A Systems Approach to Soil-Borne Pest Management

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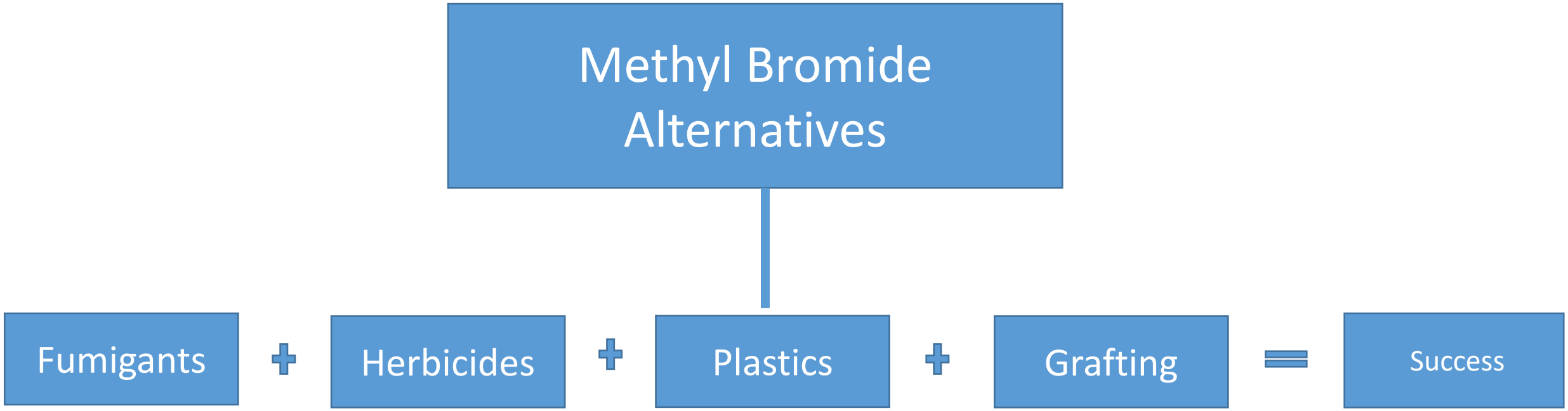
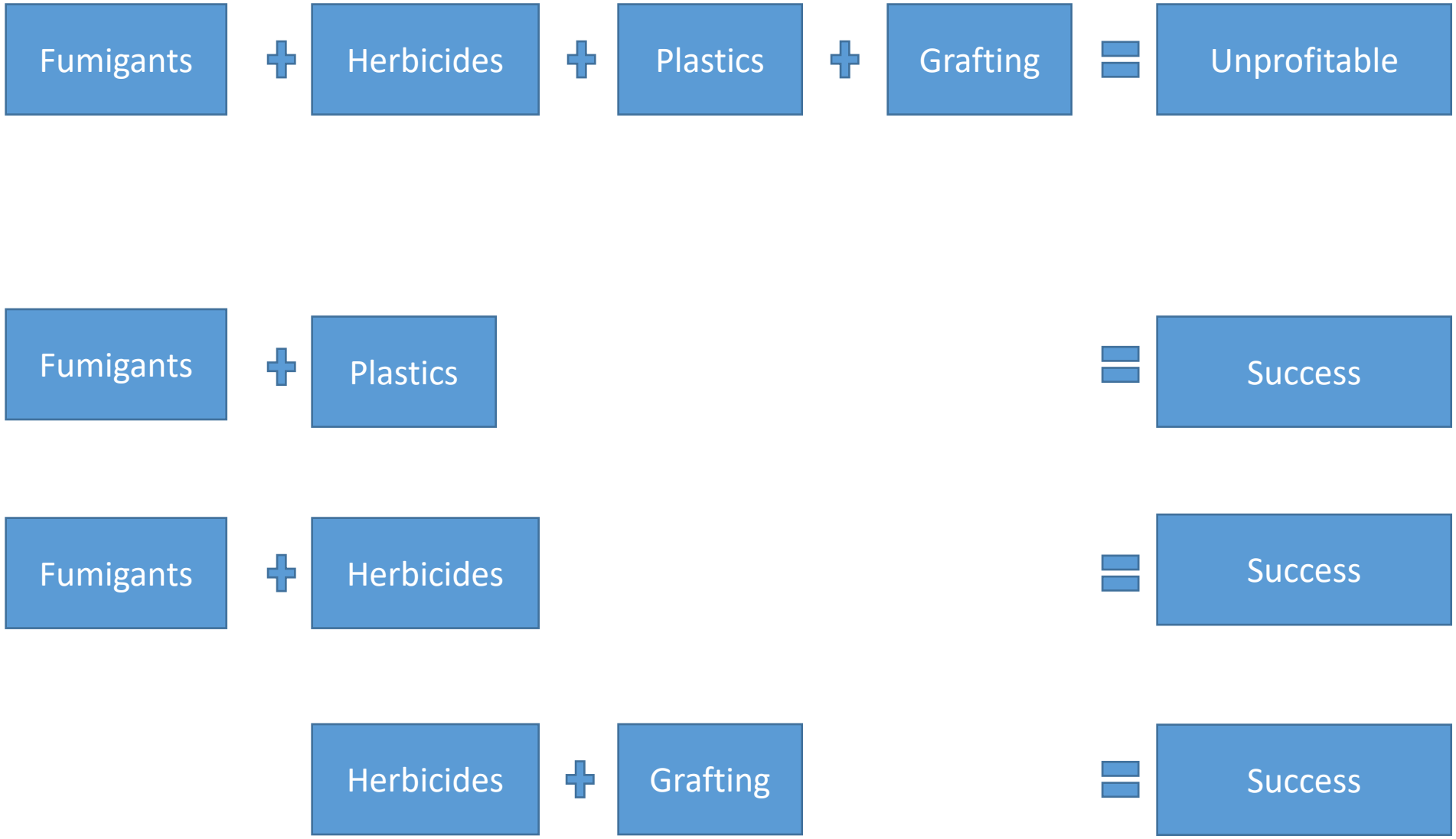
Quincy, FL


Methyl Bromide Alternatives
Fumigants
+
Herbicides
+
Plastics
+
Grafting
=
Success


Fumigants
Herbicides
Plastics
Grafting
Unprofitable
Fumigants
Plastics
Success
Fumigants
Herbicides
Success
Herbicides
Grafting
Success

Situation Post Methyl Bromide

- Pests are still present and likely in greater numbers than before methyl bromide phase out
- New pest issues continue to emerge or become prominent
- No single solution has been identified

Knowledge

- If you don’t know what your target is, there is a slim chance of you hitting it
- There is also a good chance of you wasting a lot of money trying to hit it

Knowledge

- What are you trying to manage
- Many of our pest management tools are very specific and must be matched appropriately to the correct pest

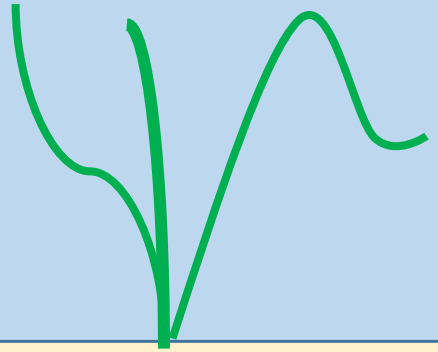
- Some pests simply can’t be managed

Response

- Avoid the pest – crop rotation or fallowing
- Tolerate – manage the amount of production lost through various tactics
- Manage/control – use method**S** to keep pests in control

The 4 R’s

- Right material
- Right placement
- Right rate
- Right time (season)



