**Supplementary tables**

**Table S1.** Relationship between average fruit weight (AWT, mostly fresh weight) and the number of achenes (gynoecia or seeds) per fruit in strawberry. s.e. = standard error. Data from the studies indicated in the table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Country | Experimental set-up | *N* | Range in AWT (g) | Range in the number of achenes | *P* value from linear relationship between AWT & the number of achenes | *R*2 value from linear relationship between AWT & the number of achenes | Slope (± s.e.) from linear relationship between AWT & the number of achenes |
| Valleau (1918) | United States | Three cultivars/species × 3 types of flowers. | 9 | 8.3-28.0 | 77-382 | 0.033 | 0.42 | 0.0516 ± 0.0198 |
| Nitsch (1950) | United States | Eight types of fruit. | 8 | Approx. 0.23-2.73 (18 days) | Approx. 13-133 | < 0.001 | 0.90 | 0.0185 ± 0.0024 |
| Janick & Eggert (1968) | United States | Five cultivars × 7 fruit types. | 388 | Approx. 2-14 g | Approx. 50-350 | 0.01 | 0.58 (r = 0.76) | - |
| Eaton & Chen (1969) | United States | Five concentrations of captan × 2 cultivars. | 10 | 6.7-13.8 | 45-257 | 0.002 | 0.68 | 0.0319 ± 0.0072 |
| Foster & Janick (1969) | United States | Seven types of fruit. | 7 | 2.6-16.5 | 95-422 | < 0.001 | 0.97 | 0.0422± 0.0031 |
| Abbott et al. (1970) | United Kingdom | ‘Redgauntlet’, with fruit with six densities of achenes. | - | - | - | - | 0.83-0.96 | 0.1089, 0.0936, 0.0806, 0.0733, 0.0657, & 0.0501 |
| Abbott et al. (1970) | United Kingdom | ‘Cambridge Vigour’, with fruit with five densities of achenes. | - | - | - | - | 0.67-0.86 | 0.0626, 0.0397, 0.0379, 0.0359, & 0.0320 |
| Moore et al. (1970) | United States | Four cultivars × 3 types of fruit. | 12 | 2.3-22.2 | 22-237 | 0.01 | 0.81 | 0.0591 ± 0.0086 |
| Thompson (1971) | United Kingdom | Three pollination treatments × 3 temperatures × 3 photoperiods × 2 types of fruit. | 32 | 9.3-37.8 | 18-265 | 0.019 | 0.14 | 0.0437 ± 0.0176 |
| Hortyński et al. (1972) | Poland | Crosses between 7 female × 7 male parents. | 49 | 1.5-11.6 | 12-188 | < 0.001 | 0.56 | 0.0445 ± 0.0156 |
| Hulewicz & Hortyński (1972) | Poland | Nine or eleven cultivars over 2 years. | 20 | 3.2-13.8 | 122-250 | 0.01 | 0.28 | 0.0465 ± 0.0161 |
| Webb et al. (1974) | United Kingdom | Thirteen cultivars/seasons × 4 types of fruit. | 50 | 4.5-28.0 | 95-428 | < 0.001 | 0.93 | 0.0568 ± 0.0023 |
| Brandstveit (1978) | Norway | Five years of cropping. | 5 | 9.1-1.7 | 115-130 | 0.003 | 0.95 | 0.1485 ± 0.0172 |
| Webb et al. (1978) | United Kingdom | Eighteen cultivars/seasons × 4 types of fruit. | 72 | 4.9-25.1 | 93-363 | < 0.001 | 0.98 | 0.0734 ± 0.0011 |
| Øydvin (1984) | Norway | Thirteen cultivars × 4 types of fruit. | 51 | 1.7-47.8 | 43-1221 | < 0.001 | 0.68 | 0.0460 ± 0.0044 |
| Øydvin (1984) | Norway | Sixteen clones of wild species × 4 types of fruit. | 58 | 0.5-5.0 | 11-13 | < 0.001 | 0.20 | 0.0105 ± 0.0027 |
| Strik & Proctor (1988) | Canada | Four cultivars × 2 growing systems. | 8 | 8.5-13.9 | 225-396 | 0.096 | 0.29 | - |
| Hortyński et al. (1991) | Poland | Nine cultivars × 3 types of fruit. | 27 | 2.9-19.0 | 72-264 | < 0.001 | 0.80 | 0.0792 ± 0.0076 |
| Khanizadeh et al. (1993) | Canada | Six cultivars | 6 | 5.4-7.0 | 93-167 | 0.723 | - | - |
| Hansen (1995) | Denmark | Two cultivars × 3 types of fruit. | 6 | 5.9-16.6 | 112-226 | < 0.001 | 0.99 | 0.0896 ± 0.0046 |
| Mori (1998) | Japan | Three cultivars × 3 temperatures. | 9 | 19.9-32.9 | 339-568 | < 0.001 | 0.99 | 0.0533 ± 0.0055 |
| Kaczmarska et al. (2008) | Poland | Nine cultivars. | 9 | 9.4-16.4 | 236-378 | 0.315 | - | - |
| Ariza et al. (2011) | Spain | Three cultivars × 2 types of fruit. | 6 | 11.1-28.4 | 157-336 | 0.054 | 0.56 | 0.0662 ± 0.0245 |
| Sun et al. (2012) | China | Single cultivar with different fruit samples. | - | Approx. 0.5-4.0 (Dry weight) | Approx. 50-300 | < 0.01 | 0.91 | 0.0136 |
| Shokaeva et al. (2014) | Russia | Eight twelve cultivars over 2 years. | 22 | 9.6-16.3 | 383-719 | 0.668 | - | - |
| Interiano Zapata et al. (2014) | Mexico | Four pollination treatments. | 150 | - | - |  | 0.91-0.98 | 0.0413, 0.0376, 0.0414, & 0.0338 |
| Rahman et al. (2015) | Bangladesh | Thirteen cultivars. | 13 | 5.1-18.7 | 187-473 | < 0.001 | 0.93 | 0.0393 ± 0.0030 |
| Herbertsson et al. (2017a) | Sweden | Different numbers of flowers previously visited by “pollinators’. | 60 | 1-25 | 10-350 | < 0.001 | - | 0.0420 |
| Herbertsson et al. (2017b) | Sweden | Different levels of grasslands. | - | 1-25 | 10-350 | < 0.001 | Non-linear | - |
| Dung et al. (2021) | Australia | One cultivar with different fruit samples. | 470 | 0.6-32.8 | 21-847 | < 0.001 | 0.46 | 0.0396 ± 0.0020 |

