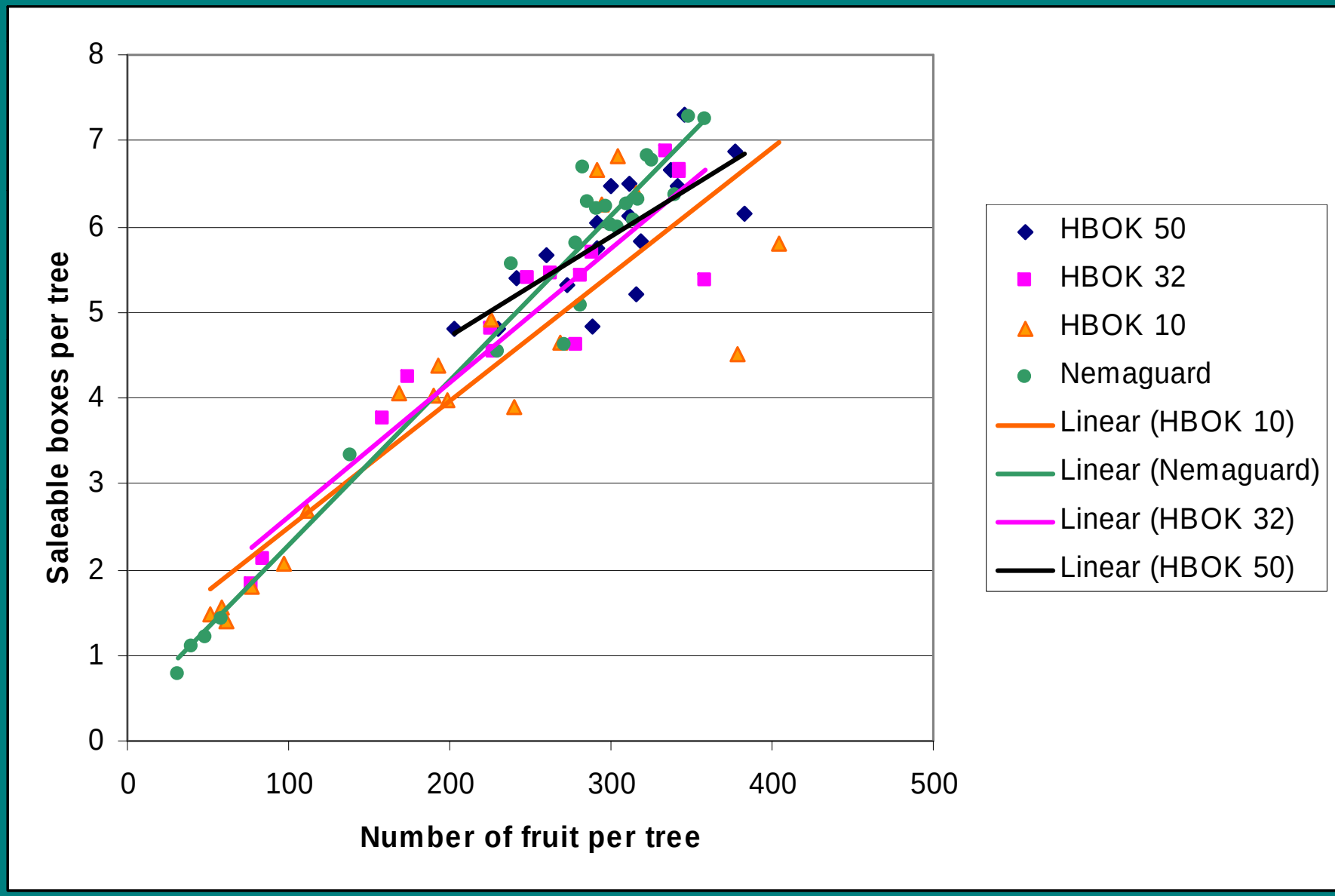
Summer Fire Fruit Size



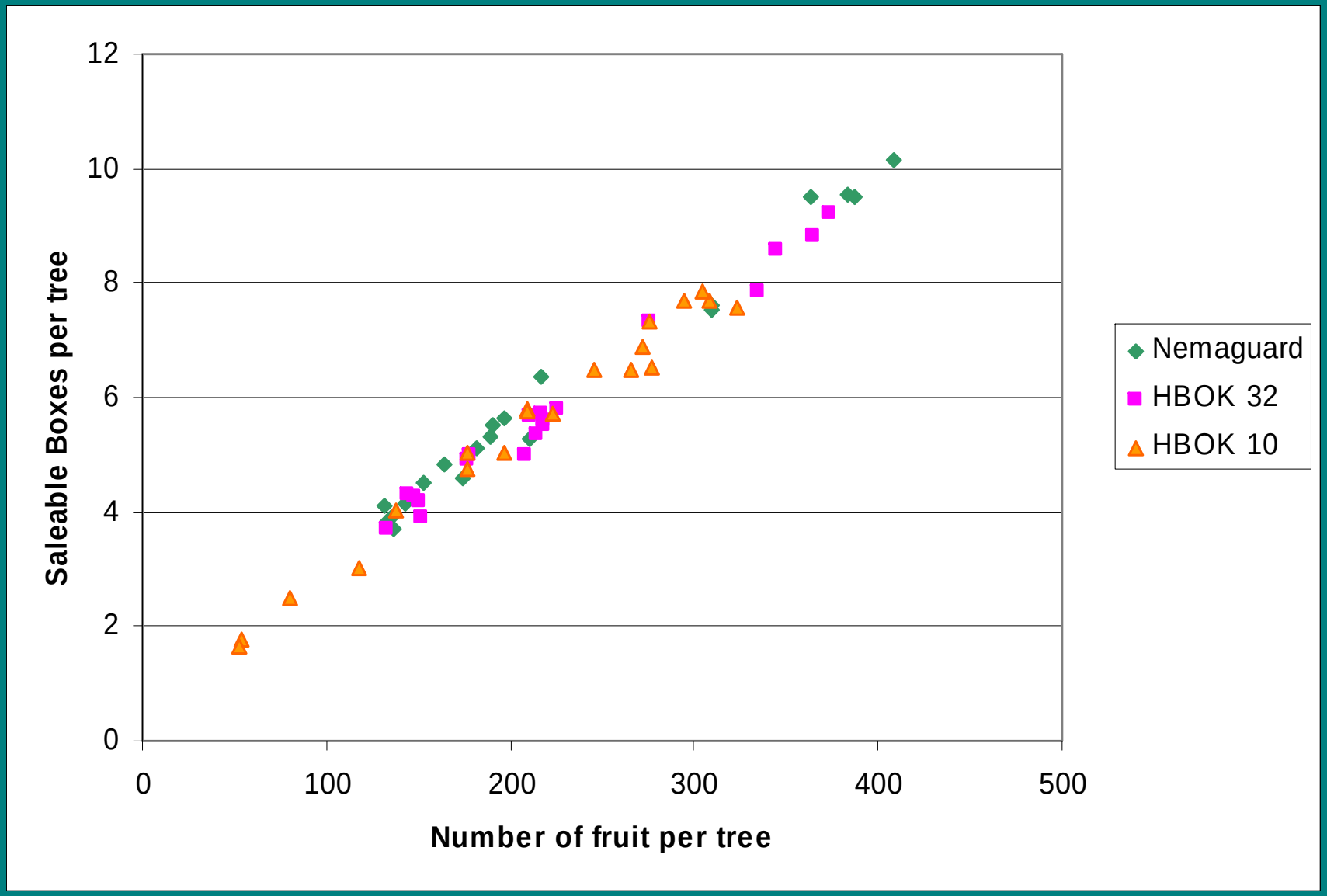
Fruit Prices

- O’Henry – August 5-10
  - 34/36 $11-12
  - 40/42 $12
  - 48/50 $10-11
  - 56 $11-12
  - 60/64 $10
  - 70/72 $8
- Summer Fire – August 1-5
  - 40/42 $16-17
  - 48/50 $16-17
  - 56 $ 16
  - 60/64 $13-14
  - 70/72 $12

O'Henry boxes per tree
(56's and larger)



Summer Fire boxes per tree
(56's and larger)



