

Making EFAs work for farmers and biodiversity

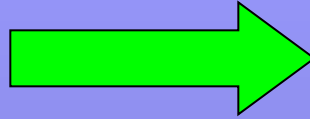
Felix Wäckers



Agri Environment Schemes



Agriculture



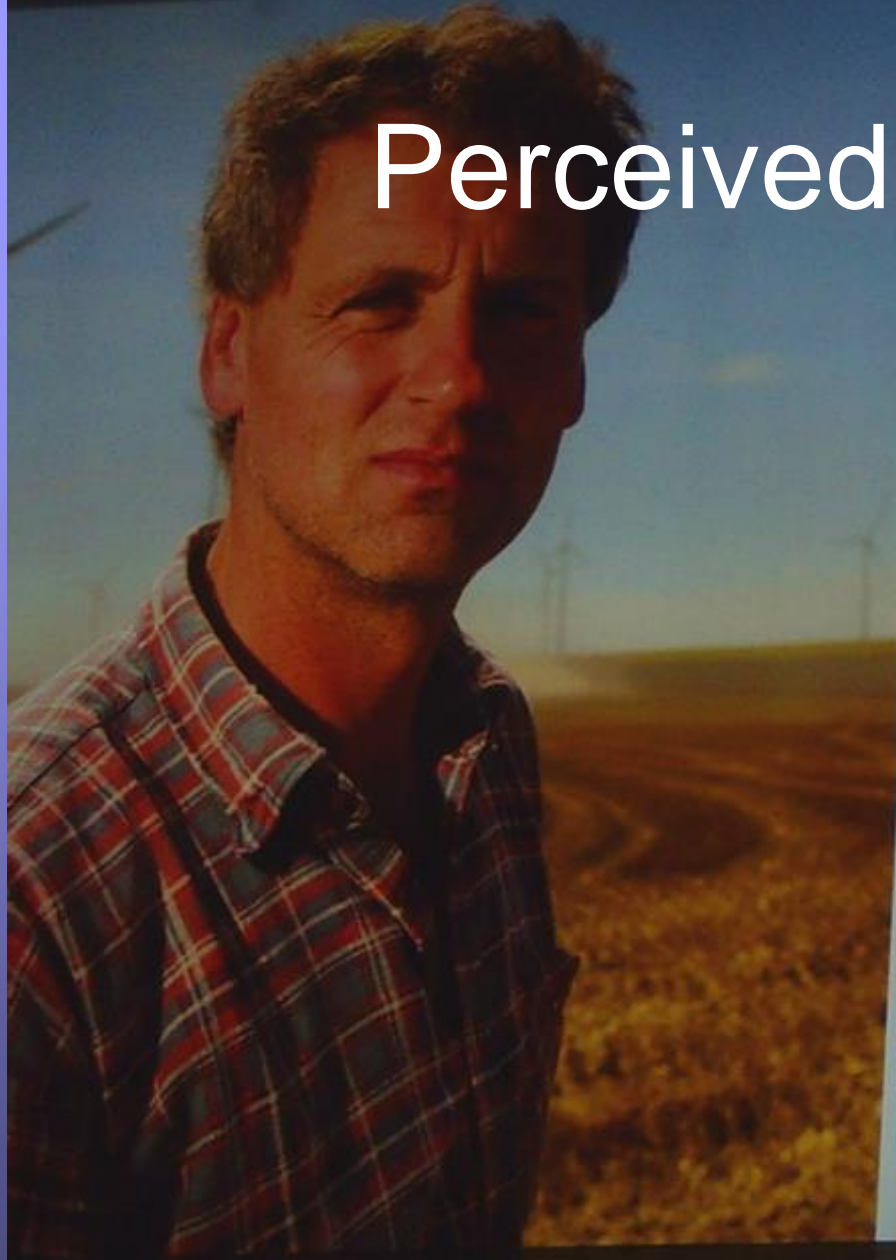
Environment



Focus on conservation



Perceived Conflict

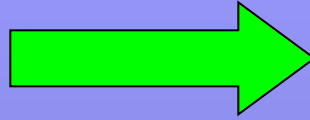


Yield or environment?

Agri Environment Schemes



Agriculture



Environment



Focus on ecosystem services



€320 billion/year



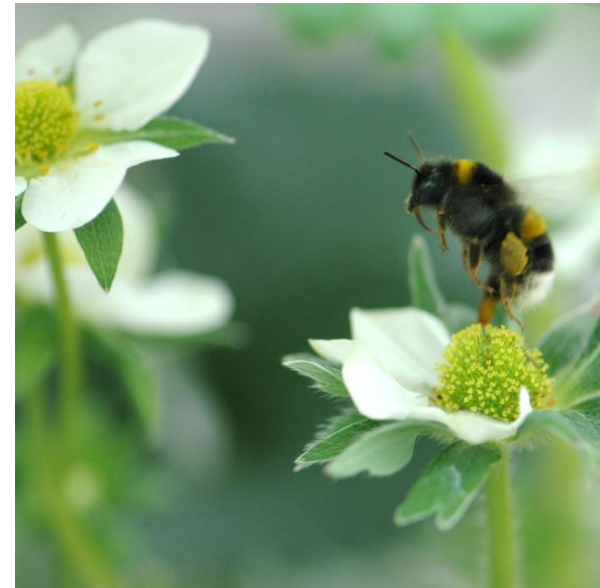
€90 billion/year
(Constanza 1997)

How to optimize services?

Traditional paradigm: Enhance diversity (diversity = stability = services)

Pimentel, D. (1961) Diversity-Stability hypothesis:

The stability of a community increases with increasing biological diversity



Does it work?

