

Science for Environment Policy

Woody networks in agricultural landscapes provide refuge for intrinsic and functional biodiversity

Woody networks in agricultural landscapes are known to harbour high intrinsic biodiversity (i.e. diversity of plant species) and functional biodiversity (i.e. ecosystem services that arise from biodiversity). In order to clarify the drivers of intrinsic and functional biodiversity in woody networks, researchers analysed the plant species diversity, pollinator resource value (PRV), and potential edibility value (PEV) of a woody network in northern Belgium. The analysis confirmed that woody elements are a rich source of intrinsic and functional biodiversity and identified several important drivers. From a policy perspective, this research highlights the value of protecting existing woody elements and thoughtfully designing and locating new ones to maximise intrinsic and functional biodiversity in the countryside.

Approximately half of Europe's land surface is agricultural land¹. The [European 2020 Biodiversity Strategy](#)² calls for an increase in the contribution of agriculture to biodiversity, ecosystem function and the delivery of ecosystem services in the European Union. Since woody networks (comprising woody elements such as hedgerows, tree lines, and small forest patches) in agricultural landscapes are associated with high biodiversity and a wide range of ecosystem services, they make a compelling policy focus.

To date, relatively little research has been conducted on the link between biodiversity and associated ecosystem services in these woody networks. In order to better understand this link, a team of scientists studied the herb layer of a woody network, comprising 831 woody elements, in 47 landscape windows of 1 km² in the Belgian countryside.

First, they assessed intrinsic plant diversity, focusing on two characteristics of the vegetation linked to two potential ecosystem services: the value of the plants as a resource for pollinators (PRV) and the usefulness of the plants to wild food production (PEV). The PRV represents the feeding value of the plant for pollinators based on nectar and pollen quality and the duration of the flowering period. The PEV indicates the proportion of edible species in the woody element – 'edibility' meaning parts of the plant (leaves, fruits, flowers, etc.) suitable for human consumption. The scientists then analysed the data to gain insight into the drivers of the biodiversity and associated ecosystem services, in order to inform management decisions aimed at maximising biodiversity and ecosystem services.

The research revealed that, although the woody networks only covered 0.7% of the studied countryside, they hosted approximately 45% of the total plant diversity. Forest species, grassland species, tall herbs, and pioneer species were all found to coexist successfully within the woody elements. The PRV showed the highest correlation with the species richness and abundance of the forest species, while for PEV, the species richness and abundance of tall herb species were vital. The number of forest species mainly depended on the presence of forests in the surrounding landscape, with the link being even stronger in historical woody elements. The structure of the woody element (e.g. width, area, and type) were the main drivers of overall species richness and the abundance of grassland, pioneer, and tall herb species.

Continued on next page.

**25 October 2018
Issue 515**

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Source: Van Den Berge, S., Baeten, L., Vanhellemont, M., Ampoorter, E., Proesmans, W., Eeraerts, M., Hermy, M., Smagghe, G., Vermeulen, I & Verheyen, K. (2018). Species diversity, pollinator resource value and edibility potential of woody networks in the countryside in northern Belgium.

Agriculture, Ecosystems and Environment, 259: 119–126. DOI: <https://doi.org/10.1016/j.agee.2018.03.008>

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1. Biological Agriculture in Flanders: State of Affairs 2016 (in Flemish). http://vacvzw.be/wp-content/uploads/2017/10/biorapport_2016.pdf

2. The European 2020 Biodiversity Strategy: http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm

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To cite this article/service: "Science for Environment Policy":

European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

These findings demonstrate that woody elements can harbour a diverse range of plant species, including those of pollinator and edibility value. As such, relatively simple measures — such as protecting existing woody elements and establishing new ones that consider design and location — can produce benefits in both intrinsic and functional diversity. The researchers describe several potentially useful conservation initiatives. These include:

- Conserving intrinsic biodiversity by ensuring the survival of old woody elements, giving priority to historical woody elements in areas with forests.
- Supporting grassland, tall herb, and pioneer species diversity through the design and location of woody elements.
- Maximising plant species diversity, RPV, and PEV with pollarded tree lines (where the top and branches of the trees are cut off to promote new growth at the top) and broad hedgerows, or tree lines, with a considerable surface area, next to roads or ditches.

