Are hoverflies good biocontrol agents ?

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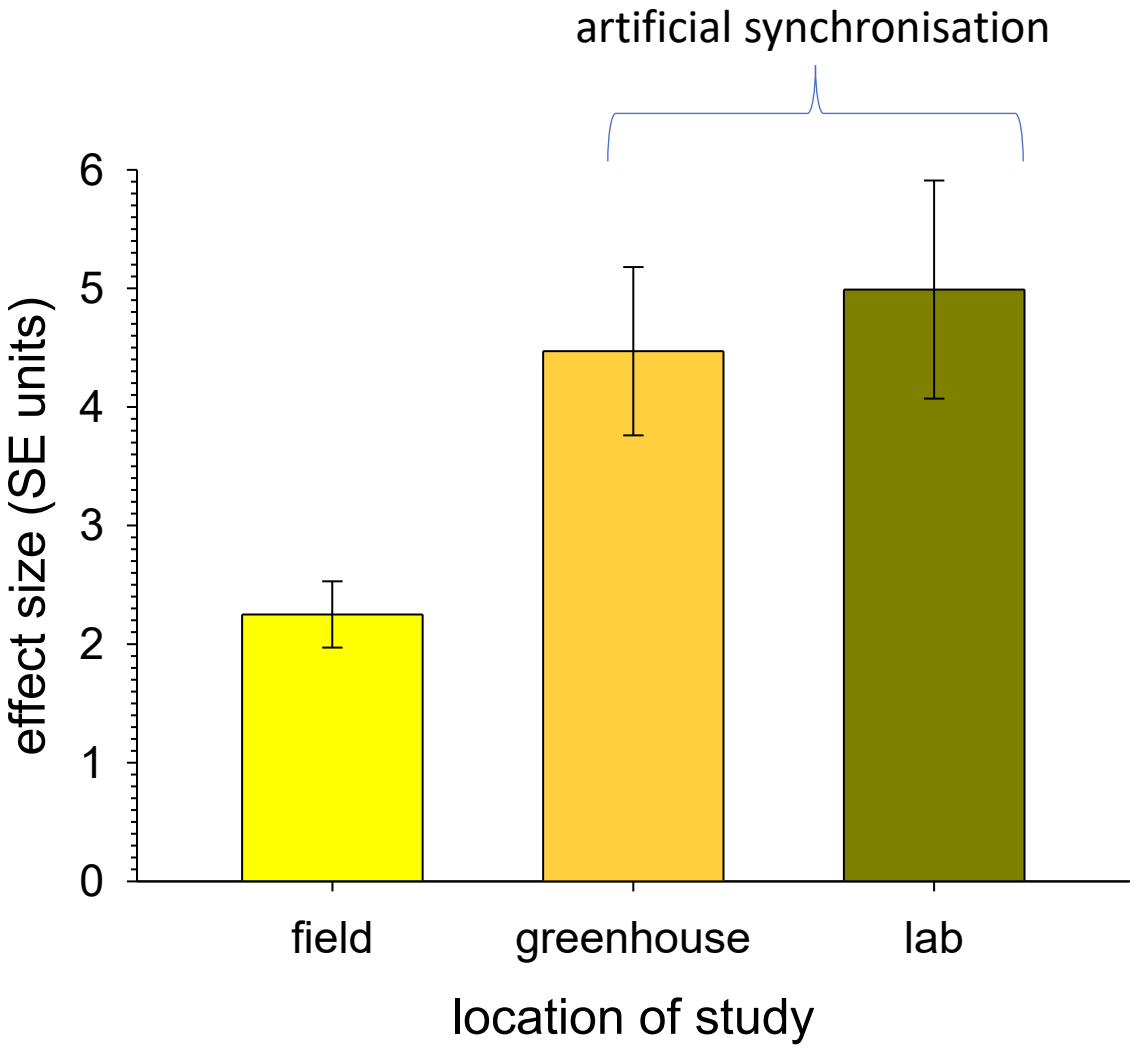
Monograph on syrphid biology

- finished !
- 3-4 vols
- published by CABI
- expensive ! (sorry)

this is a summary of the biocontrol part of the final chapter on ‘Ecosystem services’

