

BIRD COMMUNITY MONITORING IN CHLORPYRIFOS-TREATED WHEAT FIELDS IN UK – BREEDING SUCCESS AND BEHAVIOURAL ASPECTS

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From left to right ,up to down: Yellow Wagtail (Motacilla flava); winter cereal field in Cambridgeshire, United Kingdom; Skylark (Alauda arvensis); Yellow Wagtail nest with eggs; spray application in a cereal field; newly hatched Skylarks chicks in the nest; colour-ringing of a Skylark chick.

INTRODUCTION

According to pesticides Regulation 1107/2009, risks to bird reproduction must be assessed. Parents & chicks might be exposed via diet to residues on arthropods/seeds or by dermal contact.

Chlorpyrifos (CP) is an OP insecticide registered across EU in a range of arable & orchard crops. In UK & other Member States CP is sprayed once (480 g a.i./ha) in May/June to wheat, to control Orange Wheat Blossom Midge (OWBM). OWBM attacks the grain, with a heavy infestation downgrading bread-wheat to livestock-feed.

CP fails the ‘Tier 1’ reproduction risk assessment. Hence, a field study has been conducted to assess effects in a worst-case arable crop & location. **Wheat in Cambridgeshire UK** was chosen due to: **(i)** Prevalence of OWBM; **(ii)** Skylarks & Yellow wagtails nesting on ground within crop¹; **(iii)** Spraying of CP in breeding season – including when nests with eggs/chicks are present.

In this field study we monitored: **i)** Bird community within fields & close surroundings; **ii)** Reproductive performance [breeding pairs, no. of nests, chick-survival, no. of fledged juveniles] of **Skylarks & Yellow wagtails**; and **iii)** Parental behaviour by observation & radio-tracking².

MATERIAL & METHODS

The study was conducted during the breeding season in 2013 and 2014. To obtain information on the bird community, census counts were carried out. In order to find birds actually nesting within the fields, systematic nest searching and monitoring were conducted regularly in 10 untreated control fields and 10 treated fields. In total, 74 nests of Skylark and 31 nests of Yellow wagtail were monitored in 2014. Also, 20 adult birds (10 Skylarks & 10 Yellow Wagtails) were radio-tracked from dawn-till-dusk on days before and after CP application, and changes in behaviour and/or location recorded to the minute. Daily home range was estimated using Kernel Density method ³. Home range size and overlap between consecutive sessions was calculated as well as the distance travelled. Area treated with CP was 136 ha in 2013 and 86 ha in 2014.

RESULTS & DISCUSSION

□ BIRD COMMUNITY

- The regional bird community included 78 different species observed from 120 observation points on the border of the wheat fields. Wheat fields did not show a diverse bird community, with only 4 main species present (Skylark, Common Pheasant, Carrion Crow and Yellow wagtail). The presence of all species was highly influenced by: **i)** habitat factors, **ii)** off-crop features (e.g. hedges; woodland; ditches with water and bankside vegetation) which provide additional nesting and food sources and **iii)** presence of predators.
- In total, 94 nests of 18 different species were found during the study (Figure 1) in 2013. Only two species, Skylarks and Yellow Wagtails, nested within the fields (22 and 13 nests, respectively).
- Behaviour and abundance of birds within and around CP-treated wheat fields were recorded during Bird Surveys before and after the spraying. We found no changes in foraging, breeding behaviour and/or abundance in response to CP application .

□ FOCAL SPECIES: SKYLARK AND YELLOW WAGTAIL

- Based on radio-tracking of all individuals from before the application of CP, Skylarks spent on average 72% of their total foraging time (‘PT’) within the study wheat fields, while for Yellow Wagtails this was only 33%.
- In general, for individuals which were tracked before and after the application, Skylarks did not show significant changes in their movement patterns after the application of CP, neither home range size nor travelling distance. Even so the mean PT (n = 7) increased from 61% to 78%. Conversely, the mean PT for Yellow wagtails (n = 4) reduced from 23% to 9%.
- The number of active nests found and number of fledged young within the study fields showed that the bird community within CP-treated wheat fields was successful in reproduction, and productivity was not reduced by CP (Table 1, Figure 2). Additional factors potentially influencing the reproductive performance of the bird community included mainly the presence of predators and also the BBCH growth-stage of crop.

