

18<sup>th</sup> March, 2004

**Conserving and enhancing beneficial  
insect populations on farmland:**

**The OSU/Oregon Tilth '*Farmscaping for  
beneficials*' program**

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# Agroecosystems can be highly diverse



# Invertebrate biodiversity contributes directly to pest limitation

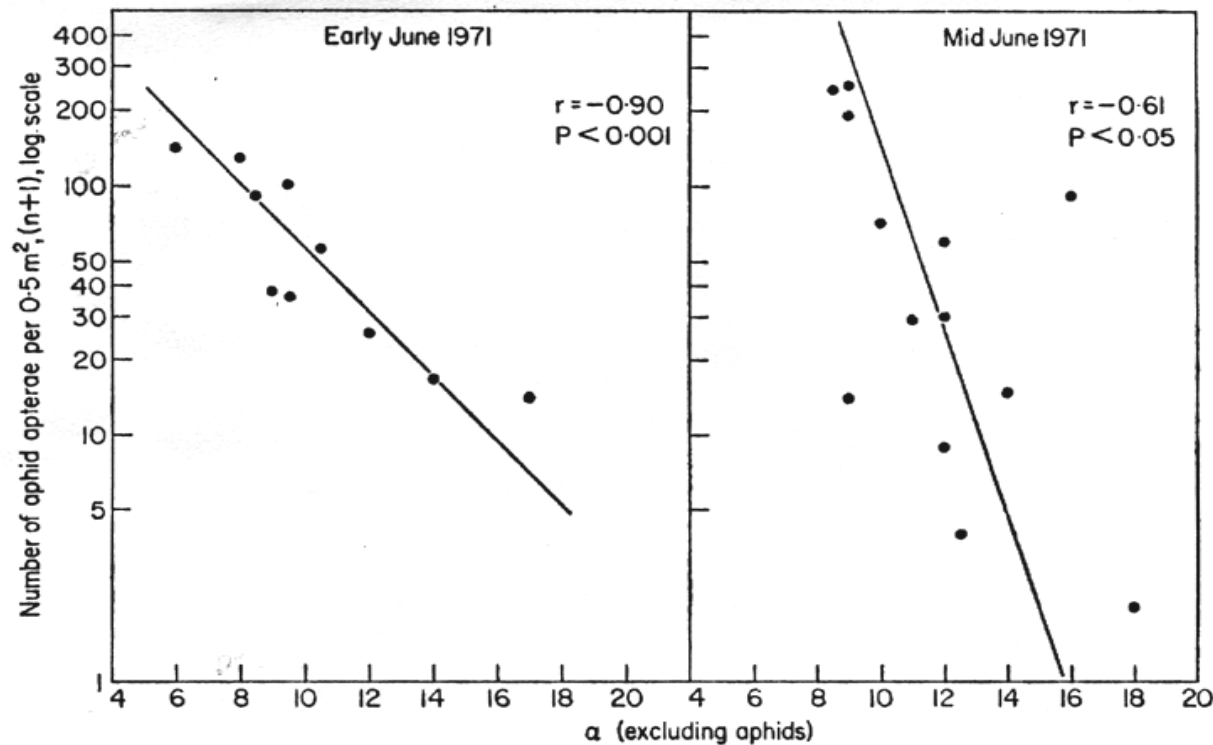


FIG. 11(ii). The correlation between arthropod diversity ( $\alpha$ ) and the density of apterous aphids in winter wheat, 1971.

