Root-knot Nematode Management in Processing Tomatoes

Jaspreet Sidhu

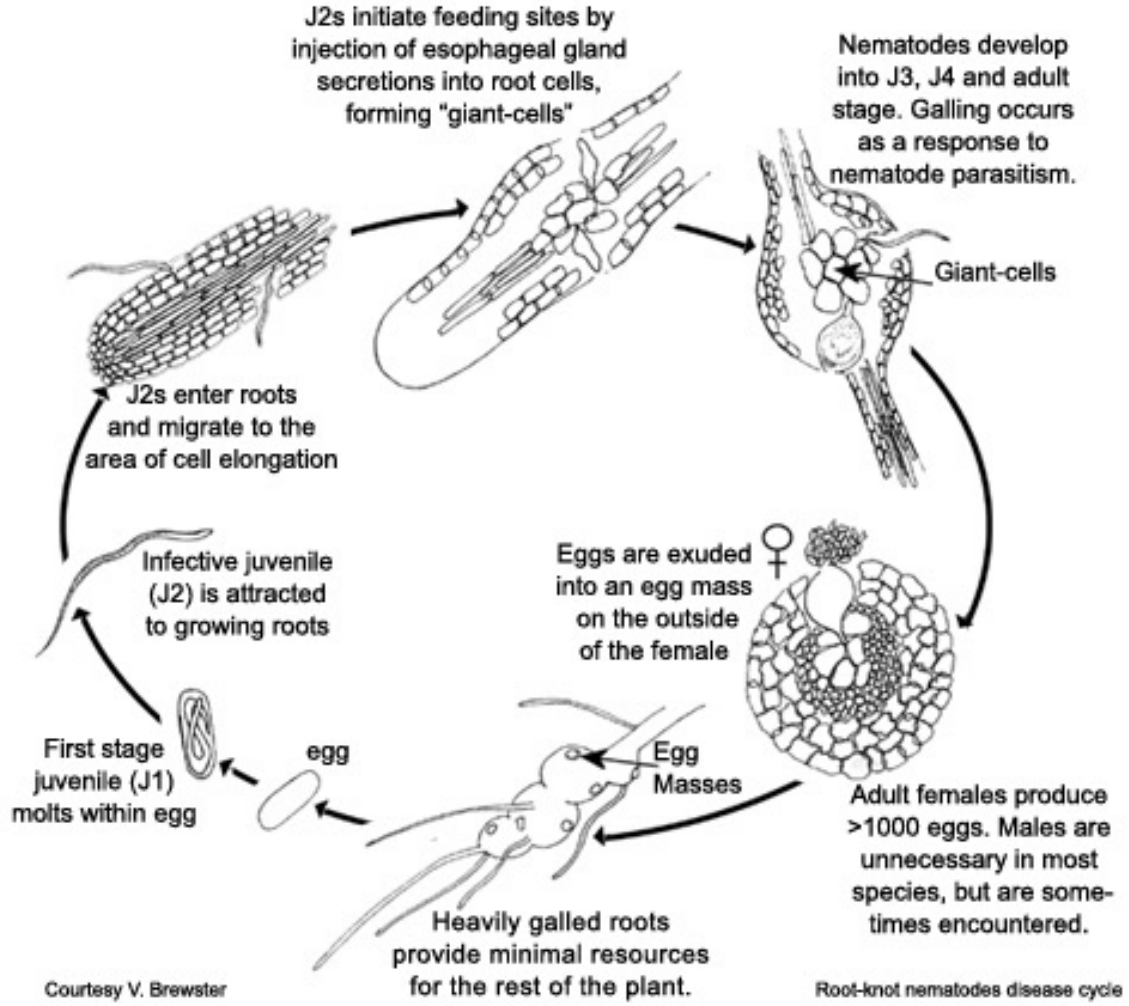
UCCE Kern

University of California
Agriculture and Natural Resources

Introduction

- Root knot nematodes, *Meloidogyn*e spp. : most important plant parasitic nematodes
- Species of *Meloidogyne* present in California; *M. incognita*, *M. hapla*, *M. javanica* and *M. arenaria*
- Widespread throughout warm regions, light texture soils

