

**Insecticide seed treatments
and in furrow applications
reduce damage by onion and
seed corn maggots**

Mary Ruth McDonald

Laura Riches, Kevin Vander Kooi

Alan G. Taylor



**UNIVERSITY
of GUELPH**



Holland Marsh , Ontario, Canada
44° 15' N, 79° 35' W

Ontario: long day yellow bulb onions

**Most grown on muck soil
with 45- 70 % organic
matter.**

**Seeded late April – mid
May,**

**Harvested mid August-
September**

**Approx. 50 % are put into
cold storage and sold over
the winter, until April**



**13,800 acres of
onions in Canada.
6,500 acres in
Ontario**

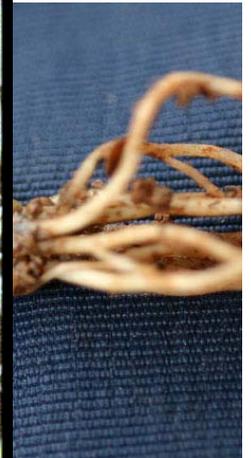
New in 2012

- **Two in-furrow treatments:**
 - **Force** (tefluthrin) granular 37.5 g/ 100m row
 - **Capture** (bifenthrin) drench 0.3 fl oz/1000 ft row
 - cv.Pulsar
- **Commercial seed treatments**
- **FarMore FI500** on cv. Trekker
- **Sepresto** on cv. Hendrix
 - The pellet was gently crushed to remove it from the seed for the check treatments
- Also, **Movento** (spirotetramat) applied at the emergence of the second generation of onion flies (if we are spraying Movento for onion thrips, will it also suppress onion maggots?)

Onion maggots

Seed corn maggots

**Many similarities
Both damage
seedling onions**





Onion maggot

(*Delia antiqua*)