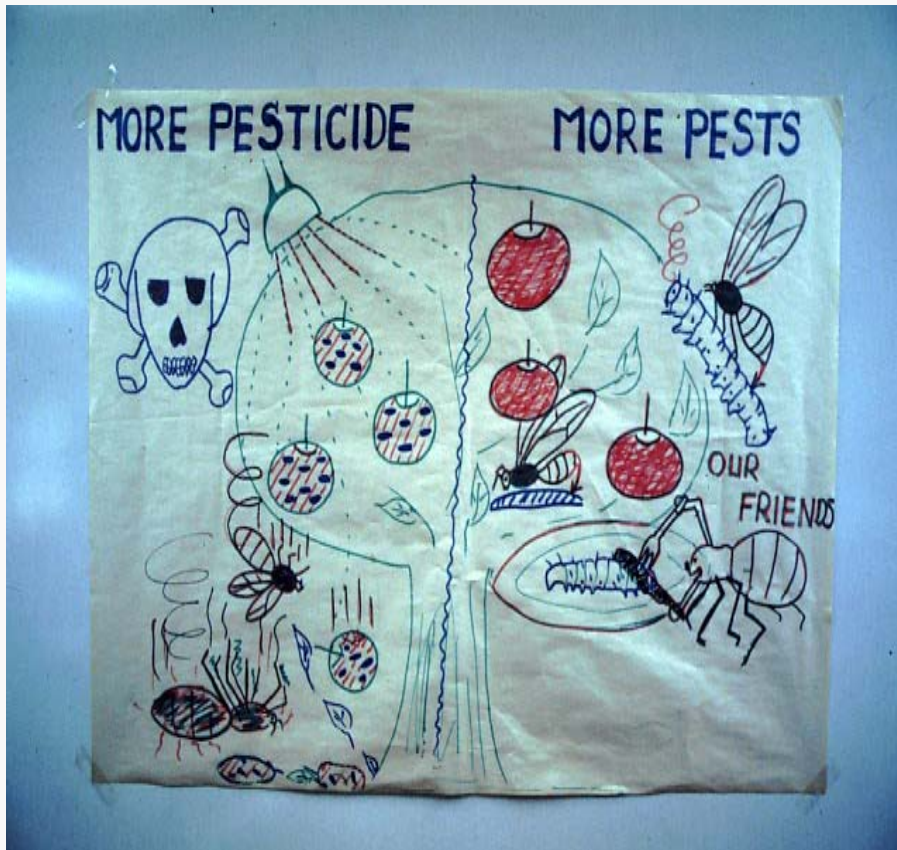
**Potts and Vickerman,  
1974**

**Pest  
abundance  
is lower  
where  
farmland  
biodiversity  
is higher**

**How can  
biodiversity  
be  
managed?**



# Impacts of broad-spectrum pesticides on natural enemies



# Why encourage beneficial invertebrates?

- **Alternatives to pesticides**
  - Less frequent need to use sprays
  - Enables avoidance in pesticide free gardens
  - Adds caution into the decision to spray
- **Pest suppression**
  - Less damage, fewer outbreaks
- **Food web engineering!**
  - Promotes biodiversity (e.g. birds, other insects)
- **Educational opportunities**
  - Highly visible insects and activities
- **Being a good neighbor**
  - Export beneficials not pests to neighbors!

# **Promoting beneficial insect biodiversity**

## **Insectary Plantings**

***‘Insectary plantings’* refers to the use of flowering plants (which contain resources in the form of nectar and pollen) for natural enemies of plant pests and other beneficials.**