Life Cycle: Temperature driven



Symptoms

- Generally root galling
- Above-ground symptoms: stunted and less vigorous plants, wilting yellowing etc.
- Roots unable to sustain the water and nutrients needs
- Reduced yield and poor fruit quality
- Vulnerable to other soil-borne pathogens

Challenges in management

- Wide host range
- Mi gene resistance in tomato cultivars: Breakdown instances
- Management relied on pre-plant fumigation
- New fumigant regulations by Department of Pesticide Regulation (DPR)
    - limits the amount used by a grower
    - caps on the amounts allowed in a township
    - expanded buffer zones

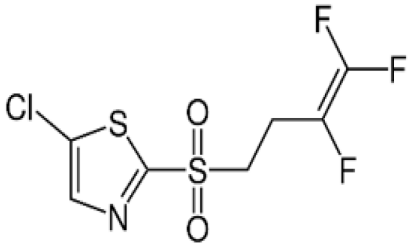
Objective

To evaluate alternative non-fumigant nematicides for managing RKN

- high efficacy
- economically viable
- environmentally safe

Product	AI	Manufacturer
Nimitz	Fluensulfone	Adama
Velum	Fluopyram	Bayer
Salibro	Fluazaindolizine	Corteva
Developmental product	----- Conventional----	Syngenta
Organic products		

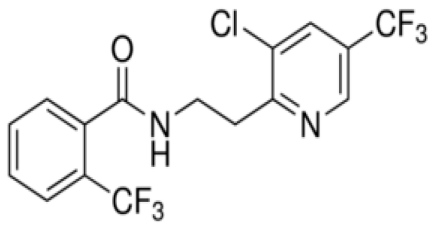
Nimitz (Adama)



Fluensulfone

Caution

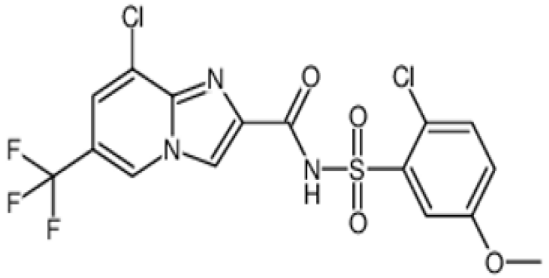
Velum(Bayer)



Fluopyram

Caution

Salibro (Corteva)



Fluazaindolizine

Caution

DP

"?"

New products are less toxic, more selective, and Safer to use – true nematicides

Modes of action – New or unknown

Trials in 2019, 2020 & 2021

The trials are done at the research farm with *M. incognita* being the main RKN present there.

