



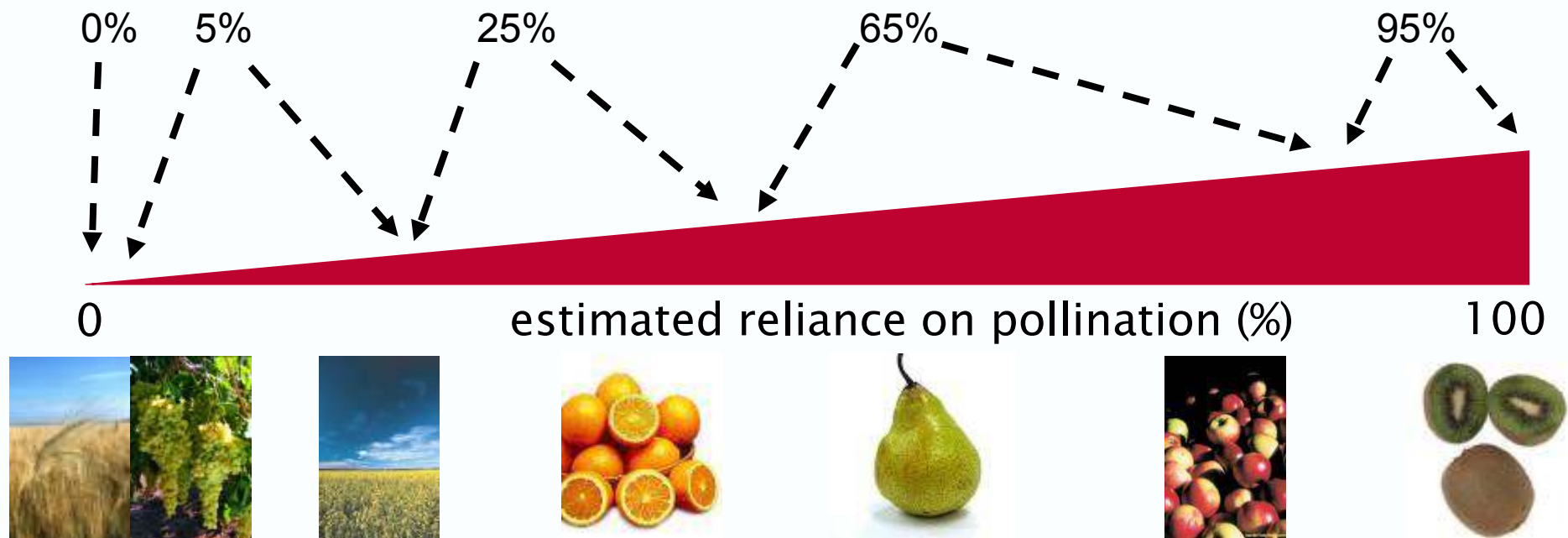
# Insect diversity for resilient pollination services

