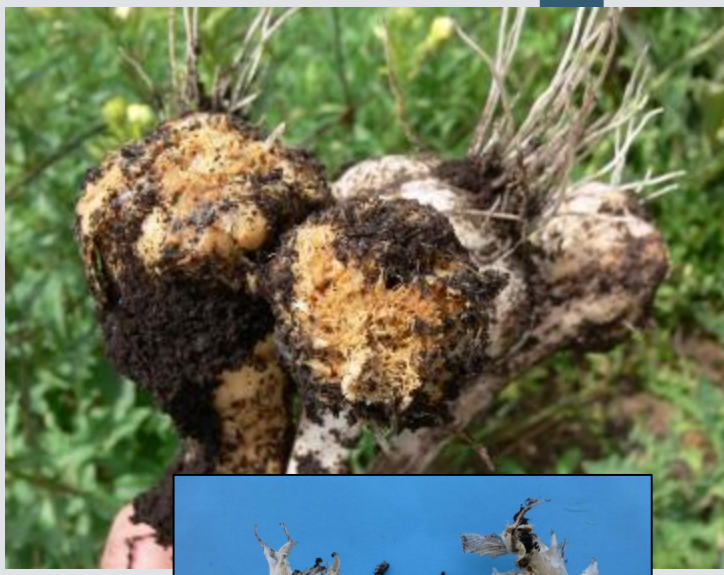
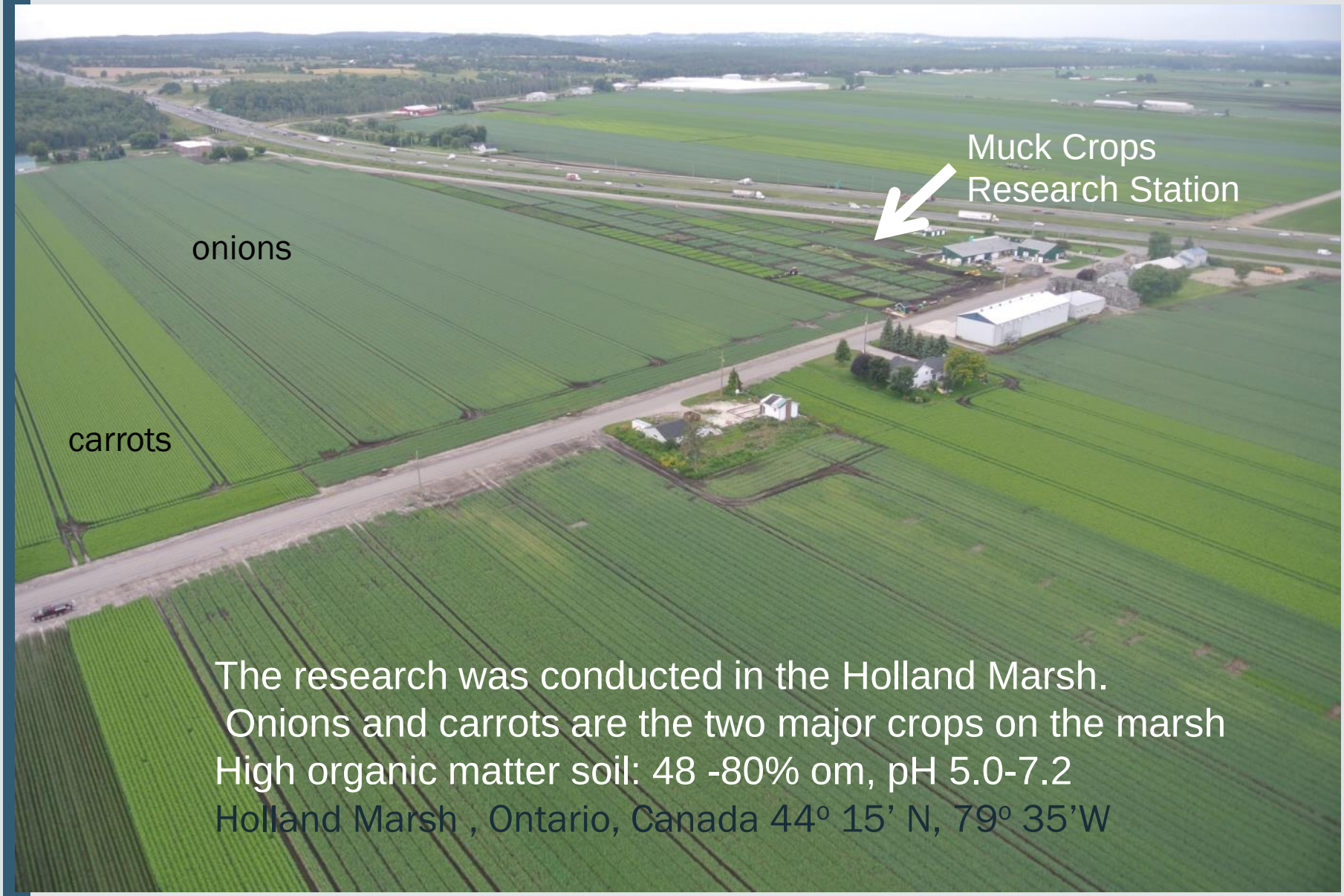
DOWNY MILDEW AND NECK ROT ON ONION, AND STEM AND BULB NEMATODE ON GARLIC 2017

Mary Ruth McDonald, Kevin Vander Kooi, Lilieth Ives and Mike Celetti

Dept. of Plant Agriculture, Univ. of Guelph
Ontario ministry of agriculture, food and rural affairs



