



Seed treatments for control of onion and seed corn maggots.

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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**





Onion maggots and seed corn maggots are very damaging to onions- 70 to 100% loss

Onion maggot (*Delia antiqua*) life cycle



adult emergence

210 day degrees, base 4°C



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

Onion maggot fly (*Delia antiqua*)

- First generation damage –
 - Females deposit eggs in groups at base of onion plant



Second generation damage



Onion Maggot



Third generation damage



**Onion maggot pupae
on onion from
storage**

Seed corn maggot fly (*Delia platura*)



- Overwinter as pupae in the soil
- Adults emerge in spring- March to May depending on location
- Damage highest in cool years (active at temp of 40 °F and above) and in soils with high organic matter
- 3-5 generations a year in most of U.S.
- The first generation is most damaging to onion seedlings





Yellow sticky traps are used to monitor the adult flies of seed corn maggots and onion maggots

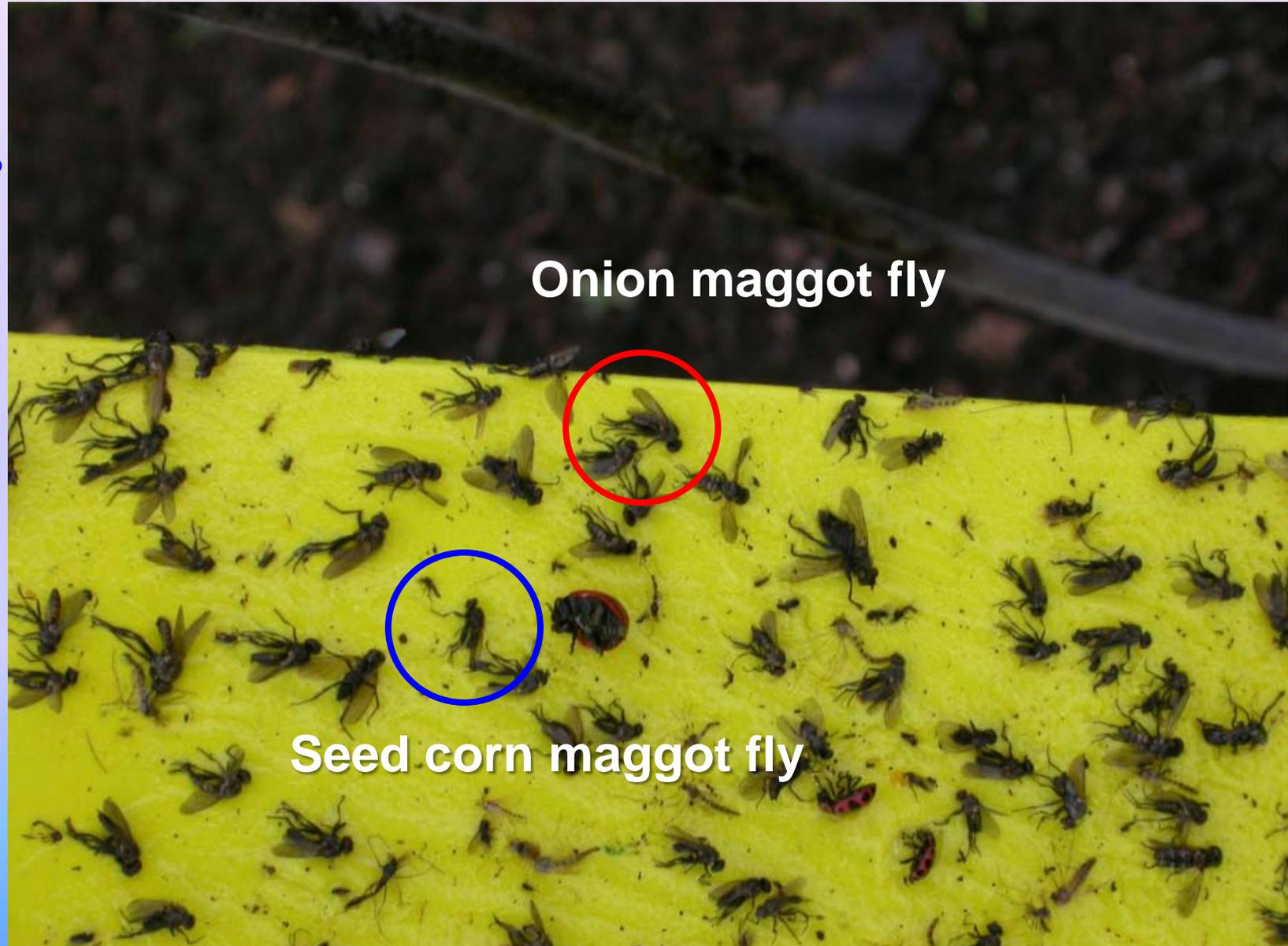
Maggot flies on yellow sticky traps, monitored 2 x a week

There are high populations of onion maggot flies in the Holland Marsh area.

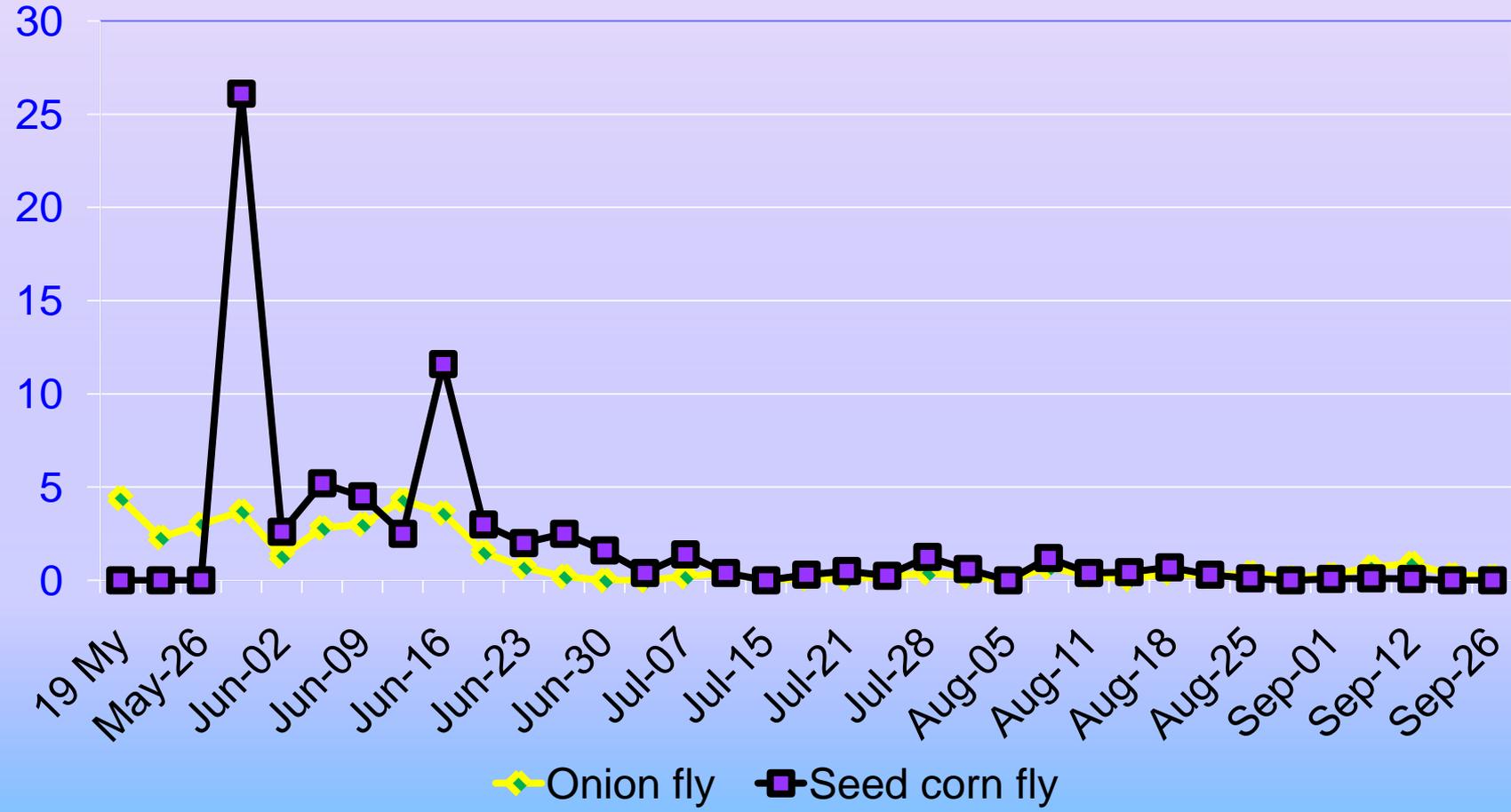
**Onion fly counts have decreased over last 25 years-
Good control reduces populations over time?**



