Promoting biodiversity in Canola Cropping Systems

The Canadian Prairies Experience

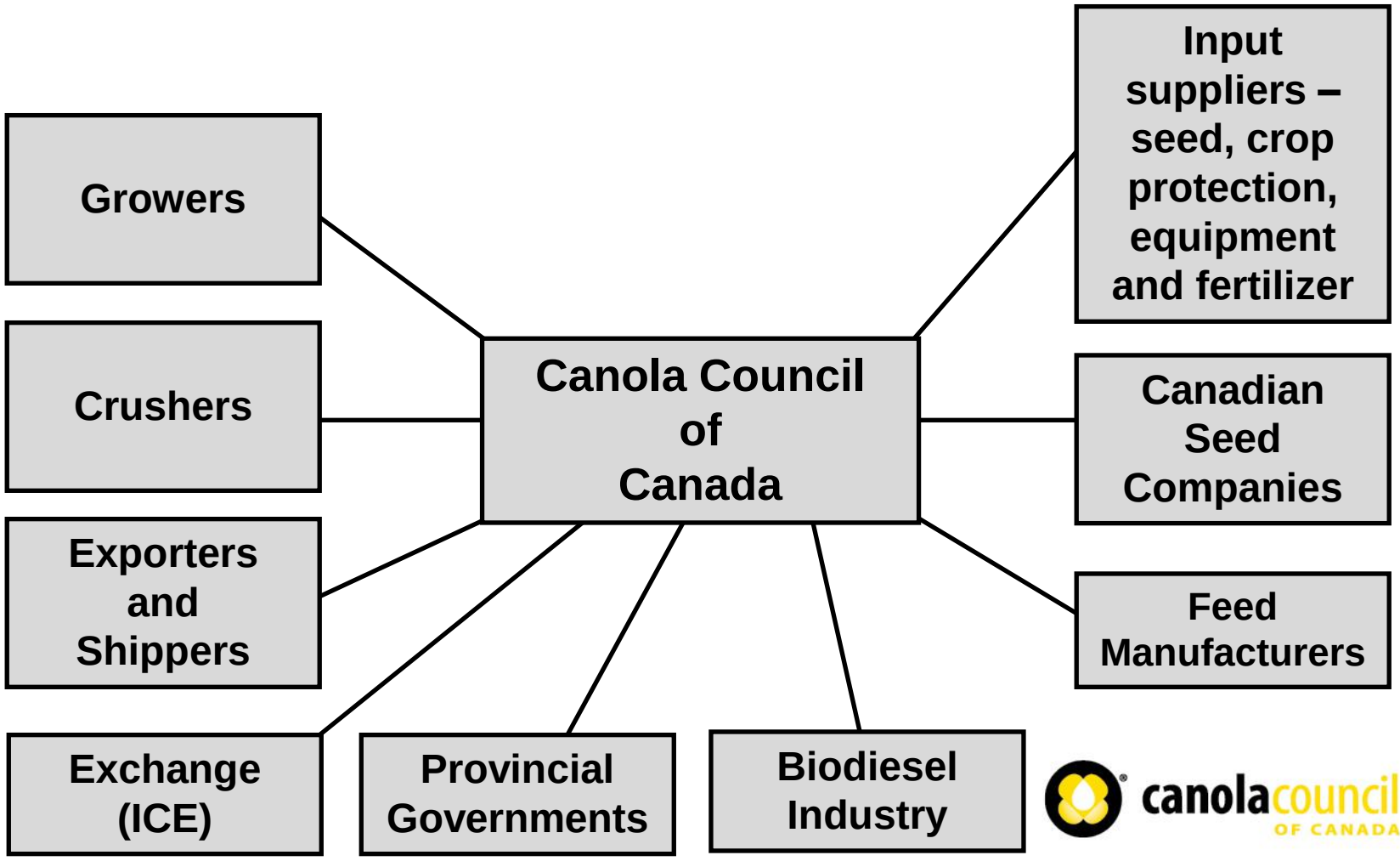
GCIRC Technical Meeting Nyon, Switzerland

April 30, 2013

Gregory Sekulic, Agronomy Specialist - Peace

Canola Council of Canada

Canola Council of Canada Members



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Key Messages

- Canola Cropping Frequency in Canada is predominantly 1-in-2
- The 1-in-2 Rotation is the most profitable
- Canola Disease is manageable
- Ongoing research to quantify species diversity
- Increasing Producer awareness of the Value of Beneficial insects

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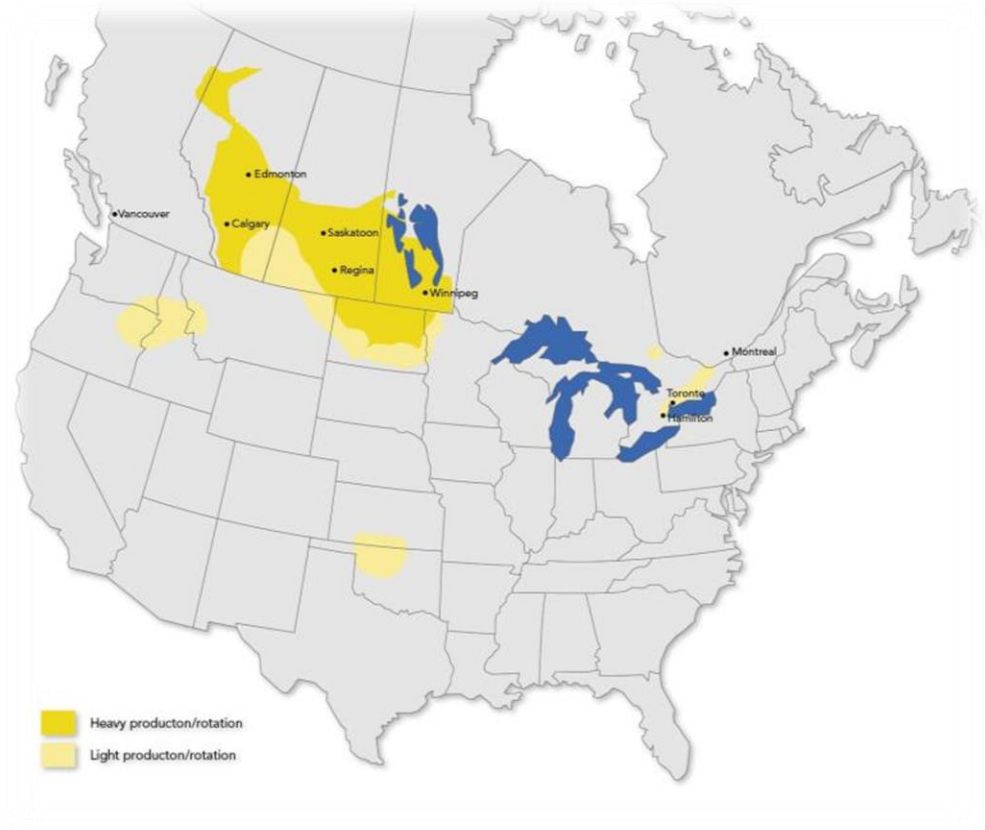
Canola Growing Regions



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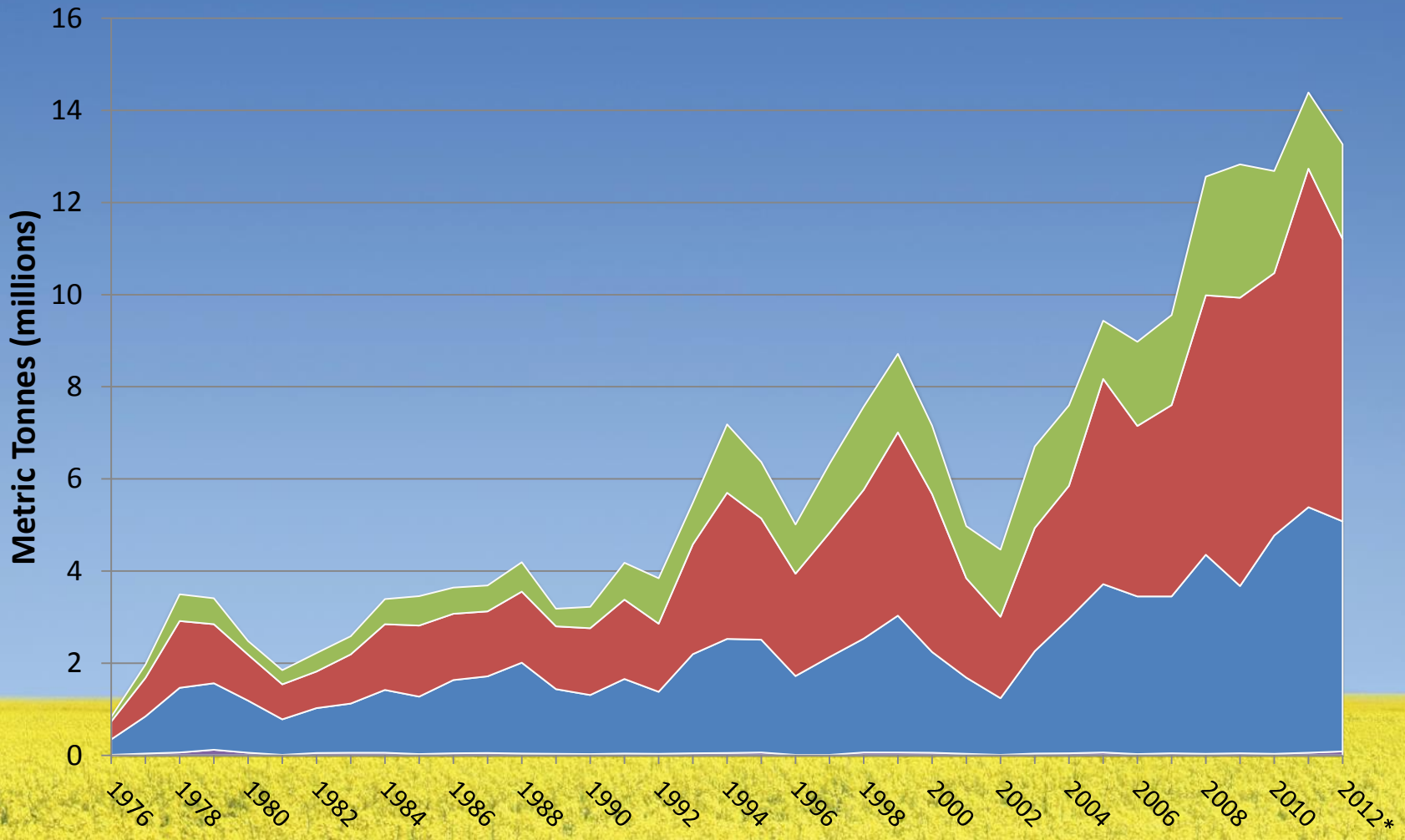
Total Canola Production – Provincial