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NEMATODES

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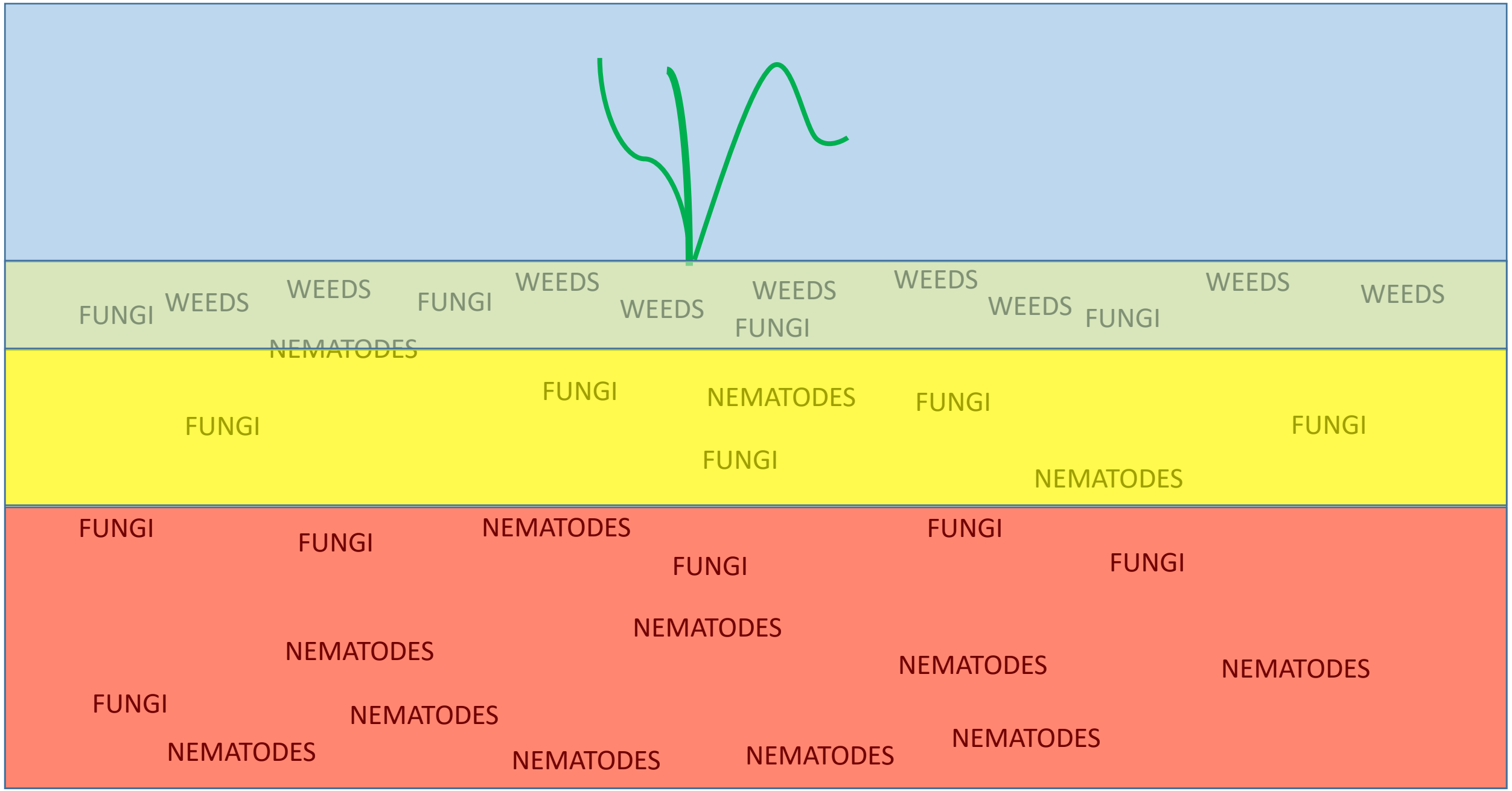
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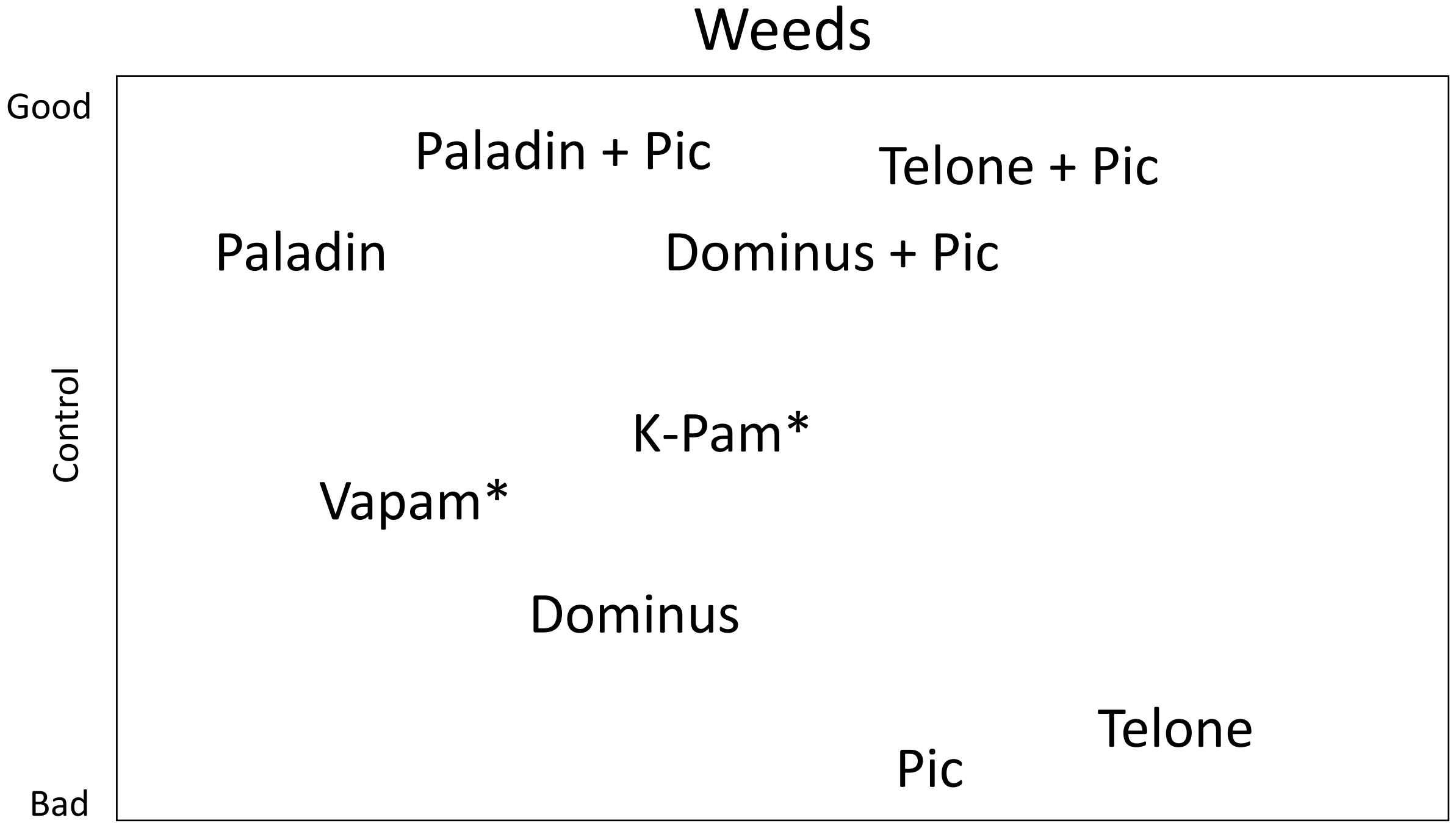
Tools

- Metam Sodium
- Metam Potassium
- Dominus
- Paladin
- Chloropicrin
- Telone

- Low Density Polyethylene
- Virtually Impermeable Film
- Totally Impermeable Film

- Broadcast tarped
- Broadcast un-tarped
- Bedded row tarped
- Bedded row un-tarped
- Drip
- Deep shank
- Deep drip


Weeds
Good
Control
Bad
Paladin + Pic
Telone + Pic
Paladin
Dominus + Pic
K-Pam*
Vapam*
Dominus
Telone
Pic

