



Research on the benefits of floral strips to support natural enemies and pollinators

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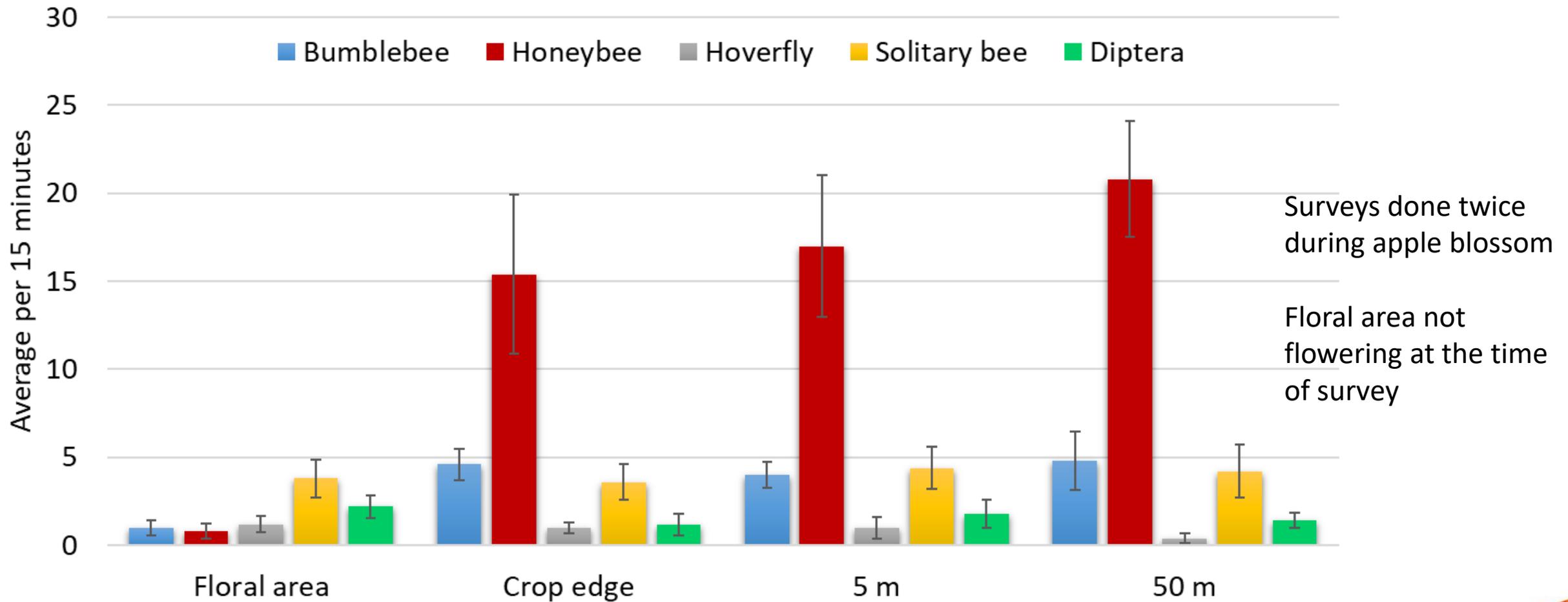
% vegetation cover of wildflower mix

Site	Crop	Sown	2018	2019	2020	2021
B1B	Apple	2016	-	-	50	95
B1F	Rasp	2016	-	-	-	79
B2F	Apple	2016	-	-	90	71
Site 1	Apple	2017	81	65	69	-
Site 4	Apple	2017	42	54	98	93
Site 6	Apple	2017	22	43	59	85
Site 14 Sainfoin	Stw	2019		78	92	99
Site 14 Chicory	Stw	2019		74	95	77
Site 14 Mix	Stw	2019		17	72	99
Site 7	Stw	2020				89
Site 10	Rasp	2020				73
Site 15	Apple	2020				72
Site 16	Apple	2020				99

