Nematodes associated with peach and their management challenge

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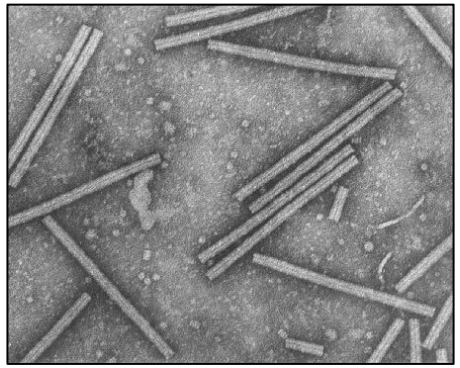
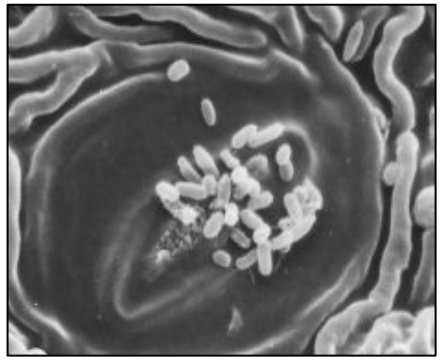
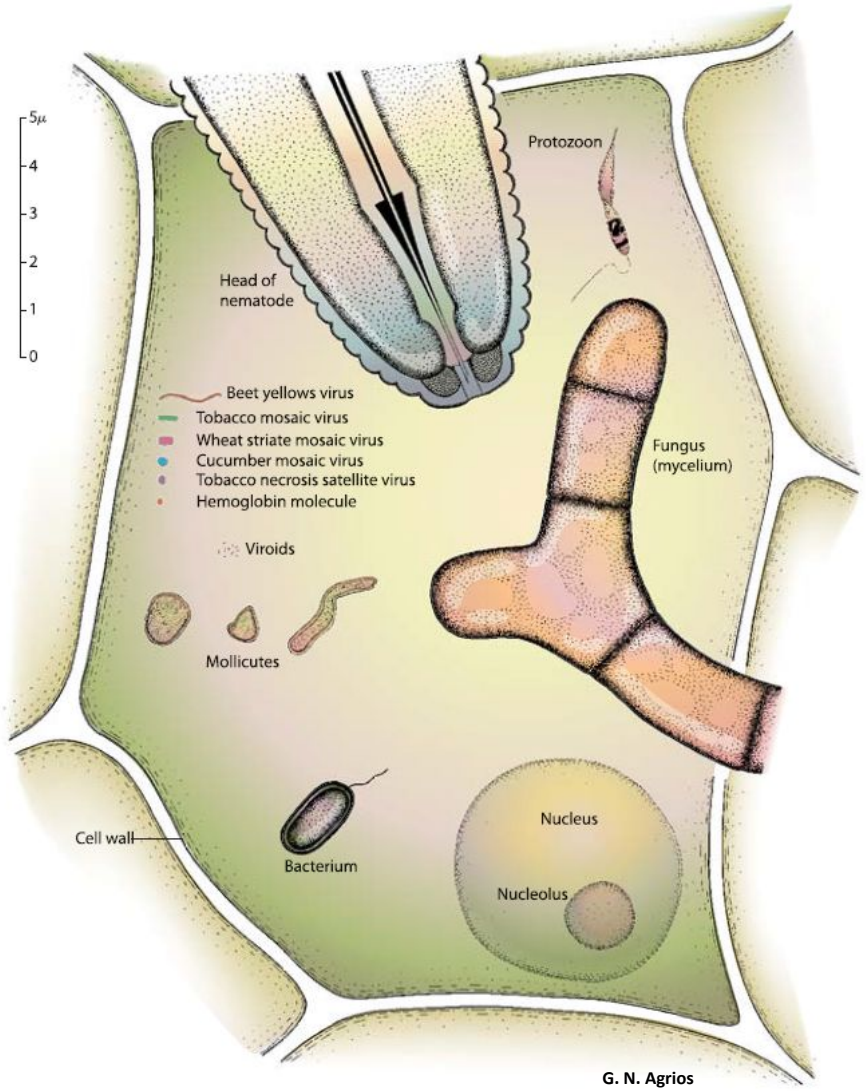
Relative sizes of plant pathogens and cell

