**Appendices**

Appendix I. Summary of study site Information including area, crop density main crop variety, and dates related to flowering period and pollinator surveys. Actual site locations cannot be given due to GDPR.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  | Period 1 | | Period 2 | | Period 3 | |
| Crop | Site | Location (County) | Area (ha) | Date sown | Flowering started | Flowering ended |  | 1st Visit | 2nd Visit | 1st Visit | 2nd Visit | 1st Visit | 2nd Visit |
| OSR | 1 | Meath | 19 | 14.08.18 | 07.03.19 | 25.05.19 |  | 21.04.19 | 24.04.19 | 22.06.19 | 27.06.19 | 04.08.19 | 06.08.19 |
|  | 2 | Meath | 22 | 14.08.18 | 10.03.19 | 31.05.19 |  | 11.04.19 | 21.04.19 | 22.06.19 | 27.06.19 | 01.08.19 | 06.08.19 |
|  | 3 | Kildare | 0.5 | 30.09.18 | 20.03.19 | 30.05.19 |  | 01.04.19 | 10.04.19 | 26.06.19 | 29.06.19 | 08.08.19 | 13.08.19 |
|  | 4 | Kildare | 5 | 21.08.18 | 12.03.19 | 02.06.19 |  | 11.04.19 | 21.04.19 | 22.06.19 | 27.06.19 | 01.08.19 | 02.08.19 |
|  | 5 | Laois | 10 | 21.08.18 | 07.03.19 | 30.05.19 |  | 01.04.19 | 10.04.19 | 01.07.19 | 02.07.19 | 02.08.19 | 07.08.19 |
|  | 6 | Louth | 10 | 14.08.18 | 14.03.19 | 30.05.19 |  | 22.04.19 | 25.04.19 | 24.06.19 | 28.06.19 | 03.08.19 | 04.08.19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| APP | 7 | Tipperary | 3.5 |  | 06.04.19 | 28.05.19 |  | 16.05.19 | 28.05.19 | 01.07.19 | 02.07.19 | 08.08.19 | 13.08.19 |
|  | 8 | Offaly | 0.9 |  | 16.04.19 | 16.05.19 |  | 16.05.19 | 29.05.19 | 26.06.19 | 29.06.19 | 01.08.19 | 02.08.19 |
|  | 9 | Dublin | 0.4 |  | 10.04.19 | 31.05.19 |  | 04.05.19 | 15.05.19 | 24.06.19 | 28.06.19 | 04.08.19 | 07.08.19 |
|  | 10 | Dublin | 2.4 |  | 06.04.19 | 26.05.19 |  | 04.05.19 | 11.05.19 | 24.06.19 | 28.06.19 | 03.08.19 | 07.08.19 |
|  | 11 | Meath | 4.0 |  | 06.04.19 | 26.05.19 |  | 25.04.19 | 06.05.19 | 24.06.19 | 28.06.19 | 03.08.19 | 04.08.19 |

Appendix II. Abundance of A. butterflies and B. bumble bees in OSR crops and Apple orchards, in Period 1 (April-May), Period 2 (June-July) and Period 3 (August), in field margins (FM) and centres of crops (CC)