Source: Statistics Canada, Field Crop Reporting Series



** Preliminary estimate*

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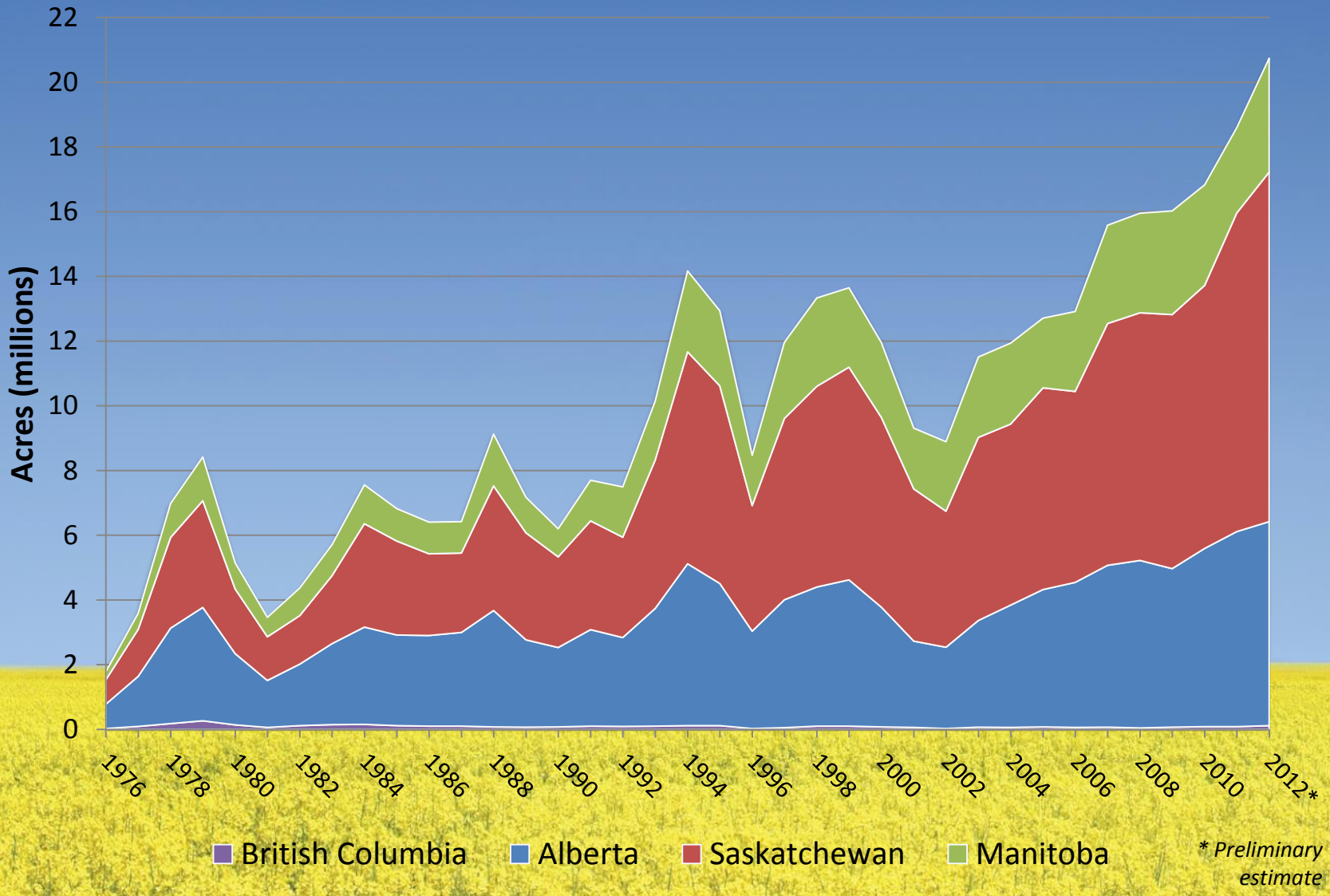
Harvested Acres – Provincial