biocontrol studies

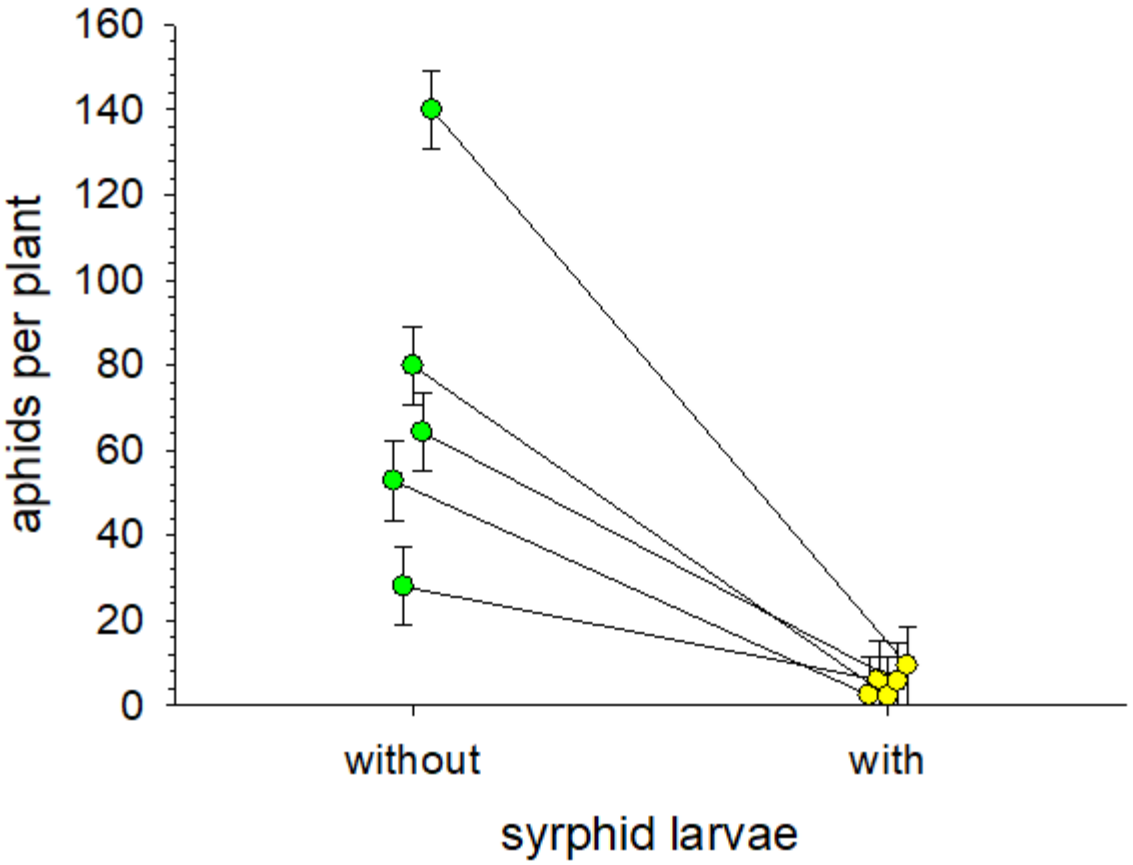
- 295 studies of biocontrol (mostly aphids) involving statements about the effectiveness of syrphid larvae; 164 observational, 131 experimental
- nearly all people interested in field biocontrol do not rear to identify, hence ‘syrphid larvae’; usually the dominant aphidophages; parasitoids rarely important
- 69% conclude that they are effective; more likely (82%) if experimentally manipulate densities
- 36 studies have multiple syrphid:aphid ratios
- 81 studies manipulated predator access


artificial synchronisation
effect size (SE units)
0
1
2
3
4
5
6
field
greenhouse
lab
location of study

	syrphids control?				syrphid rank order								experimental	
type of plant/crop	**no**	**yes**	**%yes**	**total**	**1**	**2**	**3**	**4**	**5**	**abs**	**%first**	**total**	**number**	**%**
sugar beet	1	6	86	7	4	1					80	5	4	57
brassicas	9	30	77	39	24	5		1			80	30	15	38
cereals	15	41	73	56	37	9			4	2	71	52	22	39
citrus	4	8	67	12	7	2			2		64	11	4	33
conifers	6	7	54	13	5	5					50	10	8	62
cucurbits	1	9	90	10	3					1	75	4	9	90
fruit trees	9	24	73	33	19	6	3		1	1	63	30	19	58
legumes	24	18	43	42	4	8	4	3	6		16	25	25	60
lettuce	1	8	89	9	8	1					89	9	4	44
Solanaceae	4	11	73	15	3	4				1	38	8	7	47
trees	5	10	67	15	8	2	2				67	12	3	20
other	12	28	70	40	16	7	4	1	4		50	32	14	35
overall	91	200	69	291	138	50	13	5	17	5	61	228	134	46

lettuces

Toxomerus saved the $2-billion lettuce industry from *Nasonovia*



syrphid biocontrol

- top-down control of aphids is the norm, mainly by specialist aphidophages such as syrphids, esp wild plants
- syrphids are usually the dominant aphidophages, but to show this it is essential to sample the whole 24-hr cycle & to sample destructively
- a correlation between the numbers of predators and prey is totally inadequate to show importance
- hard to know the rate of predation in the field
- syrphids are the best because arrive earlier at lower aphid densities, & numerical response better; *Aphidoletes* act too late
- especially good in greenhouses where can synchronise