Fungi

Good

Control

Bad

Paladin + Pic

Pic
Dominus + Pic

Telone + Pic

Paladin

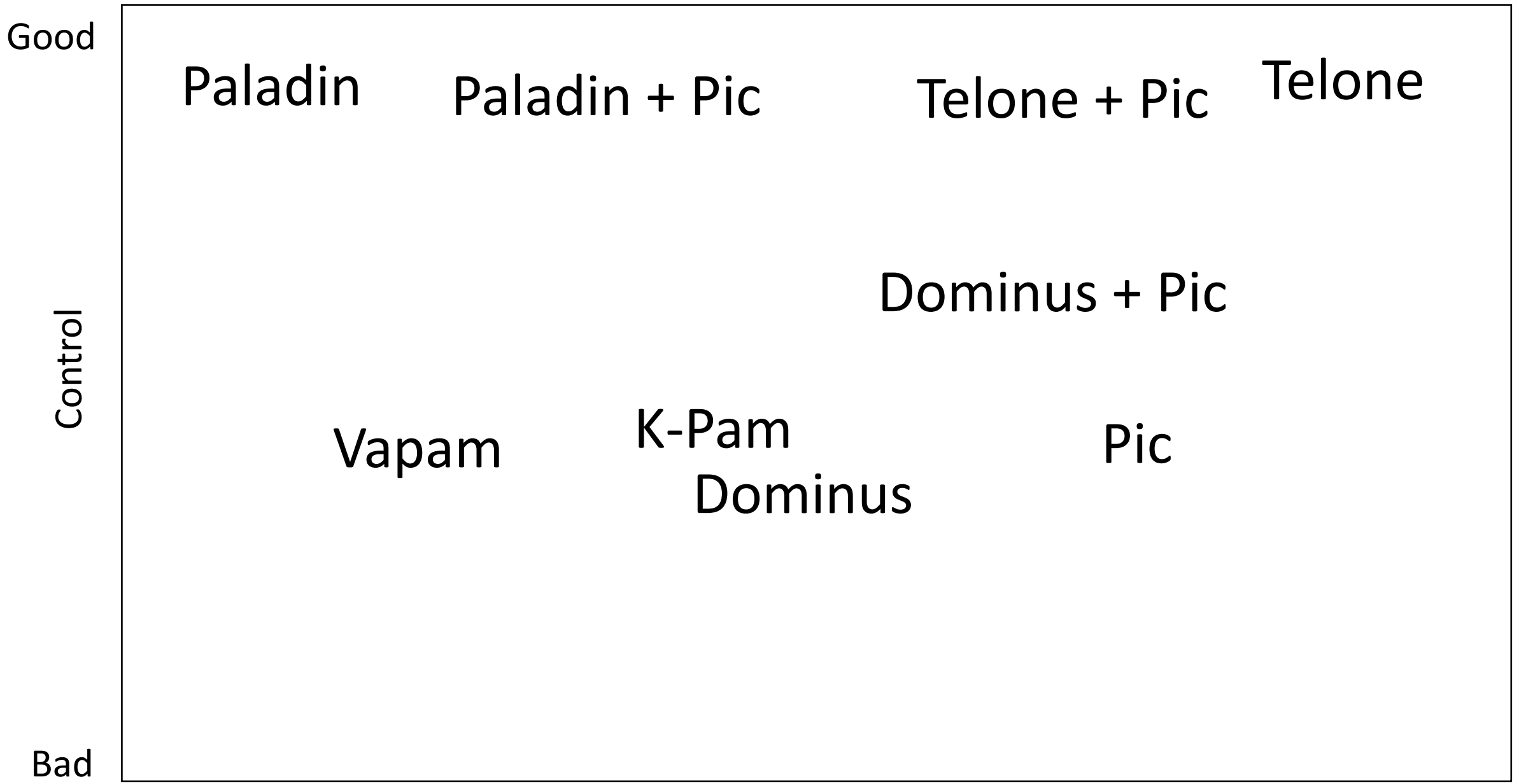
K-Pam

Vapam

Dominus

Telone

Nematodes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Bad
Paladin
Paladin + Pic
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Telone
