



Agriculture & Horticulture  
DEVELOPMENT BOARD



# Grower Summary

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## **FV 385**

The influence of vegetable  
production on farmland bird  
populations

Final Report 2011

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## Headline

Horticultural cropping is likely to provide high quality habitat for a range of farmland bird species and has been associated with higher population densities and healthier population trends, on average, since 1994, for many species.

## Background

Birds represent the highest profile part of biodiversity on farmland and changes in their numbers form the most widely adopted indicators of health of the farmed environment. Thus, for example, the previous government's Public Service Agreement target relating to farmland biodiversity was based on bird population trends, effects of the loss of set-aside have been assessed using bird responses and birds form one of three themes of the Campaign for the Farmed Environment (CFE).

There is reason to believe that horticultural cropping provides high quality habitat for a range of farmland bird species, but objective evidence for this has not yet been published. In this project, we review the scientific literature relevant to this issue and analyse national bird population data from the BTO/JNCC/RSPB Breeding Bird Survey (BBS) to look for differences in bird numbers ("abundance"), population trends over time and species diversity between farmland with and without horticultural crops, as indicated by the presence of HDC-registered growers in the local area.

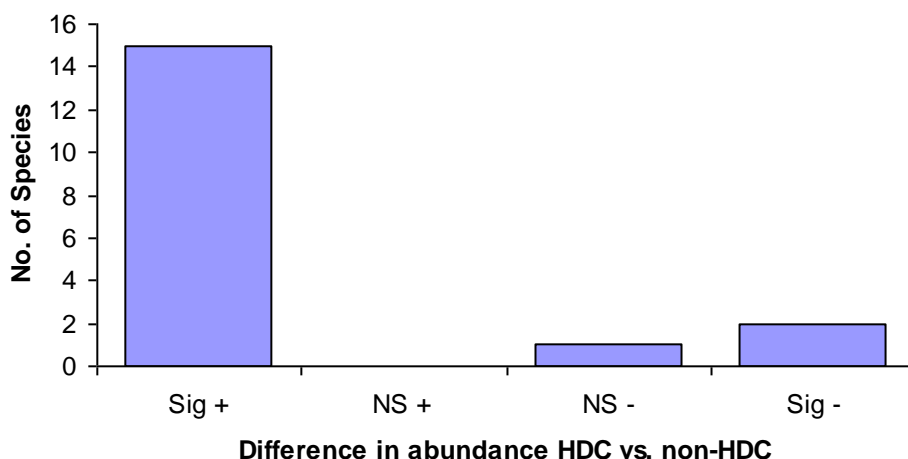
The aim of the work was to identify whether there is objective evidence for the possible benefits of horticulture and whether the geographical variation in bird populations is consistent with these benefits having effects at the national scale. The project did not aim to provide definitive evidence of the scale of any benefits that birds receive because this would be beyond the scope of what is possible from analyses of existing data and would require new studies in the field.

## Summary

Reviewing the scientific literature on the effects of horticulture on birds showed that there is very little information available about the value of the sector as a whole or that of individual crops. However, research on widespread arable crops, such as potatoes and sugar beet, has shown that a number of the typical features of vegetable cropping are likely to benefit farmland birds, notably spring-sowing (both direct effects and indirect via the potential for over-wintered stubble/crop residue), more complex crop structure (e.g. compared to cereals) with access for birds to bare ground and smaller crop units with a concomitant increase in crop variability within fields and farms. Farmland birds can, broadly, be divided into those that nest and feed in open fields, those that feed there and nest in hedges and those that both feed and nest in hedges. Both of the former two categories have the potential to be affected positively by horticultural cropping.

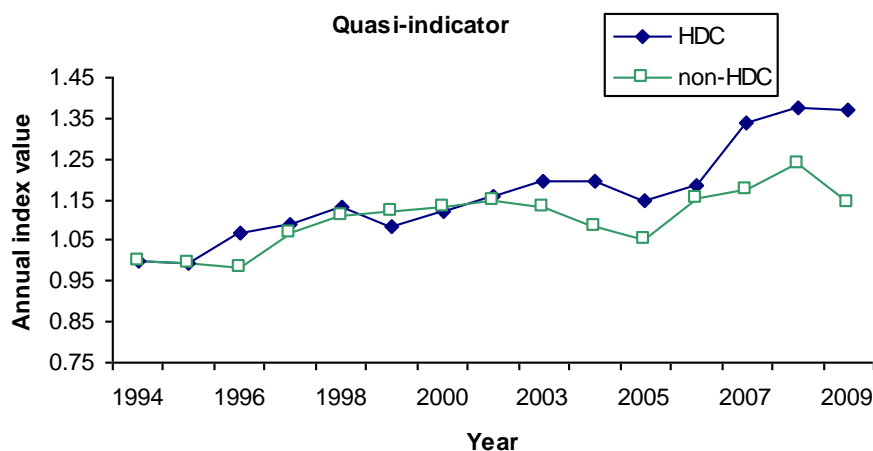
The BBS consists of over 3000 1km survey squares spread throughout the UK. Each square is surveyed every year by volunteer ornithologists and the BTO collates the resulting data for monitoring national bird populations. We analysed existing BBS data from 1994-2009 for 18 bird species that use open field habitats (corn bunting, goldfinch, greenfinch, grey partridge, jackdaw, kestrel, lapwing, linnet, reed bunting, rook, skylark, starling, stock dove, tree sparrow, turtle dove, whitethroat, yellow wagtail and yellowhammer) were analysed, considering only survey areas (1km squares) with 50% or more tilled land by area, comparing areas with HDC-registered farms (identified by postcode) to areas without. The latter were identified as areas within 50km of postcodes with registered HDC growers to ensure that like farmland was compared with like.