Onion maggot and Seed Corn Maggot



Populations of seed corn maggot flies and onion maggot flies caught on sticky traps-2011



Seed Treatments for Onion Maggot and Seed Corn Maggot

- Seed treatments are important for control of maggots and smut:
- onion maggot flies in Ontario have about 7 x resistance to Lorsban (chlorpyrifos)
- 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.

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

Insecticide treatments -2010

Treatment	Active ingredient	Rate (100 g)
Aria	50% flonicamid	5.13
Avicta 400	37% avermectin	5.13
Avicta+ Cruiser	37% avermectin +47.6% thiamethoxam	5.13 +5.13
Cyazapyr	47 % cyantraniliprole	5.13
Dermacor-X	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% imidiclopid	6.15
Trigard	75% cyromazine	5.0
Untreated		

New in 2011

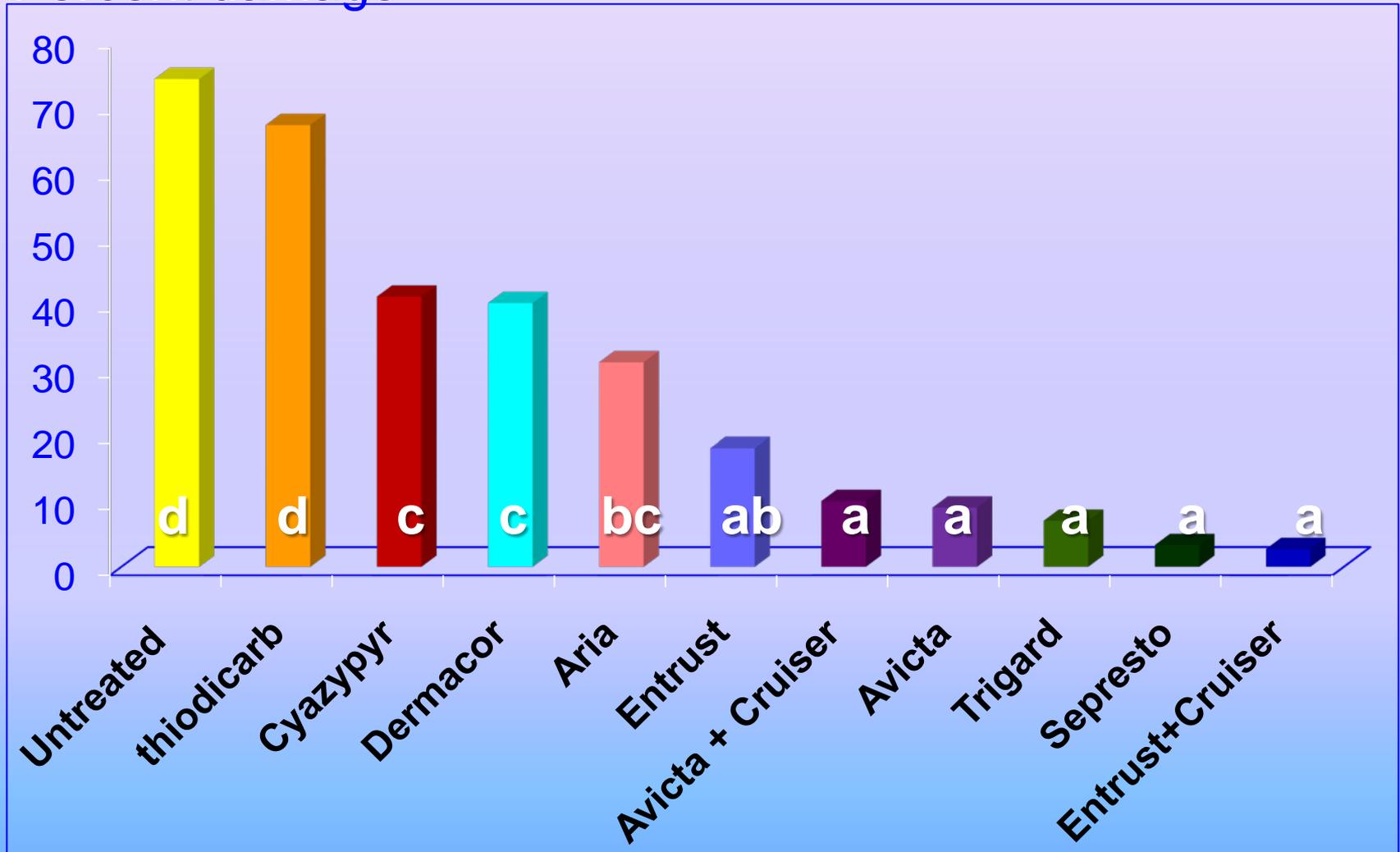
- Compared seed treatments to a drench of Lorsban (15% chlorpyrifos) applied 6 days after seeding (2x rate)
- Added a treatment with Movento (spirotetromat) plus surfactant (Sylgard) applied when second generation onion flies emerge.
- If we are spraying Movento for thrips control, will it reduce 2nd generation onion maggot damage?

Insecticide treatments -2011

Treatment	Active ingredient	Rate
Movento + Sylgard	24% spriotetromat + syloxilated polyether 76%	375 ml +0.375%
Avicta 400	37% avermectin	4.55
Cyazapyr	47% cyantraniliprole	4.55
Cyazapyr	47% cyantranilipole	6.82
Dermacor-X	50% chlorantraniliprole	4.55
Dermacor-X	50% chlorantraniliprole	6.82
Entrust	80% spinosad	4.55
Entrust +Cruiser	80% spinosad+70% thiamthoxam	4.55 +4.55
Lorsban	15% chlorpyrifos	32 kg/ha
Sepresto	56.25% clothianidin + 18.75% imidiclopid	5.45
Trigard	75% cyromazine	5.0
Untreated		