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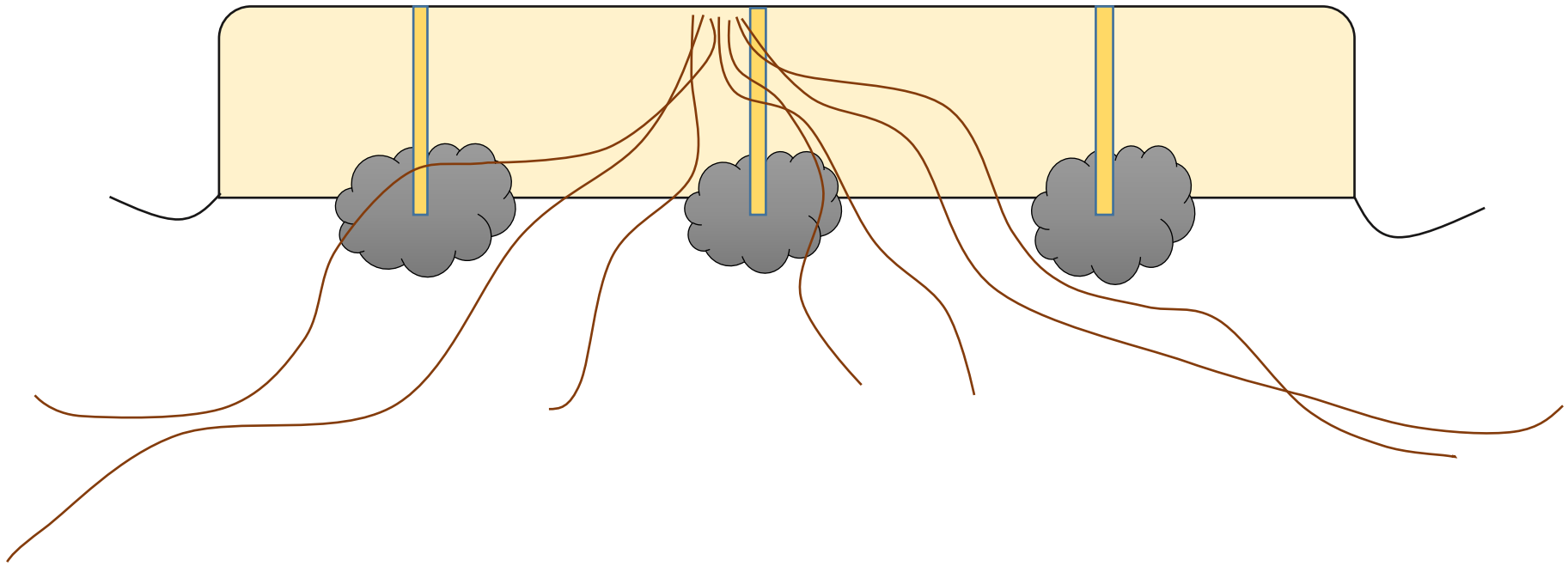
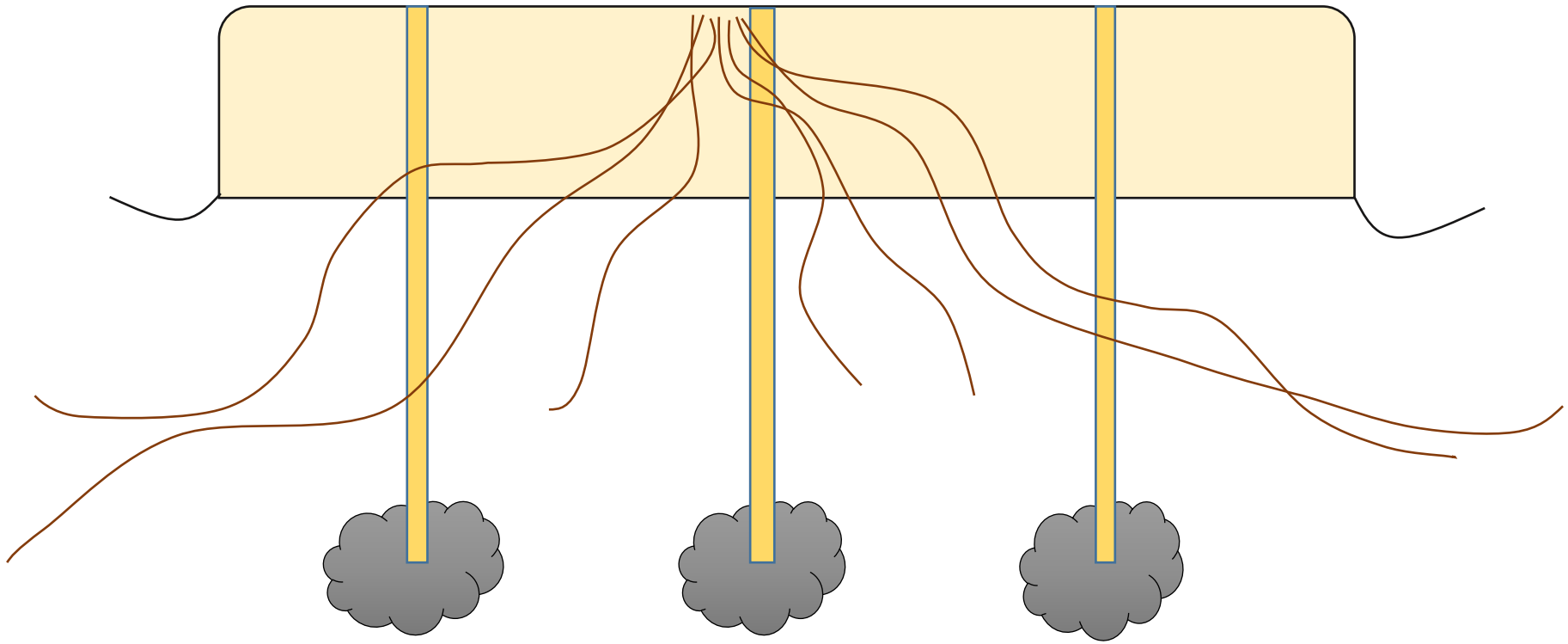
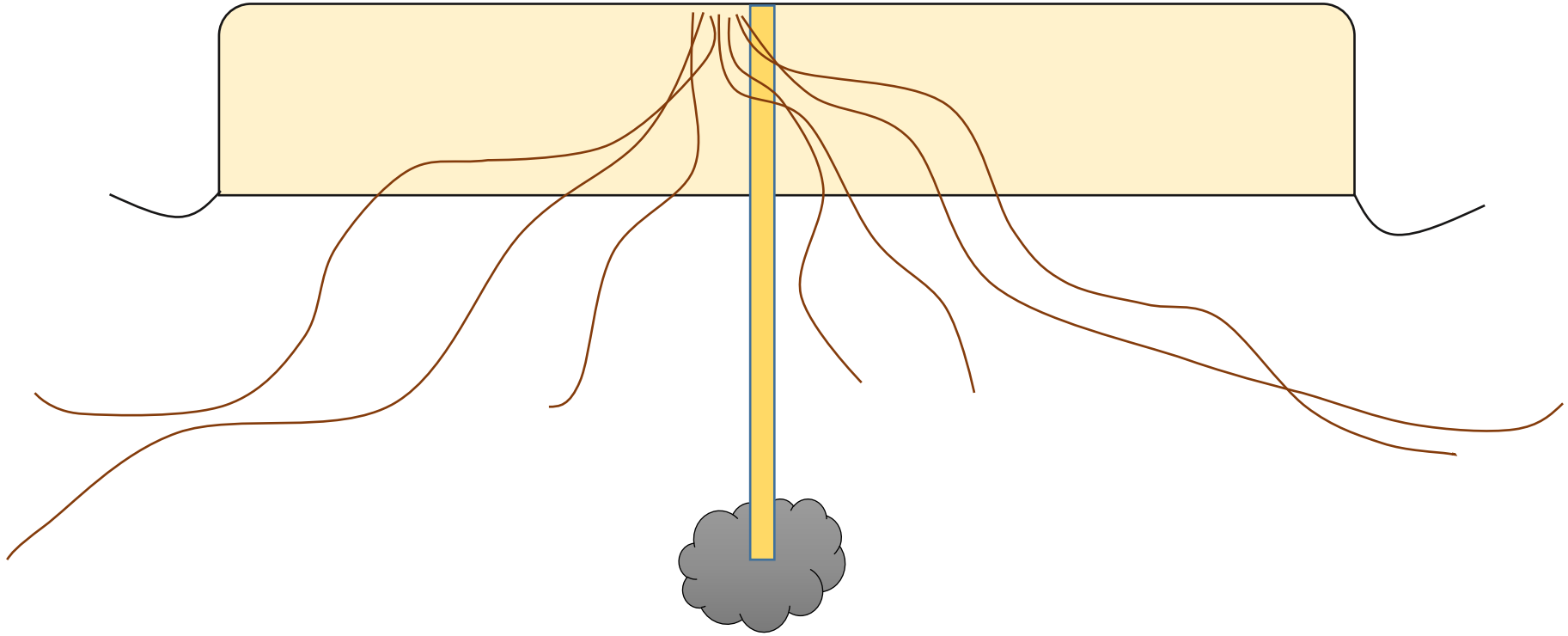
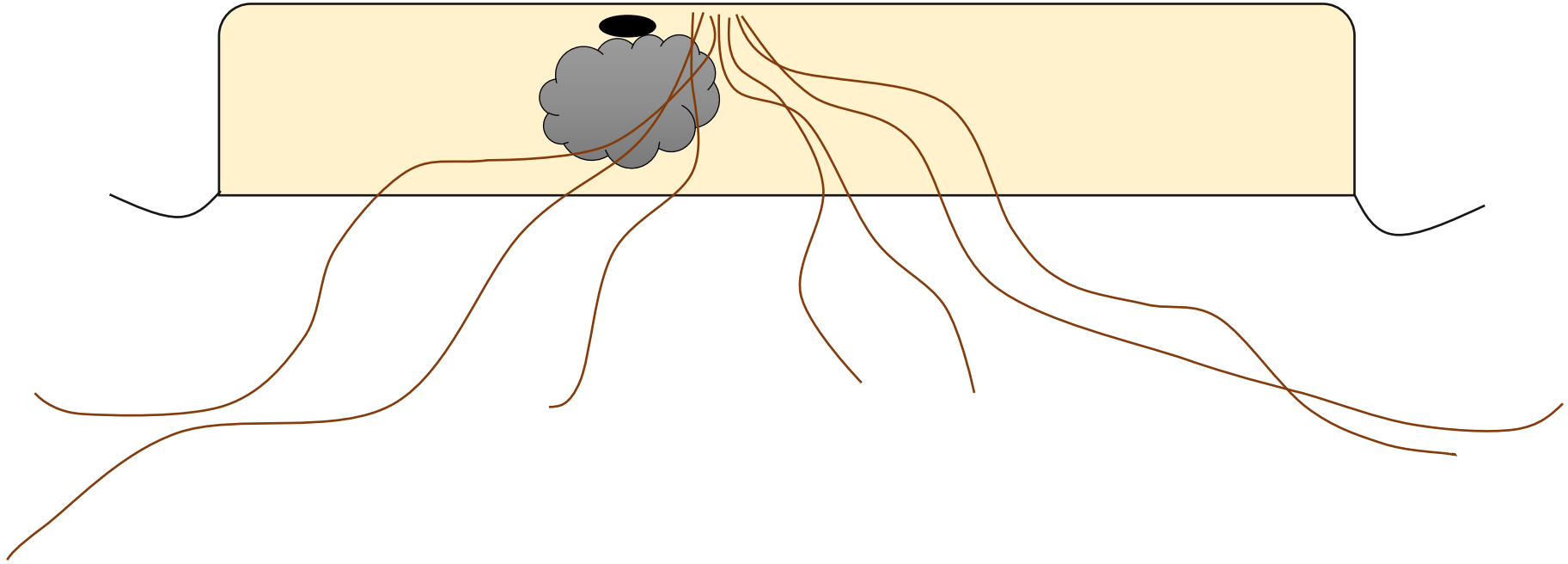
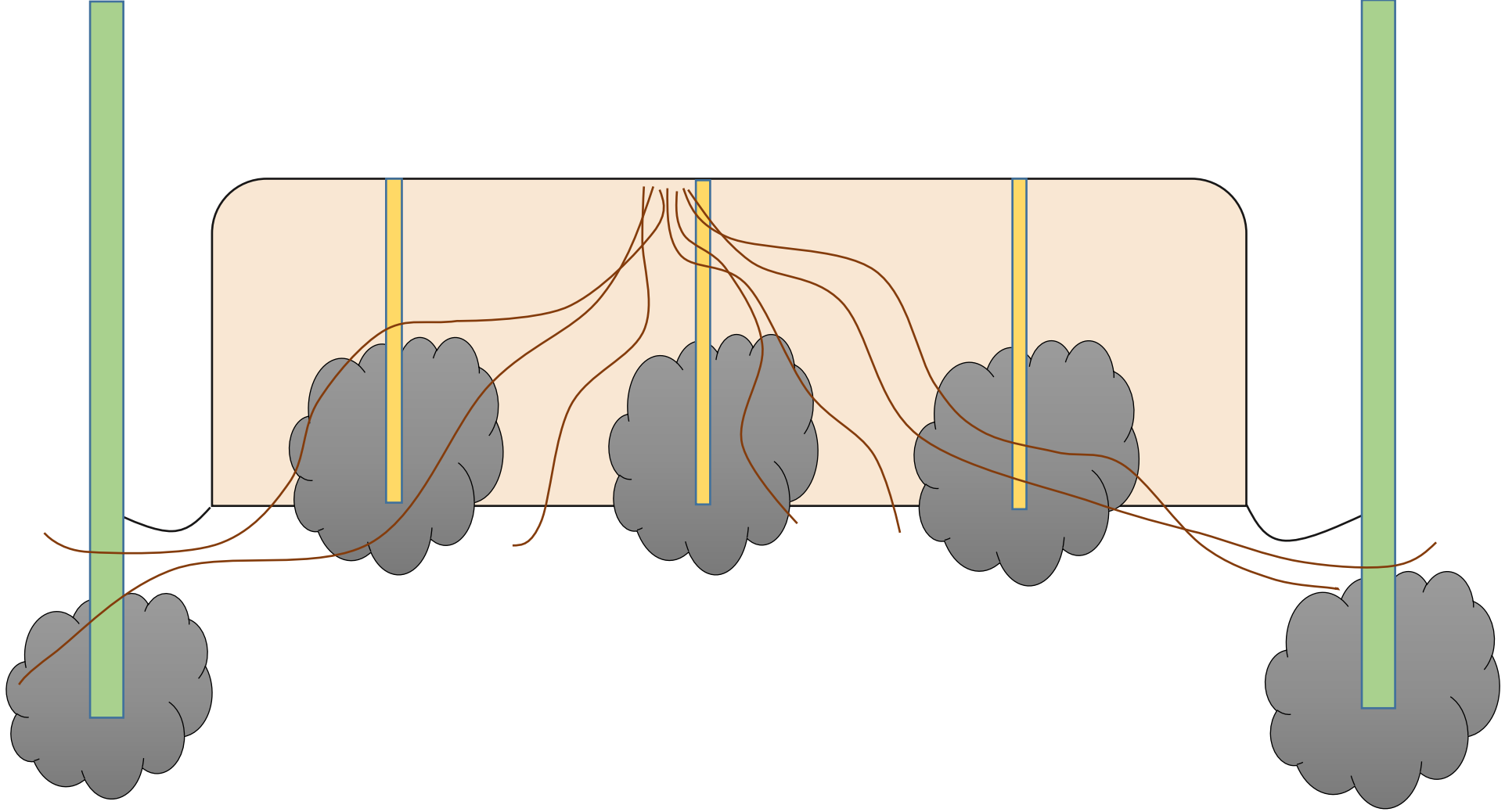
K-Pam
Dominus
Pic