- 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

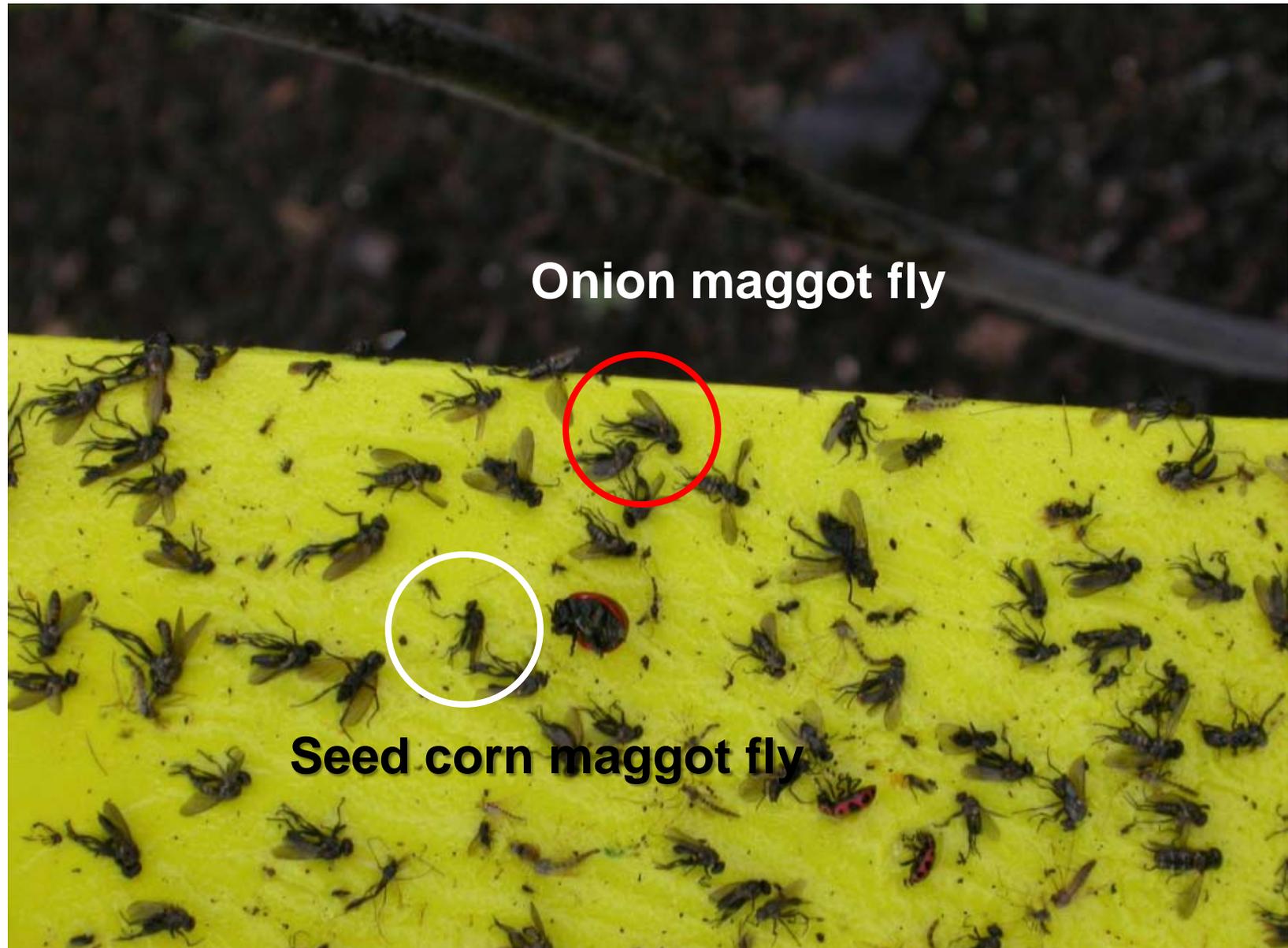
Seed corn maggot

(*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

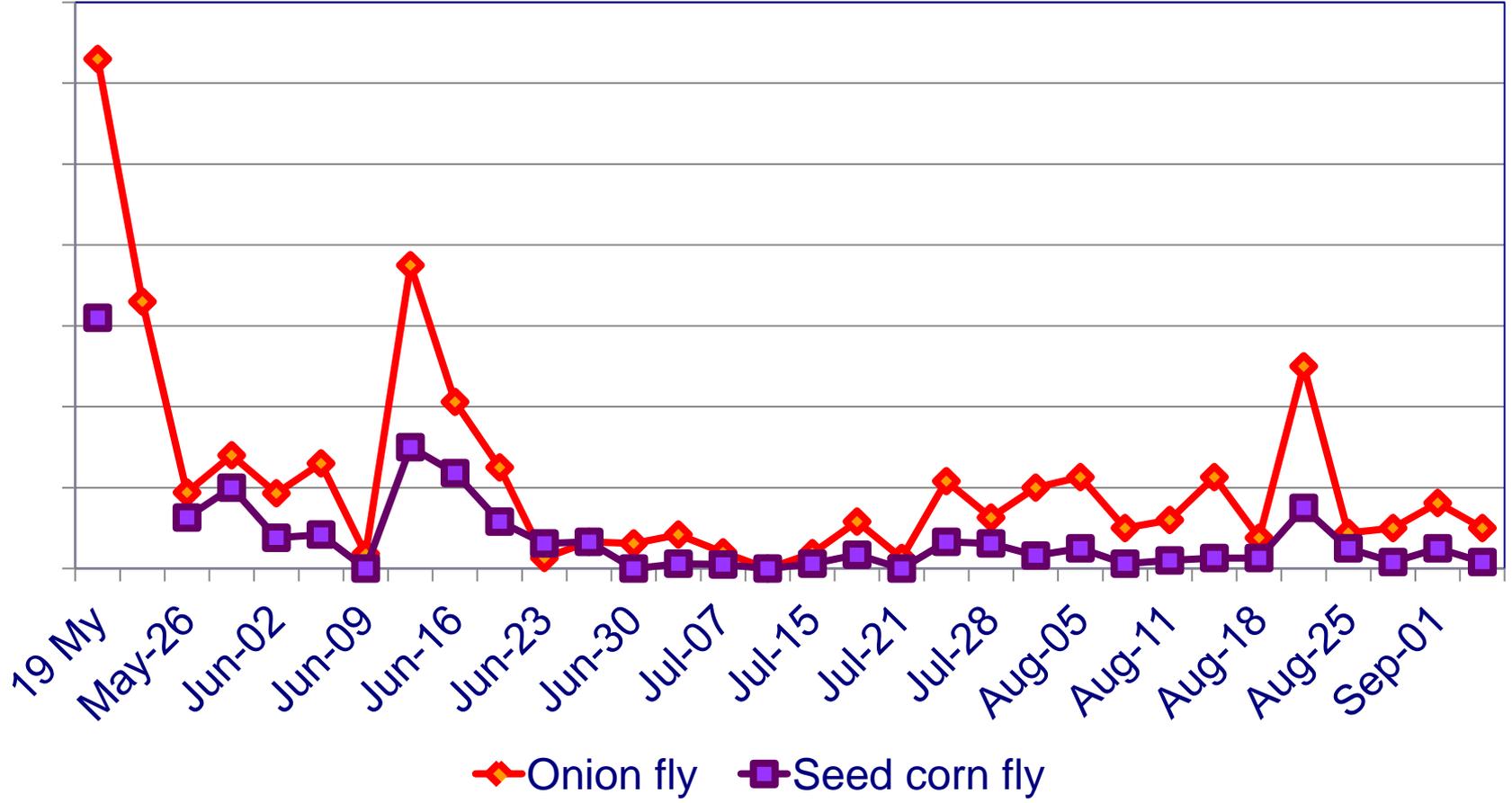


Onion maggot fly

Seed corn maggot fly

Populations of seed corn maggot flies and onion maggot flies caught on sticky traps-2012

Flies/trap/day



Seed corn maggot flies were approx. 25% of the population

Seed Treatments for Onion Maggot and Seed Corn Maggot

- Seed treatments are important for control of maggots and smut:
- Treatments applied in Al Taylor's lab at NYSAES -Film coat
- 2010: Seeded 3-4 May, harvested 20 Sept,
- 2011: Seeded 10 May, harvested 12 Sept.
- 2012: Seeded 10 May, harvested 13 Sept.
- Cv. Pulsar



Fungicides to control onion smut applied to all seed:
Raxil (tebuconazole) 250 mg/ 100 g seed and thiram,
in 2010, penflufen and mefanoxam in 2011



Insecticide trials: maggot damage in onions

- 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 -30 June, 2nd generation- 19 Aug, and harvest)- 13 Sept., 2010
- 2 m of row harvested and all plants assessed for damage

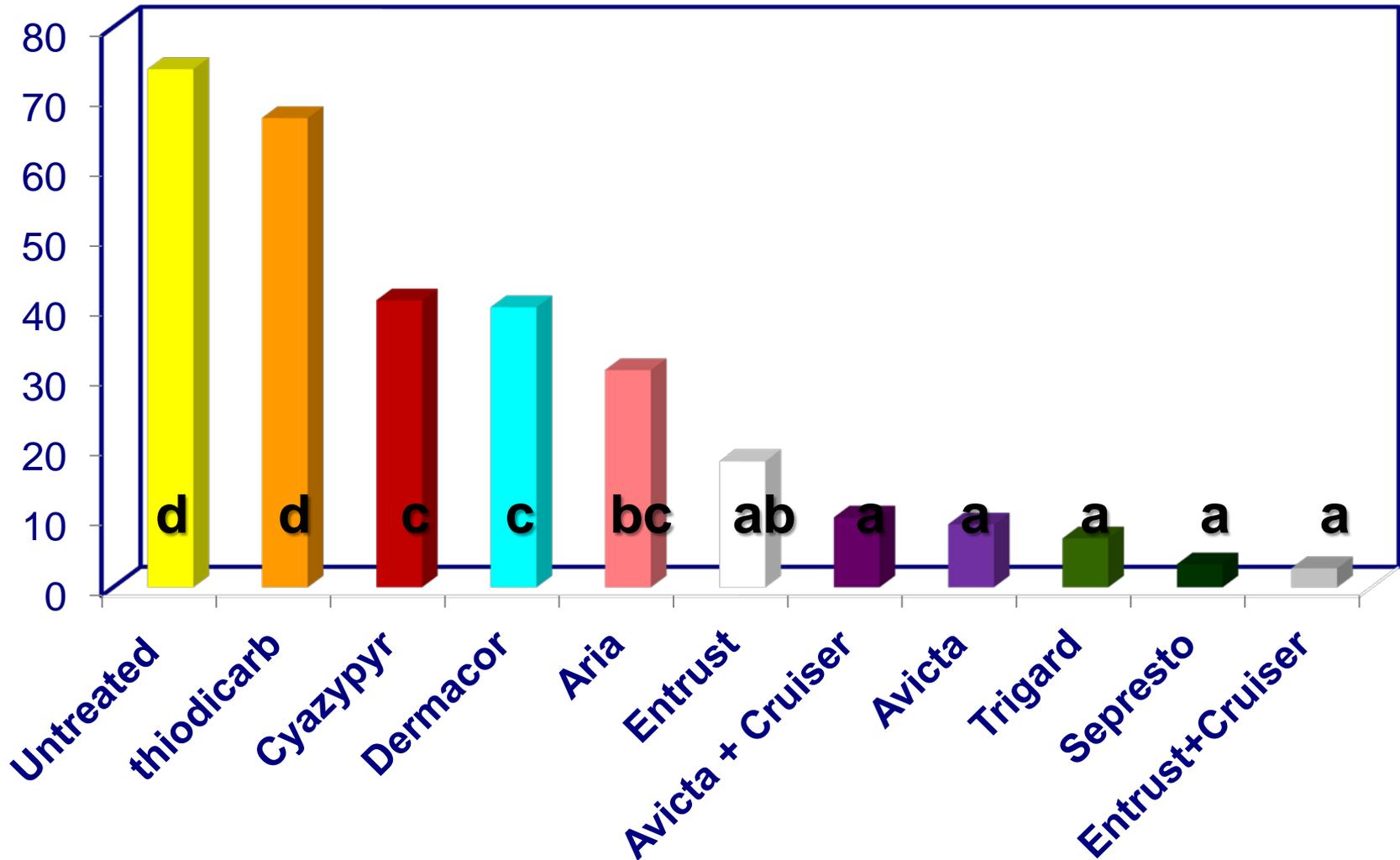


Damage from first generation, first plus second, and total cumulative damage, plus separate yield sections

Insecticide seed treatments- 2010

Treatment	Chemical name and concentration	Rate (g a.i./ 100 g seed)
ARIA	50% flonicamid	5.13
AVICTA 400	37% avermectin	5.13
AVICTA +CRUISER	37% avermectin +47.6% thiamethoxam	5.13 +5.13
CYAZYPYR	cyantraniliprole	5.13
DERMACOR X-100	50% chlorantraniliprole	5.13
ENTRUST	80% spinosad	5.13
ENTRUST +CRUISER	80% spinosad + 47.6% thiamethoxam	5.13 +5.13
EXP- 3	thiodicarb	5.13
SEPRESTO	56.25% clothianidin + 18.75% imidicloprid	6.15
TRIGARD	75% cyromazine	5.0
Untreated check		