Newest developments

- HBOK 27
- HBOK 28
- Controller 5 used as an inter-stem

O’Henry

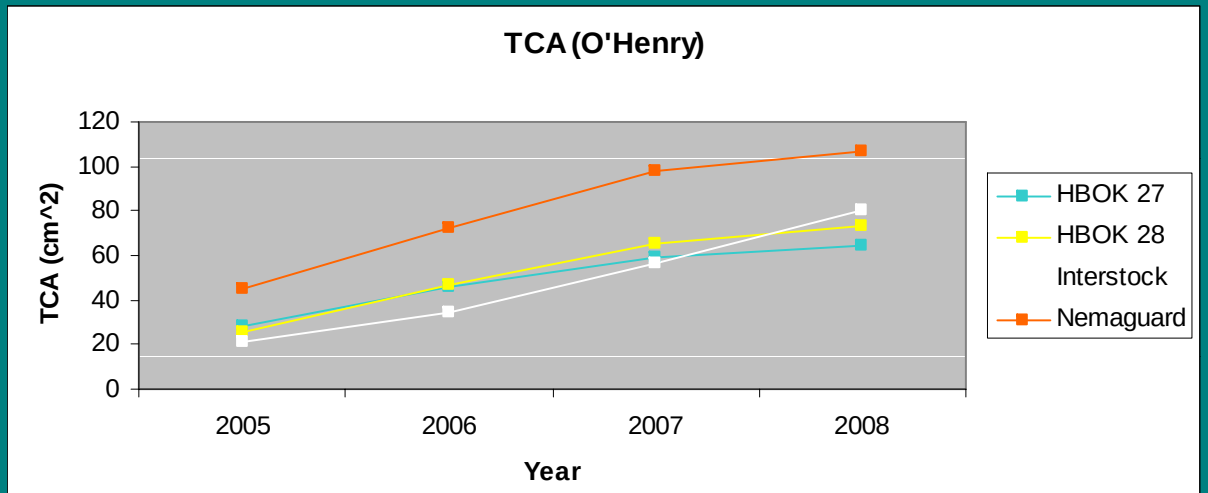
HBOK 27

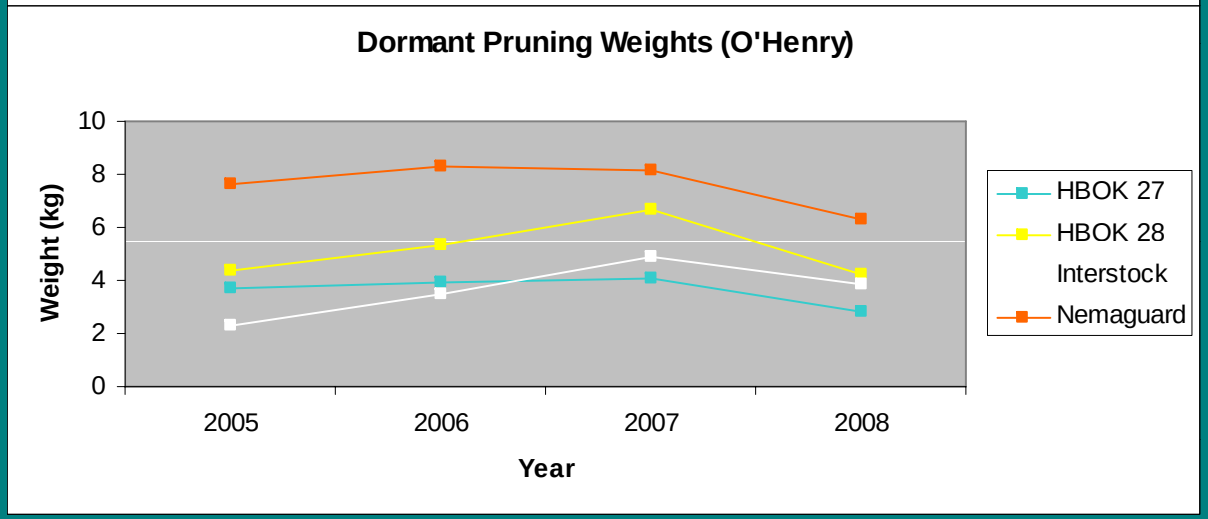