Source: Statistics Canada, Field Crop Reporting Series



** Preliminary estimate*

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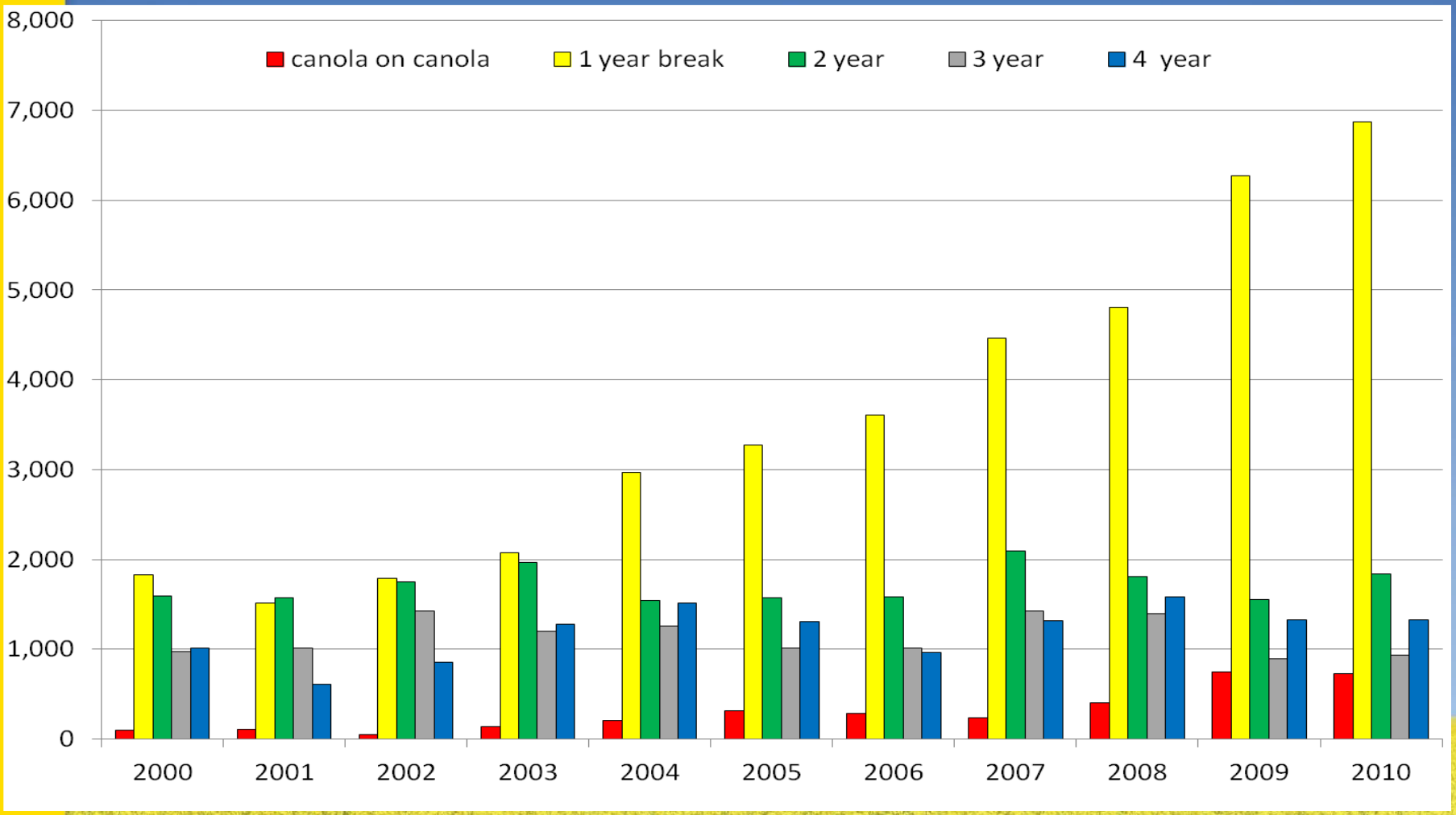
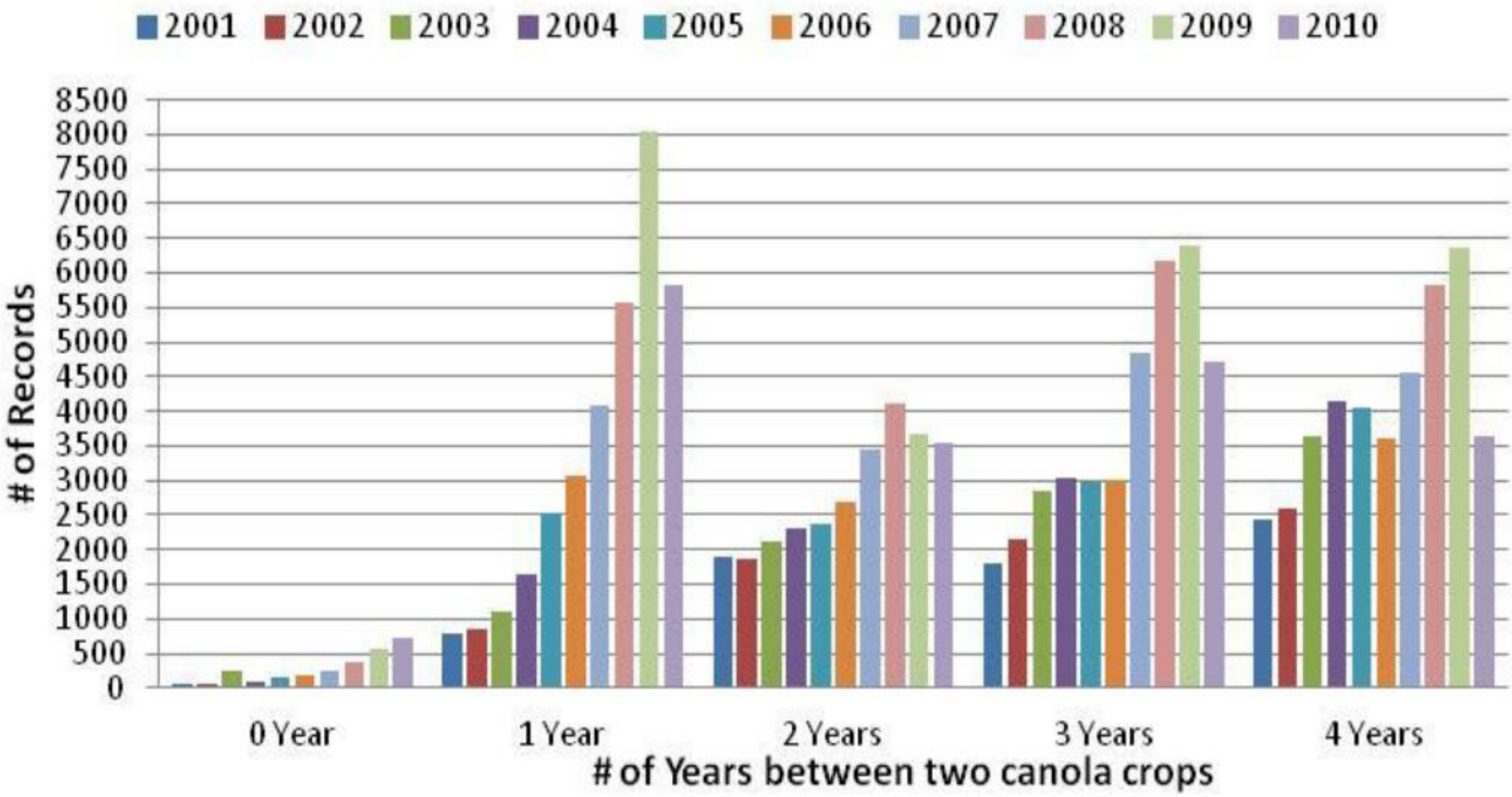
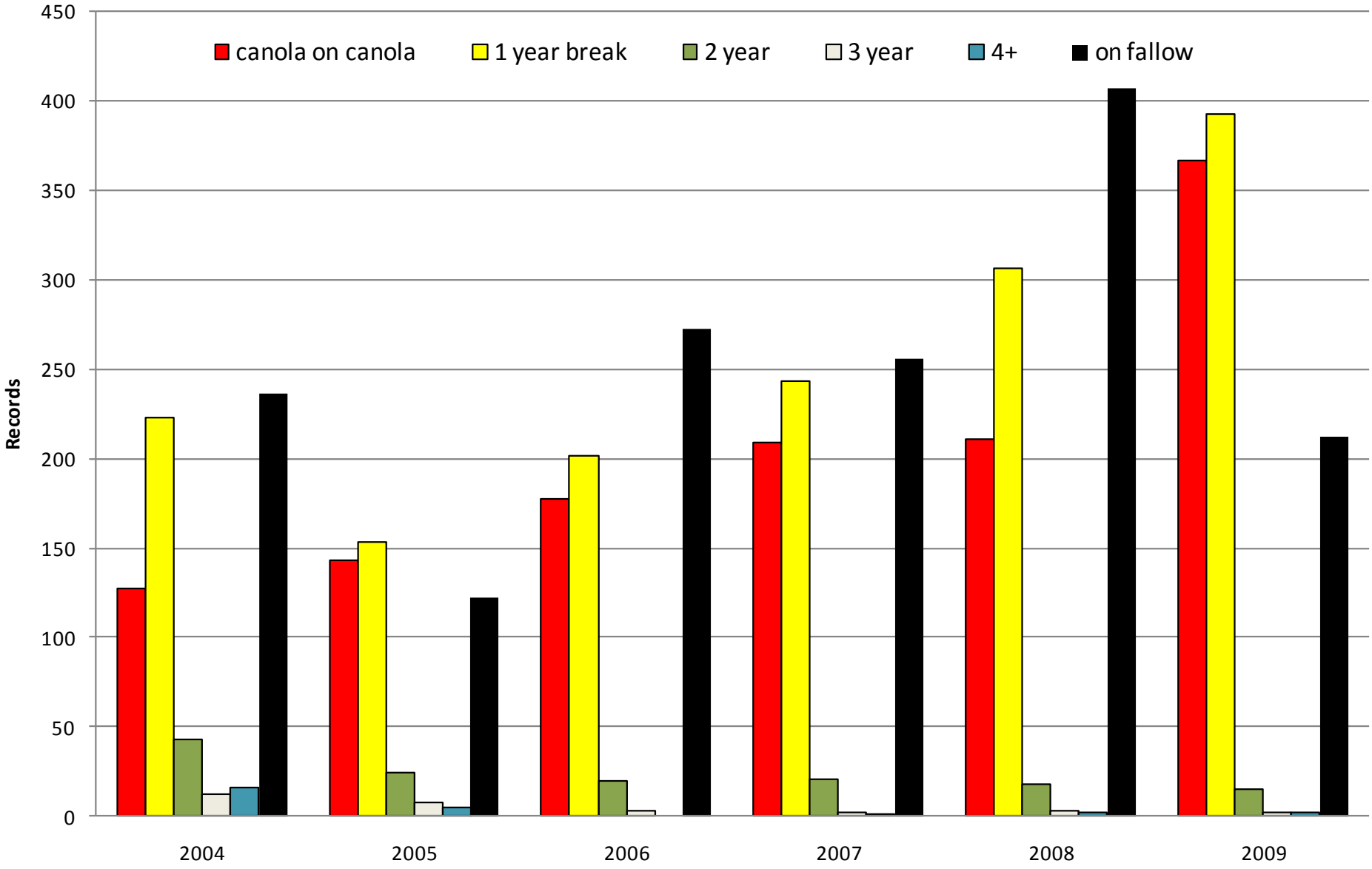


Data courtesy of Anastasia Kubinec, MAFRI, compiled

Canola Cropping Frequency by Rotation Break (Black Soil Zone)