Average bird counts differed formally between HDC and non-HDC survey squares for 17 of the 18 species (all except for goldfinch) and were higher in HDC squares for all except jackdaw and starling, two species associated with human habitation and grassland (Figure 1). This suggests that horticulture is associated with higher densities of most species, the exceptions being species that are less likely to use tilled land and so to gain any benefits. The evidence is consistent, therefore, with vegetable cropping having a positive effect on the presence and numbers of most open field bird species, although it does not prove cause and effect.



**Figure 1.** Summary of numbers of positive and negative associations of farmland bird abundance with HDC cropping across species. “Sig” denotes differences identified statistically and “NS” weaker differences that were not “statistically significant”.

Comparing population trends over time showed that HDC squares supported healthier populations for nine species (grey partridge, jackdaw, lapwing, rook, skylark, stock dove, tree sparrow, yellow wagtail and yellowhammer) and less healthy ones for only four species (goldfinch, greenfinch, reed bunting and turtle dove), all of which depend heavily on non-cropped habitats as well as fields themselves. This suggests that these patterns across species are consistent with vegetable cropping being a driving force on population trend direction, being a positive influence on birds that use open fields more and perhaps less relevant where non-cropped habitats are more significant. Combination of the trends into a “quasi-indicator”, i.e. a version of the Farmland Bird Index, confirmed that, on average across species, there was a positive association with horticulture (Figure 2): the average population trend was considerably more positive in HDC squares than elsewhere. As with average counts, this result does not prove cause and effect, however: it just shows an association of which horticulture may or may not be the driving force.



**Figure 2.** Summary of the population trends of 18 bird species as average trends equivalent to the Farmland Bird Index on each of HDC and non-HDC squares.

Repeating the analyses described above considering the individual crops registered by growers produced less clear-cut results, but all crops were associated with higher average counts than the surrounding farmland for more species than they with lower counts. Similarly, the abundances of individual species were more often positively than negatively associated with individual crops. However, it is unclear whether registration of interest in a crop in 2010 is a good indicator of the presence of that crop throughout the period 1994-2009, so the results for individual crops should be treated with caution.

When the diversity of all bird species was compared between HDC and non-HDC squares, there was no detectable effect of horticultural cropping in general or of individual crops. This probably shows a dominating influence of non-cropped habitats on the numbers of species present. More generally, it suggests that while vegetable cropping might affect the numbers of some open-field species, it does not affect the overall farmland bird community present very much.

Overall, this study shows that areas in which horticultural crops are grown, as indicated by HDC registration in 2010, have been associated with higher average counts and healthier population trends of open-field bird species during 1994-2009. This does not prove a causal link, however, because other features of the areas classified as HDC and non-HDC might also have differed. Although there are theoretical reasons why positive effects of vegetable cropping might be expected, as the literature review reveals, further research is required to confirm that associations with horticultural cropping are due to effects of the crops themselves and not other, correlated factors (perhaps farmland with vegetable cropping is better for birds for unrelated reasons, such as soil type, distance from woodland or villages or drainage). In addition, the results here provide no information on best practice for crop management that would maximize the value of vegetable cropping for birds.

## **Financial benefits**

This project does not provide specific recommendations relevant to financial benefits, although there are financial benefits of healthy biodiversity, such as pollination and pest control services provided by certain animal species. Some researchers have attempted to calculate values for these services, as well as others such as tourism benefits to local communities deriving from people visiting an area because of the biodiversity present, but it is beyond the scope of this project to consider these issues.

## **Action points for growers**

The aim of this project was to indicate whether and what positive effects of ongoing horticultural practices on birds exist. Hence, given the broadly positive associations revealed by the analyses, there is no obvious recommendation to change any current practices to benefit birds. Moreover, this project has only considered broad, landscape-scale patterns and detailed information on cropping was not available. Thus, it is not possible to make recommendations about specific crop management. As well as research to identify whether the apparent effects of horticulture on bird populations are real and how they operate in practice (i.e. by increasing feeding opportunities, nesting success, cover or survival, among other possibilities, such as reducing competition from other species), detailed work investigating how cropping practices might be improved (from a bird's perspective) represents the next major research priority. This applies to the species for which positive associations with vegetable cropping were found here as well as those for which there were negative associations.