**Table S2.** Insects associated with pollination in strawberry. Data from the studies indicated in the table.

|  |  |  |
| --- | --- | --- |
| Reference | Location | Relative importance of different species |
| Free (1968a) | United Kingdom | The flowers were effectively pollinated by honeybees. |
| Free (1968b) | United Kingdom | Ninety-seven percent of visits to the flowers were due to honeybees and 3% due to bumblebees. |
| Moore (1969) | United States | Honeybees were effective pollinators of the flowers. |
| Jaycox (1970) | United States | Most of the flowers were visited by honeybees. |
| Connor (1972) | United States | The most common visitors to the flowers were species of Halictidae (50.5 ± 1.1% of total), followed by honeybees (21.5 ± 2.5%) & species of Andrenidae (17.0 ± 2.1%). |
| Connor & Martin (1973) | United States | Honeybees were effective pollinators of the flowers. |
| Nye & Anderson (1974) | United States | The most common pollinators were honeybees (66% of total) followed by Syrphidae (hoverflies). |
| Jaycox (1979) | United States | Most of the flowers were visited by honeybees. |
| Lackett & Burkhardt (1979) | United States | Honeybees were effective pollinators of the flowers. |
| Sannino & Priore (1979) | Italy | Honeybees were effective pollinators of the flowers. |
| Singh (1979) | India | Fifty-eight percent of visits to the flowers were due to honeybees and 42% due to bumblebees. |
| Pion et al. (1980) | Canada | The most common visitors to the flowers were honeybees (55 ± 10% of total), followed by sweat bees (27 ± 2%) & Syrphid flies (18 ± 9%). |
| Petersen (1983) | United States | Honeybees were effective pollinators of the flowers. |
| Antonelli et al. (1988) | United States | Honeybees & hoverflies were the main insects pollinating the flowers. |
| Bagnara & Vincent (1988) | Canada | Honeybees were the main insects pollinating the flowers. |
| Goodman & Oldroyd (1988) | Australia | Honeybees were effective pollinators of the flowers. |
| Blasse & Haufe (1989) | Germany | Honeybees were effective pollinators of the flowers. |
| Chagnon et al. (1989) | Canada | The flowers were pollinated by honeybees. |
| Matsuka & Sakai (1989) | Japan | Production in greenhouses was dependent on honeybees. |
| Couston (1991) | United Kingdom | Honeybees were effective pollinators of the flowers. |
| De Oliveira et al. (1991) | Canada | Fifty-eight percent of visits to the flowers were due to honeybees, 22% to Syrphidae (flies) & 10% to Halicidae (sweat bees). |
| Svensson (1991) | Sweden | Honeybees were the most important visitors to the flowers. |
| Abrol (1992) | India | Eighty-eight percent of visits to the flowers were due to Western or European honeybees (*Apis mellifera*) and 12% due to Eastern or Asian honeybees (*Apis cerana*). |
| Maeta et al. (1992) | Brazil | Stingless bee (*Nannotrigona testaceicornis*) pollinated the flowers in plants under tunnels. |
| Chagnon et al. (1993) | Canada | The most common bees visiting the flowers were honeybees (72% of total, with wild bees less important (28%). Pollination was better with honeybees than with wild bees |
| Kakutani et al. (1993) | Japan | The flowers were readily pollinated by *Apis mellifera* (Western or European honeybees) & stingless bees (*Trigona minangkabau*) in a greenhouse. |
| Verma & Phogat (1995) | India | The main visitors to the flowers were eastern or Asian honeybees (*Apis cerana*, 46.2% of total), *A. dorsata* (30.5%), *A. florea* (23.5%). Other insects accounted for 17.1% of visits. |
| Wilkaniec & Radajewska (1997) | Poland | The solitary bee*, Osmia bicorna (Osmia rufa*) successfully pollinated the flowers in a tunnel. |
| Delaplane & Mayer (2000) | Global | Strawberry pollination was dependent on honeybees (24% of achenes). |
| Paydaş et al. (2000a) | Turkey | A combination of honeybees & bumblebees gave the best yields. Honeybees alone were similar to bumblebees alone. |
| Paydaş et al. (2000b) | Turkey | Honeybees alone were similar to bumblebees alone. Combinations of the two bees were no better than single colonies. |
| Partap (2000) | Nepal | Eastern or Asian honeybees (*Apis cerana*) were effective pollinators of the flowers. |
| Chang et al. (2001) | Korea | *Apis mellifera* (Western or European honeybees) were better pollinators than *A. cerana* (Eastern or Asian honeybees) for plants in a tunnel. |
| Kremen et al. (2002) | California | Ninety-six percent of visits to the flowers were due to native bees (87 to 100%). |
| Mawdsley (2003) | United States | Beetles (Coleoptera) were important visitors to the flowers. |
| Ashman & King (2005) | United States | The most common visitors to the flowers were ants (339), wild bees (297) & flies (64). |
| Bigey et al. (2005) | France | Both honeybees and bumblebees (*Bombus terrestris*) were effective pollinators of the flowers. |
| Li et al. (2006) | China | Seventy-eight percent of visits to the flowers were due to bumblebees (*Bombus* *lucorum*) and 22% due to honeybees (*Apis mellifera*). |
| Zaitoun et al. (2006) | Jordan | Honeybees & bumblebees were equally effective pollinators of the flowers. |
| Antunes et al. (2007) | Brazil | The stingless bee, *Tetragonisca angustula* was an effective pollinator for plants in a tunnel. |
| Kant & Misger (2007) | India | There were similar visits to the flowers by Western or European (*Apis mellifera*, 3.6 ± 0.5 visits/flower) & Eastern or Asian honeybees (*Apis cerana*, 4.0 ± 0.5 visits/flower). |
| Malagodi-Braga & Kleinert (2007) | Brazil | The stingless bee, *Tetragonisca angustula* was an effective pollinator for plants in a greenhouse. |
| Malagodi-Braga & Kleinert (2007) | Brazil | Both honeybees and wild bees (*Trigona spinipes*) were effective pollinators of the flowers (tunnels). |
| Dimou et al. (2008) | Greece | The flowers were successfully pollinated by bumblebees (*Bombus* *terrestris*) in a greenhouse. |
| Abrol & Kumar (2009) | India | *Apis mellifera* (Western or European honeybees), *A. cerana* (Eastern or Asian honeybees), *A. florea* & *A. dorsata* were the most common visitors to the flowers. |
| Albano et al. (2009a) | Portugal | The main visitors to the flowers were Coleoptera-Nitidulidae (31.9 ± 7.0% of total), Coleoptera-Oedomeridae (12.1 ± 9.7%), Coleoptera-Dermestidae (6.7 ± 6.4%), Ditera-Syrphidae (11.0 ± 4.8%), Diptera-Calliphoridae (4.4 ± 2.8%), Hymeoptera-*Aphis mellifera* (6.1 ± 6.4%), Hymeoptera- native bees (6.2%) & Heteroptera-*Orius* sp. (7.9 ± 1.7%). |
| Albano et al. (2009b) | Portugal | The most common visitors to the flowers were Syrphidae (flies), honeybees & native bees. |
| Carré et al. (2009) | Germany | The most common bee visitors to the field (traps) & flowers (transects) were Western or European honeybees (*Apis* spp., 83.2% of total) & bumblebees (*Bombus* spp., 6.4%). |
| Dag (2009) | Israel | Honeybees were important than bumblebees (*Bombus terrestris*) for pollination. |
| Roselino et al. (2009) | Brazil | Plants in greenhouses were pollinated by stingless bees, including *Nanotrigona testaceicornis*. Plants outside were pollinated by several bees, including honeybees. |
| Calvete et al. (2010) | Brazil | Plants under tunnels were visited by honeybees. |
| Chen et al. (2011) | China | Honeybees were better pollinators than bumblebees (*Bombus* *terrestris* & *B. hypocrita*) for plants in a greenhouse. |
| Ariza et al. (2012) | Spain | Bumblebees (*Bombus terrestris*) were effective pollinators for plants under tunnels. |
| Asiko (2012) | Kenya | Honeybees & the stingless bee, *Hypotrigona* sp. were effective pollinators of the flowers. |
| Blažytė-Čereškienė et al. (2012) | Lithuania | Flowers were mainly visited by solitary bees (38%) & flies (31%). |
| Witter et al. (2012) | Brazil | The wild stingless bee was an effective pollinator of the flowers in a greenhouse. |
| Garibaldi et al. (2013) | Germany | The most common visitors to the flowers were honeybees (62% of total), followed by *Bombus terrestris* (9%) & *Bombus lapidarus* (7%). |
| Bartomeus et al. (2014) | Europe | The most common visitors to the plants were honeybees (78.3 ± 2.3% of total), bumblebees (11.2 ± 2.3%), hoverflies (1.3 ± 0.5%) & other wild bees (8.3 ± 1.2%). |