Canola Cropping Frequency in Peace Region
Based on AFSC data



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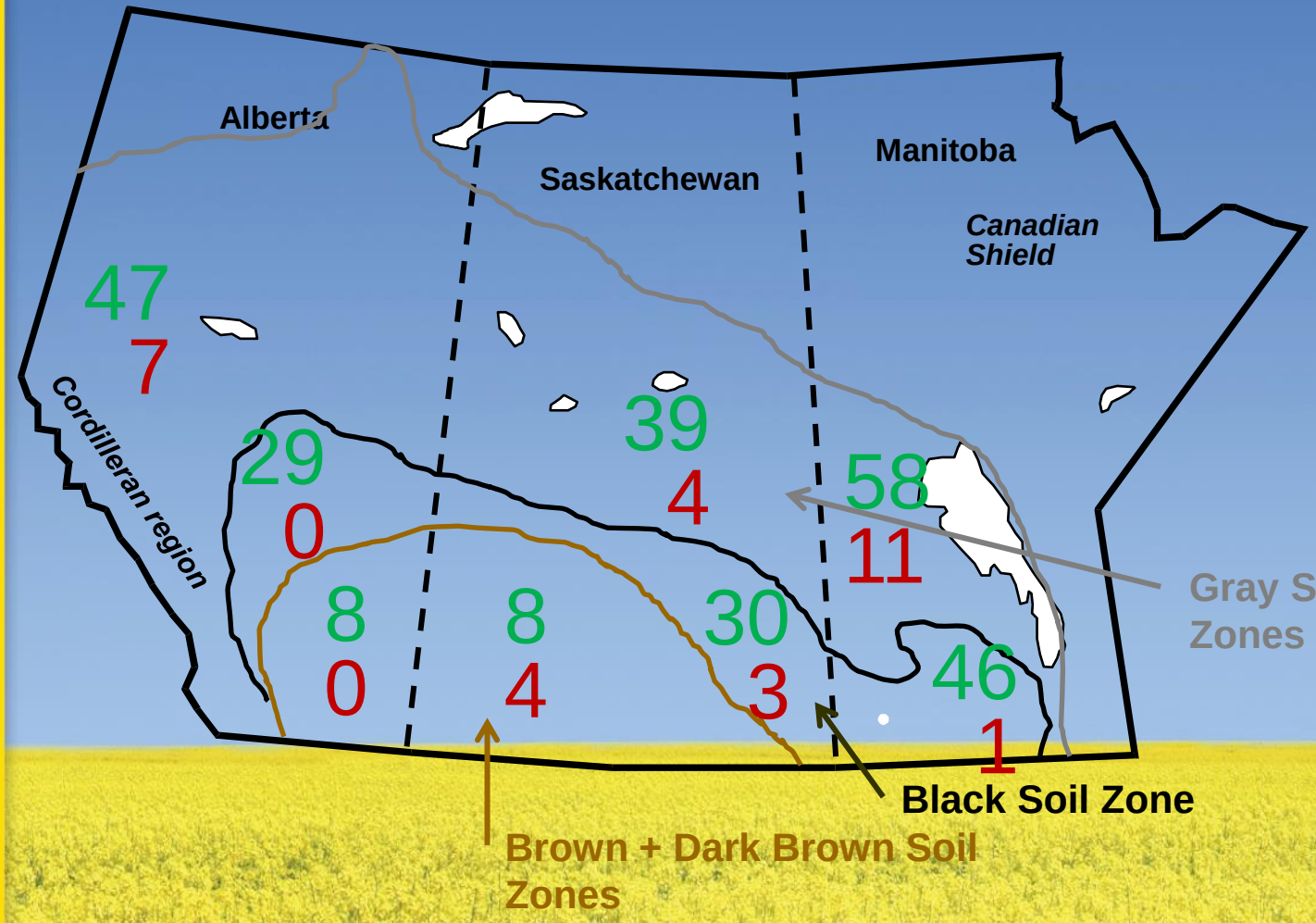
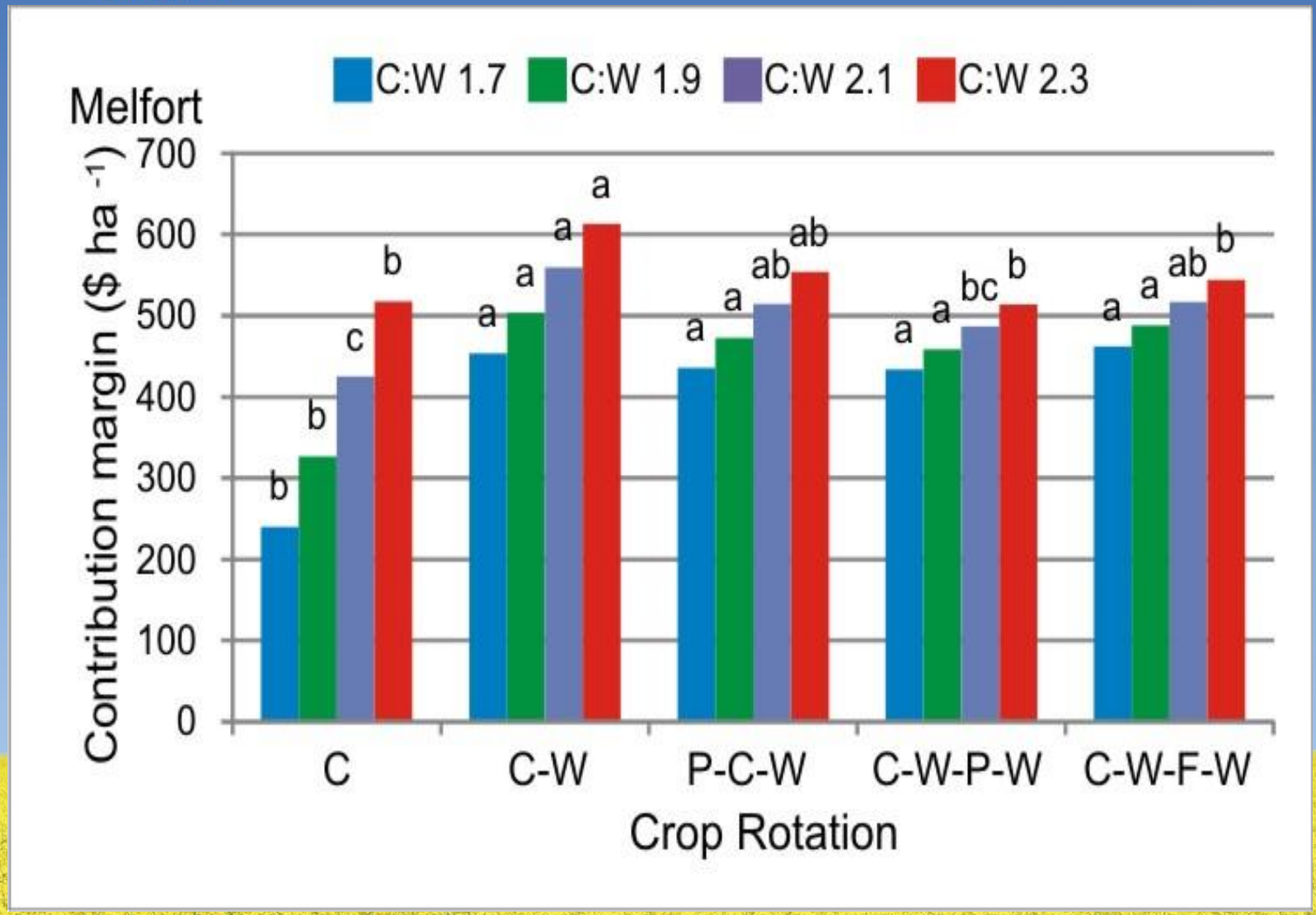
Canola on Same Field in 2009 or 2010

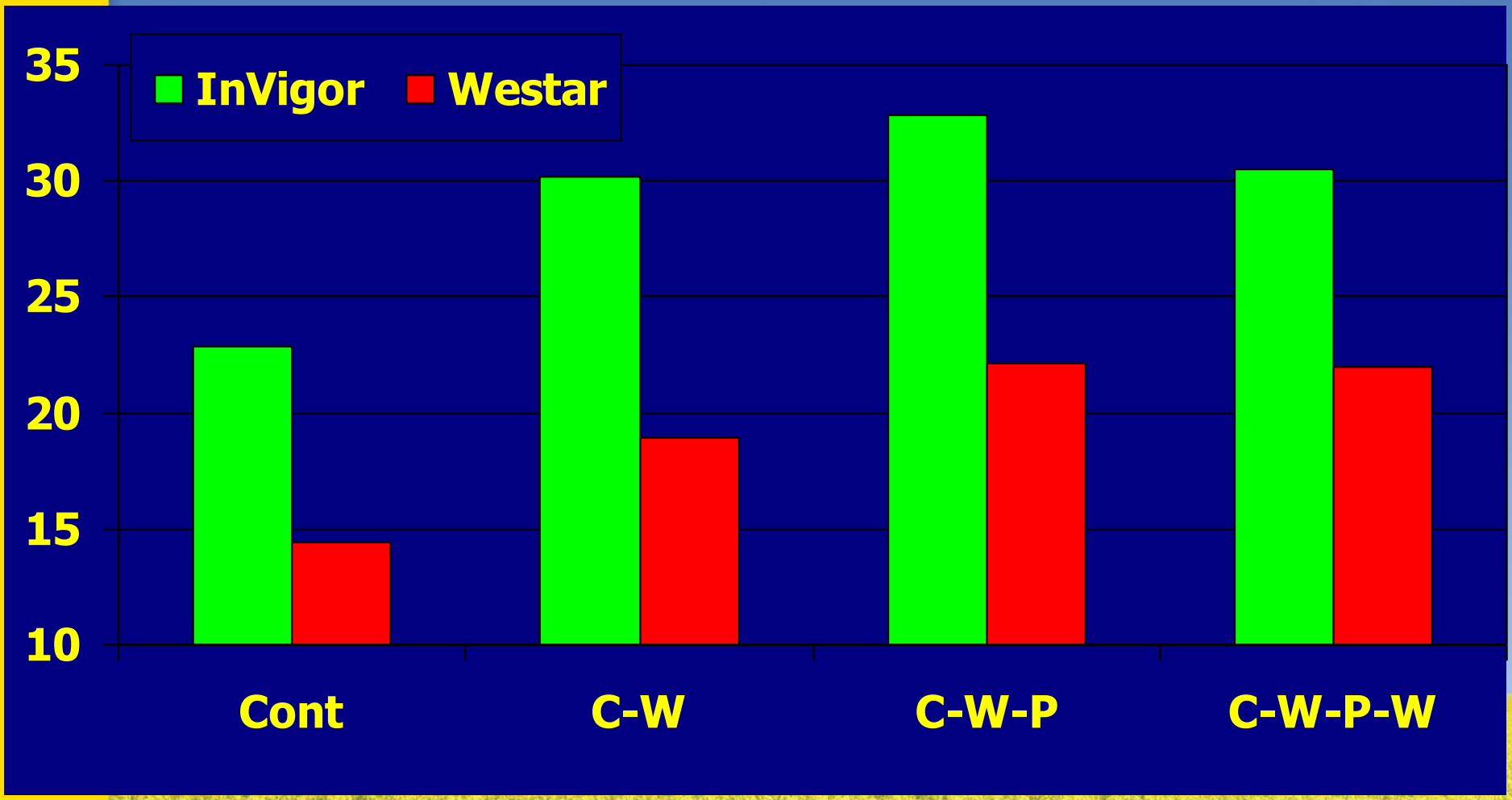




Slide courtesy of Elwin Smith, Economic analysis of Kutcher et all, 2008.