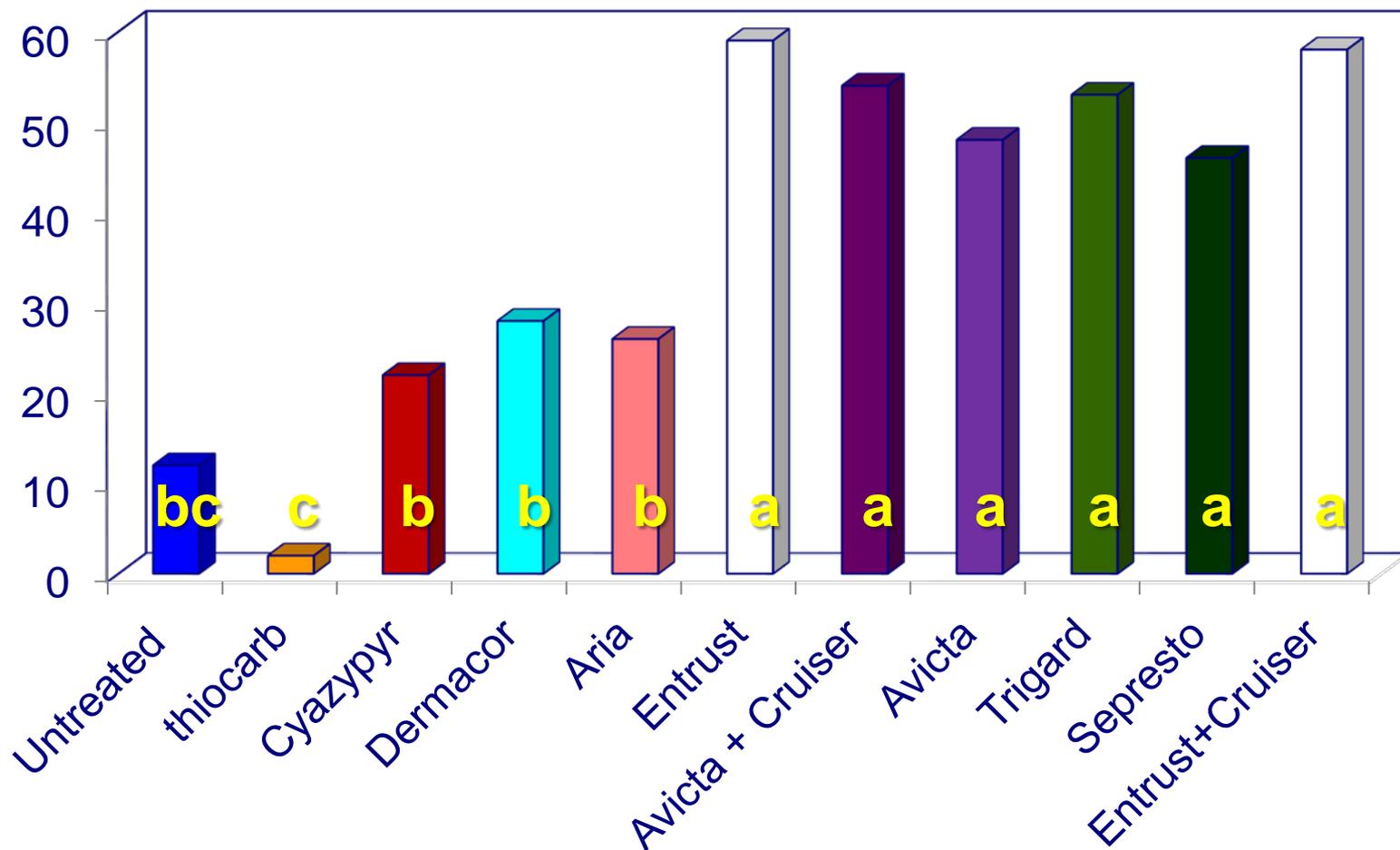
First generation maggot damage- 2010



Effect of insecticide seed treatment on marketable yield - 2010

Tonnes/ha

58 t/ha = 522 cwt/acre



Furrow insecticides: Pyrethroid insecticides

Registered for seed corn maggot in corn

Capture (Bifenthrin)

- Spray directly over the seed
- Creates a “zone of protection”
- Increased root mass
- Healthier plant stand
- Also controls wireworms, cutworms, grubs



Furrow insecticides: Pyrethroid insecticides registered for seed corn maggot in corn

Force 3 G (tefluthrin)

- “The unique vapor action of FORCE® permeates the soil and penetrates the insect cuticle, disrupting nerve conductance and causing cessation of feeding and death. Strong repellence gives additional protection to young plants”
- Granular formulation
- Also controls cutworms, wireworms, grubs



Onion growers in Ontario apply Lorsban 15 G (5% chlorpyrifos) as a granular formulation in the furrow at seeding.

**The registered rate is 15.7 kg/ha Lorsban (2.4 kg ai/ha)
Onion flies have a 7x resistance to chlopyrifos**

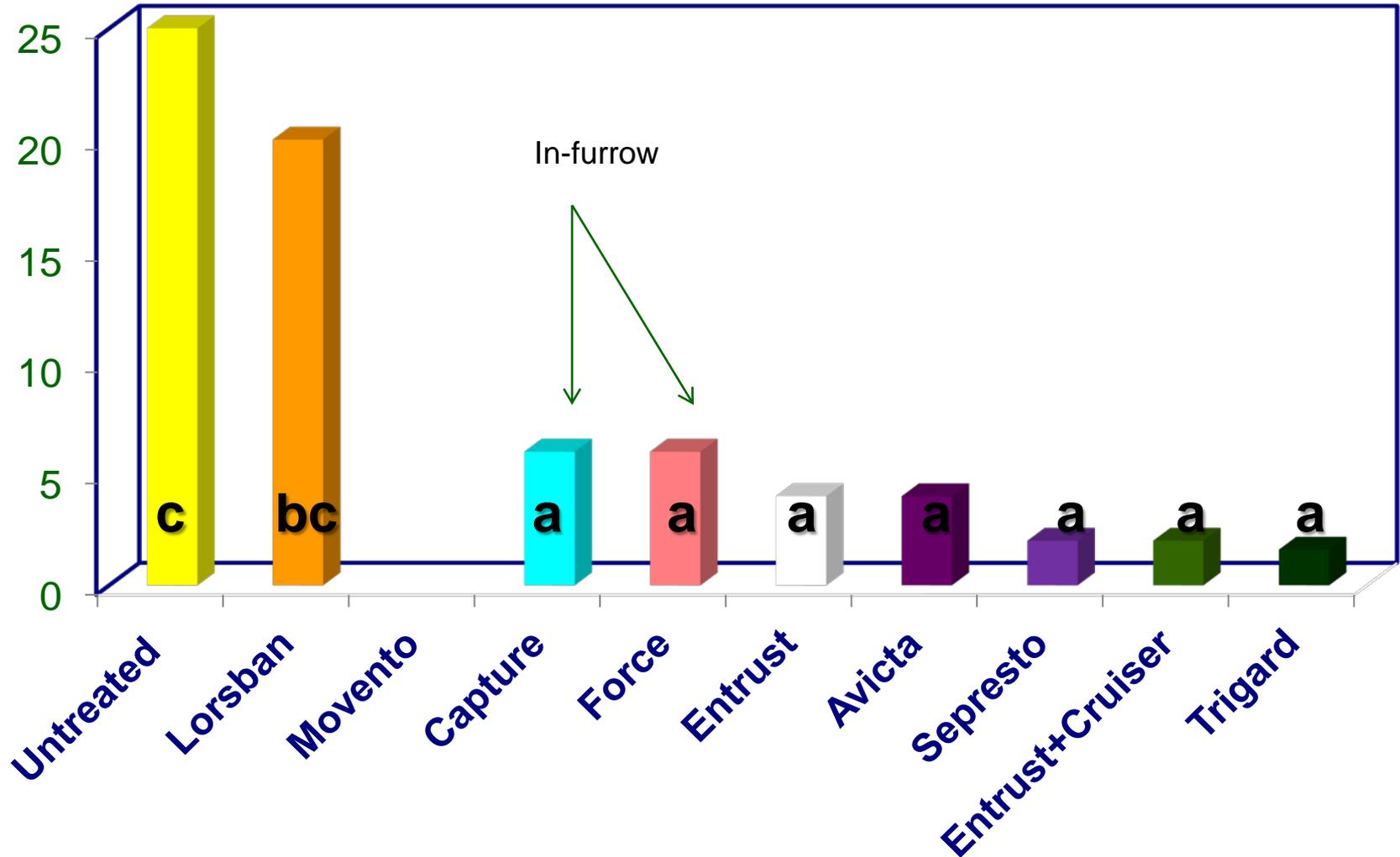
Seed
treatment
Trigard
(cyromazine)
is also
registered for
maggot
control