Saul Cunningham | Research Scientist



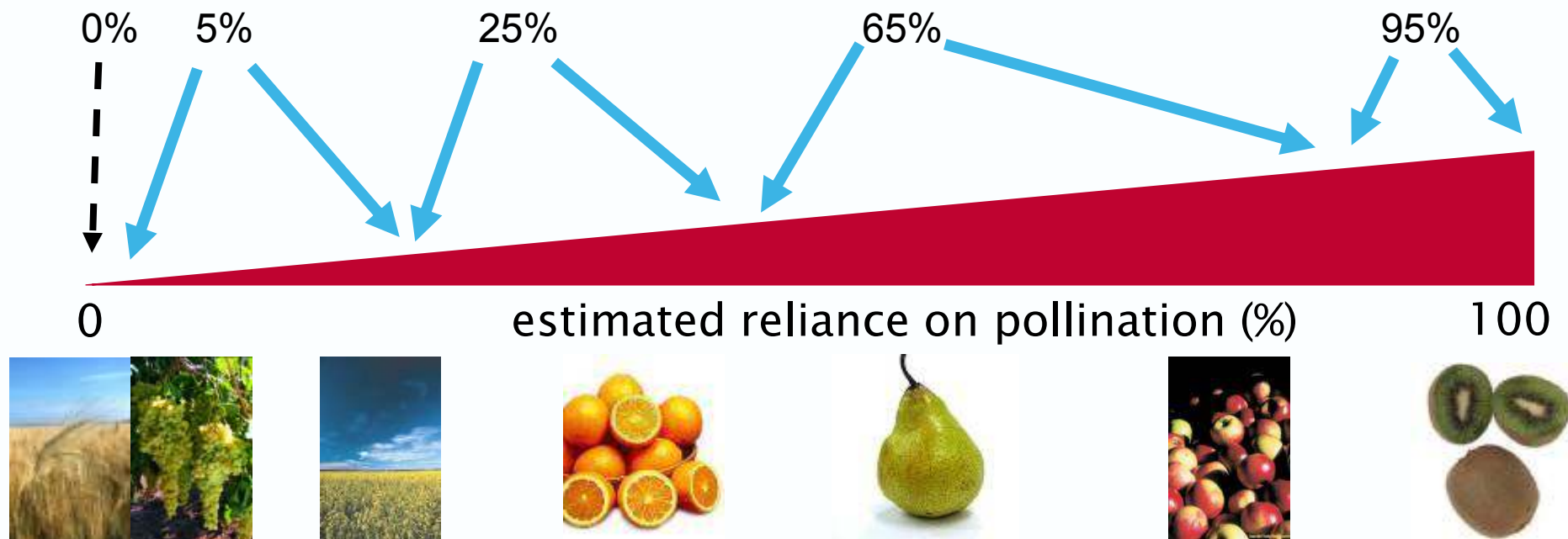
# Pollination spectrum

## Five categories

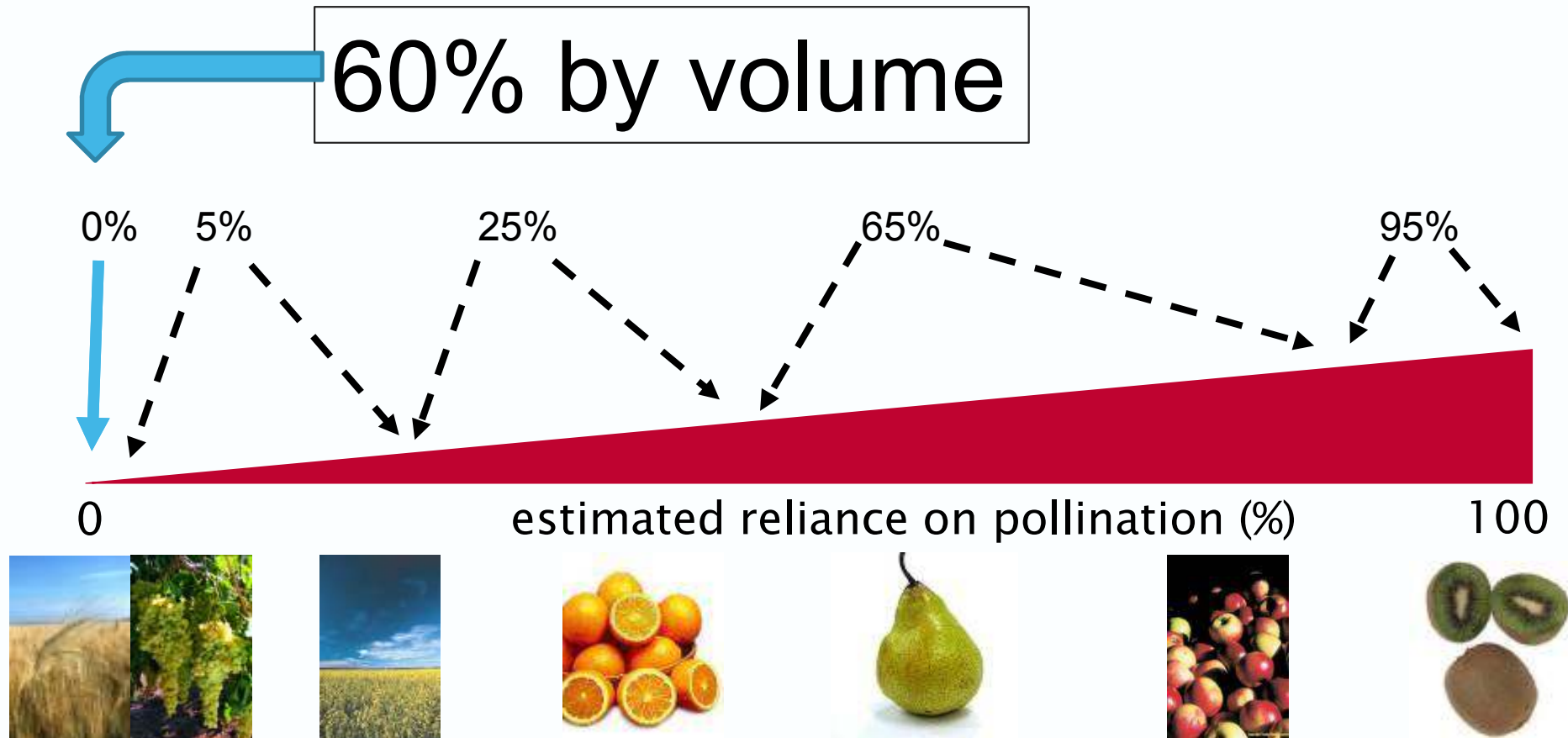


# Pollination spectrum

75% by number of crops



# Pollination spectrum



# Who pollinated my flower?



**Managed  
honey bees**

**Feral honey  
bees**

**Other wild  
insects**

**One species:  
*Apis mellifera***

**Diverse  
native  
species**

# Bee diversity

## Australian Native Bee Fauna



| Family | Notes | # Species |
|--------|-------|-----------|
|--------|-------|-----------|

A  
C  
H  
M  
S

~2,000 bee species in Australia  
~20,000 bee species globally



**Missing:** Andrenidae, Mellitidae, *Apis*, *Bombus*



ALISON BENJAMIN AND BRIAN McCALLUM

# A WORLD WITHOUT BEES



HONEYBEES ARE DYING.

IN AMERICA, ONE IN THREE HIVES WAS LEFT LIFELESS  
AT THE BEGINNING OF 2008.