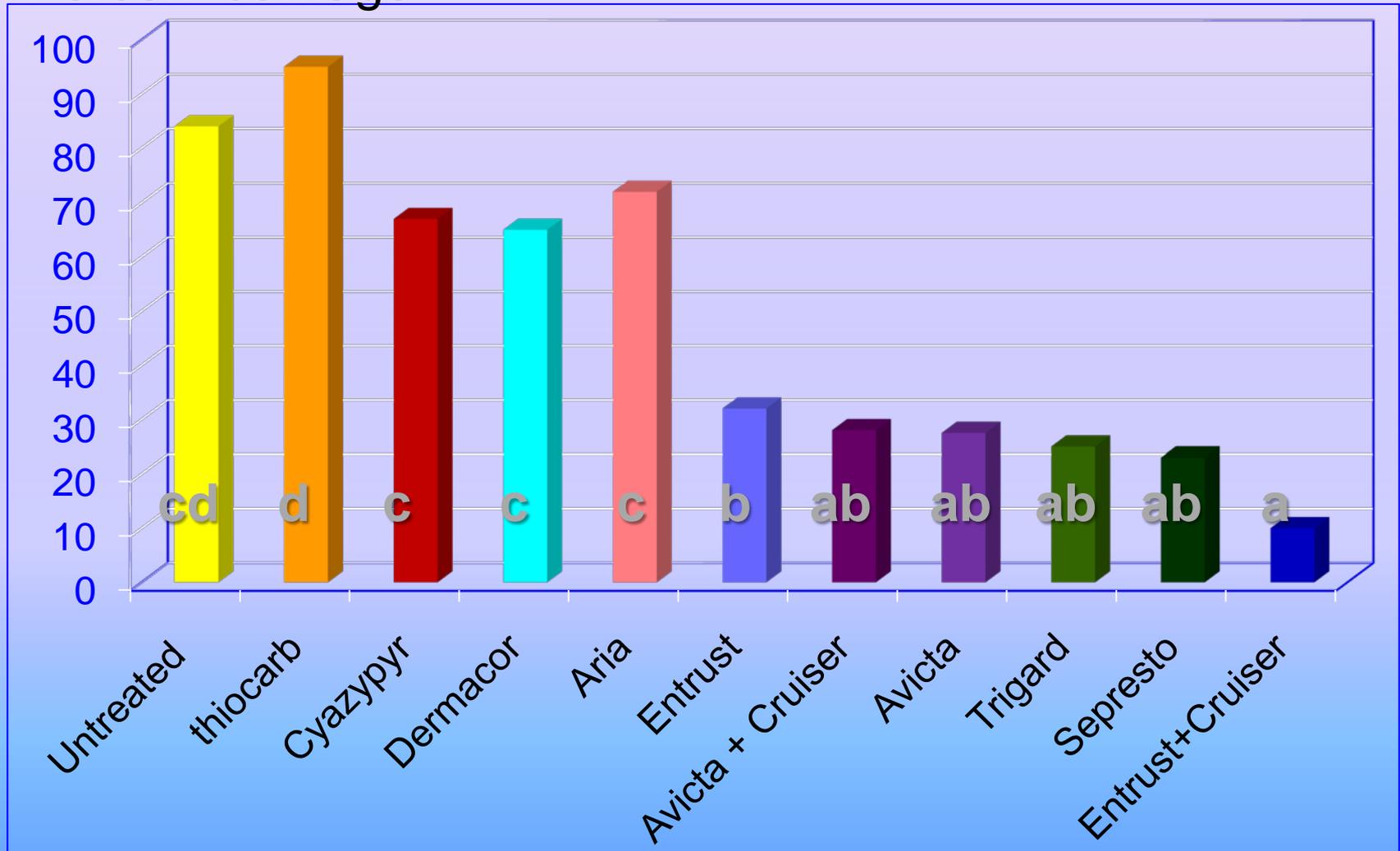
First generation maggot damage- 2010

Percent damage



Harvest assessment of cumulative maggot damage- 2010

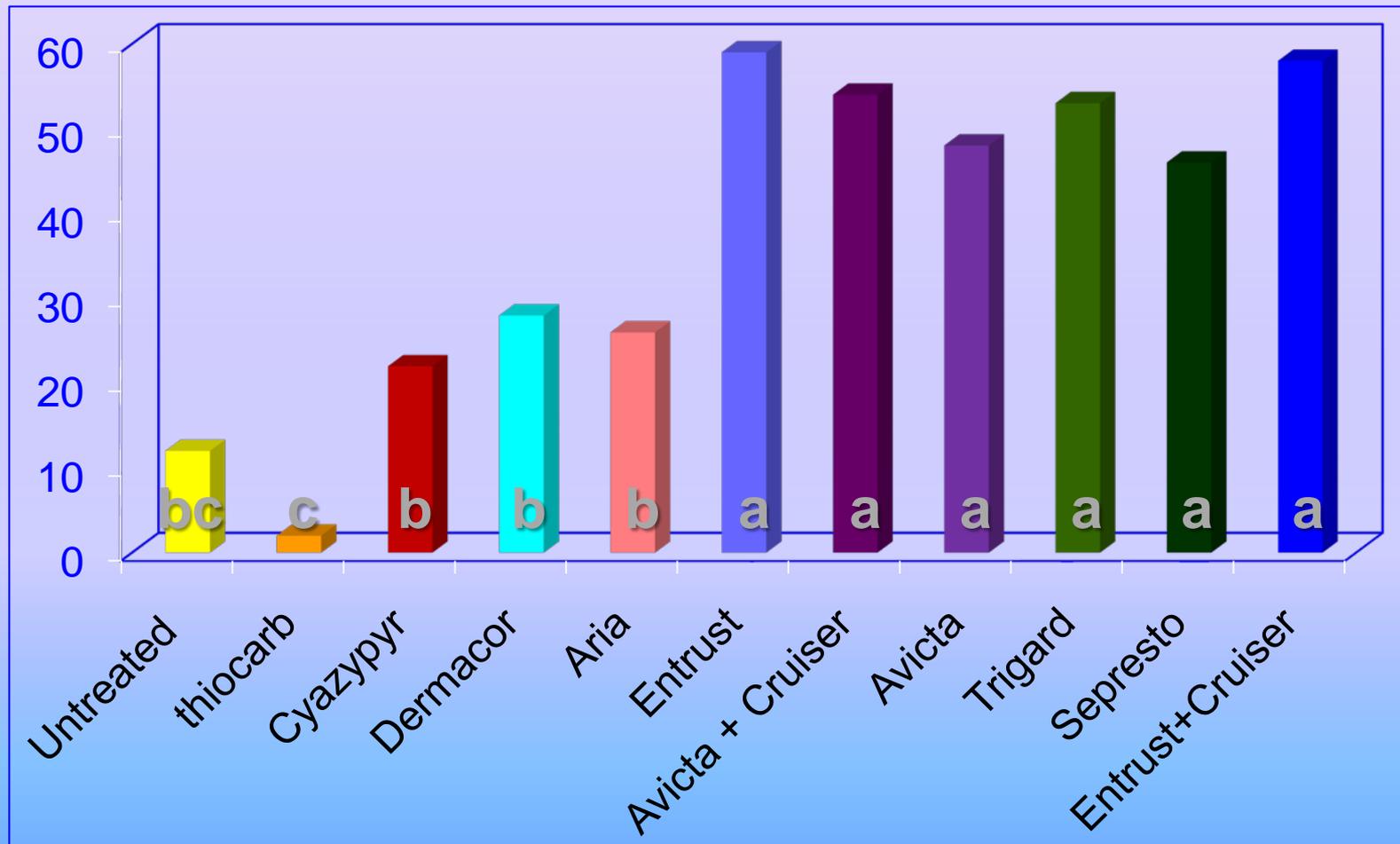
Percent damage



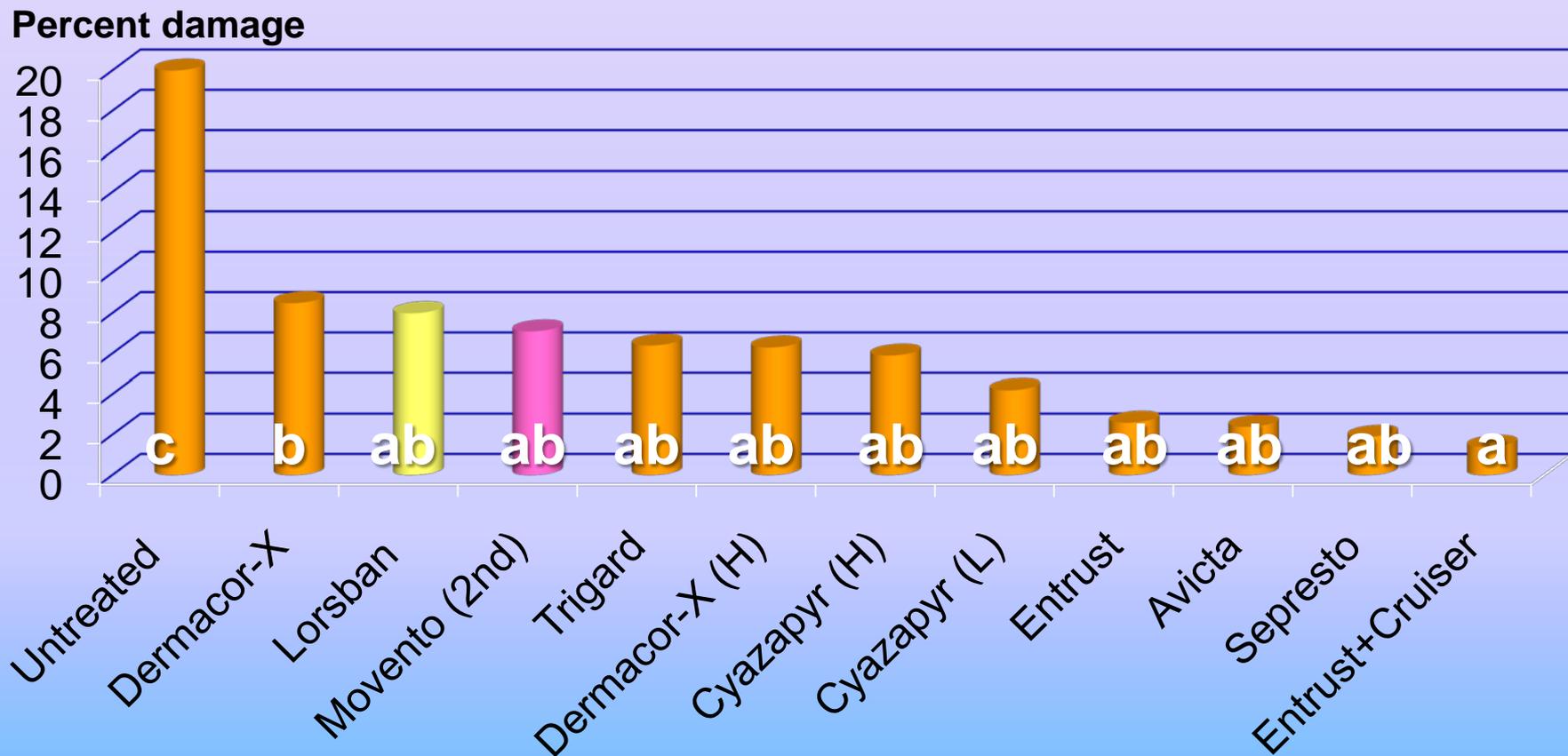
Effect of insecticide seed treatment on marketable yield - 2010

