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Using ecological and field survey data to establish a national list of the wild bee pollinators of crops.

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Abstract:	The importance of wild bees for crop pollination is well established, but less is known about which species contribute to service delivery to inform agricultural management, monitoring and conservation. Using sites in Great Britain as a case study, we use a novel qualitative approach combining ecological information and field survey data to establish a national list of crop pollinating bees for four economically important crops (apple, field bean, oilseed rape and strawberry). A traits data base was used to establish potential pollinators, and combined with field data to identify both dominant crop flower visiting bee species and other species that could be important crop pollinators, but which are not presently sampled in large numbers on crops flowers. Whilst we found evidence that a small number of common, generalist species make a disproportionate contribution to flower visits, many more species were identified as potential pollinators, including rare and specialist species. Furthermore, we found evidence of substantial variation in the bee communities of different crops. Establishing a national list of crop pollinators is important for practitioners and policy makers, allowing targeted management approaches for improved ecosystem services, conservation and species monitoring. Data can be used to make recommendations about how pollinator diversity could be promoted in agricultural landscapes. Our results suggest agri-environment schemes need to support a higher diversity of species than at present, notably of solitary bees. Management would also benefit from targeting specific species to enhance crop pollination services to particular crops. Whilst our study is focused upon Great Britain, our methodology can easily be applied to other countries, crops and groups of pollinating insects.

- Bee pollinators provide critical ecosystem services, yet currently there are no ‘national lists’ of crop pollinators to advise management, monitoring and conservation programmes.
- We outline a novel approach to identify bee species important for current and future crop pollination at a national scale providing the basis to sustainably manage pollination services.
- Whilst a small proportion of common, generalist species may make the majority of flower visits, many more species, include rare and specialist ones, likely contribute to crop pollination.
- Our results demonstrate that management initiatives to support pollinators need to be targeted, and benefit a greater diversity of species, notably of solitary bees, which are key pollinators of many crops.

Using ecological and field survey data to establish a national list of the wild bee pollinators of crops.

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Abstract

The importance of wild bees for crop pollination is well established, but less is known about which species contribute to service delivery to inform agricultural management, monitoring and conservation. Using sites in Great Britain as a case study, we use a novel qualitative approach combining ecological information and field survey data to establish a national list of crop pollinating bees for four economically important crops (apple, field bean, oilseed rape and strawberry). A traits data base was used to establish potential pollinators, and combined with field data to identify both dominant crop flower visiting bee species and other species that could be important crop pollinators, but which are not presently sampled in large numbers on crops flowers. Whilst we found evidence that a small number of common, generalist species make a disproportionate contribution to flower visits, many more species were identified as potential pollinators, including rare and specialist species. Furthermore, we found evidence of substantial variation in the bee communities of different crops. Establishing a national list of crop pollinators is important for practitioners and policy makers, allowing targeted management approaches for improved ecosystem services, conservation and species monitoring. Data can be used to make recommendations about how pollinator diversity could be promoted in agricultural landscapes. Our results suggest agri-environment schemes need to support a higher diversity of species than at present, notably of solitary bees. Management would also benefit from targeting specific species to enhance crop pollination services to particular crops. Whilst our study is focused upon Great Britain, our methodology can easily be applied to other countries, crops and groups of pollinating insects.

Key-words

Agri-environment Schemes, Apple, Biodiversity, Crop pollination, Dominant Pollinators, Ecosystem Services, Field Bean, Oilseed Rape, Rare Species, Strawberry.

1. Introduction

Insect pollination is key to global agricultural productivity (IPBES, 2016) due to growing demand for entomophilous crops (Godfray and Garnett 2014). The nutritional and economic importance of insect pollinated crops (Vanbergen et al., 2014), and the inability of managed pollinators (e.g., *Apis mellifera*) to meet service demand, mean agriculture is highly dependent upon wild pollinators (Aizen and Harder 2009; Breeze et al., 2014). Yet conventional agricultural practices are a key driver of pollinator declines (Senapathi et al., 2015). Whilst agri-environment scheme options have had positive impacts (Tonietto et al., 2018), most benefit a limited suite of common species (Scheper et al., 2013) and homogeneous communities provide less reliable pollination services (Grab et al., 2019). Currently agri-environment schemes tend preferentially to benefit bumblebee populations (Wood et al., 2015a; Wood et al., 2015b, 2016a, b), yet solitary bee species are more important pollinators of some crops (Woodcock et al., 2013). As such, current agri-environment schemes may not be optimally designed to increase pollination services to many crops. Identifying key pollinating species to individual crops, and ones which may provide additional pollination and insurance against declines in other species, would help inform agricultural management for bee pollinators (Garratt et al., 2014a). Yet there is insufficient information on bee communities for many crops (Kremen and Chaplin-Kramer, 2007) and no studies have attempted to establish a ‘national list’ of crop pollinators to advise management or monitoring programmes.

Whilst the majority of crop flower visitation is attributed to a small proportion of bee species (Kleijn et al., 2015), species-rich communities have been shown to positively influence crop yields and pollination service stability (Hoehn et al., 2008; Garibaldi et al., 2011; Martins et al., 2015; Dainese et al., 2019; Woodcock et al., 2019). Biodiversity conservation and ecosystem service management are often seen as distinct objectives (Sutter et al., 2017), however management that only targets common crop pollinators will not safeguard production if it fails to encompass species that supplement service provision (Fijen et al., 2018). High species turnover means that diverse communities, including rare and specialist species, are required to maintain crop pollination service at regional scales (Winfree et al., 2018). With climate change reducing the occupancy and richness of some wild bee species (Soroye et al., 2020), supporting wider species diversity may be crucial for crop pollination service stability under the substantial future environmental change that is predicted (Oliver et al., 2015; Dainese et al., 2019). Additionally, different crops have distinct pollinator communities and it will be beneficial to identify the pollinating taxa of individual crops and target management accordingly (Garratt et al., 2014a). Furthermore, a national list of crop pollinators can inform monitoring schemes to ensure they include important crop pollinating species (Carvell et al., 2017; Garratt et al., 2019).

In order to inform pollinator management and monitoring, our study aimed to compile the bee species visiting four crops: apple (*Malus domestica*), field bean (*Vicia faba*), oilseed rape (*Brassica napus*) and strawberry (*Fragaria x ananassa*). Insect pollination has been shown to enhance yield quantity and quality in all four crops (Bartomeus et al., 2014; Garratt et al., 2014b). Additionally, they differ in flower phenology and morphology (Garibaldi et al., 2015) and likely show corresponding differences in their pollinator community composition (Garratt et al., 2014a). We use sites in Great Britain as a case study because its bee fauna is comprehensively described and their occupancy is well recorded over a long time period (Powney et al. 2019). We compiled a list of all British bee species and their available physiological and ecological traits, and combined it with field survey data in order to devise an approach to generate lists of (i) definite flower visitors to each crop (ii) likely flower visitors, which are expected to also contribute to crop pollination (iii) possible crop flower visitors whose contribution to pollination is not well understood and merits further investigation. Our aim was to compile these lists for reference purposes, but not to statistically compare pollinator communities between crops, due to the unstandardised nature of the datasets used to generate the lists of bee species. Additionally, we identify dominant crop pollinating species, and asses the contribution of wild bees compared to honey bees for crop flower visitation.

2. Materials and Methods

2.1 Potential crop pollinators.

First, a species database of all extant, resident wild bee species in Great Britain was established using the most recent checklist of UK species (Else et al., 2016). For each species, data on the following were collated: flight period (months); sociality (cleptoparasite, eusocial or solitary); lecty (oligolectic or polylectic, including if any of the target crop plant families are visited for pollen and/or nectar), tongue length (short/long), geographic coverage (distribution and habitat) (based on trait information compiled by Stuart Roberts for the EU- FP6 ALARM-project and BWARS, 2020) and conservation status (Webb et al., 2018). Potential crop pollinators, as defined here, are those bee species which, based upon these ecological traits, such as flight period, lecty, sociality and tongue length, could pollinate our target crops. Habitat specialists that are not coincident with cropland were initially excluded i.e., primarily coastal, heathland species. The known floral ecology of each species was then used to refine lists for each crop. Cleptoparasitic species, species that are oligolectic on plant families other than the target crop or polylectic, but not documented as foraging on the relevant plant family for pollen or nectar and species whose flight period does not overlap with the relevant crops flowering period were excluded. For field bean, only 'long-tongued' species (Michener, 2000) were considered as its flowers have deep corollas and most visits by 'short-tongued' species involve nectar robbing rather than legitimate visitation (Garratt et al., 2014a).

2.2 Field survey data

Field studies were sourced through literature searches in google scholar and existing datasets held by the authors. Fifty-seven datasets from across England, Scotland and eight other European countries were available to combine with the potential crop pollinator lists in order to establish shortlists of crop flower visitors (Figure 1 and Table S3).

Lists of bee species recorded in crop fields were compiled using three types of survey data:

i) British flower visitation studies (e.g. transect walks, observation plots).

ii) British pan trap studies in crop fields.

iii) Other European flower visitation studies (used to validate crop flower visitation for species sampled in British pan traps only).

For every bee species the total number of reported legitimate flower visits and number of studies recorded in were calculated for each crop. If studies did not include quantitative data then a conservative approach was taken whereby each bee species listed was taken as representing a single crop flower visit. As pan trap catches do not provide information on floral associations (Westphal et al., 2008), these data were only used, in combination with trait data, to generate the list of possible pollinators.

2.3 Crop flower visitors

The lists of potential crop pollinators were combined with the field survey data to categorize bee species into one of three flower visitor categories (Figure 2; Full details in Supplementary Methods 1):

i) Definite Flower Visitors – Species recorded visiting crop flowers in British flower visitation studies.
ii) Likely Flower Visitors - Species recorded in British pan trap crop studies and recorded as making at least two flower visits in other European studies.
iii) Possible Flower Visitors - Species only recorded in British pan trap studies, or in other European flower visitor studies only, and classified as a potential crop flower visitor.

2.4 Dominant crop flowers visitors

As visitation rate to crop flowers is a good proxy of relative contribution to pollination service delivery (Vazquez et al., 2005), we identified the dominant British flower visiting bee species per crop by approximating the species attributed with a combined total of 80% of flower visits, the proportion identified as corresponding to the dominant flower visitors by Kleijn et al. (2015).

Only British flower visitation datasets where bee species were either all identified to species or genus were included in the analysis (Supplementary Methods 2). Additionally, we calculated the average proportion of visits to crop flowers attributed to wild bees compared to honey bees for all crops (Supplementary Methods 2).

3. Results

3.1 Potential crop pollinators

A preliminary list of 229 extant, resident British wild bee species was compiled. Of those 132 species were excluded due to ecological and lecty traits that were deemed incompatible with these bees being present in crop fields and/or crop flower visitors (Table S1). Four species were treated as an aggregate – *Bombus terrestris* aggregate – due to the difficulties of separating their workers in the field (Wolf et al., 2010; Bossert, 2015). Therefore, a total of 97 species were initially identified as potential crop pollinators. Accounting for their documented foraging ecology and flight period, the following number of species were considered as potential pollinators per crop: apple- 83, bean- 30, oilseed- 60, and strawberry – 90 (Table S2).

3.2 Field survey data

The total number of studies sourced per crop were as follows: apple – 17; bean – 10; oilseed – 19; strawberry – 11. The number of studies per survey type for each crop is provided in Figure S1.

3.3 Crop flower visitors

Seventy-three species from ten genera where categorised as flower visitors of one or more crops, 63 of which were recorded in British crop field studies (Table 1, Figure 3). Fourteen species were included in flower visitor categories that were not initially identified as potential crop pollinators. Ten of those were widely polylectic *Bombus* or *Lasioglossum* species, all recorded in oilseed datasets, but not documented in the literature as foraging on

Brassicaceae. The remaining species were three short-tongued *Andrena* species recorded visiting bean flowers, two of which are oligolectic on Fabaceae and a *Colletes* species, recorded in a single strawberry dataset, that is documented as being oligolectic on another plant family. The majority of species identified as potential pollinators, but not recorded in crop field surveys were either rare species or polylectic species documented as having distinct preferences for plant families other than the target crop. The remaining species were overwhelmingly smaller species from the genera *Hylaeus* and *Lasioglossum* or cavity nesting *Megachilidae*. Most species identified as crop flower visitors were geographically widespread (BWARS, 2020) and polylectic species. However, a quarter (n=18) of species included in flower visitor categories, currently have a designated conservation status in Britain. Full details of all species in crop flower visitor categories are given in tables S4a-d and S5a – S8d.