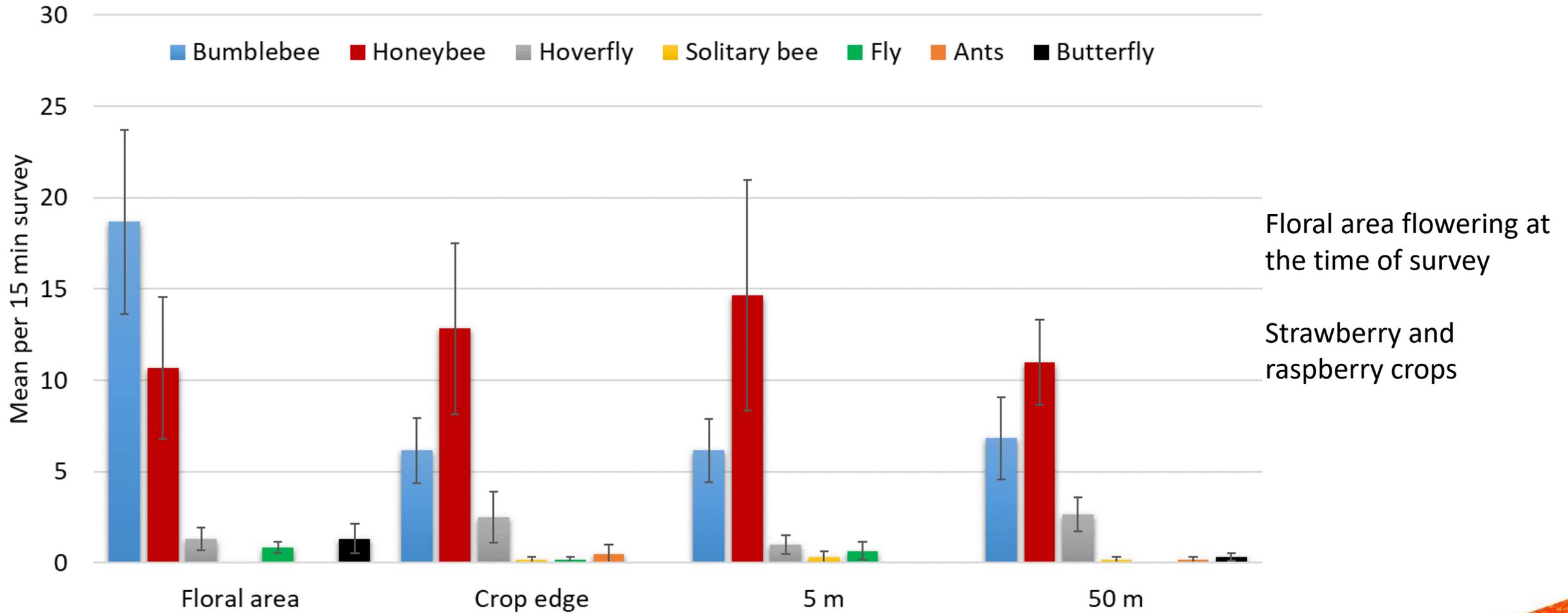
- year not monitored
- * data being analysed