Tonnes/ha

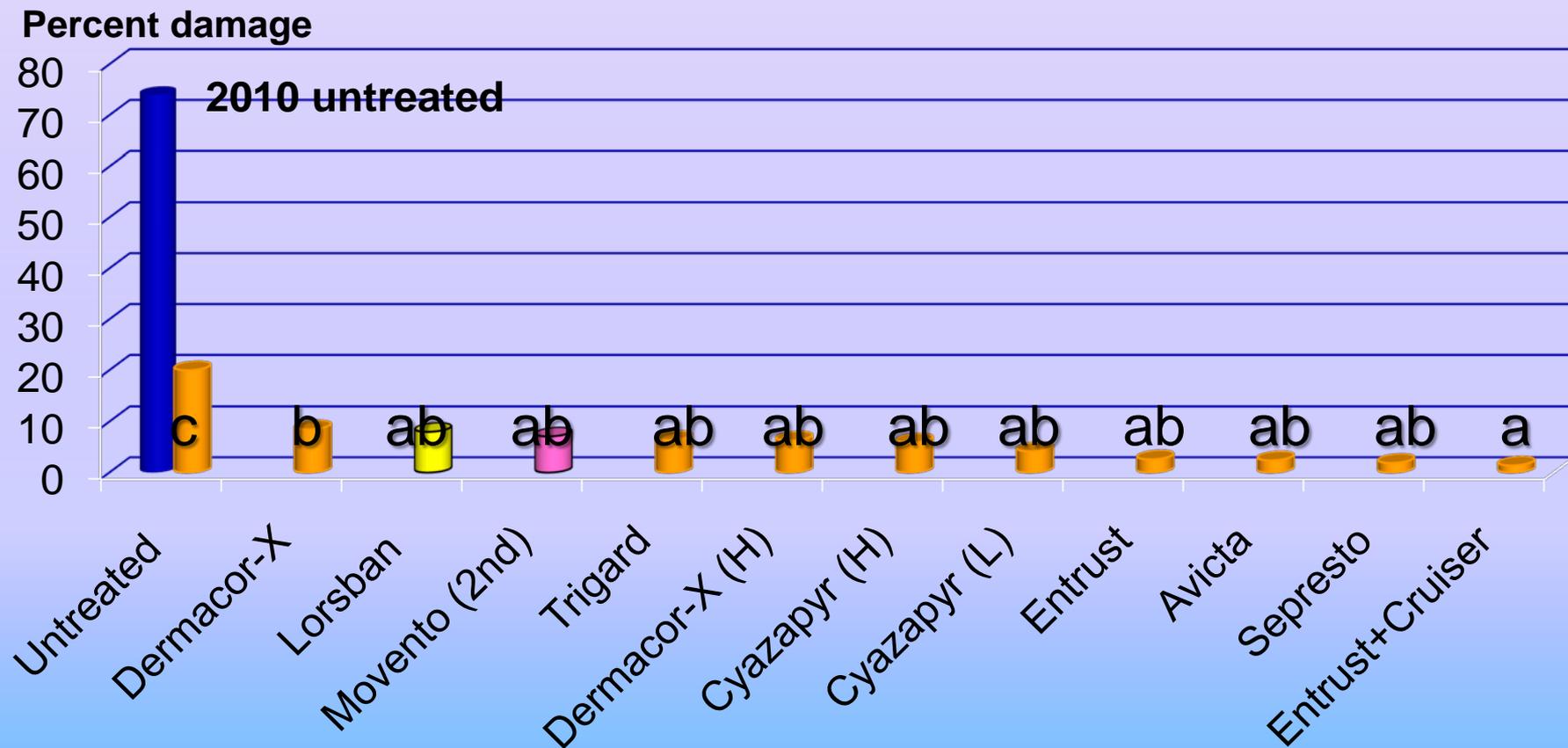
58 t/ha = 1044 bu/acre



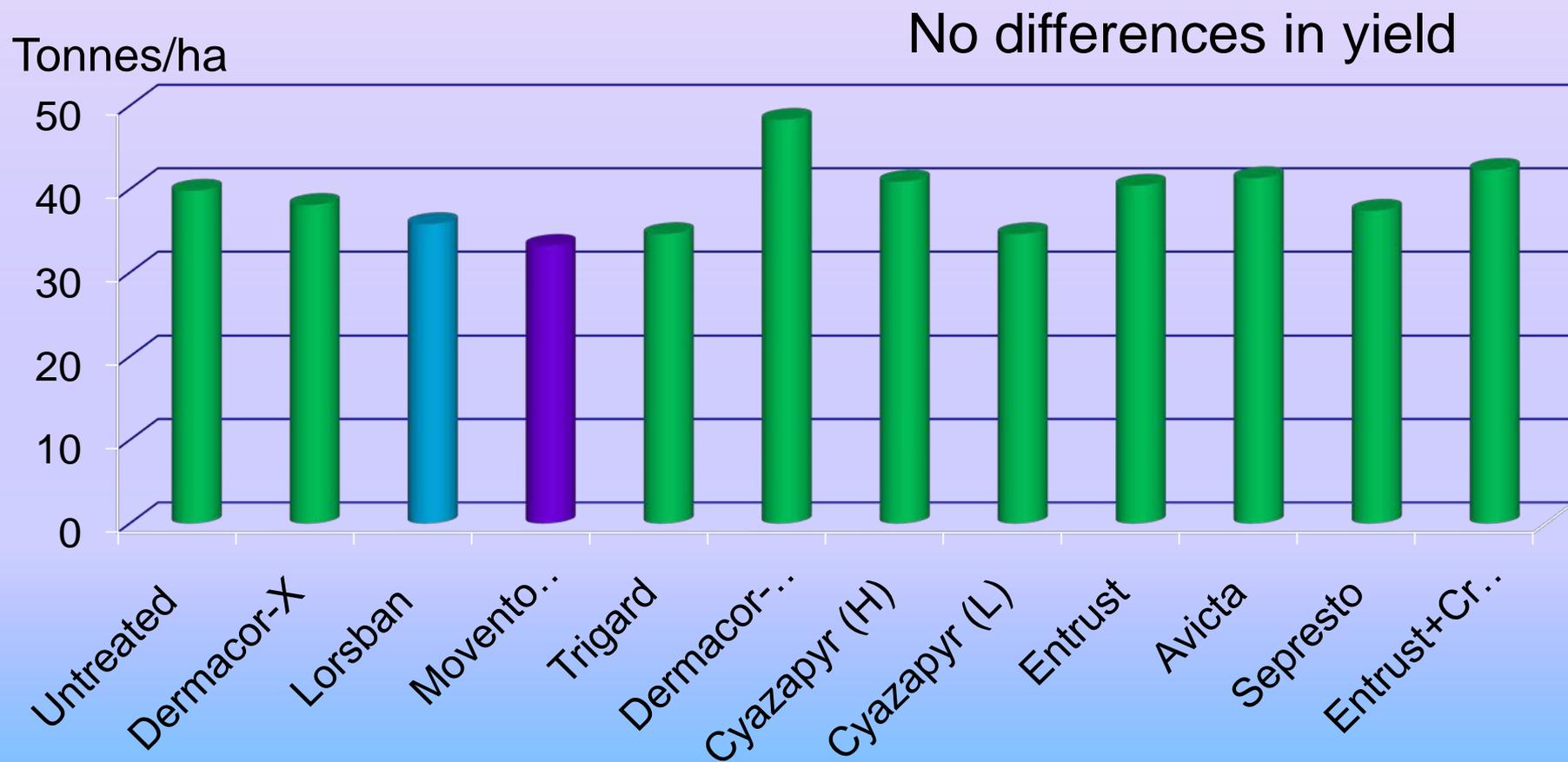
