Organic Farming

Title
Organic Farming 1992-1994

Description and Summary of Results
Many species of farmland bird declined dramatically both in numbers and range between the 1960s and early 1990s. The ultimate reason is usually thought to be the intensification of farming systems in the broad sense although each species will have been affected by different particular aspects of these processes.
Organic farming systems have been put forward by some as a potential "cure" for the ills of farmland generally. Such systems are commonly thought of simply as farms where chemical pesticides and synthetic fertilisers are not used, but this definition is too narrow. Different methods of crop and livestock production are used and these lead to patterns of land-use and farm structure that can be strikingly different to those on conventional farmland in the same region. This project aimed to assess what, if any, potential benefits might accrue to bird populations from organic farming in its broadest sense, and specifically to assess the effect of the use or non-use of agrochemicals in particular field types. This would be done by making comparisons between farms that were within the normal range of variation for organic and conventional systems for the region concerned.
The density of the majority of species studied was consistently higher on organic than on conventional farms in all habitat/season samples, but numbers of many individual species were not statistically different, probably because sample sizes were effectively limited by the large number of zero counts. For field boundaries, 10 out of 18 species were more abundant on organic farms in at least one breeding season, and 11 out of 18 species were more abundant (and more markedly so) in at least one winter period. No species was more abundant in boundaries on conventional farms. It is likely that this was partially attributable to structural differences (due to hedgerow management and crop types) between the two farm types. However, boundaries on organic farms still held higher densities of certain species and of all species combined when physical structure was controlled for.
The only field-nesting species for which breeding season field counts were both sufficiently large and accurate to analyse was Skylark *Alauda arvensis*. Breeding densities were higher on organic than conventional fields in 1992 and 1993 but did not differ in 1994 and, when variation in crop type was controlled, they remained higher. In winter, seven species were more abundant on organic than conventional fields in at least one winter period, but two (Lapwing *Vanellus vanellus* and Fieldfare *Turdus pilaris*) were more abundant on conventional fields in at least one winter period. The most striking winter result was that Linnet *Carduelis cannabina* was more abundant on organic farms in the early winter period of both winters examined. In no case was overall density significantly higher on conventional farms.
The conclusion was that organic farms often support higher densities of several bird species than conventional farmland, especially in winter, and that the main reasons for this are: 1) the boundary features of many organic farms have features beneficial to birds as a result of sympathetic management, eg reduced frequency of trimming; 2) mixed enterprises upon

which most organic farms are based offer birds more diverse nest sites and food resources; 3) organic crop production techniques, including restricted use of agrochemicals and the application of organic manures, can generate richer food resources for several species. However, in addition, hedges on organic farms tended to be taller and to hold more trees, and fields on conventional farms were slightly larger, more frequently contained winter cereals and less often spring cereals.

Methods of Data Capture

The comparison of breeding and winter bird populations was made on a sample of 22 organic and 22 'paired' conventional farms. The organic farms were all those which met strict criteria and whose owners agreed to allow surveys, and the conventional 'pair' was the nearest conventional farm to the chosen organic one which would allow surveys. The farms chosen were paired by geographical location and also, as far as possible, in terms of farm area (minimum 30ha) and coarse-grained physical features such as amount of non-crop habitat and field size. Nonetheless, some differences remained in these attributes which to some extent reflect general differences in the physical structure of organic and conventional farmland.

Each site received four visits in the breeding season and three in the winter. During each, the perimeter of each field was walked and every bird was noted. A modified Common Birds Census methodology was used in the breeding season to determine the number of active territories in the area. In the winter all birds were recorded similarly along each boundary and observers were asked in addition to walk across the centre of each field. One observer carried out fieldwork on both farms of the pair with visits to each normally within a week of each other.

For purposes of analysis each winter was divided into early (September-November) and late (December-February) periods.

Purpose of Data Capture

The broad aims were: 1) to assess whether bird populations on organic farms differed from those on nearby conventional farms; 2) to examine likely causes of any differences, taking account of any differences in non-crop habitat, cropping patterns, farming practices and the non-crop habitat; 3) to undertake an intensive examination of habitat use and breeding success of selected bird species; and 4) to compare the food resources available to birds on the two farm types.

