Final report:
British Beet Research Organisation Project 03/13

The value of the sugar beet crop for birds and the farm environment

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Summary

Overall the project investigated whether the use of 'Skylark scrapes' in sugar beet or uncropped areas around the field could enhance bird use of sugar beet fields. The incorporation of uncropped headlands is becoming a normal practice for sugar beet and this project showed how such headlands attract birds and increase their use of fields where sugar beet is grown. In the early season sugar beet has an open habit and is attractive to birds such as Lapwings, Skylarks and, in areas such as the Breckland, Stone Curlews. Later in the season birds respond to seed availability (as shown by their response to the seed produced on the headlands). Any increase in seed availability in the crop should further increase bird use of sugar beet. It is difficult to achieve this in cereals and so sugar beet in the rotation may be important, especially if more seeds can be produced (this is one of the targets of a new BBRO project 05/11). Invertebrate populations varied greatly between the two years of the study (2003 and 2004) in the headland but the numbers found in the crop were consistent with those found in the Government's Farm Scale Evaluations of genetically modified herbicide tolerant crops (e.g. numbers of carabid beetles were higher than in maize or spring oilseed rape). Unfortunately 'Skylark scrapes' in the sugar beet fields were not shown to be the method to provide more seeds in the crop, as scrapes did not increase the use of the fields by birds. In June, Skylarks densities tended to be higher than in other months and there appeared to be only a narrow window for this species to nest in sugar beet and no evidence in this study for second broods. It is possible that the numbers of Skylarks observed on sugar beet farms are the result of the rotations which result from the growing of this crop i.e. a tendency to more spring cropping (especially after late harvested beet) than where winter cropping predominates.

Headland study (report A) The densities of bird species were higher on headlands than in crops and on average the presence of a headland increased the bird abundance 'value' of a field by introducing a new habitat in which to forage. Of the birds recorded, some such as thrushes, finches and buntings were probably foraging whilst others, such as Skylarks or Grey Partridge, may have nested within the margins. The increased use of the headlands in late summer and autumn by birds, emphasised the late-season value of the headlands as a food resource, though more for seed-eating finches and buntings than for insectivorous species such as Dunnock, thrushes and wagtails.

Higher bird densities occurred in cropped areas with adjacent headlands compared to cropped areas without adjacent headlands. This difference was likely to have been due to the crops proximity to the headland rather than any tangible difference in the food quality of the cropped areas as a consequence of being next to the headland (i.e. due to weed ingress from the headland). There was an increase in bird densities with increasing weed-seed densities in headlands but this was not significant in cropped areas. When the three sites with game crops adjacent to the headlands were excluded from the analysis, this led to a weaker correlation between headland bird densities and adjacent crop bird densities.

The lack of association between birds and invertebrates is likely to be due to a range of factors including the comparative density of foliage in the headland and the crop and the presence of large mobile beetles which can move around freely in crops (and

were caught in larger numbers in the crop than the headlands) but less freely in the headlands. Weed numbers, species, cover and seed production varied greatly between the headlands but were much less variable in the beet crop. The general trend for the headlands to attract birds to the field and into the crop suggests that the use of non-cropped headlands in beet will be particularly beneficial for birds that inhabit farm environments.

In-field 'Skylark' scrapes (report B) This project examined bird use of sugar beet crops in summer and autumn. Foraging and breeding behaviour, along with data on plant food and vegetation composition, were recorded on a total of 20 sites, eight in 2003 and twelve in 2004.

As many farmland bird species avoid nesting or foraging amongst dense vegetation, the project tested the hypothesis that leaving small (c.4m x 4m) unplanted plots (sometimes known as 'skylark scrapes'), at a density of two plots per hectare within the crop, would increase access for ground nesting or foraging birds. Leaving plots has been demonstrated to increase skylark productivity in winter wheat, at very low cost to the farmer (Morris *et al.*, 2004). On each of the 15 sites, bird use, plant food and vegetation structure were compared between 'Plot' and 'Control' (normal-husbandry sugar beet) treatments. Treatments were normally situated on a single large (>10ha) split field.

Using skylark as an example of a crop-nesting species of Conservation Concern that occurred widely on the study sites, data were collected on territory densities (both years), timing and success of individual nesting attempts (2004 only). Densities of territorial birds were similar to previous estimates from sugar beet and those reported from winter wheat (Browne *et al.*, 1999). In sugar beet, there was no indication that territory densities differed between the two treatments. The sample size of nests was small, but breeding success and productivity were similar to a contemporaneous sample of nests from winter wheat. There were too few nests to test for differences between sugar beet treatments. All nests found were instigated during a three-week period, starting in late June. No nests were found within the 4m x 4m plots. However, even in wheat, where the plots have been shown to increase breeding productivity, the main benefit appears to be enhanced access to invertebrate chick-food rather than as nest sites (Morris *et al.*, 2004). The timing of the nesting attempts in beet suggests they were birds which had previously nested elsewhere and which had probably been displaced by changes in habitat at the initial nest site.

