Management of onion maggot on seeded onions

Kevin Vander Kooi, Mary Ruth McDonald

Dept. of Plant Agriculture, University of Guelph

Onion maggot *(Delia antigua)* life cycle

eggs oviposited at onion base

eggs hatch into maggots

maggots feed on onions causing seedling death and unmarketable bulbs

overwinter as pupae

adult emergence

210 day degrees, base 4°C

Three generations per year in Ontario, Canada

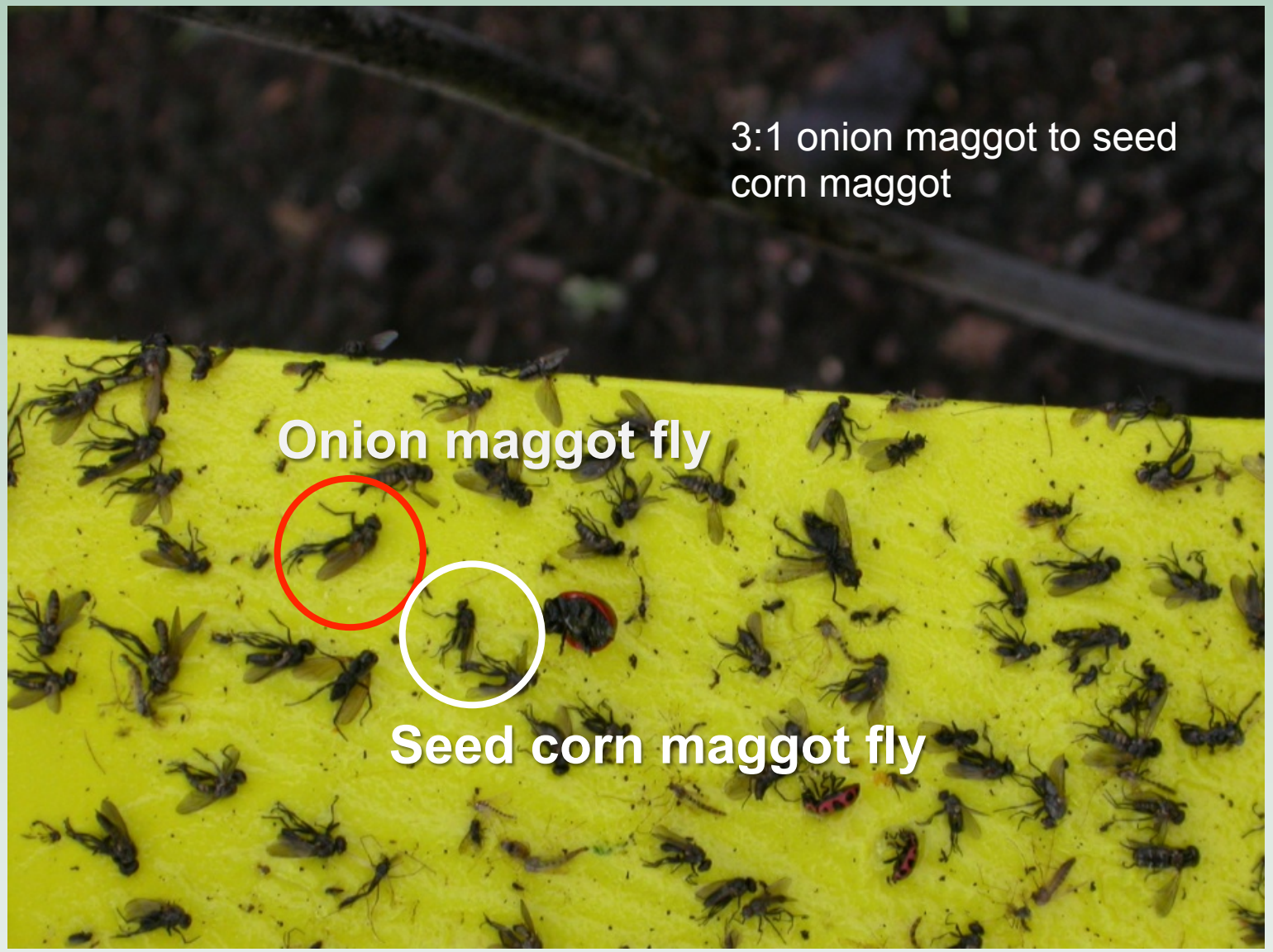
Onion maggot
(Delia antigua)

- Attacks seedling onions
- Attracted by scent of rotting onions
- 3 generations a year, most damage in the spring
- Overwinter as pupae in soil
- Damage is higher in cool, wet seasons and in high organic matter soils

Seed corn maggot
(Delia platura)

- Attacks many crops, including onions and corn
- Attracted by rotting plant material
- 3 – 5 generations per year, most damage in spring
- Overwinter as pupae in soil
- Damage is higher in cool, wet seasons and in high organic matter soils

Onion maggot and seed corn maggot



Registered Insecticides for Maggot Control in Ontario

Trade Name	Active Ingredient	Class	Method of Application
Sepresto	clothianidin + imidacloprid	Neonicotinoid + Neonicotinoid	Seed treatment
Governor	cyromazine	Triazine	Seed treatment
Lorsban	chlorpyrifos	OP	In furrow at seeding
Diazinon	diazinon	OP	Soil drench at seeding