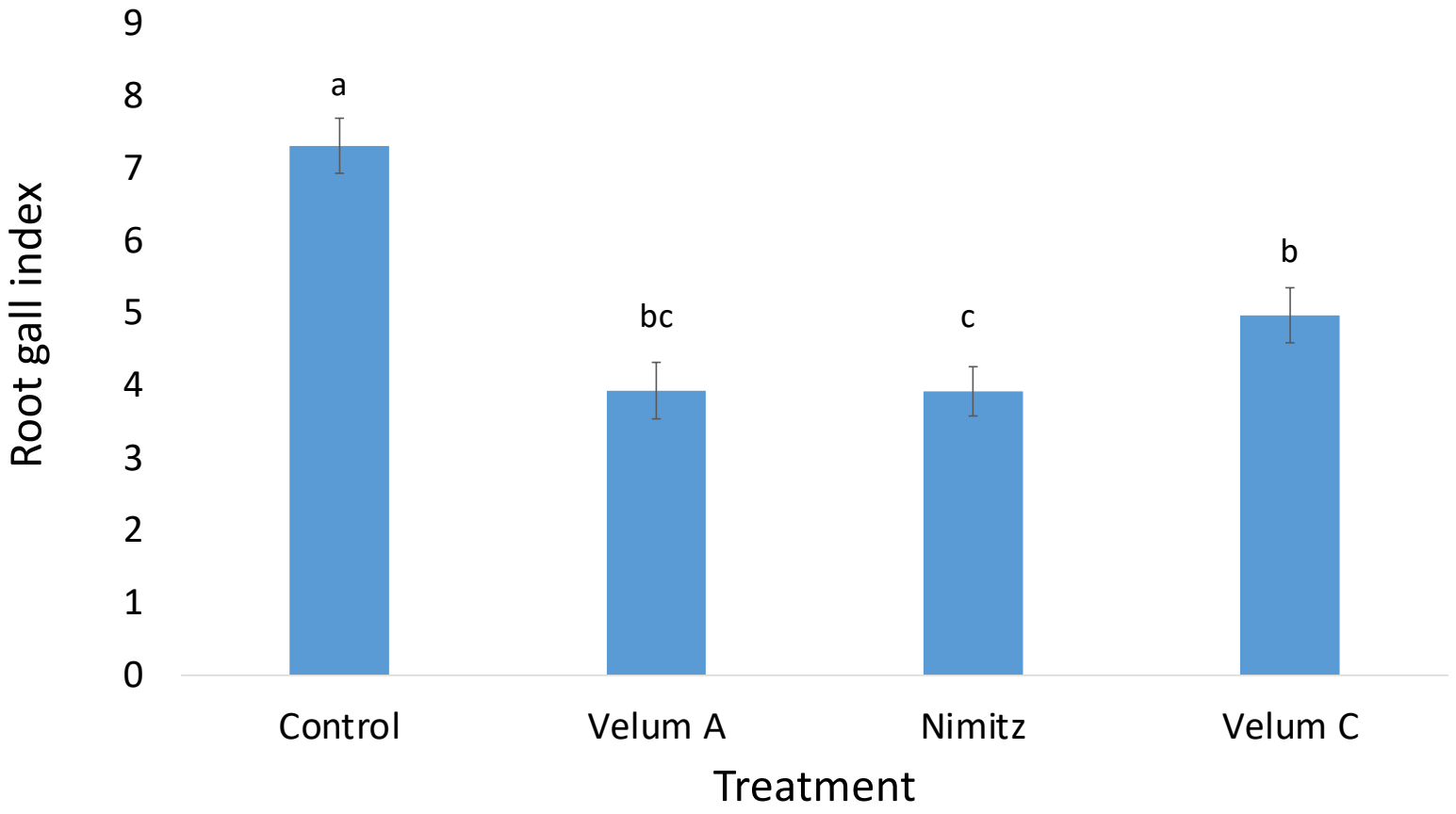
Trial details

- Small plot field trial, 60” beds, 20 feet plots with a 2 feet buffer between plots
- Tomato variety ‘Halley’ hand transplanted
- Four replications
- Four treatments in 2019, six in 2020 & seven treatments in 2021
- Treatments applied either as a pre or post-plant as soil drench
- Surface drip irrigation
- Root galling index: 0-10 (0= no visible galls 10 extensive galling)

2019 Treatments

Trt no.	Trt	Application Timing	Rate /Acre
1	Control		
2	Velum	5 days after planting	6.5 Oz/ A
3	Nimitz	At planting	5 pt/ A
4	Velum	2 weeks after planting	6.5 Oz/ A