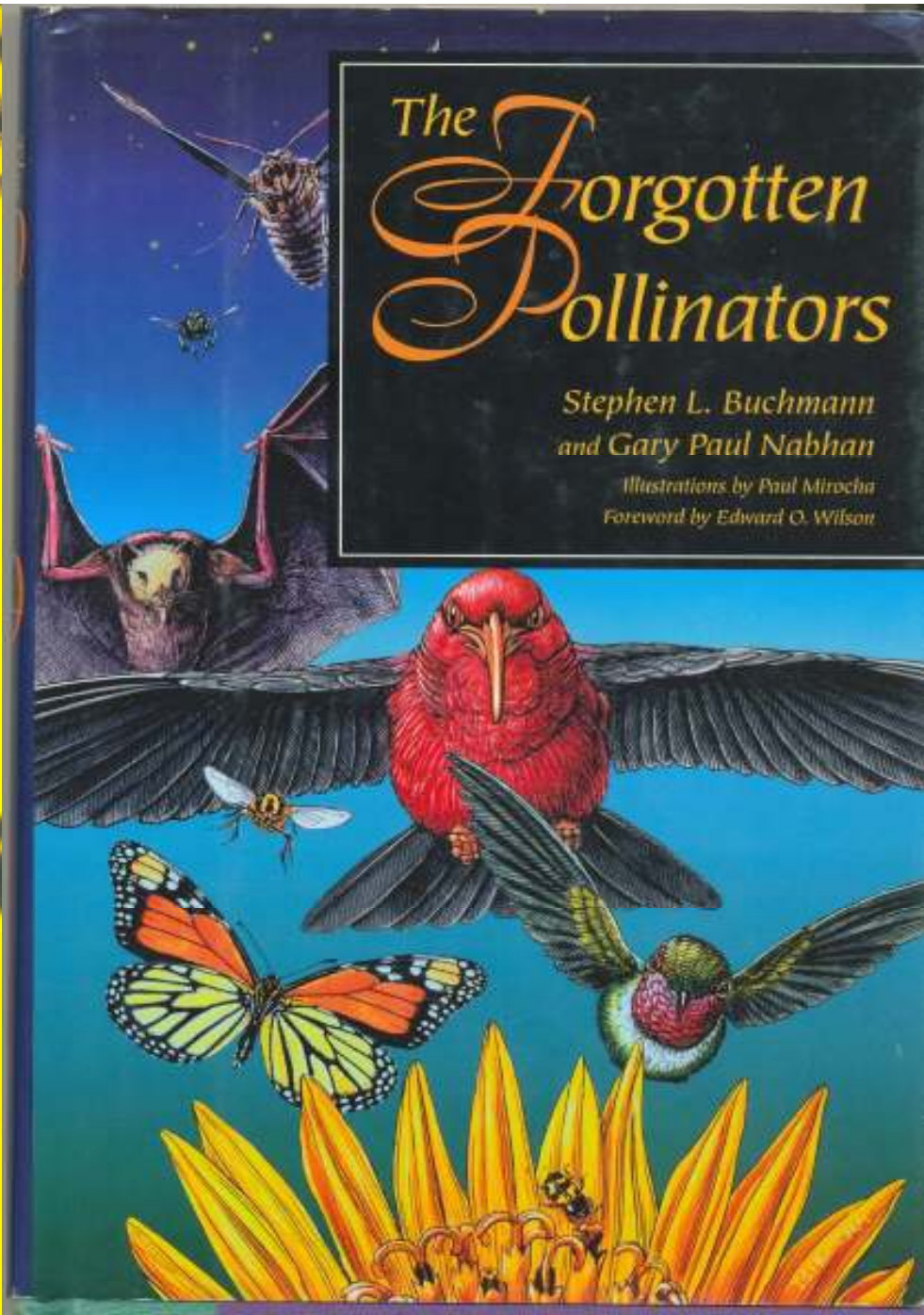
IN FRANCE, THE DEATH RATE WAS MORE THAN  
60 PER CENT.

IN BRITAIN, A GOVERNMENT MINISTER WARNED THAT  
HONEYBEES COULD BE EXTINCT WITHIN A DECADE.

## The Forgotten Pollinators

Stephen L. Buchmann  
and Gary Paul Nabhan

Illustrations by Paul Mirocha  
Foreword by Edward O. Wilson







# Two different stories, different threats

## Wild bees

Habitat loss

Social and economic change

land use change

insecticides

climate change

disease

## Managed honey bees

Habitat loss

Social and economic change

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# Two different stories, different threats

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# Low resilience?



# Who is pollinating?

- Review of 41 crop systems with visit data
- From all around the world
- Most crops DO NOT have managed bees applied



- Wild bees *strongly* associated with better fruit set
- Honey bees only associated with better fruit set in only 14% of studies
- Best outcome with BOTH

Move from the middle of large fields towards a non-crop edge and...

Mean

Stability

*Increases by*

Richness, wild insects

34%

32%

Visits, wild insects

27%

15%

Fruit set

16%

9%

# Non-bee insects just as important as bees for world's crops

ABC Science By Sam Provost

Updated Tue 1 Dec 2015, 8:01am



PHOTO: Insects like this hoverfly are important crop pollinators (David Kleijn)