The Holland Marsh



The research was conducted in the Holland Marsh.
Onions and carrots are the two major crops on the marsh
High organic matter soil: 48 -80% om, pH 5.0-7.2
Holland Marsh , Ontario, Canada 44º 15’ N, 79º 35’W

Onion downy mildew - 2014

A few cycles of downy mildew sporulation and infection can destroy a crop

This crop was not sprayed on time. However, downy mildew came in late, so bulbs are still a good size

Severe onion downy mildew in 2017.
In this field, probably applied fungicides that were not specific for downy mildew

Onion downy mildew

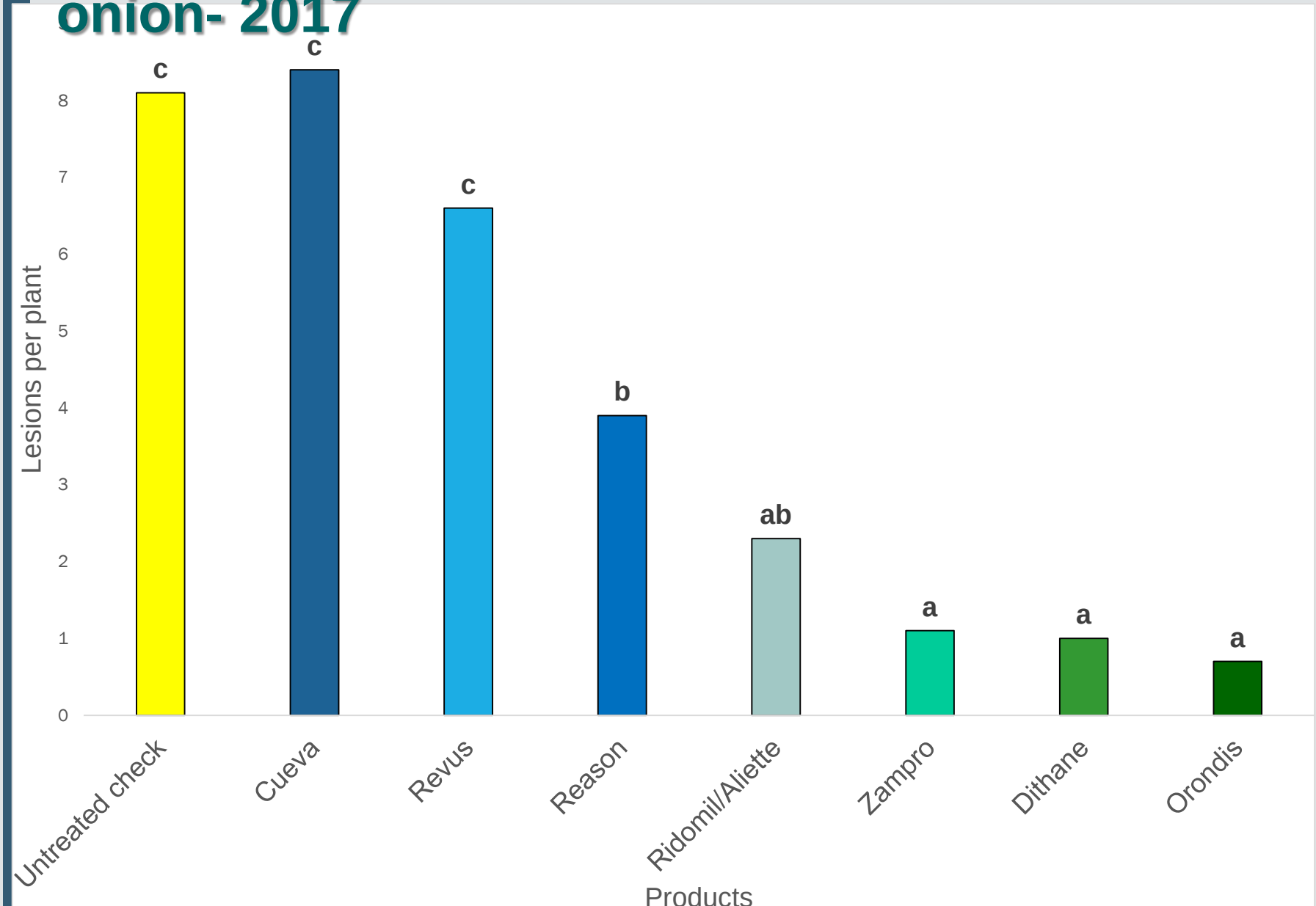
- Develops in cool, humid weather
- Fungicides must be applied before infection takes place
- Disease forecasting important

- Sporulation when temperatures below 75 ^{o}F, (24 ^{o}C) previous day
- **Temperatures over 81 ^{o}F inhibit sporulation**
- Temp 38 - 75 ^{o}F (4 – 24 ^{o}C) at night
- Humidity above 95%, but not rain at night,
- Infection: 43-79 ^{o}F, 3-6 hours leaf wetness
- Takes 9 to 16 days from infection until sporulation
- No symptoms until sporulation occurs

Fungicide treatments for downy mildew control – 2017

Treatment	Rate (per ha)
ZAMPRO (ametoctradin+dimethomorph)	1.0 L + 0.25% v/v Sylgard
RIDOMIL/ALIETTE (mefanoxam/ fosetyl-Al)	2.5/2.8 kg
REVUS (mandipropamid 250g/L)	400 mL
REASON (fenamidone 500 g/L)	401.5 m
ORONDIS (oxathiapiprolin 100 g/L, formerly QGU42)	350 mL
DITHANE (mancozeb 75%)	32.5 kg
CUEVA (copper)	2% solution
Check	