Field Trials from 2010 to 2019

- Lorsban has been the standard treatment for many years
- Resistance to Lorsban has been observed
- Can seed treatments be as effective?
- Seed treatments may not work for transplants, need to investigate alternatives

Benefits of Seed Treatments

- Seed treatments are important for control of maggots and onion smut:
- Easy to use
- Accurate rate on each seed
- Low rates of products
- Safer for the environment
- Minimal exposure when handling

Regulatory Issues

- Pest Management Regulatory Agency – similar to EPA
- All neonicotoids are under review including seed treatments
- Future use patterns unknown
- Drenches or in furrow need to be investigated

Insecticides seed treatments 2010-2014

Treatment	Active ingredient
Aria	50% flonicamid
Avicta 400	37% avermectin
Avicta + Cruiser	37% avermectin +47.6% thiamethoxam
Cyazapyr	47 % cyantraniliprole
Dermacor-X	50% chlorantraniliprole
Entrust	80% spinosad
Entrust +Cruiser	80% spinosad + 47.6% thiamethoxam
Sepresto	**56.25% clothianidin + 18.75% imidicloprid**
Governor	**75% cyromazine**

Maggot trials: Methods

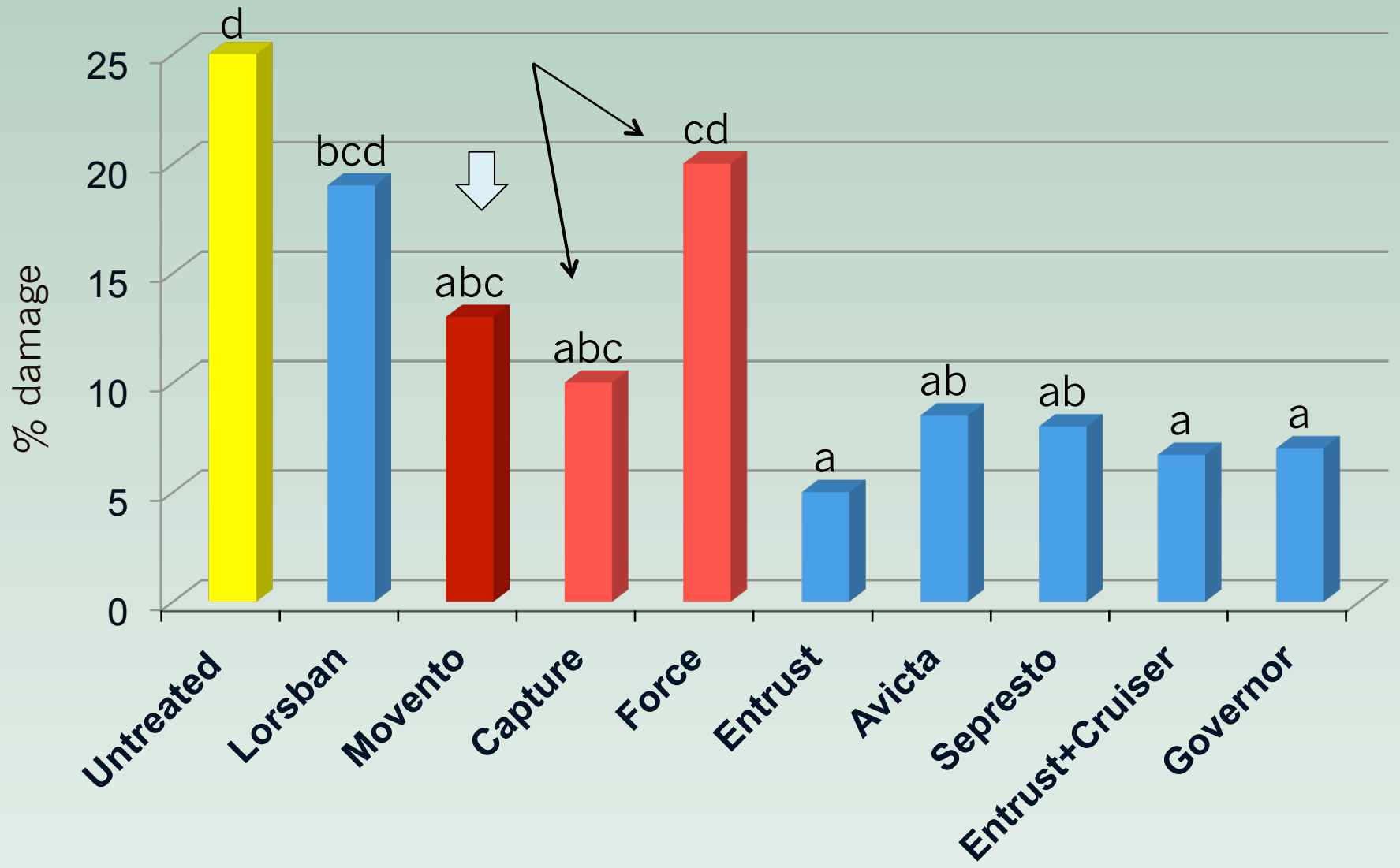
- Randomized complete block with 4 reps per treatment
- Shortly after onions emerge, 2 m sections are staked out in each plot
- Stand counts 3 times after emergence
- Maggot (and onion smut) damage assessed visually each week
- Onion maggot assessed after each generation -1st generation (early July), 2nd generation (mid August) and 3rd generation (harvest)
- 2 m of row harvested and all plants assessed for damage

Damage from first generation, first plus second, and total cumulative damage, plus separate yield sections