HBOK 28

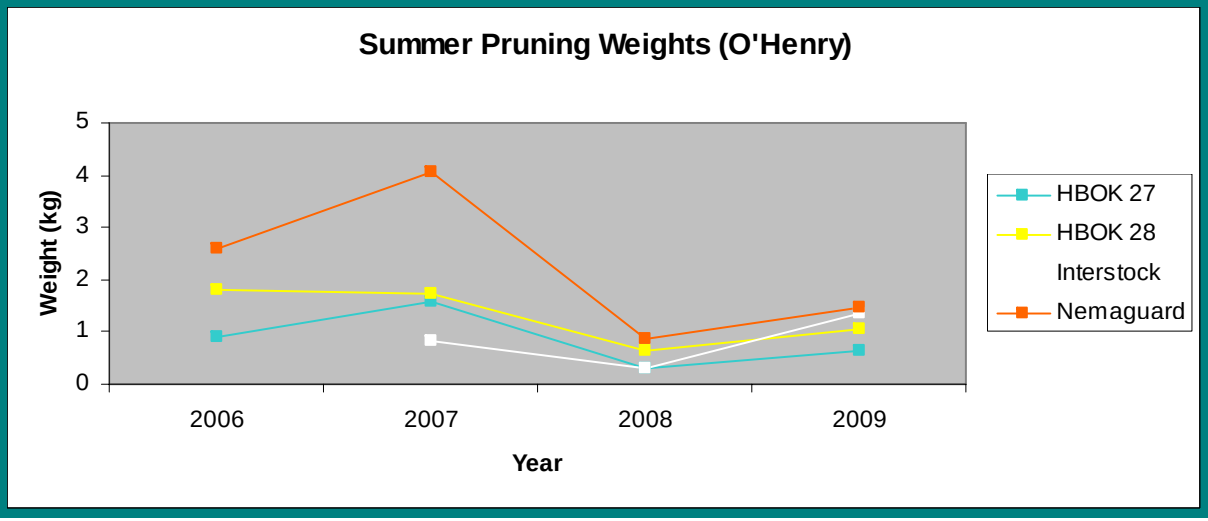
Controller 5

inter-stem

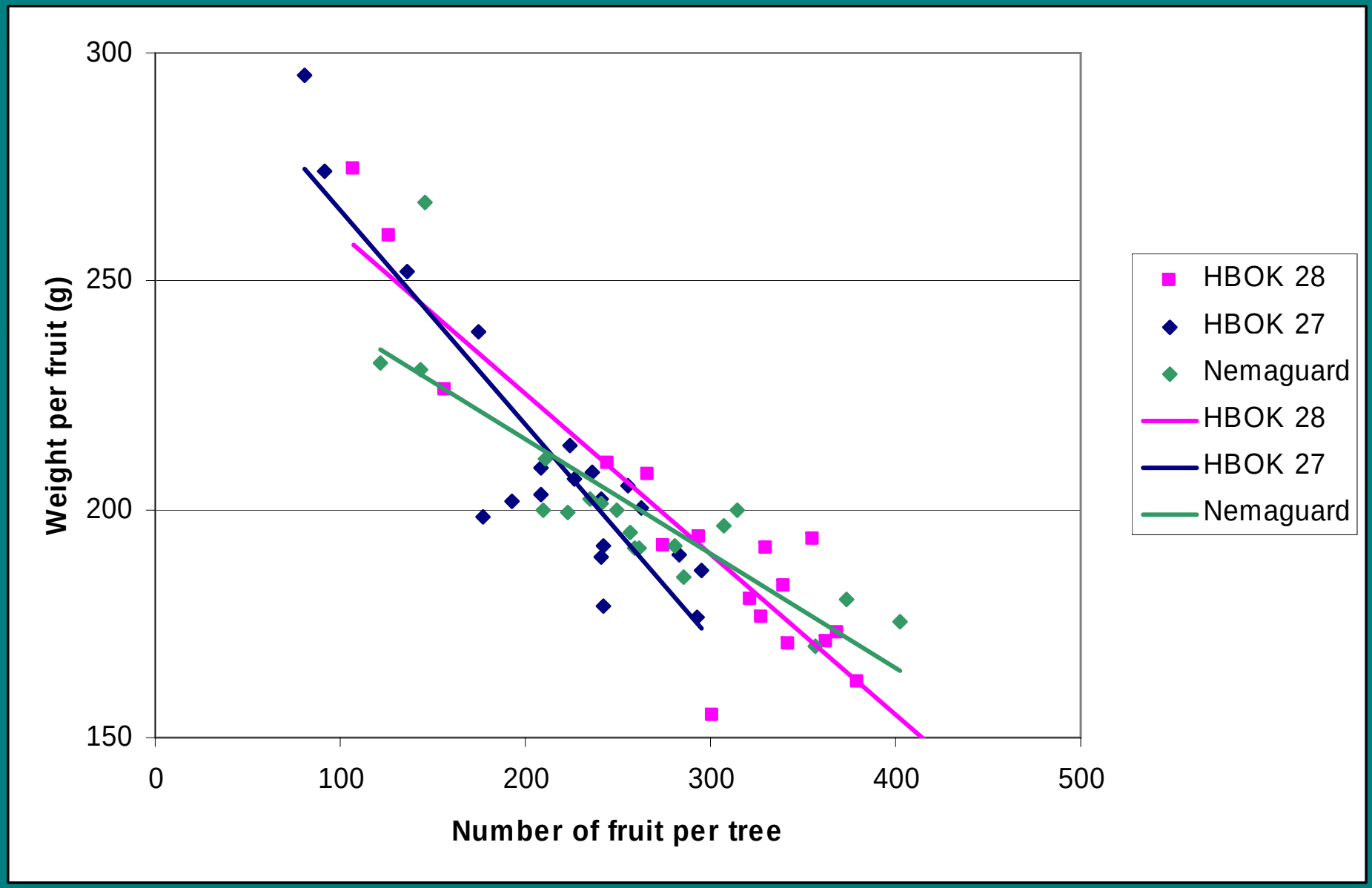
Nemaguard