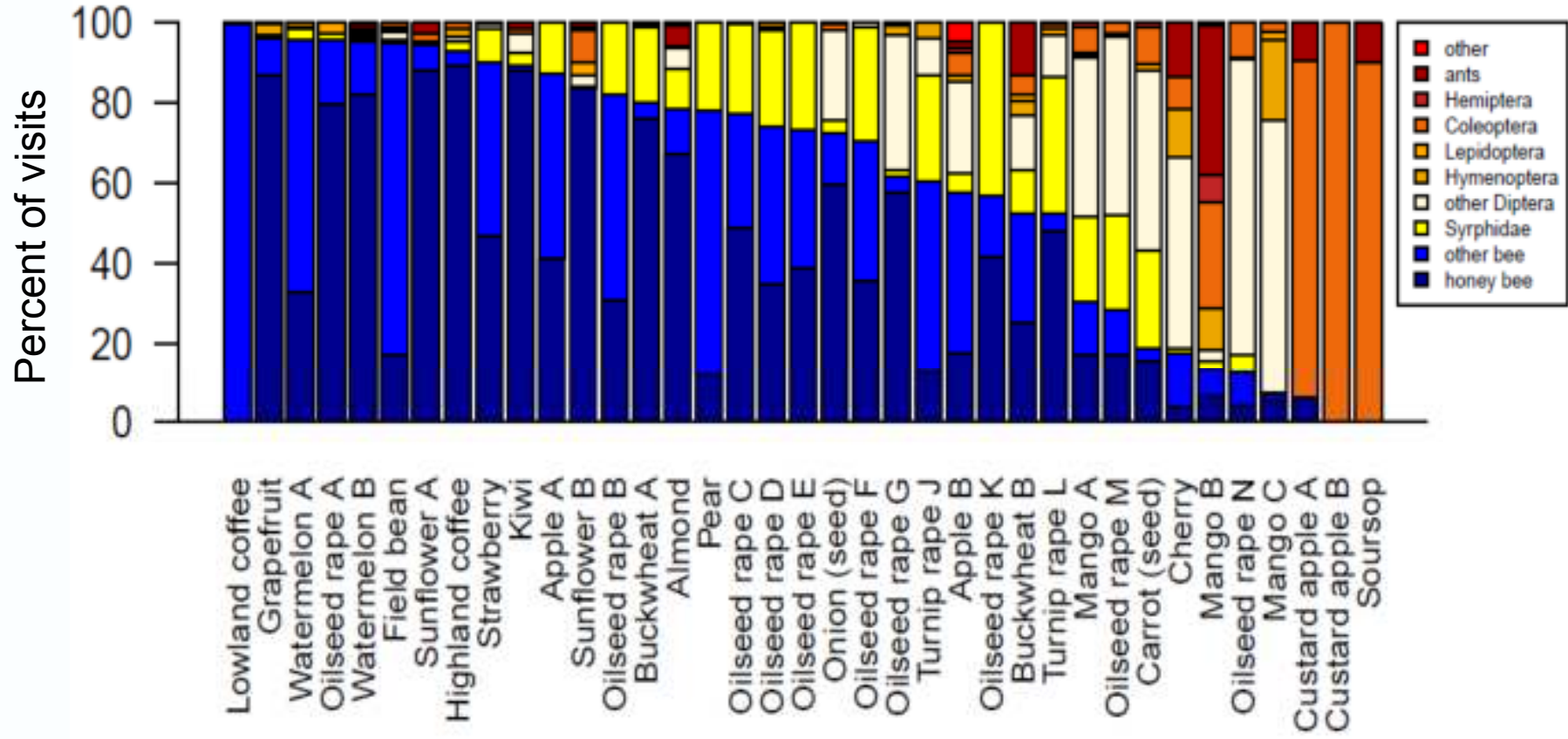
**Although bees are often lauded for their pollination prowess, other insects are just as important for the success of the world's crops, according to a new study.**