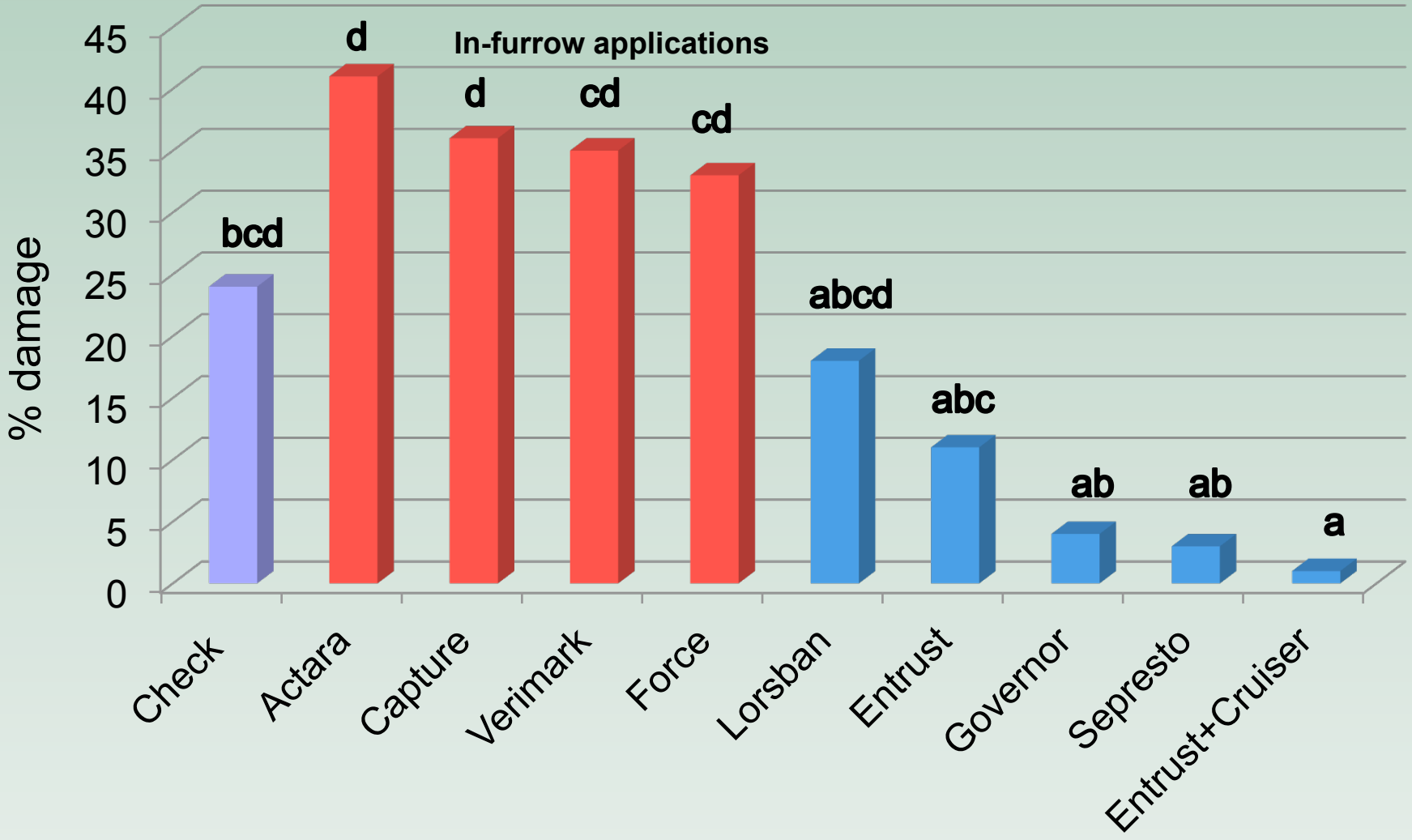
Onion maggot and seed corn maggot

- **2012 - 2014**
  - **In-furrow treatments:**
  - **Force** (tefluthrin) granular 37.5 g/ 100 m of row
  - **Capture** (bifenthrin) drench 0.3 fl oz/1000 ft row
  - **Actara** (thiamethoxam) drench 4.4 mL/100 m of row
  - **Verimark** (cyantraniliprole) drench 1.0 L/ha
  - **Movento** (spirotetramat) foliar at 350 ml/ha

