

Best Management Practices when Replanting following Nemaguard without a Fumigant

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Modesto

January 19, 2011

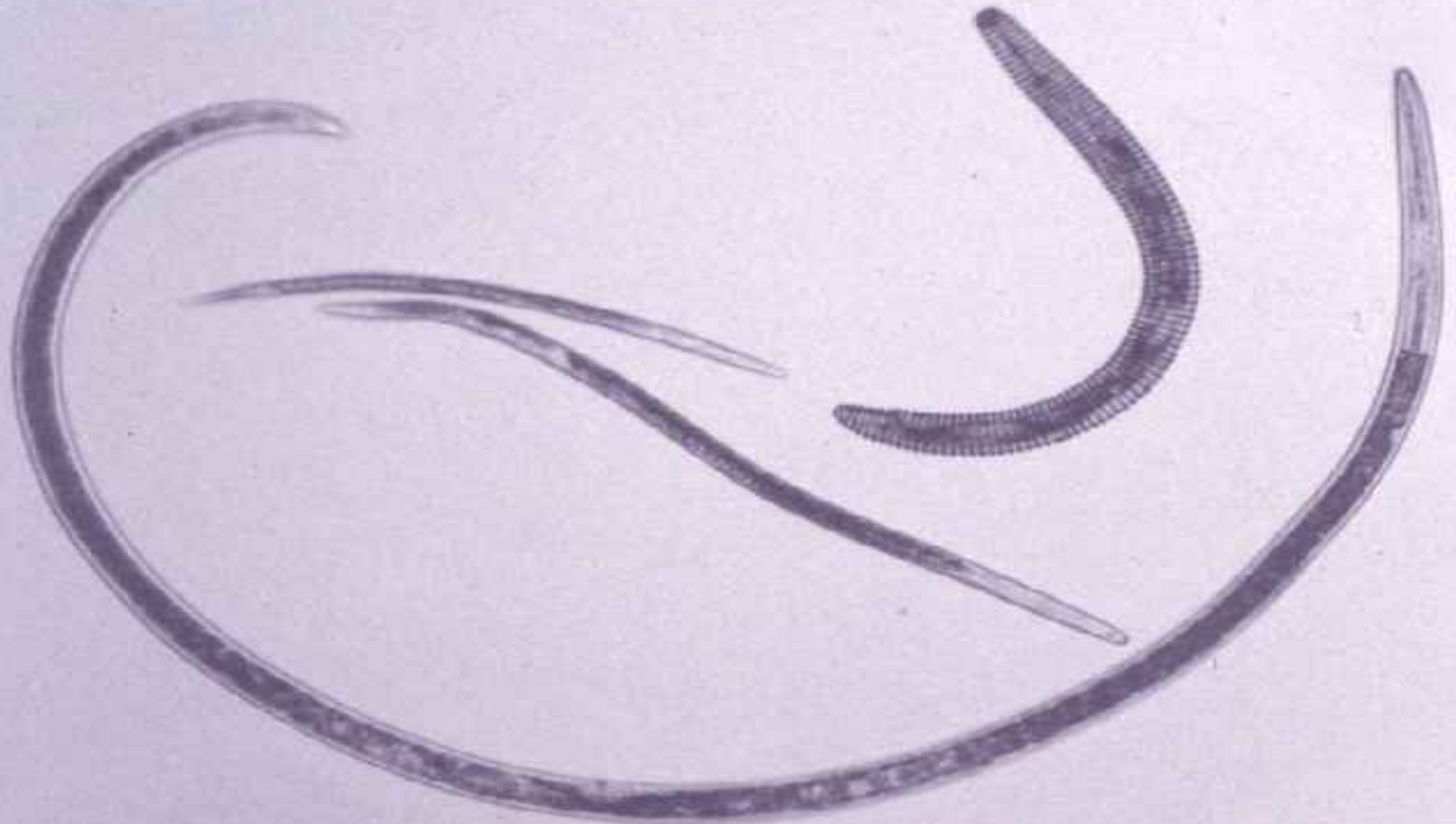
The Replant Problem has four components

- Rejection component
- Soil pest and disease component
- Soil physical and chemical problems
- Nutritional component

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- ~~• Soil physical and chemical problems~~
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Plant-parasitic nematodes, one component of RP



Root rejection, a second component of RP



What tools have growers been using when fumigants aren't available?

- Wait a year, but you really need to wait four years
- Prune the trees heavily after first-leaf and sometimes second-leaf
- Add lots of nitrogen

If you wait 6 months and replant in SJV without soil fumigation

Expect first-year biomass of various perennials after a previous perennial to achieve $1/7^{\text{th}}$ of their potential.

In second-year it is closer to $1/2$ the biomass as the rejection is overcome.

What tools appear most useful when fumigants are unavailable?

“**Switch**” to a rootstock that is rejection tolerant and carries resistance to known soil pests.

Treat old trunks with a systemic herbicide then wait a full year to “**starve**” soil ecosystem.

Apply **spot** or strip **treatments** of biocide if pest resistance is also in the rootstock.

Use macro and micronutrients at planting time.