Table 1: Number of bee species, based upon field datasets and trait information, that were assigned to each category of flower visitor per crop

	Flower Visitor Category			
Crop	**Definite**	**Likely**	**Possible**	**Total**
Apple	19	13	25	57
Field Bean	11	0	3	14
Oilseed Rape	37	11	3	51
Strawberry	9	6	18	33

Apple

All five British apple flower visitor studies recorded every bee to species level. *Andrena* were the most speciose genus of flower visitor, both overall (n=22) and in the definite flower visitor category (n=10). *Bombus* species were the next most commonly represented genus in the latter category (n=6), but were less frequent overall (n=9) than *Lasioglossum* species (n=16). Within the definite flower visitor category 80% of flower visits were attributed to eight species, only half of which were recorded in all studies. Most likely and possible flower visitors were *Andrena* or *Lasioglossum* species.

Bean

Three of the five British bean flower visitor studies recorded all bee to species level, the remainder only recorded *Bombus* to species, which was both the most common genus overall (n=9) and in the definite flower visitor category (n=7). Three short-tongued *Andrena* sp. were identified as definite flower visitors, but all were recorded as very low numbers of flower visits (≤10). Four *Bombus* species and *Anthophora plumipes* accounted for 95% of all visits recorded in British flower visitation studies. However, all the *A. plumipes* records derived from one study (Bond and Kirby, 1999) carried out at a single site. The four *Bombus* were the only species recorded in four or more studies. No species met the criteria for the likely flower visitor category. The possible flower visitor category included two *Bombus* and one *Osmia* species.

Oilseed

Six of the nine British oilseed flower visitor studies recorded bees to species level, but only two included quantitative data on all bee species. *Andrena* was the most speciose genus of bee, both overall (n=27) and within the definite flower visitor category (n=15). *Bombus* and *Lasioglossum* species were equally represented in the definite flower visitor category (n=9), but *Lasioglossum* were more frequent overall (n=14). Within the definite flower visitor category 80% of recorded flower visits were attributed to six species, only two of which were recorded in all nine studies, with the remainder only recorded in between five and eight studies, despite all being large *Andrena* or *Bombus* species, generally identified and quantified in all field studies. The likely and possible visitor categories were entirely comprised of *Andrena* or *Halictidae* species, two of which are oligolectic on *Brassicaceae.*

Strawberry

Two British strawberry flower visitor studies recorded all bees to species level. The remaining three only recorded a group of large *Andrena* and *Bombus* to species. *Bombus* species were the most common genus of bee within the definite flower visitor category (n=5), but joint second as the most frequent genus overall, alongside *Lasioglossum* (n=7), with *Andrena* species being the most prevalent genus across all categories (n=14). Within the definite flower visitor category 80% of recorded flower visits were attributed to just two *Bombus* species, which along with two other *Bombus*, were the only species recorded in more than two studies. The likely visitor category was almost exclusively represented by *Andrena* species. The possible visitor category was largely comprised of solitary bees from five different genera.

3.4 Dominant crop flower visitors

Ten bee species were attributed with 80% of flower visits across the four crops (Figure S2; Figure 4). There were differences however in the number and composition of those species making up the 80% of flower visits on a per crop basis. Differences in crop communities were even more distinct when considering the entire suite of bee species included in the characterisation of each crops' total flower visiting community (Figure 3; Figure 4). Wild bees were attributed with an average of between 63 and 83 percent of crop flower visits compared to honey bees (Apple: solitary bee visits = 68%; Bean: solitary bee visits = 83%; Oilseed: solitary bee visits = 63%; Strawberry: solitary bee = 77%).

4. Discussion

4.1 Crop pollinator species

Our study is the one of the first to evaluate the entire wild bee community of multiple crops on a national basis and can be used as model approach for other countries, crops and pollinators. With the identification of bee species important for pollinating crops we build the basis to better sustainably manage services with changing climate and land use. Whilst in accordance with other studies (Rader et al., 2012; Kleijn et al., 2015) our results indicate that a small proportion of common, generalist bee species do make the majority of crop flower visits, many more species were evidenced as crop flower visitors. Additionally, our results suggest that the contribution of wild bee species to crop flower visitation may be even greater than previously thought. Whereas previous estimates indicate that wild bees make a similar overall contribution to honey bees (Kleijn et al. 2015), when considering the entire suite of flower visiting species our results indicate that wild bees make on average between 63 and 83% of flower visits to our target crops.   Given the benefits of biodiverse communities for current and future crop pollination services (Kremen et al., 2002; Hoehn et al., 2008; Garibaldi et al., 2011; Rader et al., 2012), interventions to support crop pollinators should target a more significant proportion of the bee fauna than at present (Wood et al., 2015b, 2016a; Gresty et al., 2018). Establishing a list of currently important, but also potentially relevant crop pollinators, is necessary to help target monitoring and conservation (Carvell et al., 2017).

Our results also support prior evidence of distinct differences in individual crop pollinator communities (Garratt et al., 2014a). The overwhelming majority of field bean and strawberry flower visits were attributed to bumblebees. However, whereas field bean was visited by the three longest tongued species in Britain, strawberry crops were almost exclusively visited by two other bumblebee species, with relatively shorter tongues. This supports a link between trait matching of bees and flowers in crop pollination (Garibaldi et al., 2015). *Bombus* species were also recorded visiting apple and oilseed rape. However, due to their low abundance in early spring during apple flowering (Martins et al., 2015), and lower rate of pollen transfer when visiting oilseed flowers (Woodcock et al., 2013) they are less important pollinators of these crops compared to solitary species. *Andrena* and *Lasioglossum* species were prevalent across both apple and oilseed flower visitor categories. *Andrena* are known to be highly efficient pollinators of both crops (Martins et al., 2015; Woodcock et al., 2013), especially apple (Russo et al., 2017). Most *Lasioglossum,* species however*,* generally emerge later than many *Andrena* species, and peak after apple flowering, whereas oilseed tends to flower later and longer, and *Lasioglossum* are likely important pollinators of this crop (Perrot et al., 2018; Catarino et al., 2019). Furthermore, we almost certainly significantly underestimated the diversity and abundance of *Lasioglossum* bees visiting oilseed rape, given that many studies did not include detailed quantitative data on this genus.

Our datasets also indicate that rare and specialist species may visit crop flowers when they are locally abundant or are especially attracted to crop flowers (MacLeod et al., 2020). Several rare species recorded in apple orchards are most common in south-east England, Britain's principal apple growing region, and bee species that are oligolectic on Brassicaceae were recorded in oilseed rape studies. Given that biodiversity benefits pollination (Dainese et al., 2019), strategies to support biodiverse crop communities may prove critical to sustain ecosystem service provision. Yet current agri-environment schemes options rarely consider rare species (Senapathi et al., 2015). There is however, a significant overlap in the floral resources used by common and rare crop pollinators (Sutter et al., 2017; MacLeod et al., 2020), and thus there are opportunities to promote both biodiversity and conservation in agricultural landscapes.

Our findings also offer an opportunity to anticipate potentially important future crop pollinators. For example, whilst a number of European crop flower visitors not presently recorded in British crop fields are currently geographically restricted, should they expand their range in the future, they could ameliorate the threat of ecological mismatches between current pollinators and crops due to climate change (Polce et al., 2013; Polce et al., 2014; Settele et al., 2016). Taken further, this information could be used to refine existing models of bee populations used to project pollinator populations at large spatial scales (e.g. Gardner et al., 2020), which can assist in larger scale planning of pollinator management.

Identifying specific bee crop pollinating species, as we have done, can inform refinements to agri-environment schemes to promote more biodiverse communities in agricultural landscapes. For example, *Andrena* were the most speciose genus of bees identified across flower visitor categories in three of the crops. Currently European agri-environment measures to boost pollinator populations have focused on the creation of flower-rich habitats, including wildflower buffer strips (Wratten et al., 2012). Yet evidence suggests these are primarily visited by bumblebees, with solitary bees preferring non-sown, wild plants (Wood et al., 2015). In apple orchards for example, early-flying *Andrena* species have been positively associated with dandelions (Taraxacum agg.) rather than sown species, which often bloom later than apple flowers (Campbell et al., 2017). Reduced mowing regimes in orchards, and other crop areas, particularly in early spring could boost *Andrena* numbers and hence pollination. Such interventions are also likely to benefit early flying *Lasioglossum*, many species of which are known be attracted to yellow flowers in the family *Asteraceae*. *Osmia* species have also been demonstrated as efficient pollinators of apple, oilseed and strawberry crops (Abel et al., 2003; Garratt et al., 2016; Horth and Campbell, 2018), but as in this study, are frequently recorded in low numbers, likely due to a lack of suitable nesting and floral resources in agricultural landscapes for cavity nesting species (Gardner and Ascher, 2006; Blitzer et al., 2016). Incorporating hedgerow species such as Dog Rose and Bramble, alongside, areas of old and dead wood, around crop areas would provide both forage and nesting resources (Else and Edwards 2018; Gresty et al., 2018) for these and other cavity nesting bees. Future management to support long-tongued solitary bees could benefit field bean pollination. *Anthophora plumipes*, for example, prefers to nest in vertical soil profiles, which are not currently a common feature in agricultural landscapes.

4.2 Data constraints and limitations

There are caveats to using foraging ecology to identify potential bee pollinators, as done here and elsewhere (Ahrenfeldt et al., 2015). There is a lack of published data for many bee species and others visit a wider range of flowers than can be realistically documented (Else and Edwards, 2018). As such, determining the status of bee species as crop flower visitors requires field survey data for confirmation. Yet comprehensive crop pollinator data is currently lacking as sampling is irregular, undertaken almost exclusively as part of bespoke research projects rather than systematic monitoring (Breeze et al., 2020). Furthermore, whilst census methods can provide information on floral associations, they require experienced surveyors to comprehensively record species richness (O'Connor et al., 2019). Across all four crops the only bees which were consistently identified to species level were large, conspicuous ones from the genera *Bombus* and *Andrena*. Small and inconspicuous species, particularly from the genus *Lasioglossum*, were often only extensively sampled in the pan trap surveys. Additionally, whilst the visitation rate of dominant species is strongly correlated to pollination service delivery (Winfree et al., 2015; Fijen et al., 2018), the assumption here and elsewhere that quantitative visitation data can be used to infer pollination (Kleijn et al., 2015), neglects to factor in that flower visitation alone is not a perfect proxy for pollination (King et al., 2013; Senapathi et al., 2015; Ollerton, 2017). Certain physiological and behavioural traits also influence pollination service delivery (Martins et al., 2015). Further detailed data and research is required before any definitive conclusions can be made about the contributions of individual bee species to crop pollination.

5. Conclusions

Given the importance of wild pollinators and the detrimental impacts of conventional agriculture on their populations it is unsurprising that the management of wild and managed pollinating insects is considered a critical step for future food security (Garibaldi et al., 2019; Kleijn et al., 2019; Rollin and Garibaldi et al., 2019; Reilly et al., 2020). Yet information on which species contribute most to ecosystem service delivery has long been elusive (Kremen and Chaplin-Kramer, 2007) despite its critical importance for both monitoring and conservation measures. Here we combine ecological and field data to provide a uniquely comprehensive overview of the crop pollinating bees of a single region, Great Britain. Whilst we have focused on Great Britain, a similar approach would be applicable across Europe, and could also be applied to non-bee species that have been identified as important crop pollinators (Rader et al., 2016). Our research bolsters evidence that many wild bee species, including rare and specialised ones, may contribute to crop pollination (Klein et al., 2003; Sutter et al., 2017; Winfree et al., 2018; MacLeod et al., 2020), thus it can be argued that agri-environment scheme options should not focus solely on dominant crop pollinators.