Insecticide treatments on Pulsar -2012

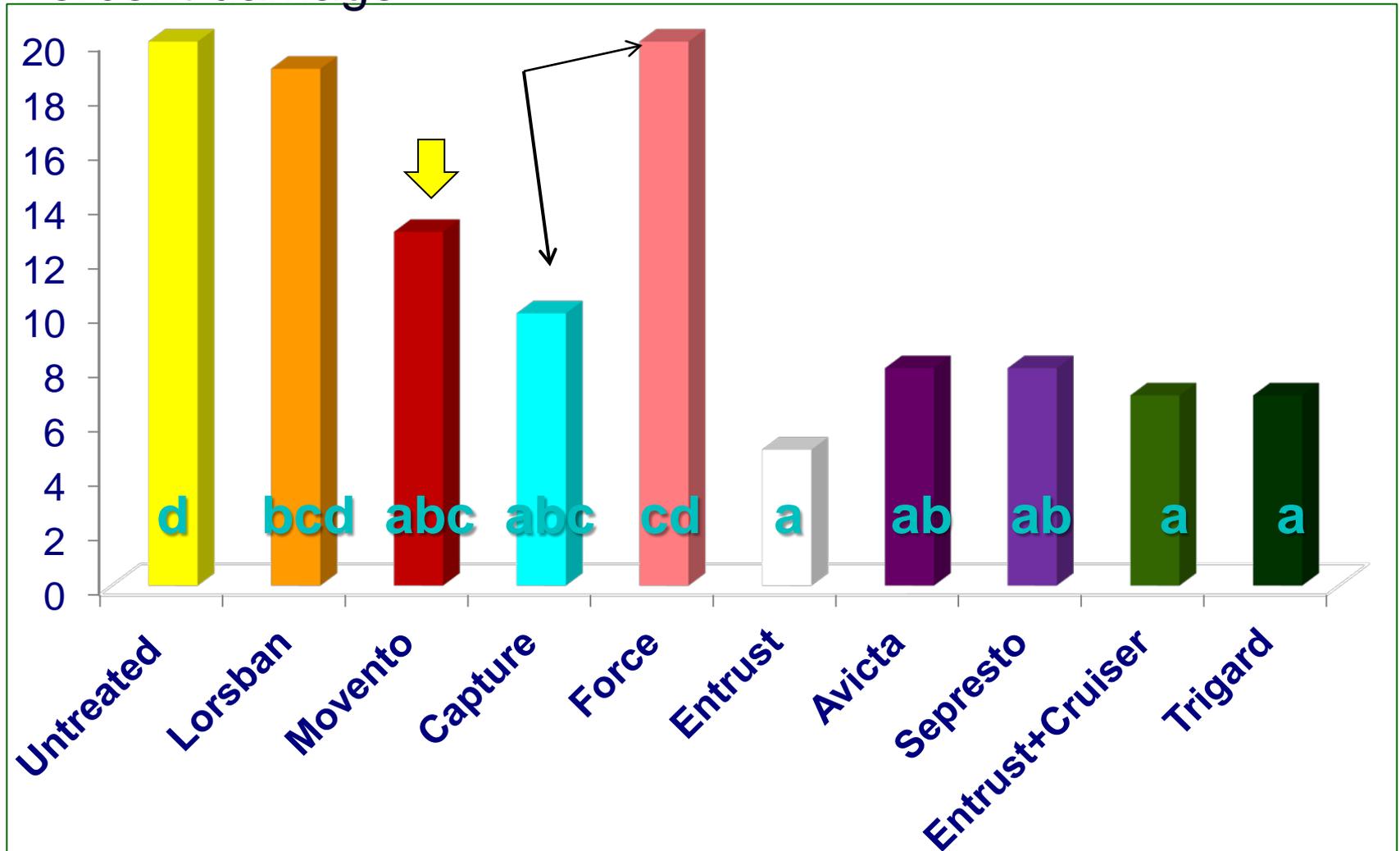
Treatment	Active ingredient	Rate
Capture	bifluthrin	0.38 g/m
Force	tefluthrin	0.46 ml/m
Lorsban	15% chlorpyrifos	32 kg/ha
Movento + Sylgard	24% spriotetromat + syloxilated polyether 76%	375 ml +0.375%
Avicta 400	37% abamectin	4.55
Entrust	80% spinosad	4.55
Entrust +Cruiser	80% spinosad+70% thiamthoxam	4.55 +4.55
Sepresto	56.25% clothianidin + 18.75% imidicloprid	5.45
Trigard	75% cyromazine	5.0
Untreated		

First generation maggot damage- 2012



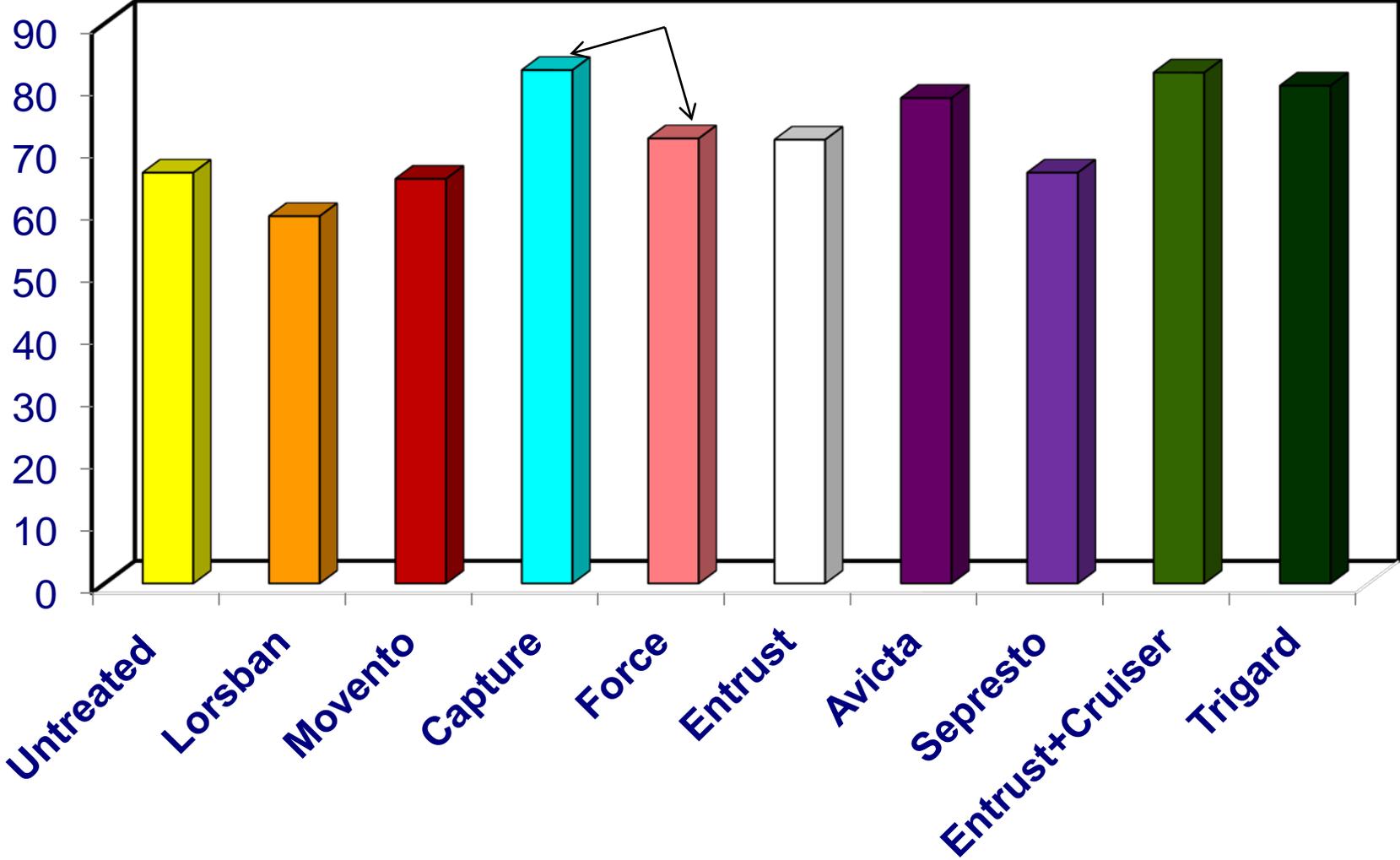
Cumulative maggot damage- 2012

Percent damage



Onion yield- 2012

Tonnes/ha



No significant differences (range from 60 to 82 tonnes/ha or 540 cwt to 740 cwt/acre)

FarMore F1500 contains spinosad and thiamethoxam

(Entrust and Cruiser)

Plus fungicides
mefanoxam, fludioxonil
and azoxystrobin

“ Spinosad will be
available exclusively as
part of FarMore F1500”

Variety Trekker

SOLUTIONS

Solution sources

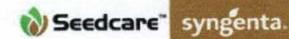
▼ Species

Alfalfa/Lucerne
Asparagus
Barley
Beans, field
Beans, garden
Broccoli
Cabbage
Canola/Rapeseed
Carrot
Cauliflower
Chickpea
Clover
Cotton
Cowpea
Cucumber
Eggplant/Brinjal
Fescue
Flax
Lentils
Lettuce
Lupins
Maize/Com
Melon
Mungbean
Oats
Onion
Parsnip
Peanuts/Groundnuts
Peas, field
Pepper
Pigeon pea
Potato
Pumpkin
Radish
Rice
Rye
Ryegrass
Sorghum
Soybeans
Spinach
Squash
Stevia
Sudangrass
Sugarbeet
Sunflower
Sweet corn
Switchgrass
Tomato
Triticale
Watermelon
Wheat

Solution Page

Search solutions

Topics A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



Know your enemy: onion maggots



USA
November 2011

Source

From planting to harvest, an onion crop can be attacked by three different generations of onion maggots. One of the most destructive pests that attack onion crops, onion maggots will feed and burrow through plants, moving down rows to feast on each plant, ruining crop quality and potentially spreading fungal and bacterial pathogens.