Example biological pest control



How to optimize services?

Traditional paradigm: Enhance diversity

Functional biodiversity: Selectively enhance diversity

Focus on functional groups that provide ecosystem services



Targeted landscape management

Informed selection of non-crop plants as a multifunctional tool to optimize ecosystem services

- Select plants that optimize biological pest control or pollination
- Select plants that avoid stimulation of pests
- Select plants that generate multiple ecosystem services



Attractive

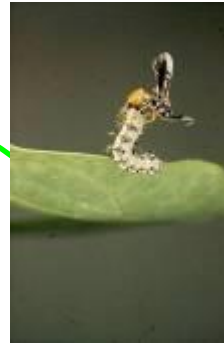
Accessible
nectar



Aegopodium podagraria



Vicia sativa



Inaccessible
nectar



Leucanthemum vulgare



Galium mollugo

Select to optimize BC benefits

Non-attractive



Daucus carota



Trifolium pratense



Medicago lupulina



Trifolium repens



Origanum vulgare



Erigeron annuus



Achillea millefolium

Select plants that optimize biological pest control

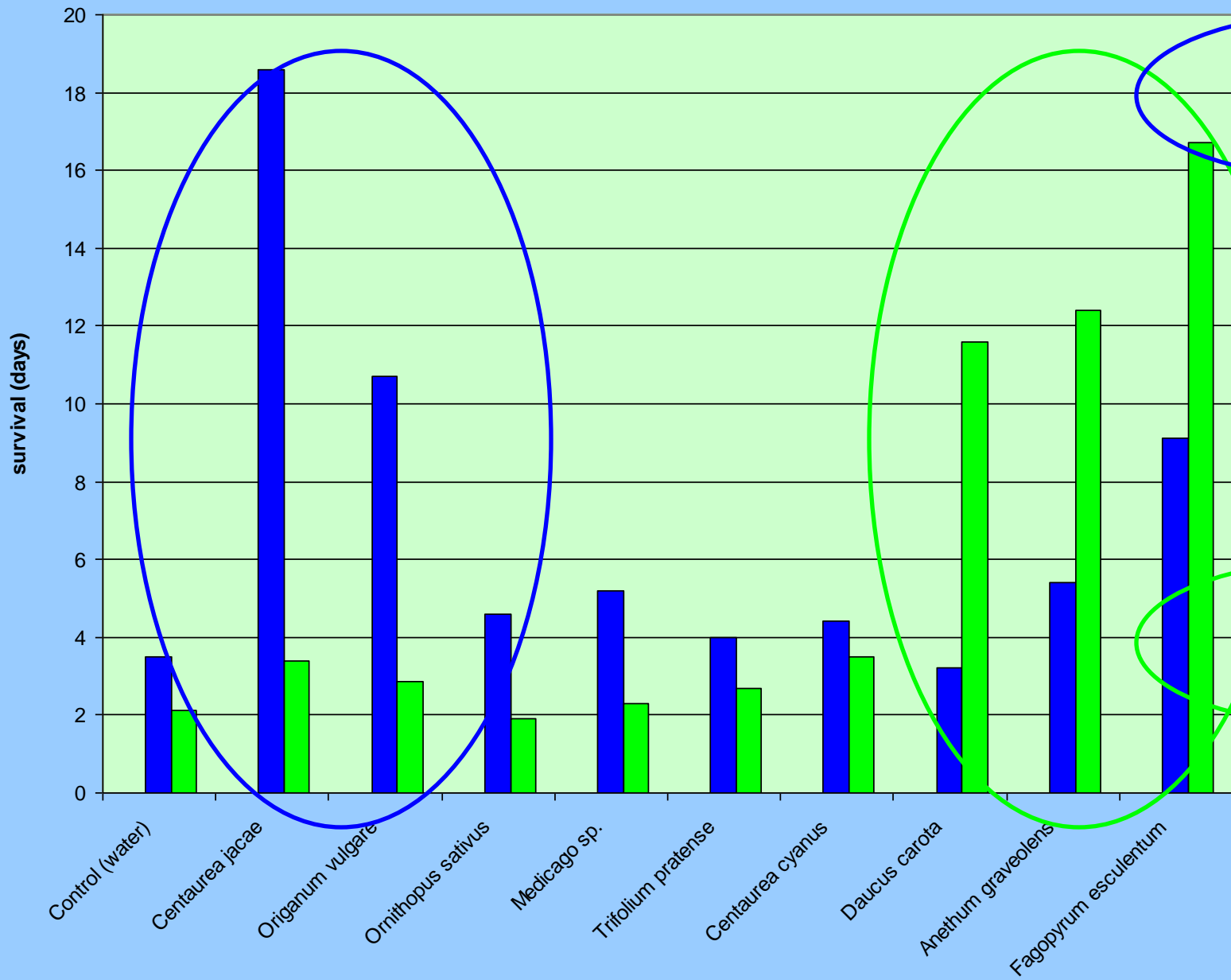
family	species	Floral Nectar depth	Longevity (AFLI)			References parasitoids (species)
			Hoverfly <i>E. balteatus</i>	Lacewing <i>C. carnea</i>	Parasitoids	
Apiaceae	<i>Ammi majus</i>	0				
Apiaceae	<i>Coriandrum sativum</i>	0				
Apiaceae	<i>Daucus carota</i>	0				
Apiaceae	<i>Foeniculum vulgare</i>	0				
Apiaceae	<i>Heracleum spondylium</i>	0				
Apiaceae	<i>Pastinaca sativa</i>	0				
Polygonaceae	<i>Fagopyrum esculentum</i>	0				
Boraginaceae	<i>Borago officinalis</i>	0				
Ranunculaceae	<i>Ranunculus acris</i>	0				
Caryophyllaceae	<i>Gypsophila elegans</i>	1				
Asteraceae	<i>Matricaria chamomilla</i>	1				
Asteraceae	<i>Achillea millefolium</i>	1				
Asteraceae L	<i>Cichorium intybus</i>	1				
Asteraceae	<i>Chrysanthemum segetum</i>	2				
Asteraceae	<i>Anthemis tinctoria</i>	2				
Asteraceae	<i>Leucanthemum vulgare</i>	2				
Asteraceae	<i>Tanacetum vulgare</i>	2				
Asteraceae	<i>Calendula officinalis</i>	3				
Asteraceae	<i>Centaurea cyanus</i> (+EFN)	3				
Asteraceae	<i>Helianthus annuus</i> (+EFN)	3				
Asteraceae	<i>Cosmos bipinnatus</i>	4				
Malvaceae	<i>Malva sylvestris</i>	4				
Boraginaceae	<i>Phacelia tanacetifolia</i>	4				
Fabaceae	<i>Medicago sativa</i>	4				
Fabaceae	<i>Vicia sativa</i> (+EFN)	4				
Fabaceae	<i>Lotus corniculatus</i>	4				