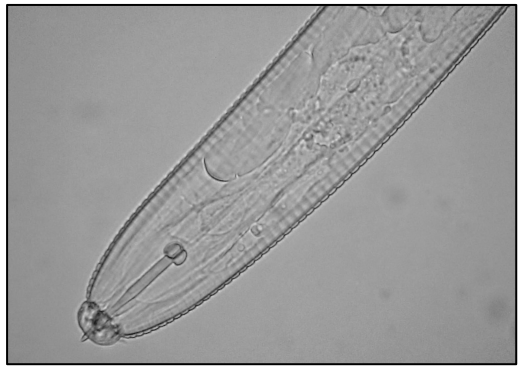


Viruses
Mayer-1886



Bacteria
Burrill-1878

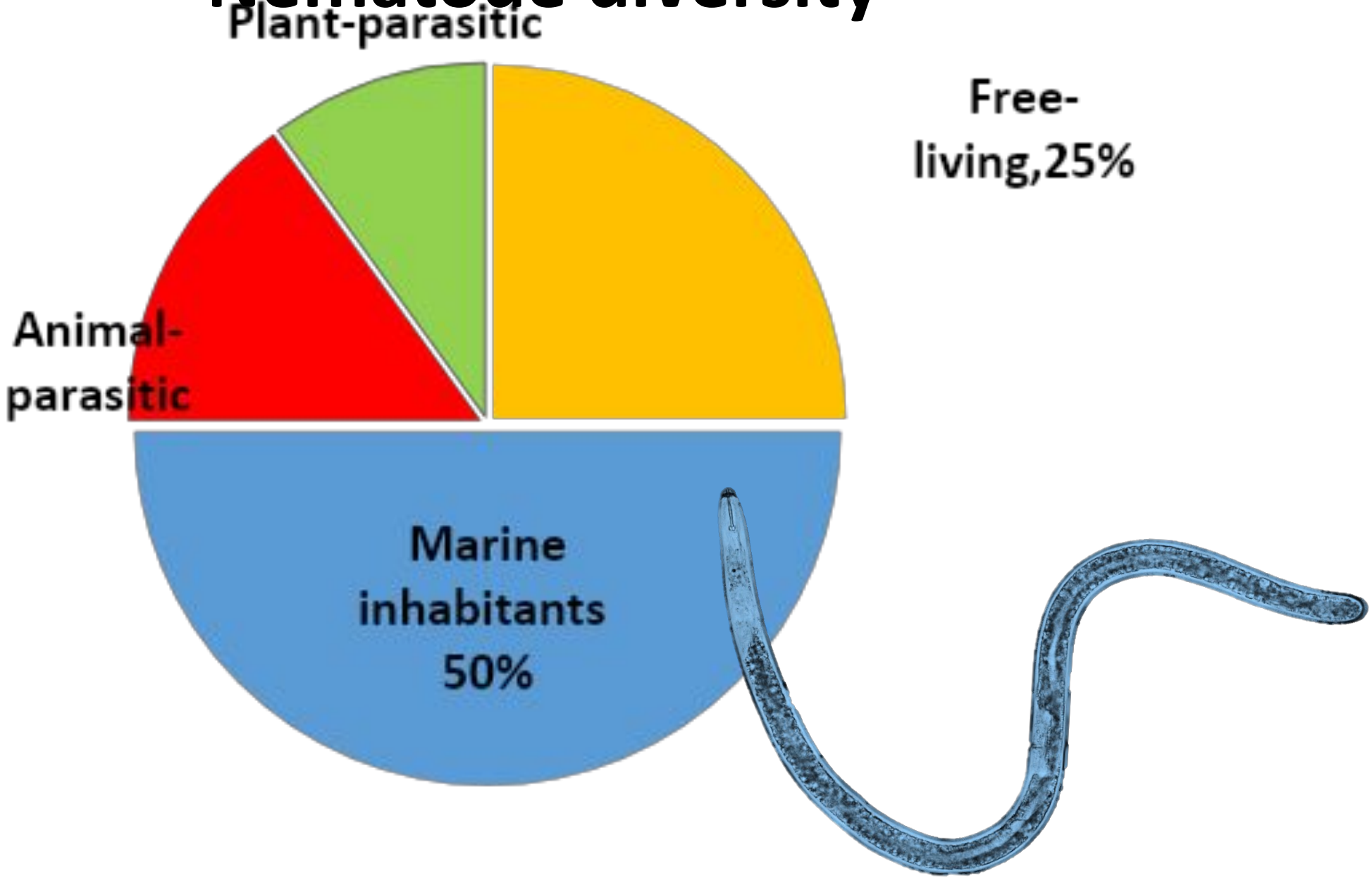


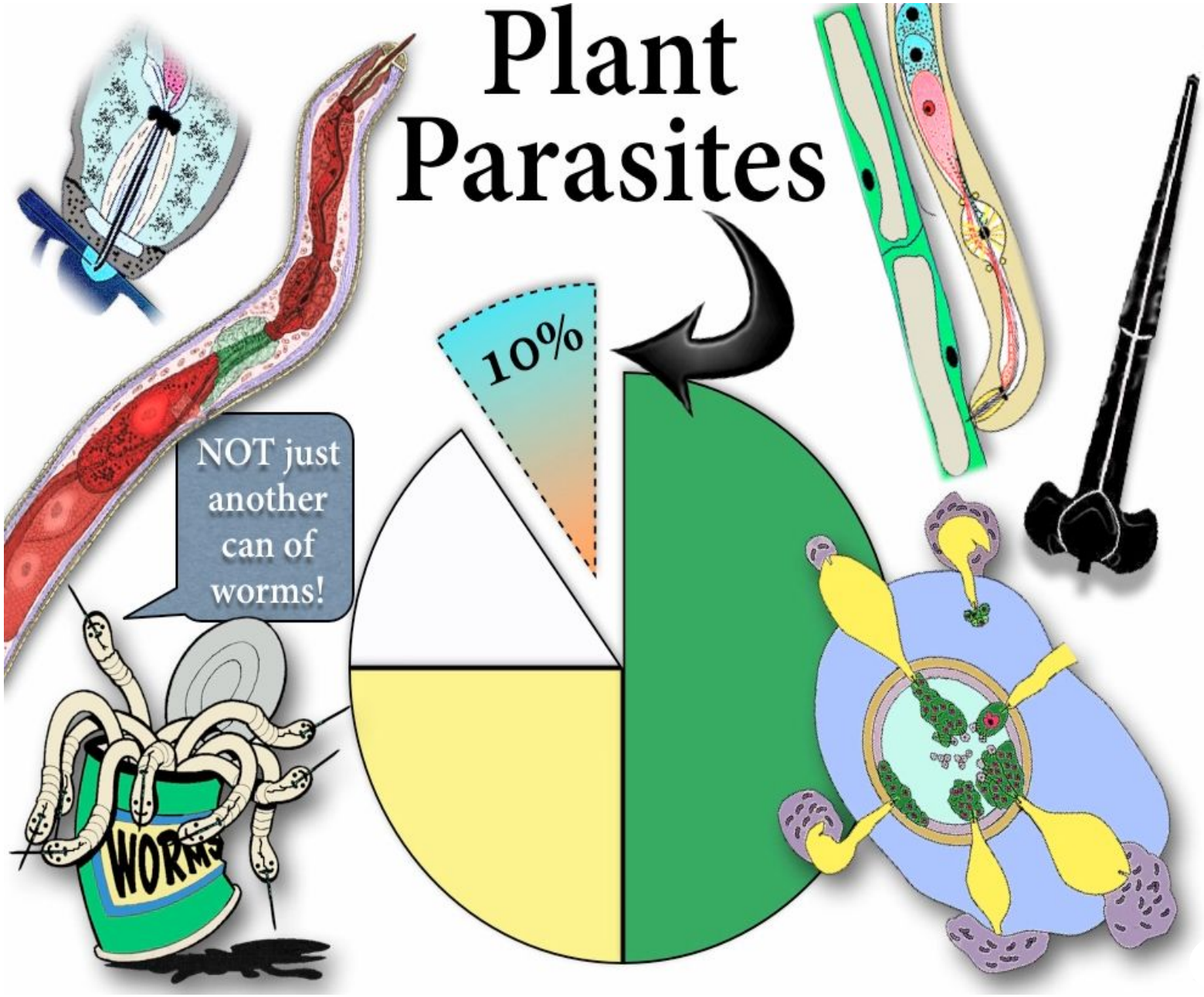


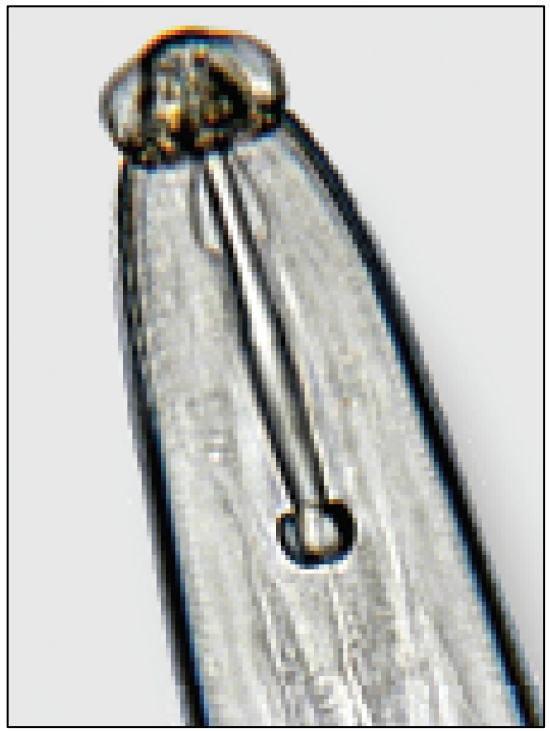
Nematodes
Needham-1743

Fungi
DeBary-1861

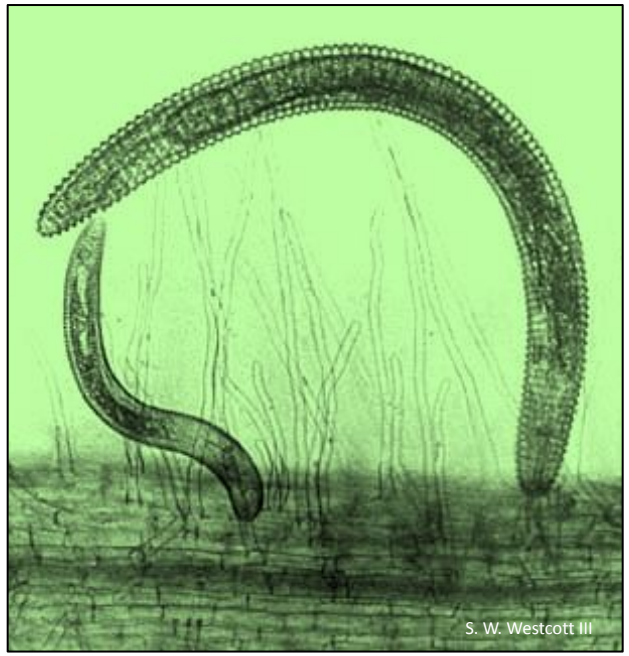
Nematode diversity

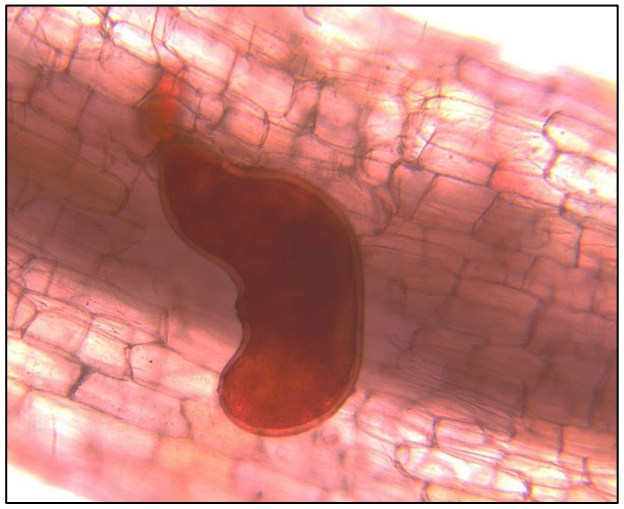



Plant Parasites
10%
NOT just another can of worms!
WORMS



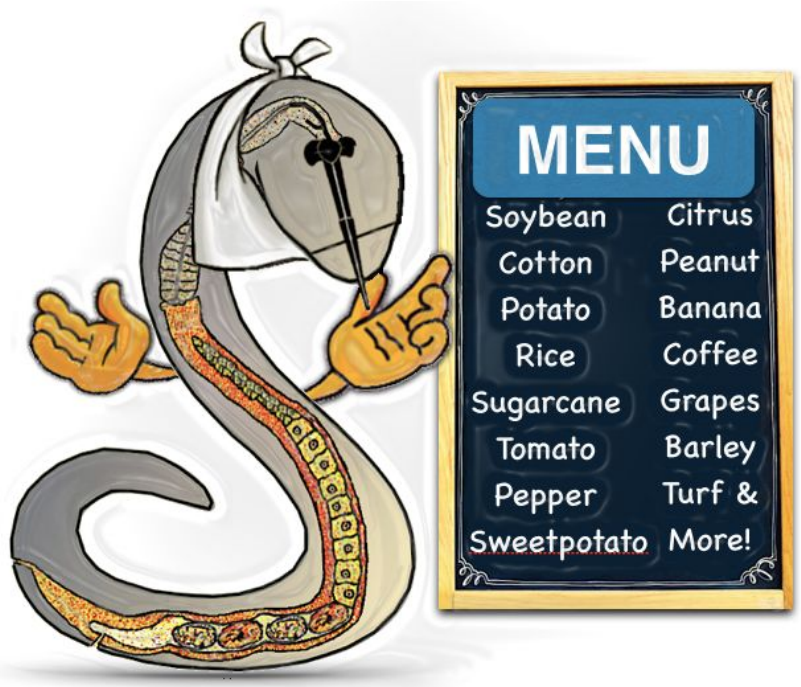
Highly diverse body sizes and shapes





Crop damage and losses by nematodes

Hundreds of billion dollar lost annually worldwide



Symptoms of nematode attack

Above-ground symptoms:

- Chlorosis
- Stunting/reduced stand & vigor
- Wilting
- Dieback

Below-ground symptoms:

- Swollen root tips
