

IMPACT: CROP YIELD

Reference 10

Zamorano, J; Bartomeus, I; Grez, AA; Garibaldi, LA 2020 Field margin floral enhancements increase pollinator diversity at the field edge but show no consistent spillover into the crop field: a meta-analysis INSECT CONSERVATION AND DIVERSITY, 13, 519-531. 10.1111/icad.12454

Background and objective

Conventional intensification of agriculture has reduced the availability of resources for pollinators, reducing their diversity and affecting plant pollination, both in natural habitats and croplands. Field margin floral enhancements such as flower strips or restored field margins could counteract these negative effects. The objective of the study is to perform a meta-analysis to understand the influence of field margin floral enhancements on the abundance and richness of pollinators at the edge and within the field, and on crop yield.

Search strategy and selection criteria

A search of the published literature on the effect of field margin floral enhancements on pollinators was conducted using the Web of Science core collection database available from 1975 to May 2019. The following combination was used: *pollinat** AND *hedgerow* AND *crop*, *pollinat** AND *field margin* AND *crop*, *pollinat** AND *hedgerow* AND *agro*, *pollinat* AND *field margin* AND *agro*, *pollinat* AND *edge* AND *crop*, *pollinat** AND *edge* AND *agro*, *pollinat* AND *flower strip* AND *crop*, *pollinat** AND *flower strip* AND *agro**. Additionally, a search was made in the database of two other synthesis papers which include 71 and 204 studies, respectively. 1) A field study that evaluates the effect of field margin floral enhancements on the pollinator diversity on the edge or within the crop; 2) The response variables consider the abundance, richness, visitation rate of pollinators, and/or crop yield; 3) Mean, standard deviation (or standard error) and sample size are reported; 4) Includes a comparison between an experimental and a control group. Treatments compare always sites with field margin floral enhancement (experimental group) and sites without field margin floral enhancement (control group).

Data and analysis

Due to the low number of studies on the effect of flower field margins (only restored edges and herbaceous plants) on crop yield, a random-effect model was carried out. For pollinators, a mixed-effects model was carried out using edge management, edge type and pollinator guild as moderators of the effect. Analyses were run independently for each type of contrast (i.e. edge–edge, edge–interior and interior–interior) and the effect size was estimated for the different levels within each moderator. The models were adjusted using the estimate of maximum restricted likelihood. The heterogeneity of the effect sizes between the levels of each moderator was tested using omnibus (QM) tests. Publication bias was tested using funnel plots.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
4 ⁰	Croplands and grasslands	Sites with field margin floral enhancement (only restored edges and herbaceous plants)	Sites without field margin floral enhancement	Metric: Crop yield; Effect size: Hedge g (standardized difference) comparing the considered metrics between intervention and control	81.25

Results

- Crop yield was explored in only eight cases, which had a restored edge management with herbaceous plants, not having a significant effect size ($d = 0.46$; 95% CI = $-0.06, 0.99$; $P = 0.08$).

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

Overall, there was no effect of field margin floral enhancements on crop yield.