Apple orchards – Pollinator surveys

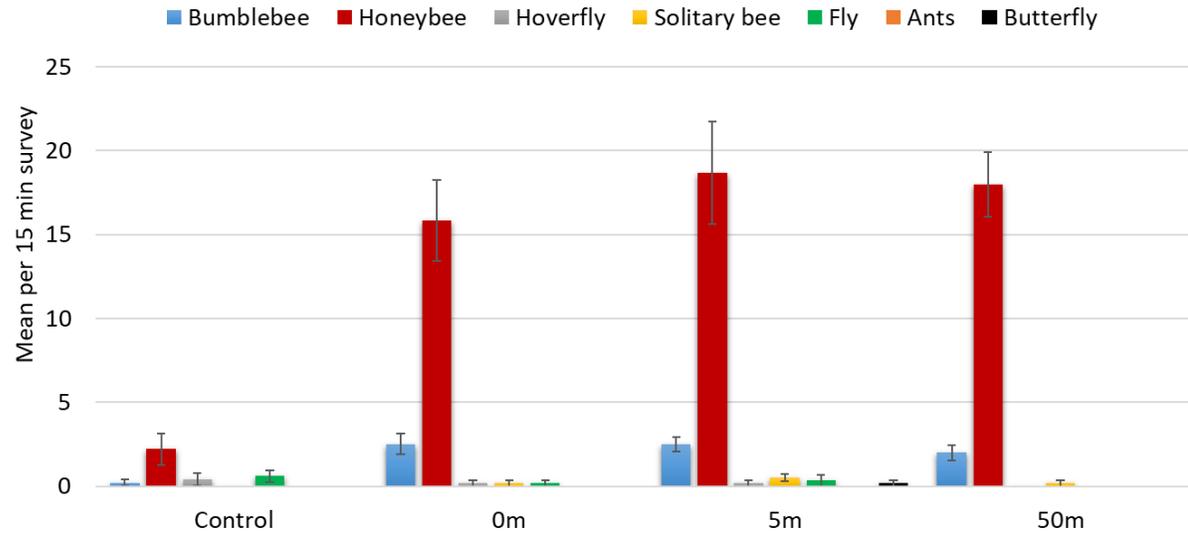


Berry crops – Pollinator surveys 2021

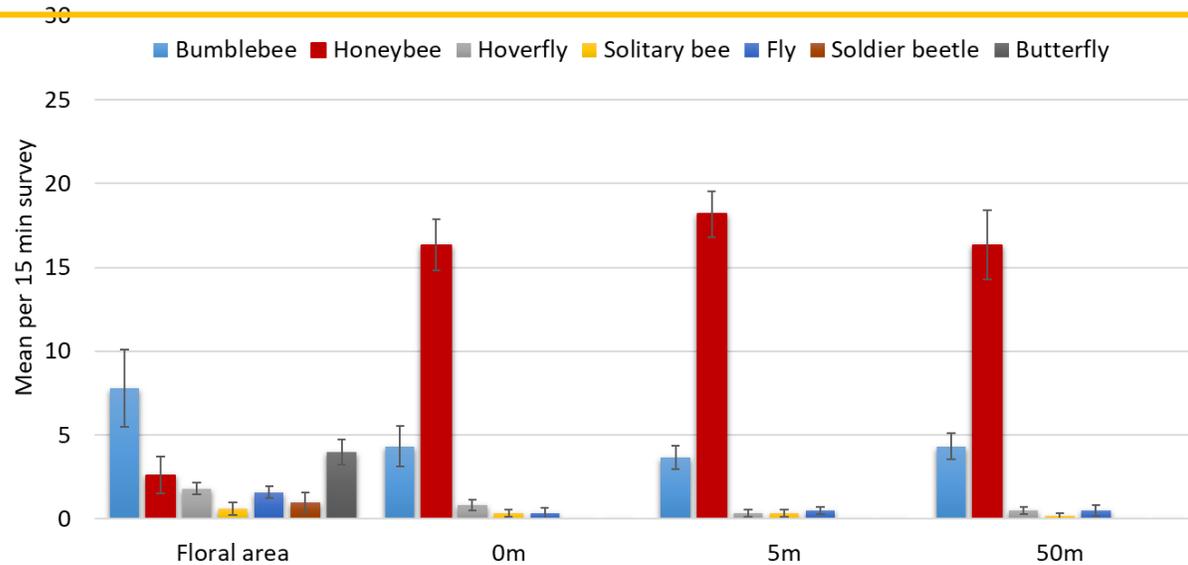


Raspberry crops – Pollinator surveys 2022

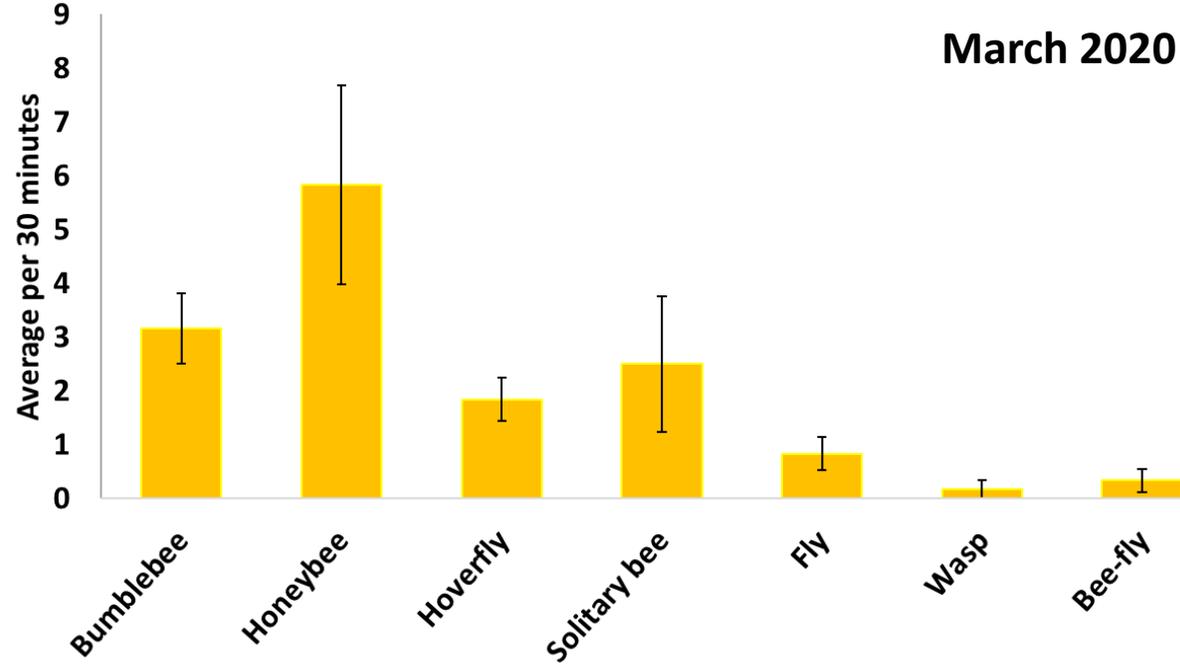