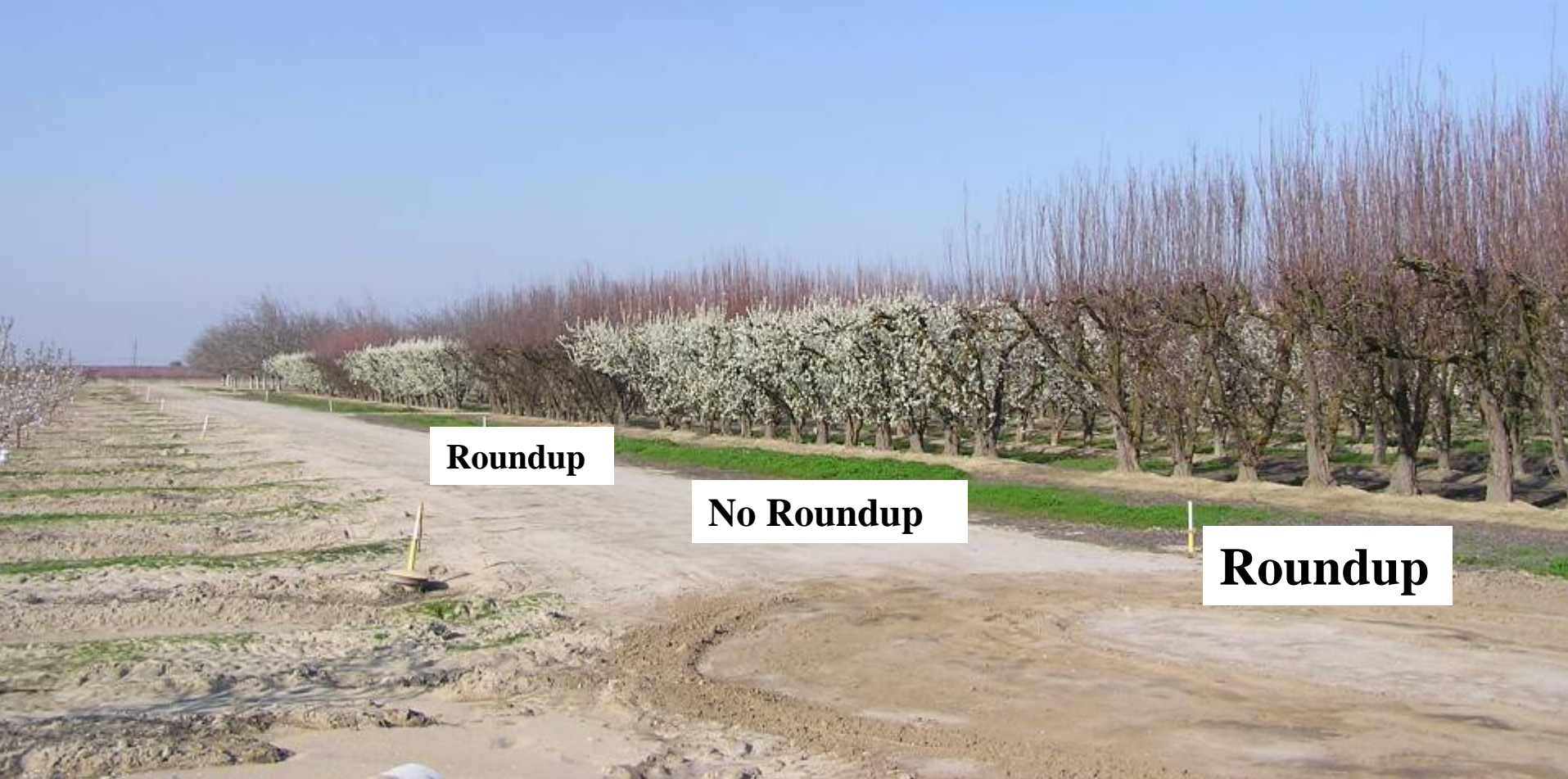
There are plenty of locations where the rejection and nematode components of RP are absent, but we are not good at predicting where these are.