Cumulative maggot damage on onions at harvest -2011



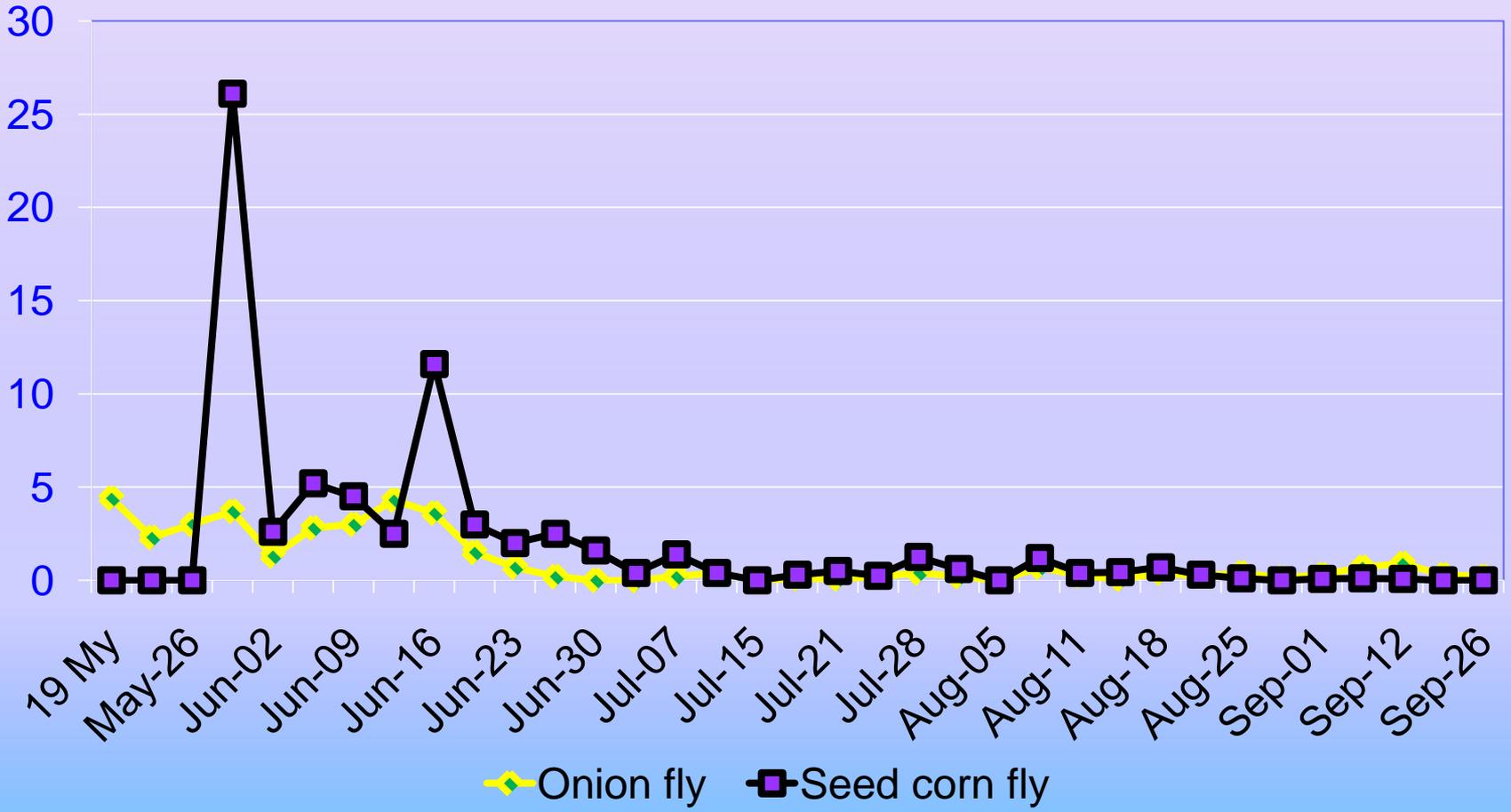
Cumulative maggot damage on onions at harvest -2011