Typically a bigger problem in Northern temperate regions, onion maggots overwinter as pupa in a dormant stage in the soil. When the weather begins to warm in the spring, the pupae will develop into adult flies. An adult female onion maggot can lay 200 eggs in her 30-day lifespan. When the eggs hatch, the larvae will cause damage by using their hooks to bore into the plant. It is this first generation of onion maggots that will cause the plant to wilt and eventually become flaccid.

The second generation of onion maggots that hatch will feed on the onion bulb. No damage will be seen above the soil, but beneath the surface maggots will burrow, creating deformed onion bulbs that are not suitable for market. The burrowing also may spread disease and fungus to the plant.

The third generation of onion maggots occurs around the same time as harvest. Usually these eggs are laid directly on the bulb, which can destroy a crop while it is in storage, or they will be laid on the soil next to and beneath the dying onions.

Syngenta recently announced a solution to help growers fight onion maggot infestations. Spinosad insecticide, now available for use on onions as a seed treatment, can help protect onion crops from the damaging effects of onion maggots, as well as seedcorn maggots and onion thrips.

Spinosad will be available exclusively as part of FarMore® F1500 insecticide/fungicide seed treatment. Featuring two insecticides, spinosad (Regard™) and thiamethoxam (Cruiser®), as well as three trusted fungicides, mefenoxam (Apron XL®), fludioxonil (Maxim® 4FS) and azoxystrobin (Dynasty®), FarMore F1500 marks the latest evolution of the FarMore Technology platform.

"The FarMore Technology brand is constantly evolving, which is critical to our continued commitment to the small-seeded vegetable market," said Chad Shelton, asset lead, Syngenta. "Onion maggot is a very real problem for onion growers. Syngenta is excited to offer this seed treatment chemistry combined with our proprietary application technology to help combat common soil-borne diseases and insect pests, all the while increasing overall plant health."

FarMore Technology is the first comprehensive and proprietary seed-delivered solution that helps maximize vegetable production by enhancing performance and value. This combination of seed protection products and proprietary application technologies provides direct-seeded small-seeded vegetable growers with consistent performance to enhance seedling emergence, plant stand establishment, early-season vigor and plant health, as well as protect yield potential. A continually evolving platform of seed protection solutions, FarMore Technology is one of the latest in a long line of Syngenta innovations stemming from a commitment to invest in research and development.

For more information about FarMore F1500 contact your local Syngenta representative, or ask your local seed supplier for more details.

©2011 Syngenta. Important: Always read and follow label instructions before buying or using Syngenta products. The instructions contain important conditions of sale, including limitations of warranty and remedy.

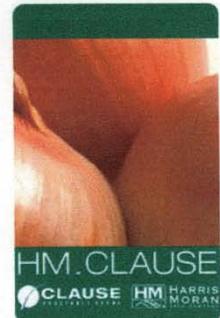
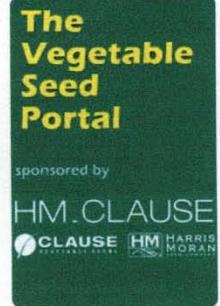
Regard is not registered for use or sale in all states. Please check with your state or local extension service before buying or using this product.

FarMore Technology is a seed company- or seed technology provider-applied combination of separately registered seed protection products and proprietary application technologies. FarMore F1500 contains three fungicides: Apron XL, Maxim 4FS and Dynasty; and two insecticides: spinosad and Cruiser 70WS.

Apron XL®, Cruiser®, Dynasty®, FarMore®, Maxim®, Regard™, Seedcare™ and the Syngenta logo are trademarks of a Syngenta Group Company.



sponsor of
**The
Seed Treatment
Portal**



The seed treatments
are proprietary

Sepresto is now
registered

(clothianidin and
imidicloprid)

variety Hendrix



Maggots have met their match.

Introducing Sepresto®: a new insecticide seed treatment
available exclusively on Nunhems onion seed.

Protect your seedlings from the damaging effects of maggots, thrips and other troublesome insects with Sepresto – available now only on onion seed from Nunhems.

Sepresto, the latest insecticide seed treatment from Bayer CropScience, has been shown to deliver early season pest control throughout the critical time of plant establishment. Sepresto goes to work almost immediately, causing a cessation of sucking, biting and chewing within 24 hours after insect feeding or contact. Exclusive onion seed treatments for better results in the field: another way Nunhems is earning its reputation as “the global specialist.”

For more information, please contact your local sales specialist
or Nunhems Customer Service at **(800)733-9505**

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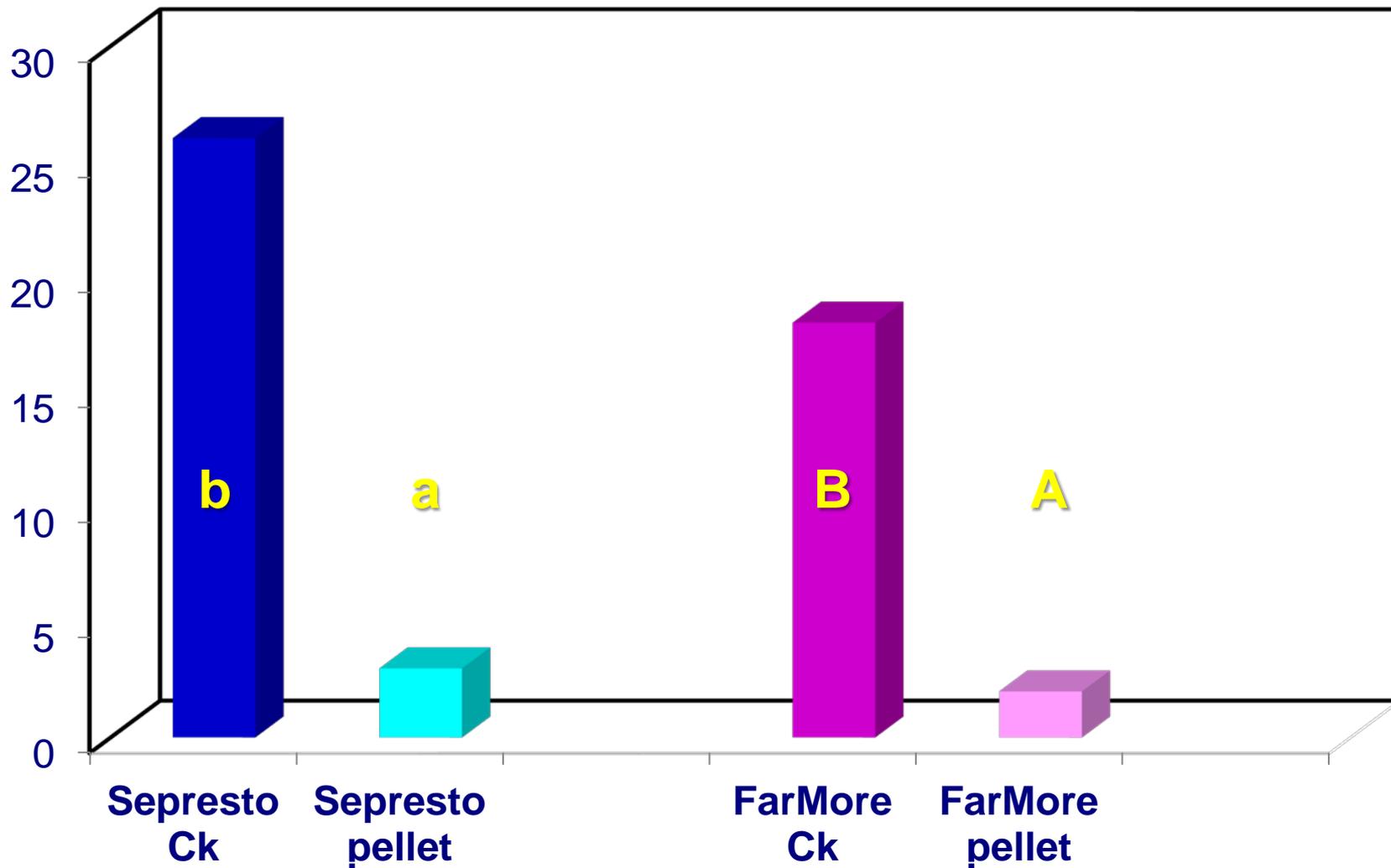