Selecting plants that avoid stimulation of pests





Pest



Biological control agent



Selecting plants that generate multiple ecosystem services

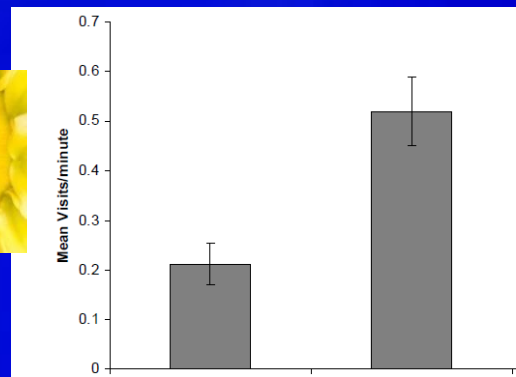
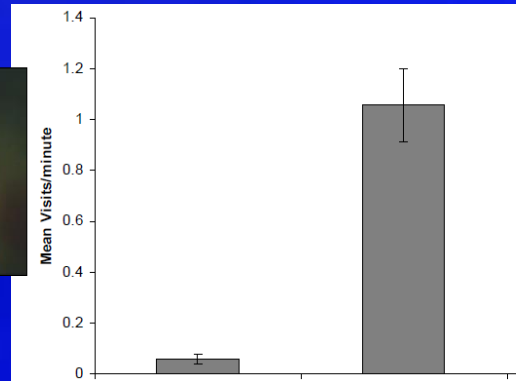
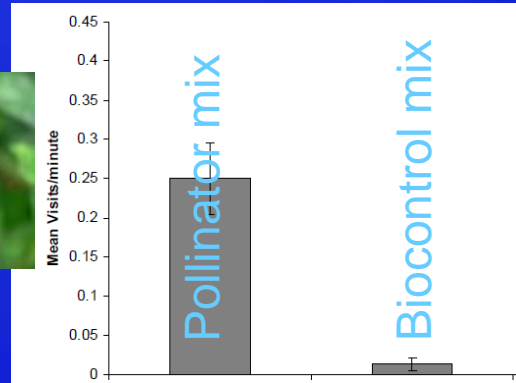


Pollination



Biocontrol

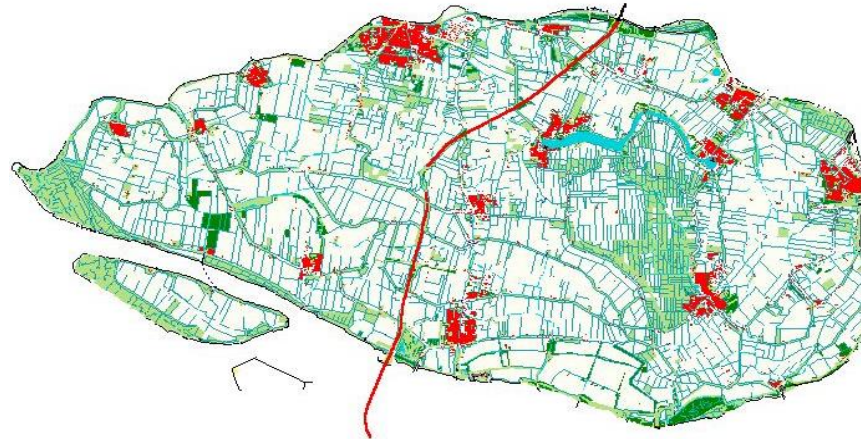
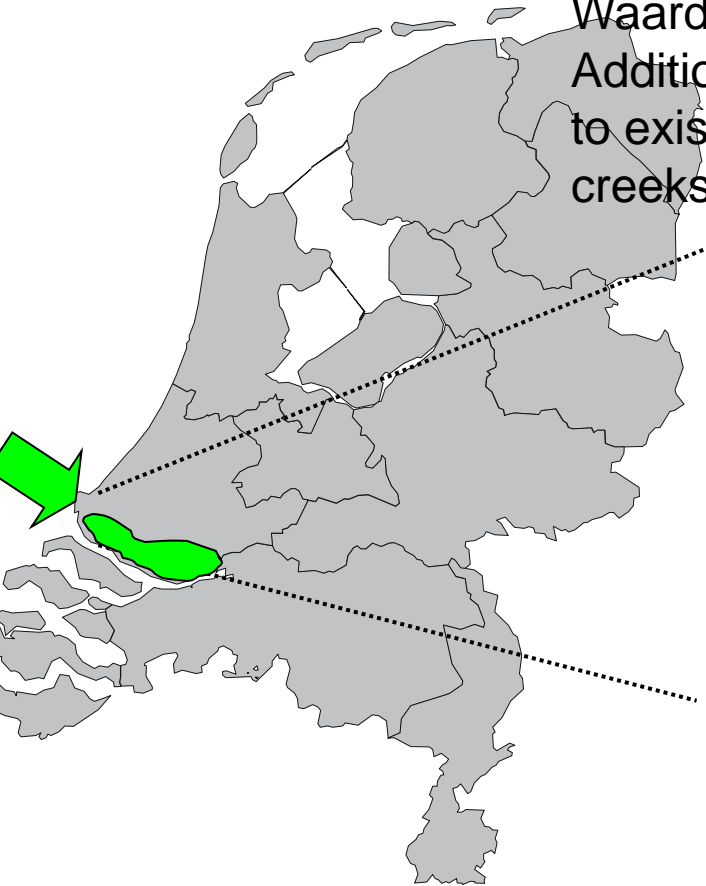


