Rural Policy Centre Research Briefing

SRUC

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Riparian buffer strips: Their role in the conservation of insect pollinators in intensive grassland systems[1]

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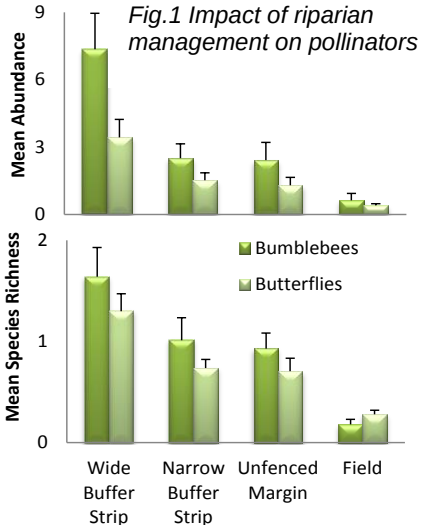
Key message: Riparian buffer strips, especially when over five meters wide, can provide important resources for insect pollinators. Restricted grazing to facilitate the growth of flowering plants and to prevent scrub encroachment is likely to enhance the value and prolong the longivity of riparian buffer strips as a resource for pollinators.

Main Findings

Common carder on Knapweed

- This briefing summarises the findings of research aimed at determining how the management of riparian field margins influences insect pollinators (i.e. butterflies and bumblebees) in intensively managed grassland landscapes.
- Riparian buffer strips are a recognised *Ecological Focus Area*[4] and within intensively managed agricultural landscapes they have the potential to integrate biodiversity, diffuse pollution and agronomic goals.
- Insect pollinators rely on a variety of flowering plants to provide continual supplies of nectar and pollen throughout the season. Riparian field margins are typically less intensively managed due to many agricultural practices being restricted adjacent to watercourses. As a result floristic diversity was found to be higher in riparian field margins (both fenced buffer strips and unfenced margins) than within grassland fields. Riparian field margins supported more foraging pollinators than the adjacent fields (Fig 1).
- Neither fencing nor buffer strip width influenced the floristic diversity of riparian field margins. The highest abundance of flowers was found in wide buffer strips (i.e. those over 5m wide) and such buffer strips also supported the greatest densities of butterflies and bumblebees (Fig 1). Previous research investigating non-riparian field margins also found greater densities of bumblebees in wider field margins[5].
- Management to open up the vegetation structure (e.g. by restricting grazing or mowing) and thereby enhance floristic diversity may further increase the value of fenced buffer strips to insect pollinators.
- More pollinator species were recorded in wide buffer strips than narrow buffer strips and this could not solely be attributed to differences in the abundance of flowers. This suggests that wide buffer strips provided additional resources for insect pollinators (e.g. early season foraging resources and tussocky grasses to provide food for butterfly larvae, shelter and bumblebee nesting sites).
- Many flowering plants and insect pollinators prefer warm sunny locations. With the exception of a few woodland specialists, pollinators are typically impoverished in densely wooded areas. The afforestation of riparian zones may therefore adversely impact on insect pollinators.Introduction and Rationale

Fig.1 Impact of riparian management on pollinators



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[1] This research was undertaken within the Scottish Government Rural Affairs and the Environment Portfolio Strategic Research Programme 2011-2016, Programme 1: Environment. For more information please see: http://www.scotland.gov.uk/Topics/Research/About/EBAR/StrategicResearch/future-research-strategy/Themes/ThemesIntro

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[4] Ecological Focus Areas are areas that bring environmental benefits, improve biodiversity and maintain attractive landscapes. http://ec.europa.eu/agriculture/glossary/index_en.htm

[5] Bäckman, J.P., Tiainen, J., 2002. Habitat quality of field margins in a Finnish farmland areas for bumblebees (Hymenoptera: *Bombus* and *Psithyrus*). Agriculture, Ecosystems & Environment 89, 53-68.

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Within intensively managed agricultural landscapes the primary function of riparian buffer strips is often to prevent pollutants from entering the watercourse. Their potential to provide multiple benefits, however, is becoming increasingly recognised. SRUC and the James Hutton Institute have conducted a series of field experiments to determine how riparian management impacts on biodiversity. This research has highlighted that wide buffer strips (i.e. over 5m wide) provide stable semi-natural habitats within intensive grassland landscapes which benefit specific ground beetle species[6]. Afforestation of riparian field margins can adversely influence flowering plants which may reduce the availability of foraging resources for insect pollinators[7]. This research brief reports on how the physical and botanical structure of riparian margins influences insect pollinators.

Methods and Limitations

This research was conducted on working farms within two intensively managed grassland landscapes in Ayrshire and Kirkcudbrightshire. Riparian margins were classified into three categories: Unfenced margins (no fence between fields and watercourses), narrow buffer strips (fences erected within 3.5m from watercourses) and wide buffer strips (fences erected over 5m from watercourses). Insect pollinators (i.e. bumblebees and butterflies) and flowering plants were monitored using standardised transect walks[8]. Pollinators and flowering plants were also surveyed in a range of riparian and non-riparian woodlands in Ayrshire, and in riparian woodlands in North East Scotland.

This research focused on the value of riparian field margins to insect pollinators within grassland landscapes. In grassland situations riparian field margins are fenced to exclude livestock and the resultant buffer strip is typically left unmanaged. Conversely in arable situations, riparian buffer strips are frequently created without the use of fencing and management (e.g. annual mowing) is comparatively common. Due to differences in the establishment and management of buffer strips in grassland and arable situations, the implications of the findings of this research briefing are not directly transferable to arable situations.

Implications for Policy


Ringlet & Greater Bird's Foot Trefoil


Early bumblebee & Comfrey

This research indicates the potential for riparian buffer strips to provide resources for insect pollinators in intensive grassland catchments. Four policy relevant implications arise from the research:

- To benefit insect pollinators buffer strips should be a minimum width of 5m. This is in-line with Good Agricultural and Environmental requirements to prevent significant poaching within 5m of watercourses and with the 6m minimum width for conservation headlands and for water margins in grassland fields (i.e. adjacent to watercourses that are over 1.2m wide).
- To enhance floristic diversity, prevent scrub encroachment and further increase the value of riparian buffer strips as a resource for insect pollinators, policies should address the management of vegetation structure (e.g. through recommending restricted grazing or mowing).
- As many species of insect pollinators and flowering plants are adversely influenced by shading, large-scale afforestation of riparian field margins should be discouraged. Afforestation of riparian buffer strips should be spatially targeted to maximise the benefits they deliver (e.g. enhancing ecological connectivity for woodland species and mitigating flooding).
- Riparian zones are inherently complex and dynamic ecosystems. Care should therefore be taken to ensure that the spatial targeting of agri-environment measures (e.g. for diffuse pollution mitigation or biodiversity) does not result in the simplification of these habitats (e.g. through the widespread fencing or afforestation of watercourses at the catchment level).

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[6] Stockan & Cole 2014: Impact of riparian buffer strips on ground beetle populations
http://www.sruc.ac.uk/info/120481/changing_environment_archive/1325/2014_impact_of_riparian_buffer_strips_on_ground_beetle_populations%202014

[7] Stockan & Cole 2014: Soil and vegetation responses to forested riparian buffer strips
http://www.sruc.ac.uk/info/120332/changing_environment/1451/2014_soil_and_vegetation_responses_to_forested_riparian_buffer_strips

[8] Cole et al. 2015. Riparian buffer strips: Their role in the conservation of insect pollinators in intensive grassland systems. Agriculture, Ecosystems & Environment, 211, 207-220.