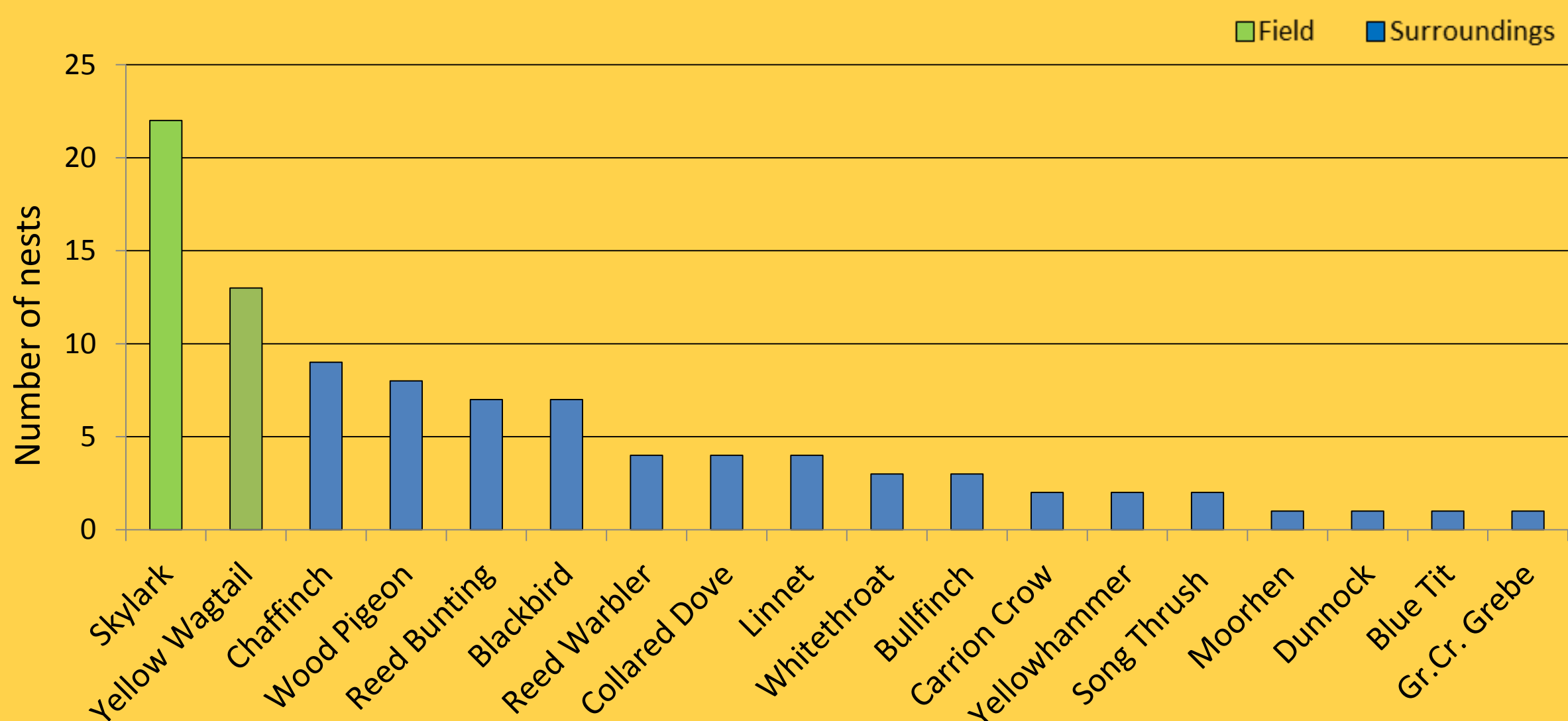


Fig.1: Total number of active nests by species as found within the fields and in the surroundings in 2013.