| Interiano Zapata et al. (2015) | Mexico | Honeybees were effective pollinators of the flowers. |
| Klatt et al. (2014a) | Germany | The most common visitors to the flowers were wild solitary bees, *Osmia bicornis* (52% of total), followed by honeybees (34%) & bumblebees (*Bombus terrestris*) (4%). |
| Lee et al. (2014) | Korea | Strawberry pollination under tunnels was dependent on honeybees. |
| Sharma et al. (2014) | India | Syrphid flies (hoverflies) were the most important visitors to the flowers & accounted for 48% of all visits. |
| Sharma et al. (2014) | India | Honeybees (43% of total visits to the flowers) & Syrphid flies (hoverflies, 39%) were the most common pollinators. |
| Ahrenfeldt et al. (2015) | Northern Europe | Within bee species, solitary bees from three genera were more common (2.8 ± 1.2 bees/trap) than honeybees (1.7 ± 0.3 bees/trap) or bumblebees (0.2 ± 0.1 bees/trap). |
| Choi & Jung (2015) | Korea | Western or European honeybees (*Apis mellifera*) were the main pollinators of the flowers. |
| Connelly et al. (2015) | United States | The most common bees visiting the fields were wild bees (93% of total), with honeybees less important (7%). |
| Feltham et al. (2015) | United Kingdom | The most common visitors to the flowers were bumblebees (67% of total) & hoverflies (31%). |
| Adhikari & Miyanaga (2016) | Japan | Hairy-footed flower bees, *Anthophora plumipes* were effective pollinators of the flowers in a greenhouse. |
| Rader et al. (2016) | United Kingdom | The most common visitors to the flowers were honeybees (47 ± 6% of total), other bees (43 ± 7%) & hoverflies (8 ± 5%). |
| Bukovinszky et al. (2017) | Netherlands | Within wild bee species, the most common visitors to the fields were *Dasypoda hirtipes* (32% of total), *Lagioglossum calceatum* (15%) & *Bombus pascuorum* (13%). |
| Çolak et al. (2017) | Turkey | Honeybees were effective pollinators of the flowers. |
| Ellis et al. (2017) | United Kingdom | Twenty-nine percent of visitors to the flowers were made by commercial *Bombus terrestris*, 18% by wild *B. terrestris*/*B. lucorum*, 25% by honeybees, 10% by other bumblebees & 23% by Syrphid flies. |
| Grab et al. (2017) | United States | A total of 994 individual bees were collected, with a total of 60 species (wild bees). Honeybees were rare (1.3% of bees collected). |
| Horth & Campbell (2018) | United States | Main bee species collected from the fields were Mason bees (*Osmia lignaria*), with fewer individuals of bumblebees (*Bombus* sp.) and honeybees. |
| Darsono & Widhiono (2018) | Indonesia | Native bees, including *Nomia* sp. (11.2 individuals/day) & *Camposomeris fasci*ata (9.9 individuals/day) were the most frequent visitors to the flowers. |
| Ganser et al. (2018) | Switzerland | The most common visitors to the flowers were honeybees (39% of total), followed by bumblebees (29%), wild bees (11%), flies (10%) & other insects (10%). |
| Gogate et al. (2018) | India | Within bee species, the main visitors to the flowers were the honeybees (*Apis mellifera*, 8.6 visits/flower), *A. dorsata* (8.5 visits/flower) & *A.* *florea* (12.3 visits/flower). |
| Hodgkiss et al. (2018) | United Kingdom | Hoverflies (Syrphidae) were effective pollinators of the flowers, with *Eupeodes latifasciatus* better than *Episyrphus balteatus*. |
| Podeva Coronel et al. (2018) | Colombia | The native *Bombus atratus* was an effective pollinator of the flowers. |
| Trillo et al. (2018) | Spain | Five taxa accounted for 94% of all visitors to the flowers. These included managed honeybees (75% of total) & bumblebees (*B. terrestris*, 10%) & wild insects such as Syrphid flies (*Eupeodes corollae*) (7%). |
| Wietzke et al. (2018) | Germany | The most common pollinators in the field were wild bees (mainly *Bombus terrestris*) with 72% of total visits. Honeybees were less important with 28% of visits. |
| Abrol et al. (2019) | India | Four bee species accounted for 89% of visits to the flowers by pollinators. These bees included *Apis mellifera* or Western/European honeybees (20%), *A. cerana* or Eastern/Asian honeybees (33%), *A. florea* (31%) & *A. dorsata* (5%). |
| Castle et al. (2019) | Germany | The most common visitors to the plants were from the family of Empididae (Diptera) (45% of total), followed by Syrphid flies (12%) & bees (5%). |
| Garibaldi et al. (2019) | Global | Main visitors to flowers were honeybees. |
| Halder et al. (2019) | Global | Honeybees were the most important pollinators of the flowers. |
| Herrmann et al. (2019) | Germany | The European orchard bee, *Osmia cornuta* & the green bottle fly, *Lucilia* *sericata* (*Luciana sericata)* were effective pollinators of the flowers. |
| MacInnis & Forest (2019) | Canada | Within bee species, honeybees accounted for 55% of total visits to the flowers & wild bees accounted for 45% of visits. The most abundant wild bees were species of *Lasioglossum* & *Andrena*. |
| Martin et al. (2019) | United Kingdom | The most common visitors to the flowers were Coleoptera family Nitidulidae (57% of total), followed by Muscoidea Anthomyiidae (18%) & Apidae (16%). Within the Apidae, most of the visits were made by *Bombus terrestris* (n = 86) with only four made by *Apis mellifera.* |
| Masyitah et al. (2019) | Indonesia | The most frequent visitors to the flowers were two hoverflies, *Episyrphus balteatus* (47.3% of total) & *Melanostoma* sp. (33.8%) & two bees, *Lagioglossum* sp. (7.0%) & *Apis cerana* (Eastern or Asian honeybees) (5.3%). |
| O’Connor et al. (2019) | United Kingdom | Bumblebees (147 ± 32 visits), Western or European honeybees (121 ± 34 visits), & hoverflies (40 ± 12 visits) were the most common visitors to the flowers. Solitary bees were rare (1.8 ± 0.6 visits). |
| Piovesan et al. (2019) | Brazil | The most common visitors to the flowers were honeybees with 65% of visits (50 to 80%). |
| Bänsch et al. (2020a) | Germany | The most common visitors to the flowers were bumblebees (mainly *B. terrestris*) (450), honeybees (218) & solitary bees (164). |
| Begna et al. (2020) | Korea | Western or European honeybees (*Apis mellifera*) were effective pollinators of the flowers in a greenhouse. |
| Griffiths-Lee et al. (2020) | United Kingdom | The most common visitors to the flowers were beetles (28.6 ± 3.0% of total), butterflies & moths (19.9 ± 10.1%), hoverflies (15.8 ± 0.8%), other flies (16.0 ± 5.0), bumblebees (6.6 ± 2.2%) & honeybees (5.2 ± 1.0%). |
| Lee et al. (2020) | Korea | Honeybees (*Apis mellifera*) were effective pollinators of the flowers in a glasshouse. |
| MacInnis & Forest (2020) | Canada | The most common visitors to the flowers were honeybees (49% of total) followed by the two sweat bees *Lasioglossum ellisae* (25%) & *L. tegulare* (14%). |
| MacInnis et al. (2020) | Canada | Within bee species, honeybees made more visits to the field (33 ± 5 bees) than wild bees (18 ± 1 bees). |
| Silva et al. (2020) | Brazil | Stingless bees, *Nannotrigona testaceicornis* were effective pollinators of the flowers. |
| Zorigt et al. (2020) | Mongolia | Honeybees were effective pollinators of the flowers. |
| Angelella et al. (2021) | United States | Within bee species, numerous wild bees were common, & honeybees rare in the fields. |
| Bänsch et al. (2021) | Germany | The most common bees visiting the flowers were honeybees (46.5% of total) followed by bumblebees (29.9%) & solitary bees (23.6%). Bumblebees were dominated by *Bombus terrestris* (83.7%) & solitary bees were mostly species of *Andrena* (81.1%). |
| Howard et al. (2021) | Australia | Honeybees accounted for 85% of visits to the flowers, with other insects accounting for 15% of the visits under tunnels. |
| Hutchinson et al. (2021) | Europe | Within wild bees, the majority of visits to the flowers were two bumblebees (67% for *Bombus terrestris* and 22% for *Bombus lapidarius*). |
| Saridaş et al. (2021) | Turkey | Plants under tunnels were visited by honeybees. |
| Senapathi et al. (2021) | Germany | The most common visitors to the flowers were honeybees and bumblebees (*Bombus terrestris*). |