Total maggot damage - 2012



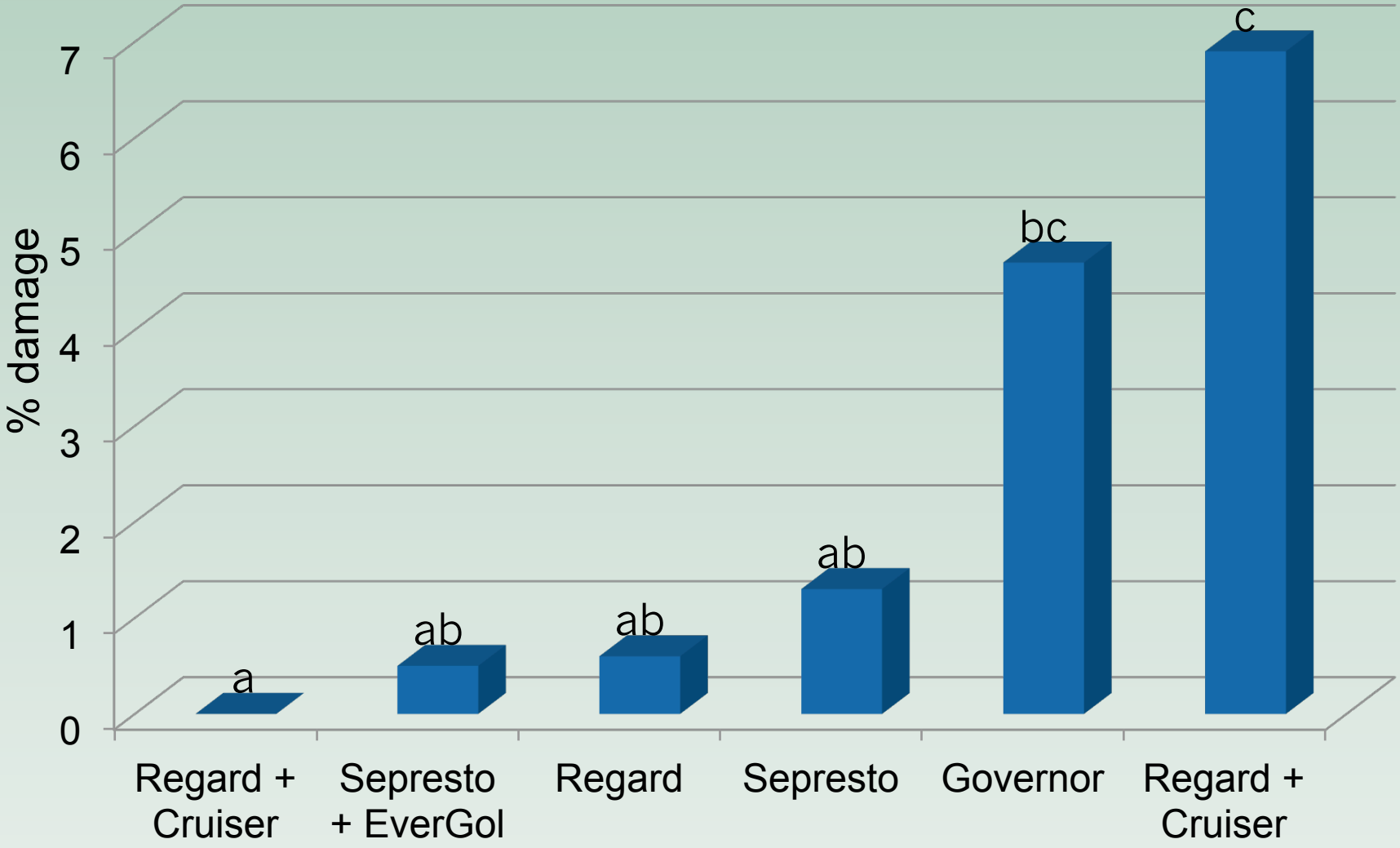
1st generation maggot damage - 2014



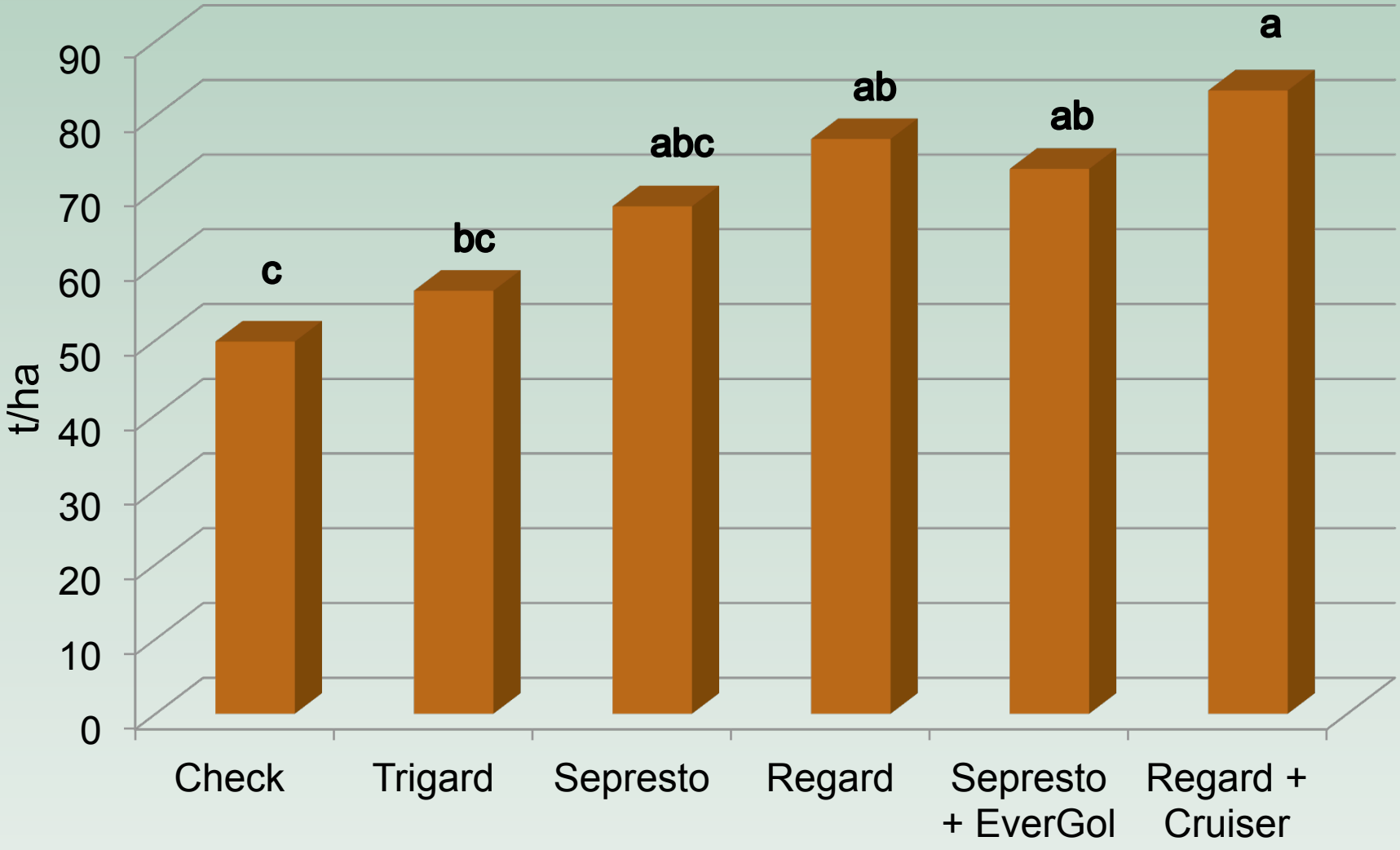
Onion maggot and seed corn maggot

- **2015 - 2019**
  - **Seed treatments:**
  - **Regard** (spinosad)
  - **Cruiser** (thiamethoxam)
  - **Sepresto** (clothianidin + imidacloprid)
  - **Governor** (cyromazine)