**In addition to floral resources, these plantings may provide alternative prey or host food and shelter.**

# **Insectary plants can be included in cropping systems in many different configurations**



**Within the crop field or orchard in strips or smaller blocks**



# Insectary planting tactics continued:



**Among hedgerow  
plants, or as perennial  
or annual plantings in  
crop margins**



**Cover crops**



**Selective  
conservation of  
existing insectary  
plants**





hoverflies



ladybird  
beetles



parasitoid  
tachinid  
flies

**Beneficials  
that benefit  
from pollen  
and nectar  
sources**



soldier beetles

# Beneficials that benefit from pollen and nectar sources continued:



parasitoid wasps



green  
lacewings



# Beneficials benefited by alternative prey and shelter



big-eyed bug



minute pirate bug



predacious stink bugs



damsel bugs



assassin bugs



# Beneficials benefited by alternative prey and shelter, continued:



rove  
beetles



spiders



ground  
beetles

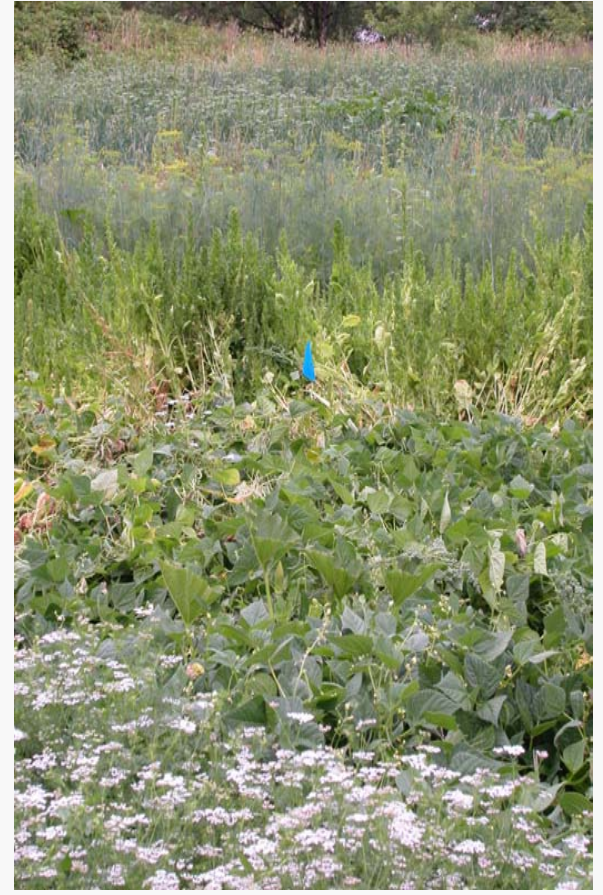


**August 6<sup>th</sup>**  
**Farm Walk**  
***Persephone***  
***Farm***

# Biological control measures in progress at Persephone Farm, OR

- Bird and bat houses
- Plantings of sunflowers for birds and minute pirate bug (predator of cucumber beetle larvae)
- Plantings of dill, *Cilantro*, fennel, *Agastache*, *Alyssum*, *Calendula* and orache interspersed with cash crops to attract and sustain various beneficial insects
- Attempted hedgerow (not a success) of shrubs meant to attract and sustain birds, bees, beneficial insects. Intend to try again
- Emphasis on cover-cropping fields not in cash crops, many with flowering plants such as vetch and clover
- Pastured poultry flock hopefully eats bugs in soil
- Used to release purchased ladybugs and lacewing larvae (no longer feel the need)
- Strong wild population of mustards, radishes, chickweed, speedwell etc., sustains vibrant wasp community





**Diverse plantings, structural complexity,  
multiple insectary plant types to provide  
temporal spread**

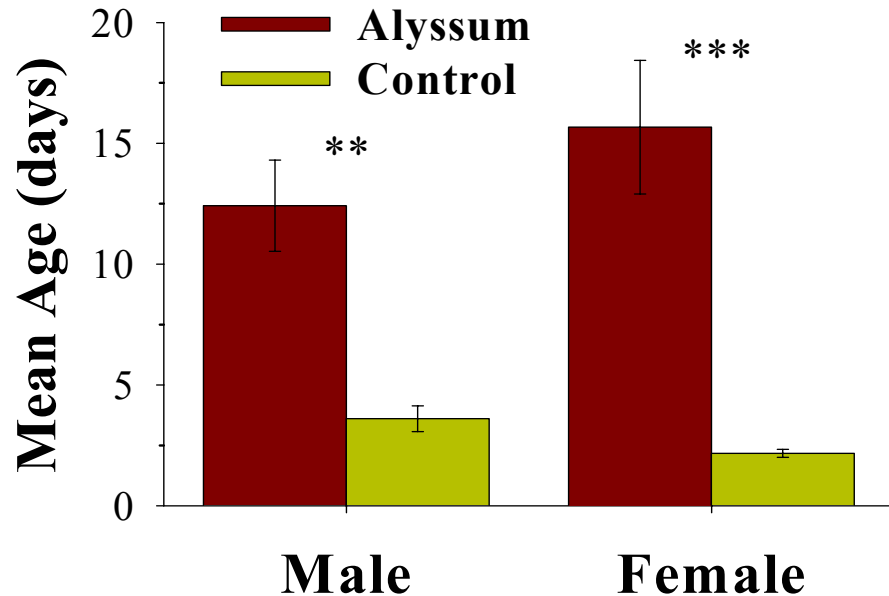
# **Mechanisms that underlie the success of insectary plantings**