Starve the soil ecosystem

Roundup

No Roundup

Roundup





**Hand sprayed, low psi, no wind,
below tree tops, one side at a time**



During the one year waiting period

Harvest Time View



Plums, showing Roundup damage in closest adjacent tree



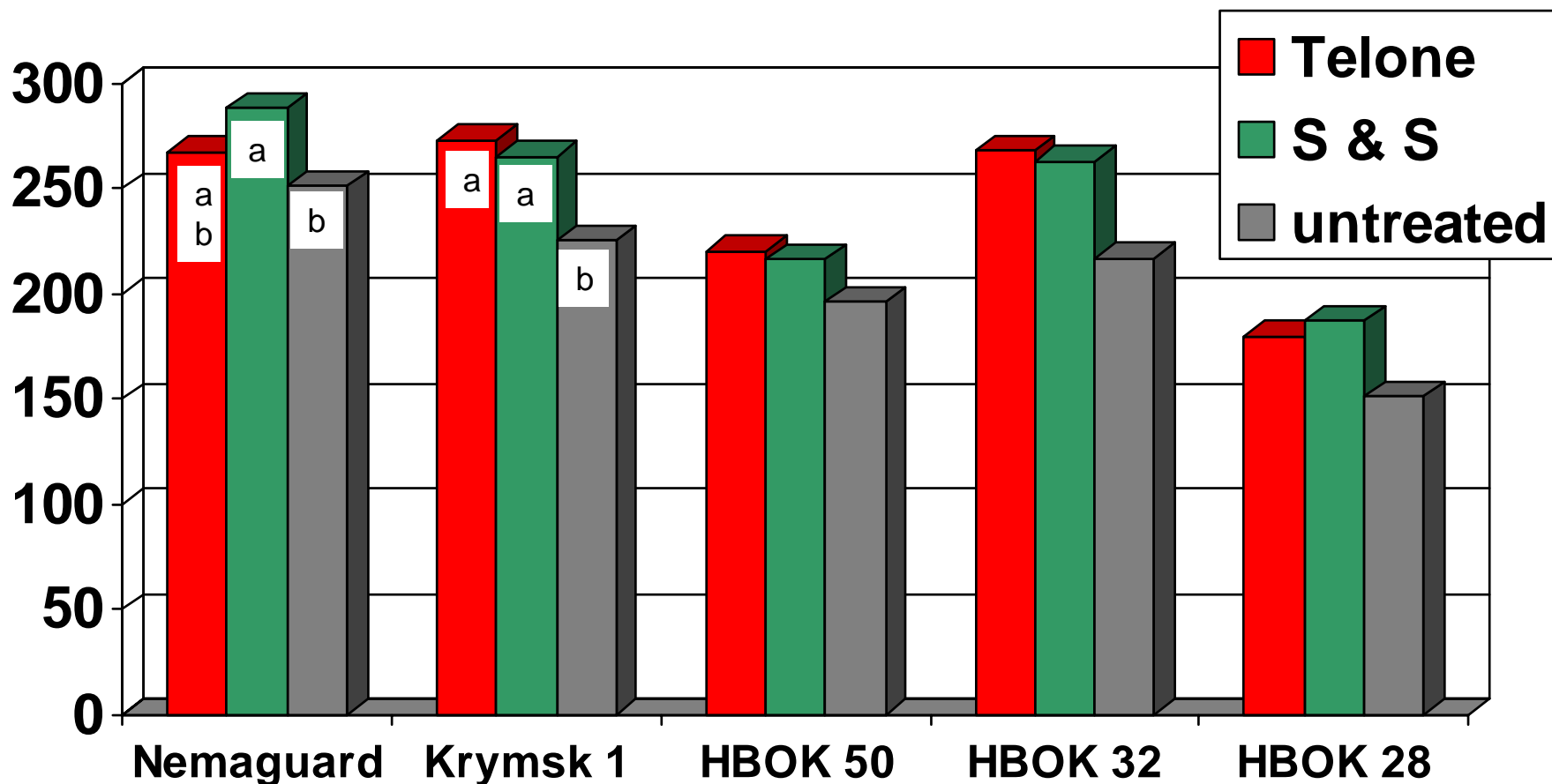
Owen T on Krymsk1 rootstock, Sept 28, 2009