- Galls or knots
- Necrosis / lesions

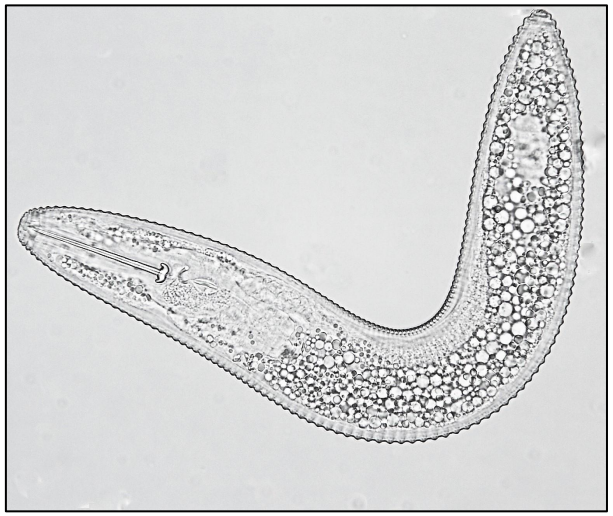
Peach Tree Short Life

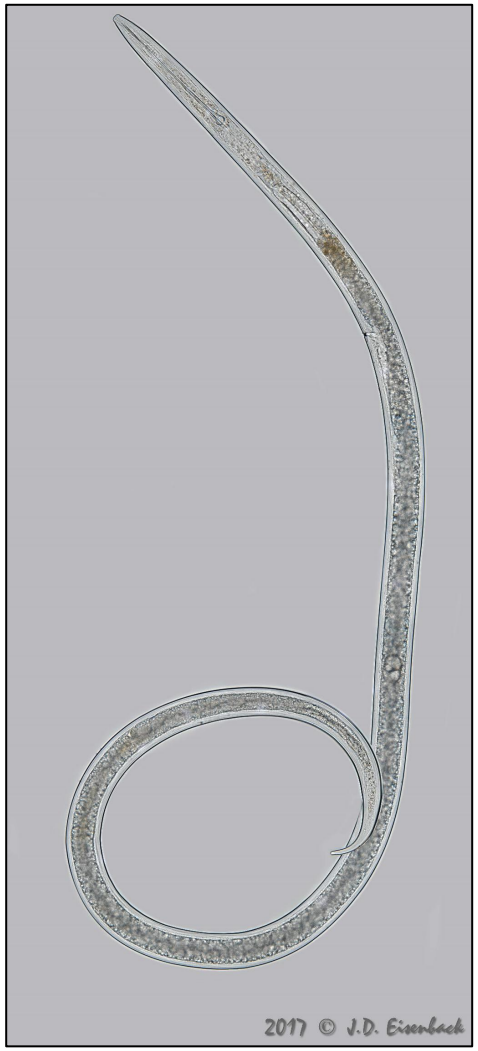
- Crop lost to nematodes can be direct or indirect
- Nematode damage usually goes unnoticed

Plant-parasitic nematodes and peach

- Peach is attacked by several plant-parasitic nematodes

Major nematodes	Action threshold
Ring nematode	20 per 100 cm^3 soil
Dagger nematode	50 per 100 cm^3 soil
Root-knot nematode	50 per 100 cm^3 soil





Common management methods

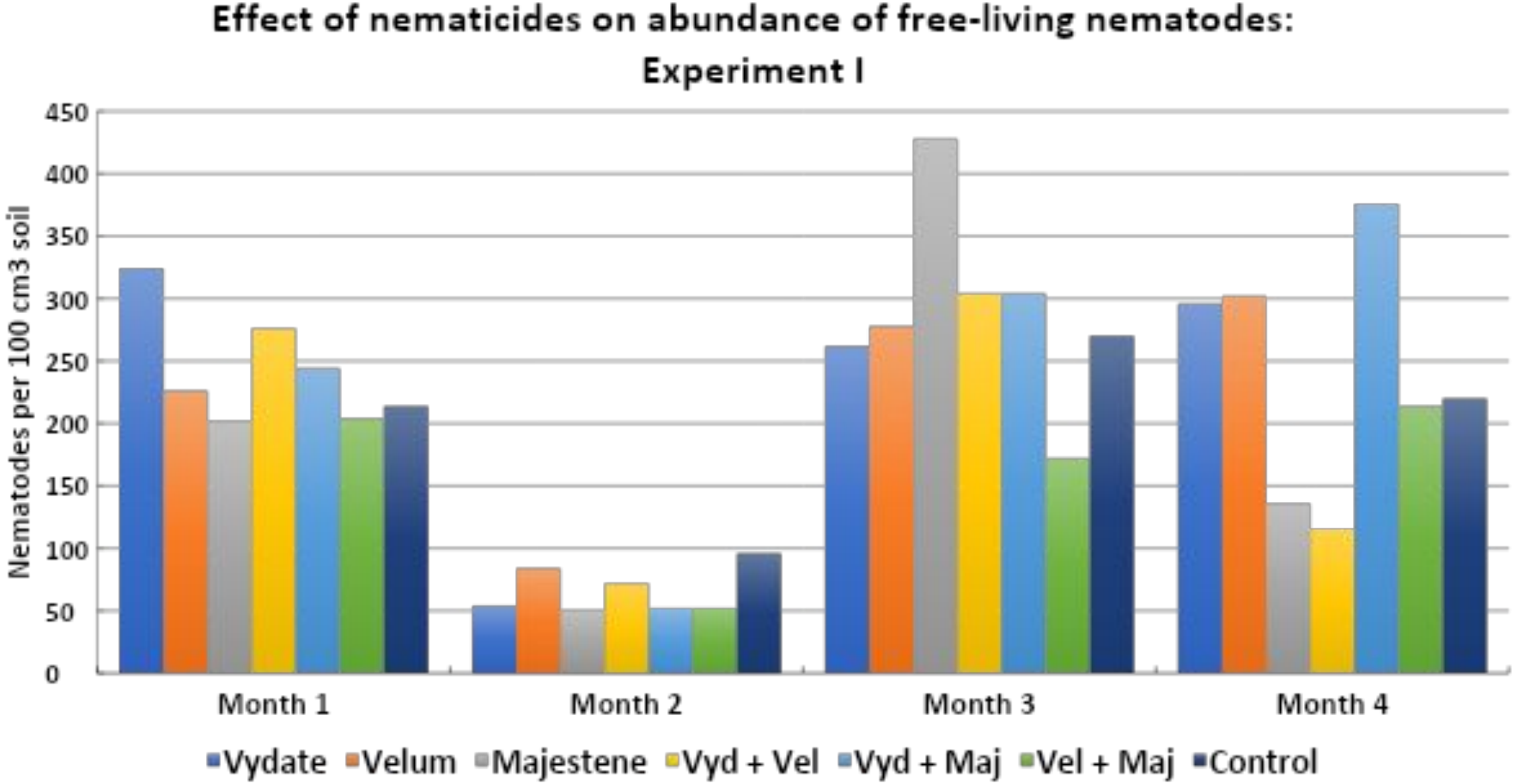
1. Chemical
2. Biological
3. Cultural
4. Legislative
5. Host-plant resistance
   - Guardian is tolerant to ring nematode, but it is NOT resistant to Peach root-knot nematode, *Meloidogyne floridensis*