Fungicides for the control of downy mildew on onion- 2017



To control onion downy mildew, it is important to apply fungicide before infection takes place

Several fungicides provide effective control:
Orondis (oxathiopipronil),
Zampro (ametoctradin + dimethomorph)
Ridomil (mefanoxam) alternated with Aliette (fosetyl-Al)
And (surprisingly) Dithane (mancozeb)
Good timing of fungicide applications

Issue: Fungicide resistance can develop quickly

Evaluation of fungicides for onion neck rot

(Botrytis allii, B. aclada, B. byssoidea)

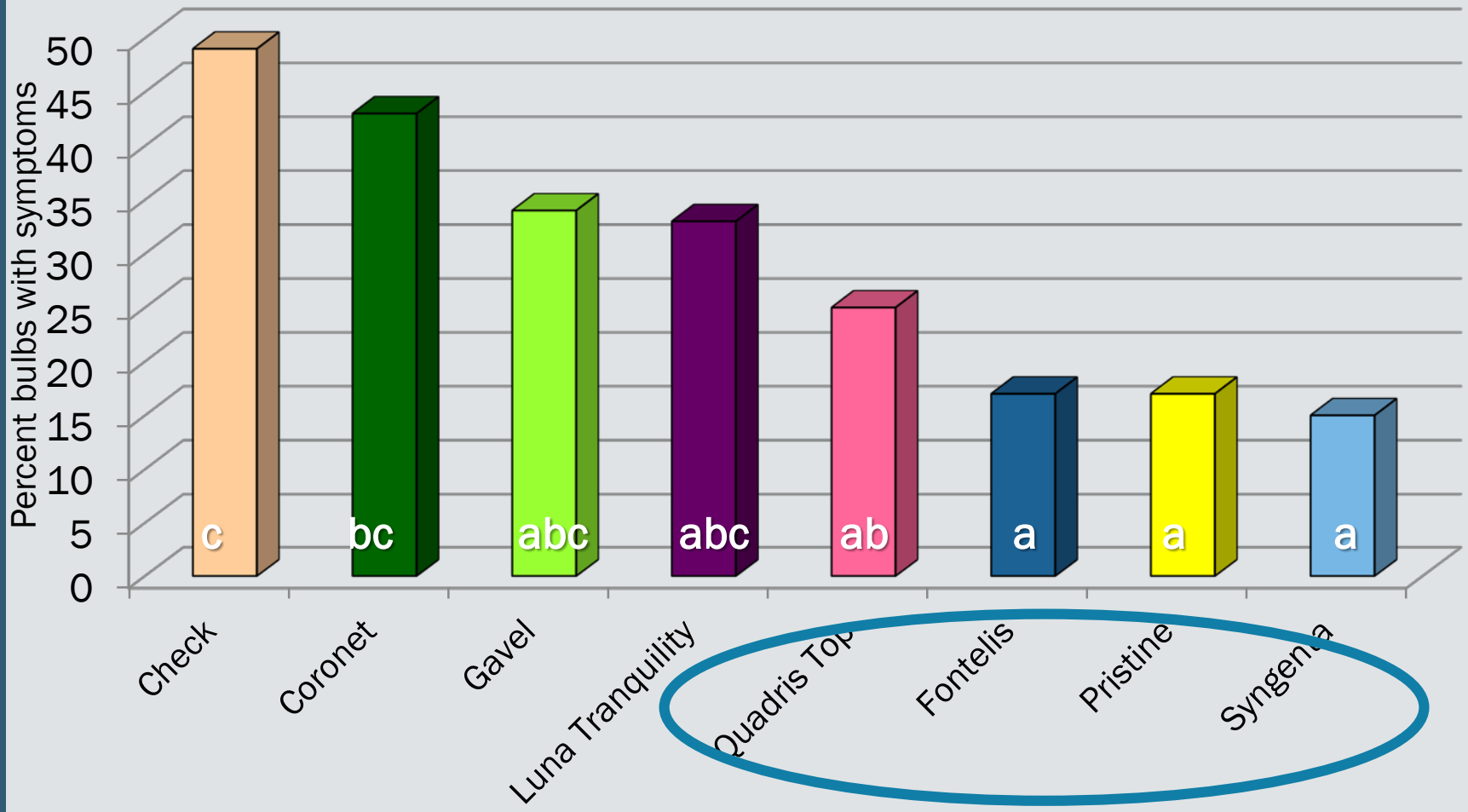
- Infection takes place during cool, (50-68°F) humid weather
- "Latent" infection. Usually no symptoms until onions are in storage

- Seeded 16 May
- Fungicides sprays began 19 July
- 5 sprays at ~ 10 day intervals)
- Onions harvested 17 October (late harvest)
  - *no artificial curing.*
- Placed in cold storage, assessed 26 Jan.

Fungicides for neck rot control-2016, 2017

Treatment	Active ingredient	Rate L/ha
Fontelis	penthiopyrad	1.75
Pristine	boscalid + pyraclostrobin	1.3
Syngenta A19649B	experimental	0.75
Gavel 75 DF	zoxzmide and mancozeb	2.2 kg
Luna Tranquility		
Quadris Top	azoxstrobin + difenoconzole	1.0
Coronet seed treatment	boscalid + pyraclostrobin	
Check		

Evaluation of fungicides for the control of onion neck rot: dehydrator onion- 2016