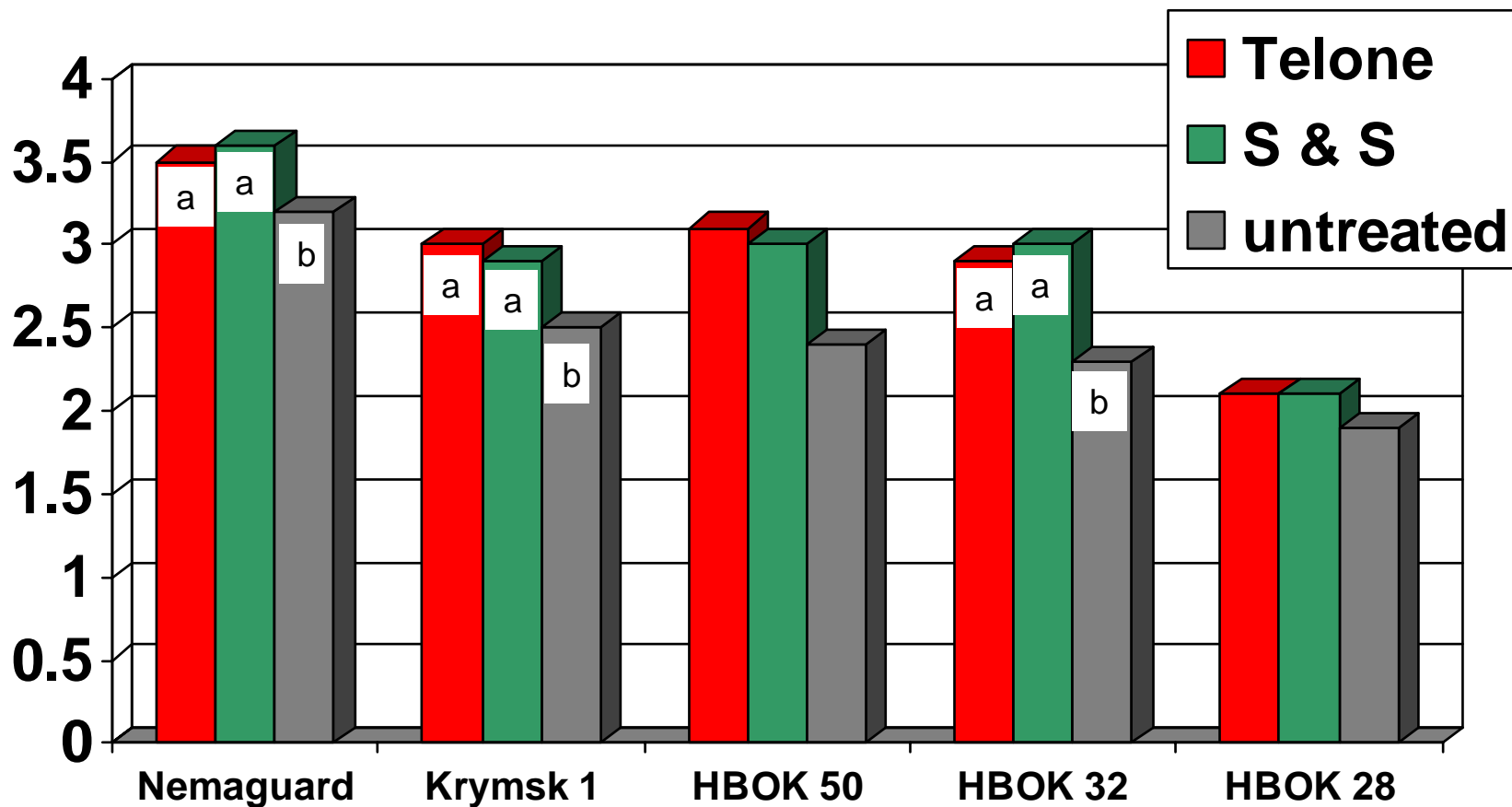
Owen T on Krymsk1, Sept. 28, 2009



Starve & Switch-Owen T plum first-year tree height (cm)



Starve & Switch-Owen T plum first-year trunk diameter (cm)



Nectarines, with no adjacent Roundup damage



Starve & Switch III, almond w/Carmel and Nonpareil scions



Aug 28, 2009

Nonpareil on Nemaguard rootstock, Sept. 28, 2009



Nonpareil on Nemaguard rootstock, Sept 28, 2009



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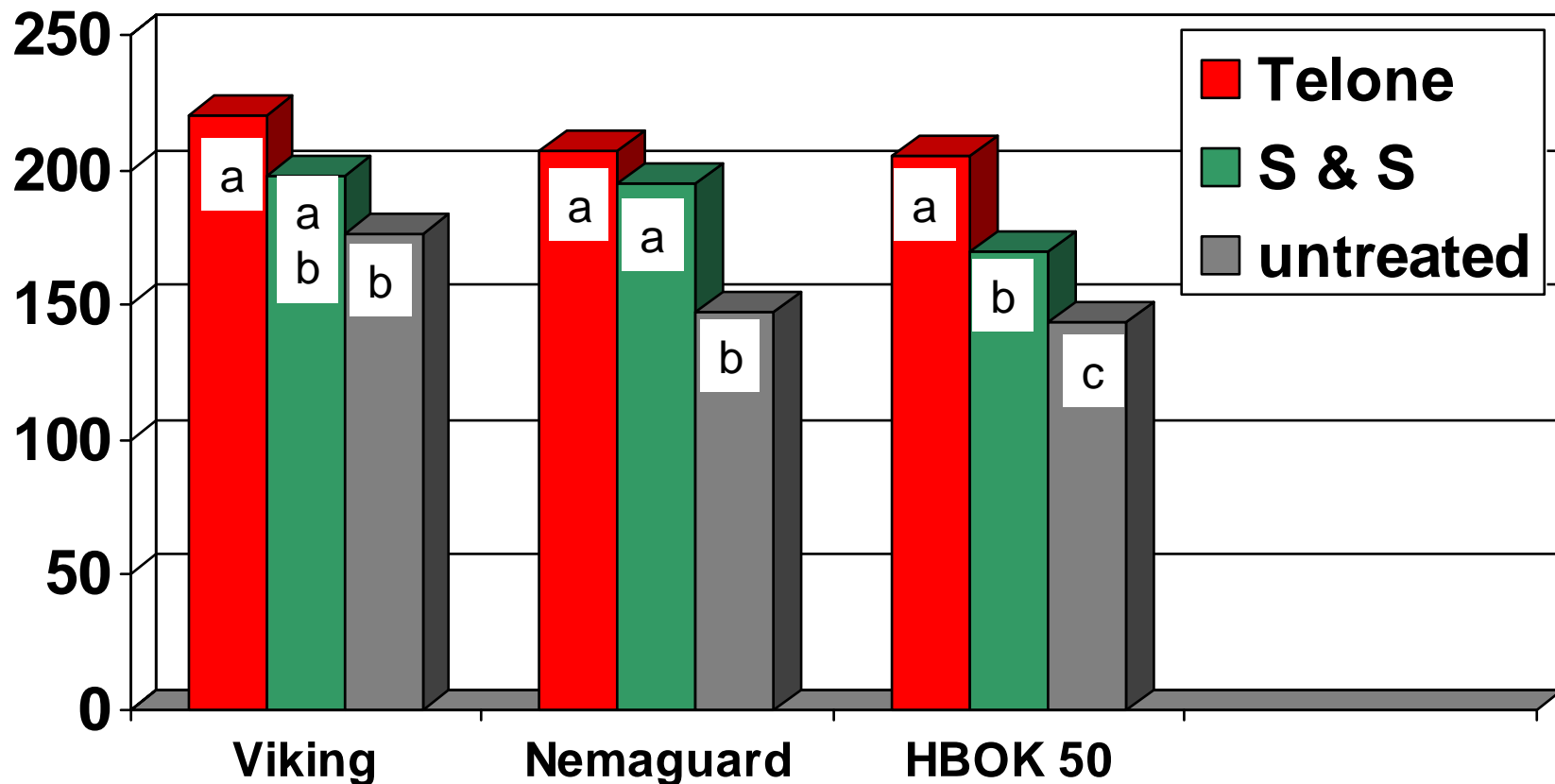
S&S