Future climatic changes threaten to further deplete already impoverished bee populations (Soroye et al., 2020) and create spatial mismatches between crops and their pollinators, which could exacerbate existing pollination deficits (Polce et al., 2014). To that end, the species identified as possible crop pollinators could represent an as yet untapped pollinator resource. Whilst some species may not currently visit crops due to ecological or environmental constraints, they could be assisted to expand by dedicated conservation measures in agricultural landscapes, allowing them to compensate for any declines in current crop pollinating species. Many such species are solitary, which presently benefit much less from agri-environment schemes than social species (Wood et al., 2015b, 2016a, 2016b; Gresty et al., 2018). As such land managers may need to re-evaluate existing pollinator management interventions and consider a broader range of species to safeguard the ecosystem service of crop pollination in an uncertain future.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' contributions

LH conceived the ideas, analysed the data and wrote the manuscript. MG, TB and TO contributed to the conceptual development and manuscript revisions. All other authors provided data and contributed to manuscript revisions.

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Figure 4 – Bee photographs courtesy of Nicolas J. Vereecken and Stéphane De Greef.

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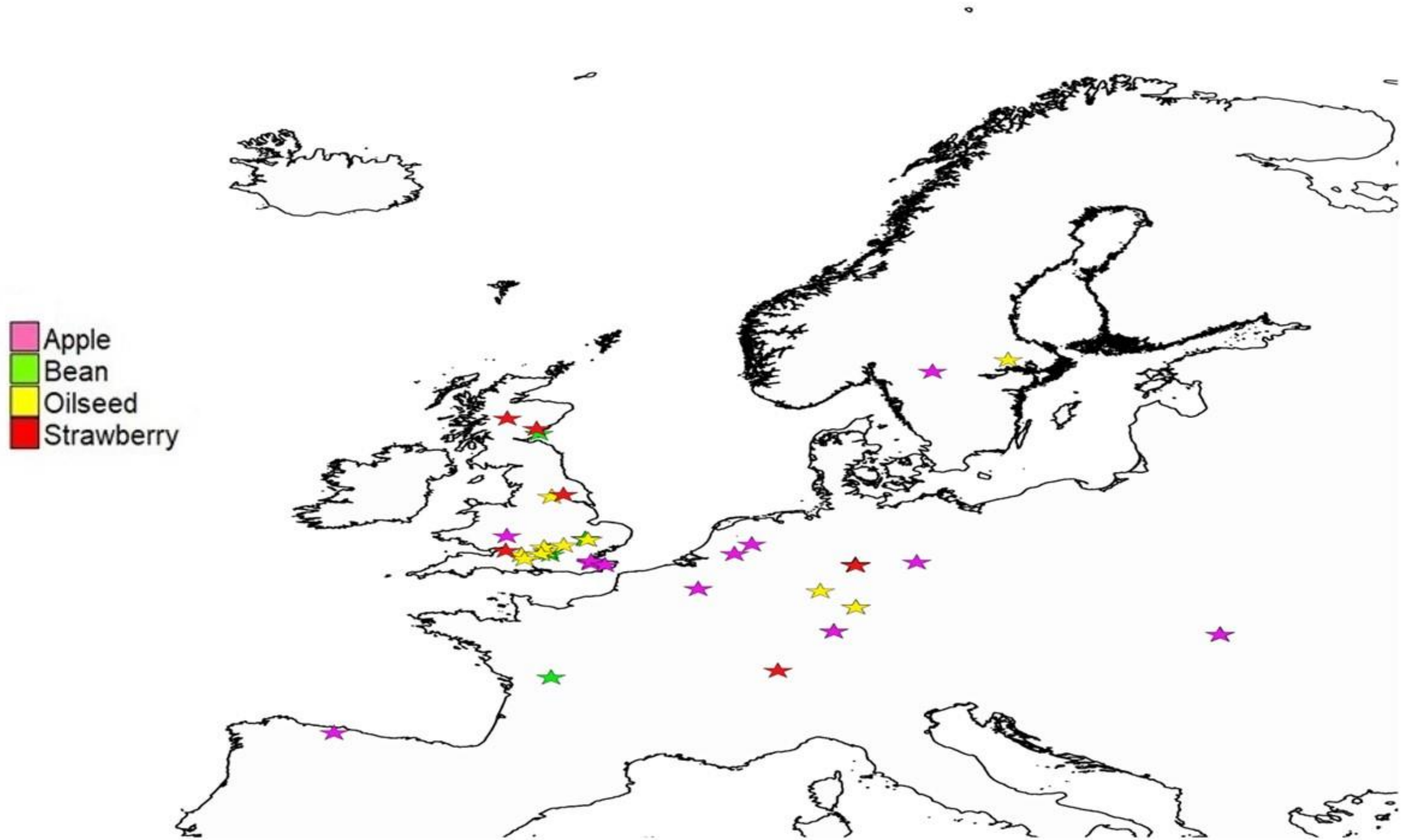

Figure 1: Map of Europe, showing the countries from which field studies were sourced for each crop.

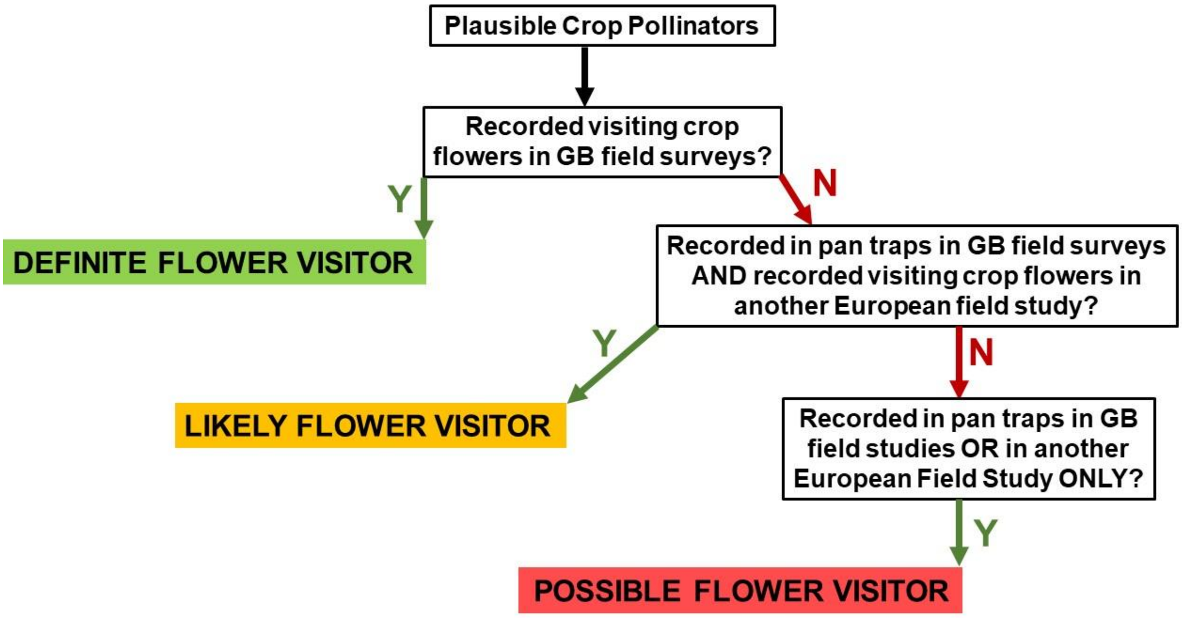

Figure 2: Methodology by which bee species were categorised as definite, likely and possible flower visitors.

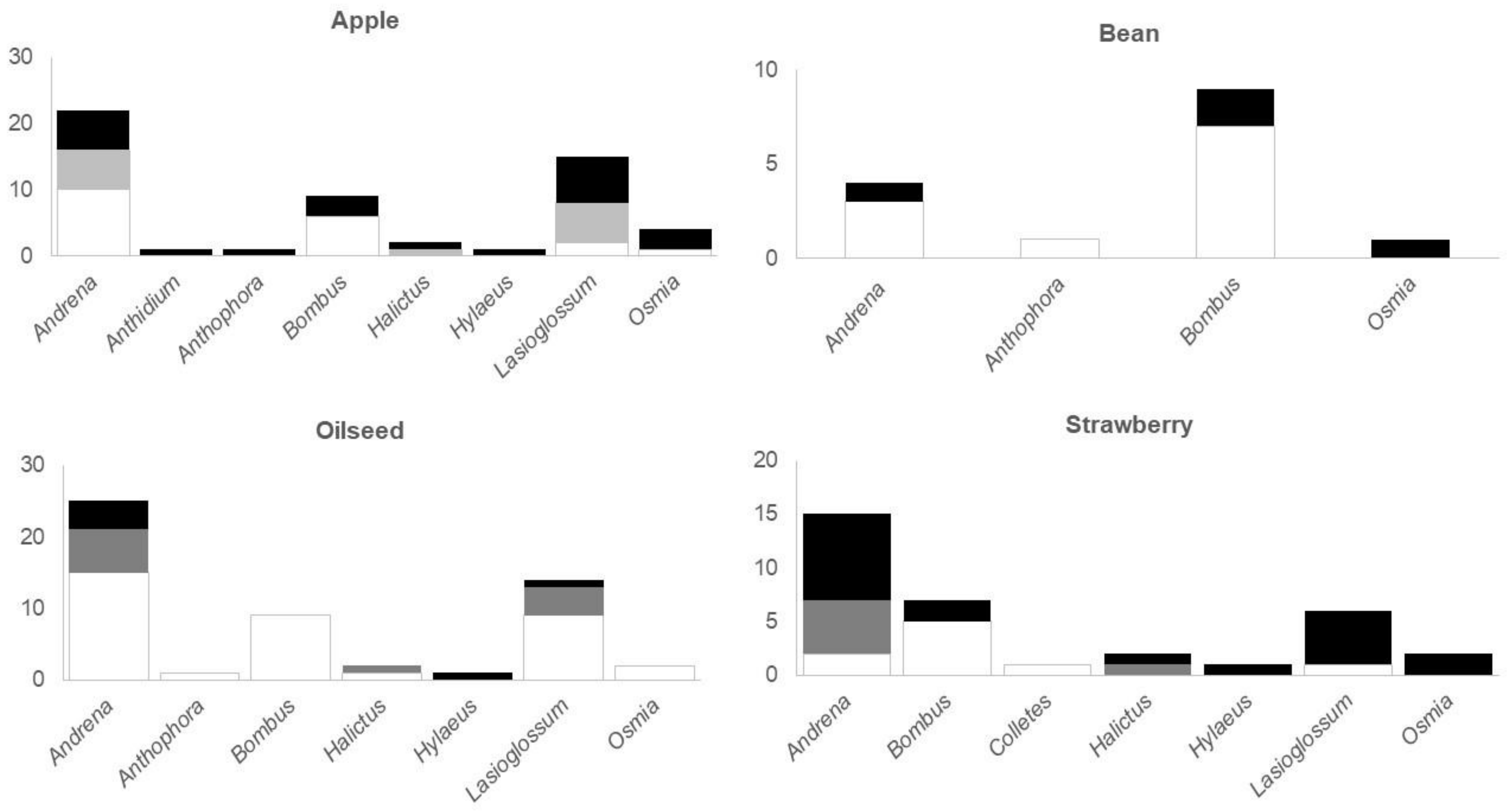

Figure 3: The number of bee species from each genus which were categorised as definite likely or possible flower visitors per crop.