A.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Crop | OSR | | | | Apples | | | | | | Total |
| Period | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 2 | 3 | 3 |  |
| Position | CC | FM | FM | FM | CC | FM | CC | FM | CC | FM |  |
| *Aglais io* | 1 | 1 |  | 5 |  |  |  |  | 1 | 2 | 10 |
| *Aglais urticae* | 1 | 5 |  |  |  |  | 1 |  | 1 |  | 8 |
| *Anthocaris cardamine* |  | 12 |  |  |  | 4 |  |  |  |  | 16 |
| *Aphantopus hyperantus* |  |  |  | 1 |  |  |  |  |  |  | 1 |
| *Celastrina argiolus* |  |  |  | 1 |  |  |  |  |  |  | 1 |
| *Coenonympha pamphilus* |  |  | 2 |  |  |  |  |  |  |  | 2 |
| *Lasiommata megera* |  |  |  |  |  |  |  |  |  | 1 | 1 |
| *Leptidae* spp*.* |  |  |  |  |  |  |  |  |  | 1 | 1 |
| *Lycaena phlaeas* | 1 |  | 1 |  |  |  |  |  |  |  | 2 |
| *Maniola jurtina* |  |  |  |  |  |  |  | 1 |  | 2 | 3 |
| *Pararge aegeria* | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 3 | 2 | 2 | 18 |
| *Pieris* spp. |  | 10 | 3 | 43 | 3 | 5 |  |  | 6 | 13 | 83 |
| *Polyommatus icarus* |  | 1 |  | 4 |  |  |  |  |  | 2 | 7 |
| *Pyronia tithonus* |  |  |  | 3 |  |  |  |  |  |  | 3 |
| *Vanessa atlanta* |  |  |  |  | 2 |  |  |  |  | 1 | 3 |
| *Vanessa cardui* |  |  | 1 | 1 |  |  |  |  | 1 | 2 | 5 |
| Unknown |  | 2 |  |  |  | 1 |  |  |  |  | 3 |

B.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Crop | OSR | | | | Apples | | | | | | Total |
| Period | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 2 | 3 | 3 |  |
| Position | CC | FM | FM | FM | CC | FM | CC | FM | CC | FM |  |
| *B. hortorum* |  | 1 |  |  | 2 | 2 |  | 2 |  |  | 7 |
| *B. jonellus* |  |  | 1 |  |  |  |  | 1 |  |  | 2 |
| *B. lapidarius* | 23 | 26 | 12 | 5 | 7 |  |  |  |  | 4 | 77 |
| *B. pascuorum* | 3 | 8 | 19 | 15 | 5 | 9 |  | 14 | 2 | 6 | 81 |
| *B. pratorum* |  |  | 1 | 2 | 4 | 1 | 1 | 4 |  | 2 | 15 |
| *B. terrestris/lucorum* agg. | 41 | 39 | 72 | 45 | 73 | 16 | 26 | 30 | 59 | 30 | 431 |
| Unknown | 2 |  |  |  | 2 |  |  |  |  |  | 4 |