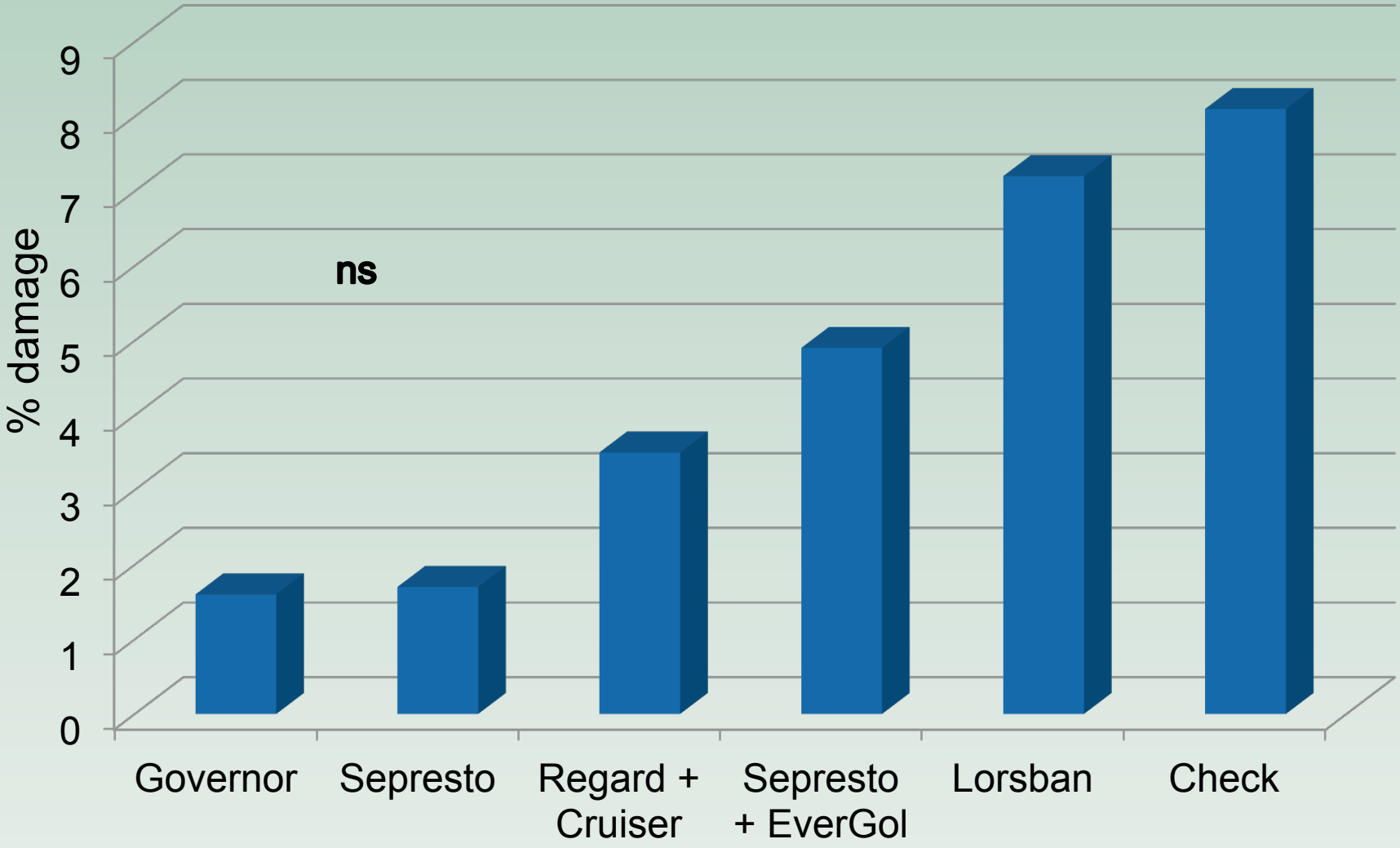
1st generation maggot damage - 2017



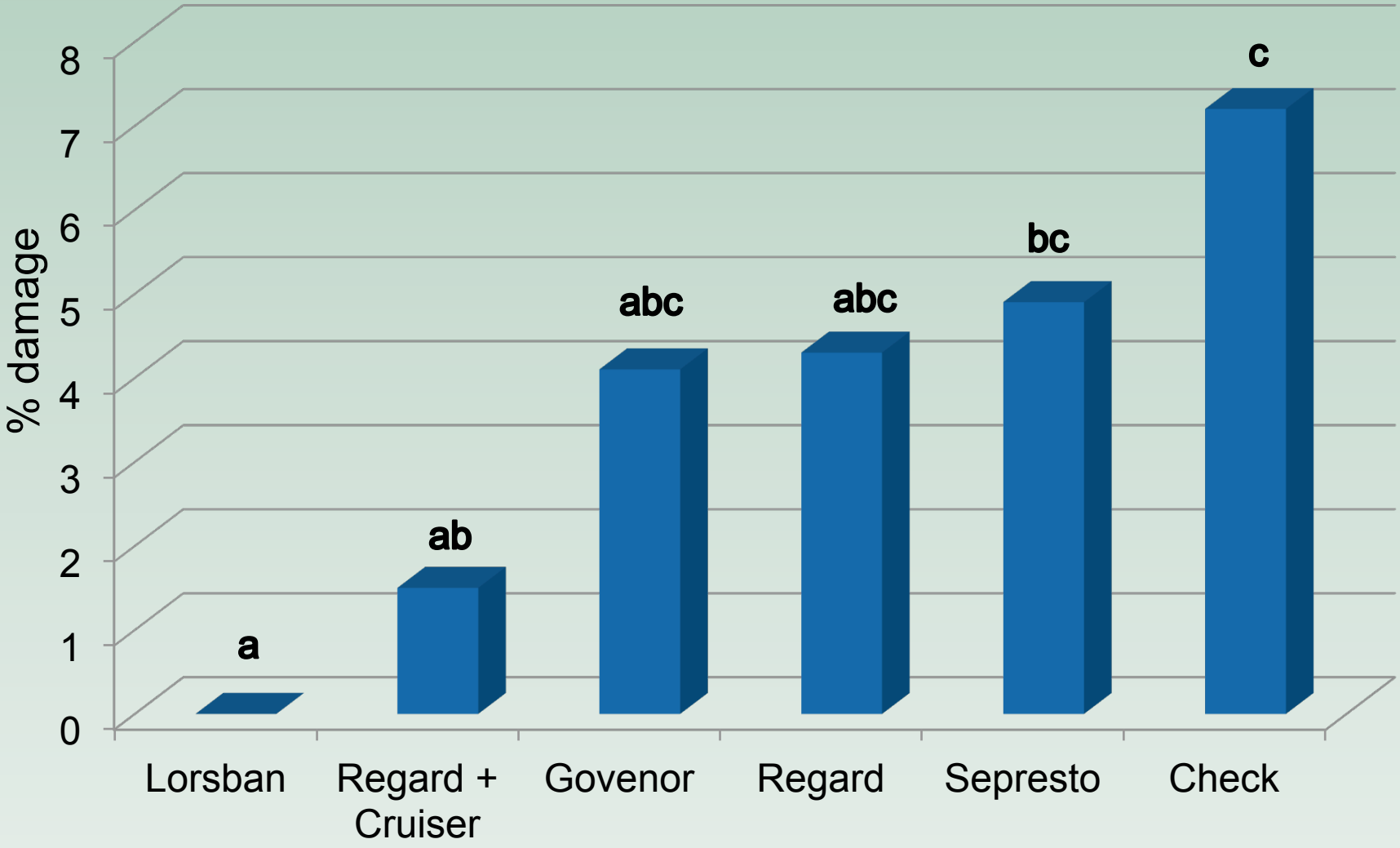
Marketable Yield- 2017



1st generation maggot damage - 2018



1st generation maggot damage - 2019



Summary of 2017-2019 trials

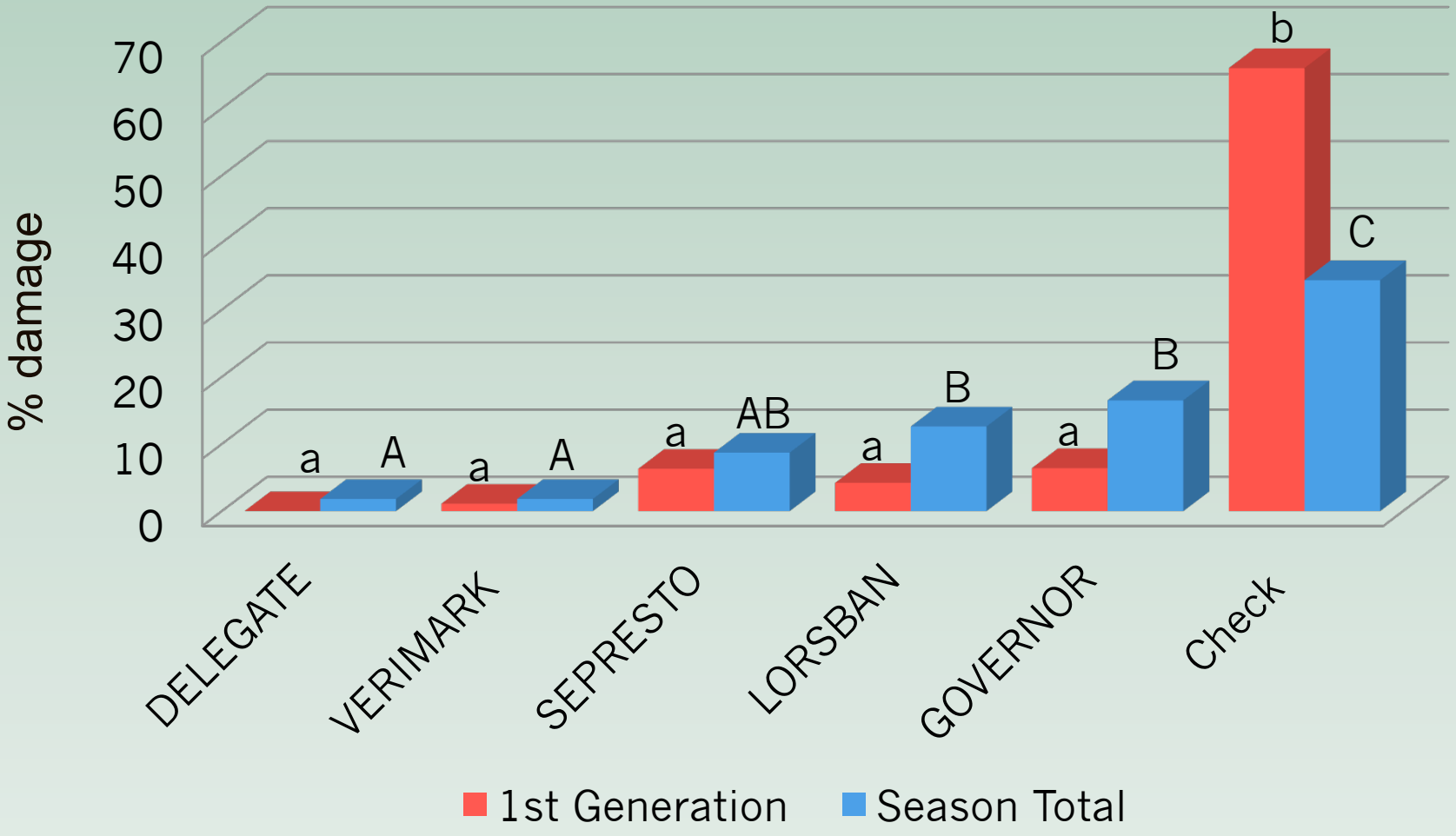