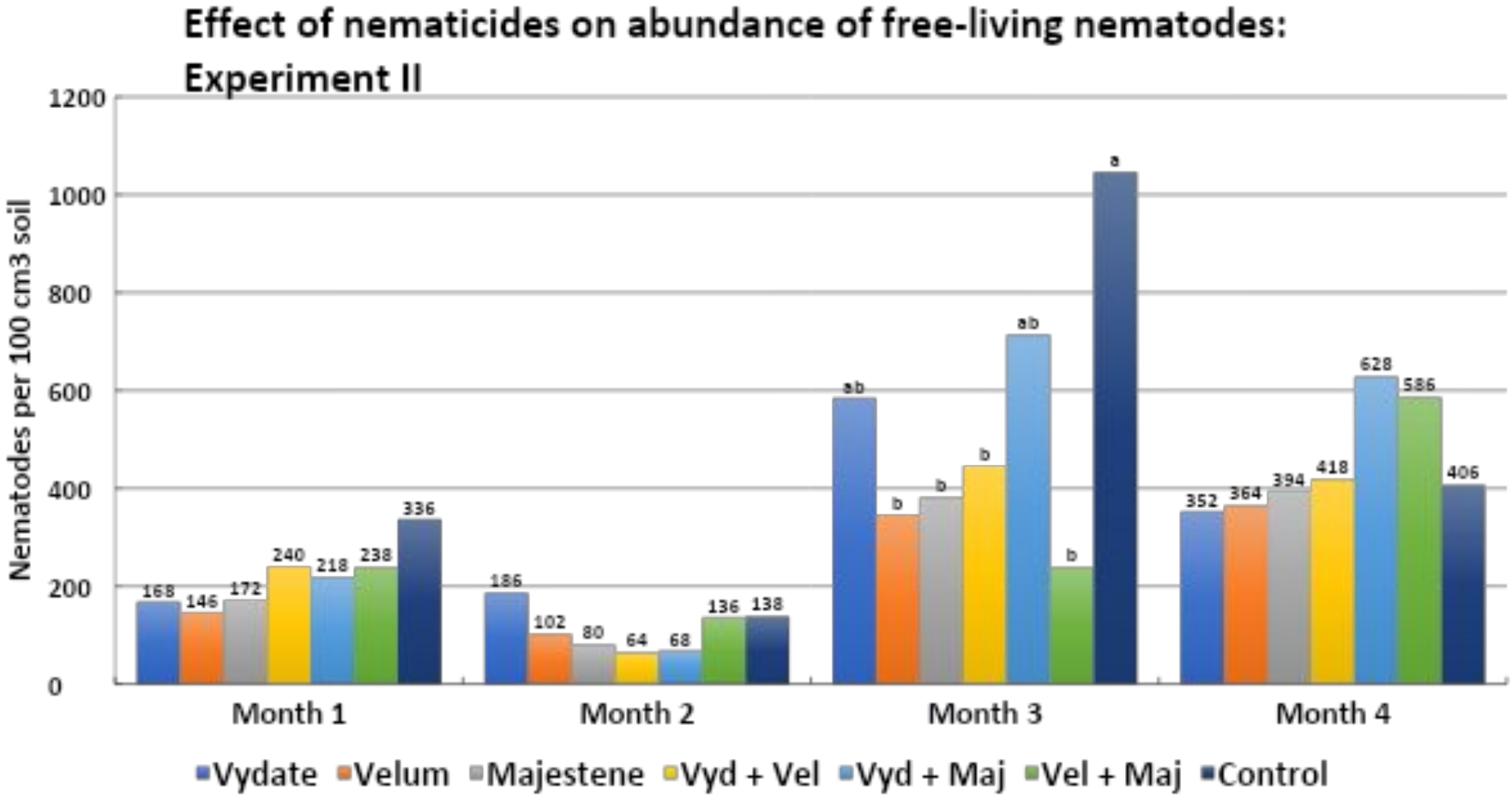
Nematicide trial 1

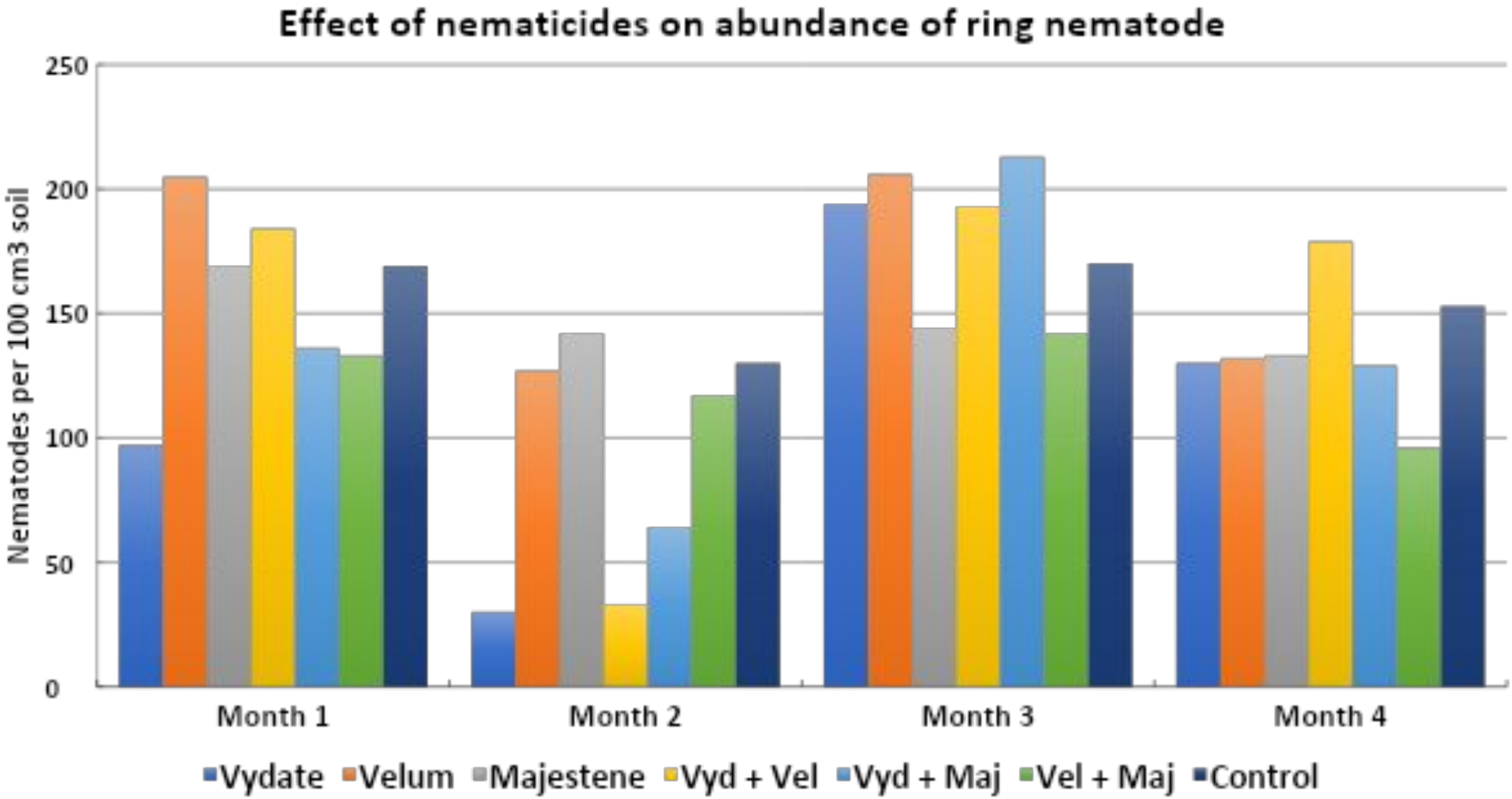
Trt #	Product(s)	Rate/A
1	Vydate	1 gal
2	Velum	6.8 oz
3	Majestene	2 gal
4	0.5X Vydate	1 gal +
	0.5X Velum	6.8 0z
5	0.5X Vydate	1 gal +
	0.5X Majestene	2 gal
6	0.5X Velum	6.8 oz +
	0.5X Majestene	2 gal
7	Control	