2019 Galling on tomato roots caused by root knot nematode



P<0.0001

Control

Nimitz

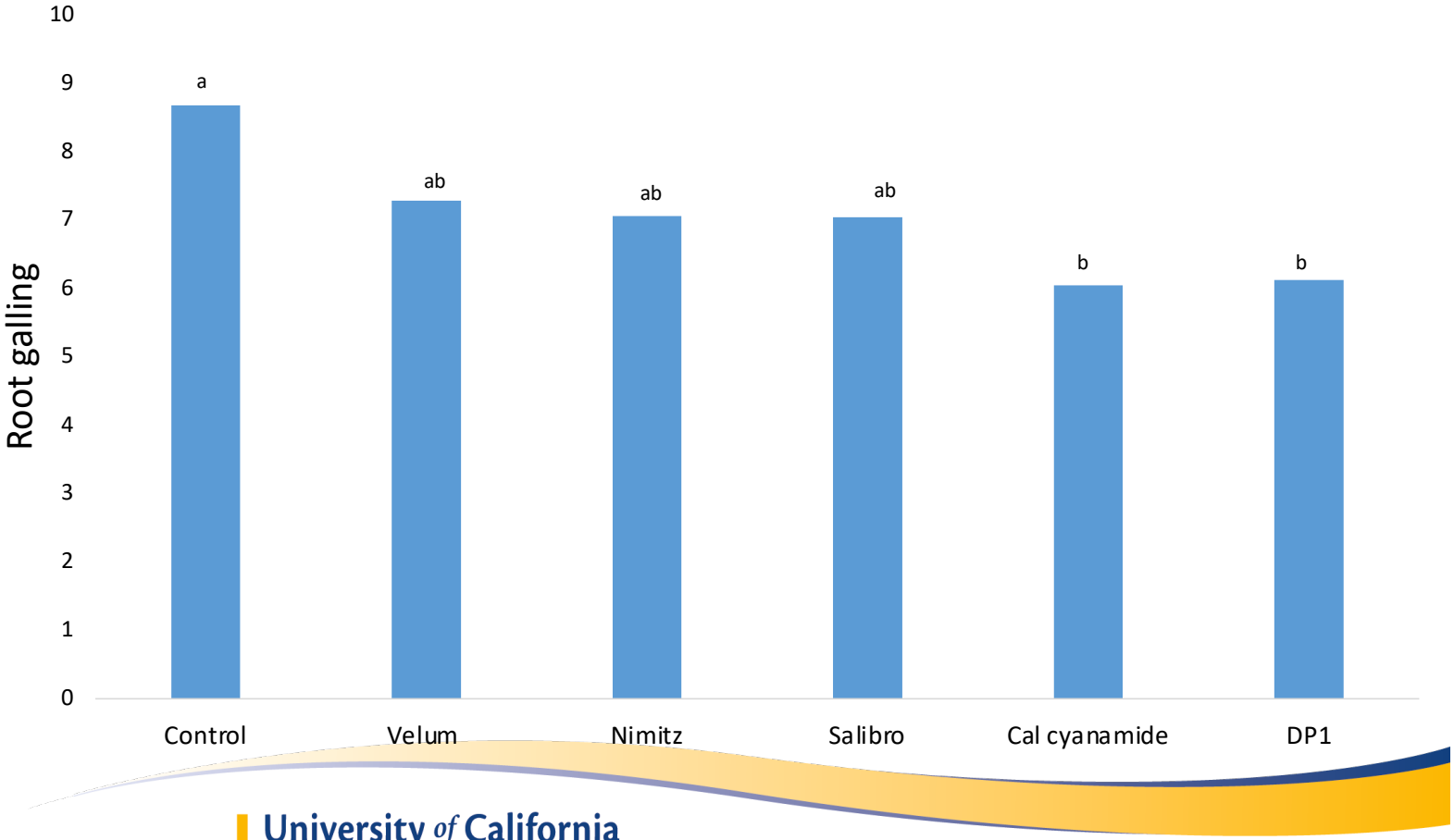
Nimitz

Velum C

2020 Treatments

Trt no.	Trt	Application time	Rate /Acre
1	Control		
2	Velum	At planting	6.5 Oz/ A
3	Nimitz	At planting	5 pt/ A
4	Salibro	At planting, 28 d after planting	30.7 fl oz/A
5	Calcium cyanamide	At planting, Soil incorporated	200lbs/ A
6	DP1	At planting	11.4 fl oz/ A