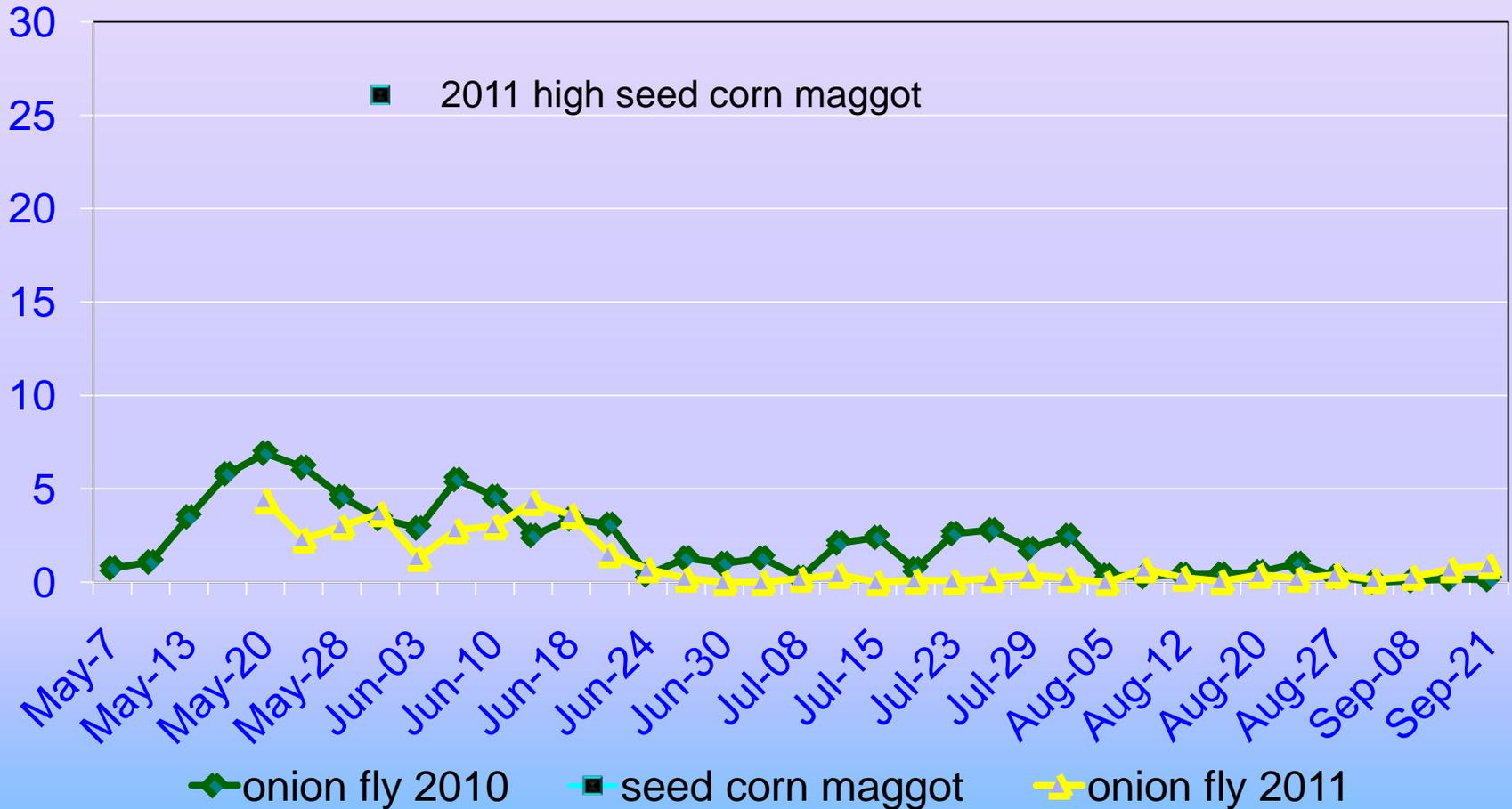
Marketable yield of onions at harvest - 2011



Populations of seed corn maggot flies and onion maggot flies caught on sticky traps-2011



Populations of onion maggot flies caught on sticky traps- 2010 and 2011



Conclusions: Maggot control

- Seed treatments can provide effective control of maggot damage
 - At least as effective as a Lorsban drench
- Entrust plus Cruiser, Sepresto, Trigard and Avicta were very effective
- Highest yields were obtained with Entrust, Entrust plus Cruiser, Avicta, Avicta plus Cruiser, Trigard and Sepresto (2010)



Conclusions: Maggot control

- Maggot damage was much lower in 2011.
- No effect on yield in 2011, probably because of low maggot pressure
- Yield was related to first generation maggot damage ($r^2 = 0.65$, $P = 0.00$) in 2010 when there was high maggot pressure:

What next? Maggot control

- Controlling maggots is essential
- Some new registered seed treatments work very well



The seed treatments
are proprietary

Sepresto is now
registered

(clothianidin and
imidicloprid

“available now only
on onion seed from
Nunhems”



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

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”

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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
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Spinach
Squash
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Sudangrass
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Sunflower
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Switchgrass
Tomato
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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.

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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.

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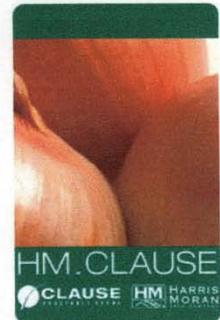
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What next? Maggot control

- New products for n furrow application
 - Capture (biflenthrin)
 - Force (tefluthrin)Singly and with seed treatments

- Continue work on
 - Avicta
 - Moven to foliar sprays

- Compare to standard treatments:
Sepresto, FarMore F1500, Trigard,
Entrust, Lorsban drench



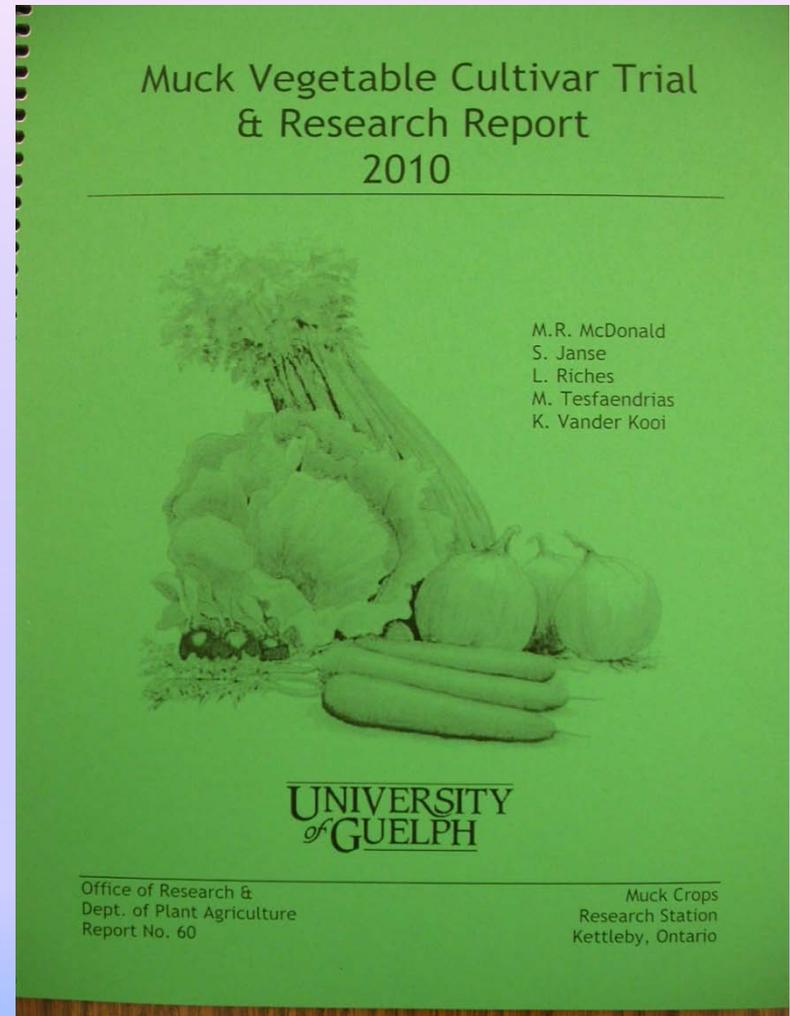
All research trials are summarized in the Annual Report