**Table S3.** Effect of insect pollination on yield, average fruit fresh weight and the incidence of misshapen fruit in strawberry. The flowers were pollinated with the assistance of gravity and wind (self-pollination or SP) or with the assistance of insects (open-pollination or OP). Data from the studies indicated in the table. Data show mean values (± s.e. or standard errors where available).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reference | Growing system | Experimental system used to exclude insects | Yield  (Self//Open Pollination) | Average fruit fresh weight  (Self/Open Pollination) | Incidence of misshapen fruit  (Self/Open Pollination) |
| Bhupen (1939) | Field | Netted cages | 0.69 |  |  |
| Mommers (1961) | Greenhouse | Netted cages | 0.87 |  | 1.47 |
| Petkov (1963) | Field | Netted bags |  | 0.33 | 4.03 |
| Free (1968a) | Field | Netted cages | 0.74 | 0.80 | 3.16 |
| Moore (1969) | Field | Netted cages | 0.56 | 0.85 | 3.51 |
| Connor (1972) | Field | Plastic screen cages | 0.76 | 0.60 |  |
| Connor (1972) | Field | Netted cages | 0.54 | 0.76 |  |
| Hulewicz & Hortyñski (1972) | Glasshouse | Cloth bags |  | 0.44 ± 0.05 |  |
| Hulewicz & Hortyñski (1972) | Glasshouse | Cloth bags |  | 0.56 ± 0.05 |  |
| Nye & Anderson (1974) | Field | Netted cages | 0.89 ± 0.02 |  | 3.95 ± 0.06 |
| Deodikar (1975) | Field | - |  | 0.77 |  |
| Cirnu et al. (1978) | Greenhouse | Closed greenhouse | 0.48 |  |  |
| Lackett & Burkhardt (1979) | Field | Netted cages | 0.59 | 0.93 | 3.36 |
| Lackett & Burkhardt (1979) | Field | Netted cages | 1.03 |  |  |
| Lackett & Burkhardt (1979) | Field | Netted cages | 0.33 | 0.85 | 3.26 |
| Lackett & Burkhardt (1979) | Field | Netted cages | 0.60 |  |  |
| Sannino & Priore (1979) | Tunnel | Closed tunnel | 0.39 ± 0.02 |  | 3.30 ± 0.44 |
| Sannino & Priore (1979) | Tunnel | Closed tunnel | 0.58 ± 0.05 |  |  |
| Pion et al. (1980) | Field | Netted cages |  | 0.64 |  |
| Petersen (1983) | Field | Netted cages | 1.03 ± 0.11 | 0.96 ± 0.02 | 2.22 ± 0.29 |
| Petersen (1983) | Field | Netted cages | 0.94 ± 0.11 |  |  |
| Antonelli et al. (1988) | Field | Netted cages | 0.34 ± 0.03 | 0.46 ± 0.03 |  |
| Antonelli et al. (1988) | Field | Netted cages | 0.49 ± 0.01 | 0.56 ± 0.02 | 5.87 ± 1.68 |
| Bagnara & Vincent (1988) | Field | Netted cages | 0.72 ± 0.06 |  | 3.79 ± 0.68 |
| Goodman & Oldroyd (1988) | Field | Netted cages | 0.65 | 0.74 | 1.42 |
| Blasse & Haufe (1989) | Field | Netted cages | 0.84 ± 0.06 | 0.85 ± 0.07 |  |
| Blasse & Haufe (1989) | Field | Netted cages | 0.82 ± 0.05 |  |  |
| Couston (1991) | Field | Netted cages | 0.45 | 0.59 | 2.87 |
| Couston (1991) | Field | Netted cages | 0.07 |  |  |
| Kakutani et al. (1993) | Greenhouse | Closed greenhouse | 0.68 | 0.56 | 1.39 |
| Dag et al. (1994) | Greenhouse | Closed greenhouse | 0.77 |  | 2.46 |
| Verma & Phogat (1995) | Field | Paper bags | 0.20 ± 0.01 | 0.98 ± 0.01 |  |
| Wilkaniec & Radajewska (1997) | Greenhouse | Closed greenhouse | 0.67 | 0.70 | 3.82 |
| Żebrowska (1998) | Field | Linen bags | 0.43 | 0.30 | 9.83 |
| Partap (2000) | Field | Netted cages | 0.46 | 0.81 | 2.86 |
| Chang et al. (2001) | Greenhouse | Closed greenhouse | 0.43 |  | 7.60 |
| Lalama (2001) | Greenhouse | Closed greenhouse |  |  | 1.45 |
| Malagodi-Braga (2002) | Field & tunnel | Netted bags |  | 0.51 | 5.04 |
| Malagodi-Braga (2002) | Tunnel | Closed tunnel | 0.93 | 0.88 | 7.26 |
| Malagodi-Braga & Kleinert (2004) | Field & greenhouse | Closed greenhouse & netted bags |  |  |  |
| Bigey et al. (2005) | Field | Netted bags |  | 0.12 |  |
| Nagar & Chaudhary (2006) | Field | Netted cages | 0.72 | 0.70 | 4.90 |
| Zaitoun et al. (2006) | Greenhouse | Closed greenhouse | 0.76 | 1.40 |  |
| Dimou et al. (2008) | Greenhouse | Netted cages | 0.50 | 1.01 | 3.21 |
| Abrol & Kumar (2009) | Field | Netted cages | 0.52 | 0.80 | 1.56 |
| Calvete et al. (2010) | Tunnel | Closed tunnel | 1.02 ± 0.06 |  | 1.60 ± 0.11 |
| Kuvanci et al. (2010) | Field | Netted cages | 0.32 |  |  |
| Kuvanci et al. (2010) | Field | Netted cages | 0.53 |  |  |
| Chen et al. (2011) | Greenhouse | Closed greenhouse |  | 0.60 | 4.57 |
| Ariza et al. (2012) | Tunnels | Closed tunnel | 0.69 |  | 1.93 |
| Asiko (2012) | Field | Netted cages | 1.55 | 0.95 |  |
| Widhioni et al. (2012) | Field | Netted cages | 0.25 |  |  |
| Widhioni et al. (2012) | Field | Netted cages | 0.53 |  |  |
| Witter et al. (2012) | Greenhouse | Closed greenhouse |  | 0.68 |  |
| Bartomeus et al. (2014) | Field | Netted bags |  | 0.80 ± 0.04 |  |
| Klatt et al. (2014a) | Field | Paper bags |  |  | 1.70 ± 0.40 |
| Klatt et al. (2014b) | Field | Netted cages |  |  | 2.93 |
| Connelly et al. (2015) | Field | Netted bags |  | 0.65 |  |
| Interiano Zapata et al. (2015) | Field | Netted cages |  |  | 2.25 |
| Çolak et al. (2017) | Field | Netted cages | 0.60 | 0.87 |  |
| Ellis et al. (2017) | Field | Netted cages |  | 0.91 |  |
| Deepika et al. (2018) | Field | Paper bags |  |  | 2.71 |
| Gogate et al. (2018) | Field | Netted cages | 0.77 |  | 1.16 |
| Hodgkiss et al. (2018) | Tunnel | Netted cages | 0.68 | 0.56 | 1.39 |
| Lata et al. (2018) | Field | Paper bags |  |  | 3.39 ± 0.24 |
| Podeva Coronel et al. (2018) | Greenhouse | Closed greenhouse |  | 0.48 |  |
| Trillo et al. (2018) | Open tunnel | Netted bags |  | 0.84 |  |
| Wietzke et al. (2018) | Field | Paper bags |  | 0.59 |  |
| Abrol et al. (2019) | Field | Netted bags | 0.52 | 0.80 | 1.56 |
| Castle et al. (2019) | Potted plants in the field | Netted bags |  | 0.64 |  |
| Herrmann et al. (2019) | Field | Netted cages |  | 0.70 | 1.82 |
| MacInnis and Forrest (2019) | Field | Netted bags |  | 0.36 |  |
| Masyitah et al. (2019) | Field | Bags |  | 0.48 |  |
| MacInnis and Forrest (2020) | Field | Nylon mesh |  | 0.64 |  |
| MacInnis and Forrest (2020) | Field | Nylon mesh |  | 0.94 |  |
| Silva et al. (2020) | Field | Netted bags |  | 0.60 |  |
| Zorigt et al. (2020) | Greenhouse | Closed greenhouse | 0.45 | 0.61 |  |
| Alpionita et al. (2021) | Field. | Netted cages. | 0.25 | 0.60 | 2.59 |
| Bänsch et al. (2021) | Field | Paper bags |  | 0.95 |  |
| Bänsch et al. (2021) | Field | Netted bags |  | 0.94 |  |
| Dung et al. (2021) | Glasshouse | Mesh bags in a glasshouse | 0.87 | 0.96 |  |
| Saridaş et al. (2021) | Tunnel | Closed tunnel | 0.65 | 0.85 |  |
| Willden et al. (2022) | Field & tunnel | Organza bags |  | 1.05 ± 0.06 | 1.02 ± 0.11 |

**Table S4.** Effect of cross pollination on average fruit fresh weight, percent of flowers setting a fruit, dry weight of achenes per fruit and the incidence of misshapen fruit in strawberry. The flowers were cross pollinated by hand (CP or Cross Pollination) or self-pollinated by hand or with the insects (SP or Self Pollination). Data from the studies indicated in the table. Data show mean values. HP = hand pollination.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference | Growing system | Experimental set-up | Average fruit fresh weight  (Cross/Self Pollination) | Percent of flowers setting a fruit  (Cross/Self Pollination) | Dry weight of achenes per fruit  (Cross/Self Pollination) | Incidence of misshapen fruit  Cross/Self Pollination) |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.11 | 1.00 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 0.92 | 0.96 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.08 | 1.14 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.25 | 1.13 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 0.99 | 1.34 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.83 | 1.18 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.35 | 1.07 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 0.92 | 0.99 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.25 | 1.35 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.25 | 1.25 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 0.82 | 1.20 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.27 | 0.86 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.02 | 1.07 |  |  |
| Moore (1964) | Greenhouse | CP (HP) & SP (HP) | 1.16 | 1.28 |  |  |
