

Presentation given at the 3rd Syrphidae Symposium,
Leiden, The Netherlands, 2nd to 5th September, 2005

3rd International Symposium on Syrphidae

**Syrphids as Bio-control Agents in
Organic Lettuce on the Central Coast of
California, USA**

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Hugh Smith & Cathy Carlson*

University of California Cooperative Extension



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Overview of the system

Crop

Pest

Goal of current project

Habitat manipulation

Review of key syrphid species

Future directions



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Overview of the system

*Organic lettuce production
in the Salinas Valley*



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Overview of the system

*Lettuce aphid was discovered in
California in 1998*

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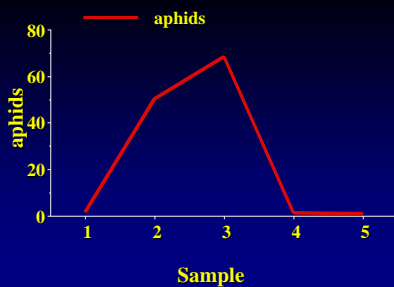


Lettuce aphid (*Nasonovia ribis-nigri*)

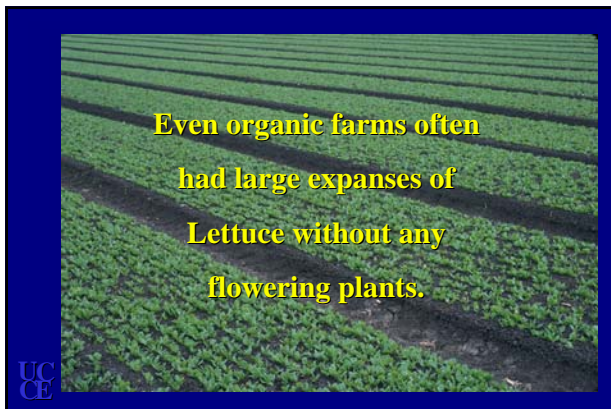
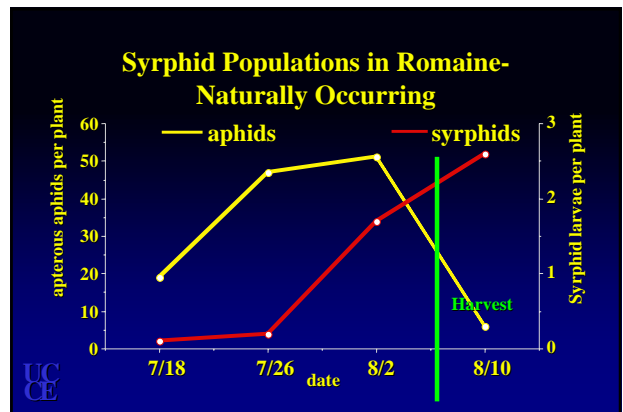
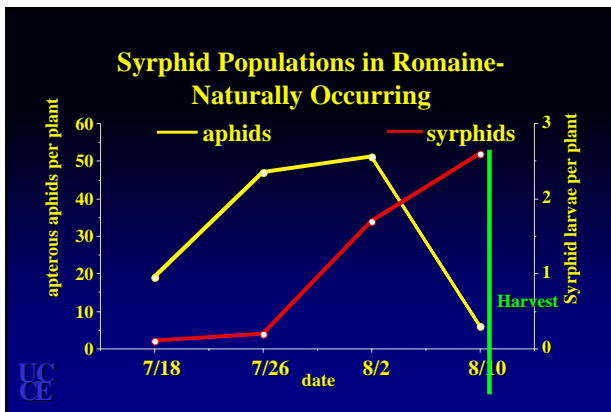
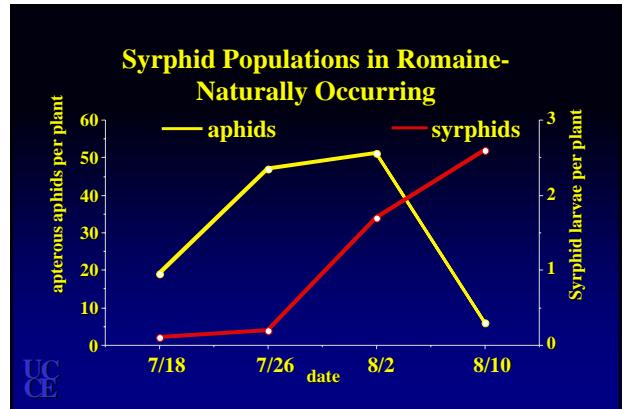
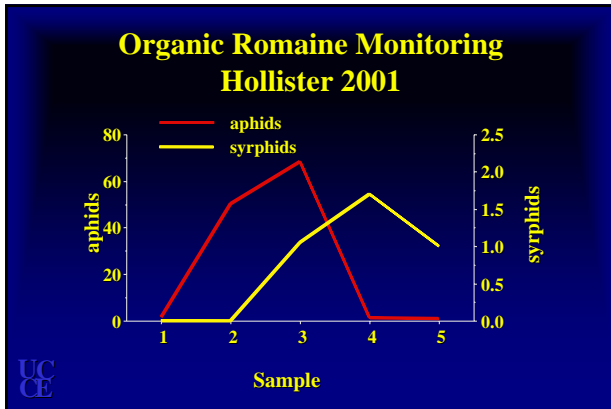


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Organic Romaine Monitoring Hollister 2001



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Goal of current project
Habitat manipulation

**Habitat Manipulation and
Management for Biological Control**



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**Enhancing Biologically
Integrated Farming Systems
for Lettuce on the
Central Coast of California**
Chaney and Smith

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**Habitat Manipulation and
Management for Biological Control**

- Insectary plantings
- Permanent hedgerows
- Windbreaks
- Crop diversity
- Sequential plantings
- Others?