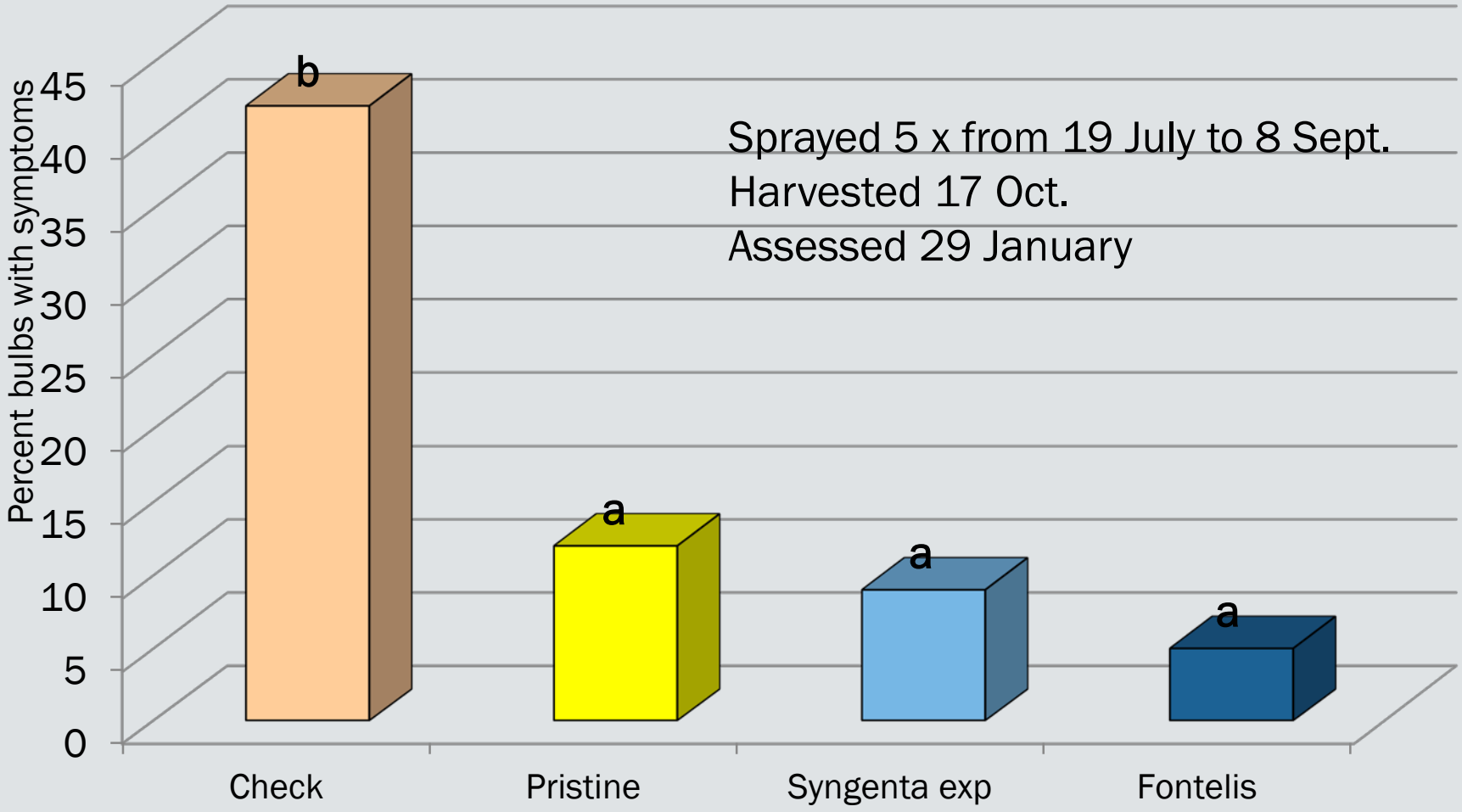
Major flooding occurred on 23 June, 2017. (First time in over 70 years)

All of the onion trials were under water for at least 24 hours

Enough onions recovered for a smaller trial.

Three fungicides and a check, also a yellow onion check

Evaluation of fungicides for the control of onion neck rot: dehydrator onion- 2017



Fungicides and spray timing for the control of onion neck rot- Conclusions

- White dehydrator onions are very susceptible.
- Moderate to high disease pressure in 2017.
- Fontelis, Pristine, and a new fungicide from Syngenta were very effective. Quadris Top also reduced disease in 2016 trials.
- Fungicide sprays starting at the 4-5 leaf stage are effective.
- Cultural methods to ensure dry necks at harvest are important to reduce neck rot
- Yellow bulb onions not as susceptible (no disease in 2017)

Stem and Bulb Nematode

Ditylenchus dipsaci

- Microscopic nematodes 1.2 mm long
- Live and feed inside bulb and stems of plants but travel in soil pores filled with water
- Attack garlic, onions and other crops- some host specificity
- They are transferred easily in garlic cloves used for seed

Trials 2016-2017

Planted October 2016

- Nematode infested garlic cloves ~ 830 nematodes /g were treated in the Fall of 2016, prior to planting
- Planted in (relatively) non-infested soil
- – 2 sites: muck and mineral soil
- Treatments:
- Agri-Mek (abamectin) - soak
- Vive-Aba (nano formulation of abamectin)- drench
- Velum Prime (fluopyram)- soak
- Nimitz (fluensulfone)- soak
- ProMax (thymol)- soak
- Phostoxin gas – preplant fumigation of seed
- Nematode free cloves

