

Effects of Land Management on Farmland Wader Food Resources

Heather M. McCallum*¹, Jeremy Wilson^{1,2}, Robert D Sheldon², Mark O'Brien², David Beaumont², Dave Goulson¹ and Kirsty Park¹

1 = University of Stirling
2 = RSPB Scotland

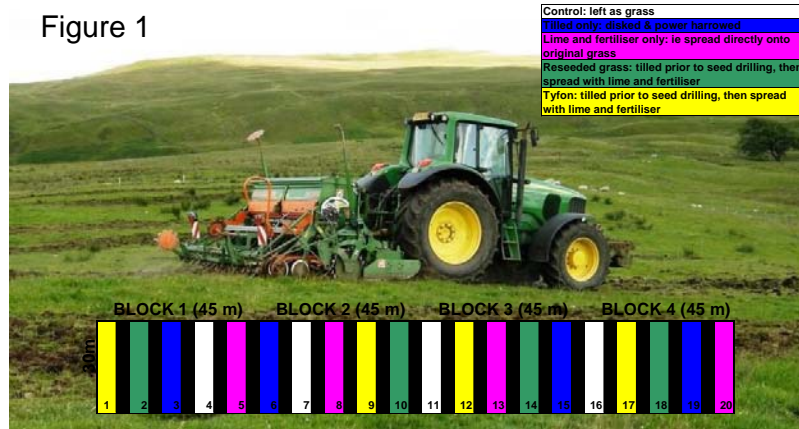
*h.m.mccallum@stir.ac.uk



Introduction

- Many changes in farming practices associated with agricultural intensification have been linked to declines in farmland breeding wader populations.¹
- This project investigates land management techniques used at an upland livestock farm (Townhead) in Stirlingshire, Scotland that has unusually high densities of breeding waders, in particular lapwing (0.4 pairs/ha on in-bye in 2009).
- Understanding what factors are responsible for these high lapwing numbers may aid development of agri-environment management at the national scale for a species that has declined severely across the UK and is currently in decline in Scotland.
- Management at Townhead involves tyfon (forage brassica) cultivation, including the application of lime, rotated round pasture grassland.

Figure 1



Results

- Soil invertebrate abundance varied significantly between treatments in May (Fig 2: earthworms $\chi^2_4 = 16.27$, $p = 0.003$, tipulid larvae $\chi^2_4 = 15.85$, $p = 0.003$).
- Post-hoc tests showed that earthworm abundance in May was significantly lower in the tyfon treatment than in all other treatment types, the lime and fertiliser treatment also had significantly more earthworms than the reseeded grass and tilled treatments.
- In May the number of tipulid larvae was significantly higher in the lime and fertiliser treatment than in the tyfon and reseeded grass treatments. The control and tilled treatments also had significantly higher tipulid abundance than the tyfon treatment.
- Patterns of abundance across treatments were similar in April for both earthworms and tipulid larvae, however differences were not significant (earthworms $\chi^2_4 = 4.318$, $p = 0.36$, tipulid larvae $\chi^2_4 = 9.216$, $p = 0.056$).

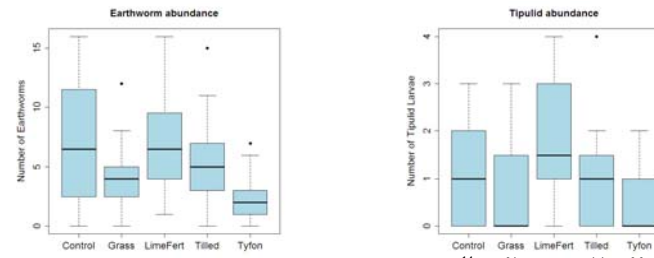


Figure 2
Earthworm and tipulid larvae abundance in May varied significantly with land management. Treatments with the same number, do not vary significantly. Graphs show the raw data (i.e. 6 samples per plot = 24 samples per treatment).

Discussion

- Soil invertebrate abundance was consistently found to be highest for the lime and fertiliser only treatment, suggesting a positive response to either increased soil pH, nutrients or a combination of the two.
- Whilst the tyfon and reseeded grass treatments were the only other two treatments to receive lime and fertiliser, they were the worst performing treatments in terms of soil invertebrate abundance. This suggests that some other aspect of these treatments negated any of the benefits of lime and fertiliser.
- Mechanical disturbance such as tillage and seed drilling has been shown to have negative effect on earthworm abundance.³
- Differences in earthworm abundance may be explained by differences in the amount of mechanical disturbance involved in the treatment process, although this does not account for the higher abundance seen in the reseeded grass compared to tyfon treatment.
- This project is in the first year and results will be assessed for a further two years.

References

- 1 Newton I (2004) *Ibis* **146** 579-600
- 2 Edwards C.A. & Bohlen (1996) *Biology and Ecology of Earthworms*, 3rd Edition, Chapman and Hall
- 3 Edwards C.A. & Lofty, J.R. (1982) *J Appl Ecol* **19** 723 - 734

Many thanks to Alistair Robb of Townhead Farm.