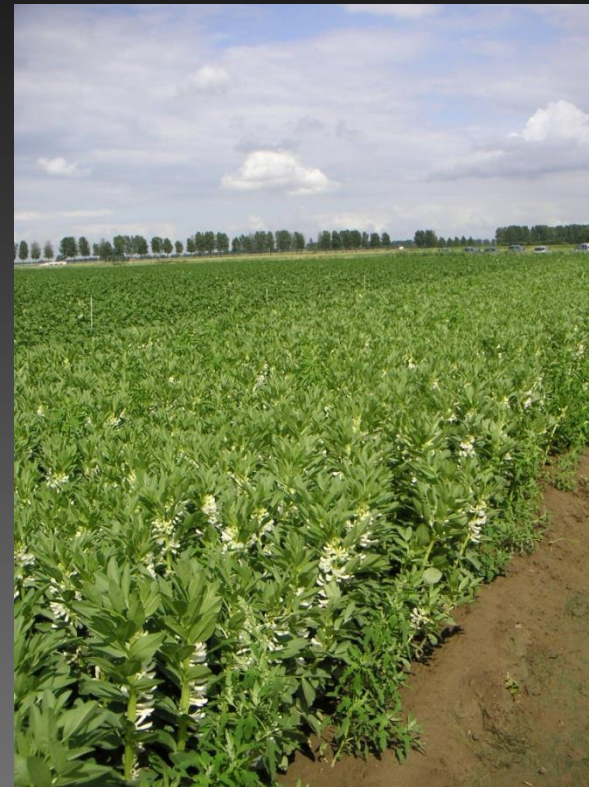


Taking it to the Farmer

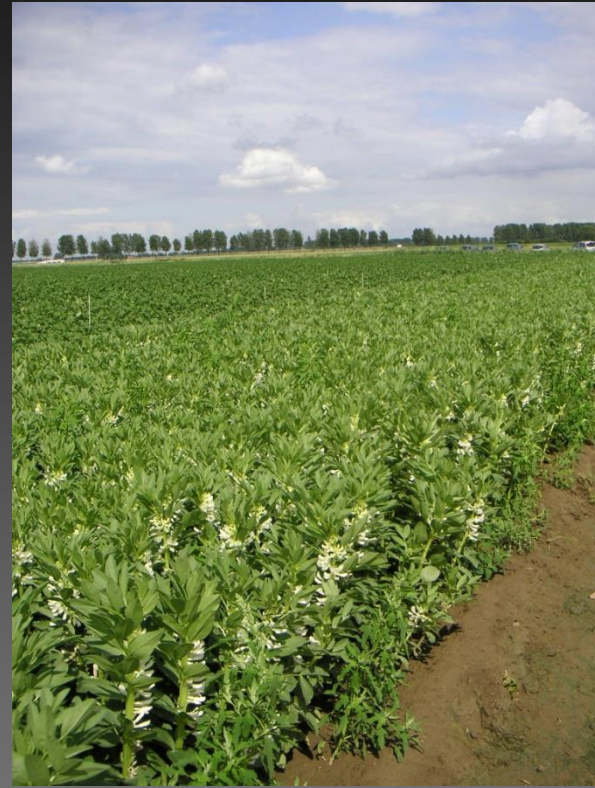
FAB (Functional Agrobiodiversity)

Large scale biodiversity project in the Hoekse Waard working with conventional growers. Addition of annual and perennial field margins to existing landscape features (polders, dikes, creeks, canal borders).