| Hulewicz & Hortyñski (1972) | Glasshouse | CP (HP) & SP (HP) | 1.26 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.61 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.01 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.76 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.46 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.71 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.00 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.01 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.10 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.80 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.17 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.47 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.90 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.67 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.01 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.55 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.71 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.68 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.97 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.94 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.78 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.90 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.50 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.48 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.00 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.91 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.27 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.13 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.31 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.00 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.40 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.65 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.48 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.20 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.36 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 2.00 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.48 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.91 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.52 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.88 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 0.84 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.63 |  |  |  |
| Hortyñski et al. (1972) | Glasshouse | CP (HP) & SP (HP) | 1.84 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 1.06 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 1.24 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 1.04 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 1.08 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 1.12 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 0.98 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 1.12 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 0.96 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 0.97 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 1.14 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 0.93 |  |  |  |
| Tuohimetsä et al. (2014) | Greenhouse | CP (HP) & SP (HP) | 0.95 |  |  |  |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.00 |  | 0.91 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.02 |  | 0.92 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.07 |  | 0.57 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.02 |  | 0.95 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 0.97 |  | 0.75 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.09 |  | 0.58 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.00 |  | 1.01 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.02 |  | 0.99 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 0.94 |  | 1.23 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.07 |  | 0.81 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.06 |  | 1.24 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 0.97 |  | 1.13 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 0.95 |  | 1.20 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.04 |  | 0.55 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 0.98 |  | 0.09 |
| Lata et al. (2018) | Field | CP (HP) & SP (HP) |  | 1.09 |  | 0.06 |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.11 |  |  |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.09 |  |  |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.15 |  |  |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.09 |  |  |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.14 |  |  |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.06 |  |  |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.15 |  |  |
| Rajput & Singh (1967) | Field | CP (HP) & SP (bees) |  | 1.11 |  |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.07 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.67 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.01 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.80 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.23 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.02 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.61 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.90 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.97 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.61 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.71 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.85 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.06 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.14 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.15 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.84 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.76 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.62 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.94 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.03 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.46 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.26 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.17 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.92 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.14 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.98 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.76 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.89 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.97 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.68 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.97 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.17 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.09 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.11 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.14 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.92 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.78 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 0.73 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.32 |  |
| Colbert & de Oliveira (1992) | Field | CP (HP) & SP (HP) |  |  | 1.08 |  |
| Malagodi Braga (2002) | Field | CP (HP) & SP (HP) | 1.07 |  |  |  |
| Malagodi Braga (2002) | Field | CP (HP) & SP (HP) | 1.07 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 2.12 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 1.13 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 1.17 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 1.26 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.34 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.62 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.63 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.35 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.70 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.82 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.31 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.74 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.46 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.83 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 1.08 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.90 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.82 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.88 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 0.64 |  |  |  |
| Thompson (1971) | Glasshouse & field | CP (HP) & SP (HP) | 1.07 |  |  |  |
| Dung et al. (2021) | Glasshouse | CP (HP) & SP (HP) | 0.96 |  |  |  |
| Dung et al. (2021) | Glasshouse | CP (HP) & SP (HP) | 1.00 |  |  |  |