Soak in product solution for 4 hours,
Allow to dry,
Plant the following day

Drench in to the open furrow on top of cloves, then cover with soil

Muck soil site
June 2017

Hail damage and recovery

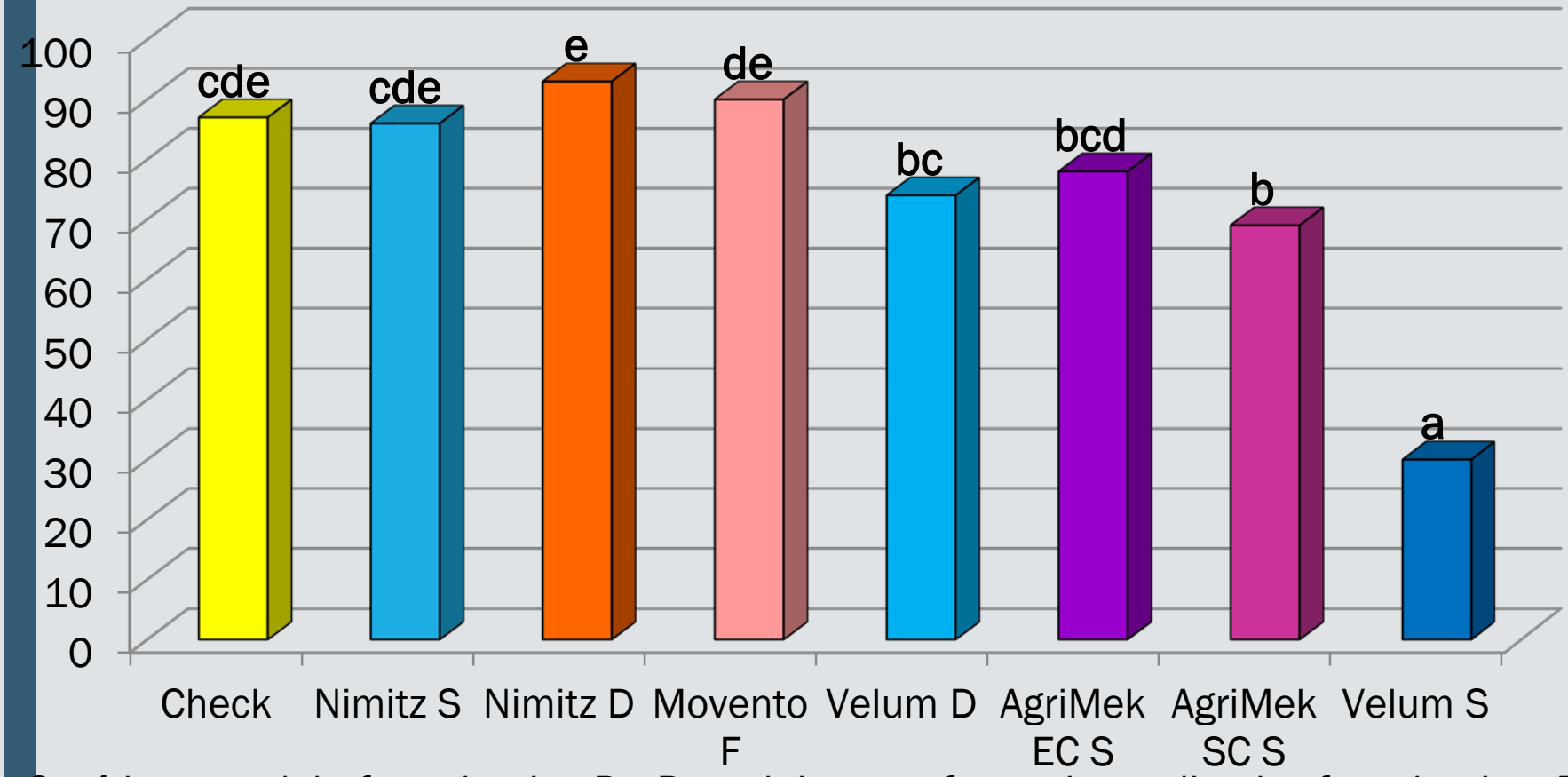
Mineral soil site

Symptoms of stem and bulb nematode

Products and application methods 2015 - 2016

Product	App'n Method	Rate	Details
AGRI-MEK SC	Soak	0.9 mL/L	4 hour soak
AGRI-MEK EC	Soak	3.76 mL/L	soak
AGRI-MEK SC	Dbl rate soak	1.7 mL/L	soak
VELUM PRIME	Soak	1.67 mL/L	soak
VELUM PRIME	Drench	0.5 mL/L	over-the-open-row drench at planting
NIMITZ 480 EC	Soak	20 mL/L	4 hour soak
NIMITZ 480 EC	Drench twice	6 mL/L	drench at planting and 3 May
NIMITZ 15G & NIMITZ 480 EC	In-furrow & drench	0.768 g/m, 6 mL/L	in-furrow at planting and drench 3 May
MOVENTO	Foliar	400 mL/ha	foliar applications on 3, 18 May & 1, 15 June