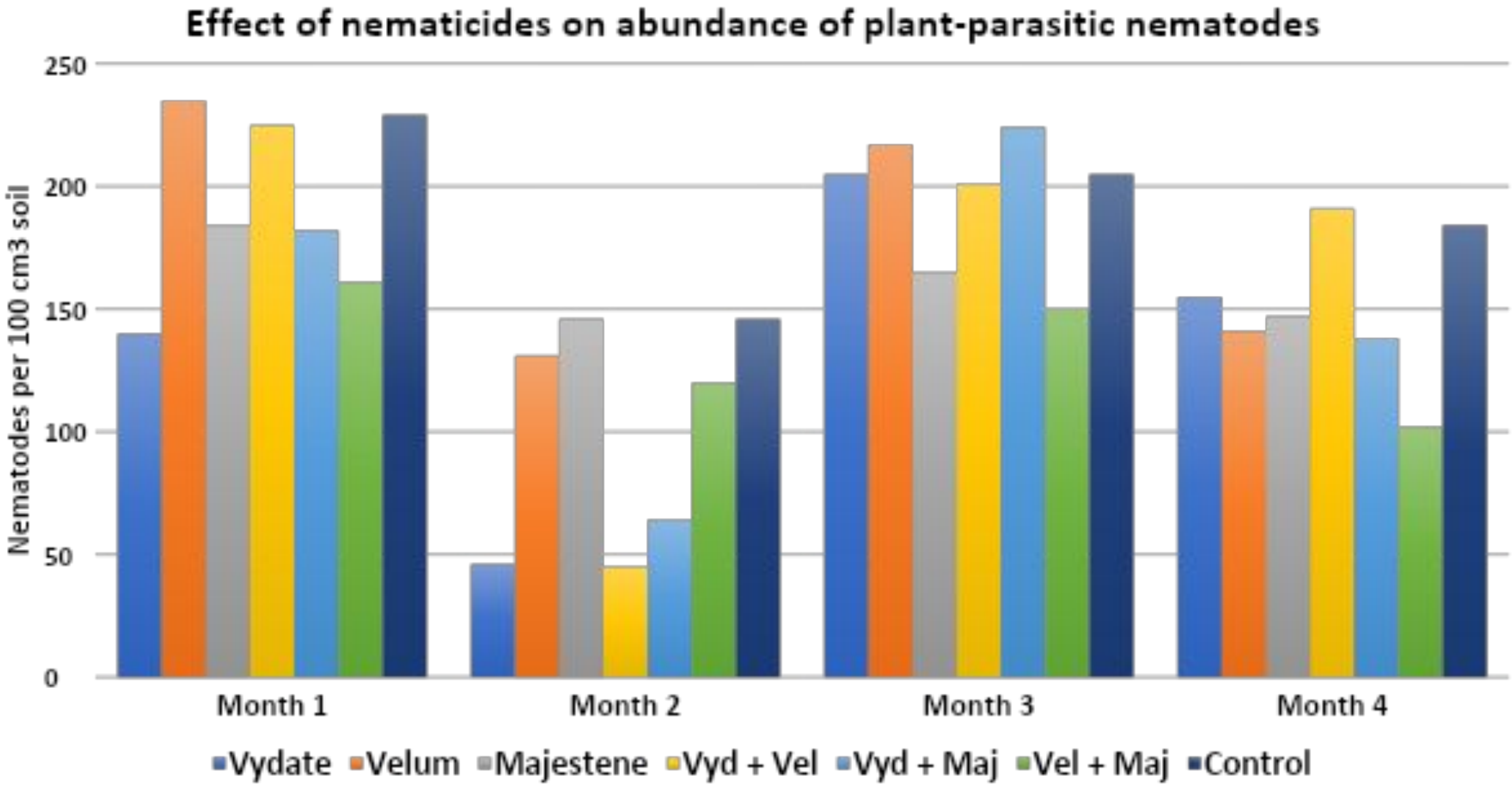
Variety:
Scarlet Prince

Randomized block design with 5 replications
Drench application around the trunk (1 m^2)
Nematode samples pulled before and after nematicide application


Effect of nematicides on abundance of free-living nematodes:
Experiment I
Nematodes per 100 cm3 soil
450
400
350
300
250
200
150
100
50
0
Month 1
Month 2
Month 3
Month 4
Vydate
Velum
Majestene
Vyd + Vel
Vyd + Maj
Vel + Maj
Control


Effect of nematicides on abundance of free-living nematodes: Experiment II
Nematodes per 100 cm3 soil
1200
1000
800
600
400
200
0
168
146
172
240
218
238
336
186
102
80
64
68
136
138
ab
b
b
b
ab
b
a
352
364
394
418
628
586
406
Month 1
Month 2
Month 3
Month 4
Vydate
Velum
Majestene
Vyd + Vel
Vyd + Maj
Vel + Maj
Control


Effect of nematicides on abundance of ring nematode
Nematodes per 100 cm3 soil
250
200
150
100
50
0
Month 1
Month 2
Month 3
Month 4
Vydate
Velum
Majestene
Vyd + Vel
Vyd + Maj
Vel + Maj
Control


Effect of nematicides on abundance of plant-parasitic nematodes
Nematodes per 100 cm3 soil
250
200
150
100
50
0
Month 1
Month 2
Month 3
Month 4
Vydate
Velum
Majestene
Vyd + Vel
Vyd + Maj
Vel + Maj
Control

Nematicide trial 2

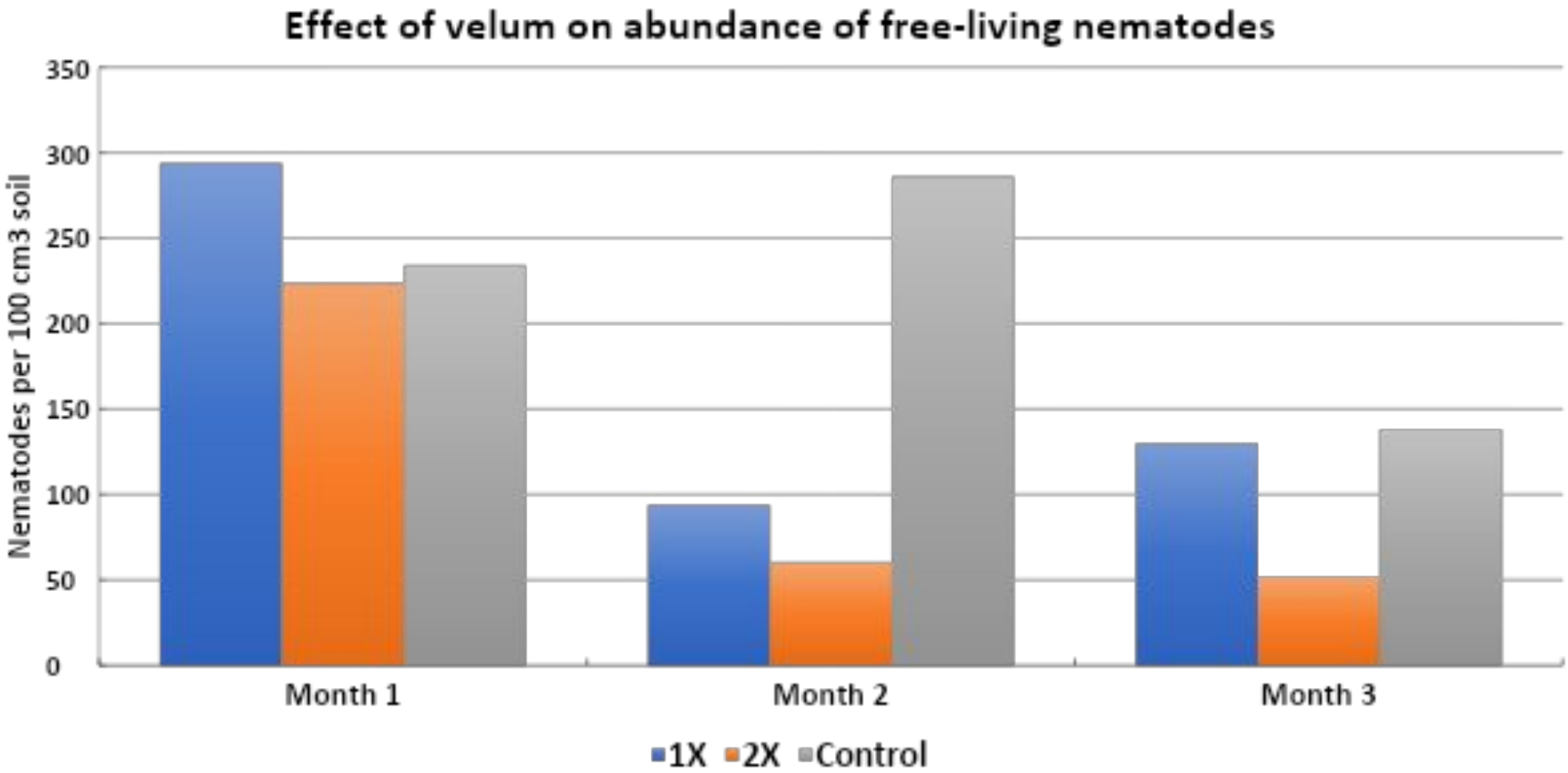
Trt #	Treatment	Rate/A
1	Velum 1X	6.8 oz
2	Velum 2X	13.7 oz
3	Control	