**Table S5.** Effect of supplementary insect pollination on yield and fruit weight in strawberry. The flowers were pollinated with insects under natural open conditions (OP or Open Pollination) or with the addition of bee or other insects, etc. (Supplementary Pollination). Pollen limitation (PL) was calculated as PL = (Ps – Po)/PMax, where Ps is the yield or fruit weight from the supplementary pollination treatment, Po is the yield or fruit weight from the control treatment (open pollination) and PMax is the larger of the two values (Baskin and Baskin, 2018; Ryniewicz et al., 2022). Data from the studies indicated in the table. Data show mean values (± s.e. or standard errors where available).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reference | Growing system | Experimental system used to supplement insect pollination | Pollen limitation for yield | Pollen limitation for fruit weight |
| Muttoo (1952) | Field | Colony of *Apis mellifera* added to plot. | 0.31 |  |
| Free (1968a) | Field | Cages with a colony of *Apis mellifera*. | 0.10 | -0.01 |
| Deodikar (1975) | Field | Addition of *Apis mellifera.* |  | 0.23 |
| Lackett & Burkhardt (1979) | Field | Cages with a colony of *Apis mellifera*. | 0.44 | 0.08 |
| Lackett & Burkhardt (1979) | Field | Cages with a colony of *Apis mellifera*. | 0.41 |  |
| Petersen (1983) | Field | Cages with a colony of *Apis mellifera*. | 0.12 ± 0.06 | 0.12 ± 0.04 |
| Petersen (1983) | Field | Cages with a colony of *Apis mellifera*. | 0.13 ± 0.06 |  |
| Partap (2000) | Field | Cages with a colony of *Apis cerana*. | 0.32 | 0.17 |
| Paydaş et al. (2000a) | Open greenhouse | *Apis mellifera* introduced into a section of the greenhouse. | 0.41 | 0.21 |
| Paydaş et al. (2000a) | Open greenhouse | *Bombus terrestris* introduced into a section of the greenhouse. | 0.30 | 0.29 |
| Paydaş et al. (2000a) | Open greenhouse | *Apis mellifera & Bombus terrestris* introduced into a section of the greenhouse. | 0.41 | 0.30 |
| Paydaş et al. (2000b) | Open greenhouse | *Apis mellifera* introduced into a section of the greenhouse. | 0.17 | 0.17 |
| Paydaş et al. (2000b) | Open greenhouse | *Bombus terrestris* introduced into a section of the greenhouse. | 0.21 | 0.13 |
| Paydaş et al. (2000b) | Open greenhouse | *Apis mellifera & Bombus terrestris* introduced into a section of the greenhouse. | 0.05 | 0.11 |
| Nagar & Chaudhary (2006) | Field | Cages with a colony of *Apis mellifera*. | 0.17 | 0.26 |
| Antunes et al. (2007) | Tunnel | Two colonies of *Tetragonisca angustula* added to the tunnel. | 0.19 ± 0.04 | 0.04 ± 0.06 |
| Antunes et al. (2007) | Tunnel | Four colonies of *Tetragonisca angustula* added to the tunnel. | 0.21 ± 0.05 | 0.02 ± 0.07 |
| Witter et al. (2012) | Greenhouse | Two colonies of *Plebeia nigriceps* added to a section of the greenhouse. |  | 0.91 |
| Sharma et al. (2014) | Field | Cages with a colony of *Apis mellifera*. | 0.21 ± 0.02 | 0.21 ± 0.02 |
| Gogate et al. (2018) | Field | Cages with a colony of *Apis mellifera*. | -0.01 | -0.02 |
| MacInnis & Forrest (2019) | Field | Honeybees (*Apis* *mellifera)* allowed to pollinate some of the flowers. |  | -0.20 |
| Trillo et al. (2018) | Open tunnel | Two colonies of *Bombus* *terrestis* introduced to a tunnel. |  | 0.04 |
| MacInnis & Forrest (2020) | Field | Wild bees allowed to pollinate some of the flowers. |  | 0.26 |
| Silva et al. (2020) | Field | Each flower had one visit from *Nannotrigona testaceicornis*. |  | -0.21 |
| Silva et al. (2020) | Field | Each flowers had two visits from *Nannotrigona testaceicornis*. |  | -0.34 |
| Silva et al. (2020) | Field | Each flower had three visits from *Nannotrigona testaceicornis*. |  | -0.21 |
| Alpionita et al. (2021) | Field | Cages with *Apis cerana*. | 0.05 | 0.10 |
| Alpionita et al. (2021) | Field | Cages with *Tetragonula laeviceps*. | -0.26 | -0.11 |

**Table S6.** Estimates of pollen limitation (PL) in strawberry. The fertility of flowers or plants after hand pollination (HP) was compared with that after open pollination (OP). Pollen limitation = (Ps – Po)/PMax, where Ps is the number of seeds, etc. from the hand pollination treatment, Po is the number of seeds, etc. from the control treatment (open pollination) and PMax is the larger of the two values (Baskin and Baskin, 2018; Ryniewicz et al., 2022). Data from the studies indicated in the table. Data show mean values (± s.e. or standard errors where available).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reference | Growing system | Measure of fertility | Fertility after hand pollination | Fertility after open pollination | Pollen limitation |
| Malagodi-Braga (2002) | Field | Fruit weight (g) | 23.9 ± 1.2 | 24.8 ± 1.5 | - 0.036 |
|  |  | No. achenes per fruit | 601 ± 21 | 587 ± 17 | 0.023 |
| Blasse & Haufe (1989) | Field | Yield (g per plant) | 236 ± 33 | 228 ± 19 | 0.034 |
|  |  | Fruit weight (g) | 6.7 ± 0.7 | 6.6 ± 0.4 | 0.015 |
| Lata et al. (2018) | Field | Percent of flowers setting fruit | 88.0 ± 0.5 | 79.5 ± 0.8 | 0.097 |
| Wietzke et al. (2018) | Field | Fruit weight (g) | 20.9 | 23.0 | - 0.091 |
|  |  | No. achenes per fruit | 2753 | 2327 | 0.155 |
| Connelly et al. (2015) | Field | Fruit weight (g) | 10.8 | 8.4 | 0.222 |
| Bigey et al. (2005) | Field | Fruit weight (g) | 18.2 | 19.7 | -0.076 |
|  |  | No. achenes per fruit | 236 | 260 | -0.092 |
| Deepika et al. (2018) | Field | Fruit width (mm) | 28.0 ± 1.6 | 24.4 ± 1.4 | 0.129 |

**Table S7.** Relationship between fertility and pollinating insects in strawberry. Data from the studies indicated in the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reference | Country | Growing system | Main pollinators visiting the fields or flowers | Method for assessing fertility | Relationship between fertility & pollinators |
| Chagnon et al. (1989) | Canada. | Open field. | Colonies of honeybees (*Apis mellifera*) introduced into the field. | Percentage of achenes in a fruit fertilized. | Weak correlations with visits by honeybees (r = 0.30, *P* < 0.05). Up to 6 visits per flower. |
| Chagnon et al. (1993) | Canada. | Open field. | Mostly honeybees (*Apis mellifera*) & some wild bees (9 species). | Percentage of achenes in a fruit fertilized. | Weak correlations with visits by wild bees (r = 0.42, *P* < 0.005) & honeybees (r = 0.29, *P* < 0.005). Up to 6-7 visits per flower. |
| Kakutani et al. (1993) | Japan. | Greenhouses. | Colonies of honeybees & stingless bees (*Trigona minangkabua*). | Percentage of achenes in a fruit fertilized. | Exponential relationships for visits by honeybees (one visit pollinated 11% of achenes) and stingless bees (one visit pollinated 4.7% of achenes). |
| Paydaş et al. (2000a) | Turkey. | Greenhouses. | Honeybees (*Apis mellifera*) & bumblebees introduced into the greenhouses. | Yield. | A combination of honeybees & bumblebees gave the best yields. Honeybees alone were similar to bumblebees alone. |
| Paydaş et al. (2000b) | Turkey. | Greenhouses. | Honeybees (*Apis mellifera*) & bumblebees introduced into the greenhouses. | Yield. | Honeybees alone were similar to bumblebees alone. Combinations of the two bees were no better than single colonies. |
| Chang et al. (2001) | Korea. | Greenhouses. | Colonies of honeybees (*Apis mellifera* & *Apis cerana*) introduced into the greenhouses. | Yield. | Yields were similar with the two species (48.8 or 44.4 g per inflorescence). |
| Zaitoun et al. (2006) | Jordan. | Greenhouses. | Colonies of honeybees (*Apis* mellifera) & bumblebees introduced into the greenhouses. | Average fruit weight. | Fruit were slightly larger with the honeybees (24.7 g) than with bumblebees (21.1 g). |
| Malagodi & Kleinert (2007). | Brazil. | Open field. | Specimens of Western honeybees (*Apis mellifera*), stingless bees (*Trigona* *spinipes*) & sweat bees (*Dialictus* sp.) introduced. | Yield. | There were similar yields across the different pollinators (577-673 g per plant). |
| Albano et al. (2009b) | Portugal. | Open field. | Specimens of honeybees (*Apis mellifera*), sweat bees (Halictidae) & hoverflies (Syrphidae) introduced. | Percentage of achenes in a fruit fertilized. | There were similar rates of pollination across the different pollinators (80-90%). |