Control



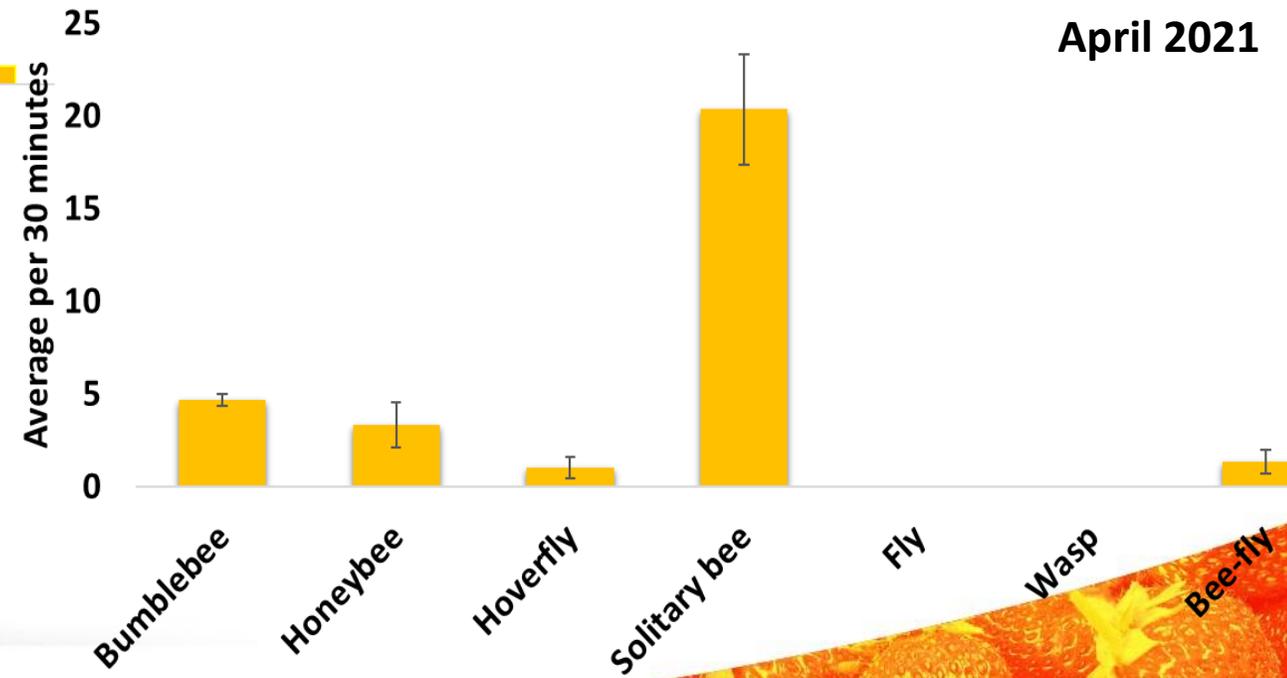
Floral margin



Determining main pollinators in plum



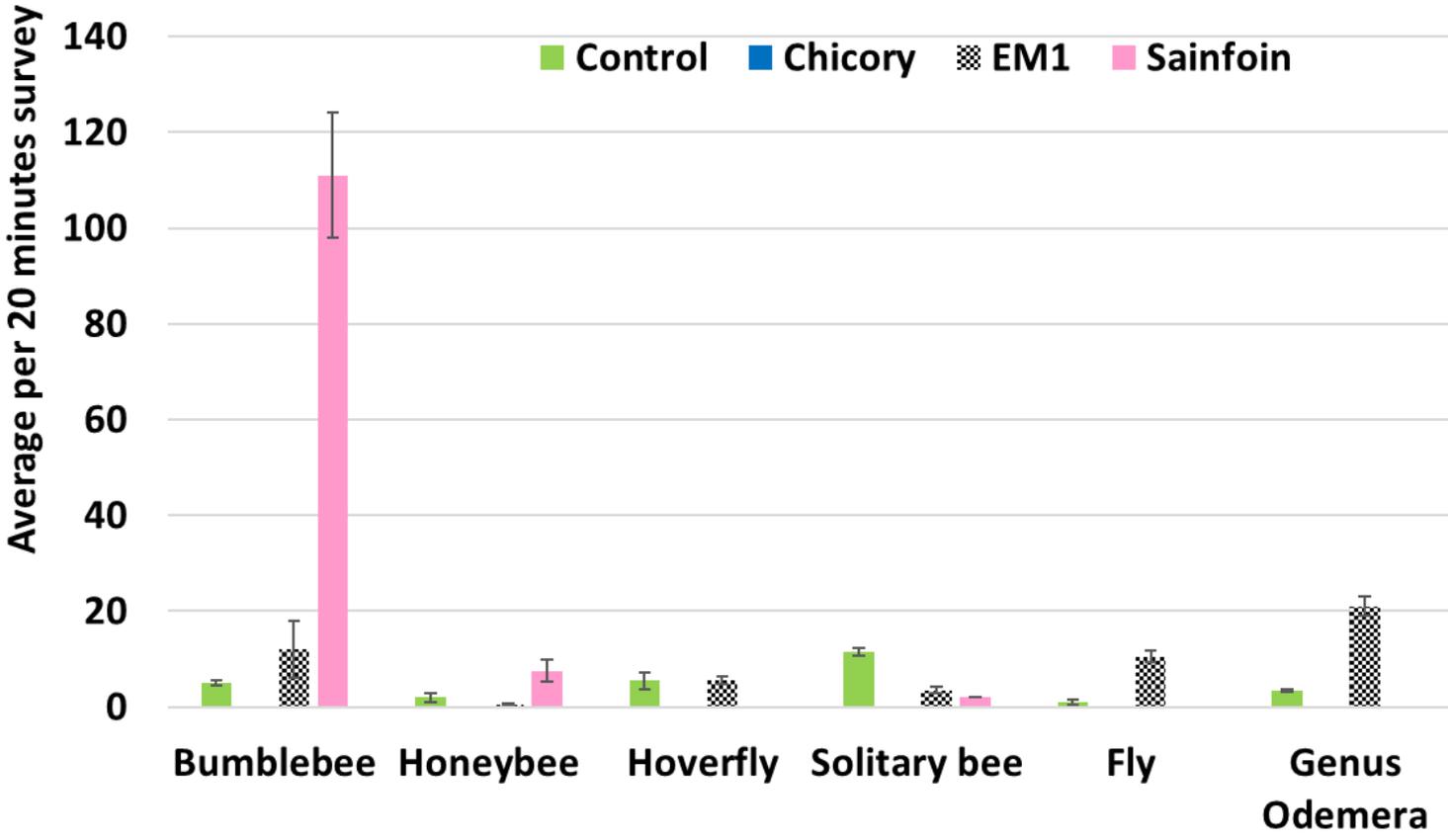
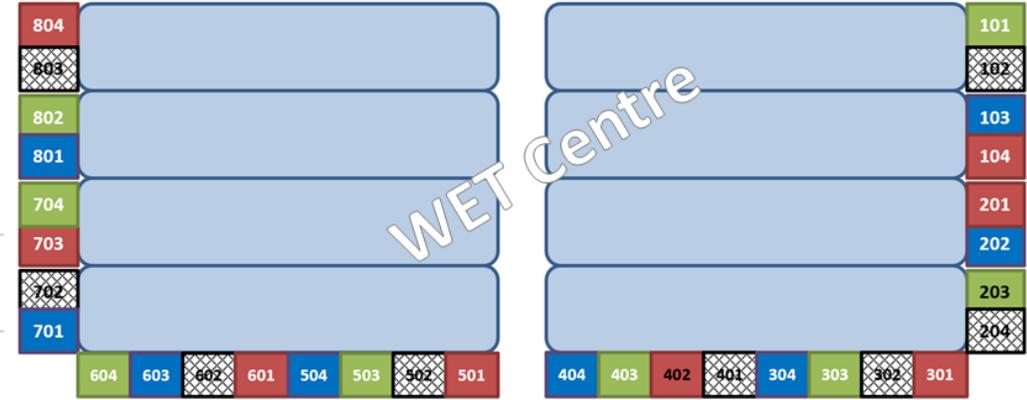
Survey done at blossom