FUM

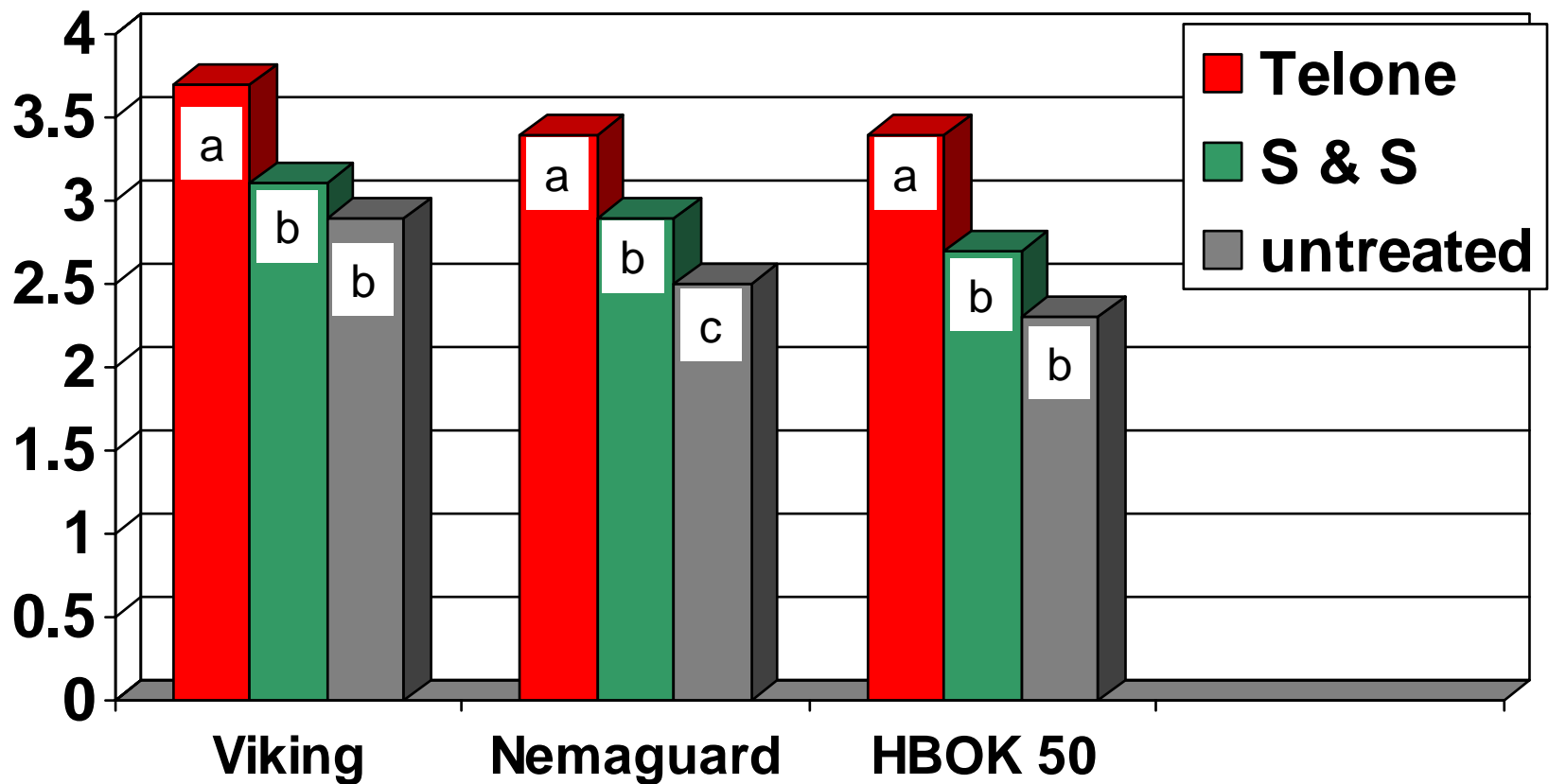
Nonpareil on Nemaguard rootstock, Sept 28, 2009



Starve & Switch-Nonpareil first-year tree height (cm)