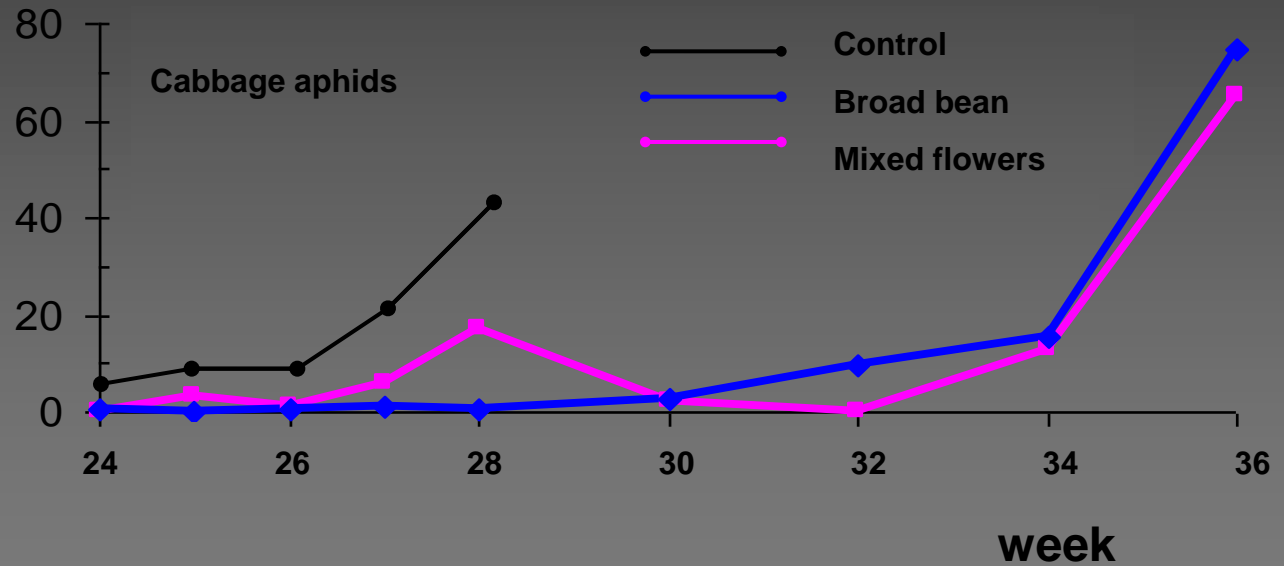


Leguminous Plants: Insect Magnets

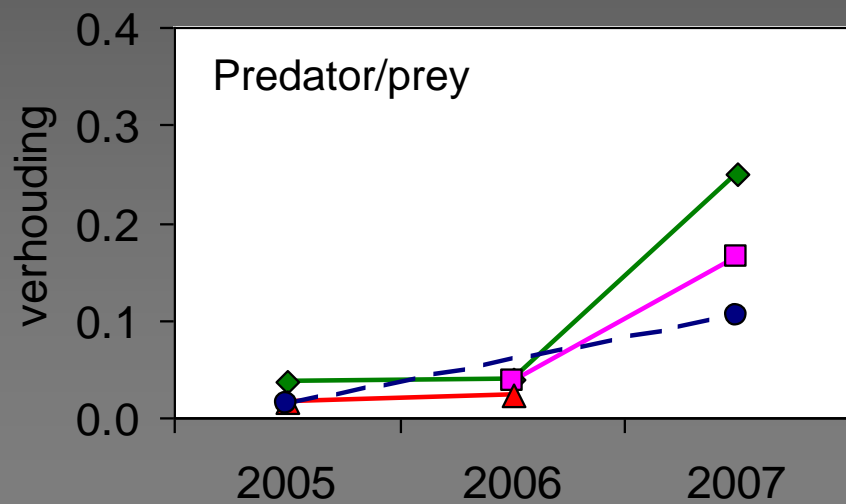
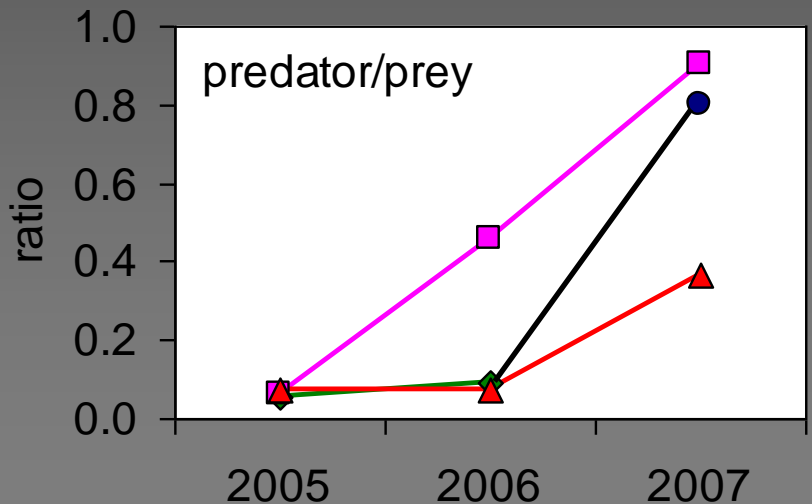
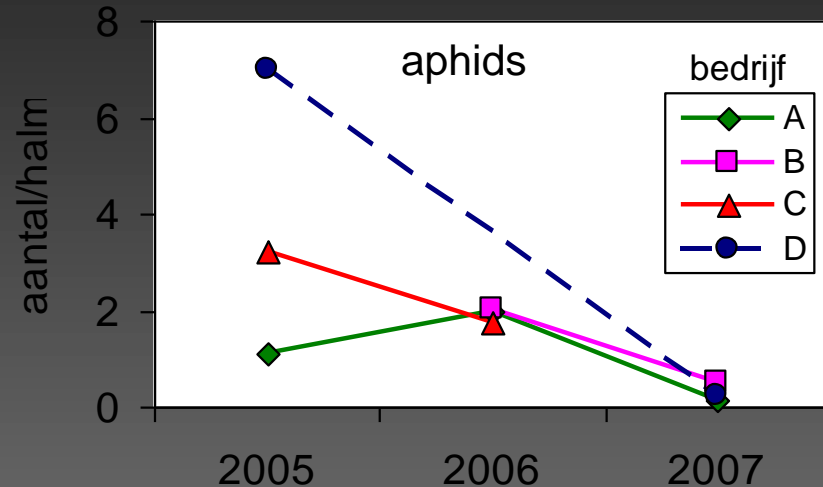
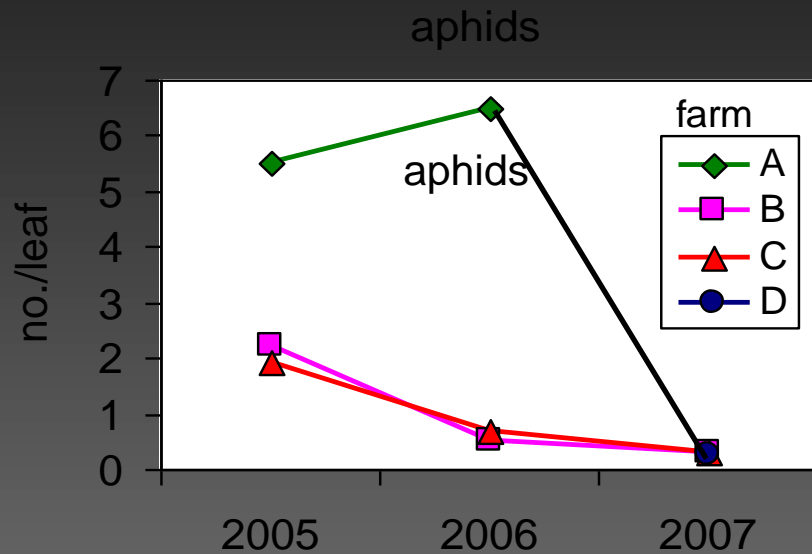