The finding, reported in Proceedings of the National Academy of Sciences

**RELATED STORY:** Human use of honeybee products dates back at least 9,000 years

**MAP:** Australia 





# What role for landscape management?





# Landscape benefit of pasture trees

Bee species richness in field traps



ects,

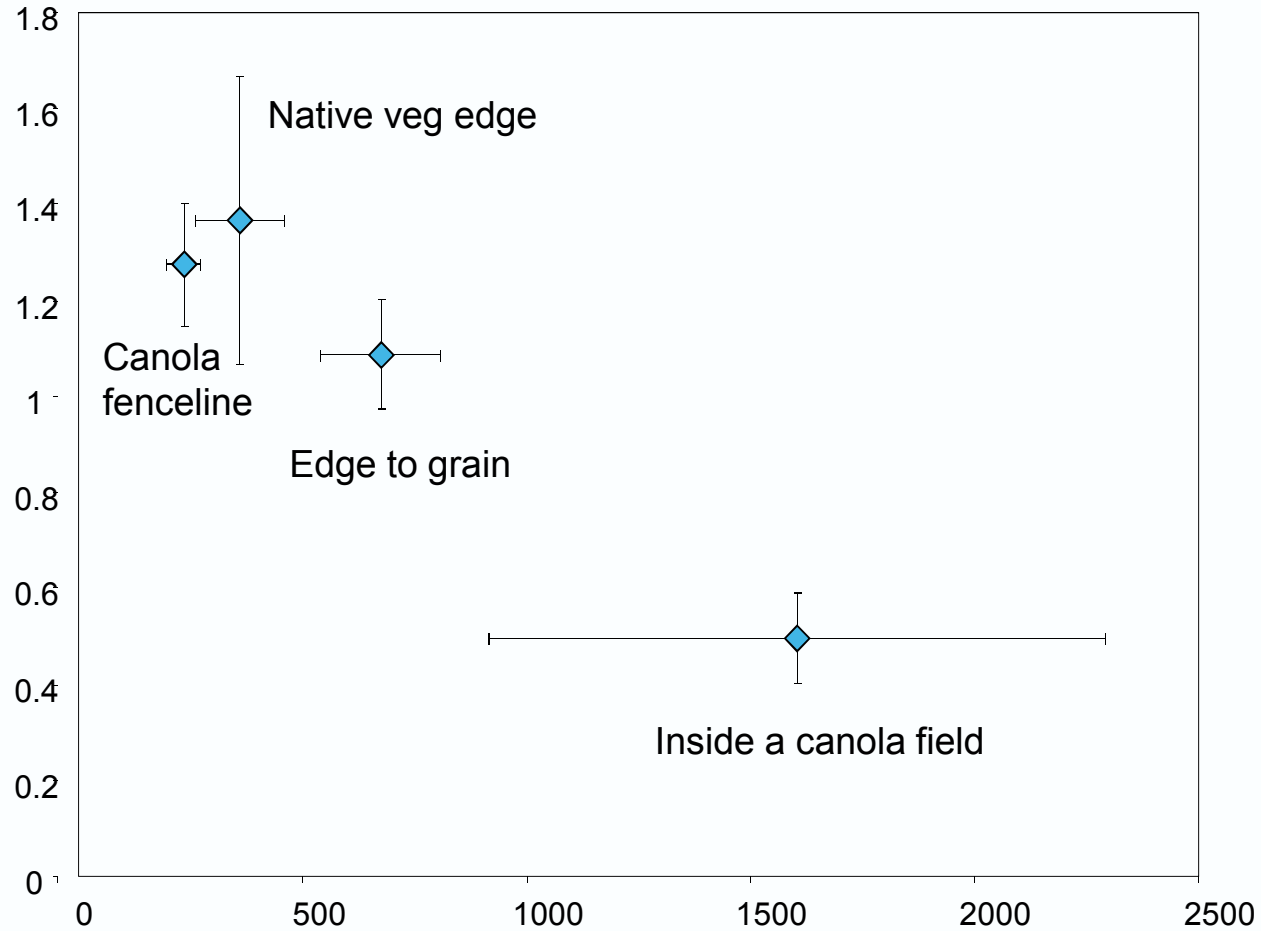
Number of trees <100m from field traps

*Lentini, Martin, Gibbons, Fischer, Cunningham (2012)*



# Edges have higher diversity, lower abundance

**Diversity** (mean shannon)



**ABUNDANCE** (total trapped over 5 weeks, mean across sites)



## Good for abundance:

Any nectar producing flowers!

Nesting resources  
(non ag. patches)



## Good for diversity:

- Patches of non-ag. land (roadsides, remnants, fencelines, uncropped paddocks, etc)
- Scattered trees



Landscape heterogeneity is key!

Keep in mind that most benefits occur within hundreds of meters (this indicates a scale to work on)

Reduce insecticide use, and control spray drift

These strategies provide other biodiversity benefits

