# Main text

#### Pesticide toxicity, potential ecological value, and agronomic harm

Herbicide use data was translated into potential pesticide load index (PLI) using the Danish-PLI methodology (Kudsk et al., 2018). Potential ecological value and agronomic harm were estimated using a methodology derived from that of Yvoz et al. 2021. For ecological value, two indices were estimated. The first, potential benefits to pollinators, was comprised of three sub-indices representing (1a) the absolute benefit to bees (LATIN NAME?), (1b) bumble bees (LATIN NAME?), and (1c) hoverflies (LATIN NAME?). The second, potential benefits to organisms, was comprised of three sub-indices representing absolute contributions to (2a) farmland birds, (2b) carabids, and (2c) parasitoid wasps. The agronomic harm index was comprised of three sub-indices representing (3a) competition with crops, (3b) contribution to harvest difficulties, and (3c) contribution to future weed infestations. More details on each sub-index are presented in supplemental material. Plant-level attributes reported by Yvoz et al. 2021 for 155 species were used to assign sub-index values to each of the 12 species in our dataset. For the four genus in our dataset, the median value for all species reported in the database within that genus were used. After each species/genus in the present study was assigned a value for each of their respective sub-indices, the sub-indices were scaled within the present study such that the maximum value was assigned a value of 1, and the minimum a value of 0. Sub-indices were summed to provide an estimate for each of the three indices for each of the 16 species/genus observed in our study, resulting in a summed scale of 0-3. These values were weighted by the species/genuses’ percent cover for each sample to calculate the fall vegetation community’s potential benefit to pollinators, potential contributions to organisms, and potential to cause agronomic harm. For the ‘synthesis’ analysis, the maximum value between the benefit to pollinators and contribution to organisms was used to represent the community’s potential ‘ecological benefits’.

# Supplemental text

### Potential ecological value, agronomic harm

**Supplemental Table S2.** Summary of the indices derived from Yvoz et al. 2021 used in the present study. The reader is directed to Yvoz et al. 2021 for more information.

|  |  |  |  |
| --- | --- | --- | --- |
| **Index** | **Sub-indice** | **Description** | **Components, in brief** |
| Potential benefit to pollinators | Pol1 | Benefit to bees | Value to pollinators group (Table 3 from (Ricou et al., 2014)) flower diameter, average number of flowers per plant |
| Pol2 | Benefit to bumble bees | Same as above |
| Pol3 | Benefit to hoverflies | Same as above |
| Potential contribution to organisms | Cont1 | Contribution to farmland birds | Seed lipid content, seed mass, average number of seeds per plant |
| Cont2 | Contribution to carabids | Seed lipid content, seed mass, seed accessibility (size), average number of seeds per plant |
| Cont3 | Contribution to parasitoid wasps | Nectar quantity, flower form, corolla depth, flower number, extra floral nectar production |
| Potential agronomic harm | Harm1 | Competition with crop | Germination period, flowering period, relative height, relative Ellenberg N, relative specific leaf area, survival success in crop |
| Harm2 | Contribution to harvest difficulties | Maximum height, proportion of plants green at harvest, synchrony between flowering period and crop harvest |
| Harm3 | Contribution to future weed infestations | Seed longevity, average seed number per plant |

*The problem is these mainly depend on flowers being present, or seeds being produced. The value of the green thing is not…included…except in the case of harm. I will just have to ignore that I think.*

# Calculating aggregate, scaled values

Individual species values were calculated as described in the main text. Resulting values are presented in Table S3.

**Supplementary Table S3.** Service and dis-service scores assigned to individual species or genus found in this study, derived from data presented in Yvoz et al. 2021

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **EPPO code** | **Latin name** | **Ecosystem contribution\*** | **Pollinator\* support** | **Benefit\*\*** | **Harm\*** | ***Net value\*\*\**** |
| AVESA | Avena sativa | 0 | 0 | 0 | 0 | *0* |
| CAPBP | Capsella bursa-pastoris | 2.89 | 2.06 | 2.89 | 1.53 | *1.36* |
| CIRAR | Cirsium arvense | 0.5 | 1.62 | 1.62 | 2.75 | *-1.12* |
| EPHEX | Euphorbiaceae | 0.16 | 0.13 | 0.16 | 0.17 | *-0.01* |
| GERSS | Geranium species | 1.1 | 1.44 | 1.44 | 0.54 | *0.9* |
| HORVW | Hordeum vulgare | 0 | 0 | 0 | 0 | *0* |
| LAMSS | Lamium species | 0.16 | 0.2 | 0.2 | 0.24 | *-0.04* |
| LOLPE | Lolium perenne | 0 | 0 | 0 | 0 | *0* |
| MATIN | Tripleurospermum inodorum | 0 | 0 | 0 | 0 | *0* |
| PAPRH | Papaver rhoeas | 2 | 0.76 | 2 | 2.34 | *-0.34* |
| RAPSR | Raphanus sativus | 0 | 0 | 0 | 0 | *0* |
| SENSS | Senecio species | 0.6 | 1.15 | 1.15 | 1.19 | *-0.04* |
| soil | - | 0 | 0 | 0 | 0 | *0* |
| TAROF | Taraxacum officinale | 0.16 | 1.18 | 1.18 | 0.12 | *1.07* |
| TRFRE | Trifolium repens | 0.1 | 1.3 | 1.3 | 0.56 | *0.74* |
| VERSS | Veronica species | 0.4 | 1.54 | 1.54 | 0.33 | *1.21* |

*\*The maximum possible value is 3*

*\*\*Benefit is the maximum value between Ecosystem contribution and Pollinator support values*

*\*\*\*Presented only to help interpretation, this value was not used in any subsequent calculations*

# Calculating community metrics

## Potential benefit

The potential benefit provided by the fall vegetation community was calculated by weighing each species/genus value by its respective percent cover contribution in a given sub-sample. The mean community values for ‘Benefit’ were calculated for each tillage, cover crop, and residue treatment across years. The resulting values were scaled from 0-1 with 0 representing the lowest observed community ‘Benefit’ value (0, several systems), and 1 representing the maximum observed community ‘Benefit’ value (0.67 in the notill/mixE/-res).

## Potential harm

The same procedure was used for assigning potential Harm to each fall vegetation community.