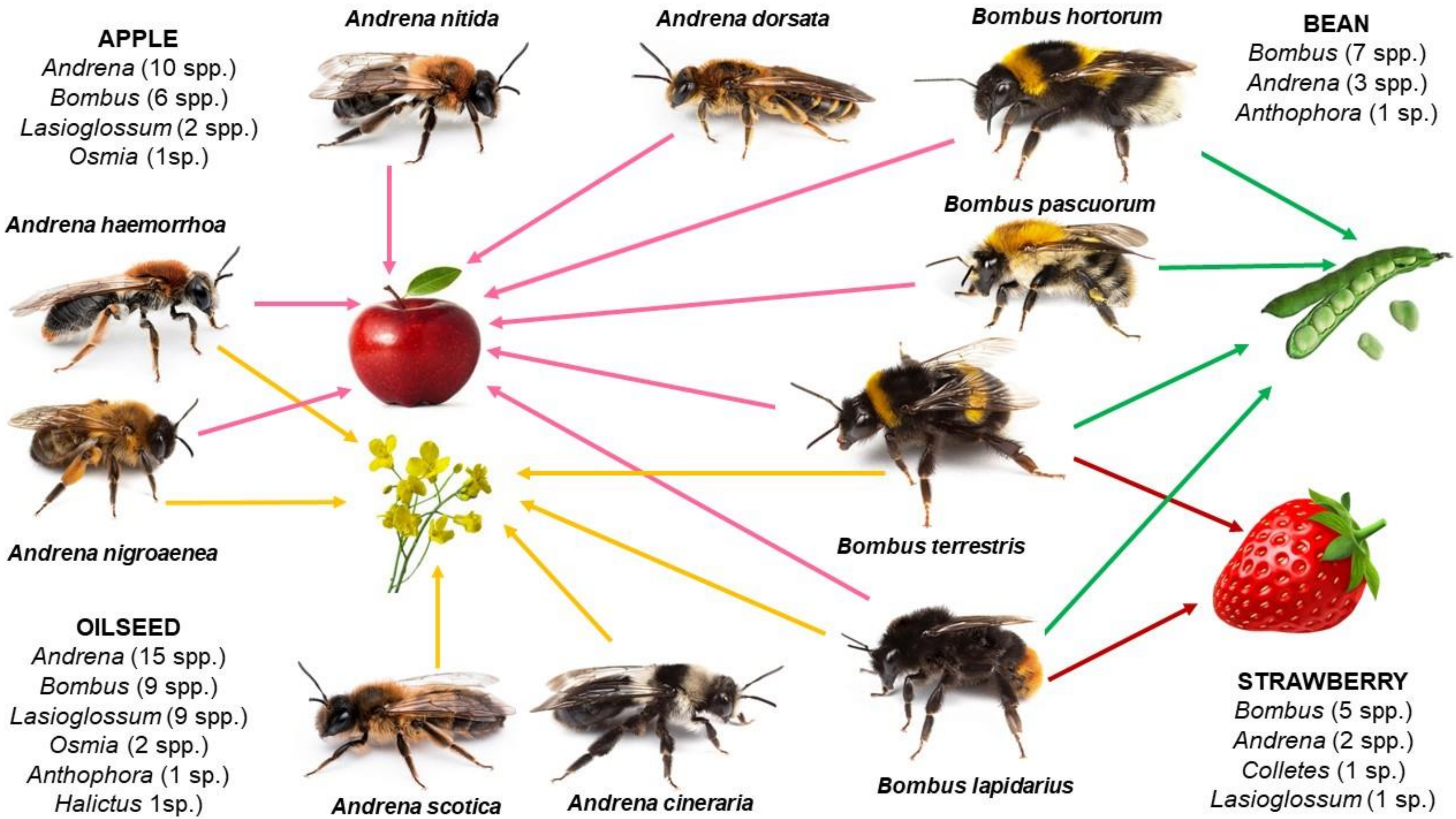

Figure 4: Dominant crop visiting bee species (attributed with ~80% of flower visits in field studies per crop) shown as photographs, with number of bee species in each genus that are 'definite' flower visitors for each crop.

Supplementary Methods

1. Crop flower visitors

The lists of potential crop pollinators were combined with the field survey data to categorize bee species as follows;

1. 'Definite' flower visitors:
    a. Species recorded visiting crop flowers in British studies.
    b. Species only recorded as a single visit were –
        i. Retained if they were recorded in at least one other European crop flower visitor study.
        ii. Retained but downgraded to a likely flower visitor if they did not appear in another European study but were classified as a potential crop flower visitor.
        iii. Excluded if they did not meet the above criterion.
2. 'Likely' flower visitors:
    a. Species recorded in British pan trap crop studies only and recorded as making at least two flower visits in other European studies.
    b. Species recorded visiting once in a single European study were –
        i. Retained in the likely flower visitor category if they were classified as a potential flower visitor for that crop.
        ii. Excluded if they did not meet the above criteria.
3. 'Possible' flower visitors:
    a. Species only recorded in British pan trap studies, or in other European flower visitor studies only, and classified as a potential crop flower visitor.
    b. Species only recorded as a single flower visit in European studies were excluded.

2. *Dominant Crop Pollinating Species*

We calculated the proportion of flower visits attributed to every bee species at each site per dataset. This was done to negate the potential biases of different sampling effort and intensity between field studies and to account for the fact that some species may have an unusually high abundance within a given site or individual dataset but not make a significant contribution to flower visitation overall. Any flower visits for bees only identified to genus were allocated to bees identified to species level at the same percentage as those bees accounted for overall flower visits i.e. if a given *Andrena* species accounted for 20% of flower visits then 20% of the total flower visits by unidentified *Andrena* were added to that species total flower visits. For each crop the total average proportion of flower visits per species across all datasets was then calculated to determine the species corresponding to a combined total of 80% all flower visits. The same analysis was also carried out to compare the proportion of flower visits attributed to wild bees and honey bees at each site per dataset, for all above datasets which also recorded honey bee visits to crop flowers.

Number of datasets per crop used to establish wild bee species attributed with 80% of flower visits (number used to compare the proportion of flower visits attributed to wild bees and honey bees in brackets).

Crop	**Number of Datasets**
Apple	**5 (4)**
Field Bean	**5 (4)**
Oilseed Rape	**8 (6)**
Strawberry	**2 (2)**

***** The majority of studies recorded all, or most, Lasioglossum species to genus only, so all Lasioglossum visits had to be aggregated for all crops except strawberry.

****** It was not possible to get site data for one strawberry field study, but all sites were within the same region of Scotland, so the datum was just considered as one site for analysis.

*** One oilseed data set had largely qualitative data, and it was only possible to assign bee species a number of flower visits between one and four.

Supplementary Results

Table S1: List of bee species excluded as potential crop pollinators.

Species	**Exclusion Criteria (Floral or Habitat)**
Andrena apicata	Oligolectic (Salix spp.)
Andrena argentata	Ericaceous heath
Andrena bimaculata	Heaths
Andrena clarkella	Oligolectic (Salix spp.)
Andrena denticulata	Oligolectic (Asteraceae)
Andrena falsifica	Heath and heathy woodland
Andrena ferox	Oligolectic (Quercus robur)
Andrena florea	Oligolectic (Bryonia spp.)
Andrena fulvago	Oligolectic (Asteraceae)
Andrena fuscipes	Oligolectic (Calluna spp.)
Andrena hattorfiana	Oligolectic (Dipsacaceae)
Andrena humilis	Oligolectic (Asteraceae)
Andrena labialis	Oligolectic (Fabaceae) / short-tongued
Andrena lapponica	Oligolectic (Vaccinium spp.)
Andrena marginata	Oligolectic (Dipsacaceae)
Andrena nitidiuscula	Oligolectic (Apiaceae)
Andrena ovatula	Heaths, moors and coastal dunes
Andrena pilipes	Coastal
Andrena praecox	Oliglolectic (Salix spp.)
Andrena proxima	Oligolectic (Apiaceae)
Andrena rosae	Oligolectic (Apiaceae)
Andrena ruficrus	Oliglolectic (Salix spp.)
Andrena simillima	Coastal grasslands and cliffs
Andrena similis	Oligolectic (Fabaceae) / short-tongued
Andrena tarsata	Oligolectic (Potentilla spp.)
Andrena vaga	Oliglolectic (Salix spp.)
Andrena wilkella	Oligolectic (Fabaceae) / short-tongued
Anthophora furcata	Oligolectic (Lamiaceae)
Anthophora retusa	Heathlands, coastal dunes and cliffs
Bombus barbutellus	No lectic status
Bombus bohemicus	No lectic status
Bombus campestris	No lectic status
Bombus distinguendus	Natural grassland mosaics
Bombus monticola	Upland Habitats
Bombus rupestris	No lectic status

Bombus sylvestris	No lectic status
Bombus vestalis	No lectic status
Chelostoma campanularum	Oligolectic (Campanula spp.)
Chelostoma florisomne	Oligolectic (Ranunculaceae)
Coelioxys conoideus	No lectic status
Coelioxys elongata	No lectic status
Coelioxys inermis	No lectic status
Coelioxys mandibularis	No lectic status
Coelioxys quadridentatus	No lectic status
Coelioxys rufescens	No lectic status
Colletes cunicularius	Sandy coastal sites, heaths and quarries
Colletes daviesanus	Oligolectic (Asteraceae)
Colletes floralis	Coastal sites
Colletes fodiens	Oligolectic (Asteraceae)
Colletes halophilus	Oligolectic (Asteraceae)
Colletes hederae	Flight period – starts September
Colletes marginatus	Coastal dunes and grass heaths
Colletes similis	Oligolectic (Asteraceae)
Colletes succinctus	Flight Period (July – Sep)
Dasypoda hirtipes	Oligolectic (Asteraceae)
Epeolus cruciger	No lectic status
Epeolus variegatus	No lectic status
Halictus confusus	Sandy heaths
Halictus eurygnathus	Coastal chalk grasslands
Heriades truncorum	Oligolectic (Asteraceae)
Hylaeus annularis	Coastal dunes and shingle
Hylaeus cornutus	Polylectic (non-crop families)
Hylaeus pectoralis	Reedbeds
Hylaeus signatus	Oligolectic (Reseda spp.)
Lasioglossum angusticeps	Coastal grasslands
Lasioglossum brevicorne	Oligolectic (Asteraceae)
Lasioglossum laticeps	Coastal grasslands
Lasioglossum pauperatum	Plant families visited unknown
Lasioglossum prasinum	Polylectic (non-crop plant families)
Lasioglossum puncticolle	Polylectic (non-crop plant families)
Macropis europaea	Oligolectic (Primulaceae)
Megachile circumcincta	Coastal dunes and inland heaths
Megachile leachella	Coastal dunes
Megachile maritima	Coastal and heathland
Melecta albifrons	No lectic status
Melitta dimidiata	Oligolectic (Onobrychis spp.)
Melitta haemorrhoidalis	Oligolectic (Campanula spp.)
Melitta tricincta	Oligolectic (Odontites vernus)
Nomada argentata	No lectic status

Nomada armata	No lectic status
Nomada baccata	No lectic status
Nomada conjungens	No lectic status
Nomada fabriciana	No lectic status
Nomada ferruginata	No lectic status
Nomada flava	No lectic status
Nomada flavoguttata	No lectic status
Nomada flavopicta	No lectic status
Nomada fucata	No lectic status
Nomada fulvicornis	No lectic status
Nomada goodeniana	No lectic status
Nomada guttulata	No lectic status
Nomada hirtipes	No lectic status
Nomada integra	No lectic status
Nomada lathburiana	No lectic status
Nomada leucophthalma	No lectic status
Nomada marshamella	No lectic status
Nomada obtusifrons	No lectic status
Nomada panzer	No lectic status
Nomada roberjeotiana	No lectic status
Nomada ruficornis	No lectic status
Nomada rufipes	No lectic status
Nomada sexfasciata	No lectic status
Nomada sheppardana	No lectic status
Nomada signata	No lectic status
Nomada striata	No lectic status
Osmia inermis	Scottish montane grassland
Osmia leaiana	Oligolectic (Asteraceae)
Osmia spinulosa	Oligolectic (Asteraceae)
Osmia uncinate	Ancient pine forest
Osmia xanthomelana	Coastal cliffs and dunes
Panurgus banksianus	Oligolectic (Asteraceae)
Panurgus calcaratus	Oligolectic (Asteraceae)
Sphecodes crassus	No lectic status
Sphecodes ephippius	No lectic status
Sphecodes ferruginatus	No lectic status
Sphecodes geoffrellus	No lectic status
Sphecodes gibbus	No lectic status
Sphecodes hyalinatus	No lectic status
Sphecodes longulus	No lectic status
Sphecodes miniatus	No lectic status
Sphecodes monilicornis	No lectic status
Sphecodes niger	No lectic status
Sphecodes pellucidus	No lectic status

Sphecodes puncticeps	No lectic status
Sphecodes reticulatus	No lectic status
Sphecodes rubicundus	No lectic status
Sphecodes scabricollis	No lectic status
Sphecodes spinulosus	No lectic status
Stelis breviuscula	No lectic status
Stelis ornatula	No lectic status
Stelis phaeoptera	No lectic status
Stelis punctulatissima	No lectic status

Table S2: List of species considered potential crop flower visitors based upon flight period and forage for apple (A), bean (B), oilseed (O) and strawberry (S).