Galling on tomato roots caused by nematodes



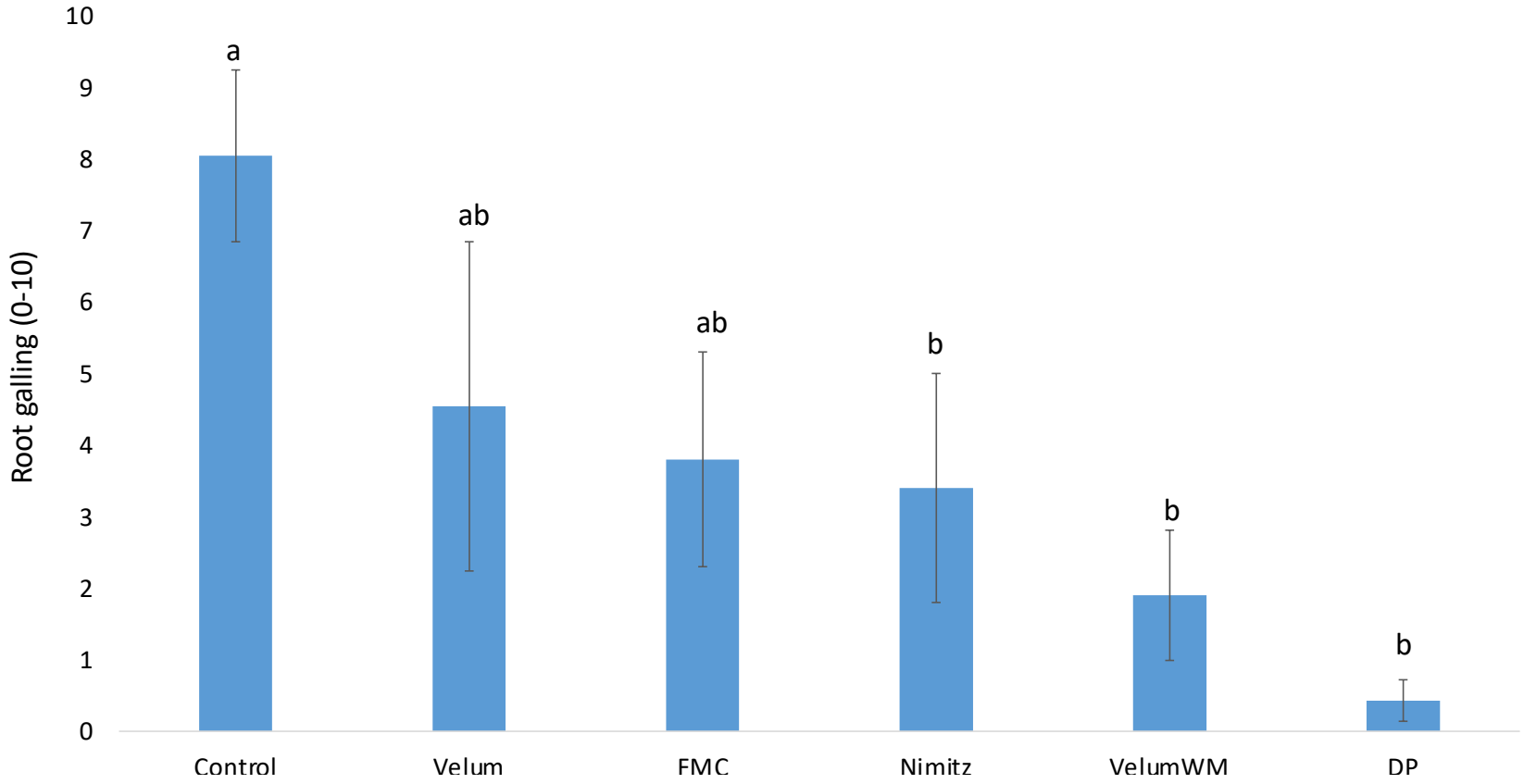
University of California
Agriculture and Natural Resources

P=0.054

2021 Treatments

Trt no.	Trt	Application timing	Rate /Acre
1	Control		
2	Velum	At planting	6.5 Oz/ A
3	Velum +Watermaxx2	At planting	6.5 Oz/ A 2 qtz/ A
4	Nimitz	At planting	5 pt/ A
5	FMC	At planting, 30, and 60 DAP	1L/ ha
7	DP1	At planting	11.4 fl oz/ A