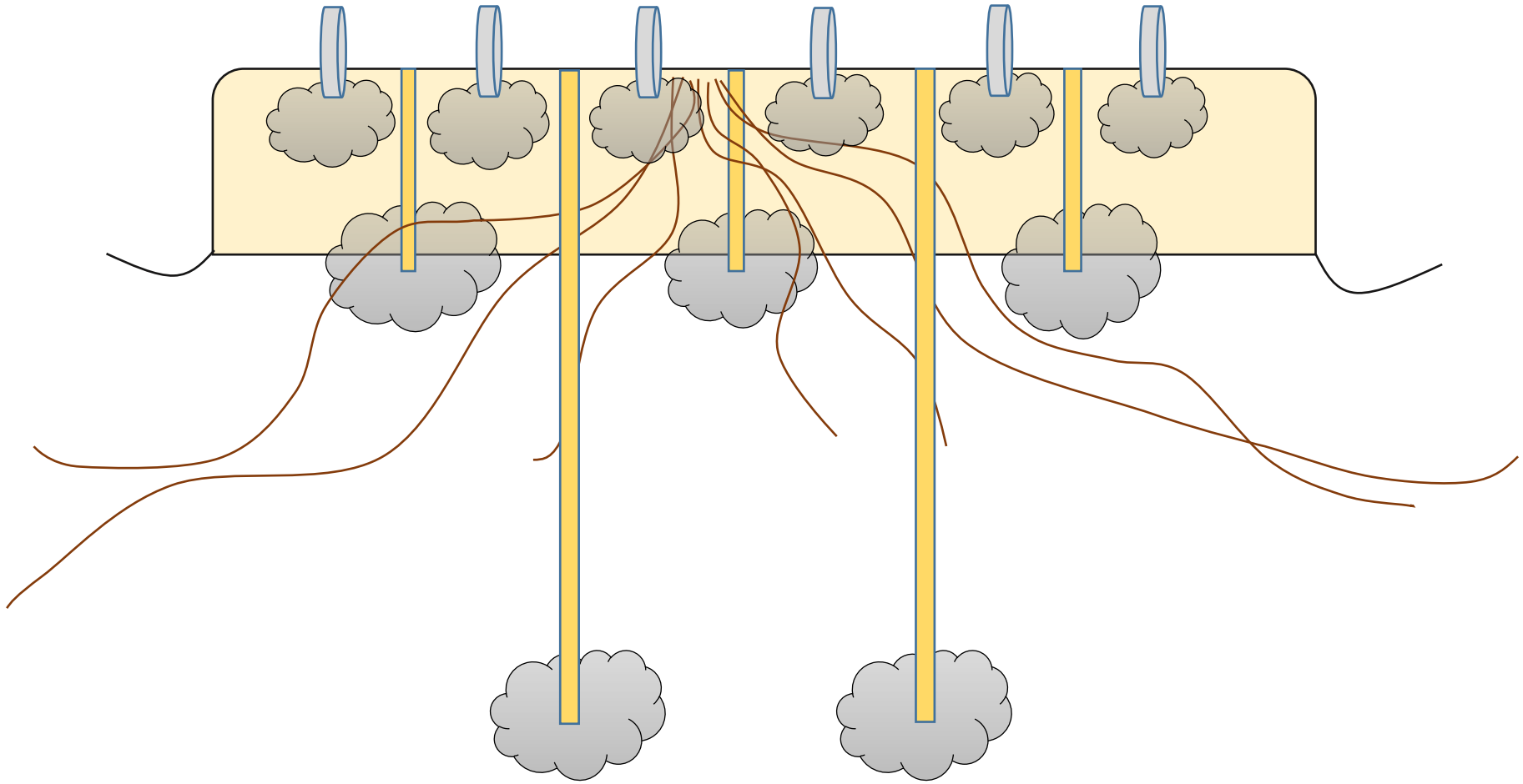


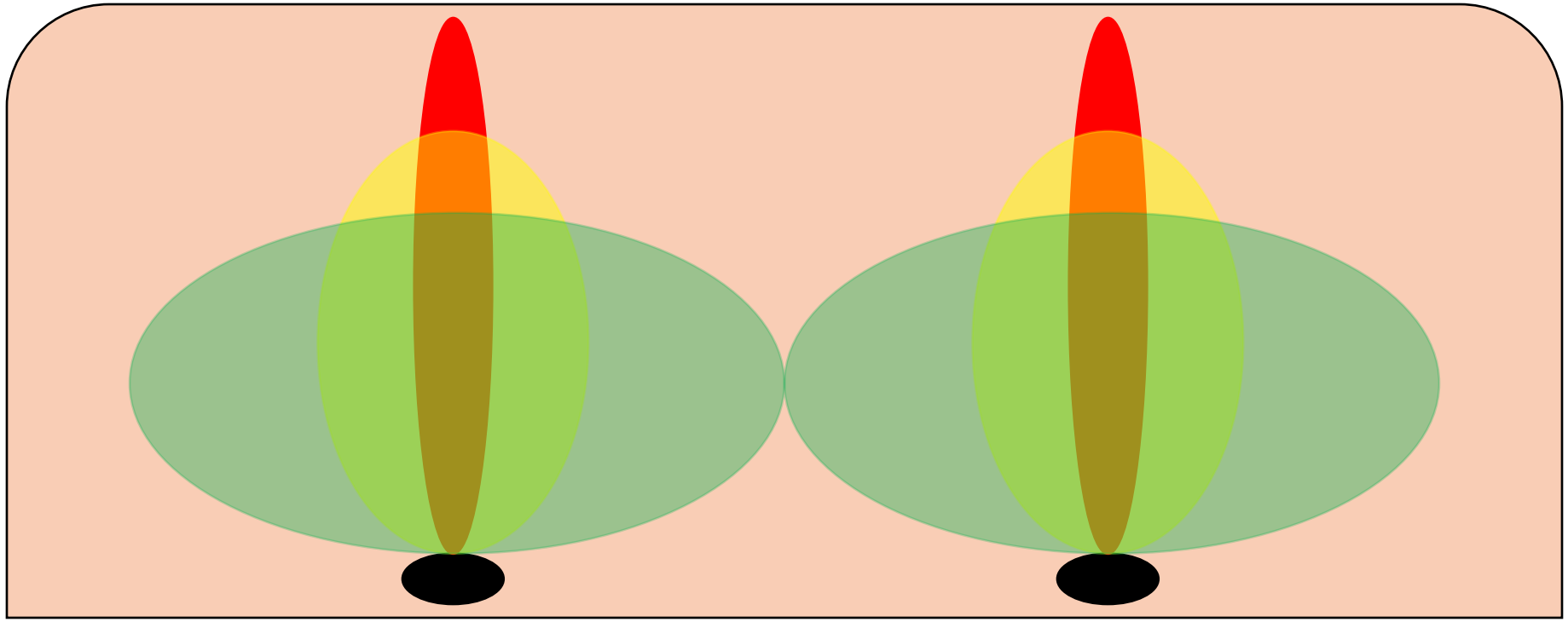












An oversimplified schematic of fumigant movement in a plasticulture bed with three different levels of soil preparedness