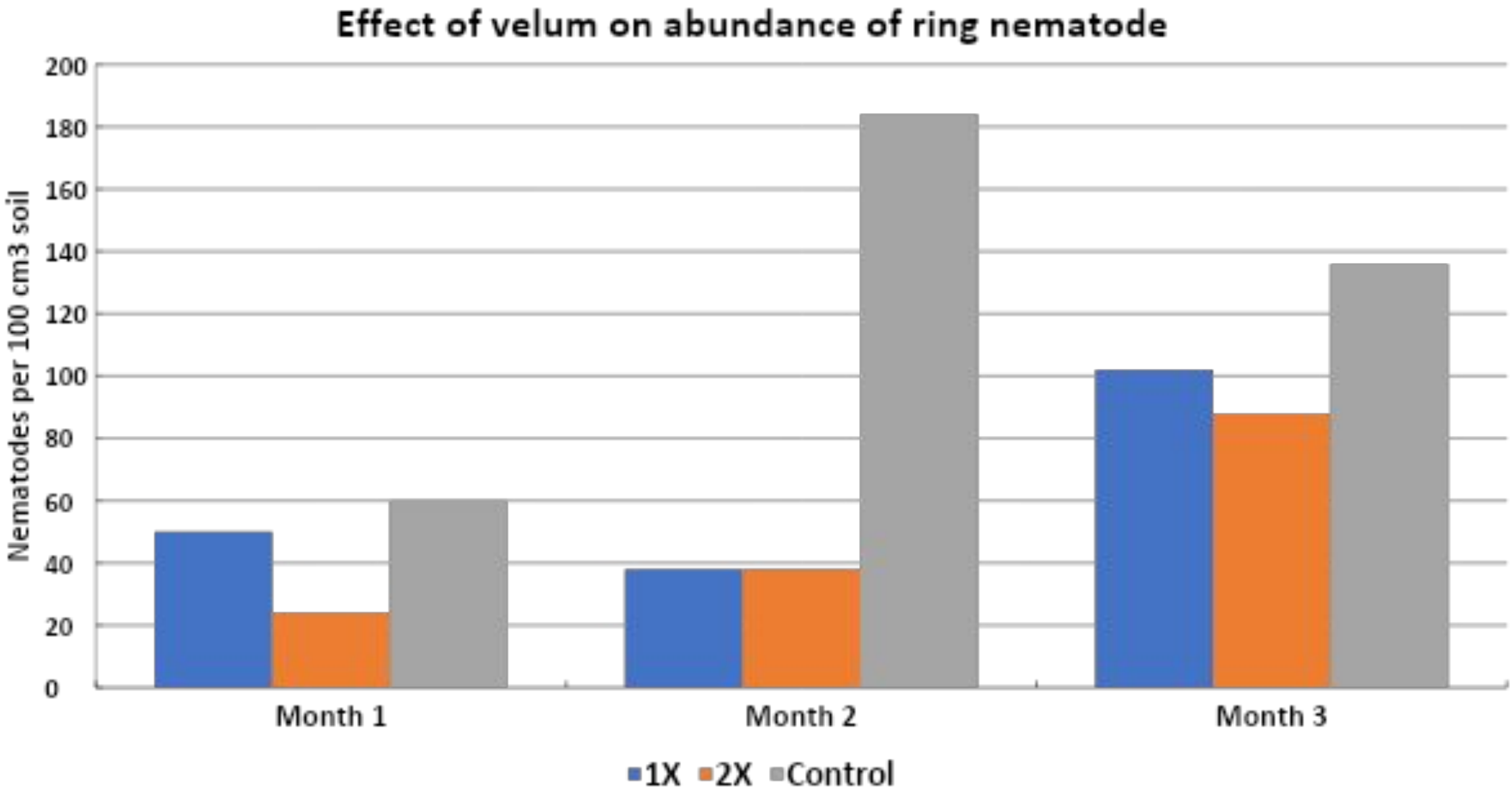
Randomized block design with 5 replications

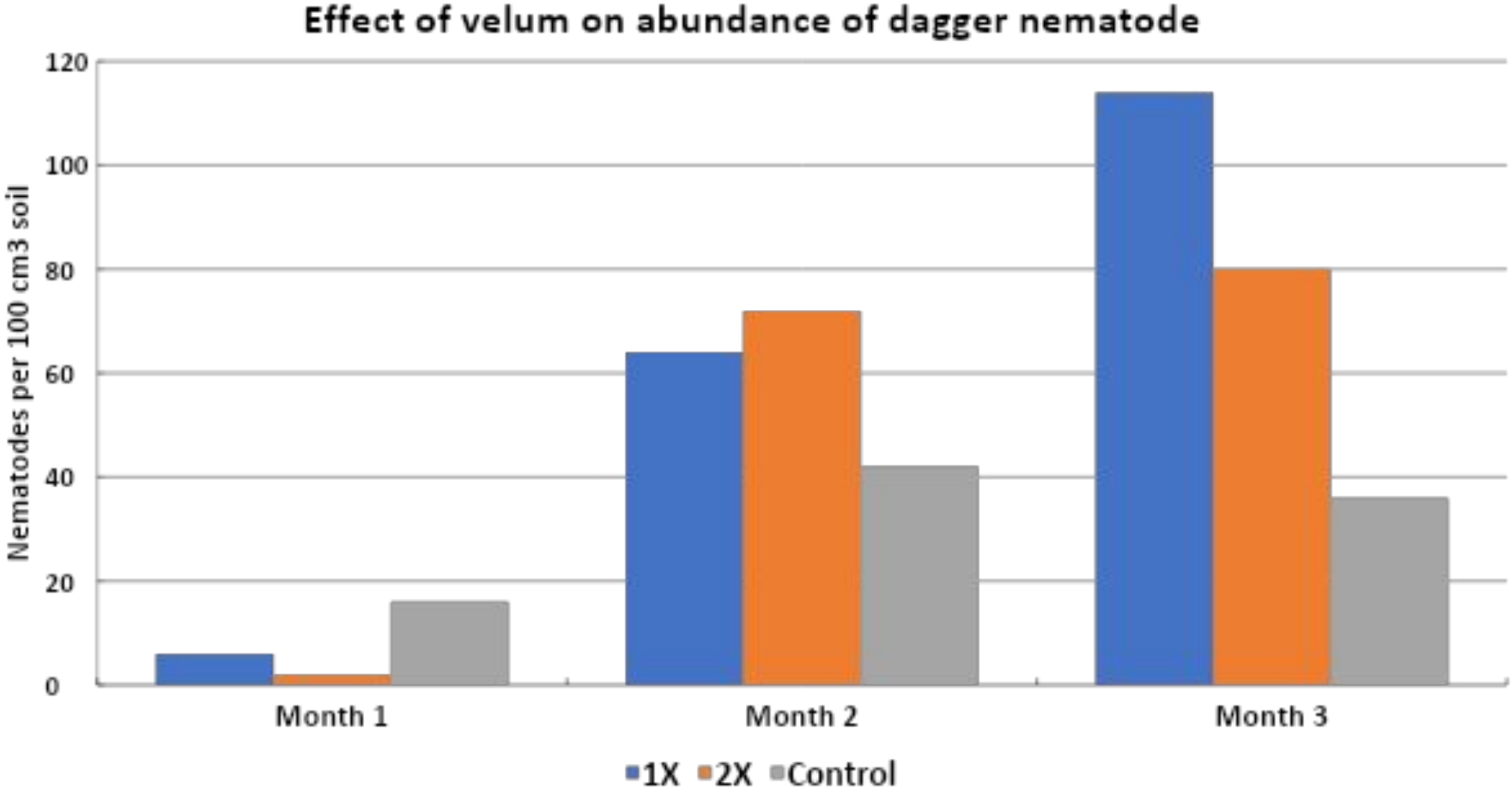
Drench application around the trunk (24 ft X 22 ft)