Species	Lecty	A	B	O	S
Andrena alfkenella	Polylectic	✓		✓	✓
Andrena angustior	Polylectic	✓		✓	✓
Andrena barbilabris	Polylectic	✓		✓	✓
Andrena bicolor	Polylectic	✓		✓	✓
Andrena bucephala	Polylectic	✓		✓	✓
Andrena chrysosceles	Polylectic	✓		✓	✓
Andrena cineraria	Polylectic	✓		✓	✓
Andrena coitana	Polylectic				✓
Andrena congruens	Polylectic	✓		✓	✓
Andrena dorsata	Polylectic	✓		✓	✓
Andrena flavipes	Polylectic	✓		✓	✓
Andrena fucata	Polylectic	✓		✓	✓
Andrena fulva	Polylectic	✓		✓	✓
Andrena gravida	Polylectic	✓		✓	✓
Andrena haemorrhoa	Polylectic	✓		✓	✓
Andrena helvola	Polylectic	✓		✓	✓
Andrena labiate	Polylectic	✓		✓	✓
Andrena minutula	Polylectic	✓		✓	✓
Andrena minutuloides	Polylectic	✓		✓	✓
Andrena nigriceps	Polylectic		✓		✓
Andrena nigroaenea	Polylectic	✓		✓	✓
Andrena nigrospina	Oligolectic (Brassicaceae)			✓	
Andrena nitida	Polylectic	✓		✓	✓
Andrena niveata	Oligolectic (Brassicaceae)			✓	
Andrena scotica	Polylectic	✓		✓	✓
Andrena semilaevis	Polylectic	✓		✓	✓
Andrena subopaca	Polylectic	✓		✓	✓
Andrena synadelpha	Polylectic	✓		✓	✓
Andrena thoracica	Polylectic	✓		✓	✓
Andrena tibialis	Polylectic	✓		✓	✓
Andrena trimmerana	Polylectic	✓			✓

Andrena varians	Polylectic	✓		✓	✓
Anthidium manicatum	Polylectic	✓	✓		✓
Anthophora bimaculata	Polylectic	✓			✓
Anthophora plumipes	Polylectic	✓	✓	✓	✓
Anthophora quadrimaculata	Polylectic		✓		
Bombus hortorum	Polylectic	✓	✓	✓	✓
Bombus humilis	Polylectic	✓	✓		✓
Bombus hypnorum	Polylectic	✓	✓	✓	✓
Bombus jonellus	Polylectic	✓	✓		✓
Bombus lapidarius	Polylectic	✓	✓	✓	✓
Bombus muscorum	Polylectic	✓	✓		✓
Bombus pascuorum	Polylectic	✓	✓		✓
Bombus pratorum	Polylectic	✓	✓		✓
Bombus ruderarius	Polylectic	✓	✓		✓
Bombus ruderatus	Polylectic	✓	✓		✓
Bombus soroeensis	Polylectic		✓		✓
Bombus sylvarum	Polylectic	✓	✓		✓
Bombus terrestris/lucuorum agg.	Polylectic	✓	✓	✓	✓
Ceratina cyanea	Polylectic	✓	✓		✓
Eucera longicornis	Oligolectic (Fabaceae)		✓		
Halictus rubicundus	Polylectic	✓		✓	✓
Halictus tumulorum	Polylectic	✓		✓	✓
Hoplitis claviventris	Polylectic	✓			✓
Hylaeus brevicornis	Polylectic	✓			✓
Hylaeus communis	Polylectic	✓		✓	✓
Hylaeus confuses	Polylectic	✓		✓	✓
Hylaeus dilatatus	Polylectic			✓	✓
Hylaeus hyalinatus	Polylectic	✓		✓	✓
Hylaeus incongruous	Polylectic			✓	✓
Hylaeus pictipes	Polylectic			✓	✓
Lasioglossum albipes	Polylectic	✓			✓
Lasioglossum calceatum	Polylectic	✓		✓	✓
Lasioglossum cupromicans	Polylectic	✓		✓	✓
Lasioglossum fratellum	Polylectic	✓			✓
Lasioglossum fulvicorne	Polylectic	✓		✓	✓
Lasioglossum laevigatum	Polylectic	✓		✓	✓
Lasioglossum lativentre	Polylectic	✓			✓
Lasioglossum leucopus	Polylectic	✓			✓
Lasioglossum leucozonium	Polylectic	✓			✓
Lasioglossum malachurum	Polylectic	✓		✓	✓
Lasioglossum minutissimum	Polylectic	✓		✓	✓
Lasioglossum morio	Polylectic	✓		✓	✓
Lasioglossum nitidiusculum	Polylectic	✓		✓	✓
Lasioglossum parvulum	Polylectic	✓			✓
Lasioglossum pauxillum	Polylectic	✓		✓	✓
Lasioglossum punctatissimum	Polylectic	✓			✓

Lasioglossum quadrinotatum	Polylectic			✓	
Lasioglossum rufitarse	Polylectic	✓			✓
Lasioglossum semilucens	Polylectic	✓			✓
Lasioglossum sexnotatum	Polylectic	✓		✓	✓
Lasioglossum sexstrigatum	Polylectic	✓			✓
Lasioglossum smeathmanellum	Polylectic	✓			✓
Lasioglossum villosulum	Polylectic	✓			✓
Lasioglossum xanthopus	Polylectic	✓		✓	✓
Lasioglossum zonulum	Polylectic	✓		✓	✓
Megachile centuncularis	Polylectic		✓	✓	✓
Megachile ligniseca	Polylectic		✓	✓	
Megachile versicolor	Polylectic	✓	✓		✓
Megachile willughbiella	Polylectic	✓	✓		✓
Melitta leporina	Oligolectic (Fabaceae)		✓		
Osmia aurulenta	Polylectic	✓	✓		✓
Osmia bicolor	Polylectic	✓	✓	✓	✓
Osmia bicornis	Polylectic	✓	✓	✓	✓
Osmia caerulescens	Polylectic	✓	✓	✓	✓
Osmia parietina	Polylectic	✓	✓		✓
Osmia pilicornis	Polylectic	✓	✓		✓

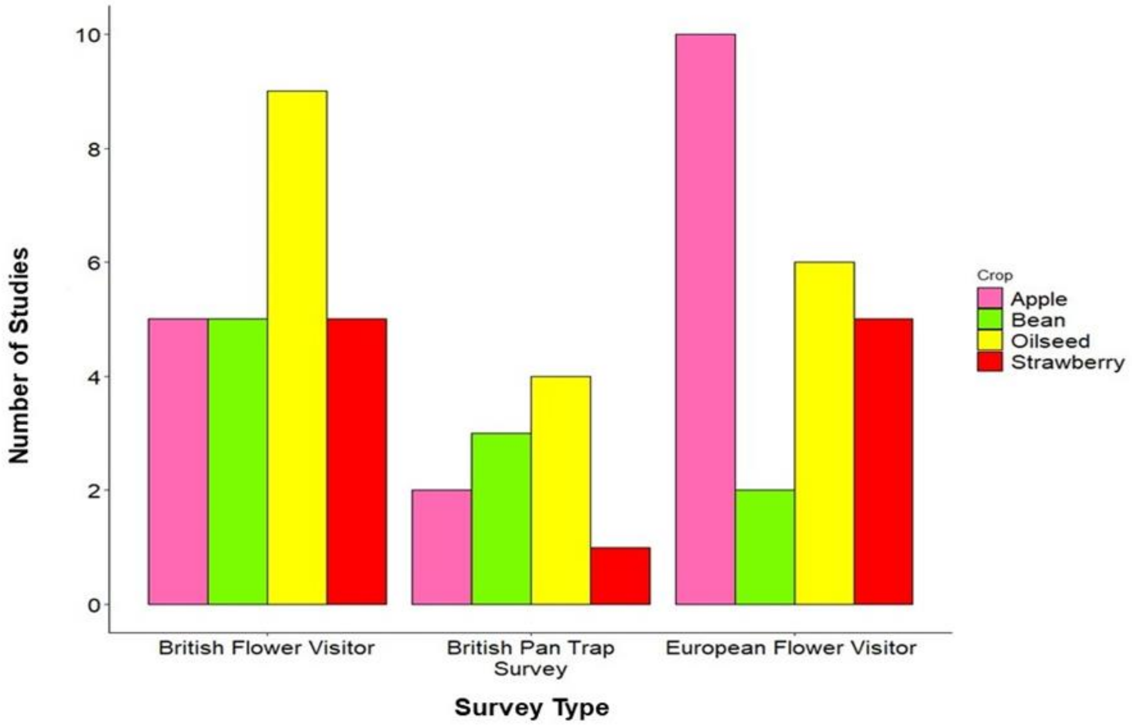

Figure S1: Number of studies per survey type for each crop

Table S3: List of crop field studies used in analysis. In survey type observation plots refer to any methodology where a set area was observed for a given period of time and transects refer to any methodology where an observer walked continuously for a given distance and/or time.

Author/Data Holder	Crop	Survey Type	Description of study or reference for study if published	Country
Ardin, S.	Apple	Transects	Ardin, S., 2018. Addressing seasonal vulnerability of orchard pollinators through restoration of floral communities [Doctoral dissertation, University of Bristol].	UK
Campbell, A.	Apple	Transects	Campbell, A.J., Wilby, A., Sutton, P. and Wäckers, F.L. (2017). Do sown flower strips boost wild pollinator abundance and pollination services in a spring-flowering crop? A case study from UK cider apple orchards. Agriculture, ecosystems and environment, 239, 20-29	UK
de Groot, A.	Apple	Transects	De Groot, G.A., R. van Kats, M. Reemer, D. van der Sterren, J. C. Biesmeijer and D. Kleijn. (2015). De bijdrage van (wilde) bestuivers aan de opbrengst van appels en blauwe bessen; Kwantificering van ecosysteemdiensten in Nederland [Dutch]. Wageningen, Alterra, Alterra report 2636.	Netherlands
Foldesi, R.	Apple	Observatons Plots	Földesi, R., Kovács-Hostyánszki, A., Kőrösi, Á., Somay, L., Elek, Z., Markó, V., Sárospataki, M., Bakos, R., Varga, Á., Nyisztor, K. and Báldi, A. (2016). Relationships between wild bees, hoverflies and pollination success in apple orchards with different landscape contexts. Agricultural and Forest Entomology, 18(1), 68-75.	Hungary
Klein, A.	Apple	Transects	Bees were surveyed for 7 days in April and May 2015. A 20m transect was walked for 5 minutes at the edge and in the interior of orchards at approximately 30 sites.	Germany
McKerchar, M.	Apple	Transects	Garratt, M.P.D., Breeze, T.D., Boreux, V., Fountain, M.T., Mckerchar, M., Webber, S.M., Coston, D.J., Jenner, N., Dean, R., Westbury, D.B. and Biesmeijer, J.C. (2016). Apple pollination: demand depends on variety and supply depends on pollinator identity. PloS one, 11(5), e0153889.	UK