Film Types

Low Density Polyethylene (LDPE)

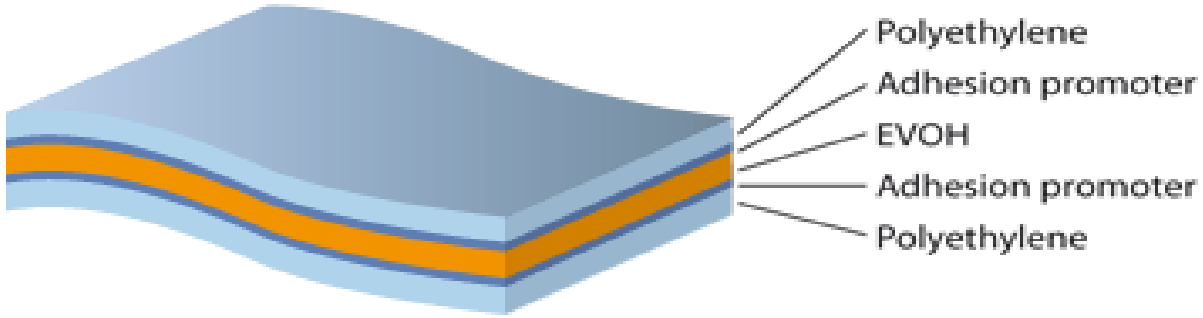
- Low cost
- Poor fumigant barrier

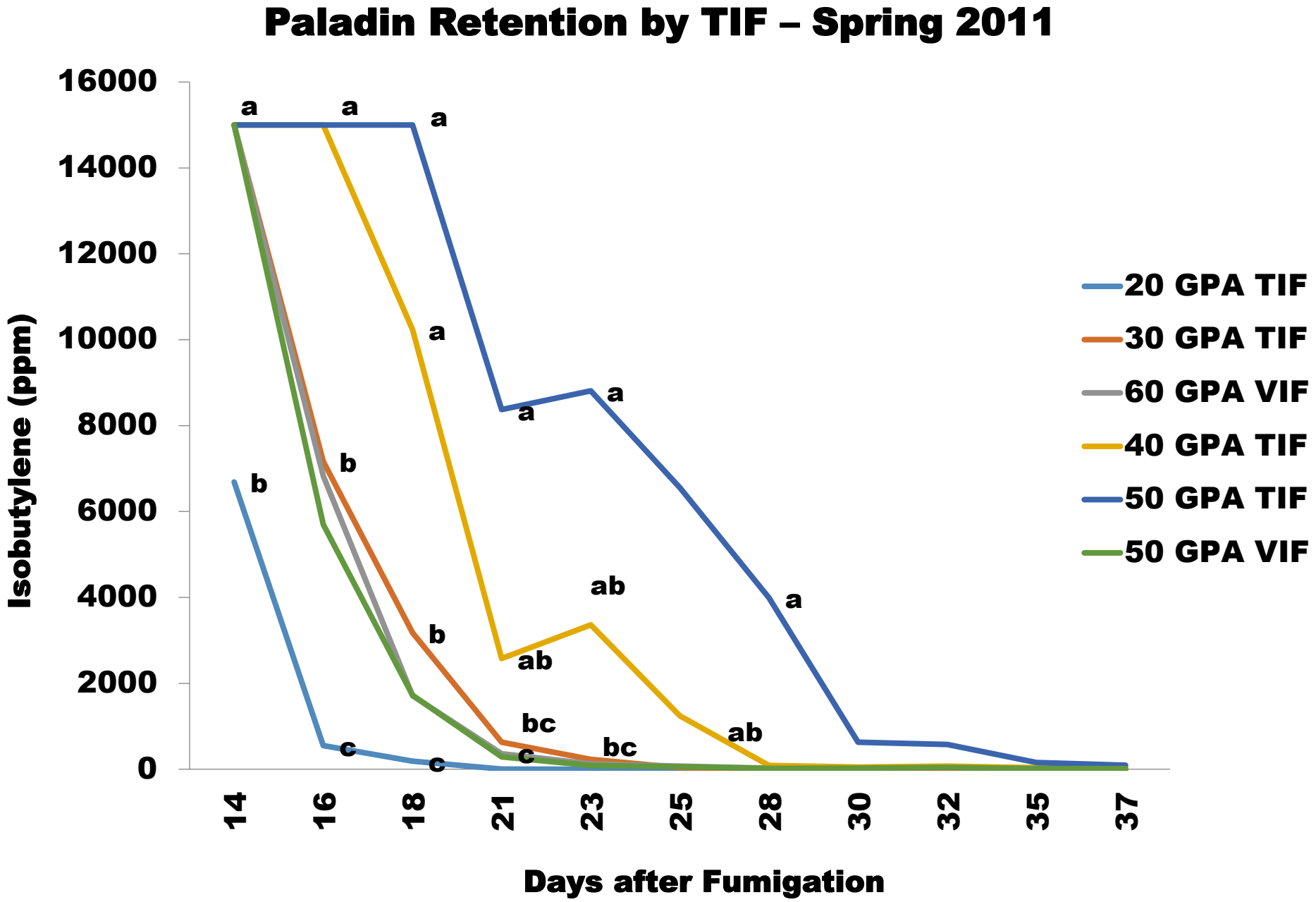
Totally Impermeable Film (TIF)

- Higher cost
- Excellent fumigant barrier

Totally Impermeable Film

- EVOH layer is more retentive than nylon barriers
- Greater retention leads to greater exposure
- Extended exposure could maintain efficacy with lower application rates