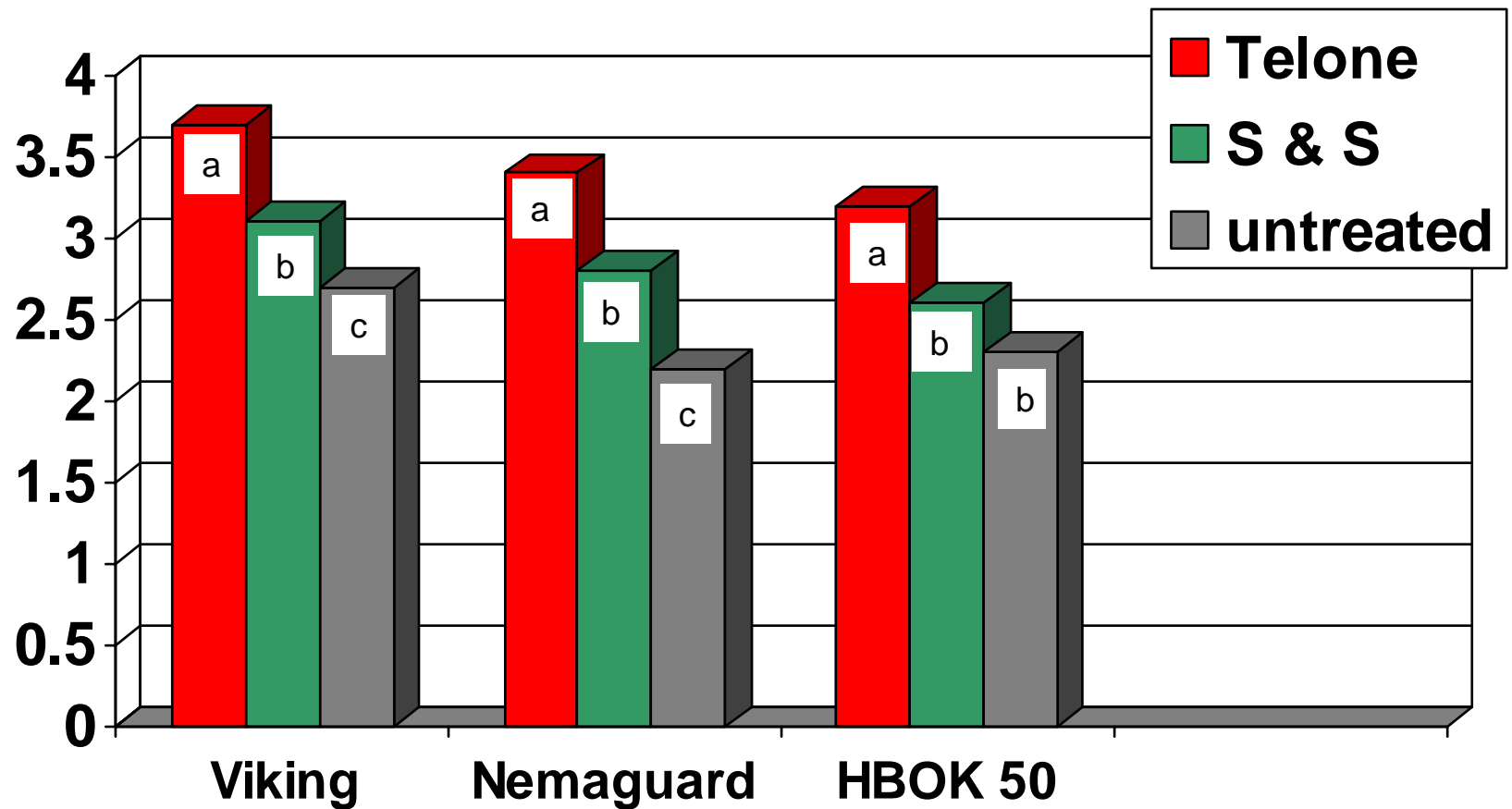


Starve & Switch-Nonpareil first-year trunk diameter (cm)