# Fitness Improved: Longevity

- e.g., *Dolichogenidea tasmanica* (Braconidae)



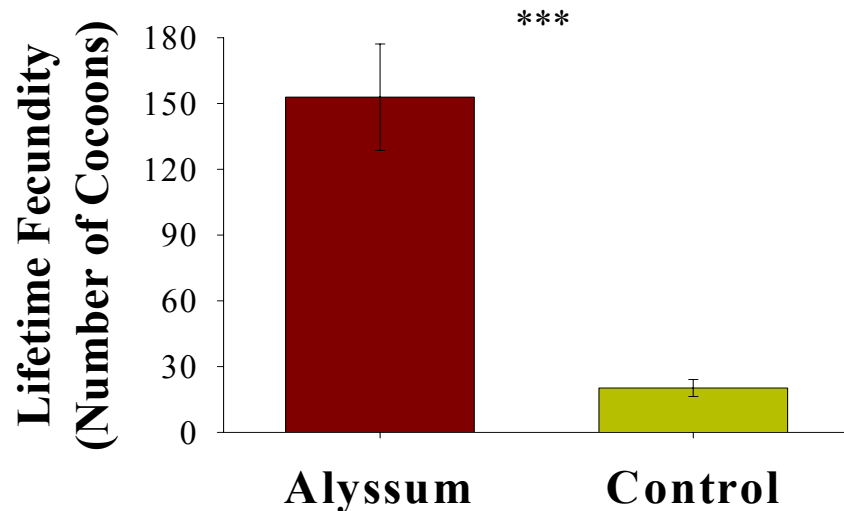
Data from Steve Wratten,  
NZ





# Fitness improved: Fecundity

- Realised fecundity: F1 cocoons produced
  - e.g., *D. tasmanica* (Braconidae)