Severity of stem and bulb nematode- 2016

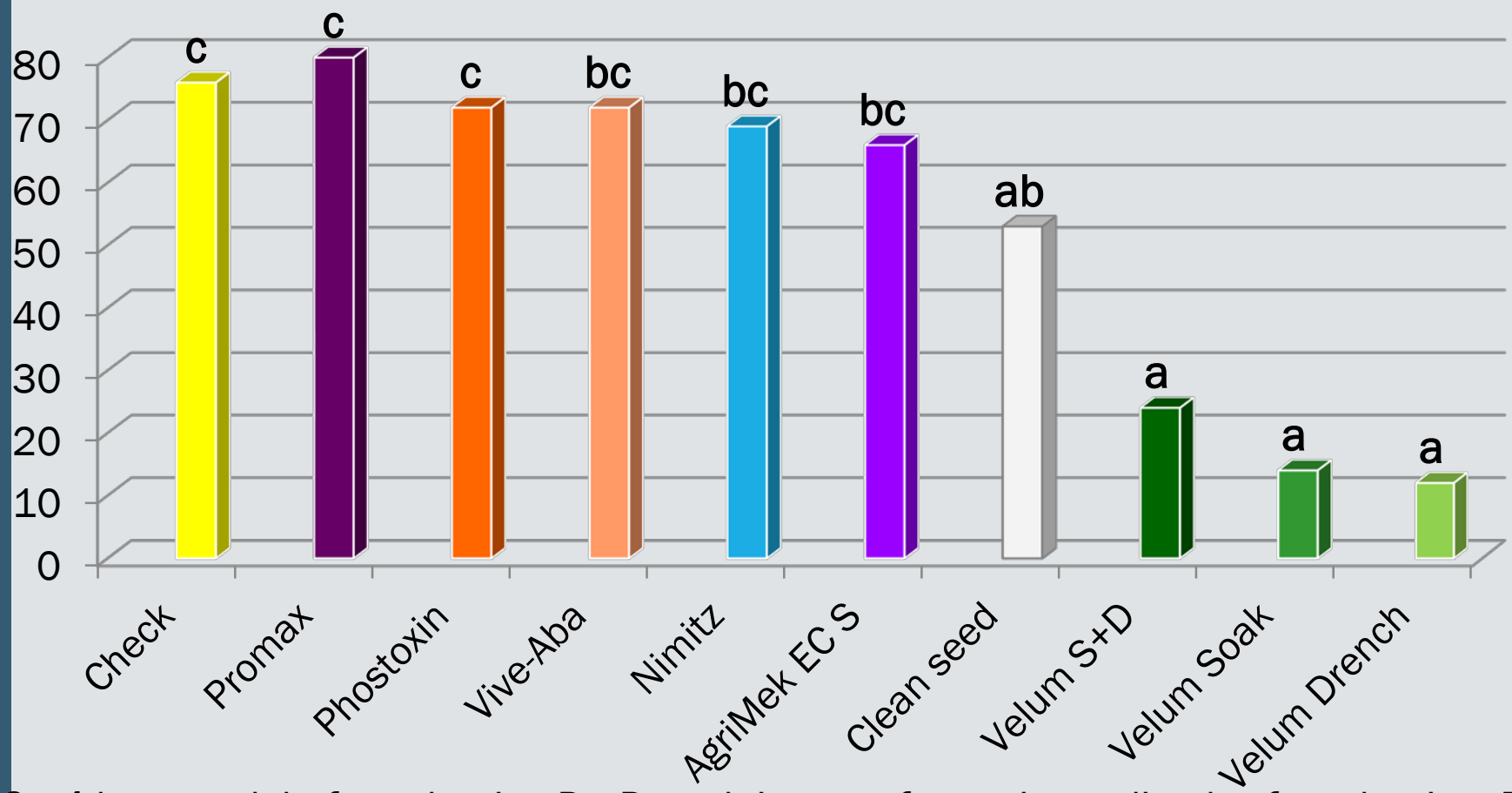


S= 4 hour soak before planting D= Drench in open furrow immediately after planting, F= foliar spray in spring (May) after emergence

Treatments: garlic trial at two sites 2016 - 2017

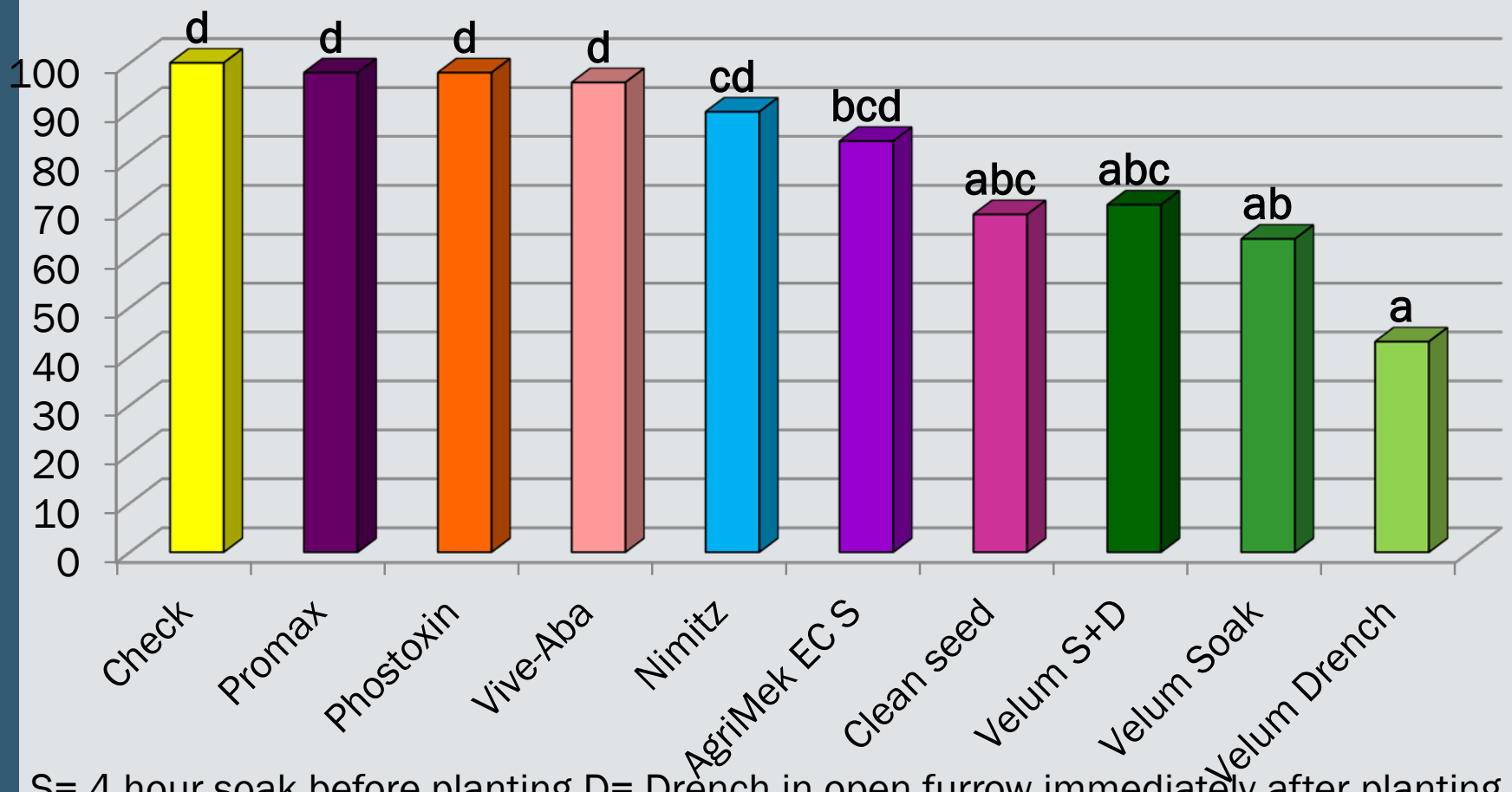
Product	Active ingredient	Treatment method	Rate
AGRI-MEK SC	Abamectin	4 hr soak	0.9 mL/L
PHOSTOXIN	Phosphine	Seed fumigation	
PROMAX	Thyme oil	4 hr soak	50 mL/L
PROMAX	Thyme oil	Drench	11.23 mL/L
NIMITZ	Fluensulfone	4 hr soak	20.00 mL/L
VELUM PRIME	Fluopyram	4 hr soak	1.67 mL/L
VELUM PRIME	Fluopyram	Drench	0.5 mL/L
VELUM PRIME	Fluopyram	4 hr soak + drench	
VIVE-ABA	Abamectin	4 hr soak	0.63 mL/L
VIVE-ABA	Abamectin	Drench	0.189 mL/L