Geographic Coverage

Twenty two organic farms and 22 'paired' conventional farms were surveyed scattered across England and Wales.

Temporal Coverage

Breeding birds were studied in three years (1992-1994), and winter birds were studied in two winters (1992/93 and 1993/94).

Other Interested parties
The project was funded by the Ministry of Agriculture, Fisheries and Food (now part of Defra), and by the World Wide Fund for Nature UK.

Organiser(s)
Jeremy Wilson then Dan Chamberlain.

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Publications
The main report of the survey is in:
Chamberlain, D.E., Wilson, J.D. & Fuller, R.J. 1999. A comparison of bird populations on organic and conventional farmland in southern Britain. *Biological Conservation* 88: 307-320. (doi:10.1016/S0006-3207(98)00124-4)
A further specific is:
Chamberlain, D.E. & Wilson, J.D. 2000. The contribution of hedgerow structure to the value of organic farms to birds. Pp 57-68 in Aebischer, N.J., Evans, A.D., Grice, P.V. & Vickery J.A. (eds) *Ecology and Conservation of Lowland Farmland Birds*. BOU, Tring.
More detailed results and which include contributions from partners investigating invertebrates etc is:
British Trust for Ornithology & Institute of Arable Crops Research - Rothamsted. 1995. *The effect of organic farming regimes on breeding and winter bird populations - Parts 1-IV.* BTO Res. Rep. 154: 1-220.
The survey was noticed in *BTO News* numbers 178, 185 and 188.

Available from NBN?
No.

Computer data -- location
BTO Windows network central area.

Computer data -- outline contents
5 directories containing bird data (one file per farm) and 5 similarly containing habitat data, for 1992 and 1993 breeding and winter and 1994 breeding.
2 spreadsheets for winter birds (one each year) and 2 for habitat data.

Computer data -- description of contents

All relevant original data files are in a standard format on a per farm basis, although there is often an "all" file as well in the relevant directories.

Various programs (SAS), list and log files also in the directories.

Birds: Columns include: Farm pair; Farm number; Visit number; Boundary; Bird species code (2-letter); no. of pairs or count of birds.

Habitat: Columns include: Farm pair; Farm number; Boundary; Farm Type (O, C); Boundary Type; length; Height; Width; Base; prof; stru; length of tree part; dtre;

Information held in BTO Archives

1 large box and 18 Transfer Cases containing all data, maps, letters, analyses and reports.

Notes on Access and Use

Other information needed

Notes on Survey Design

The selection of study areas, the lack of any experimental work, and statistical and sampling problems could have implications for the interpretation and generality of the results. More specifically: many organic farms are mixed rotations with legume-based pastures, and manure inputs from livestock; organic farms that are exclusively livestock holdings occur more frequently than ones that have no livestock component; in arable-dominated areas, such as much of eastern England, organic farms are typically strikingly different in their crop composition to most other farmland in the region.

Most of the organic farms studied were mixtures of grass and crops and it did not prove possible to pair these with nearby conventional farms with similar mixtures of fields. In many cases, therefore, the comparison was essentially one of mixed farming (organic) with arable farming (conventional). Furthermore, even though plots were successfully paired in such a way as to avoid gross differences in non-crop habitats, there remained several differences in boundary structures between the samples which reflected different management practices. Indeed, it is a requirement that organic farms are managed in ways that are sympathetic to wildlife and wildlife habitat. Differences in field type and in boundary structure are integral to organic and conventional approaches. It is appropriate, therefore, that they should have been included within this study which sought to describe differences in bird populations associated with the two approaches.

Specific Issues for Analysis

The patchy distribution of most bird species within both the organic and conventional study areas caused considerable analytical problems. The strongly non-normal distribution of the data necessitated use of randomisation -- an extremely robust way of analysing such data. Nonetheless, there were many cases when apparent differences in density were not identified as statistically significant, probably because the proportion of zeros was so large.