

IMPACT: CROP YIELD

Reference 5

Albrecht, M; Kleijn, D; Williams, NM; Tschumi, M; Blaauw, BR; Bommarco, R; Campbell, AJ; Dainese, M; Drummond, FA; Entling, MH; Ganser, D 2020 The effectiveness of flower strips and hedgerows on pest control, pollination services and crop yield: a quantitative synthesis *ECOLOGY LETTERS*, 23(10), 1488-1498. 10.1111/ele.13576

Background and objective

The lack of clarity about effects of flower plantings on ecosystem service provisioning and crop yield scattered in numerous case studies is a barrier to farmer adoption of such measures. The aim was to quantitatively assess the effectiveness of two of the most commonly implemented ecological intensification measures, flower strips and hedgerows, in promoting crop pollination, pest control services and crop production. Moreover, the authors aim to better understand the key factors driving failure or success of these measures to suggest improvement of their design and implementation.

Search strategy and selection criteria

The authors performed a search in the ISI Web of Science and SCOPUS (records published until 31.12.2017 were considered). To minimise potential publication bias and to maximise the number of relevant data sets they also searched for unpublished data by contacting potential data holders through researcher networks. 1) Pollination and/or pest control services in crops were measured in both crop fields adjacent to floral plantings and control fields without planting; 2) the replication at the field level was \geq six fields per study (three fields with plantings and three without; i.e. disqualifying small-scaled plot treatment comparisons within fields).

Data and analysis

The authors used a mixed effect-modelling approach to address the research questions. In all models, study was included as a random intercept to account for the hierarchical structure of the data with field measures nested within study. Effect sizes provided in the text and figures are model estimates of z-transformed response variables. For statistical inference of fixed effects log-likelihood ratio tests (LRT) were used. All statistical analyses were performed in R version 3.5.2 using the R-package lme4.

| Number of papers | Population | Intervention | Comparator | Outcome | Quality score |
|------------------|------------|--------------------------------|--------------------------------------|---|---------------|
| 35 | Cropland | 1) Flower strips; 2) Hedgerows | 1) No flower strips; 2) No Hedgerows | Metric: Crop yield; Effect size: Fisher's Z-transformed r | 62.5 |

Results

- Overall, no significant effect of flower strips on yield in adjacent crops was detected.
- No effects of within-field distance, plant species richness, time since establishment or landscape simplification, or their interactions with flower strip presence on yield, were detected.

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

This synthesis reveals inconsistent and highly variable effects of flower strips and hedgerows on crop yield.