Main pollinators at the WET Centre

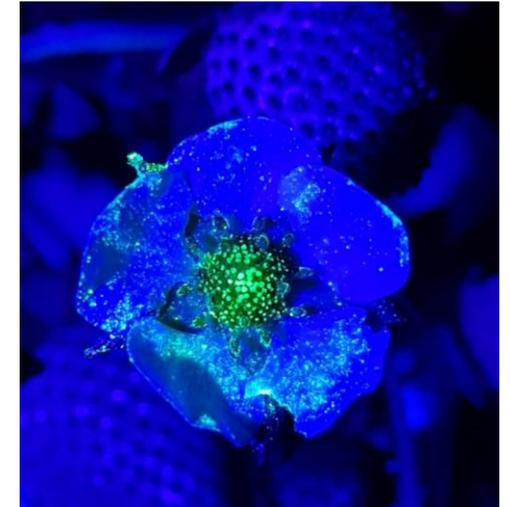
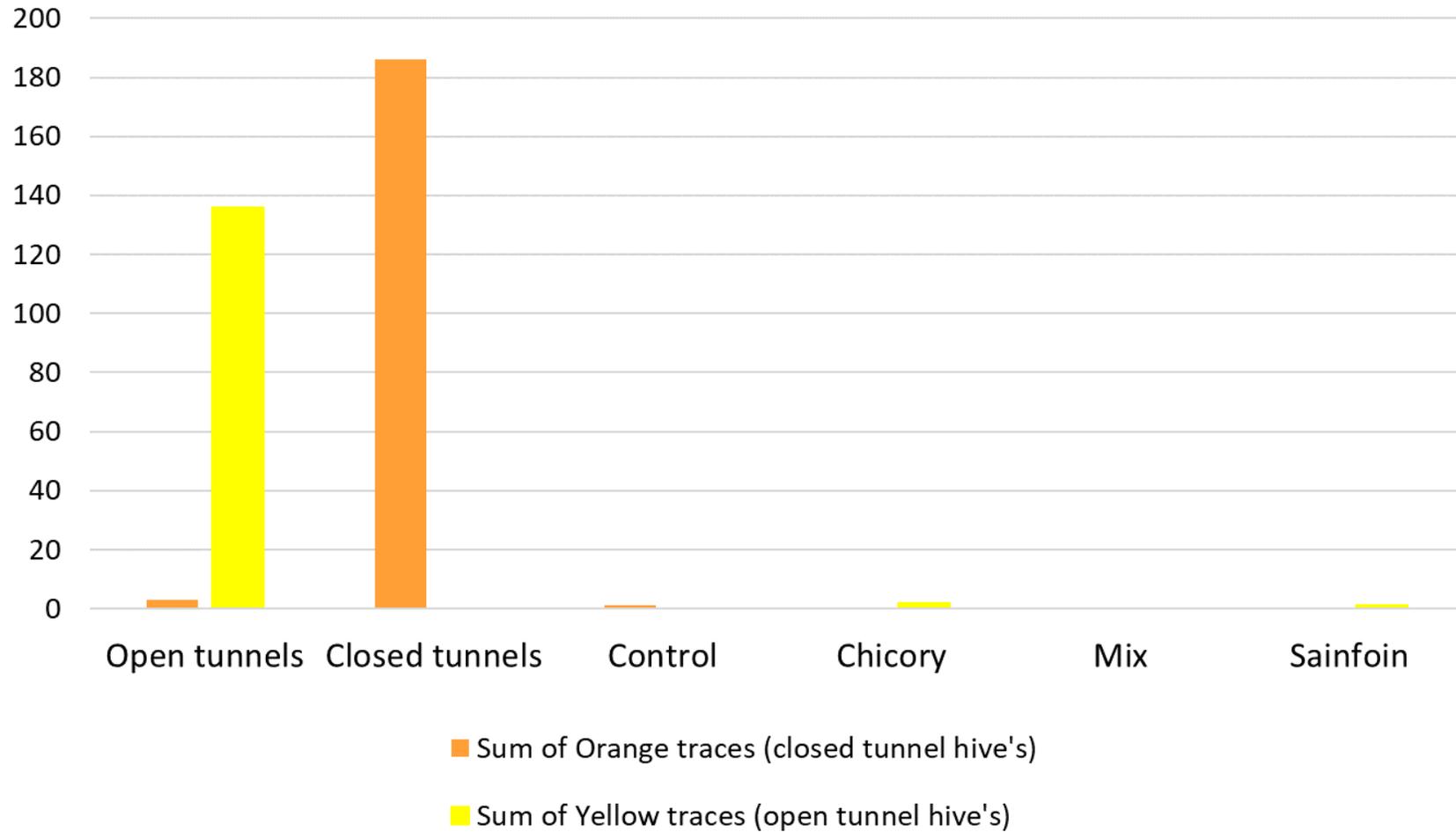


