



Promoting biodiversity through agricultural field boundaries

New research in Estonia indicates that plant biodiversity in field boundaries varies with features, such as ditches, trees and nearby roads. It suggests that, in addition to common non-weedy plants, more consideration should be given to rare weeds by broadening of field boundaries and reducing the use of agrochemicals and fertilisers near these boundaries.

Changes in agricultural land use practices and management intensity have decreased the biodiversity of natural and semi-natural habitats within farmland. Hedgerows, verges, ditches and woodland are known to help preserve biodiversity. The EU's agri-environment measures¹ aim to integrate environmental concerns into agriculture and can include the preservation of field boundary features.

The study assessed the relative impact of three factors on plant biodiversity in the boundaries of Estonian farmland:

- The presence of organic farming
- The field boundary type in terms of the presence of features, such as ditches, nearby roads and woodland.
- The surrounding landscape structure described by percentage of grassland, forest and arable fields, for example.

The research, partly supported by the EU European Regional Development Fund, studied a total of 313 plots of 4m² within 42 farms. 29 of the farms were conventional and 13 organic. 237 plant species were identified.

The study was one of the first to analyse species according to their tolerance to agricultural practices, particularly fertilisers and pesticides. It categorised species into those that flourished under agricultural practices in Estonia (known as agrotolerant species) and more rare weeds that were intolerant to such practices (nature-value species). In field boundaries, the last group was enlarged by adding all species, which are specific to natural habitats and cannot be found in fields.

Results indicated that organic farming, boundary type and landscape structure all influence the biodiversity of field boundaries in different ways. Boundary type was the main driver for the number of species at a local-scale or the species richness. Its influence differed depending on the species. Road verges supported a higher number of both types of species than other boundary types. In field boundaries adjacent to ditches, the diversity of nature-value species was much higher and the diversity of agrotolerant species much lower.

Wider boundaries were also more supportive of nature-value species, whilst agrotolerant species preferred narrow field boundaries. It was suggested that wider boundaries produce a buffering effect from the use of fertiliser and other agricultural chemicals for these nature-value species.

Further analysis indicated that a boundary width of about 3- 4 m provides the best compromise. Boundaries greater than this width lead to a decline in agrotolerant species and a levelling-off of nature-value species. The researchers suggest that further enrichment in species diversity can be achieved only by improving the area of natural habitats in the landscape. The researchers also suggest there is value in considering whether species are agrotolerant or nature-value. However, they highlight the fact that this categorisation depends on the region, i.e. an agrotolerant species in one country may be nature-value species in another.

1. See http://ec.europa.eu/agriculture/envir/measures/index_en.htm

Source: Aavik, T. & Liira, J. (2010). Quantifying the effect of organic farming, field boundary type and landscape structure on the vegetation of field boundaries. *Agriculture, Ecosystems & Environment*. 135(3): 178-186.

Contact: tsjpe.aavik@ut.ee

Theme(s): Agriculture, Biodiversity