Kleijn, D.	Apple	Transects	Kleijn, D., Winfree, R., Bartomeus, I., Carvalheiro, L.G., Henry, M., Isaacs, R., Klein, A.M., Kremen, C., M'gonigle, L.K., Rader, R. and Ricketts, T.H. (2015). Delivery of crop pollination services is an insufficient argument for wild pollinator conservation. Nature communications, 6, 7414.	Netherlands
Hutchinson, L.	Apple	Transects	Bees were surveyed for 2 days in May 2018. An observer walked along successive tree rows in orchards continuously for approximately one hour at 8 sites.	UK
Kovács-Hostyánszki, A.	Apple	Observation Plots	Kőrösi, A., Markó, V., Kovács-Hostyánszki, A., Somay, L., Varga, A., Elek, Z., Boreux, V., Klein, A.M., Földesi, R., Báldi, A. (2018) Climate-induced phenological shift of apple trees has diverse effects on pollinators, herbivores and natural enemies. PeerJ, e5269.	Hungary
Miñarro, M. and García, D.	Apple	Observation Plots	Miñarro, M. and García, D. (2018). Complementarity and redundancy in the functional niche of cider apple pollinators. Apidologie, 49(6), 789-802.	Spain
Pufal, G.	Apple	Observation Plots	Bees were surveyed for 2 days in April 2014. 15 x 2 minute observations of two apple tree varieties were carried out per site and apple variety at 16 sites.	Germany
Radzeviciute, R.	Apple	Transects	Bees were surveyed between 2013 and 2015. 500m x 1.5m transect walked for 30 minutes at 4 sites.	Germany
Samnegård, U.	Apple	Transects	Bees were surveyed for 10 days in May 2015. Two 20m transects walked per site at 28 sites.	Sweden
Garratt, M. and Potts, S.	Apple	Observation Plots, Pan Traps and Transects	6 stations of blue, white and yellow pan traps were used for 2 days in April 2011 at 8 sites. 3 x blue, green, red and yellow pan traps were used for 1 day in May 2015 at 3 sites.	UK

			Bees were surveyed for 4 days in April 2011 and 2 days in May 2013. 6 x 50m transects were walked for 10 minutes at 13 sites.	
Vereecken, N.	Apple	Aerial netting	Bees were surveyed for 6 days in April and May 2016. Aerial netting was carried out for 120 minutes at 4 sites.	Belgium
Bailes, E.	Bean	Observation Plots	Bees were surveyed for 6 days in June 2015 at 2 sites. Observations of the numbers of bean flowers visited in a set patch were recorded.	UK
Bond, D. and Kirby, E.	Bean	Observation Plots	Bond, D.A. and Kirby, E.J.M. (1999). Anthophora plumipes (Hymenoptera: Anthophoridae) as a pollinator of broad bean (Vicia faba major). Journal of Apicultural Research, 38(3-4),199-203.	UK
Griffin, H.	Bean	Timed Walks	Griffin, H.E. (1997). *Studies of the foraging behaviour, activity patterns and community structure of bumblebees (Bombus spp.) pollinating field beans (Vicia faba) and phacelia (Phacelia tanacetifolia) in Eastern Scotland* (Doctoral dissertation, University of St Andrews).	UK
Marzinzig, B.	Bean	Transects	Marzinzig, B., Brünjes, L., Biagioni, S., Behling, H., Link, W. and Westphal, C. (2018). Bee pollinators of faba bean (Vicia faba L.) differ in their foraging behaviour and pollination efficiency. Agriculture, Ecosystems and Environment, 264, 24-33.	Germany
Potts, S.	Bean	Transects and Pan traps	Carre, G., Roche, P., Chifflet, R., Morison, N., Bommarco, R., Harrison-Cripps, J., Krewenka, K., Potts, S.G., Roberts, S.P., Rodet, G. and Settele, J., 2009. Landscape context and habitat type as drivers of bee diversity in European annual crops. Agriculture, Ecosystems and Environment, 133(1-2), 40-47.	UK
Tasei, J.	Bean	Unknown	Tasei, J.N. (1976). LES INSECTES POLLINISATEURS DE LA FÉVEROLE D'HIVER (VICIA FABA EQUINA L.) ET LA POLLINISATION DES PLANTES MÂLE-STÉRILE EN PRODUCTION DE SEMENCE HYBRIDE [French]. Apidologie, 7(1), pp.1-28.	France

Garratt, M. and Potts, S.	Bean	Pan Traps (2 datasets) and Transects	Bees were surveyed for 7 days in May 2011. Bean plants were observed for 15 minutes at 8 sites. Blue, white and yellow pan traps were used for 7 days in May 2011 at 9 sites. Blue, green, red and yellow pan traps were used for 5 days in May and June 2015 at 3 sites. Bees were surveyed for 7 days in May 2011. 50m transects were walked for 10 minutes at 8 sites.	UK
Bartomeus, I.	Oilseed	Transects	Bartomeus, I., Potts, S.G., Steffan-Dewenter, I., Vaissiere, B.E., Woyciechowski, M., Krewenka, K.M., Tscheulin, T., Roberts, S.P., Szentgyörgyi, H., Westphal, C. and Bommarco, R. (2014). Contribution of insect pollinators to crop yield and quality varies with agricultural intensification. PeerJ, 2, 328.	Sweden
Holzschuh, A.	Oilseed	Transects	Holzschuh, A., Dormann, C.F., Tscharntke, T. and Steffan-Dewenter, I. (2011). Expansion of mass-flowering crops leads to transient pollinator dilution and reduced wild plant pollination. Proc. R. Soc. B, 278(1723), 3444-3451.	Germany
Jauker, F.	Oilseed	Transects	Jauker, F., Diekoetter, T., Schwarzbach, F. and Wolters, V. (2009). Pollinator dispersal in an agricultural matrix: opposing responses of wild bees and hoverflies to landscape structure and distance from main habitat. Landscape Ecology, 24(4), 547-555.	Germany
Krimmer, E.	Oilseed	Transects	Krimmer, E., Martin, E.A., Krauss, J., Holzschuh, A. and Steffan-Dewenter, I. (2019). Size, age and surrounding semi-natural habitats modulate the effectiveness of flower-rich agri-environment schemes to promote pollinator visitation in crop fields. Agriculture, Ecosystems & Environment, 284, 106590.	Germany
Phillips, B.	Oilseed	Pan Traps	Phillips, B. (2016). Pollinator community and function: in oilseed rape fields and in drought-stressed grassland [Dissertation, University of Essex].	UK

Phillips, B.	Oilseed	Observation Plots	Phillips, B.B., Williams, A., Osborne, J.L. and Shaw, R.F. (2018). Shared traits make flies and bees effective pollinators of oilseed rape (Brassica napus L.). Basic and Applied Ecology, 32, 66-76.	UK
Potts, S.	Oilseed	Observation Plots and Pan Traps	Westphal, C., Bommarco, R., Carré, G., Lamborn, E., Morison, N., Petanidou, T., Potts, S.G., Roberts, S.P., Szentgyörgyi, H., Tscheulin, T. and Vaissière, B.E. (2008). Measuring bee diversity in different European habitats and biogeographical regions. Ecological monographs, 78(4), 653-671.	UK
Riedinger, V.	Oilseed	Transects	Riedinger, V., Mitesser, O., Hovestadt, T., Steffan-Dewenter, I. and Holzschuh, A., 2015. Annual dynamics of wild bee densities: attractiveness and productivity effects of oilseed rape. Ecology, 96(5), 1351-1360.	Germany
Garratt, M. and Potts, S.	Oilseed	Transects, Pan Traps (2 datasets)	Bees were surveyed for 14 days in April and May 2012, 18 days in May and June 2013. 50m transects were walked for 10 minutes at 20 sites. Blue, white and yellow pan traps were used for 12 days in April and May 2012 at 8 sites. Blue, green, red and yellow pan traps were used for 5 days in April 2015 at 3 sites.	UK
Westphal, C.	Oilseed	Observation Plots and Transect Walks	Westphal, C., Bommarco, R., Carré, G., Lamborn, E., Morison, N., Petanidou, T., Potts, S.G., Roberts, S.P., Szentgyörgyi, H., Tscheulin, T. and Vaissière, B.E. (2008). Measuring bee diversity in different European habitats and biogeographical regions. Ecological monographs, 78(4), 653-671.	Germany
Woodcock, B.	Oilseed	Transects (6 datasets)	Woodcock, B.A., Harrower, C., Redhead, J., Edwards, M., Vanbergen, A.J., Heard, M.S., Roy, D.B. and Pywell, R.F. (2014). National patterns of functional diversity and redundancy in predatory ground beetles and bees associated with key UK arable crops. Journal of Applied Ecology, 51(1), 142-151. Woodcock, B.A., Isaac, N.J., Bullock, J.M., Roy, D.B., Garthwaite, D.G., Crowe, A. and Pywell, R.F. (2016). Impacts of neonicotinoid	UK

			use on long-term population changes in wild bees in England. Nature Communications, *7*, 12459.	
Ardin, S.	Strawberry	Transects	Ardin, S. (2018). Addressing seasonal vulnerability of orchard pollinators through restoration of floral communities [Doctoral dissertation, University of Bristol].	UK
Bartomeus, I.	Strawberry	Transects	Bartomeus, I., Potts, S.G., Steffan-Dewenter, I., Vaissiere, B.E., Woyciechowski, M., Krewenka, K.M., Tscheulin, T., Roberts, S.P., Szentgyörgyi, H., Westphal, C. and Bommarco, R. (2014). Contribution of insect pollinators to crop yield and quality varies with agricultural intensification. PeerJ, *2*, 328.	Germany
Feltham, H.	Strawberry	Transects (2 datasets)	Feltham, H. (2014). Maximising a mutualism: sustainable bumblebee management to improve crop pollination [Doctoral dissertation, University of Stirling].	UK
Klatt, B.	Strawberry	Transects	Klatt, B.K., Holzschuh, A., Westphal, C., Clough, Y., Smit, I., Pawelzik, E. and Tscharntke, T. (2014). Bee pollination improves crop quality, shelf life and commercial value. Proc. R. Soc. B, 281(1775), 20132440.	Germany
Schulze, J.	Strawberry	Observation Plots	Schulze, J., Oeschger, L., Gross, A., Mueller, A., Stoll, P. and Erhardt, A. (2012). Solitary bees–Potential vectors for gene flow from cultivated to wild strawberries. Flora-Morphology, Distribution, Functional Ecology of Plants, 207(10), 762-767.	Switzerland
Garratt, M. and Potts, S.	Strawberry	Observation Plots, Pan Traps and Transects	Bees were surveyed for 15 days in May and June 2012. Strawberry plants were observed for 10 minutes at 8 sites. Blue, white and yellow pan traps were used for 15 days in May and June 2011 at 8 sites. Bess were surveyed for 15 days in May and June 2011. 50m transects were walked for 10 minutes at 8 sites.	UK
Wietzke	Strawberry	Transects	Wietzke, A., Westphal, C., Gras, P., Kraft, M., Pfohl, K., Karlovsky, P., Pawelzik, E., Tscharntke, T. and Smit, I. (2018). Insect pollination as a key factor for strawberry physiology and marketable	Germany

			fruit quality. Agriculture, Ecosystems and Environment, 258, 197-204.	

Table S5a: Bee species recorded in British flower visitation studies that were not categorised as definite apple flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Andrena subopaca	Single individual recorded and not recorded in European studies.	Classified as likely flower visitor as classified as potential pollinator
Bombus soreensis	Single individual recorded, not recorded in European studies and not classified as potential pollinator	Excluded entirely

Table S5b: Bee species recorded in pan trap studies that were not categorised as likely apple flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Lasioglossum pauperatum	Single individual recorded and not classified as potential pollinator	Excluded entirely
Nomada fabriciana	Not classified as potential pollinator	Excluded entirely
Nomada flavoguttata	Not classified as potential pollinator	Excluded entirely
Nomada fucata	Not classified as potential pollinator	Excluded entirely
Nomada goodeniana	Not classified as potential pollinator	Excluded entirely
Nomada ruficornis	Not classified as potential pollinator	Excluded entirely
Sphecodes ephippius	Not classified as potential pollinator	Excluded entirely

Table S5c: Bee species recorded in pan trap studies that were not categorised as possible apple flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Sphecodes monilicornis	Not classified as a potential pollinator	Excluded entirely
Sphecodes niger	Not classified as a potential pollinator	Excluded entirely

Table S5d: Bee species recorded in European flower visitor studies that were not categorised as possible apple flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Andrena bimaculata	Not documented as potential pollinator	Excluded entirely
Andrena coitana	Not documented as potential pollinator	Excluded entirely
Andrena humilis	Not documented as potential pollinator	Excluded entirely
Andrena ovatula	Not documented as potential pollinator	Excluded entirely
Andrena pilipes	Not documented as potential pollinator	Excluded entirely
Bombus vestalis	Not documented as potential pollinator	Excluded entirely

Colletes cunicularis	Not documented as potential pollinator	Excluded entirely
Hylaeus annularis	Not documented as potential pollinator	Excluded entirely
Megachile centuncularis	Not documented as potential pollinator	Excluded entirely
Melecta albiforns	Not documented as potential pollinator	Excluded entirely
Nomada ferruginata	Not documented as potential pollinator	Excluded entirely
Nomada flava	Not documented as potential pollinator	Excluded entirely
Nomada fulvicornis	Not documented as potential pollinator	Excluded entirely
Nomada leucophthalma	Not documented as potential pollinator	Excluded entirely
Nomada marshamella	Not documented as potential pollinator	Excluded entirely

Table S6a: Bee species recorded in British flower visitation studies that were not categorised as definite bean flower visitors, reason for exclusion and subsequent action.