Part of Bayer CropScience

www.nunhemsusa.com

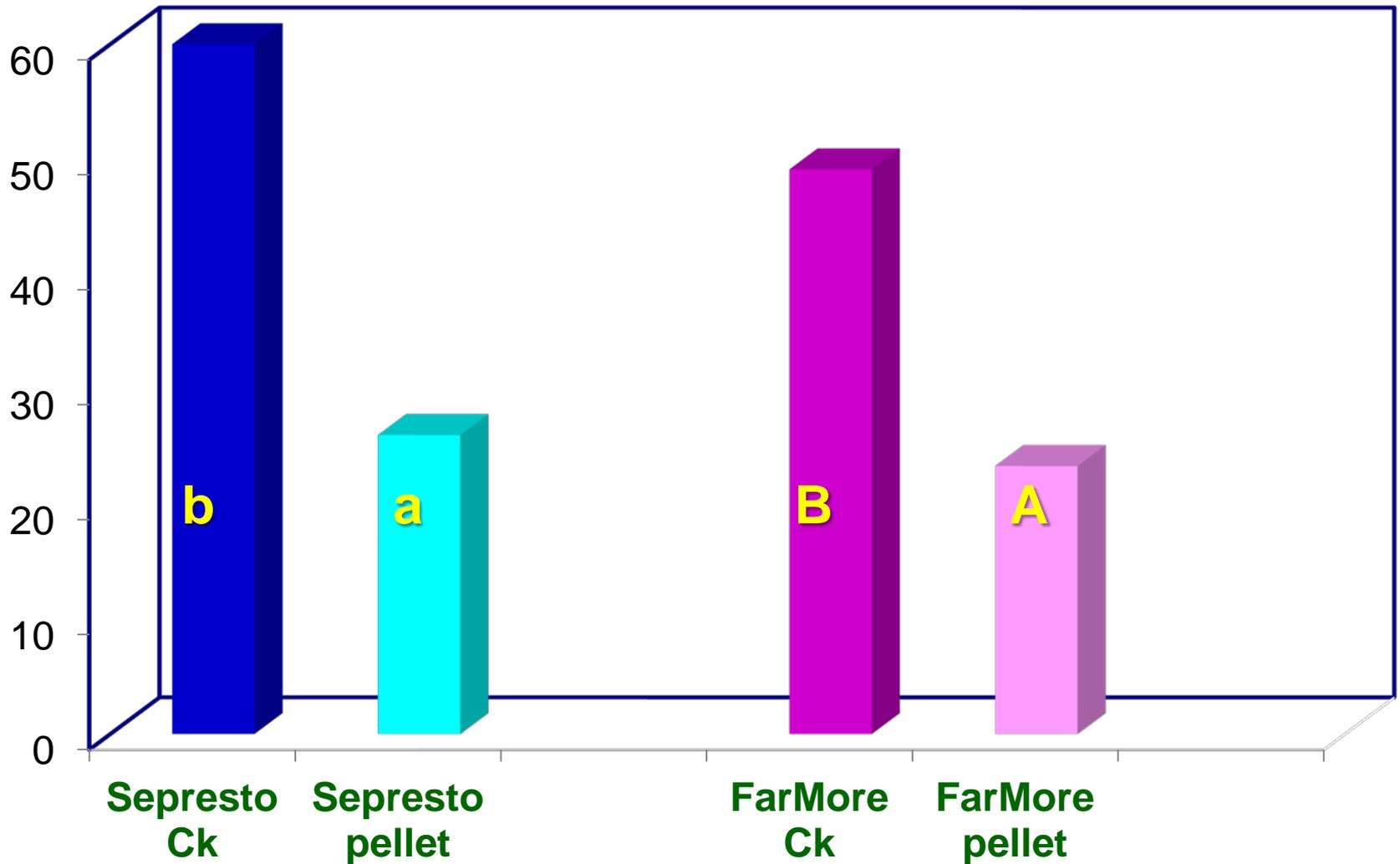
First generation maggot damage- commercial seed treatment - 2012

Percent damage

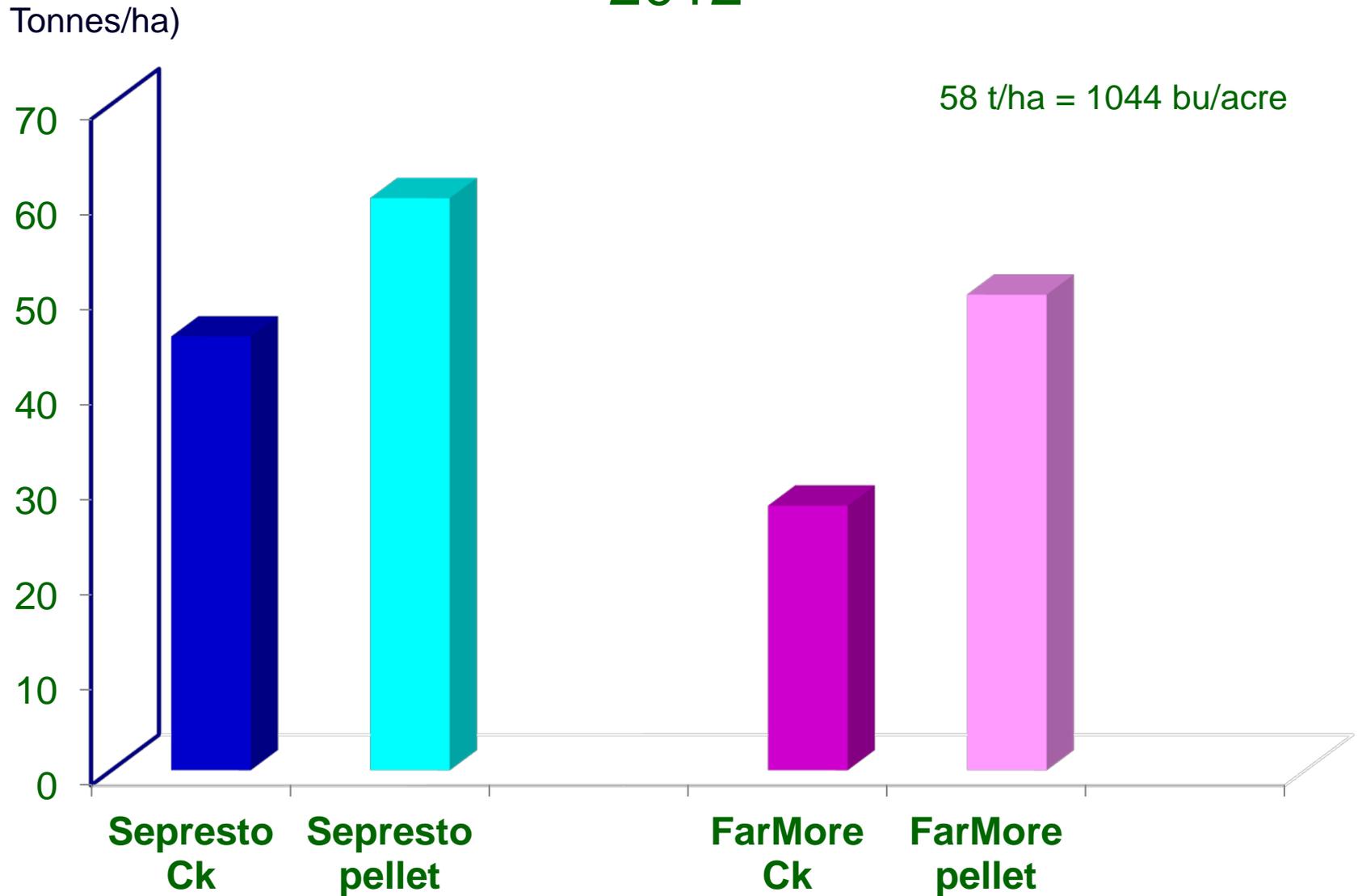


Cumulative maggot damage- commercial seed treatment - 2012

Percent damage



Yield of onions with commercial seed treatment - 2012



No significant differences in yield

Conclusions: Maggot control

- In-furrow applications of Capture and Force reduced damage
- Capture was effective for the entire season
- Uncertain if Movento had an effect
- Seed treatments provided effective control of maggot damage
- Entrust, Entrust plus Cruiser, Sepresto, Trigard and Avicta all reduced maggot damage.