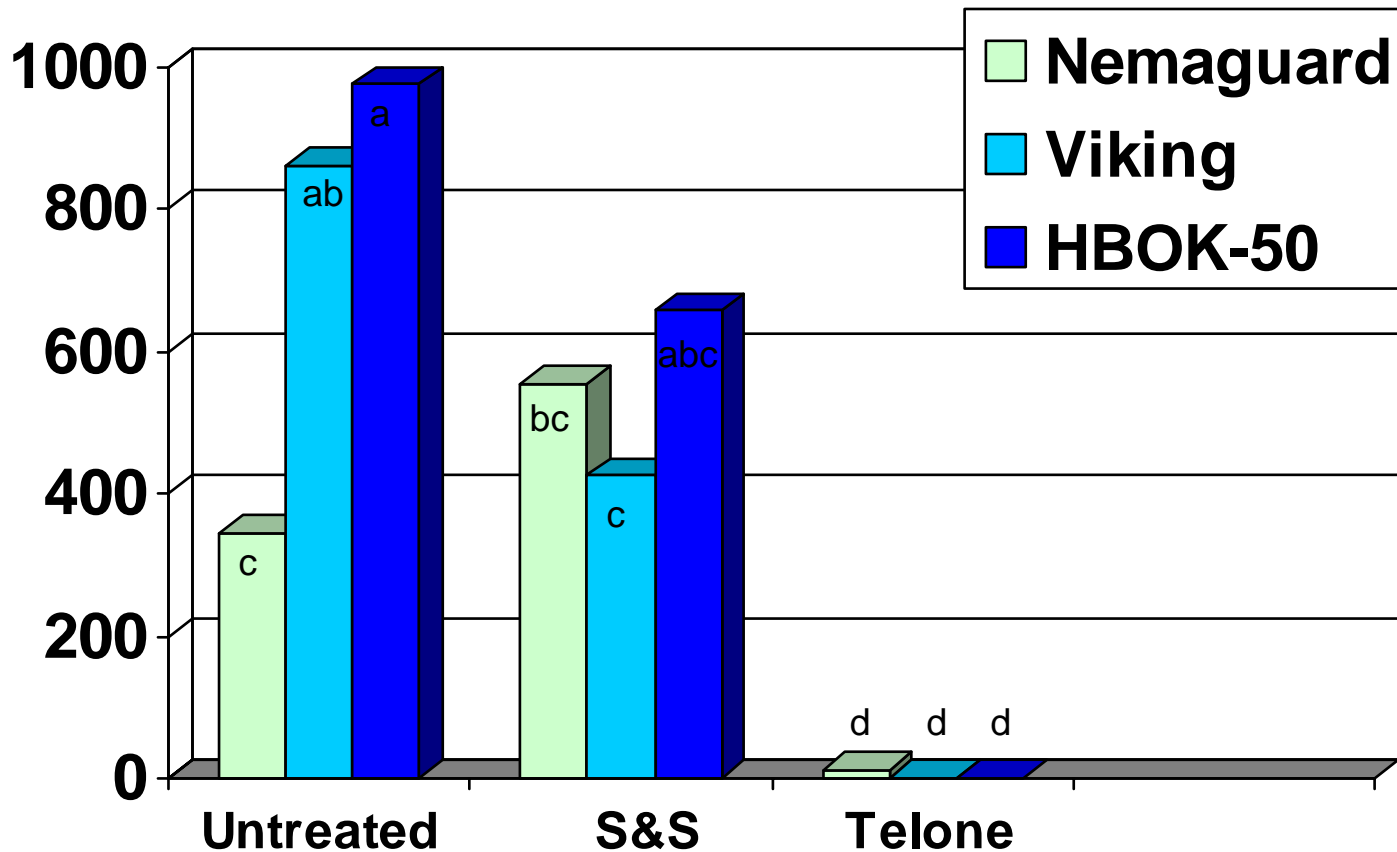


Starve & Switch-Carmel

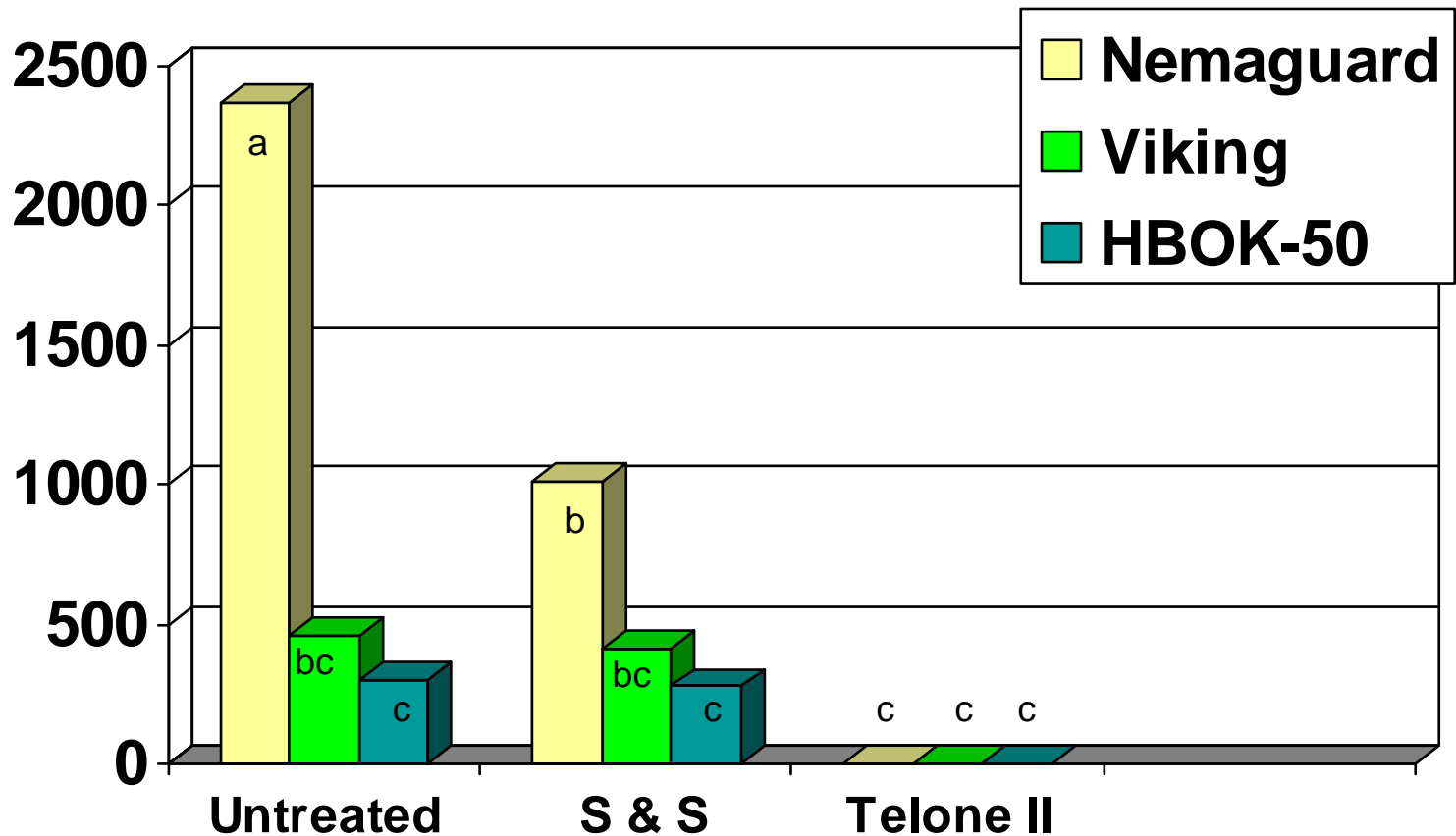
first-year trunk diameter (cm)