Species	**Reason for exclusion**	**Action**
Andrena cineraria	Single individual recorded, not recorded in European studies and not classified as potential flower visitor	Excluded entirely
Andrena scotica	Single individual recorded, not recorded in European studies and not classified as potential flower visitor	Excluded entirely
Bombus Sylvestris	Single individual recorded, not recorded in European studies and not classified as potential flower visitor	Excluded entirely
Bombus vestalis	Single individual recorded, not recorded in European studies and not classified as potential flower visitor	Excluded entirely
Halictus rubicundus	Single individual recorded, not recorded in European studies and not classified as potential flower visitor	Excluded entirely

Table S6b: Bee species recorded in pan trap studies that were not categorised as possible bean flower visitors, reason for exclusion and subsequent action.

Species	**Reason for exclusion**	**Action**
Andrena bicolor	Not documented as potential pollinator	Excluded entirely
Andrena chrysosceles	Not documented as potential pollinator	Excluded entirely
Andrena dorsata	Not documented as potential pollinator	Excluded entirely
Andrena fucata	Not documented as potential pollinator	Excluded entirely
Andrena fulva	Not documented as potential pollinator	Excluded entirely
Andrena minutula	Not documented as potential pollinator	Excluded entirely
Andrena minutuloides	Not documented as potential pollinator	Excluded entirely

Andrena nigroaenea	Not documented as potential pollinator	Excluded entirely
Andrena nitida	Not documented as potential pollinator	Excluded entirely
Andrena semilaevis	Not documented as potential pollinator	Excluded entirely
Andrena subopaca	Not documented as potential pollinator	Excluded entirely
Bombus barbutellus	Not documented as potential pollinator	Excluded entirely
Bombus campestris	Not documented as potential pollinator	Excluded entirely
Bombus rupestris	Not documented as potential pollinator	Excluded entirely
Coelioxys elongata	Not documented as potential pollinator	Excluded entirely
Halictus tumulorum	Not documented as potential pollinator	Excluded entirely
Lasioglossum albipes	Not documented as potential pollinator	Excluded entirely
Lasioglossum calceatum	Not documented as potential pollinator	Excluded entirely
Lasioglossum cupromicans	Not documented as potential pollinator	Excluded entirely
Lasioglossum lativentre	Not documented as potential pollinator	Excluded entirely
Lasioglossum leucopus	Not documented as potential pollinator	Excluded entirely
Lasioglossum leucozonium	Not documented as potential pollinator	Excluded entirely
Lasioglossum malachurum	Not documented as potential pollinator	Excluded entirely
Lasioglossum minutissimum	Not documented as potential pollinator	Excluded entirely
Lasioglossum parvulum	Not documented as potential pollinator	Excluded entirely
Lasioglossum pauxillum	Not documented as potential pollinator	Excluded entirely
Lasioglossum punctiolle	Not documented as potential pollinator	Excluded entirely
Lasioglossum quadrinotatum	Not documented as potential pollinator	Excluded entirely
Lasioglossum semilucens	Not documented as potential potential pollinator	Excluded entirely
Lasioglossum villosulum	Not documented as potential pollinator	Excluded entirely
Lasioglossum xanthopus	Not documented as potential pollinator	Excluded entirely
Nomada flavoguttata	Not documented as potential pollinator	Excluded entirely
Nomada ruficornis	Not documented as potential potential pollinator	Excluded entirely
Nomada striata	Not documented as potential pollinator	Excluded entirely
Sphecodes ephippius	Not documented as potential pollinator	Excluded entirely

Table S6c: Bee species recorded in European flower visitor studies that were not categorised as possible bean flower visitors.

Species	Reason for exclusion	Action
Andrena ovatula	Not documented as potential pollinator	Excluded entirely

Table S7a: Bee species recorded in British flower visitation studies that were not categorised as definite oilseed flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Andrena angustior	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Andrena congruens	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Andrena nigrospina	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Andrena niveata	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Andrena synadelpha	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Halictus rubicundus	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Lasioglossum cupromicans	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Lasioglossum leucopus	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Lasioglossum zonulum	Single individual recorded and not recorded in European studies	Classified as likely flower visitors as documented as potential pollinator
Bombus bohemicus	Single individual recorded and not recorded in European studies and not documented as potential flower visitor	Excluded entirely
Andrena wilkella	Single individual recorded and not recorded in European studies and not documented as potential flower visitor	Excluded entirely
Lasioglossum albipes	Single individual recorded and not recorded in European studies and not documented as potential flower visitor	Excluded entirely
Lasioglossum leucozonium	Single individual recorded and not recorded in European studies and not documented as potential flower visitor	Excluded entirely
Lasioglossum smeathmanellum	Single individual recorded and not recorded in European studies and not documented as potential flower visitor	Excluded entirely
Nomada goodeniana	Single individual recorded and not recorded in European studies and not documented as potential flower visitor	Excluded entirely

Table S7b: Bee species recorded in pan trap studies that were not categorised as possible oilseed flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Andrena apicata	Not documented as potential pollinator	Excluded entirely
Andrena praecox	Not documented as potential pollinator	Excluded entirely
Bombus barbutellus	Not documented as potential pollinator	Excluded entirely
Bombus ruderatus	Not documented as potential pollinator	Excluded entirely
Nomada fabriciana	Not documented as potential pollinator	Excluded entirely
Nomada flavoguttata	Not documented as potential pollinator	Excluded entirely
Nomada leucophthalma	Not documented as potential pollinator	Excluded entirely
Nomada ruficornis	Not documented as potential pollinator	Excluded entirely

Table S7c: Bee species recorded in European flower visitor studies that were not categorised as possible oilseed flower visitors.

Species	Reason for exclusion	Action
Andrena falsifica	Not documented as potential pollinator	Excluded entirely
Andrena proxima	Not documented as potential pollinator	Excluded entirely
Bombus humilis	Not documented as potential pollinator	Excluded entirely
Bombus sylvarum	Not documented as potential pollinator	Excluded entirely
Chelostoma florisomne	Not documented as potential pollinator	Excluded entirely
Halictus confusus	Not documented as potential pollinator	Excluded entirely
Hylaeus signatus	Not documented as potential pollinator	Excluded entirely
Lasioglossum laticeps	Not documented as potential pollinator	Excluded entirely
Nomada lathburiana	Not documented as potential pollinator	Excluded entirely
Osmia aurulenta	Not documented as potential pollinator	Excluded entirely

Table S8a: Bee species recorded in British flower visitation studies that were not categorised as definite strawberry flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Andrena bicolor	Only single individual recorded in 1 study and not recorded in European study	Classified as likely flower visitor as documented as potential flower visitor

Table S8b: Bee species recorded in pan trap studies that were not categorised as likely strawberry flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Bombus rupestris	Single individual recorded in European study and not documented as potential pollinator	Excluded entirely

Table S8c: Bee species recorded in pan trap studies that were not categorised as possible strawberry flower visitors, reason for exclusion and subsequent action.

Species	Reason for exclusion	Action
Andrena humilis	Not documented as potential pollinator	Excluded entirely
Bombus barbutellus	Not documented as potential pollinator	Excluded entirely
Bombus sylvestris	Not documented as potential pollinator	Excluded entirely
Bombus vestalis	Not documented as potential pollinator	Excluded entirely

Table S8d: Bee species recorded in European flower visitor studies that were not categorised as possible strawberry flower visitors.

Species	Reason for exclusion	Action
Andrena nitiduscula	Not documented as potential pollinator	Excluded entirely
Lasioglossum laticeps	Not documented as potential pollinator	Excluded entirely
Nomada fabriciana	Not documented as potential pollinator	Excluded entirely
Nomada marshamella	Not documented as potential pollinator	Excluded entirely
Sphecodes ephippius	Not documented as potential pollinator	Excluded entirely

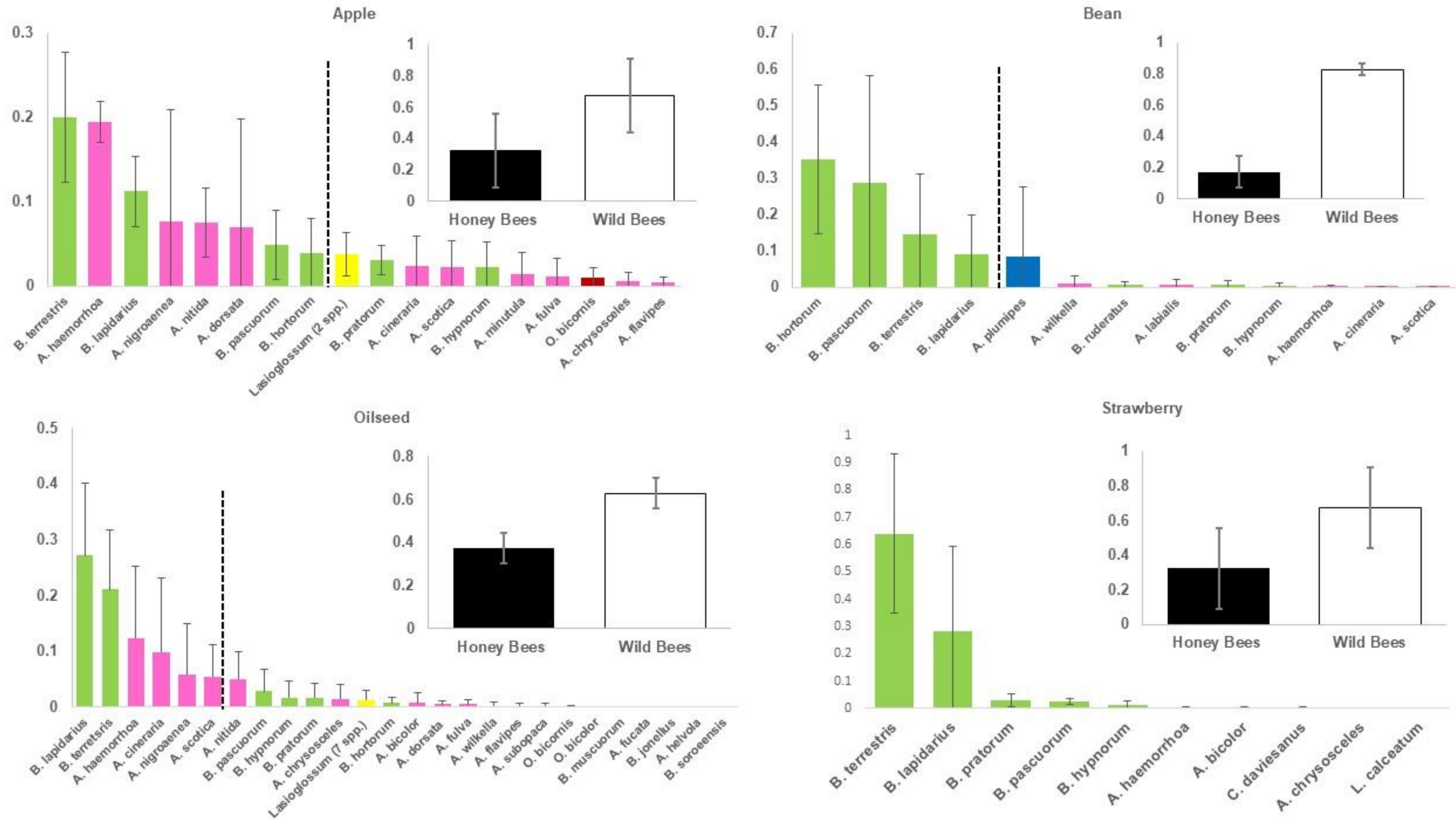

Figure S2: Bee species recorded visiting flowers in crop studies with point at which 80% of flower recorded visits reached marked with dashed line

A = Abundance (pan traps only)
V = Total number of flower visits recorded across all studies (flower visitation studies only)
S = Number of studies recorded in.