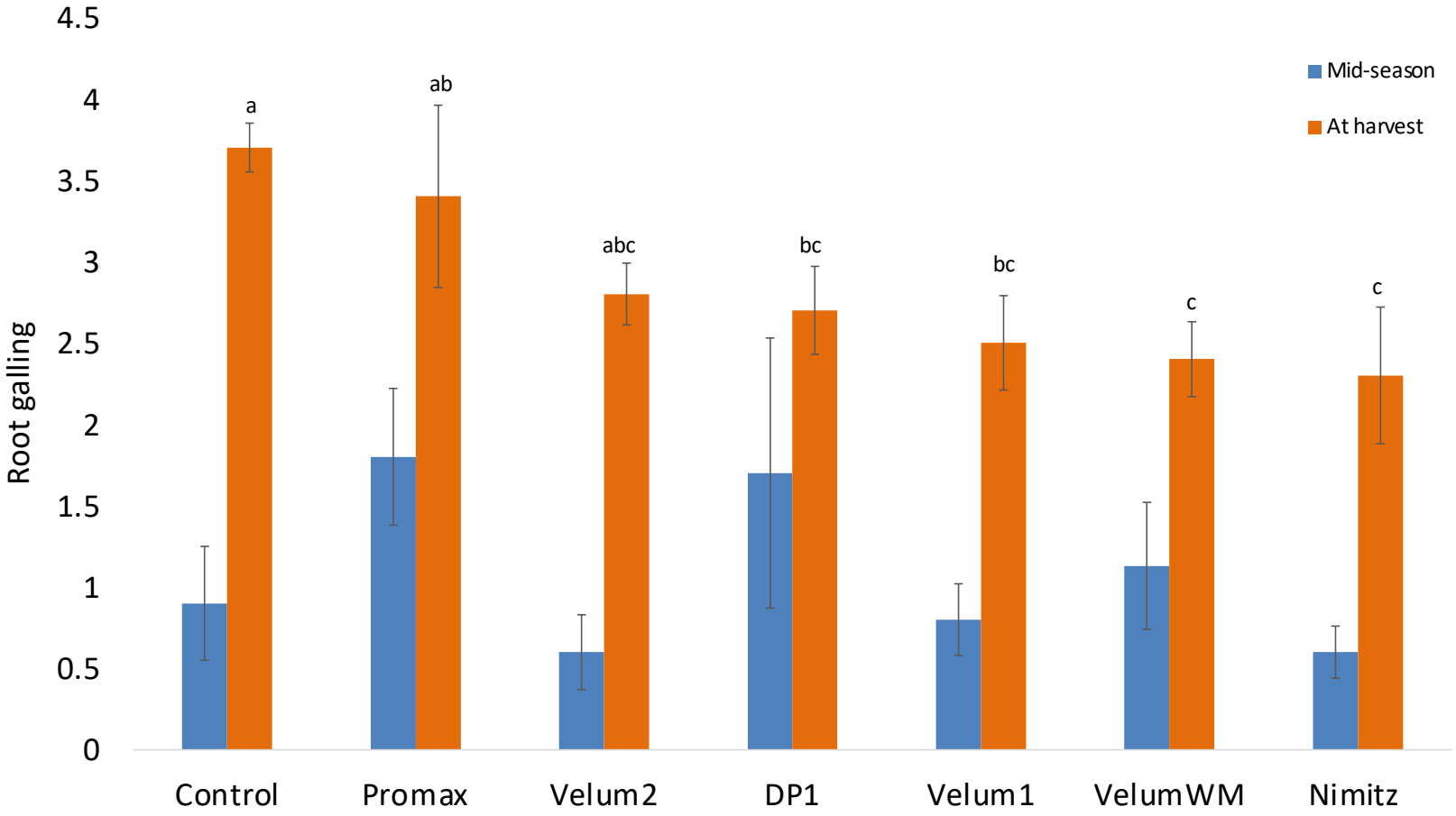
2021 galling on tomato roots caused by root knot nematode



1= Control 3= Velum+WM 4= Nimitz 7= DP

Other crops

RKN damage on carrot roots



P= 0.05

Melons

1= Control 2= Nimitz 3= Vigilante 4= FMC 5= DP 6= Velum1 7= Velum2

Nutsedge control

Conclusion

- Nimitz continued to show excellent performance. Only CAUTION label, no reentry interval. Also expected to be registered on other crops in CA.
- Velum appeared to provide good protection against RKN in these trials but further optimization needed for velum applications.
- DP showed good potential in these trials; registration status???

Next-generation non-fumigant nematicides will continue to be the main nematode-control method evaluated/applied in the high-value crops.

Acknowledgements

Jed Dubose
Jennifer Fernberg
Crystal Hernandez

BAYER

California Tomato Research Institute

University of California
Agriculture and Natural Resources