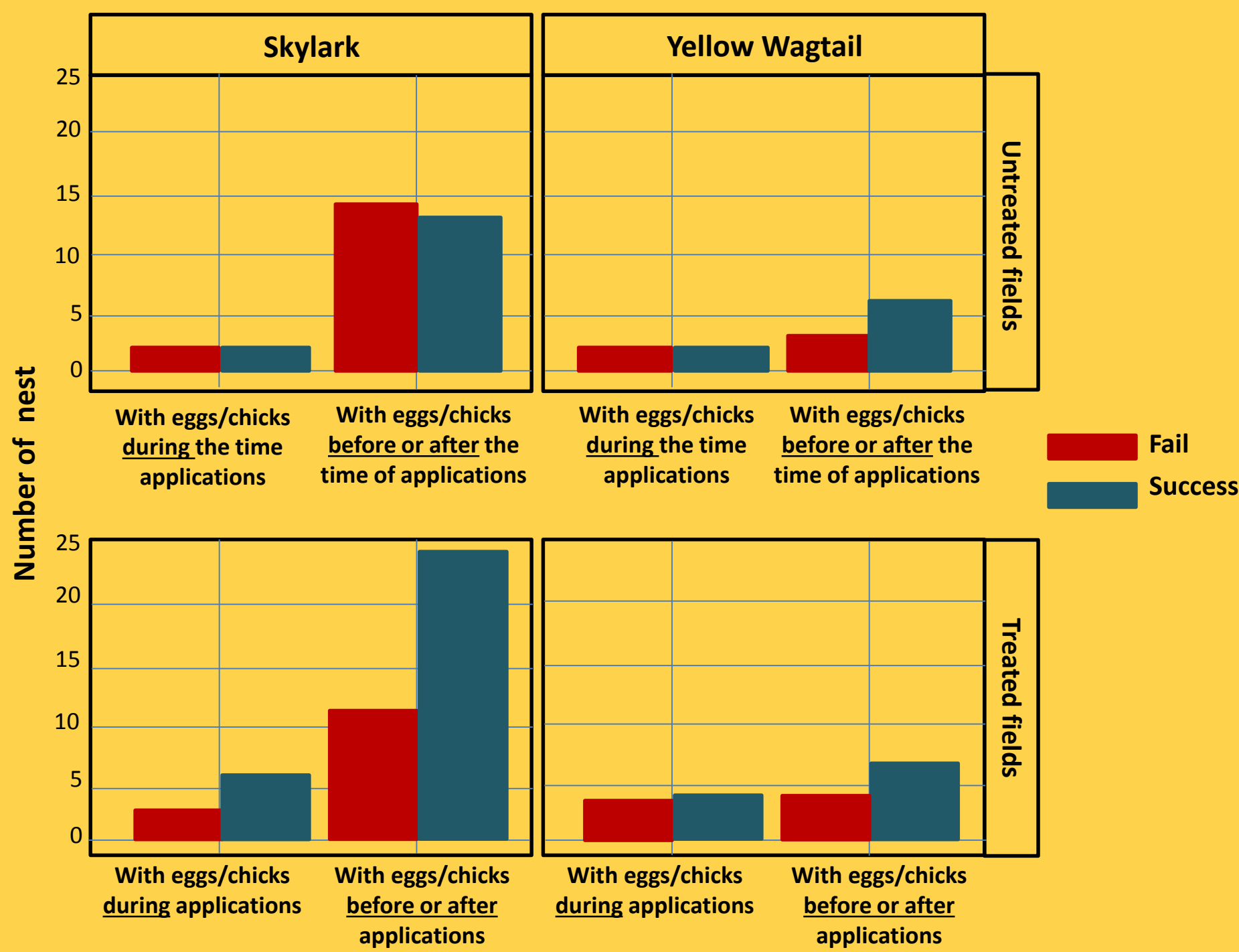


Fig.2: Fate of monitored nests of Skylark and Yellow Wagtail which were exposed and non-exposed to CP application in control and treatment fields during the study period in 2014.

Species	Treatment fields			Control fields		
	No. of fledglings	No. of nests	Mean no. of fledglings/ monitored nest	No. of fledglings	No. of nests	Mean no. of fledglings/ monitored nest
Skylark	86	43	2.0	46	31	1.5
Yellow Wagtail	38	17	2.2	37	14	2.6
Total	124	60	2.1	83	45	1.8

Table 1: Number of fledglings in treatment and control fields during study period in 2014.

CONCLUSIONS

- ✓ Behaviour and abundance of birds from the local community around CP-treated wheat fields did not change after the CP application.
- ✓ Presence of bird species was influenced by : i) habitat factors, ii) non-agricultural features (hedges, surface water etc), and iii) presence of predators.
- ✓ The number of active nests and fledged young of Skylarks and Yellow wagtails within the CP-treated fields showed that the bird community was successful in reproduction and productivity was not reduced by the application (NB Active nests were present in-crop during the CP-spraying).
- ✓ Skylark adults had a high mean PT before (0.61) and after (0.78) application. This suggests that the availability of their food sources was not affected by application; and also suggests that the majority of food items presented to chicks by these adults were obtained from the treated area.
- ✓ This study on a representative crop and its two focal species suggests a low risk to small insectivorous birds foraging in chlorpyrifos-treated arable crops.

References:

1. BirdLife International (2014). Birds in Europe: population estimates, trends and conservation status. BirdLife International, Cambridge.
2. Wolf, C., 2010. Telemetry-based field studies for assessment of acute and short-term risk to birds from spray applications of chlorpyrifos. Environmental Toxicology and Chemistry, 29(8): 1795-1803
3. Worton, B.J., 1989. Kernel methods for estimating the utilization distribution in home-range studies. Ecology 70(1):164-168

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