- Seed treatments Sepresto and Entrust most effective
- Governor when used with new fungicides is effective
- Lorsban – growers still use at low rates
- Unknown future of neonics for use in onions
- Growers need to additional new tools for effective maggot control

Onion Transplants

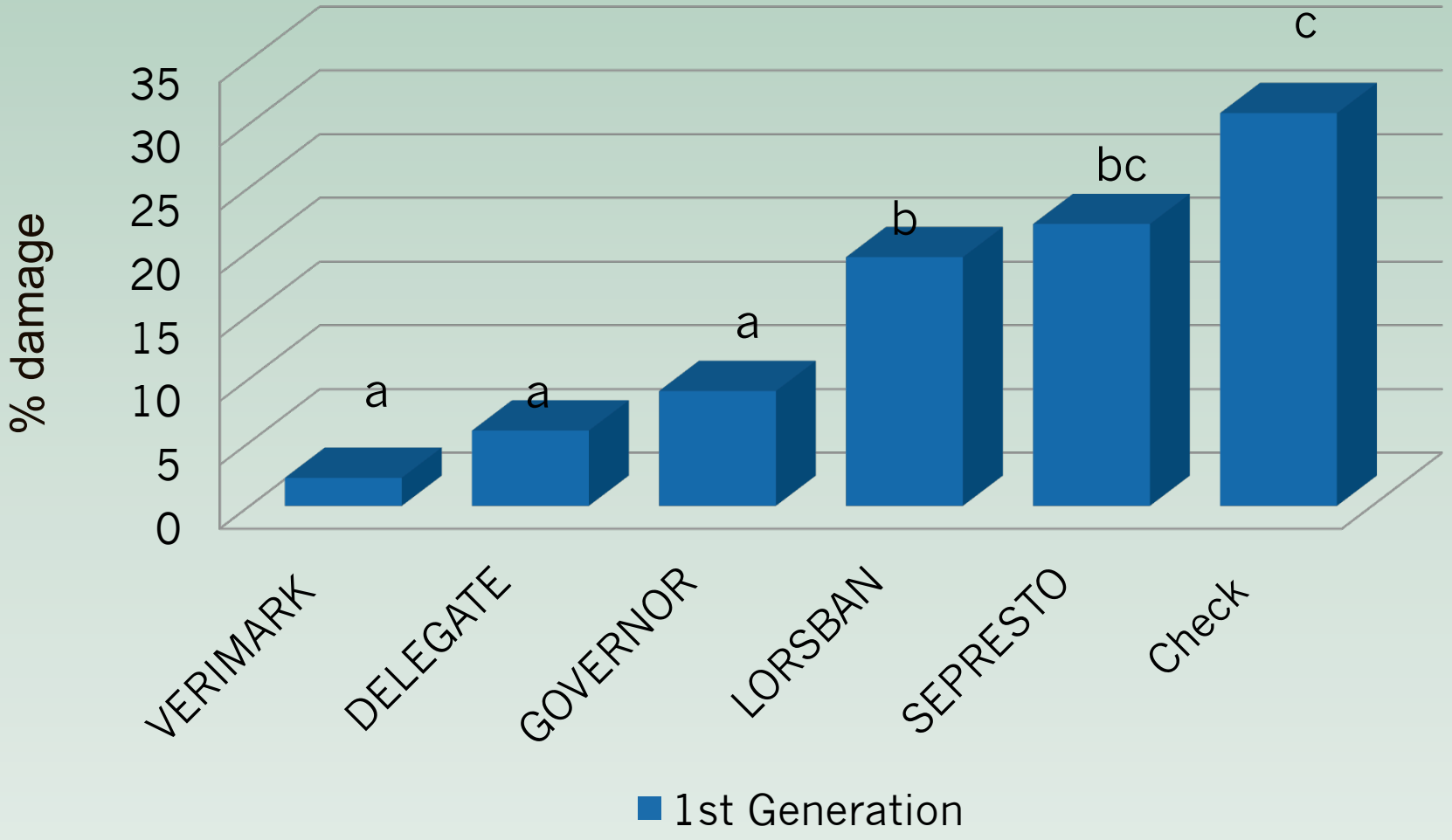
- Lorsban (chloropyrifos) is the only product registered for use at transplanting
- Up to 10% of Ontario onion production are transplants
- Sepresto, Governor pelleted seed treatments
- Delegate, Verimark drench