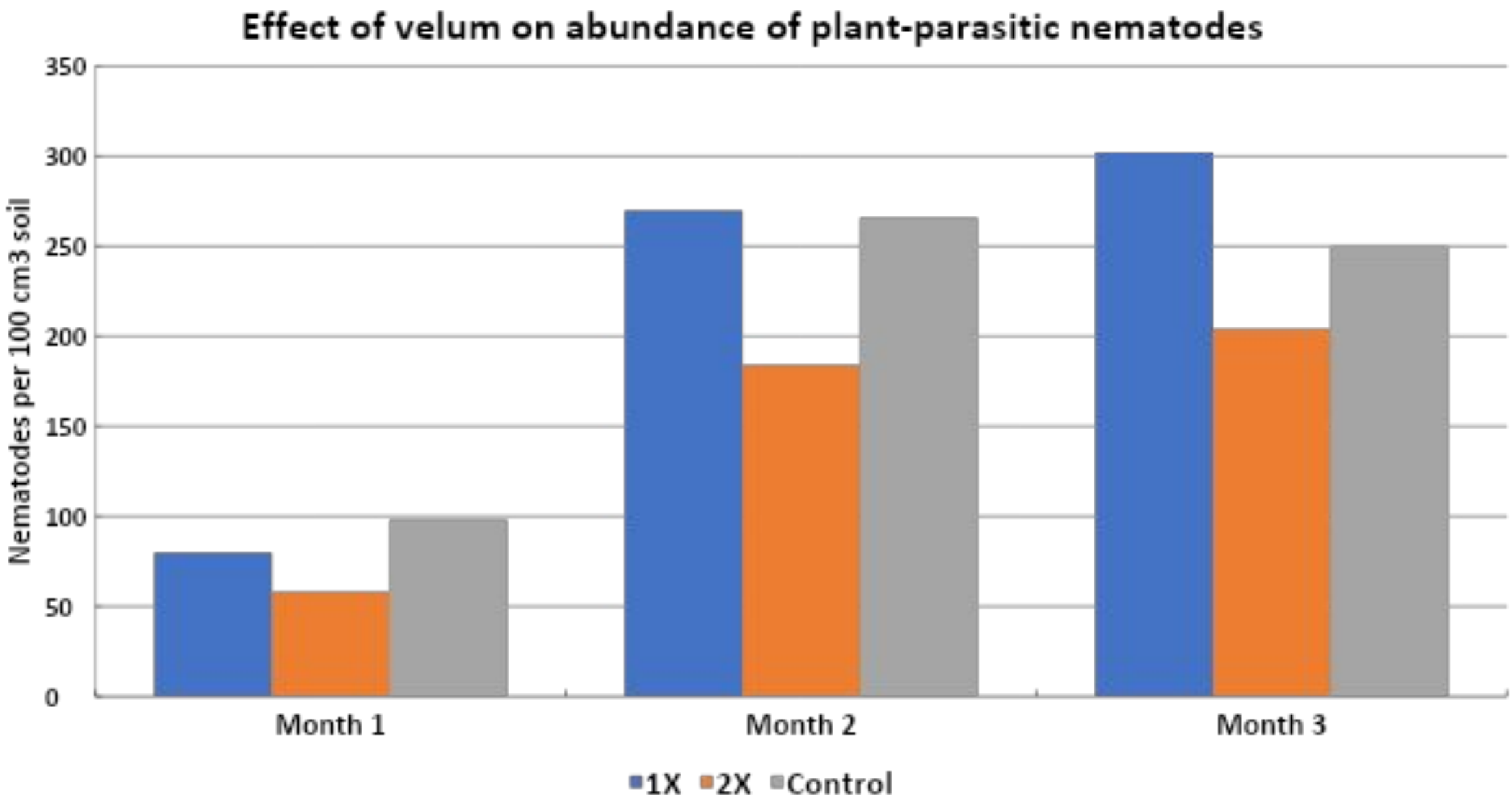
Nematode samples pulled before and after (1 and 2 months) nematicide application

Variety:
June Prince


Effect of velum on abundance of free-living nematodes
Nematodes per 100 cm3 soil
350
300
250
200
150
100
50
0
Month 1
Month 2
Month 3
1X
2X
Control


Effect of velum on abundance of ring nematode
Nematodes per 100 cm3 soil
200
180
160
140
120
100
80
60
40
20
0
Month 1
Month 2
Month 3
1X
2X
Control


Effect of velum on abundance of dagger nematode
Nematodes per 100 cm3 soil
120
100
80
60
40
20
0
Month 1
Month 2
Month 3
1X
2X
Control


Effect of velum on abundance of plant-parasitic nematodes
Nematodes per 100 cm3 soil
350
300
250
200
150
100
50
0
Month 1
Month 2
Month 3
1X
2X
Control

Soil amendment trial

3 varieties: Big Red, July Prince, Ruby Prince

3 mulch rates

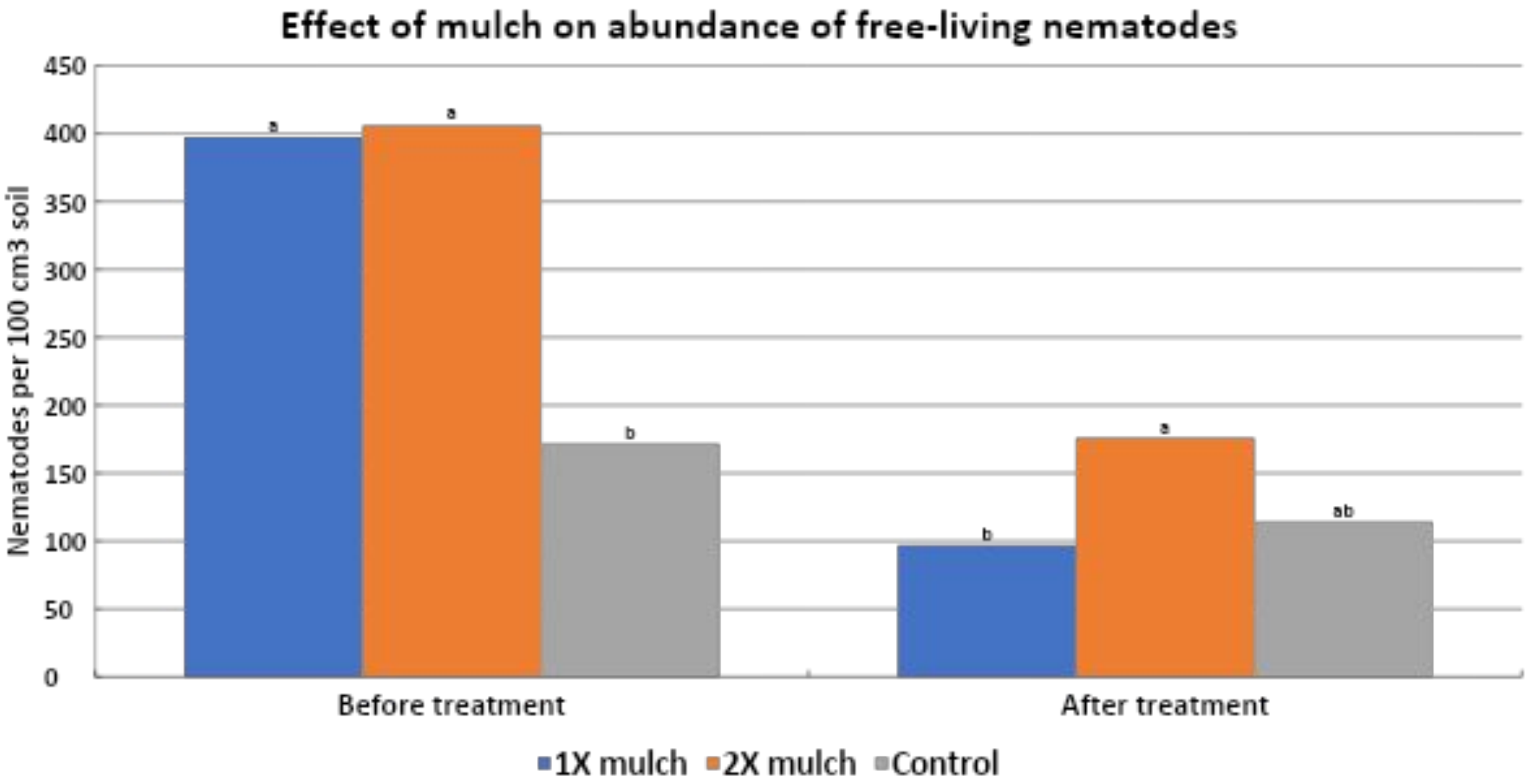
- **1X (8 ft width X 6’ depth)**
- **2X (8f t width X 12’ depth)**
- **Grower standard (control)**