Brussels Sprouts

Cabbage aphids



Three year trends in aphid and natural enemy populations at conventional farms



Potato

Aphid peak: mid July

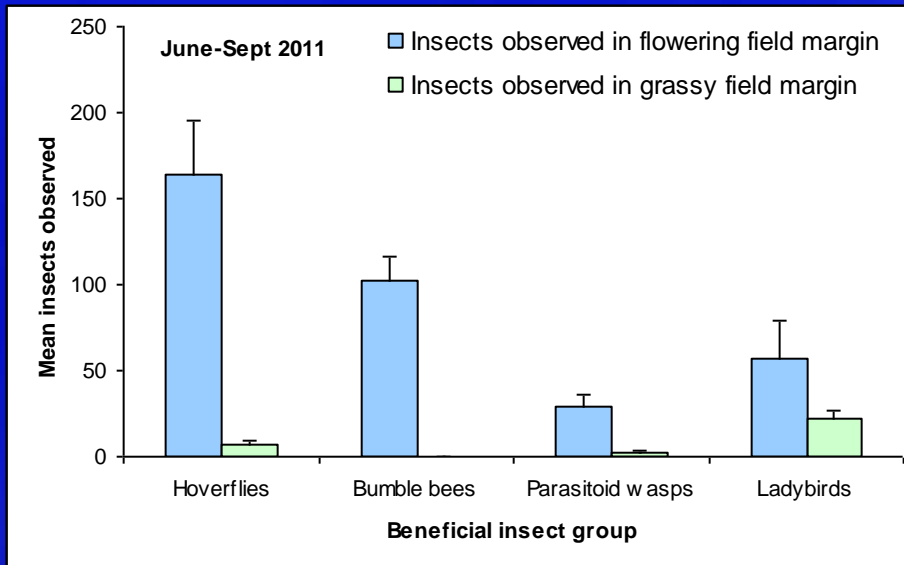
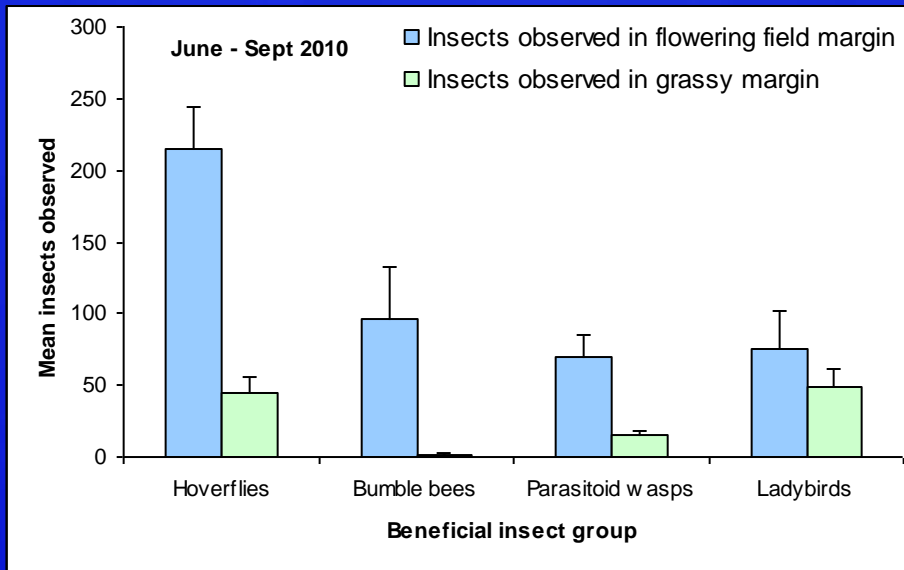
Wheat

