

Bulletin of Insectology Supplemental Material

Title: **Field trials to enhance kiwifruit production using *Osmia bicornis* and supplementary flowering plants**

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Table S1. Position, area and number of experimental sites of the 3 kiwifruit orchards involved in the study. The municipality where the orchard is located is shown in brackets. * To protect privacy, the geographic coordinates have been rounded to reduce location accuracy.

Orchard ID	Coordinates (*)	Area	N. of experimental sites
1 (Cesena)	44.1°N 12.1°E	16667 m ²	2
2 (Faenza)	44.3°N 11.8°E	63174 m ²	4
3 (Ravenna)	44.2°N 12.1°E	37906 m ²	3

Table S2. The mixture of seeds obtained by the integration of the commercial mix “APISTICO AUTUNNALE” with a 3% in weight of *Camelina sativa*. In the table the scientific name and the commercial one are reported, as the percentages in weight and in number of seeds respectively.

Species	Cultivar	Weight (%)	N. seeds (%)
<i>Phacelia tanacetifolia</i> Benth.	Balo	11.6	15.5
<i>Vicia villosa</i> Roth	Montsia	11.6	0.5
<i>Linum usitatissimum</i> L.	Kaolin	9.7	3.0
<i>Onobrychis viciifolia</i> Scop.	Esparsette	9.7	1.3
<i>Trifolium squarrosum</i> L.	Squarroso	9.7	4.7
<i>Lotus corniculatus</i> L.	Gran San Gabriele	8.7	19.4
<i>Trifolium incarnatum</i> L.	Carmina	8.7	7.1
<i>Trifolium pratense</i> L.	Krynja	7.8	13.0
<i>Trifolium alexandrinum</i> L.	Erix	4.9	4.8
<i>Melilotus albus</i> Medik.	Meliloto Bianco	3.9	5.5
<i>Melilotus officinalis</i> (L.) Lam	Meliloto Giallo	3.9	5.5
<i>Trifolium resupinatum</i> L.	Marco Polo	3.9	13.0
<i>Brassica napus</i> var. <i>oleifera</i> Delile	Perko	2.9	1.9
<i>Camelina sativa</i> (L.) Crantz	Alba+Lenska+CCE44	3.0	4.9

Table S3. Pollen analyses of samples collected from nesting stations. Results are reported as the percentage of pollen grains found in each sample, relative nesting station and orchard are indicated. Traces (>5%) are cumulated.

Orchard	Nesting station	<i>Actinidia chinensis</i> Planch	<i>Quercus</i> L.	<i>Papaver</i> L.	<i>Gleditsia</i> L.	<i>Robinia</i> L.	<i>Juglans</i> L.	<i>Ranunculus</i> L.	Traces
1 (Cesena)	1.1	0	98	2	0	0	0	0	0
1 (Cesena)	1.2	0	89	0	2	5	4	0	0
1 (Cesena)	1.3	3	77	9	8	0	0	0	3
1 (Cesena)	2.1	0	48	1	0	0	50	0	1
1 (Cesena)	2.2	6	91	0	0	3	0	0	0
1 (Cesena)	2.3	3	94	0	0	3	0	0	0
2 (Faenza)	1.1	0	86	3	8	0	0	0	3
2 (Faenza)	1.2	0	60	0	31	7	0	0	2
2 (Faenza)	1.3	0	100	0	0	0	0	0	0
2 (Faenza)	2.1	0	83	17	0	0	0	0	0
2 (Faenza)	2.2	0	72	14	8	3	0	0	0
2 (Faenza)	2.3	52	25	23	0	0	0	0	0
2 (Faenza)	3.1	0	97	3	0	0	0	0	0
2 (Faenza)	3.1	0	71	18	9	2	0	0	0
2 (Faenza)	3.3	0	100	0	0	0	0	0	0
2 (Faenza)	4.1	0	87	0	13	0	0	0	0
2 (Faenza)	4.2	0	93	0	3	3	0	0	1
2 (Faenza)	4.3	0	89	5	3	3	0	0	0
3 (Ravenna)	1.1	57	36	0	2	2	0	0	0
3 (Ravenna)	1.2	57	0	10	27	0	1	2	5
3 (Ravenna)	1.3	68	0	1	31	0	0	0	0
3 (Ravenna)	2.1	88	0	1	4	1	6	0	0
3 (Ravenna)	2.2	75	0	0	0	12	1	7	12
3 (Ravenna)	2.3	98	2	0	0	0	0	0	0
3 (Ravenna)	3.1	92	0	0	0	7	0	0	1
3 (Ravenna)	3.1	89	0	0	0	4	7	0	0
3 (Ravenna)	3.3	99	1	0	0	0	0	0	0

Table S4. Data collected from each nesting station indicating the cells containing female cocoons (F), male cocoons (M), parasitized cells (P), cells containing dead egg/larvae (D) and total number of cells (total). Fertility (total cells/egg laid respect to released adults) and fecundity (total vital cocooned bees respect to released adults) are reported as percentage.