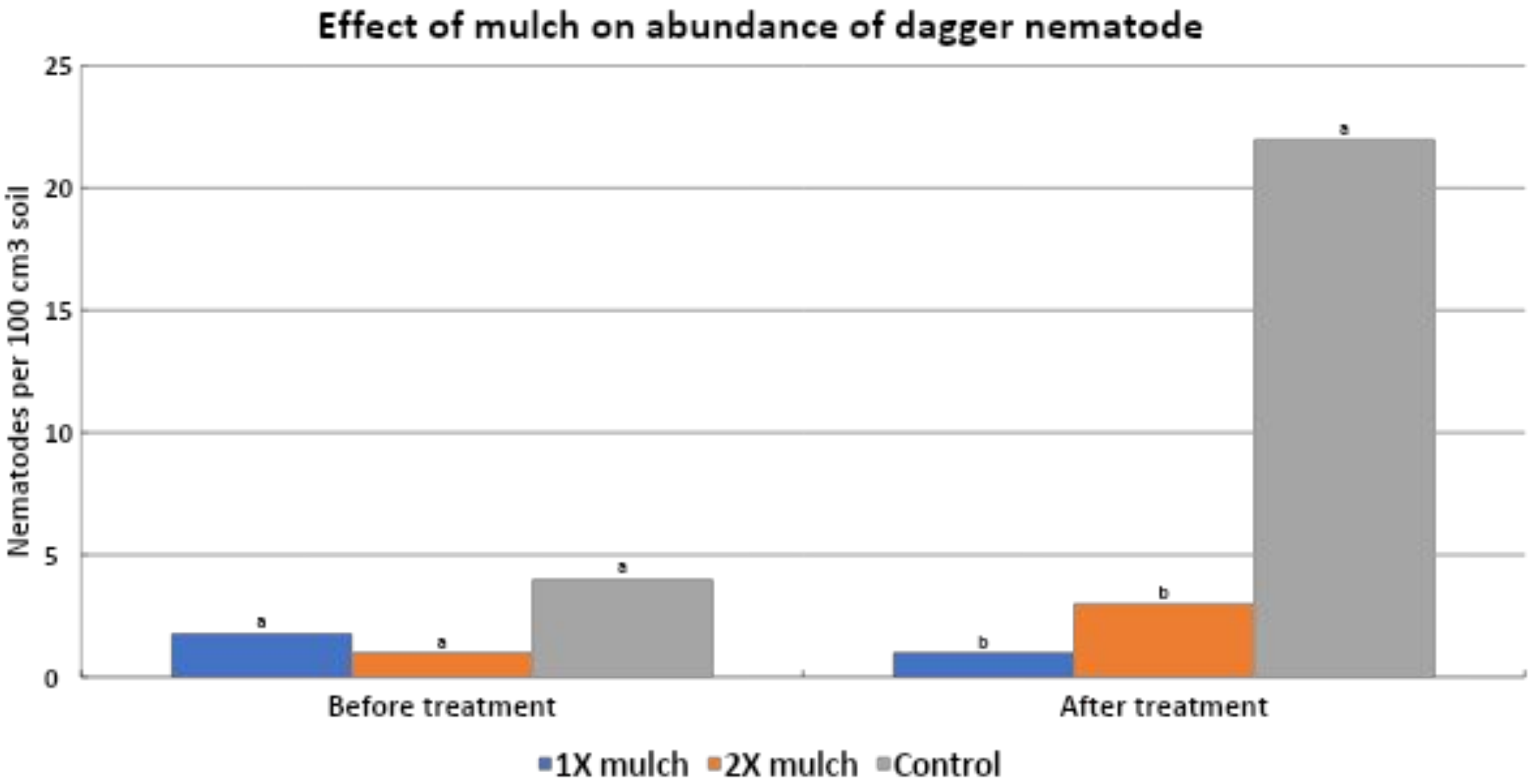
9 rows with spacing 16 ft x 22 ft

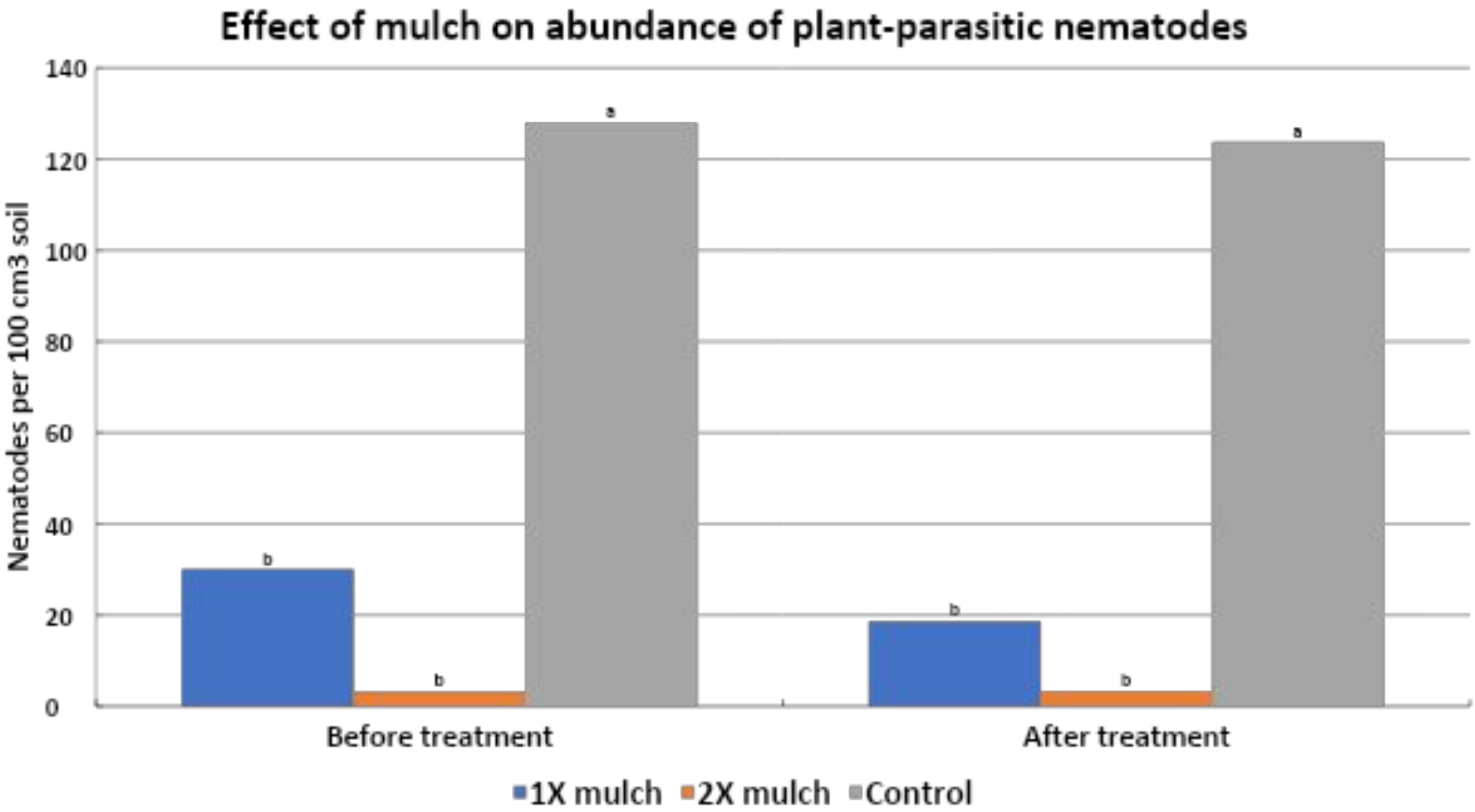
Randomized block design with 3 replications

5 trees per treatment

Nematode samples pulled before and 3 months after mulch application


Effect of mulch on abundance of free-living nematodes
Nematodes per 100 cm3 soil
450
400
350
300
250
200
150
100
50
0
a
a
b
b
a
ab
Before treatment
After treatment
1X mulch
2X mulch
Control


Effect of mulch on abundance of dagger nematode
Nematodes per 100 cm3 soil
25
20
15
10
5
0
a
a
a
b
b
a
Before treatment
After treatment
1X mulch
2X mulch
Control


Effect of mulch on abundance of plant-parasitic nematodes
Nematodes per 100 cm3 soil
140
120
100
80
60
40
20
0
a
b
b
b
b
a
Before treatment
After treatment
1X mulch
2X mulch
Control

Take-home message

- Ring, dagger, and root-knot nematodes are economically most important plant-parasitic nematodes of peach in the southeast
- Despite several years of research on peach-associated nematodes, their effective management remains a challenge
- Use of chemical nematicides remains the most common nematode management option
- Currently available non-fumigant and biological nematicides do not seem to be effective against plant-parasitic nematodes
- Use of soil amendments may help suppress the nematodes

Questions?

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