Aphid peak: mid June

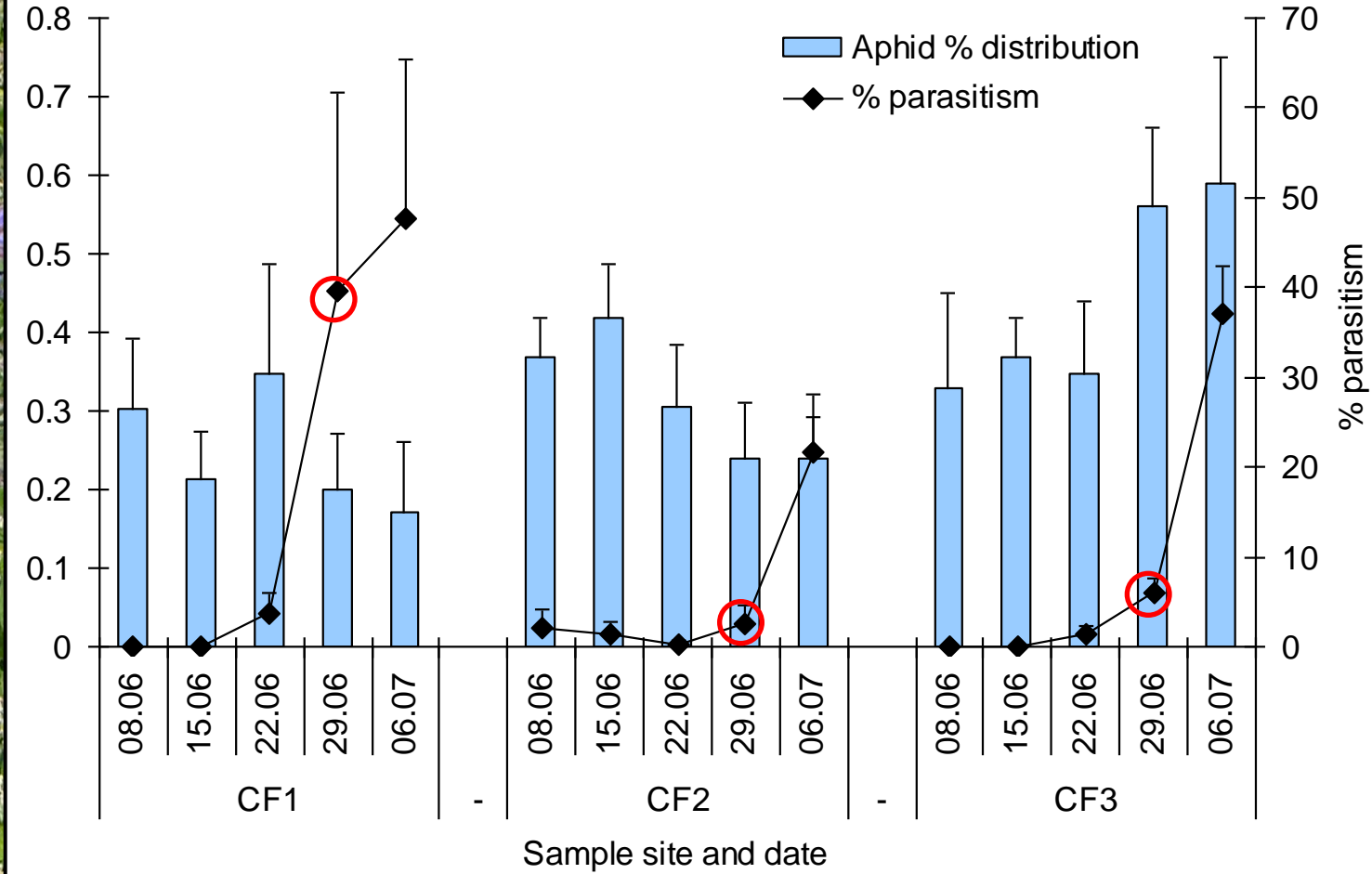
Optimizing **E**cosystem **S**ervices in Terms of **A**gronomy and **C**onservation (**ECOSTAC.CO.UK**)