Onion Transplants

Transplant Results 2016



Transplant Results 2019



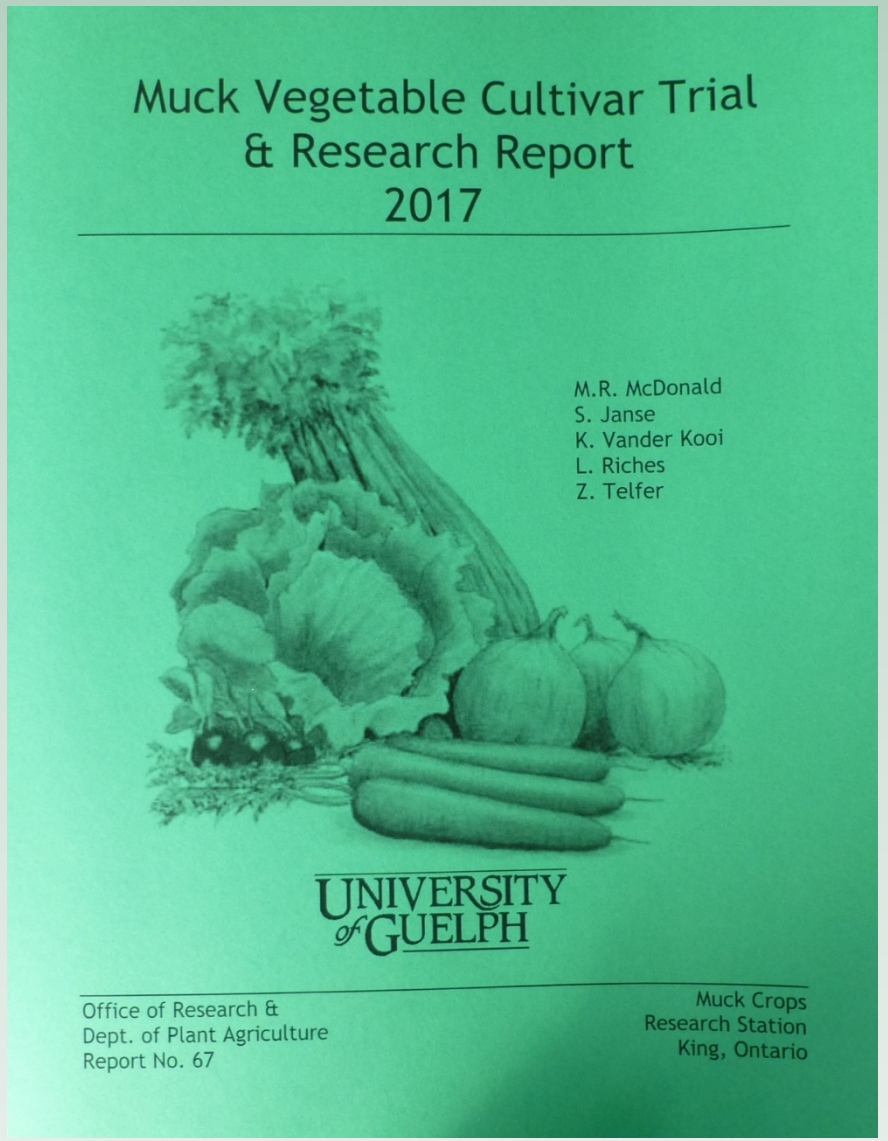
Conclusions: transplants

- Delegate and Verimark were most effective in reducing maggot damage and increasing yields in transplanted onions
- Sepresto more effective in only 2016 and Governor were also effective
- 2019 cool and wet spring, maggot damage occurred later and Sepresto seed treatment seemed less effective
- Need more work to verify results

All research trials are summarized in the Annual Report

Download at the Muck Station web site:

www.uoguelph.ca/muckcrop



Research Team

Mary Ruth McDonald

Laura Riches

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Thank you


Questions?