Conclusions: Maggot control

- Maggot damage was much lower in 2011 and 2012, than in 2010.
- No effect on yield in 2011 and 2012, probably because of lower maggot pressure (however 20 tonnes/ha differences)
- Yield was related to first generation maggot damage ($r^2 = 0.65$, $P = 0.00$) in 2010 when there was high maggot pressure



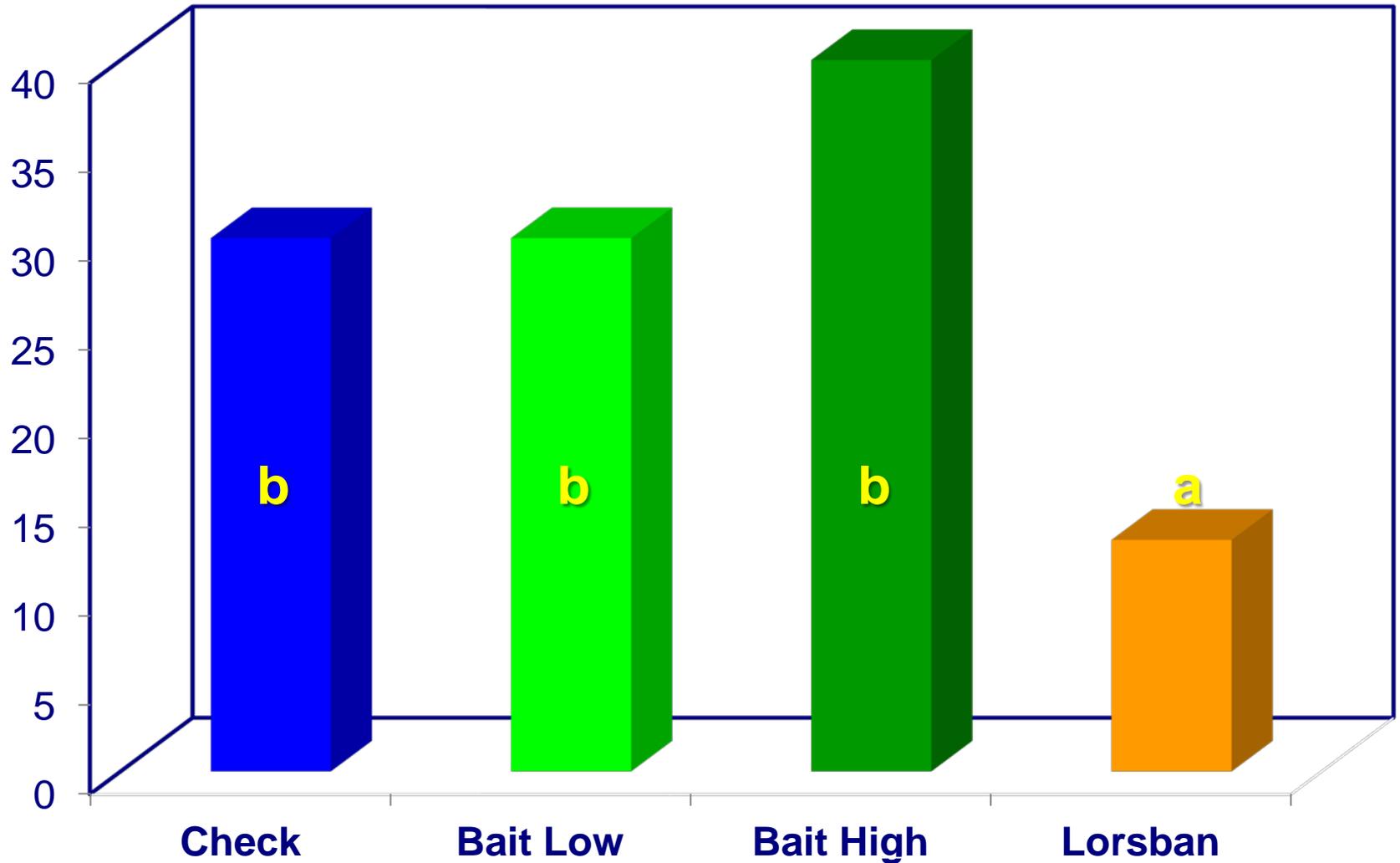
Also in 2012



- Spinosad bait to kill adult flies and reduce maggot damage in onions.
- The bait is formulated with a sugar to attract the flies.
- Bait was in a granular form
- Applied 3 times – twice for first generation onion flies and once for second generation. Spread by hand evenly on the plots
- 2 rates: 22.4 kg/ha and 49.3 kg/ha
- Compared to in-furrow Lorsban granular at 32 kg/ha

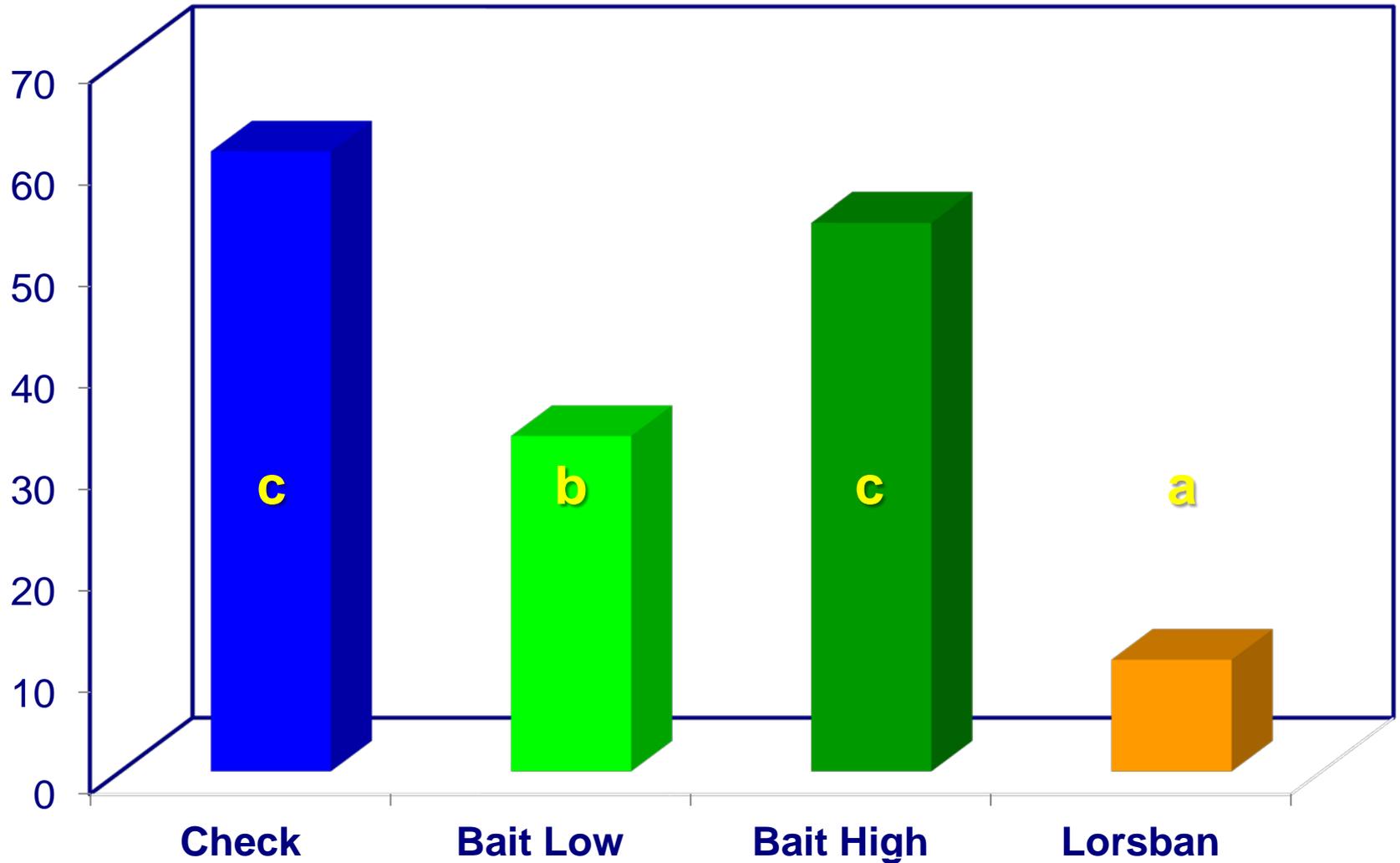
First generation maggot damage-spinosad bait - 2012