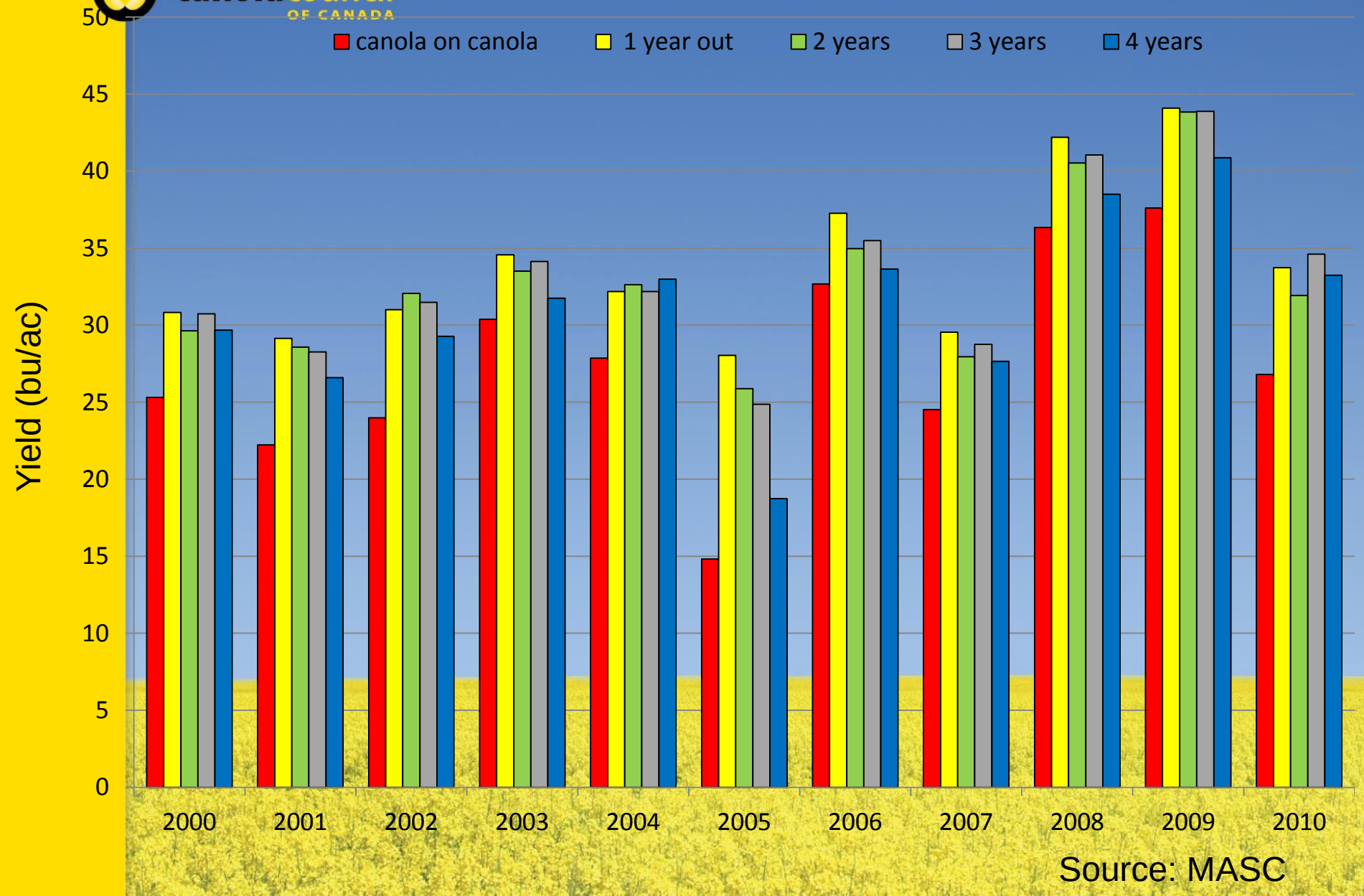
Influence of rotation length on canola yield (bu/ac) at Scott and Melfort,

[15 location year mean 2000-2007]