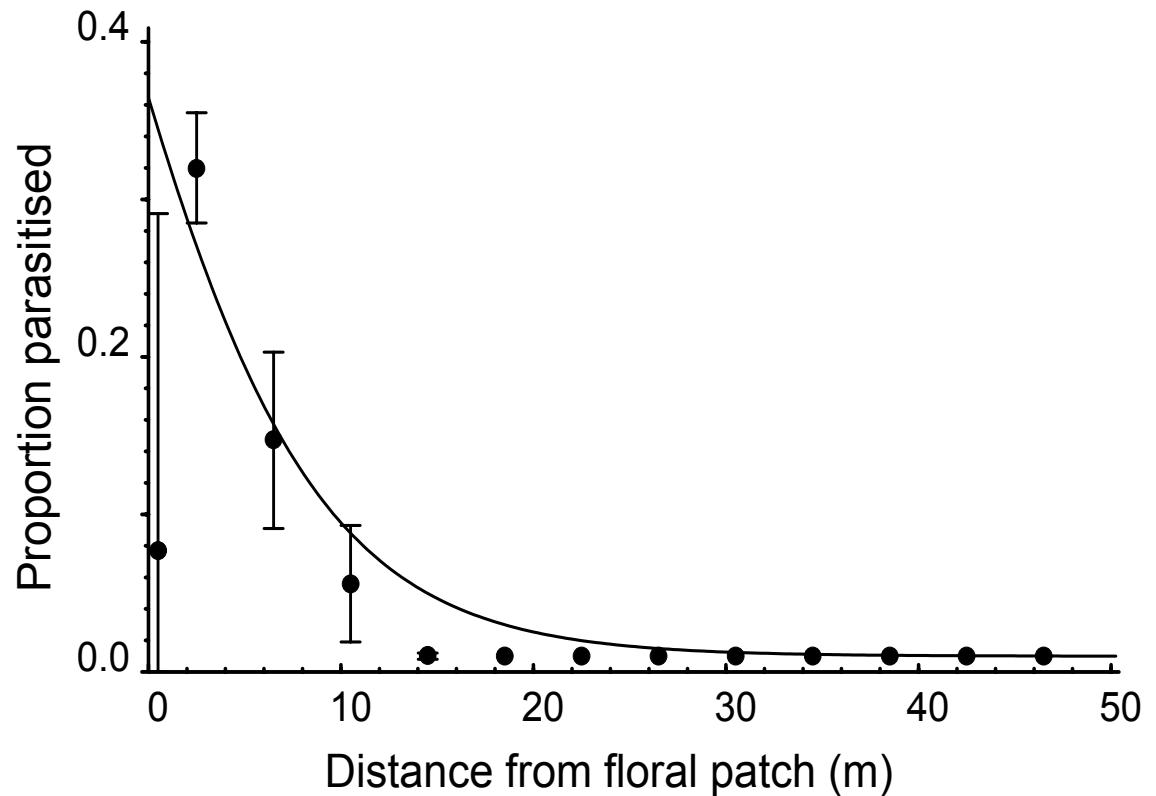


Data from Steve Wratten, NZ

# Distance of enhancement of parasitism rate: no barriers



*Aphidius*  
*rhopalosiphi*  
(Aphidiidae)