WET Centre



Flowers with fluorescent powder trace – pilot study

Strawberry crop



Interventions in Apple orchards



- six replicate blocks (orchards)
- 0.25 ha was treated with ecological enhancement interventions
- orchards were separated by >1 km

Treatment	Detail
Alleyway sowings	Yarrow, Knapweed, Oxeye daisy, Bird's foot trefoil, Self-heal, Red campion, Red clover



Treated vs Control

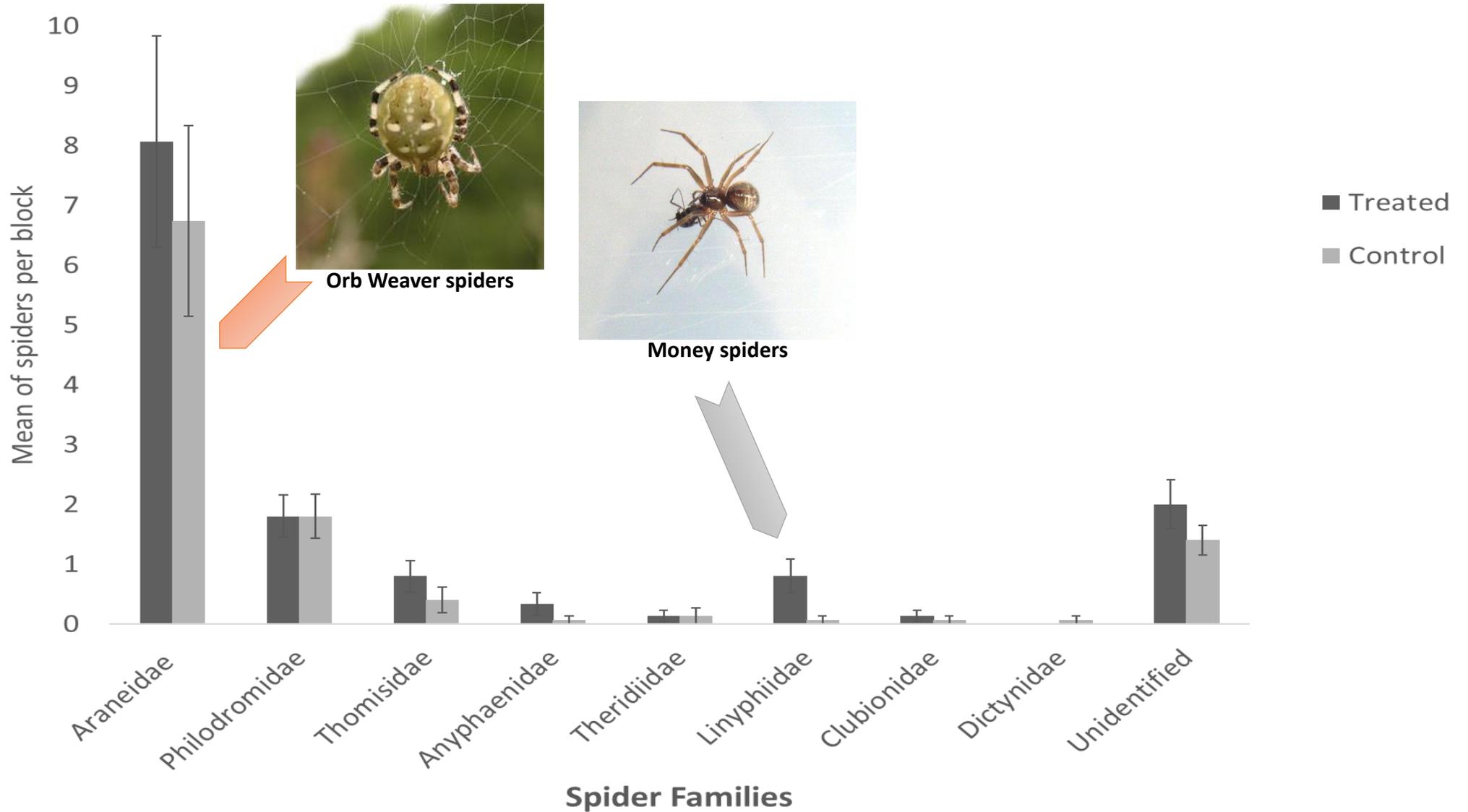
Green = positive effect
Red = negative effect
Black = no effect



