

Grassland arthropod species richness in a conventional suckler beef production system and one compatible with the Irish agri-environment scheme (REPS)

A.J. Helden, A. Anderson and G. Purvis

Department of Environmental Resource Management, Faculty of Agri-Food and the Environment, University College Dublin, Belfield, Dublin 4, Ireland, Email: alvin.helden@ucd.ie

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Introduction Grassland management practices, such as grazing, strongly affects the biodiversity of grassland arthropods; increasing grazing intensity causes a general decline in species richness (Morris, 2000). One of the aims of the Rural Environment Protection Scheme (REPS) is to conserve and enhance biodiversity within Irish agricultural land (Feehan *et al.*, 2002). In order to determine the effectiveness of this aspect of REPS, one must compare the relative biodiversity of grassland under REPS with that of conventionally managed grassland. Aiming to determine whether species richness was higher in REPS-compatible compared with a standard system of management, we measured the species richness of grassland arthropods within two contrasting grassland treatments within an experimental study of suckler beef production.

Materials and methods Grassland arthropods were sampled from the Systems of Suckler Beef Production experiment at Teagasc Grange, County Meath. The experiment compared 2 treatments: standard system (0.65ha/cow unit, 225kg N/ha); and REPS-compatible (0.82ha/cow unit, 88kg N/ha). The experiment involved 4 blocks, each containing one replicate of both treatments. The individual replicates were sub-divided into 3 grazing paddocks, grazed in a fixed sequence within each treatment and between blocks, with 2 blocks being grazed concurrently. Insects were sampled in Aug 2003 using a Vortis suction sampler. One sample, consisting of 10 randomly placed sub-samples of 10s duration, was taken per paddock, giving 3 nested samples per replicate. Depending on the taxon, 5 groups of arthropods were identified to species, morphospecies, genus or family. The 5 groups were Araneae (species); Coleoptera (species); Diptera (family); Hemiptera (species and morphospecies); parasitic Hymenoptera (genus).

Results The number of species, or equivalent, recorded for the 5 arthropod groups were: Araneae 7; Coleoptera 43; Diptera 23; Hemiptera 17; parasitic Hymenoptera 43. Treatment comparisons were carried out using the log transformed ($\ln+1$) number of species per grazing paddock, which was incorporated into a nested analysis of variance. There were no significant differences between blocks or treatments for Coleoptera, Diptera or Hymenoptera. Block was not significant for Araneae and Hemiptera, respectively ($F_{3,4} = 0.42$ & $F_{3,4} = 0.85$), but the REPS-compatible treatment had significantly more species than the standard system ($F_{4,16} = 3.17$ $p < 0.05$ & $F_{4,16} = 4.84$; $p < 0.01$, respectively). Figure 1 shows the mean number of species per grazing paddock for each treatment.

Conclusions Although these grasslands had relatively low species richness of arthropods, significant treatment effects were found. The species richness of both Araneae and Hemiptera, but not the three other arthropod groups, was significantly higher in REPS-compatible than in conventionally managed grassland. This provides evidence that REPS can fulfil, at least partially, its aim of maintaining and enhancing biodiversity. The differences between the arthropod groups may reflect contrasting mobility and relationships with vegetation structure. Araneae and Hemiptera would appear to be suitable groups for studying the effect of grassland management on arthropod biodiversity.

References

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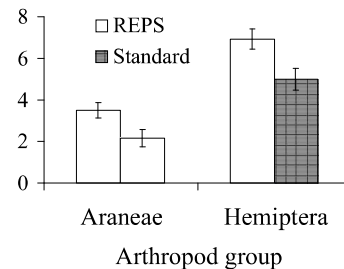


Figure 1 Species richness of Araneae and Hemiptera