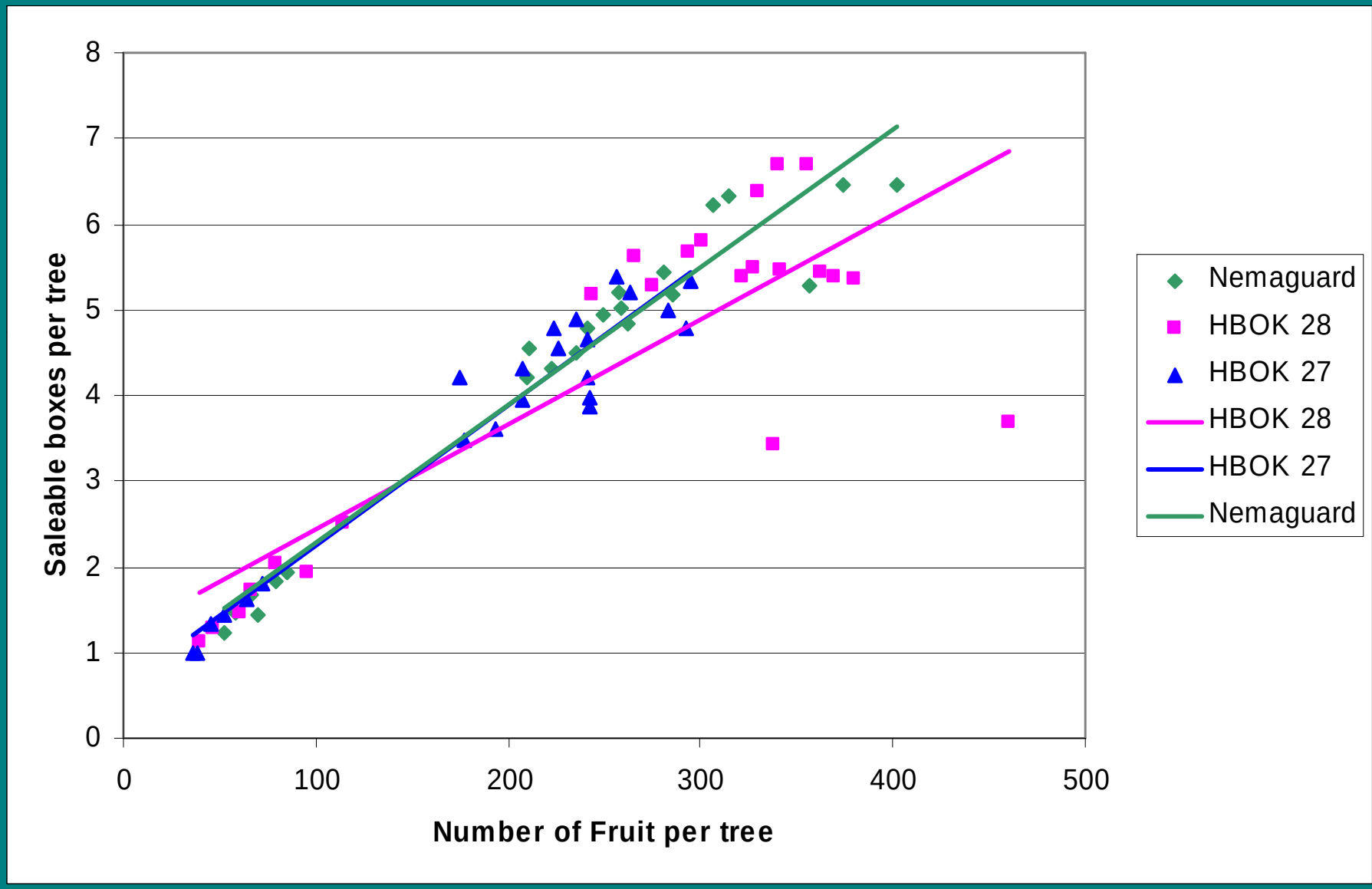




O'Henry Fruit Size
HBOK 27, HBOK 28, Nemaguard



O'Henry boxes per tree
(56's and larger)



So what is causing the size-controlling?