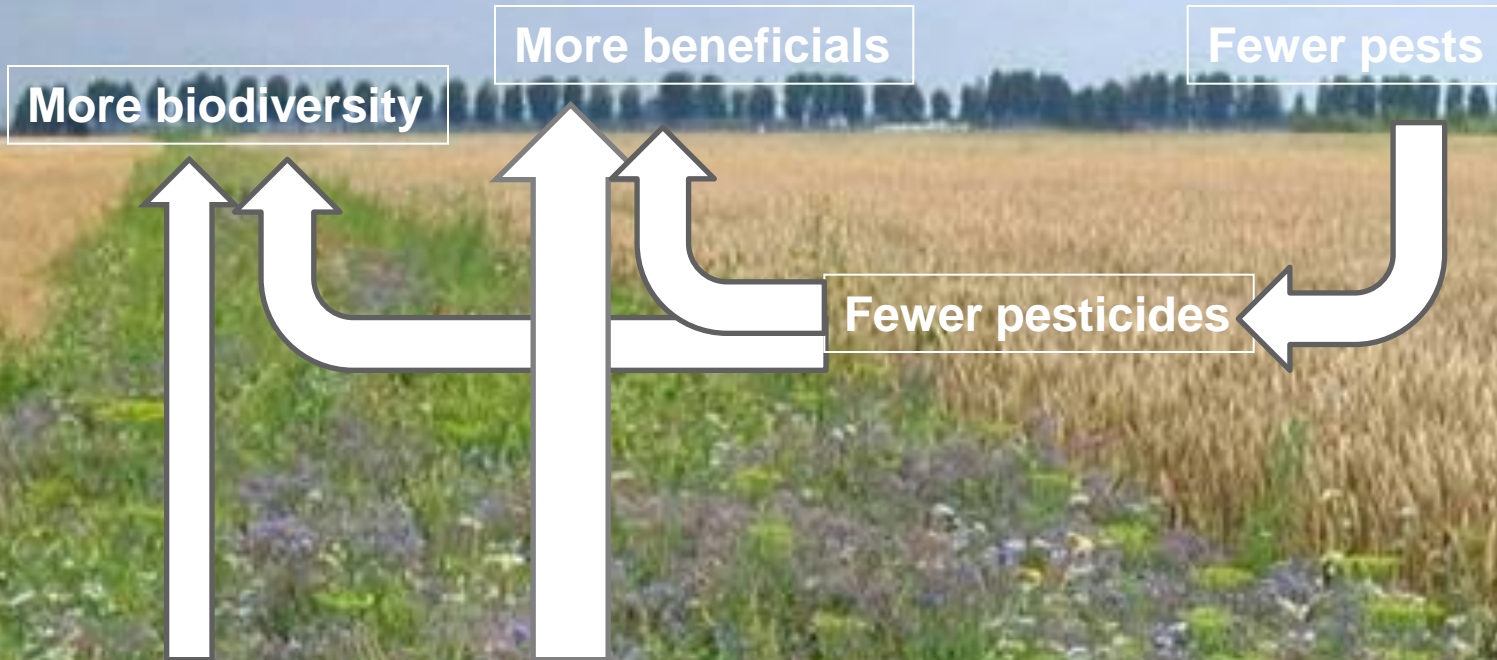
Beneficial insects in field margins



Aphids in peas



The positive spiral





Yield impact?

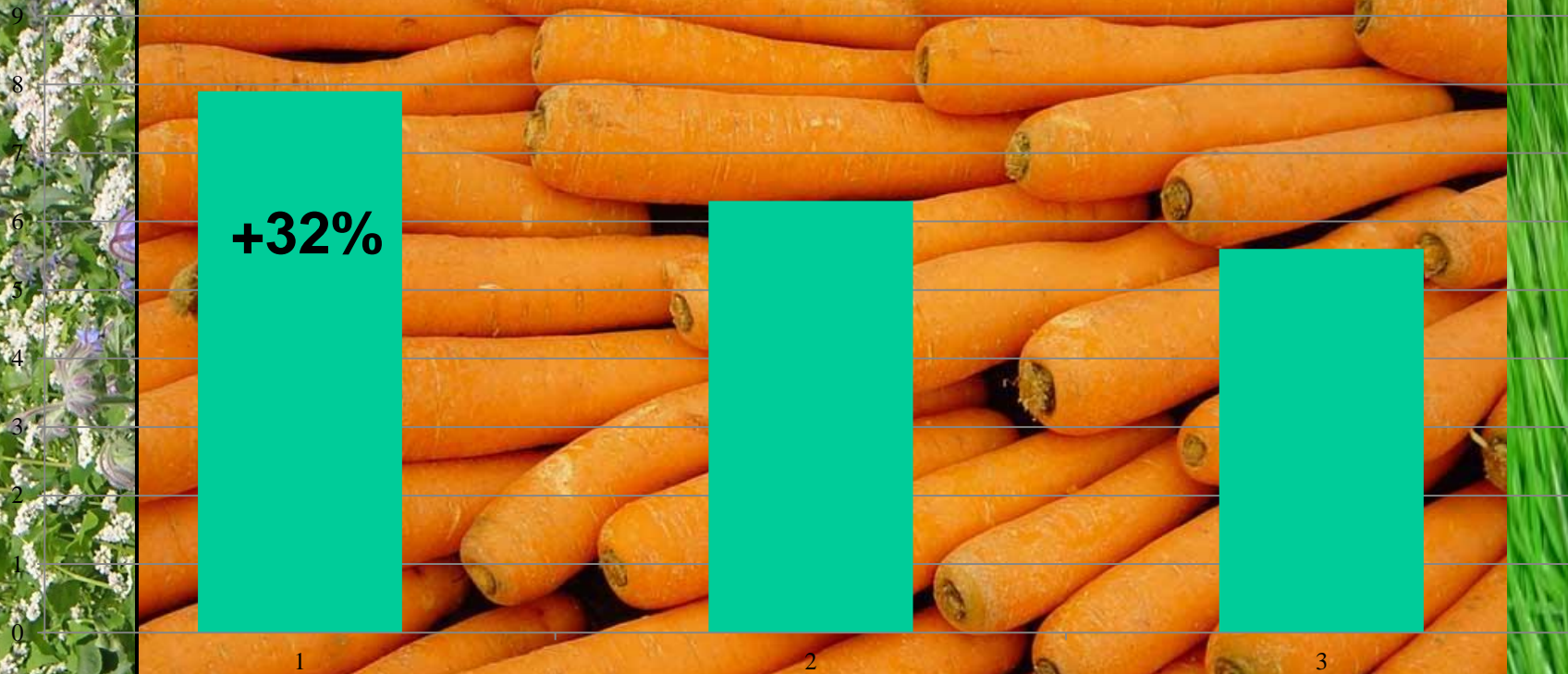
wheat (yield in tonnes/ha)



peas (yield in tonnes/ha)



carrots (yield in tonnes/ha)



Functional Biodiversity

- Shows that yield and conservation are not conflicting objectives
- Helps growers cope with ongoing decline in pollinators and reduced availability of registered agrochemicals
- Compatible with current practices
- Creates additional economic incentives for farmers to engage in Agri-Environment Schemes
- Makes CAP greening a win-win for farmers and nature



Thanks