Download at the Muck Station web site:

www.uoguelph.ca/muckcrop

The 2011 data will be available in March 2012

Includes work on onion thrips and *Allium* white rot



An aerial photograph of a field with rows of young green plants, likely garlic or onions, 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 field.

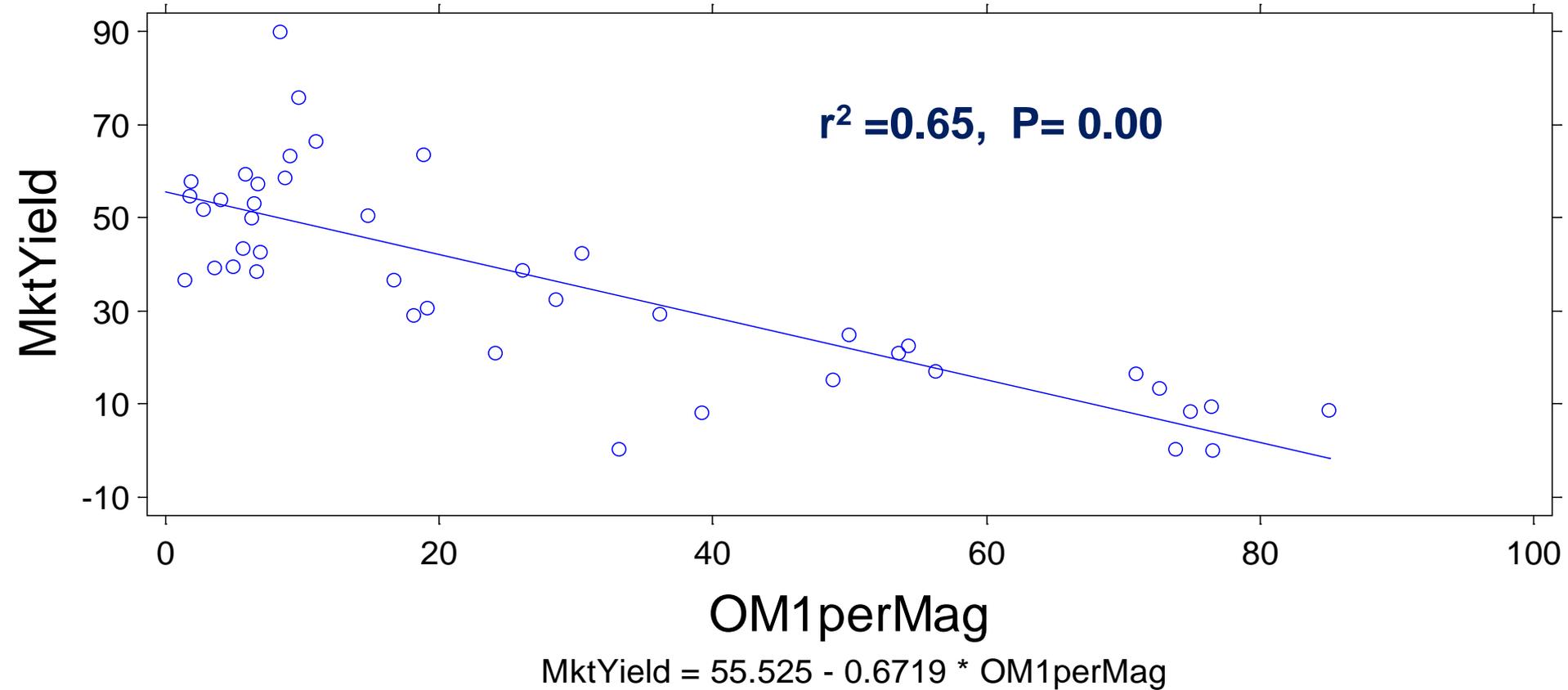
Acknowledgements

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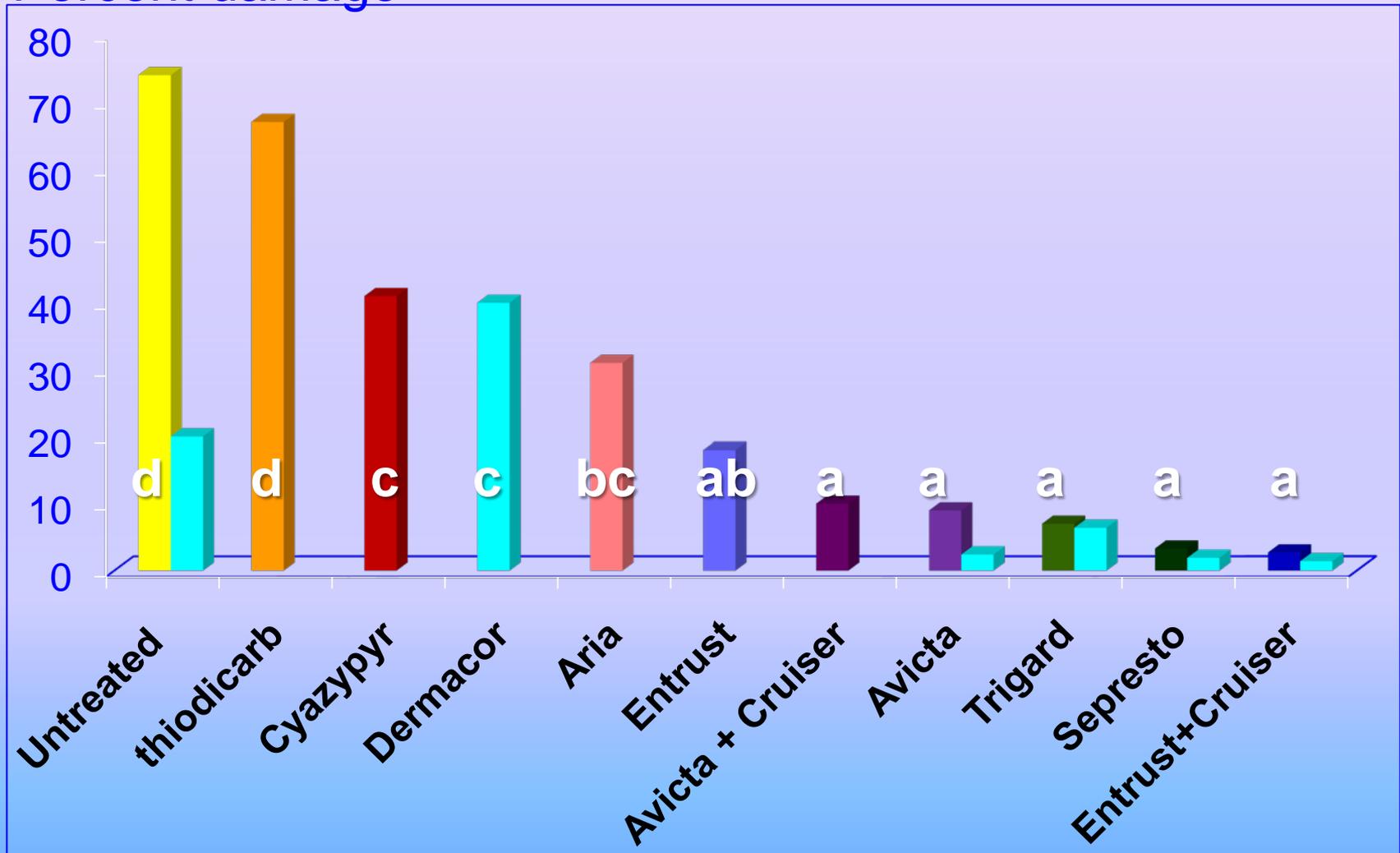
Questions?