Data from Steve Wratten, NZ

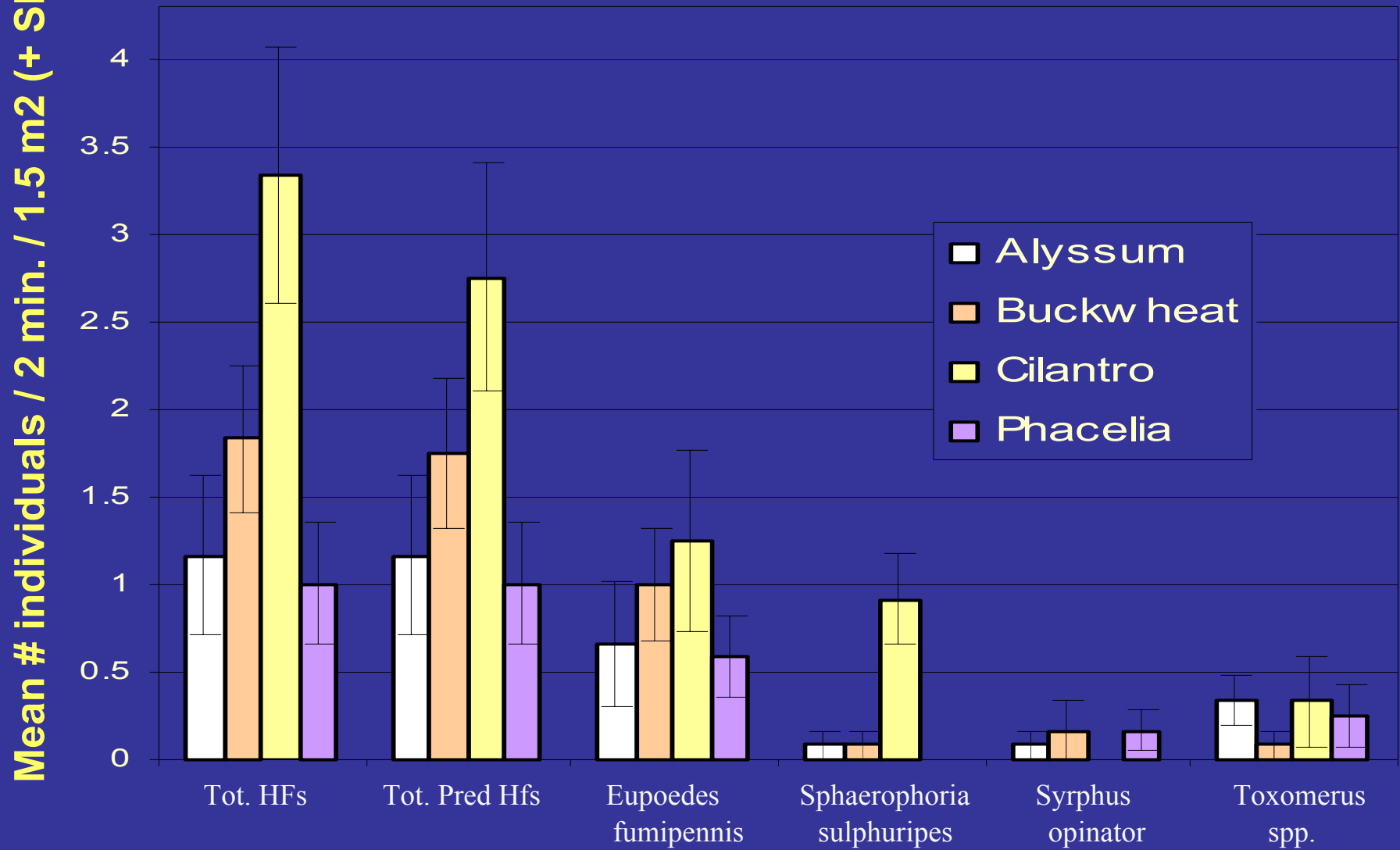


**Vine rows prevent or delay dispersal**



**Adding the right kind of  
biodiversity**

# Hoverflies Visiting 4 Flower Types

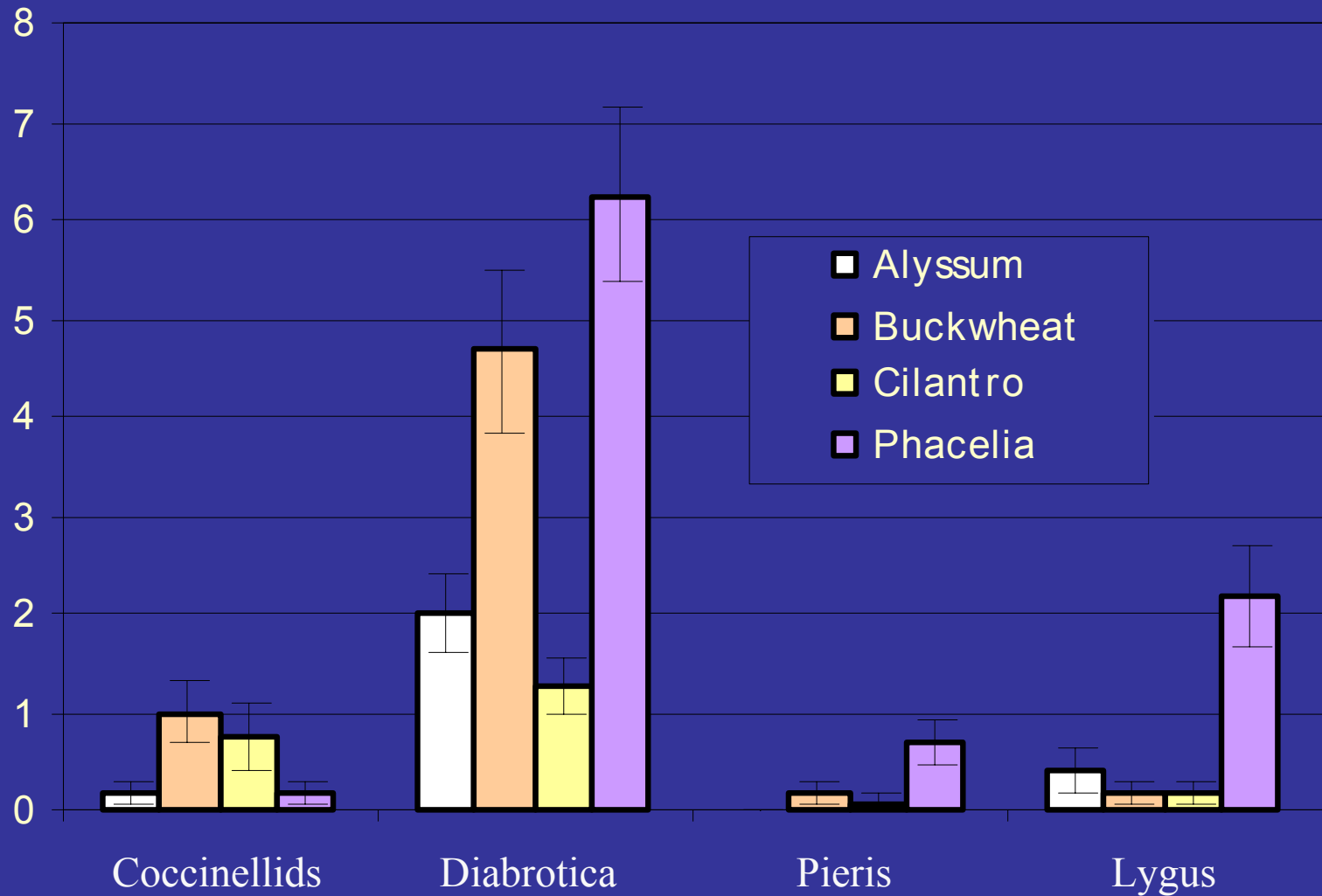


Hoverfly Type

(P = 0.05, LSM)

# Other Arthropods Visiting 4 Flower Types

Mean # individuals / 2 min. / 1.5 m<sup>2</sup> (+ SE)



(P = 0.05, LSM)



# Promoting beneficial insect biodiversity

## Beetle Banks

Beetle banks' are graded low banks that are placed in fields or gardens to enhance populations of predatory beetles and spiders. They are planted with tussock- or mat-forming grasses to provide high quality, over-wintering habitat, from which these invertebrates disperse in the spring.



*e.g. Orchard grass  
or Timothy grass*

# Beetle bank establishment



September and October are the best months to establish the grass sward on beetle banks.



Create habitats raised above the soil surface, with broad grassy swards on the top