|  |  |  |  |  |  |
| Chen et al. (2011) | China. | Greenhouses. | Colonies of honeybees (*Apis mellifera*), *Bombus terrestris* & the native *Bombus hypocrita* introduced into the greenhouse. | Average fruit weight. | Fruit were slightly larger with honeybees (15.1 g) & with *B. hypocrita* (15.1 g) than with *B. terrestris* (13.3 g). |
| Garibaldi et al. (2013) | Germany. | Open field. | Mostly honeybees and bumblebees. | Fruit set (z-scores). | Linear relationships for visits by honeybees (slope about 0.10) & wild insects (slope about 0.30), & for wild species richness (slope about 0.50). |
| Bartomeus et al. (2014) | Europe. | Open field. | Mostly honeybees, bumblebees & other wild bees. | Average fruit weight. | No relationships for total insect visits (*P* = 0.378) or species richness (*P* = 0.382). |
| Connelly et al. (2015) | United States. | Open field using open pollination. | Mostly wild bees & some honeybees. | Average fruit weight. | Linear relationships for visits by wild bees (*P* = 0.003) & honeybees (*P* =0.06), but not for species richness (*P* = 0 78 or 0.90). |
| Garibaldi et al. (2015) | United States, Germany & United Kingdom. | Open field. | Mostly wild bees & flies. | Fruit set (z-scores). | No relationships for total insect visits (*P* = 0.673), species richness (*P* = 0.603) or species evenness (*P* = 0.572). |
| Garratt cited in Rader et al. (2016) | United Kingdom. | Open field. | Honeybees, bumblebees & hoverflies. | Fruit set (z-scores). | No relationships for visits by honeybees (*P* = 0.207), bees (*P* = 0.755) or non-bees (*P* = 0.375). |
| Orford et al. (2016) | United Kingdom. | Open field. | Mostly species of bees & hoverflies (Hymenoptera & Diptera). | Average fruit weight. | No relationship for visits by insects (*P* = 0.14), but linear relationships for insect species richness (*P* = 0.022) and diversity (*P* = 0.012). |
| Ellis et al. (2017) | United Kingdom. | Tunnels. | Honeybees, bumblebees & hoverflies. | Average fruit weight. | Linear relationship for total number of insects (*P* = 0.011). |
| Grab et al. (2017) | United States. | Open field | Sixty species of bees, but with a few honeybees. | Average fruit weight. | Linear relationships for visits by bees & species richness (*P* < 0.05). |
| Horth & Campbell (2018) | United States. | Open field. | Honeybees & bumblebees, with mason bees (*Osmia ligaria*) introduced into the fields | Fruit volume. | Fruit were larger with the addition of mason bees compared with open pollination. |
| Trillo et al. (2018) | Spain. | Tunnels × 2 seasons. | Honeybees, bumblebees (hives), wild bees & other Diptera. | Average fruit weight. | Linear relationship for visits by wild insects in winter (*P* = 0.037). No relationships for visits by honeybees, bumblebees or total insects in winter (*P* = 0.621 to 0.899). No relationships for visits by honeybees, bumblebees, wild bees or total insects in spring (*P* = 0.131 to 0.891). |
| Castle et al (2019) | Germany. | Potted plants in the open field. | Mostly Diptera & Coleoptera, with some Hymenoptera (Apidae). | Average fruit weight. | Linear relationship for visits by Diptera & Hymenoptera (*P* = 0.041). |
| Dainese et al. (2019) | United States, Germany, Sweden & United Kingdom. | Open field. | Mostly bees & hoverflies. | Fruit set, seed set & average fruit weight (z-scores). | Linear relationships for insect species richness (slopes = 0.12 to 0.17). |
| Herrmann et al. (2019) | Germany. | Cages in the open field. | Four specimens of orchard bees (*Osmia cornuta*) or green bottle bees (*Luciana sericata*) or two of both species. | Average fruit weight. | Increased species diversity did not improve fruit weight. |
| MacInnis & Forrest (2019) | Canada. | Open field | Honeybees & wild bees. | Average fruit weight. | Overall, HB-visited flowers produced strawberries that weighed 42% less (mean ± SD, 7.47 ± 6.32 g) than WB-visited flowers (12.77 ± 8.20 g, *P* < 0.001). Including data from all  visits, strawberry mass was not influenced by the number of visits (*P* = 0.97). Species richness did not affect fruit weight. |
| Masyitah et al. (2019) | Indonesia. | Open field. | Mainly Eastern honeybees (*Apis cerana*), sweat bees (*Lasioglossum* sp.) & two hoverflies (*Episyrphus balteatus* & *Melanostoma* sp.). | Average fruit weight. | Only small differences in fruit weight across the four pollinators. |
| Trillo et al. (2019) | Spain. |  |  |  |  |
| Silva et al. (2020) | Brazil. | Open field. | Colonies of stingless bees (*Nannotrigona testaceicornis*) established in the field. | Average fruit weight. | Fruit weight similar with 1, 2 or 3 visits by the bees (26.0-31.5 g). Open pollination provided larger fruit (39.8 g). |
| Angelella et al. (2021) | United States. | Open field. | Wild bees & honeybees. | Yield. | No relationship for visits by wild bees (*P* = 0.52), or species richness (*P* = 0.54), diversity (*P* = 0.91) or evenness (*P* = 0.13). |
| Bänsch et al. (2021) | Germany. | Open field. | Mostly honeybees, bumblebees & solitary bees. | Average fruit weight. | Increasing visits by bees increased fruit weight in ‘Honeoye’ but not in ‘Sonata. |

**Table S8.** Relationship between pollinating insects and fertility in strawberry with changes in landscape diversity, habitat or other crops. Data from the studies indicated in the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reference | Country | Type of landscape, habitat or other crops | Effect of landscape, habitat or other crops on pollinators visiting the strawberry fields | Effect of landscape, habitat or other crops on fertility of the strawberry plants |
| Carré et al. (2009) | Europe | Range in land cover classification (39-91% crops & 2-53% natural habitat). | No relationship between wild bee abundance (*P* = 0.64) & wild bee functional diversity (*P* = 0.32) & proportion of semi-natural habitat. | Not recorded. |
| Ahrenfeldt et al. (2015) | Europe. | Different areas of strawberry fields close to semi-natural field margins, grass strips or hedges. | Greater insect species richness at margins of field compared with centers (*P* = 0.01). Species richness of solitary bees was higher at margins (*P* = 0.01). Region affected the abundance of all bees sampled, solitary bees, and bumblebees individually (*P* < 0.05), but not honeybees (*P* > 0.05). | Not recorded. |
| Connelly et al. (2015) | United States. | Proportion of agriculture in the surrounding landscape (0.09-0.60) | Wild bee abundance & species richness decreased with an increase in agriculture. There was no effect of landscape on honeybee abundance. | Average fruit weight increased with the abundance of bees (*R*2 = 0.86, *P* = 0.002). There was no effect of species richness on fruit weight (*P* = 0.09 or 0.78). |
| Feltham et al. (2015) | United Kingdom. | Farms with & without wildflower strips. | Frequency of pollinator visits was 25% higher for crops with wildflower strips than those without wildflower strips. | Not recorded. |
| Orford et al. (2016) | United Kingdom. | Range in plant diversity in planted grasslands. | Increased sward richness increased pollinator abundance, richness & functional diversity in the fields. | Average fruit weight increased with increasing pollinator richness (*P* = 0.012) & functional diversity (*P* = 0.022), but not with increasing abundance (*P* = 0.14). |
| Bukovinszky et al. (2017) | Netherlands. | Area of semi-natural habitats. | Positive relationships between growth of bumblebees & area of natural habitat (*P* = 0.051). No relationship between wild bee species richness & area of natural habitat. | Saturating relationship between proportion of fertilized achenes & area of natural habitat (*P* = 0.058). |
| Grab et al. (2017) | United States. | Level of flowering in adjacent apple orchards. | Bee abundance decreased with the index of apple flowering (*P* = 0.004). There was no effect of the index of flowering on bee species richness (*P* = 0.149). | Average fruit weight increased with bee abundance (*P* = 0.03) & diversity (*P* < 0.001). Mass flowering during early & peak bloom decreased fruit weight. Mass flowering during late bloom increased fruit weight. Overall response was not significant (*P* = 0.946). |