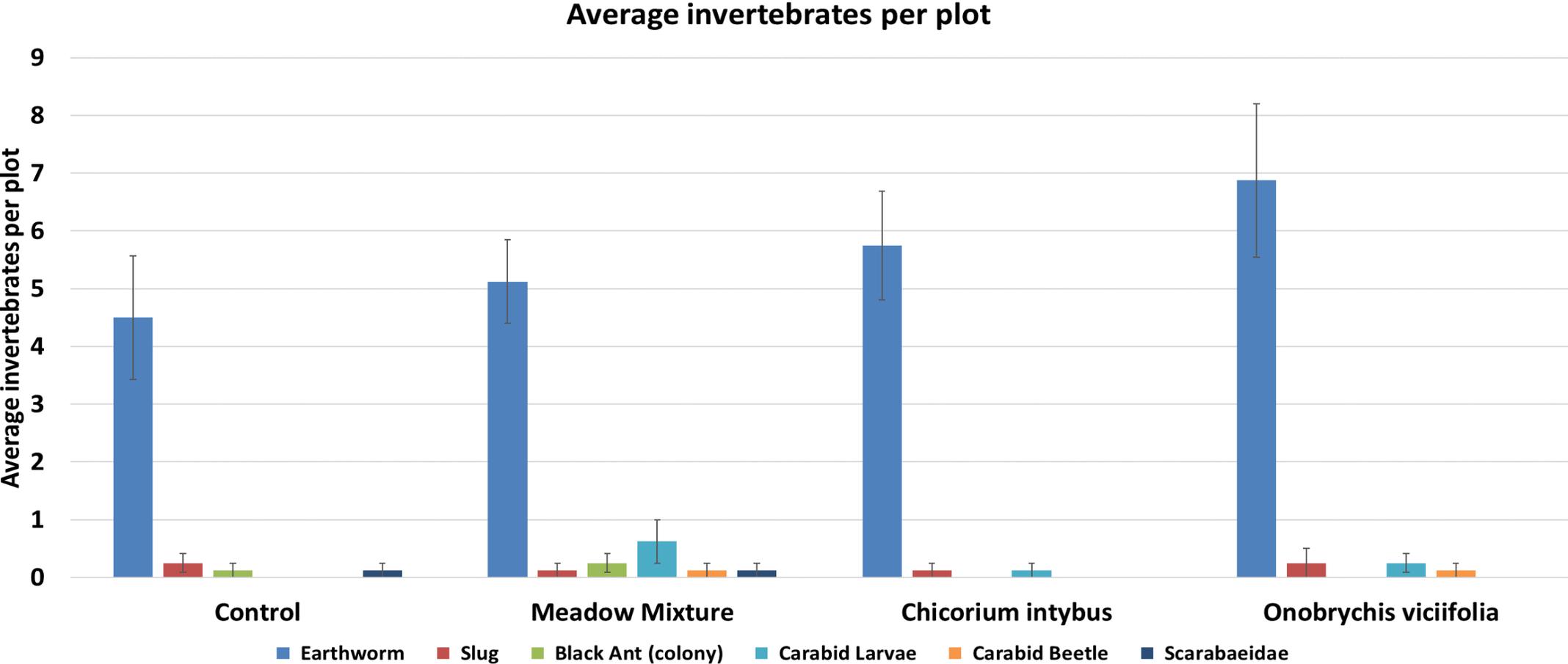
2018	2019	2020
↑ Hoverflies	↓ Codling moth	↑ Lacewings
↓ Codling moth	↑ Predatory spiders	↑ Overall aphids
↓ Aphid		↓ Tortrix
↑ Lacewings		↑ Woolly apple aphid
↑ rust mites		↑ Predatory spiders
↓ fruit tree red spider mite		↑ Anthocorids
		↓ Ladybirds
		↓ Harvestman