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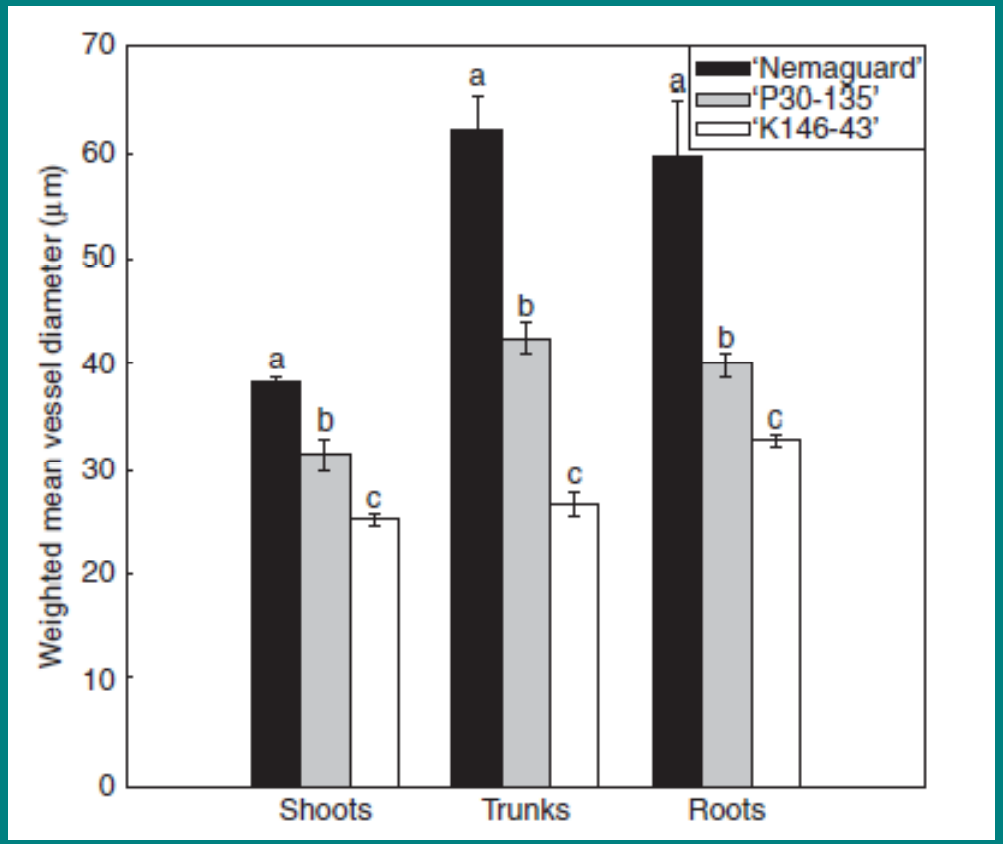
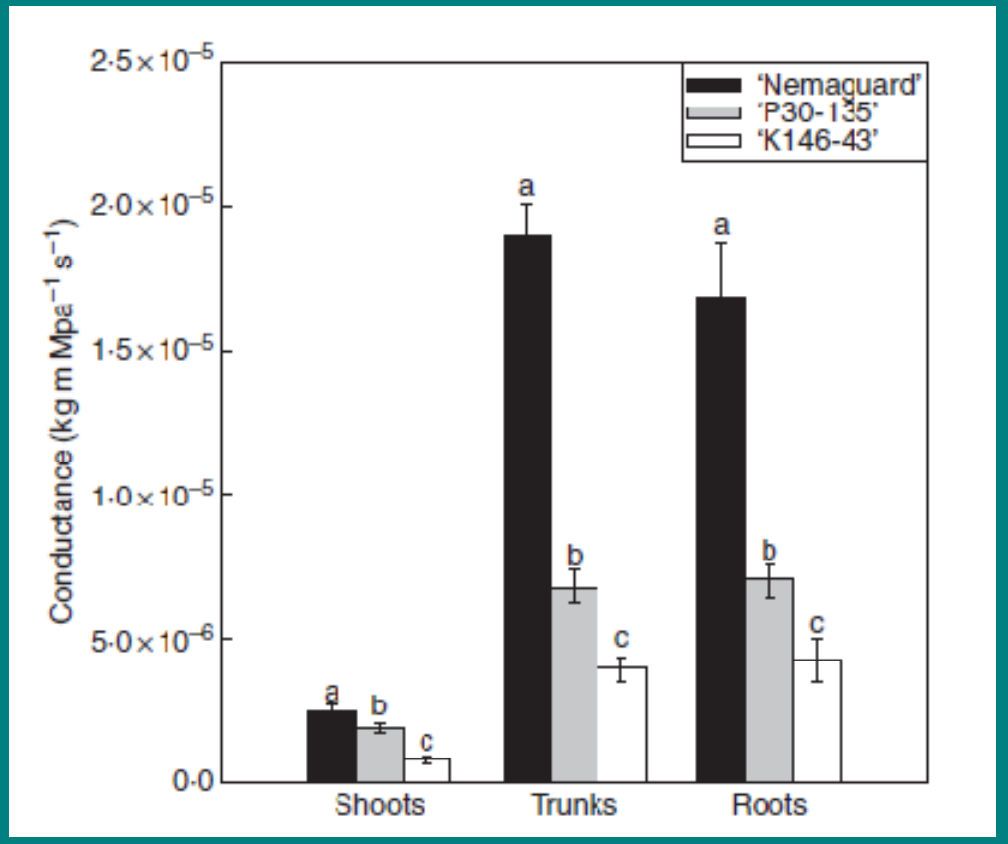
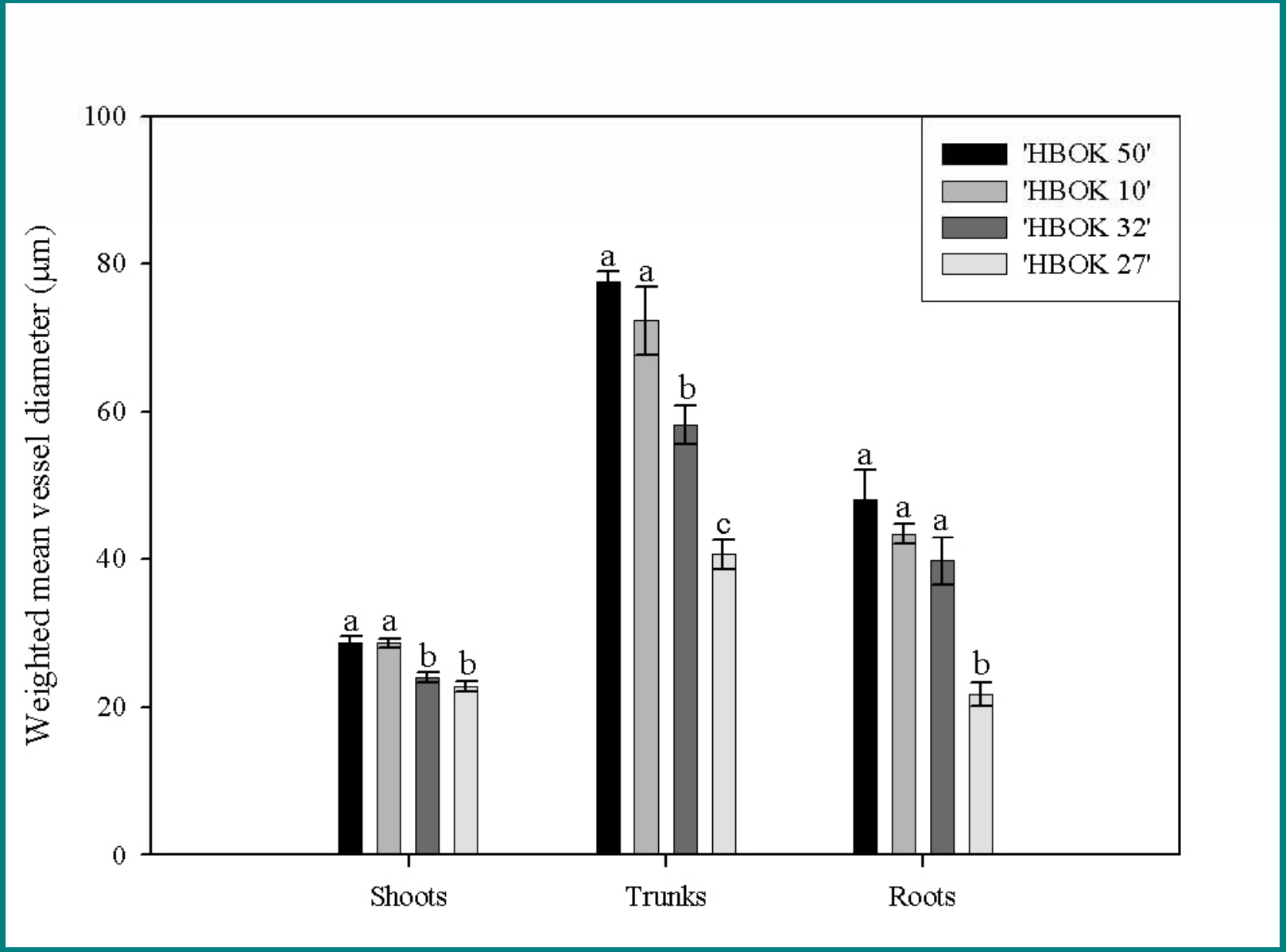
Relationships between xylem vessel characteristics, calculated axial hydraulic conductance and size-controlling capacity of peach rootstocks