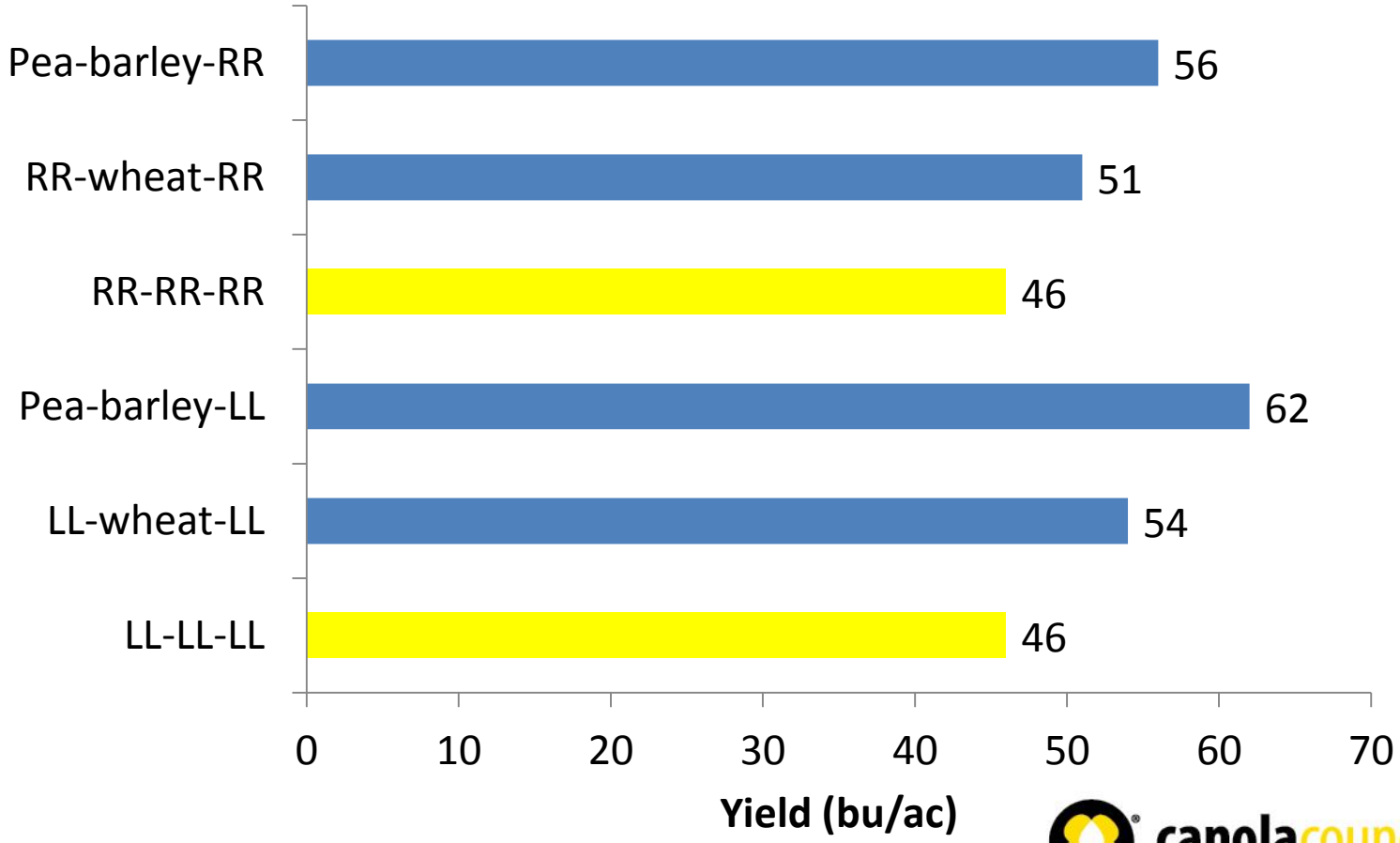


Kutcher et all, 2008 Pest implications of Intensive canola rotations

Canola Yield by Rotation Break in Manitoba



Canola Yield
- Means of 5 sites



Test 85, LSD (0.05) = 8

Dosdall et al. 2012. J. Econ. Entomol. 105:1261-1267

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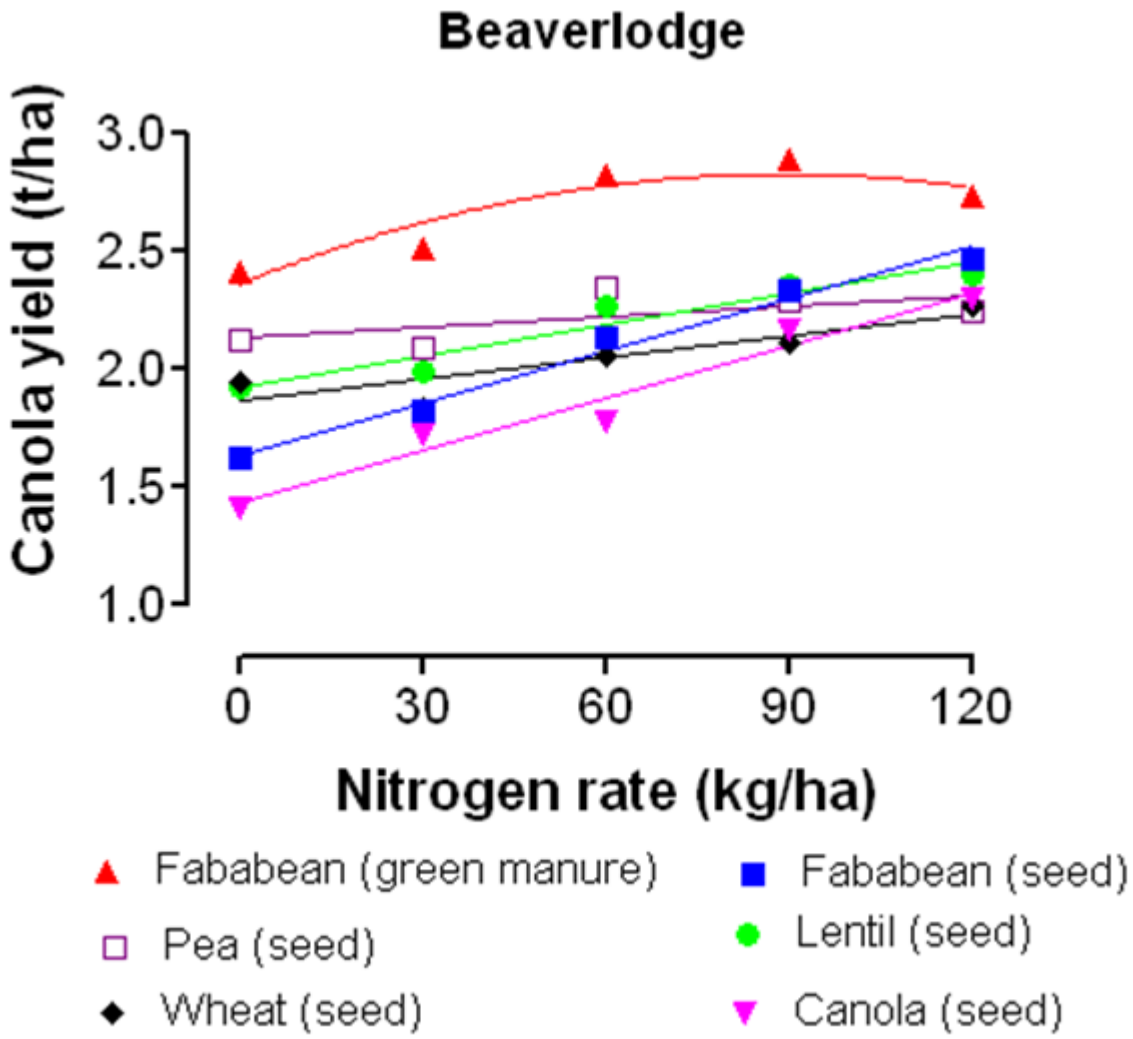

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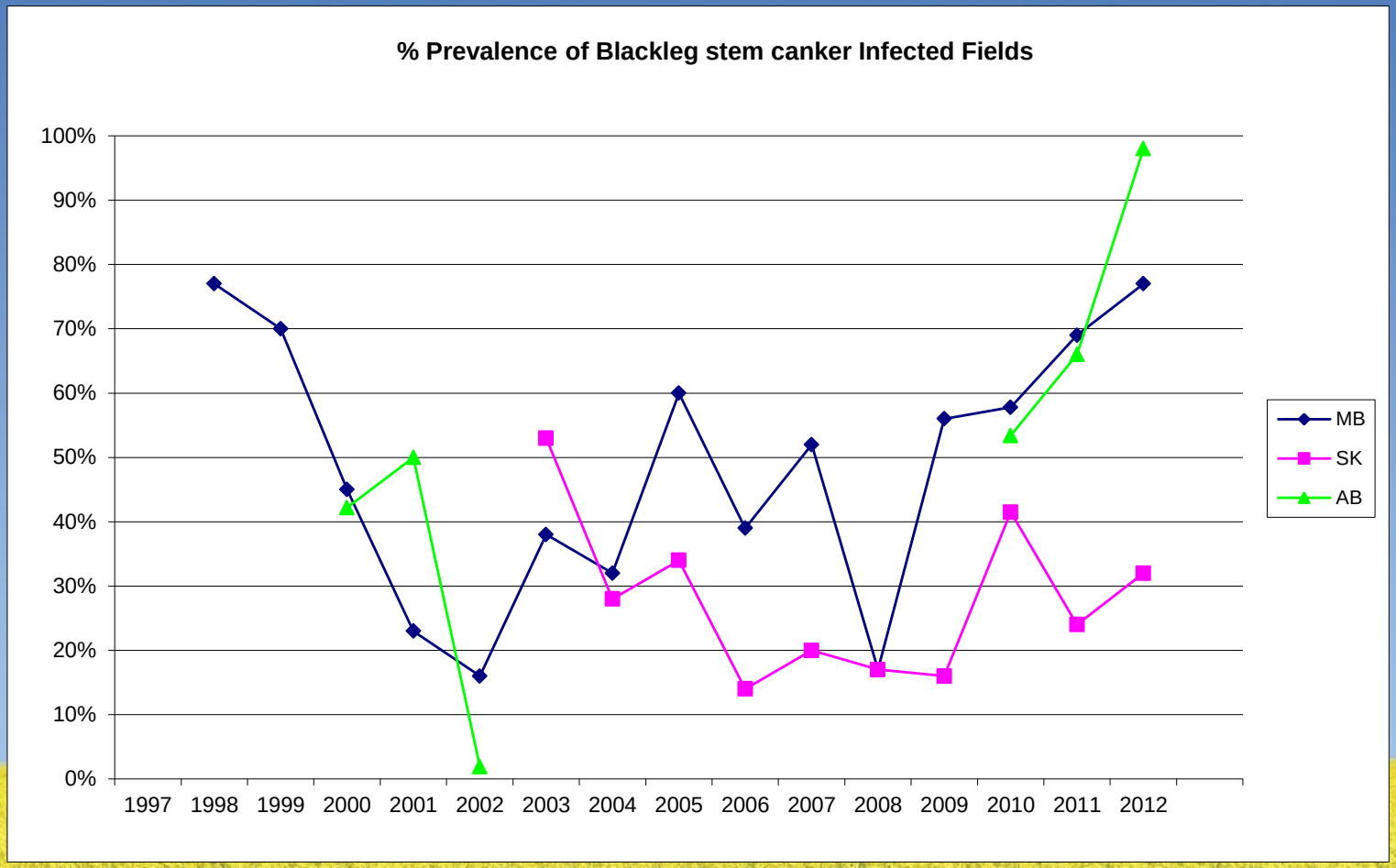
How do we promote Biodiversity in a cropping system with 2 components?

Blackleg - Situation



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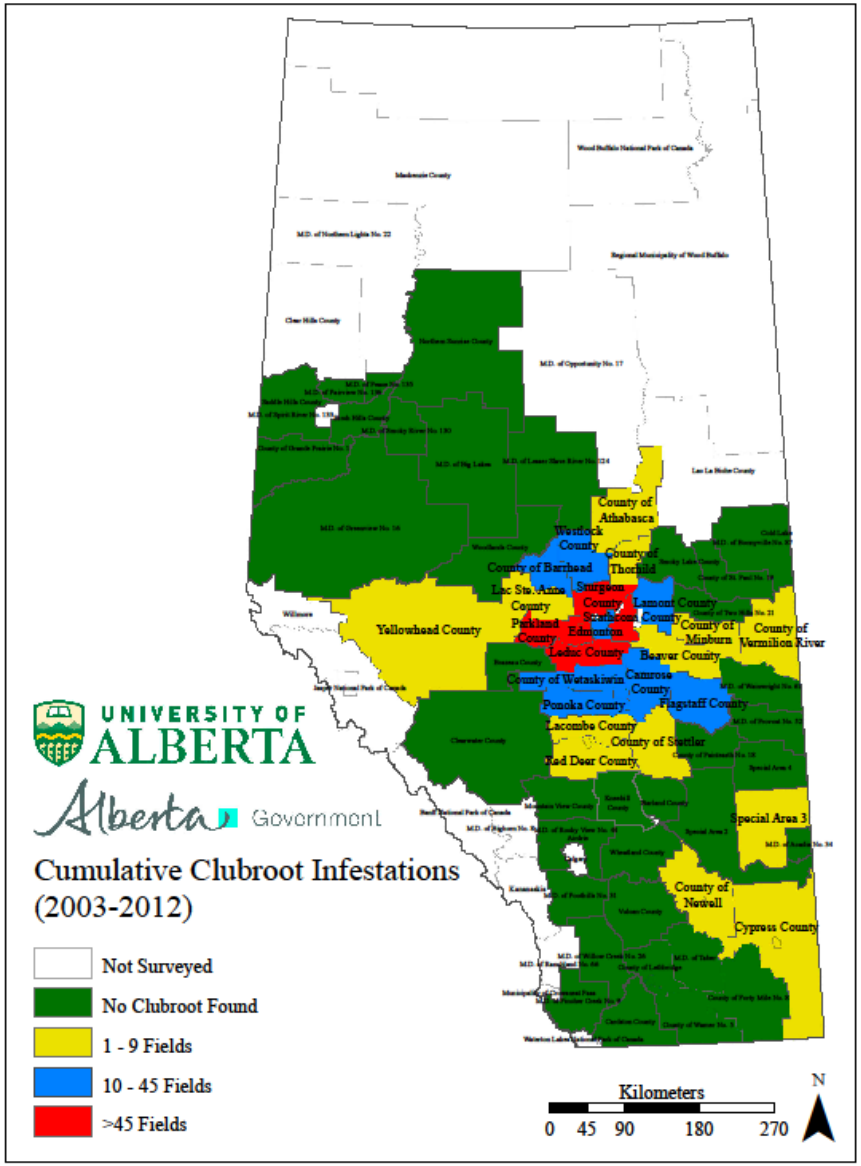
Clubroot - Situation

