

Reference 4

Van Buskirk, J; Willi, Y 2004 Enhancement of farmland biodiversity within set-aside land CONSERVATION BIOLOGY, 18(4), 987-994. 10.1111/j.1523-1739.2004.00359.x

Background and objective

Agricultural set-aside schemes were originally established to reduce overproduction of crops and to combat soil erosion. More recently, there has been widespread hope that they might halt or reverse decades-long declines in farmland biodiversity. A thorough review of the literature on set-aside land is needed to synthesize information on the quantity and quality of plants and animals within set-aside land. If the results are positive, they may help ensure political acceptance and continuation of these programs, whereas negative results could guide recommendations for alternative methods of biodiversity conservation in farmland. To synthesize information on the quantity and quality of plants and animals within set-aside land. Here, results on bird species richness and population density for birds, spiders and plants are reported.

Search strategy and selection criteria

Search was conducted in three electronic databases (AGRICOLA 1970 through 2002, AGRIS 1981 to June 2002, and BIOSIS 1990 to June 2003) for publications containing terms associated with agricultural set-aside land (agri-environment, conservation reserve program, field* and margin, *flower* and *strip**, permanent cover program, set* and aside*). A few papers were discovered by consulting reference lists in other published studies. 1) Studies contained identifiable replicates of at least two treatments or land-use types, one conventional agriculture and the other set-aside land. Conventional fields included row crops, grains, and intensively managed meadows; 2) The studies presented means and some measure of variation among replicates for either population density or the number of species of at least one plant or animal taxon, defined narrowly or broadly (e.g., skylarks or birds); 3) Studies monitored farmland managed under locally accepted standards for set-aside and conventional agriculture. Set-aside parcels in about 11% of the studies were established at unnaturally small spatial scales for experimental purposes but were included because they enabled to evaluate biodiversity responses across a broad range of field sizes.

Data and analysis

Effect sizes were combined across studies with a mixed-effects model implemented in MetaWin. Heterogeneity in effect size among taxa or types of set-aside land was tested using QB, which is chi-squared distributed.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
127	Set-aside lands in Europe and North America	Set-aside land (<6yrs)	Conventional agriculture	Metric: Bird species richness; birds population density; plants population density; spiders population density; Effect size: Hedge g (standardized difference) comparing the considered metrics between intervention and control	56.25

Results

- The number of species of birds was significantly higher on set-aside land than on nearby control areas under conventional agriculture.
- The population densities of birds were higher on set-aside land.
- The population densities of plants were higher on set-aside land.
- The population densities of birds, spiders and plants were higher on set-aside land.
- Funnel plots depicting the relationship between effect size and sample size indicated that the data set was only modestly biased by selective reporting.

Factors influencing effect sizes

- Fallow area : Large parcels of land were especially beneficial for some indicators of biodiversity. Effect sizes for bird species richness increased significantly with the surface area of the set-aside land. As well, a 10-fold increase in area was associated with an increase of 0.4 SD units for bird density.
- Fallow length : Effects on density of plants increased strongly with age.

Conclusion

Land withdrawn from conventional production unequivocally enhances biodiversity in North America and Europe.