Relationship between first generation maggot damage and yield- 2010



First generation maggot damage- 2010 and 2011

Percent damage



Seed corn maggot fly (*Delia platura*)



- Overwinter as pupae in the soil
- Adults emerge in spring- March to May depending on location
- Females deposit eggs on or near seeds and rotting vegetation (ave. 270 eggs/female)
- Eggs hatch (7-9 days) and larvae feed on the seeds and seedlings
- Damage highest in cool years (active at temp of 40 °F and above) and in soils with high organic matter
- 3-5 generations a year in most of U.S.
- The first generation is most damaging to onion seedlings



Insecticide seed treatments for onion maggot control - 2008

<u>Product</u>	<u>Rate</u>	<u>Ist gen damage(%)</u>	<u>Yield (t/ha)</u>
Sepresto	0.147	5.0 a	41.2 a
Entrust	0.2	13.0 ab	43.7 a
Sepresto	0.1	14.3 ab	42.0 a
Entrust	0.15	18.0 ab	48.3 a
Entrust	0.1	22.2 b	30.0 a
<u>Check</u>		70.0 c	13.1 b

Rate is mg ai/seed

48.3 tonnes/ha = 860 bu/acre



Treatment	Active ingredient	Rate
Aria		
Avicta 400		
Avicta+ Cruiser		
Cyazapyr		
Dermacor-X		
Entrust		
Entrust +Cruiser		
Exp-3		
Sepresto		
Trigard		
Untreated		

Evaluation of Poncho for onion maggot control - 2006



Treatments¹	Rate (mg ai/100 g seed)	First gen damage (%)	Yield (t/ha)
Poncho +Thiram +Raxil	188 +250 + 4880	1.3 a²	34.2 ns³
Thiram	188	58.0 b	25.2

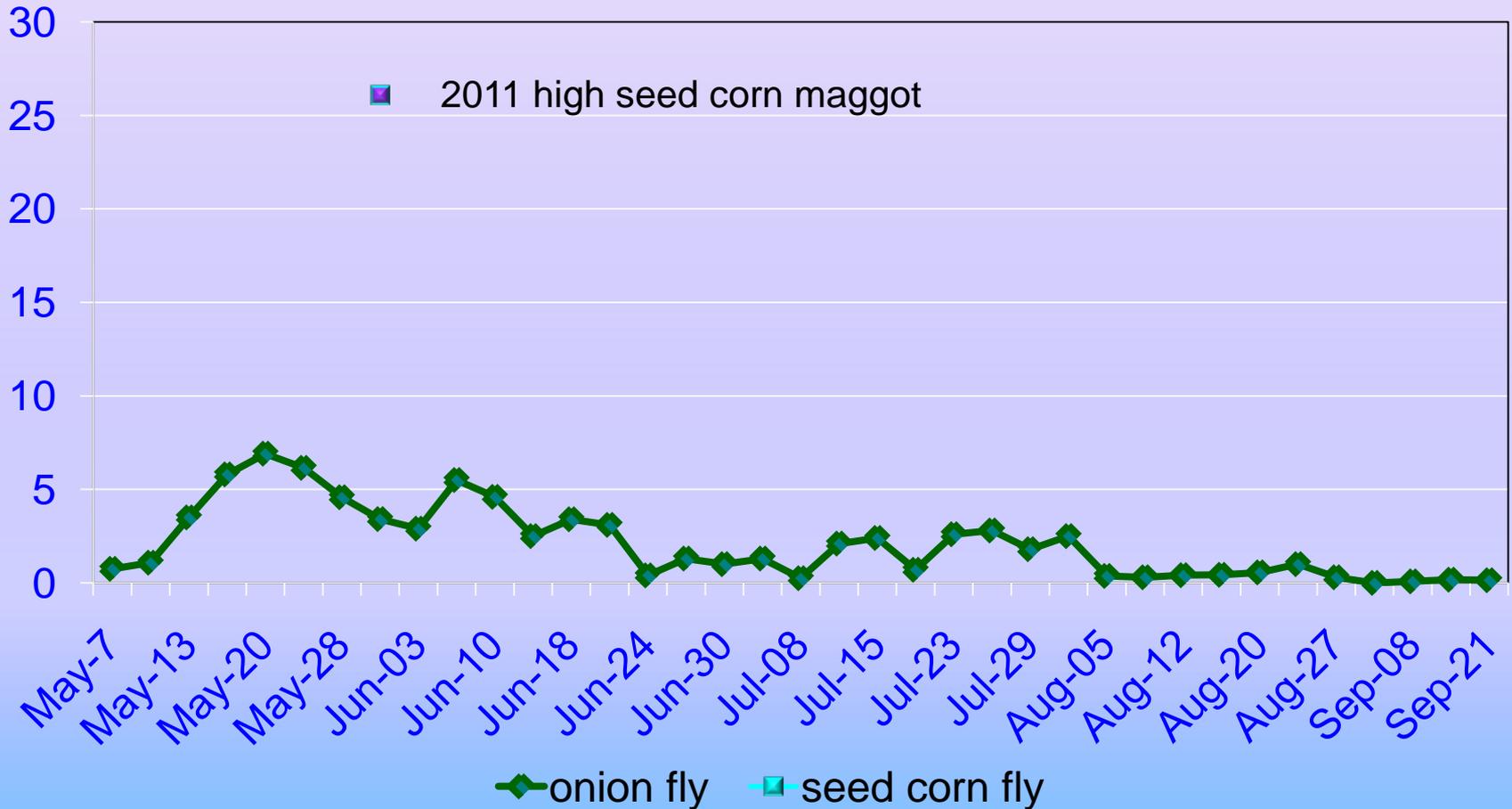
Poncho= clothianidin, Raxil = tebuconazole

Tonnes/ha x 17.8 = bushels per acre 34.2 t/ha = 609

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		

Populations of onion maggot flies caught on sticky traps- 2010





Onion fly females locate onion sites through onion volatiles such as diallyl disulfide (Dindonis and Miller 1980) and visual cues

They are attracted to rotting onions because larvae can enter and feed more easily on rotting bulbs.

Larvae may only be able to feed on damaged or rotten bulbs after the seedling stage (Finch et al. 1986)

**Field plots for onion maggot trials, Muck Crops
Research Station**

Onion maggot fly

(*Delia antiqua* Meigen)

- Major insect pest of onion
- 3 generations per year in Ontario