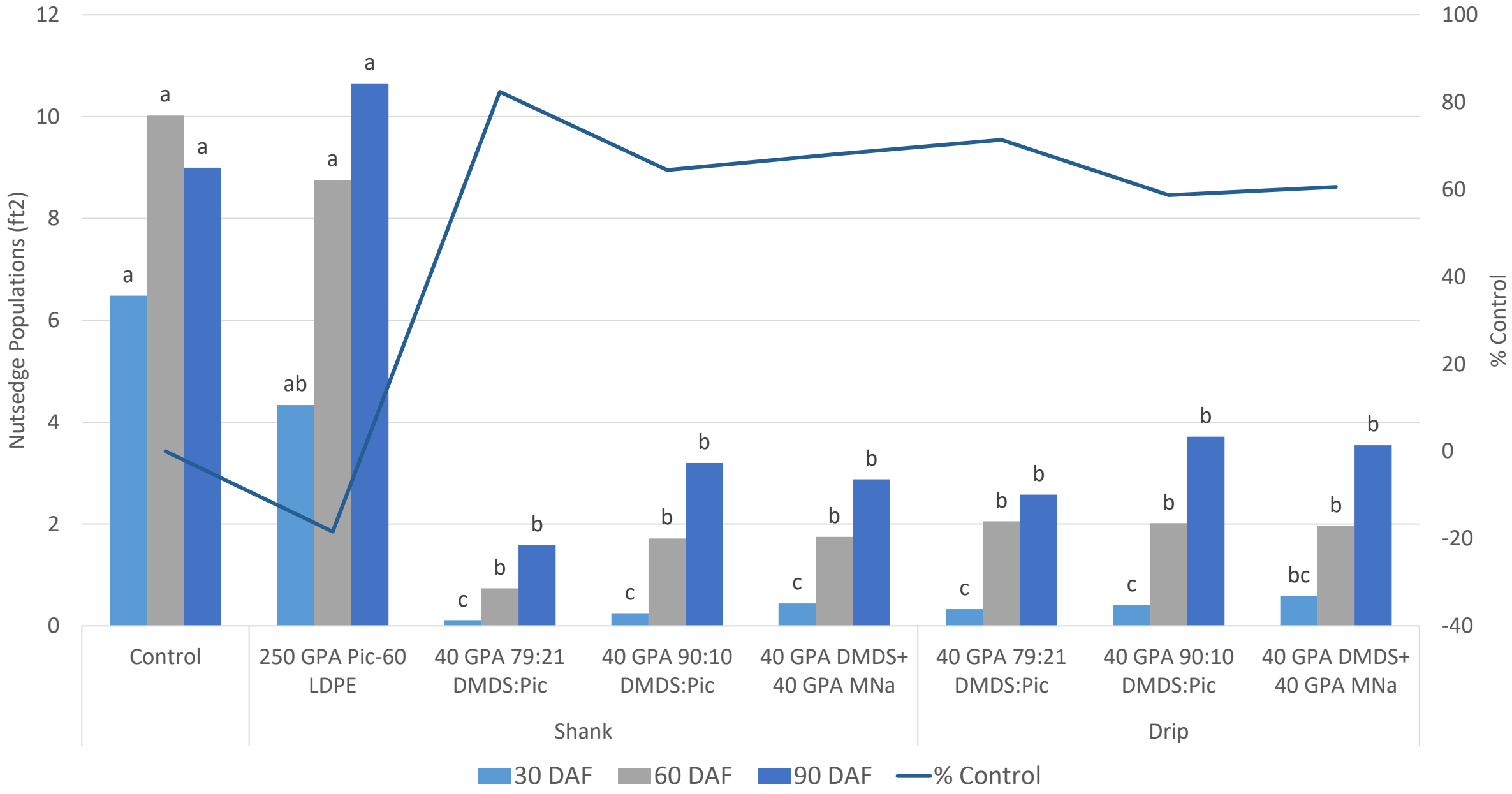


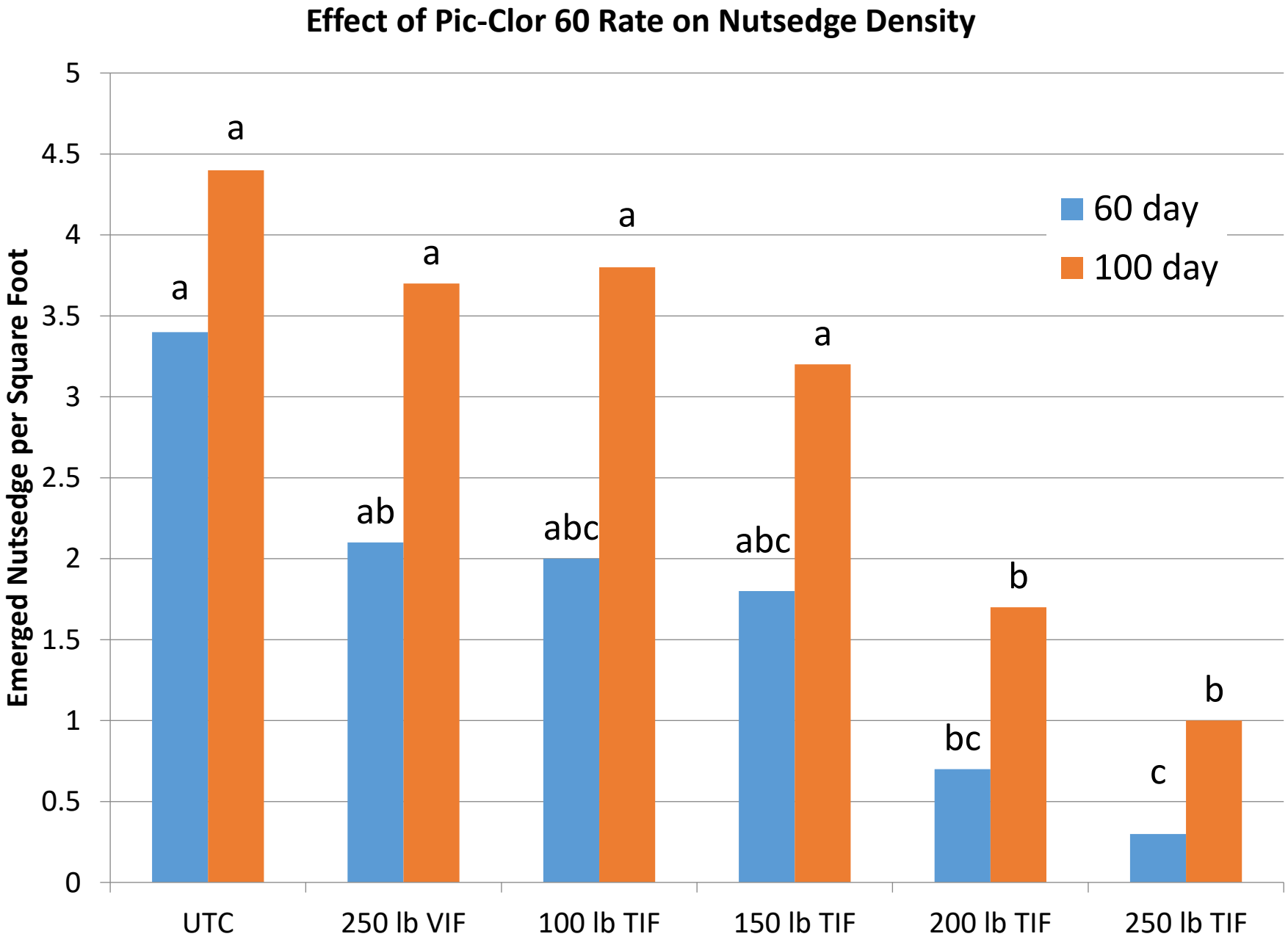

Paladin Retention by TIF – Spring 2011
Isobutylene (ppm)
16000
14000
12000
10000
8000
6000
4000
2000
0
14
16
18
21
23
25
28
30
32
35
37
Days after Fumigation
20 GPA TIF
30 GPA TIF
60 GPA VIF
40 GPA TIF
50 GPA TIF
50 GPA VIF
a
a
a
a
a
a
a
b
b
b
b
ab
ab
ab
bc
bc
c
c
c

Paladin:Pic (79:21) TIF Fumigation – Fall 2011

Treatment	Yields (lbs/A)				
	Medium	Large	X-Large	Marketable	Nutsedge/ft^2
Untreated VIF	2638 d	6365 c	9202 b	18205 c	21.4 a
Untreated TIF	4985 c	14381 b	22446 a	41812 b	5.9 b
20 GPA 79:21 TIF	8748 a	19572 a	24956 a	53276 a	0.0 b
30 GPA 79:21 TIF	8397 a	19215 a	24660 a	52272 a	0.0 b
40 GPA 79:21 TIF	7532 ab	19045 a	28369 a	54946 a	0.0 b
50 GPA 79:21 TIF	6539 bc	19614 a	27921 a	54075 a	0.0 b
50 GPA 79:21 VIF	7731 ab	16541 ab	27261 a	54534 a	0.0 b
60 GPA 79:21 VIF	7211 ab	16862 ab	24436 a	48509 ab	0.5 b

[z] Means not followed by the same letter are significantly different at $P \leq 0.05$ by Duncan's multiple range test.