Severity of stem and bulb nematode- 2017 –Muck soil



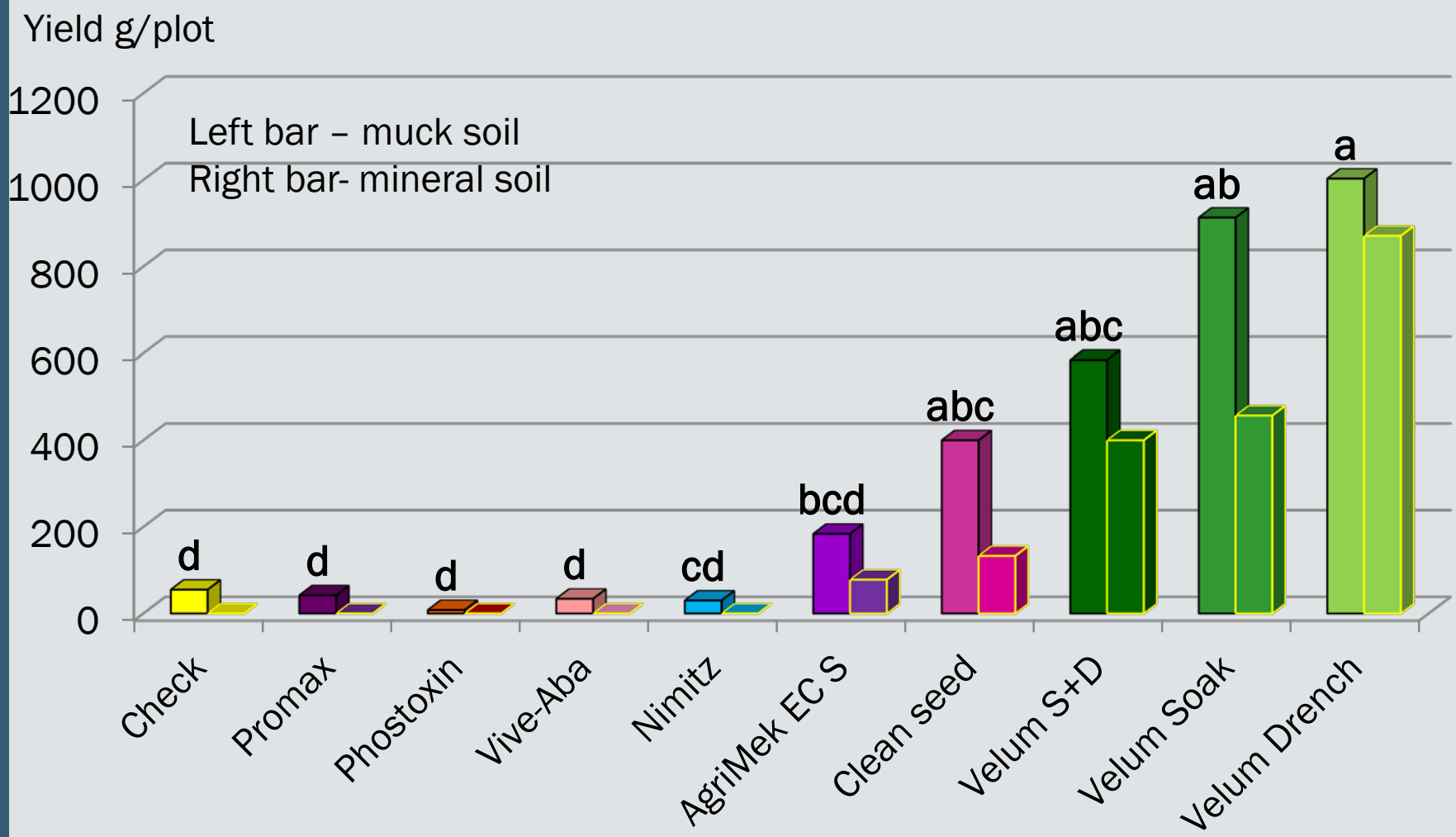
S= 4 hour soak before planting D= Drench in open furrow immediately after planting, F= foliar spray in spring (May) after emergence