Percent damage



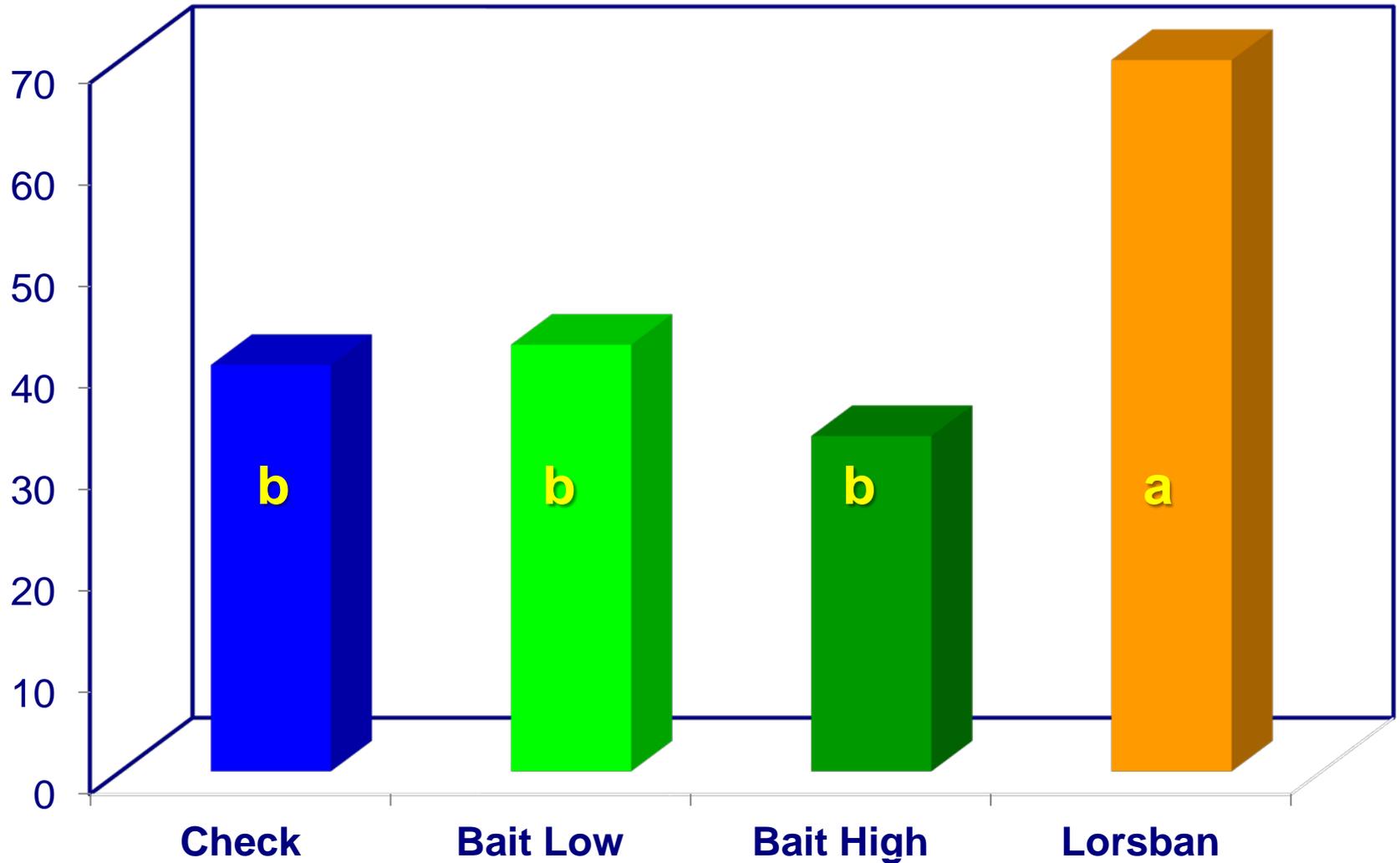
Cumulative maggot damage-spinosad bait - 2012

Percent damage



Yield of onions treated with spinosad bait - 2012

Tonnes/ha



70 tonnes/ha = 630 cwt/acre

Spinosad bait

- Uncertain about the optimum rate and timing of application. Perhaps the bait should be applied earlier.
- If the bait is attracting the flies, try applying it to the edges of the field to attract flies from the main crop?



Maggot control

- Controlling maggots is essential
- New, registered seed treatments work very well
- Furrow application of Capture is effective, Force works well for first generation damage – good for seed corn maggot?
 - Only one year of data



What next? Maggot control

- Continue to evaluate in furrow application

- Capture (bifenthrin)

- Force (tefluthrin)

- Singly and with seed treatment

- Movento foliar sprays

- Spinosad bait, field perimeter only?

- Compare to standard treatments:

Sepresto, FarMore F1500, Trigard, Entrust, Lorsban



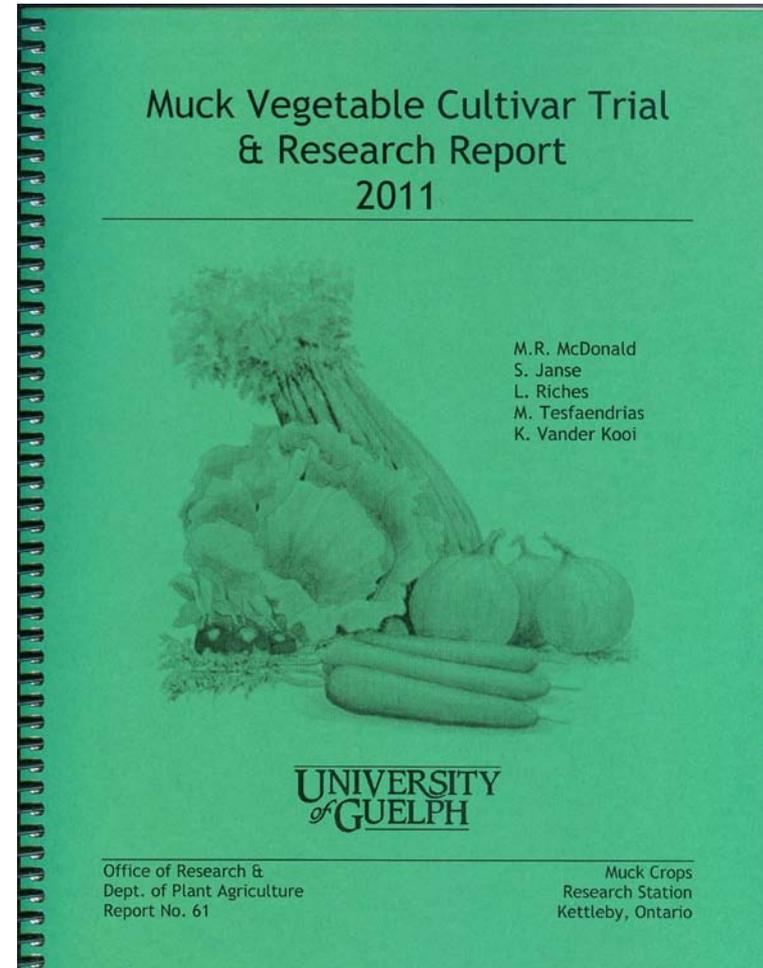
All research trials are summarized in the Annual Report

Download at the Muck Station web site:

www.uoguelph.ca/muckcrop

The 2012 data will be available in March 2013

Includes work on onion thrips and Allium white rot



An aerial photograph of a field with rows of young green plants, likely garlic or onion seedlings, planted in a grid pattern. The plants are vibrant green and the soil between the rows is dark brown. The perspective is from a high angle, looking down at the rows which recede into the distance.

Acknowledgements

**Funding for this research was provided by:
The California Garlic and Onion Research Advisory Board,
and the Holland Marsh Growers Association through the Bradford Co-op.**



Questions?



Onion maggot (*Delia antiqua*) life cycle



adult emergence

210 day degrees, base 4°C (38 F)



eggs oviposited at onion base



eggs hatch into maggots



maggots feed on onions causing seedling death and unmarketable bulbs



overwinter as pupae

Three generations per year in Ontario, Canada