Orchard	Nesting station	F	M	P	D	Total	Fertility (eggs laid)	Fecundity (vital cocoons)
1 (Cesena)	1	9	10	2	4	25	4.56%	3.45%
1 (Cesena)	2	96	42	4	64	206	37.45%	25.09%
2 (Faenza)	1	360	535	23	226	1144	208%	162.72%
2 (Faenza)	2	256	312	9	110	687	124.9%	103.27%
2 (Faenza)	3	290	449	4	102	845	153.63%	134.36%
2 (Faenza)	4	184	241	1	61	487	88.54%	77.27%
3 (Ravenna)	1	151	325	46	76	598	108.72%	86.54%
3 (Ravenna)	2	243	470	65	62	840	152.72%	129.63%
3 (Ravenna)	3	106	346	57	55	564	102.54%	82.18%

Table S5. Percentage of flower coverage in proximity of each nesting station obtained from the average of the floral coverage percentage of the 1 × 1 m plots reported separately for each date where data have been collected.

Orchard	Experimental site	Flower coverage 1	Flower coverage 2	Vegetation type
1 (Cesena)	1	7%	7.33%	spontaneous (mowed)
1 (Cesena)	2	15%	18.33%	cover crop
2 (Faenza)	1	8%	23.33%	cover crop
2 (Faenza)	2	4.33%	15%	spontaneous (mowed)
2 (Faenza)	3	4.33%	21.66%	cover crop
2 (Faenza)	4	0%	0%	spontaneous (mowed)
3 (Ravenna)	1	6%	14%	cover crop
3 (Ravenna)	2	1%	2.33%	spontaneous (mowed)
3 (Ravenna)	3	18.33%	23.33%	cover crop

Table S6. Records of insect pollinators in the study orchards are reported separately for each transect and repetition, divided by species or morphogroup. Sampling rounds 1 and 2 took place respectively on May 6 and 8 2023.

Orchard	Transect	Round	<i>O. bicornis</i>	<i>A. mellifera</i>	<i>Bombus</i> spp.	Hoverflies	Other wild bees	Other pollinators	Total
1 (Cesena)	1	1	0	0	9	0	2	0	11
1 (Cesena)	2	1	0	0	20	0	2	0	22
1 (Cesena)	1	2	0	0	8	0	0	0	8
1 (Cesena)	2	2	0	0	14	1	0	0	15
2 (Faenza)	1	1	0	0	0	0	9	0	9
2 (Faenza)	2	1	0	1	0	0	7	0	8
2 (Faenza)	3	1	0	3	0	1	6	1	11
2 (Faenza)	4	1	0	10	0	9	6	0	15
2 (Faenza)	1	2	0	5	0	1	5	1	12
2 (Faenza)	2	2	0	0	0	1	1	0	2
2 (Faenza)	3	2	0	1	0	0	0	0	1
2 (Faenza)	4	2	0	0	0	0	0	1	1
3 (Ravenna)	1	1	1	0	0	3	1	4	9
3 (Ravenna)	2	1	1	0	3	2	1	0	7
3 (Ravenna)	3	1	0	0	0	0	0	0	0
3 (Ravenna)	1	2	0	0	2	0	0	0	2
3 (Ravenna)	2	2	0	0	3	0	0	0	3
3 (Ravenna)	3	2	0	0	0	0	0	0	0

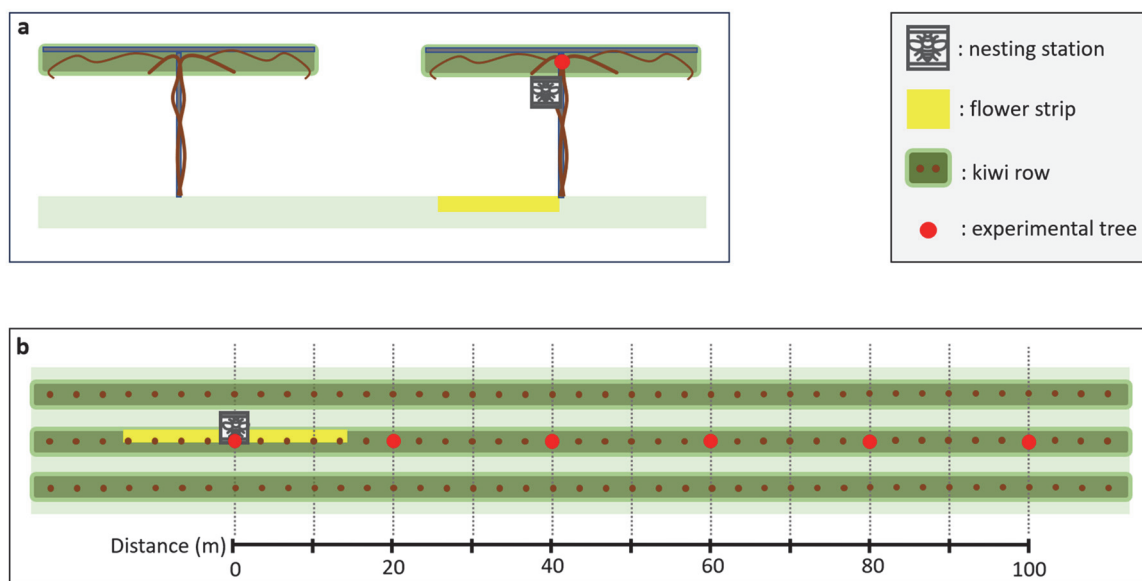


Figure S1. Representation of an experimental site, **a)** view from the head of the orchard row, **b)** top view of the experimental site.