2012

> 1000 fields

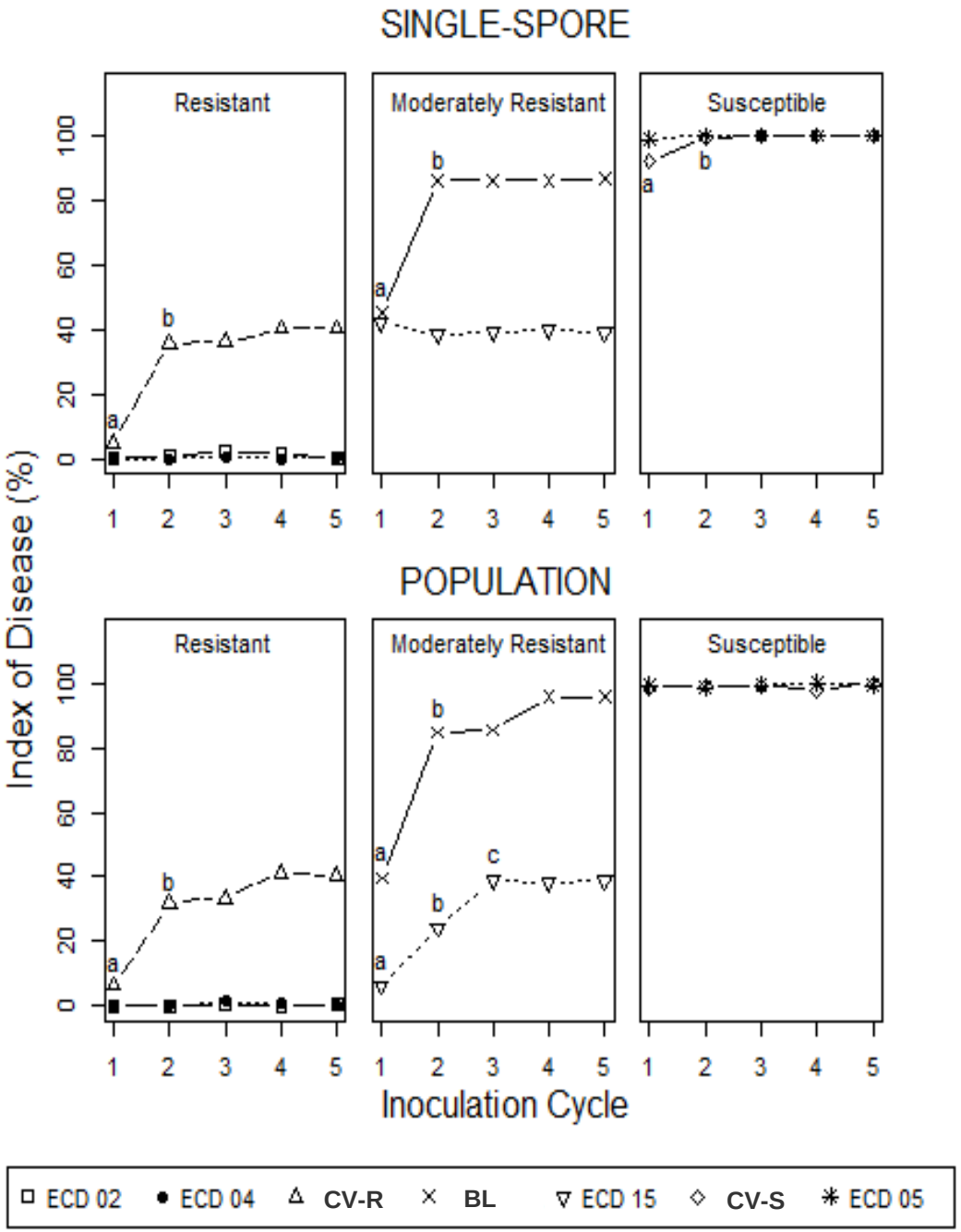
26 counties



Pathogen Cycling

Repeated cropping of a resistance source can erode the effectiveness of that resistance

Resistance <u>stewardship</u> is important!



LeBoldus et al. 2012

Arthropod Biodiversity

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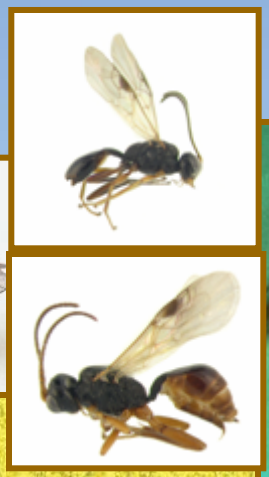
Diversity of natural enemies in the Prairies is very high!

- Over 200 species of ground beetles
- Over 300 species of spiders
- Staphylinids (rove beetles) more numerous
- Parasitoid wasps expected to have the most diversity of any group but many are still unknown



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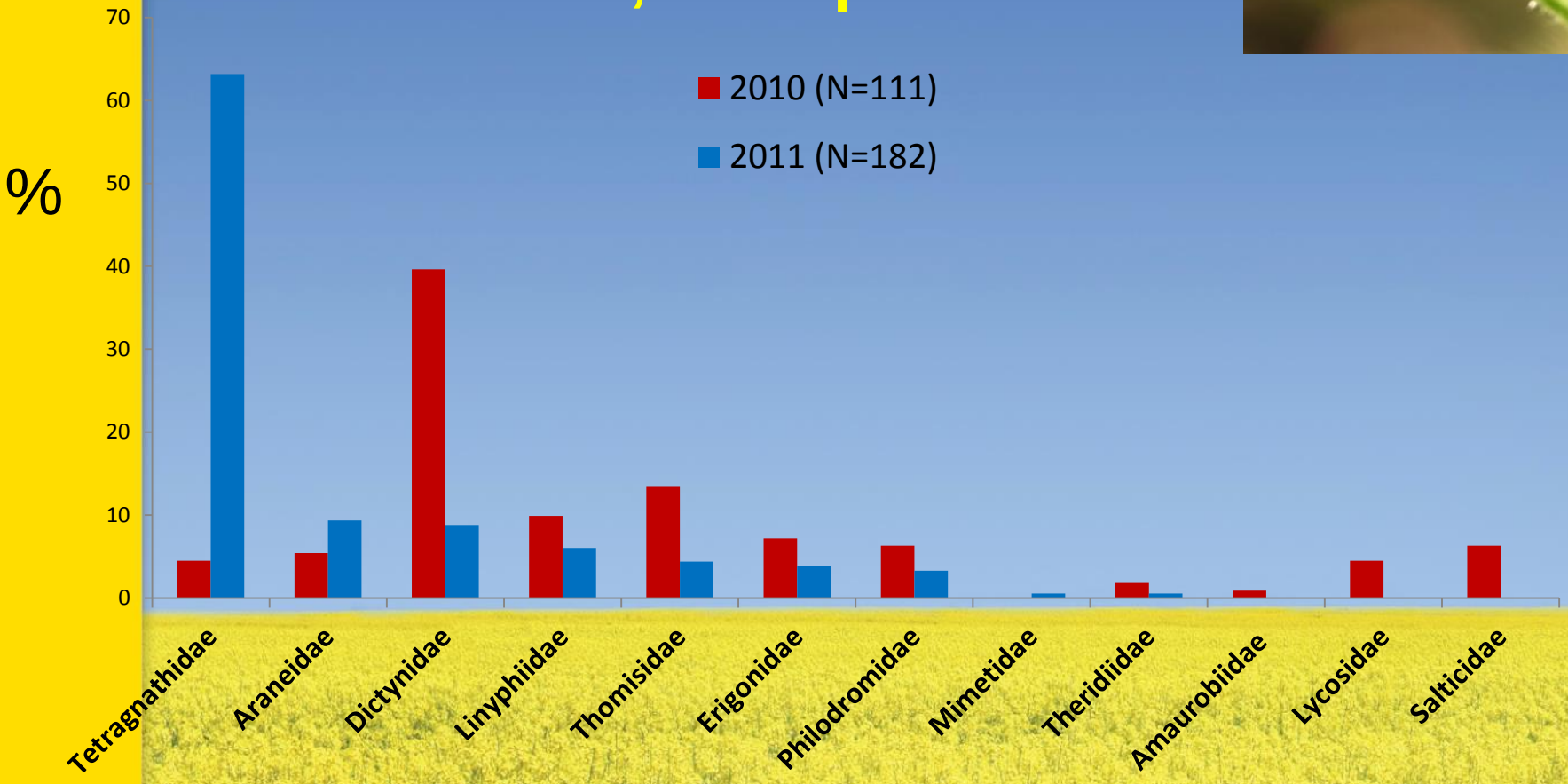
Spiders of canola foliage:

12 families, ~30 species



Source: Hector Carcamo, AAFC

Pitfall samples ~10X larger, to be identified!

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Carabid beetles (ground beetles) are the most biodiverse group of arthropods in canola cropping systems in western Canada.

-Lloyd Dosdall

***Amara* sp.**

In two multi-year studies at four sites in Alberta, Canada, at least 50 species of carabids were collected in a single hectare of canola.