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**Habitat Manipulation and
Management for Biological Control**

Insectary plantings:

In-field, annual plants that
are usually grown in strips in
the crop that provide nectar
and pollen.

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Why Alyssum?

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Why Alyssum?

- Quick to flower
- Long flowering period
- Easy to grow
- Not a serious weed
- Doesn't host major viruses
- Not a serious crop pest reservoir
- "Fits" into our production system

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Is there a better choice?



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Mixed Species Insectaries



**Alyssum
Dhani-Ya Corriander
Buckwheat
Cereal**

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Habitat Manipulation and Management for Biological Control

Permanent hedgerows:

Perennial plants (often mixes of native and introduced species to give long periods of bloom) that are planted around field or farm edges.

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Habitat Manipulation and Management for Biological Control



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Major questions:

- Type, location, and size of habitat?
- Role of habitat beyond nectar and pollen (over-wintering, refuge, mating)?
- Role of alternate prey?
- Species specific requirements?
- Economics of establishing habitat?
- Possible negative impacts (vertebrates)?

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Review of key syrphid species

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**Early in the work, it became
apparent that several syrphid
species are involved.**

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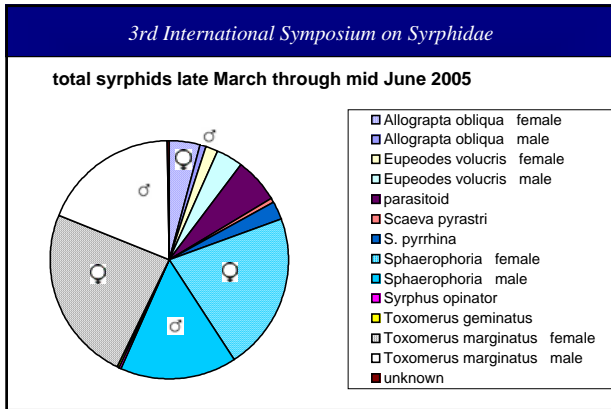
**The current work includes
collecting as many syrphid
eggs, larvae and pupae from
lettuce as possible and
rearing them to adults.**

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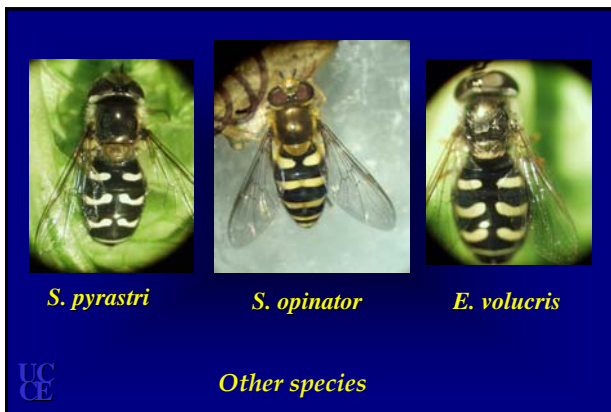
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Allograpta obliqua
Eupeodes fumipennis *E. volucris*,
Platycheirus stegnus,
Scavea pyrastris
Sphaerophoria pyrrhina, *S. sulphuripes*,
Toxomerus geminatus, *T. marginatus*,
Syrphus opinator

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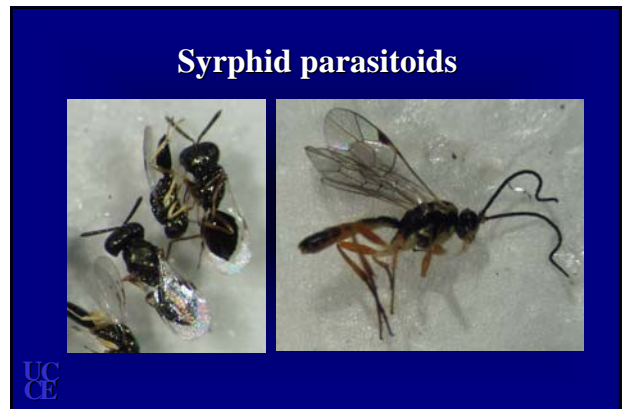
Future Direction

Overall

Improving Bio-Control

Specifically

- Rearing syrphids** (gain species specific info)
- Syrphid natural enemies**
- Better insectary plants/methods**



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**We welcome your comments,
suggestions or questions.**

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