Severity of stem and bulb nematode- 2017 –Mineral soil



S= 4 hour soak before planting D= Drench in open furrow immediately after planting, F= foliar spray in spring (May) after emergence

Yield of garlic on two soil types - 2017



S= 4 hour soak before planting D= Drench in open furrow immediately after planting, F= foliar spray in spring (May) after emergence

Stem and bulb nematode- summary

Velum Prime as a soak or drench provided excellent control of stem and bulb nematode, even at high levels of infection in the planting materials (830 nematodes/g)

In 2017 – 2018 we are using a ‘high’ and ‘low’ level of infested seed.

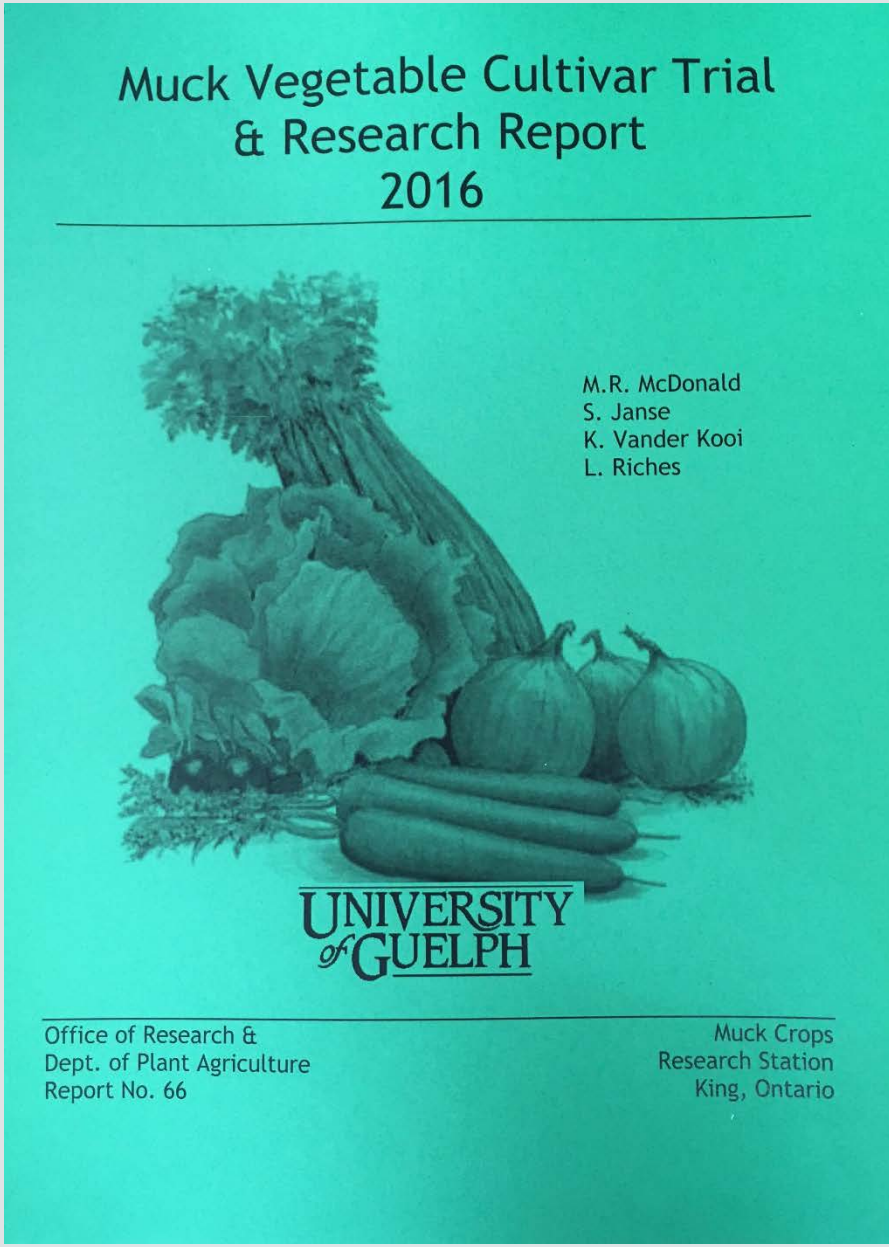
Velum Prime could be a very useful product on garlic.

All research trials are summarized in the Annual Report

Download at the Muck Station web site:

www.uoguelph.ca/muckcrop

2017 report will be available by the end of March



Acknowledgements

Funding was provided by
The California Garlic and Onion Research Advisory Board
The Fresh Vegetable Growers of Ontario,
The Bradford Cooperative Storage,
and
The OMAFRA/University of Guelph partnership

Questions?

Rotation crops and possible hosts: white beans, kidney beans dry and fresh peas, soybeans, wheat, onions, alfalfa

0
1
2
3
4

Downy mildew developed late in the season in 2014.