Species	Category	Conservation Status	British Flower Visitor	
			V	S
Andrena nigroaenea	Definite	-	172	3
Bombus terrestris agg.	Definite	-	113	5
Andrena haemorrhoa	Definite	-	96	5
Bombus lapidarius	Definite	-	59	5
Andrena cineraria	Definite	-	41	3
Andrena nitida	Definite	-	35	5
Andrena scotica	Definite	-	24	3
Bombus pascuorum	Definite	-	20	4
Andrena dorsata	Definite	-	14	1
Bombus hortorum	Definite	-	10	4
Bombus pratorum	Definite	-	10	5
Bombus hypnorum	Definite	-	9	5
Andrena fulva	Definite	-	5	1
Lasioglossum calceatum	Definite	-	4	1
Osmia bicornis	Definite	-	4	3
Andrena flavipes	Definite	-	2	2
Andrena chrysosceles	Definite	-	1	1
Andrena minutula	Definite	-	1	1
Lasioglossum pauxillum	Definite	Na	1	1
Halictus tumulorum	Likely	-	-	-
Lasioglossum malachurum	Likely	Nb	-	-
Andrena bicolor	Likely	-	-	-
Lasioglossum morio	Likely	-	-	-
Andrena helvola	Likely	-	-	-
Lasioglossum fulvicorne	Likely	-	-	-
Lasioglossum punctatissimum	Likely	-	-	-
Andrena gravida	Likely	RDB1	-	-
Andrena labiata	Likely	Na	-	-
Andrena trimmerana	Likely	Nb	-	-
Lasioglossum leucopus	Likely	-	-	-
Lasioglossum parvulum	Likely	-	-	-
Andrena subopaca	Likely	-	1	1
Andrena angustior	Possible	-	-	-
Andrena fucata	Possible	-	-	-
Andrena semilaevis	Possible	-	-	-
Bombus humilis	Possible	-	-	-
Halictus rubicundus	Possible	-	-	-
Lasioglossum albipes	Possible	-	-	-
Lasioglossum minutissimum	Possible	-	-	-
Lasioglossum smeathmanellum	Possible	-	-	-
Lasioglossum villosulum	Possible	-	-	-
Andrena varians	Possible	Nb	-	-
Lasioglossum sexstrigatum	Possible	-	-	-
Anthophora plumipes	Possible	-	-	-
Osmia bicolor	Possible	Nb	-	-
Bombus sylvarum	Possible	Nb, S41	-	-

Hylaeus communis	Possible	-	-	-
Lasioglossum zonulum	Possible	-	-	-
Bombus jonellus	Possible	-	-	-
Lasioglossum lativentre	Possible	-	-	-
Osmia aurulenta	Possible	-	-	-
Andrena barbilabris	Possible	-	-	-
Anthidium manicatum	Possible	-	-	-
Lasioglossum leucozonium	Possible	-	-	-
Osmia caerulescens	Possible	-	-	-

British Pan Trap		Europe Flower Visitor	
A	S	V	S
37	2	33	2
4	1	836	10
67	1	354	10
5	1	242	9
20	1	33	6
29	1	27	8
5	2	66	4
2	1	160	10
18	1	38	6
4	1	21	5
4	1	41	6
1	1	29	5
-	-	47	6
11	2	64	6
5	1	76	8
262	2	246	8
42	1	36	3
44	1	27	4
129	1	29	3
22	1	33	3
192	2	15	3
2	1	7	3
105	1	7	3
5	1	6	3
1	1	6	3
1	1	5	2
1	1	2	2
2	1	2	1
1	1	1	1
3	1	1	1
2	1	1	1
1	1	-	-
4	1	-	-
10	2	-	-
1	1	-	-
1	1	-	-
2	1	-	-
6	1	-	-
89	2	-	-
1	1	-	-
1	1	-	-
-	-	65	3
-	-	50	1
-	-	37	6
-	-	14	3
-	-	8	2

-	-	8	1
-	-	5	3
-	-	2	1
-	-	2	2
-	-	2	2
-	-	1	1
-	-	1	1
-	-	1	1
-	-	1	1

Species	Category	Conservation Status	British Flower Visitor	
			V	S
Bombus hortorum	Definite	-	1379	5
Bombus pascuorum	Definite	-	1184	5
Anthophora plumipes	Definite	-	618	1
Bombus terrestris agg.	Definite	-	411	5
Bombus lapidarius	Definite	-	207	4
Andrena wilkella	Definite	-	10	2
Bombus ruderatus	Definite	Nb, S41	15	2
Bombus pratorum	Definite	-	8	2
Bombus hypnorum	Definite	-	5	1
Andrena haemorrhoa	Definite	-	2	1
Andrena labialis	Definite	-	2	1
Bombus ruderarius	Possible	S41	-	-
Osmia bicolor	Possible	Nb	-	-
Bombus sylvarum	Possible	Nb, S41	-	-

British Pan Trap		Europe Flower Visitor	
A	**S**	**V**	**S**
37	2	120	2
3	1	42	2
-	-	-	-
58	3	284	2
33	3	66	2
9	2	-	-
-	-	?	1
4	2	7	1
2	1	-	-
26	2	-	-
1	1	-	-
1	1	-	-
1	1	-	-
-	-	12	1

Species	Category	Conservation Status	British Flower Visitor		British P
			V	S	A
Andrena cineraria	Definite	-	685	6	3
Bombus lapidarius	Definite	-	572	8	48
Bombus terrestris agg.	Definite	-	496	8	118
Andrena scotica	Definite	-	229	5	7
Andrena nitida	Definite	-	211	6	18
Andrena nigroaenea	Definite	-	204	7	38
Andrena haemorrhoa	Definite	-	171	8	39
Bombus pratorum	Definite	-	54	4	44
Bombus pascuorum	Definite	-	51	7	35
Andrena fulva	Definite	-	51	6	19
Bombus hortorum	Definite	-	37	4	116
Andrena dorsata	Definite	-	31	5	2
Bombus hypnorum	Definite	-	27	4	-
Andrena chrysosceles	Definite	-	26	5	17
Andrena bicolor	Definite	-	15	4	39
Andrena flavipes	Definite	-	13	6	4
Osmia bicornis	Definite	-	7	3	-
Lasioglossum calceatum	Definite	-	4	2	12
Lasioglossum pauxillum	Definite	Na	4	3	1
Andrena subopaca	Definite	-	3	2	-
Bombus jonellus	Definite	-	3	2	5
Lasioglossum malachurum	Definite	Nb	3	2	28
Lasioglossum morio	Definite	-	3	3	1
Osmia bicolor	Definite	Nb	3	2	1
Andrena helvola	Definite	-	2	2	-
Andrena labiata	Definite	Na	2	2	-
Bombus muscorum	Definite	S41	2	1	1
Lasioglossum fulvicorne	Definite	-	2	2	2
Lasioglossum parvulum	Definite	-	2	2	-
Lasioglossum pauperatum	Definite	RDB3	2	1	-
Lasioglossum puncticolle	Definite	Nb	2	2	-
Andrena fucata	Definite	-	1	1	-
Andrena minutula	Definite	-	1	1	9
Anthophora plumipes	Definite	-	1	1	1
Bombus soroeensis	Definite	-	1	1	-
Halictus tumulorum	Definite	-	1	1	-
Lasioglossum xanthopus	Definite	Nb	1	1	2
Andrena angustior	Likely	-	1	1	-
Andrena congruens	Likely	Na	1	1	-
Andrena nigrospina	Likely	-	1	1	-
Andrena niveata	Likely	RDB2	1	1	-
Andrena synadelpha	Likely	-	1	1	-

Andrena tibialis	Likely	Na	-	-	1
Halictus rubicundus	Likely	-	1	1	1
Lasioglossum cupromicans	Likely	-	1	1	-
Lasioglossum leucopus	Likely	-	1	1	-
Lasioglossum zonulum	Likely	-	1	1	-
Andrena semilaevis	Possible	-	-	-	5
Andrena gravida	Possible	RDB1	-	-	-
Andrena minutuloides	Possible	Na	-	-	-

an Trap	Europe Flower Visitor	
S	V	S
3	68	5
3	259	6
3	265	6
2	3	2
2	22	5
5	35	4
4	148	5
3	11	4
3	54	5
3	13	3
3	15	3
2	3	2
-	1	1
3	54	5
4	6	3
3	48	4
-	23	3
4	11	4
1	43	3
-	5	2
1	-	-
3	20	3
1	9	3
1	46	2
-	18	4
-	3	1
1	-	-
2	15	2
-	2	1
-	-	-
-	1	1
-	4	2
2	21	3
1	6	2
-	3	1
-	16	2
1	51	3
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

1	3	1
1	-	-
-	-	-
-	-	-
-	-	-
1	-	-
-	7	3
-	1	1

Species	Category	Conservation Status	British Flower Visitor	
			V	S
Bombus terrestris agg.	Definite	-	2562	4
Bombus lapidarius	Definite	-	891	4
Bombus pratorum	Definite	-	166	4
Bombus pascuorum	Definite	-	97	4
Bombus hypnorum	Definite	-	23	2
Andrena haemorrhoa	Definite	-	12	1
Colletes daviesanus	Definite	-	7	1
Andrena chrysosceles	Definite	-	1	1
Lasioglossum calceatum	Definite	-	1	1
Andrena nigroaenea	Likely	-	-	-
Andrena scotica	Likely	-	-	-
Halictus rubicundus	Likely	-	-	-
Andrena cineraria	Likely	-	-	-
Andrena minutula	Likely	-	-	-
Andrena bicolor	Likely	-	1	1
Bombus hortorum	Possible	-	-	-
Bombus jonellus	Possible	-	-	-
Hylaeus hyalinatus	Possible	-	-	-
Lasioglossum cupromicans	Possible	-	-	-
Lasioglossum leucopus	Possible	-	-	-
Lasioglossum villosulum	Possible	-	-	-
Osmia bicornis	Possible	-	-	-
Andrena subopaca	Possible	-	-	-
Andrena helvola	Possible	-	-	-
Andrena nitida	Possible	-	-	-
Halictus tumulorum	Possible	-	-	-
Andrena gravida	Possible	RDB1	-	-
Andrena flavipes	Possible	-	-	-
Lasioglossum fulvicorne	Possible	-	-	-
Andrena varians	Possible	-	-	-
Lasioglossum pauxillum	Possible	Na	-	-
Andrena fulva	Possible	-	-	-
Osmia bicolor	Possible	Nb	-	-

British Pan Trap		Europe Flower Visitor	
A	S	V	S
35	1	315	4
57	1	154	4
6	1	2	2
-	-	7	2
1	1	2	1
20	1	10	2
-	-	-	-
8	1	19	2
13	1	4	1
9	1	19	2
13	1	10	1
2	1	5	1
9	1	2	1
4	1	1	1
1	1	-	-
13	1	-	-
3	1	-	-
1	1	-	-
4	1	-	-
3	1	-	-
1	1	-	-
-	-	117	5
-	-	63	3
-	-	28	3
-	-	13	2
-	-	13	2
-	-	6	3
-	-	11	2
-	-	3	2
-	-	2	1
-	-	2	1
-	-	1	1
-	-	1	1