Predatory spiders in apple trees



Invertebrates in soil



Arthropods in floral margins 2020 - WET Centre



Green = positive effect Red = negative effect Black = no effect

	May	June	July	August
Unsown (control)	-	-	↑ anthocorids, parasitoids	↑ ground-bugs
EM1	↑ anthocorids ↑ ants ↓ capsids	↑ parasitoids, Oedomera beetles ↓ pollen-beetles	-	-
Sainfoin	↑ ants	↓ pollen-beetles ↑ capsids ↑ aphids	↓ capsids	-
Chicory	↓ capsids	↓ spider, ground-bugs	↓ capsids	-

Thrips in flower species 2020 thrips/flower

	May	June	July	August
<i>Frankliniella occidentalis</i> (WFT)	<1 thrips in all flower species	Chicory (1.6) Self-heal (1.3)	Chicory (1.5) Common knapweed (2.0)	Yarrow (2.0)
<i>Thrips tabaci</i> (Onion thrips)	Dandelion (1.1) Sainfoin (1.1)	Hawkbit (1.7) Mayweed (1.8) Sainfoin (1.3) Yarrow (5.2) Wild carrot (6.7)	Yarrow (1.4) Mayweed (1.2) Wild carrot (4.4)	Detected
<i>Frankliniella intonsa</i> (Flower thrips)	<1 thrips in all flower species	Self-heal (1.2) White clover (5.1)	Detected	Detected
Other thrips species	Dandelion (4.5) Oxeye daisy (1.8)	Bindweed (3.9) Hawkbit (10.9)	Hawkbit (6.7) Common knapweed (2.2)	Hawkbit (13.6)



Farm trial 2021



Edge



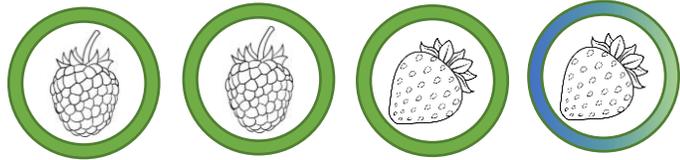
5 m



10 m



50 m



Commercial farms
Sown 2020

NIAB EMR
Sown 2019



Arthropods in floral margin and crop 2021

Green = positive effect
 Red = negative effect
 Black = no effect



	June	July	August	September
Floral margin	-	↑Aphids (crop) ↑Spiders (crop)	↑Spiders (crop)	↑Spiders (crop)
Edge	↑Rose thrips (<i>Thrips fuscipennis</i>) (6)	-	-	-
5m in crop	-	-	-	-
10m in crop	-	-	-	-
50m in crop	-	-	-	-

 Parasitoids, anthocorids in crop and floral margin. Lacewing in crop.



Thrips in flower species 2021 (thrips/flower)

	June	July	August	September
<i>Frankliniella occidentalis</i> (WFT)	Meadow buttercup (1.4)	<1 thrips in all flower species	Common knapweed (4.2)	detected
<i>Thrips tabaci</i> (Onion thrips)	Dandelion (4) Oxeye daisy (1.9) Sainfoin (1.3)	Oxeye daisy (2.5) Yarrow (2.7)	Red clover (1.8) Yarrow (3.1) Sainfoin (1.6)	detected
<i>Thrips fuscipennis</i> (Rose thrips)	Strawberry (6.0)	Sainfoin (4.3) Strawberry (2.2)	Red clover (1.8)	detected
<i>Thrips major</i> (Rubus thrips)	Detected in strawberry	Less than 1 thrips/flower in all flower species	Less than 1 thrips/flower in all flower species	Not found
Other thrips species	Dandelion (19.6) Meadow buttercup (2.9)	Hawkbit (22.6) Red campion (13.1)	Hawkbit (6.2)	Oxtongue (15.8)



Conclusions

- ✔ Pollinators are not adversely affected by floral margins and numbers may even be boosted in the crops
- ✔ The introduction of wildflower strips in apple orchards alleyways generally reduces fruit damage and increased natural enemies numbers
- ✔ Not all plant herbivores in wildflowers are crop pests. Many are not relevant pests to the crop – alternative prey to build up predators numbers
- ✔ In general, the impacts of wildflowers are positive on crops
- ✔ Better spillover if inside crop rather than margin



BEESPOKE FLOWER MIX

%	Scientific name	Common name
14	Centaurea nigra	Common Knapweed
11	Daucus carota	Wild Carrot
6	Echium vulgare	Viper's-bugloss
9	Leontodon hispidus	Rough Hawkbit
17	Leucanthemum vulgare	Oxeye Daisy
13	Lotus corniculatus	Birdsfoot Trefoil
6	Malva moschata	Musk Mallow
12	Prunella vulgaris	Selfheal
6	Succisa pratensis	Devil's-bit Scabious
6	Trifolium hybridum	Alsike Clover (agricultural)