Genus *Amara*

Amara aeneopolita
**Amara apricaria*
Amara aurata
Amara avida
**Amara carinata*
Amara coelebs
Amara confusa
Amara convexa
Amara cupreolata
Amara ellipsis
Amara familiaris
**Amara farcta*
Amara lacustris
Amara laevipennis
Amara latior
Amara littoralis
Amara obesa
Amara pallipes
Amara patruelis
**Amara quenseli*
**Amara torrida*

Genus *Agonum*

Agonum cupreum
**Agonum placidum*
Agonum sordens

Genus *Bembidion*

Bembidion bimaculatum
Bembidion canadianum
Bembidion coloradinois
Bembidion grapii
Bembidion petrosum
Bembidion quadrimaculatum
**Bembidion rupicola*

Genus *Harpalus*

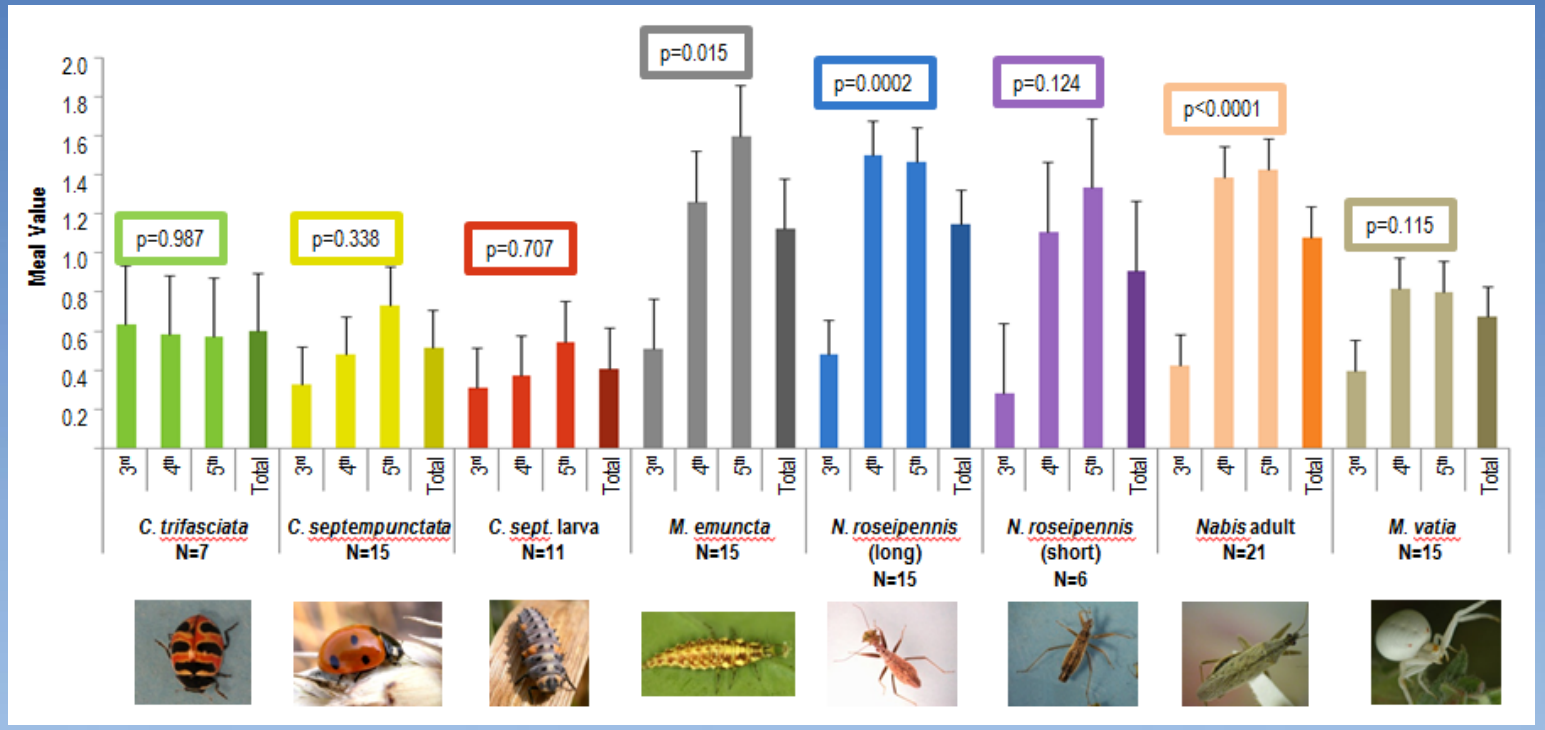
Harpalus affinis
Harpalus apacipennis
Harpalus amputatus
Harpalus fuscipalpas
Harpalus somnulentus

Miscellaneous Species

Bradycellus congener
Calosoma calidum

***Harpalus* sp.**

Predation of *Lygus* bugs – Jennifer Otani (Beaverlodge)



- Native predators (e.g. lace wings) preyed upon more Lygus nymphs
- All predators consumed Lygus nymphs in petri dish trials, suggesting there's ecological AND economic value in preserving these species in our canola canopies

Diamondback Moth Parasitoid, *Diadegma*

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- in 1995, 1.25 million ha were sprayed: $42 million (Can.)
- in 2001, 2.10 million ha were spayed: $86 million (Can.)
- in 2003, ca. 200,000 ha were sprayed: $4 million (Can.)
- in 2005, ca. 150,000 ha were sprayed: $3.5 million (Can.)

Increasing plant biodiversity in canola:

- reducing herbicide rate to leave small weed populations

J. Broatch
2008

- growing intercrops of canola and other crop species

J. Hummel
2009

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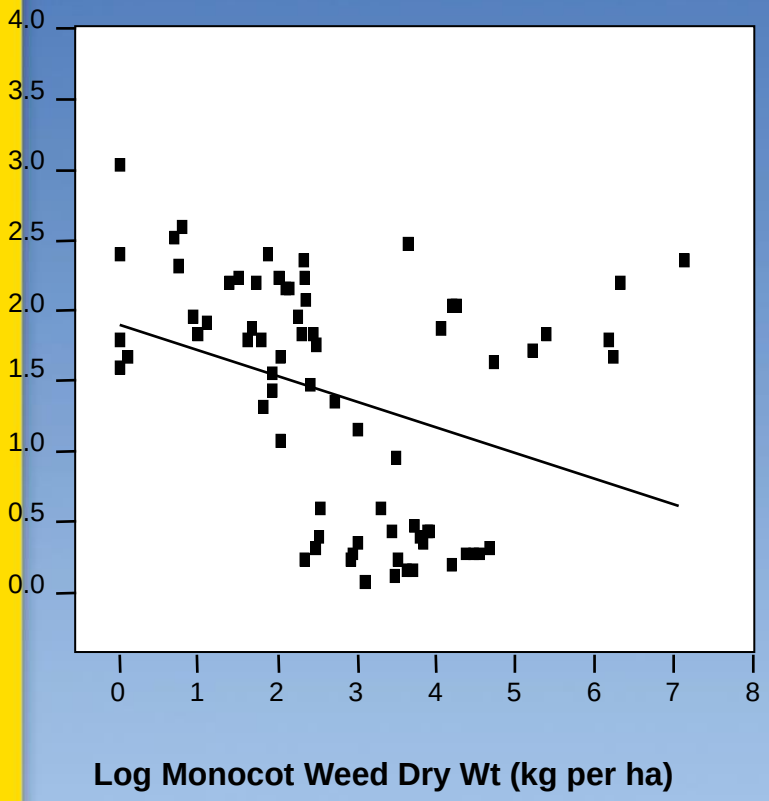
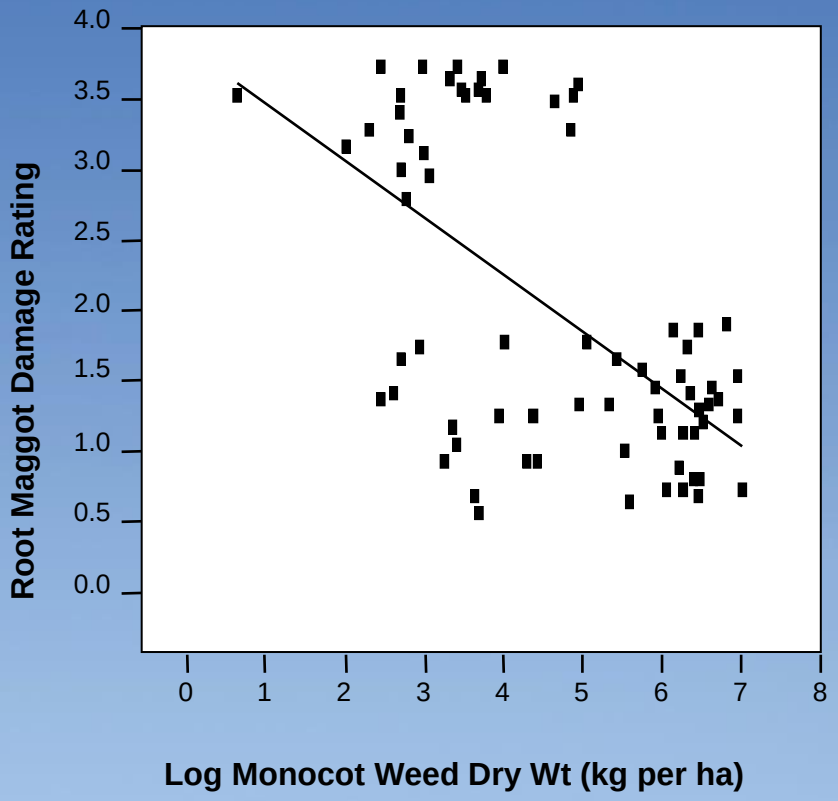
Lacombe, AB



Beaverlodge, AB



[Broatch et al. 2008]

Increasing Evidence Exists that Honeybee Pollinators Increase Yields

Study 1: (Munawar et al. 2009)

- **Caged Plants with Bees**

  Pods per plant = 815

  Seeds per pod = 20

  Seed weight = 26

- **Caged Plants without Bees**

  Pods per plant = 349

  Seeds per pod = 15

  Seed weight = 9

Study 2: (Kevan and Eisikowitch 1990)

- Seed Germination = 96%
- Seed Germination = 83%


Honeybees


Butterflies


Wasps


Flies


Beetles


Moths


Thrips

Beneficial Insects as Pollinators:

Pollinators Comprise Many More Species Than Just Honeybees

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Superior value for a healthier world

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