| Herbertsson et al. (2017b) | Sweden. | Proportion of nearby fields under oilseed rape (*Brassica napus*, 0.0-0.42). Proportion of grasslands (0.009-0.16). | Not recorded. | Average fruit weight increased with the proportion of rape, but only in landscapes with little grasslands (Interaction between OSR × G, *P* = 0.03). |
| Stewart et al. (2017) | Sweden. | Different landscapes (ponds, semi-natural habitats & field borders & no natural vegetation as a control). | Higher abundance of bees & hoverflies (Syrphidae) next to ponds compared with control habitats (*P* < 0.001). Higher abundance of hoverflies in natural vegetation compared with control habitats (*P* < 0.05). | The number of fruit was higher in the pond habitat than in the control habitat (*P* < 0.05). |
| Ganser et al. (2018) | Switzerland. | Farms with & without wildflower strips (grassy strips). | The centers of the crop fields had lower numbers of wild bees compared with the edges of the crop fields next to the wildflowers. The number of wild bees next to the grass was intermediate. Wildflowers had no effect on the numbers of honeybees or hoverflies. | A higher proportion of fertilized seeds at the edge of the crop fields compared with the center of the crop fields next to wildflower strips. |
| Grab et al. (2018) | United States. | Plots of strawberry plants planted close to grassy or wildflower borders. Different landscape composition (0.18 to 0.60 natural cover). | Wildflower borders promoted wild bee visits to the strawberry plants under intermediate natural vegetation cover (*P* < 0.05). | Wildflower borders increased average fruit weight under intermediate natural vegetation cover (*P* = 0.008). |
| Herbertsson et al. (2018) | Sweden. | Farms with & without wildflower strips. Proportion of adjacent landscape under semi-natural habitat (0.03-0.16). | Not recorded. | There was a strong interaction between wildflower strips & landscape on yield (*P* < 0.001). In poor landscapes, the strips attracted insects to the crop & increased yield. In contrast, in rich landscapes, the strips drew away pollinators from the crop & decreased yield. |
| Horth & Campbell (2018) | United States. | Fields with & without mason bees (*Osmia lignaria*). | Mostly mason bees found in the fields. Bee species diversity was low. | Fruit were larger in the fields with the mason bees (4,418 ± 207 mm3) than in fields without mason bees (2,919 ± 151 mm3) (*P* < 0.001). |
| Trillo et al. (2018) | Spain. | Proportion of agriculture in the surrounding landscape (0.001 to 0.64). | No effect of landscape on abundance of wild bees or honeybees (*P* > 0.05). | No relationship between average fruit weight & total visits by pollinators (*P* = 0.899 or 0.212). |
| Trillo et al. (2018) | Spain. | Tunnels with & without colonies of bumblebees. | Colonies of bumblebees increased visits by bumblebees to the strawberry flowers in winter (*P* < 0.001) & spring (*P* = 0.05). Colonies of bumblebees did not affect visits by honeybees & wild bees (*P* > 0.05). | There was no significant relationship between average fruit weight & visits by bumblebees (*P* = 0.656 or 0.565) or honeybees in either season (*P* = 0.621 or 0.891). There was no significant relationship between fruit weight and all visitors (*P* = 0.899 or 0.212). There was a relationship between fruit weight & wild insects in winter (*P* = 0.037) but not in spring (*P* = 0.131). |
| Castle et al. (2019) | Germany. | Fields next to hedges that were connected or isolated from forests, or next to grasslands. | Highest number of pollinators (Hymenoptera & Diptera) was found in crop fields connected to hedgerows (2.05), followed by isolated hedgerows (1.69) & grassy margins (1.37). | Average fruit weight was highest in fields connected hedgerows (6.5 ± 3.8 g), followed by crop fields with isolated hedgerows (4.5 ± 3.0 g) and grassy margins (4.2 ± 3.9 g). Fruit weight increased with the abundance of pollinators (*P* = 0.041). |
| Hodgkiss et al. (2019) | United Kingdom. | Companion plants (coriander, forget-me-not & mint) grown with the strawberry plants. | More pollinating insects visited the control plants than the strawberry plants with companion plants. | Fruit weight & quality were generally better in the control plots without companion plants. |
| O’Connor et al. (2019) | United Kingdom. | Density of flowering in strawberry fields. | The abundance of all insects (*P* < 0.001) and species richness (*P* < 0.001) increased with increasing flower density (log data). | Not recorded. |
| Trillo et al. (2019) | Spain. | Proportion of greenhouse cover in the landscape. | The abundance of managed bumblebees increased with increasing greenhouse cover, while the abundance of wild bumblebees decreased. | Not recorded. |
| Griffiths-Lee et al. (2020) | United Kingdom. | Strawberry plants with & without companion plants (borage). | Similar number of insect visitors to the strawberry plants with & without borage (*P* = 0.697). More flies, including hoverflies with the strawberry/borage planting (*P* = 0.045). | Strawberry plants with borage produced had the higher yields (82 ± 10 g) than the plants without borage (62 ± 7 g) |
| Bänsch et al. (2020a) | Germany | Landscapes with different proportions of oilseed rape (*Brassica napus*), semi-natural habitats & apple trees. | Increasing strawberry cover increased social bee abundance. In contrast, increasing oilseed rape area decreased bee abundance. The area of natural habitat had no effect on the abundance of social bees. | Not recorded. |
| Bänsch et al. (2020b) | Germany | Landscapes with different proportions of oilseed rape (*Brassica napus*) flower cover (0-800) & strawberry flower cover (0-200). | The abundance of strawberry pollen on the pollinators (honeybees & bumblebees) decreased with increasing rape flower cover & increased with increasing strawberry flower cover. | Not recorded. |
| MacInnis et al. (2020) | Canada. | Strawberry fields next to hedgerows or forests. | Bees as a group were no more species-rich or abundant in crops bordered by forests than crops bordered by hedgerows. Large-bodied bees were more abundant adjacent to the forests. Small-bodied bees declined significantly in the center of the fields. | Not recorded. |
| Angelella et al. (2021) | United States. | Wildflower strips and honeybee hives installed on farms. | Similar abundance of wild bees in farms with (37 ± 6) & without wildflower strips (34 ± 6). Similar richness of wild bees in farms with (8.4 ± 0.6) & without wildflower strips (7.4 ± 0.6). Wild bee abundance decreased by 48% with honeybees (24 ± 4 versus 46 ± 6), & species richness decreased by 20% (6.9 ± 7.0 versus 8.7 ± 0.5). | Number of fruit increased with wildflowers in 1 out of 2 years (*P* < 0.05). Honeybees decreased the number of fruit by 18% (157 ± 13 versus 192 ± 10). No relationship between yield & wild bee abundance (*P* = 0.52), diversity (*P* = 0.91) or evenness (*P* = 0.13). No relationship between yield & honeybee abundance (*P* = 0.58) or the numbers of hives per farm (*P* = 0.68). |
| Bänsch et al. (2021) | Germany. | Level of flowering in nearby oilseed rape (*Brassica napus*) farms (25-300 points). | The abundance of honeybees & bumblebees decreased with increases in rape flowering, while the abundance of solitary bees increased. The decrease in social bees was 3.7 times higher in bumblebees than in honeybees. Increased flowering increased the abundance of all bees. | High bee abundance increased average fruit weight in ‘Honeoye’ but not in ‘Sonata’. |
| Howard et al. (2021) | Australia. | Different locations within tunnels. | There were more honeybees at the edges of the tunnels than in the center assessed by transects. More other insects at the edges of the tunnels than in the center assessed by pan traps. | Not recorded. |
| Image et al. (2022) | United Kingdom. | Environmental/habitat improvement next to strawberry fields. | More tree-nesting bumblebees visiting the flowers with enhancement compared with control farms (*P* < 0.05). No improvement in the visits of ground-nesting bumblebees, ground-nesting solitary bees & cavity-nesting solitary bees (*P* > 0.05). | Not recorded. |

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