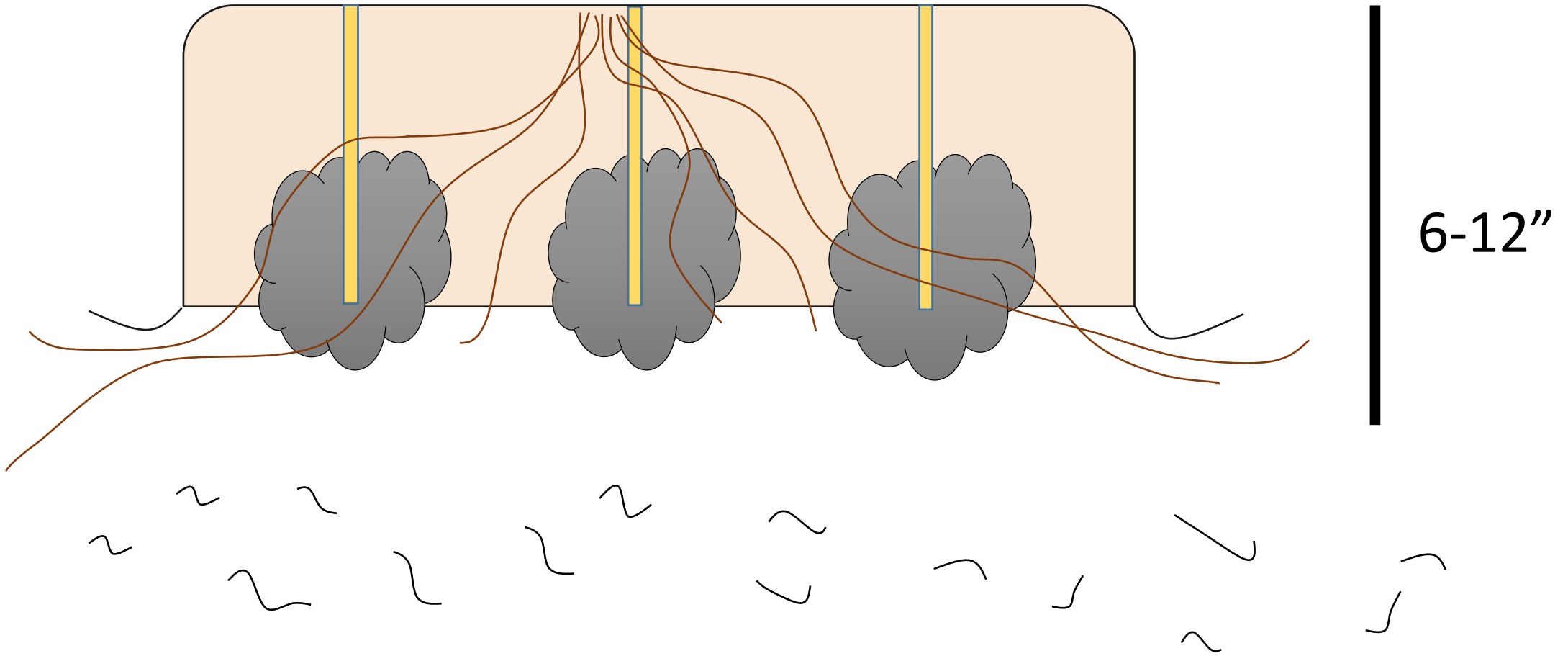

Nutsedge Populations (ft2)
% Control
12
10
8
6
4
2
0
100
80
60
40
20
0
-20
-40
a
a
a
ab
a
a
c
b
b
c
b
b
c
b
b
c
b
b
c
b
b
bc
b
b
Control
250 GPA Pic-60 LDPE
40 GPA 79:21 DMDS:Pic
40 GPA 90:10 DMDS:Pic
40 GPA DMDS+ 40 GPA MNa
40 GPA 79:21 DMDS:Pic
40 GPA 90:10 DMDS:Pic
40 GPA DMDS+ 40 GPA MNa
Shank
Drip
30 DAF
60 DAF
90 DAF
% Control

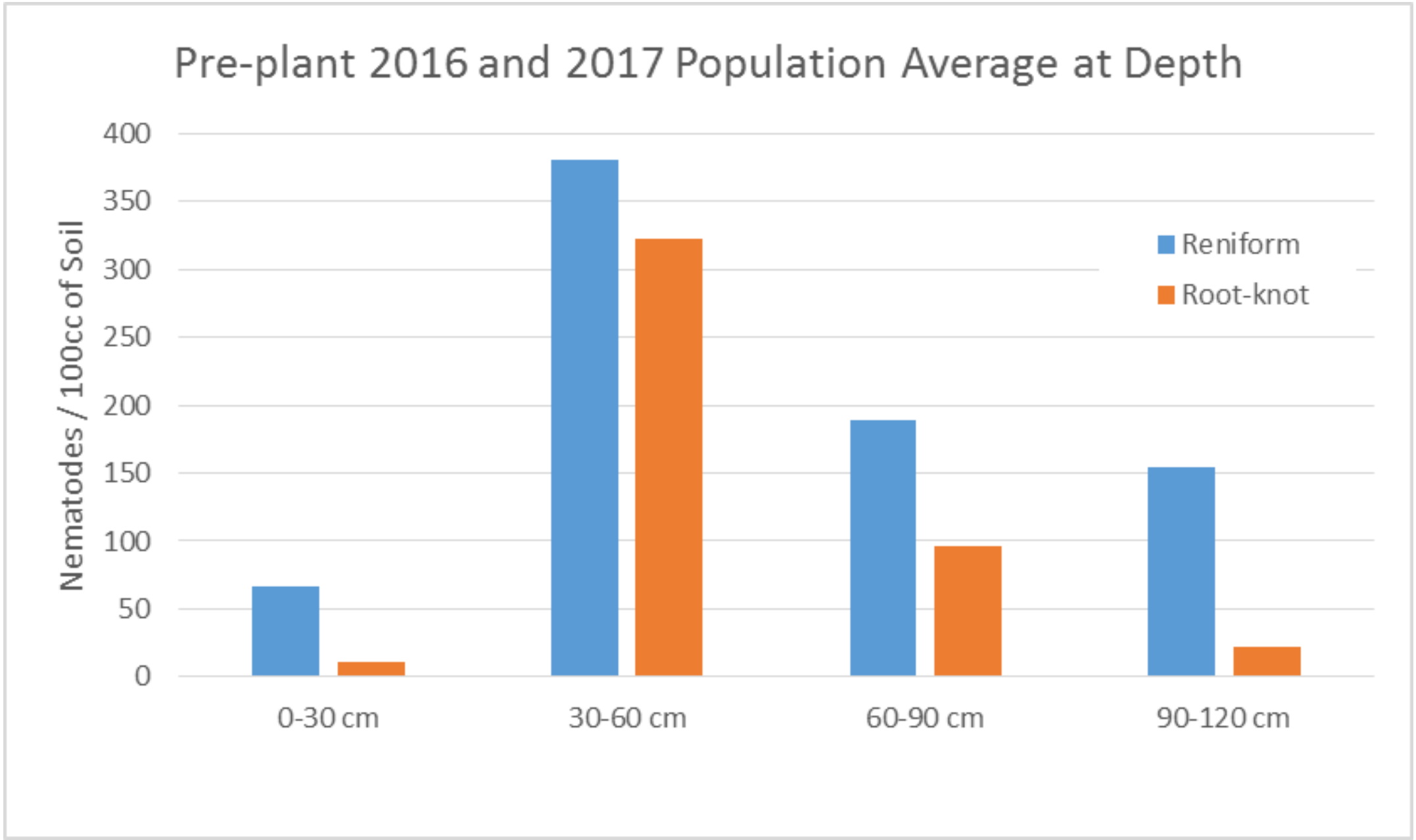

Effect of Pic-Clor 60 Rate on Nutsedge Density
Emerged Nutsedge per Square Foot
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
60 day
100 day
a
a
a
a
ab
a
abc
a
abc
b
bc
b
c
UTC
250 lb VIF
100 lb TIF
150 lb TIF
200 lb TIF
250 lb TIF

Impact of Metam Sodium Application on the Nutsedge Control Provided by Dimethyl Disulfide During Spring 2016 in Quincy, FL

Treatment	Nutsedge shoots / ft^2 60 Day	90 Day	Cantaloupe Yield (lb/a)	Average fruit weight (lb)
40 Gal/a DMDS:Pic 79:21	0.4 c	0.7 c	77985 a	5.2 ns
34 Gal/a DMDS + 40 Gal/a Metam Sodium	0.9 bc	1.0 c	73968 ab	5.0
34 Gal/a DMDS + 50 Gal/a Metam Sodium	1.0 bc	1.2 bc	72429 ab	4.8
34 Gal/a DMDS	3.1 ab	3.4 ab	58234 bc	4.9
Non-Treated Control	3.6 a	4.8 a	57744 c	4.8
40 Gal/a Vapam	3.6 a	4.1 a	55411 c	4.8
50 Gal/a Vapam	3.6 a	3.9 a	52565 c	4.6


Root galling caused by *Meloidogyne incognita* on 'Carnivor' rootstock


6-12”


Pre-plant 2016 and 2017 Population Average at Depth
Nematodes / 100cc of Soil
400
350
300
250
200
150
100
50
0
0-30 cm
30-60 cm
60-90 cm
90-120 cm
Reniform
Root-knot

Summary

- Pic Clor 60 and Paladin Pic (COMBINED WITH TIF) are the closest options to replacing methyl bromide
- Know the strengths and limitations of the tools that are in place
- Understand the dynamics of fumigant movement and how it will perform within a given operation (bed size, application equipment)


Questions?