Sergio Tombesi[1], R. Scott Johnson[2], Kevin R. Day[2] and Theodore M. DeJong[2,*]

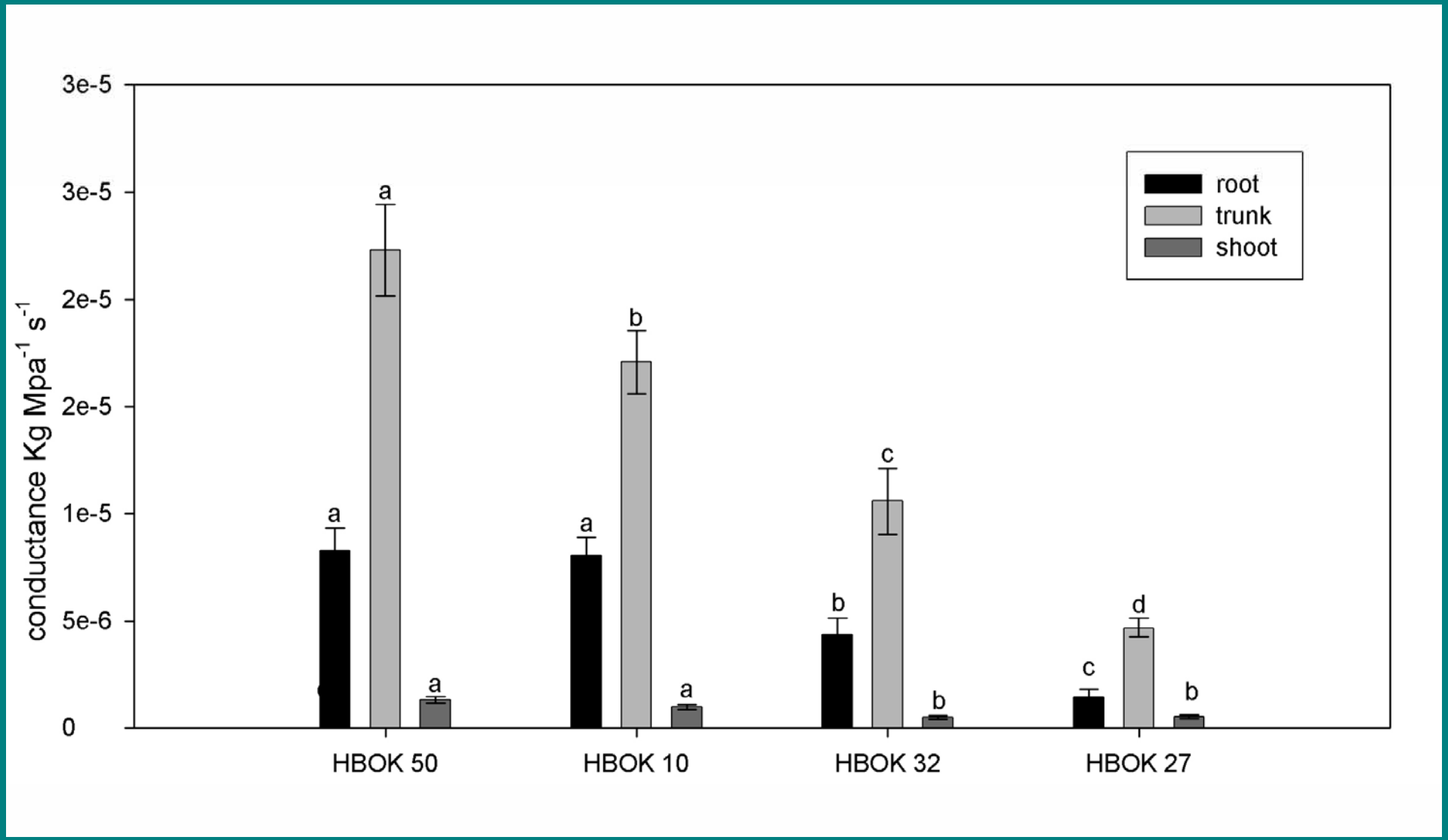




HBOK Series Xylem Vessel Diameters



HBOK Series Hydraulic Conductance



Summary of how dwarfing peach rootstocks work compared to Nemaguard rootstock

- Diameter of the water conducting (xylem) vessels of dwarfing rootstocks are smaller
- This causes the hydraulic conductance of the rootstock water conducting tissue (xylem) to be lower
- This causes the water availability (water potential) in the stems and leaves to be slightly lower
- This causes the elongation of stems to be slightly less and overall vigor of tree is decreased over time
- This decreases the amount of pruning needed
- Decreased pruning reduces the number of water sprouts and this decreases the need for pruning even more, etc.
- This also decreases internal canopy shading and thus increases shoot quality and flower bud development

Thanks for your attention!

Collaborators:

- Lyndsey Grace
- Ali Almehdi
- Kevin Day
- Scott Johnson
- Fred Bliss
- Field crew at KAC

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