Appendix III. List of field margin plan species recorded in each crop in each period.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | OSR Period 1 | APP Period 1 | OSR Period 2 | APP Period 2 | OSR Period 3 | App Period 3 |
| *Alliaria petolata* |  |  |  |  |  |  |
| *Anthriscus sylvestris* |  |  |  |  |  |  |
| *Arum maculatum* |  |  |  |  |  |  |
| *Bellis perennis* |  |  |  |  |  |  |
| *Brassica napus* |  |  |  |  |  |  |
| *Buddleja davidii* |  |  |  |  |  |  |
| *Capsellabursa pastoris* |  |  |  |  |  |  |
| *Cardamine pratensis* |  |  |  |  |  |  |
| *Cerastium arvense* |  |  |  |  |  |  |
| *Cerastium fontanum* |  |  |  |  |  |  |
| *Chamaemelum nobile* |  |  |  |  |  |  |
| *Cirsium arvense* |  |  |  |  |  |  |
| *Cirsium vulgare* |  |  |  |  |  |  |
| *Crataegus monogyna* |  |  |  |  |  |  |
| *Crepis capillaris* |  |  |  |  |  |  |
| *Epilobium ciliatum* |  |  |  |  |  |  |
| *Epilobium hirsutum* |  |  |  |  |  |  |
| *Epilobium montana* |  |  |  |  |  |  |
| *Euphorbia helioscopa* |  |  |  |  |  |  |
| *Ficaria verna* |  |  |  |  |  |  |
| *Filipendula ulmaria* |  |  |  |  |  |  |
| *Fumaria muralis* |  |  |  |  |  |  |
| *Fumaria officinalis* |  |  |  |  |  |  |
| *Fumaria* spp. |  |  |  |  |  |  |
| *Galium aparine* |  |  |  |  |  |  |
| *Geranium colombinum* |  |  |  |  |  |  |
| *Geranium robertianum* |  |  |  |  |  |  |
| *Geranium* spp. |  |  |  |  |  |  |
| *Heracleum sphondylium* |  |  |  |  |  |  |
| *Hirschfeldia incana* |  |  |  |  |  |  |
| *Hyacinthoides hispanica* |  |  |  |  |  |  |
| *Hyacinthoides* spp. |  |  |  |  |  |  |
| *Jacobea vulgaris* |  |  |  |  |  |  |
| *Labium hybridum* |  |  |  |  |  |  |
| *Lapsana communis* |  |  |  |  |  |  |
| *Lapsana* spp. |  |  |  |  |  |  |
| *Linum bienne* |  |  |  |  |  |  |
| *Lotus corniculatus* |  |  |  |  |  |  |
| *Lysimachia arvensis* |  |  |  |  |  |  |
| *Malus pumila* |  |  |  |  |  |  |
| *Malus* spp. |  |  |  |  |  |  |
| *Matricaria discoidea* |  |  |  |  |  |  |
| *Matricaria recutita* |  |  |  |  |  |  |
| *Medicago lupulina* |  |  |  |  |  |  |
| *Myosotis arvensis* |  |  |  |  |  |  |
| *Myosotis scorpioides* |  |  |  |  |  |  |
| *Nasturtium* spp. |  |  |  |  |  |  |
| *Papaver dubium* |  |  |  |  |  |  |
| *Papaver rhoeas* |  |  |  |  |  |  |
| *Papaver* spp. |  |  |  |  |  |  |
| *Poa annua* |  |  |  |  |  |  |
| *Polygonum maculosa* |  |  |  |  |  |  |
| *Prunella vulgaris* |  |  |  |  |  |  |
| *Ranunculus repens* |  |  |  |  |  |  |
| *Raphanus raphanistrum* |  |  |  |  |  |  |
| *Rosa canina* |  |  |  |  |  |  |
| *Rubus fruticosus* |  |  |  |  |  |  |
| *Rumex obtusifolius* |  |  |  |  |  |  |
| *Sambucus nigra* |  |  |  |  |  |  |
| *Senecio vulgare* |  |  |  |  |  |  |
| *Sinapis arvensis* |  |  |  |  |  |  |
| *Sisymbrium officinale* |  |  |  |  |  |  |
| *Smyrnium olosatrum* |  |  |  |  |  |  |
| *Solanum dulcamara* |  |  |  |  |  |  |
| *Sonchus asper* |  |  |  |  |  |  |
| *Sonchus oleraceus* |  |  |  |  |  |  |
| *Stachys palustris* |  |  |  |  |  |  |
| *Stellaria media* |  |  |  |  |  |  |
| *Taraxacum officinale* |  |  |  |  |  | ✓ |
| *Torilis japonica* |  |  |  |  |  |  |
| *Trifolium repens* |  |  |  |  |  |  |
| *Ulex europaeus* |  |  |  |  |  |  |
| *Urtica dioca* |  |  |  |  |  |  |
| *Urtica* spp. |  |  |  |  |  |  |
| *Veronica chamaedris* |  |  |  |  |  |  |
| *Veronica persica* |  |  |  |  |  |  |
| *Viburnum davidii* |  |  |  |  |  |  |
| *Viburnum opulus* |  |  |  |  |  |  |
| *Vicia cracca* |  |  |  |  |  |  |
| *Vicia sativa* |  |  |  |  |  |  |
| *Vicia sepium* |  |  |  |  |  |  |
| *Viola tricolor* |  |  |  |  |  |  |