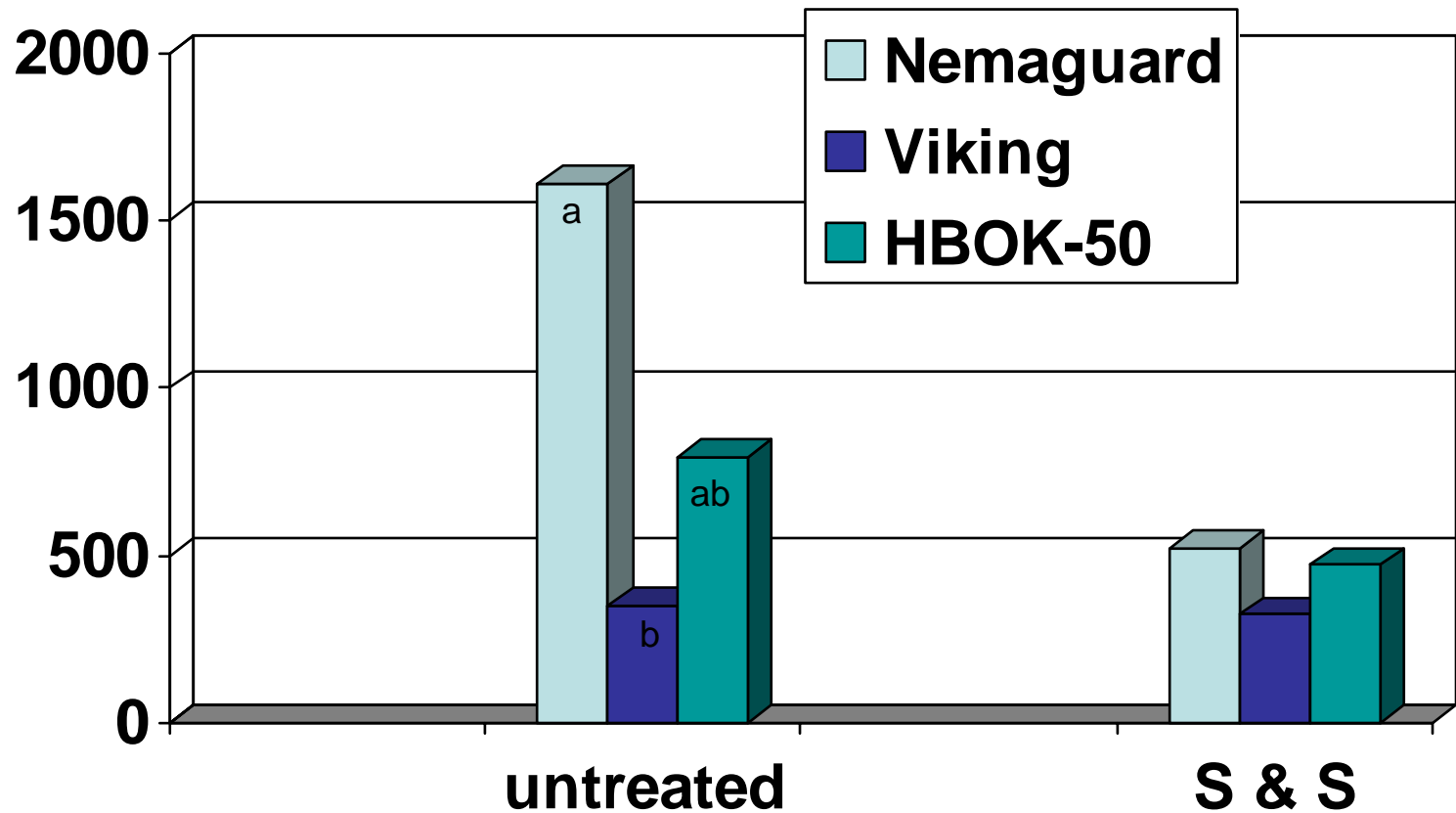
Root-lesion nematodes / 250 cc soil 14 mo after replanting 3 rootstocks into 3 field settings, with Nonpareil as the scion



Pin nematodes / 250 cc soil 14 mo after replanting 3 rootstocks into 3 field settings, with Nonpareil as the scion



Population levels of pin nematode on 3 rootstocks after 14 mo





May 19, 2010



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Which rootstocks tolerate the rejection component?

Which rootstocks have resistance to root-lesion, root-knot and ring nematodes?

www2.uck.ac.edu/nematode

Nemaguard

non fumigated

fumigated



non-fumigated

Viking

fumigated



non fumigated

Empyrean 1

fumigated



non fumigated

Hansen 536

fumigated



Rootstocks that resist root knot nematode and have tolerance to the rejection component of RP

Rootstock	Root lesion nema	Ring nematode	Rejection by RP
Nemaguard	100	100	100
Hansen 536	10	300	0
Viking	120	40 to 90	30
Cadaman	120	100	20
PAC 941	80	150	0, maybe
HBOK-144	55	45	0?
HBOK-1	90	30	0?

Best Mgmt Practices when no fumigants!

“**Switch**” to a rootstock that is rejection tolerant and carries resistance to known soil pests.

“**Starve**” soil ecosystem.

Apply spot or strip treatments of biocide *if* pest resistance is also in the rootstock.

Use macro and micronutrients at planting time.

False bottom installed with 2200 lb soil at 4% moisture in the tipster



false bottom

Tipster with thermocouples adjacent to our mobile steaming unit



Tipster

We have mounted our 1M BTU unit with other equipment on a larger trailer



The truck bed holds 6 tipsters but we need a larger propane tank on board the truck.



At 60F we are treating 2200 lb sandy loam soil at 4% moisture content in our tipster for 15 min.

We achieve complete nematode kill for the cost of 2 gallons of propane.

The tipster approach provides precision and avoidance of contamination with untreated soil.

It is also a means for low moisture contents which are key to least expensive steam delivery.