Cut grasses to promote tussock formation and limit seeding

# Insects benefited by beetle banks



**Rove beetles**  
(Staphylinidae)



**Ground beetles (Carabidae)**



**Spiders (Araneae)**







**OSU IPPC, Oregon Tilth partnership:**

***Farm-scaping for beneficients***











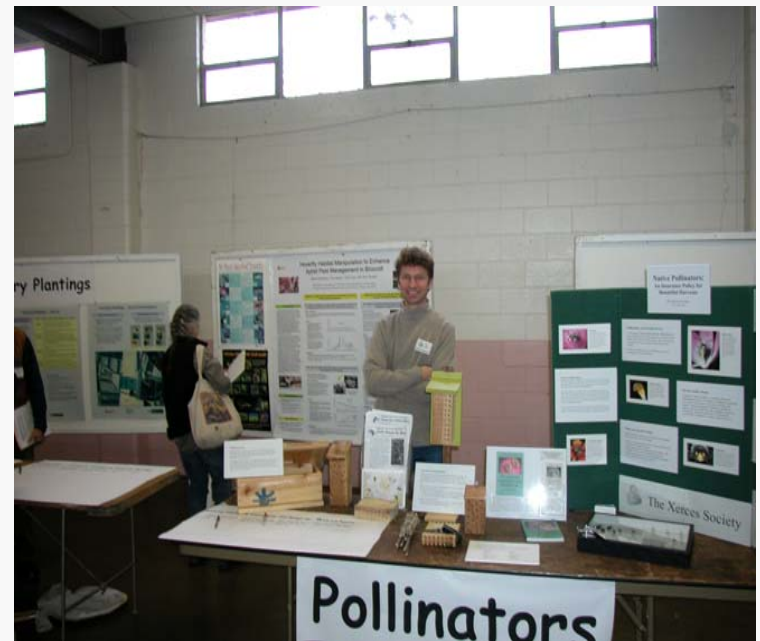
# Benton County Fair

## Aug 3 - 7

HOLIDAY FOOD DRIVE NOV 15-25  
GIFTS FOR A BETTER WORLD NOV 17 - DEC 7  
HOMESPUN CHRISTMAS FAIR SAT 10-5 SUN 10-4  
BUGSCAPING 2003  
FARMERS MARKET WED 8A - 1P

<http://bentoncountyfair.com>





# Becoming involved in the CBC Project

- Host or join farm walks/activities
- Develop a local CBC group with other growers
  - Develop experiments and tests with the *Farmscaping* program
  - Distribute/discuss findings
- Adopt CBC practices following evaluation and adaptation to your local needs

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