As well as benefiting nesting birds, plots have the potential to give greater access to food outside of the breeding season. In sugar beet, this could be especially important as:

(i) it is a relatively weedy crop, in which arable plants and volunteers can readily colonise and produce seed in the plots (where there is no crop competition), thus providing additional sources of food for granivorous birds

(ii) it is later harvested than most other crops, thus providing a relatively rich feeding area for birds well into the autumn or early winter.

Although the vegetation was lower and the amounts of bare ground and seed were greater in the plots than in the surrounding crop, there was no difference in the numbers of birds (granivorous passerines or all species combined) between the Plot and Control treatments during autumn. It is likely that the small area covered by the plots (approximately 0.5% of the cropped area in Plot treatments) meant that any additional food resource (or access to it) the plots provided was insignificant compared to the relative abundance of seed in sugar beet crops as a whole.

Introduction

Changes from production to environment-led grants for farming, together with increasing public interest in farming and the environment, have resulted in a greater need to understand and quantify the benefits that accrue from farming operations (Buckwell & Armstrong-Brown, 2004). In the future, it is likely that all crops will require environmental audits but the UK sugar beet industry is also coming under increasing pressure to make way for cane sugar imports from Least Developed Countries. Further pressures are also likely to follow reform of the EU sugar regime. Any large reduction in sugar beet area could have a disastrous effect on farms' profitability and remove a crop that has a potential benefit to farmland birds.

The DEFRA report on Sugar Beet and the Environment in the UK (prepared for Article 47 (3) of EU Council Regulation 1260/2001) reported the ways the industry has managed to mitigate environmental effects of growing the crop (e.g. reductions in pesticide and fertiliser inputs). The report also suggested that sugar beet is important for many farmland birds and, looking to the future, states 'The aspects of sugar beet which are beneficial for biodiversity will be maximised where farmers are encouraged to take appropriate management decisions. More work is needed on how this can be achieved.'

Sugar beet crops are used by a number of bird species, including many of the 19 species of farmland birds that contribute to the UK Government's Quality of Life breeding bird indictor. The government has a Public Service Agreement to reverse the long-term decline in the number of farmland birds by 2020 (Gregory *et al*., 2004). The centres of sugar beet fields provide breeding or feeding opportunities for many of these birds, especially skylark, lapwing and stone curlew. However, birds avoid nesting or foraging in dense foliage and later in the season beet may be of less use than early on. To try to overcome this, part of the project was set-up to investigate the possibilities of using unplanted 'plots' (sometimes known as 'skylark scrapes' or 'undrilled patches') in sugar beet fields. The on-going Sustainable Arable Farming For an Improved Environment (SAFFIE) project has demonstrated that leaving similar undrilled plots (4m x 4m @ 2/ha) in winter wheat increases the number of skylark reared in this crop, at a very low cost to the farmer (Morris *et al.*, 2004).

Sugar beet yields are usually lower in headlands than the main part of the field (Sparkes *et al.*, 1988a and b) and as a consequence more and more growers are prepared to leave their headlands uncropped or to sow a cover crop. These uncropped areas could be an important attractant for birds (Henderson *et al.*, 2000). Therefore, one part of this project investigated the plant and invertebrate populations and bird use of fields with cropped or uncropped headlands.

This project provides quantitative information about bird use of sugar beet crops and data on within-crop management practice (unplanted plots) of potential benefit to birds, collected during summer and autumn 2003 and 2004. This work was carried out by the RSPB and British Sugar. The work on headlands was carried out by the British Trust for Ornithology and Broom's Barn on separate sites to the within-crop study. The findings of the study of non-cropped headlands and that of the within-crop management are each presented in separate reports (Reports A and B respectively).

Objectives

1. To survey headland set-aside as used in beet fields for both invertebrate and plant compositions and bird use (report A).
2. To identify the major invertebrate and plant constituents of set-aside headlands that are important resources for birds (Report A).
3. To increase food availability and access for birds in sugar beet fields (Report B).
4. To provide additional nesting sites for birds in sugar beet fields (Report B).
5. To record presence of any rare plant species in the headlands (Report A).
6. To evaluate the practicalities, and crop and whole farm cost implications, of improvements to the headlands and centres of fields (Reports A and B).

See separate reports (A and B) for methods employed, results and conclusion for each part of the work.

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Scientific input and expenditure

Broom's Barn

Estimated Cost	£44955
Actual Cost	£47894.54
Estimated time	1.0
Actual time	0.9

RSPB

RSPB totals for both years of the BBRO The value of the sugar beet crop for birds and the farm environment project (2003 + 2004):-

Estimated Cost £25,387
Actual Cost £23,172 (includes £1,450 Research Biologist time, which I don't think gets invoiced to BBRO)
Estimated time in man years -
12 months (10 months Research Assistant; 2 months Research Biologist)
Actual time in man years -
12 months (10 months Research Assistant; 2 months Research Biologist)

British Sugar

Estimated Cost	£8580
Actual Cost	£8544
Estimated time	0.08
Actual time	0.08