

Landscape arrangement

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Factsheet about integrated weed management



Introduction

Agricultural intensification decreased the landscape complexity and affects the presence as well as dispersal of weeds on farmland. A few competitive, highly adapted and widely distributed weed species became dominant due to the simplification of cropping systems and increased inputs of agro-chemicals. Meanwhile herbicide resistance afflicts many cropping systems, such that as weed diversity has declined, in numerous cases weed biomass has not¹. An increasing amount of natural habitats surrounding agricultural fields enhances weed diversity, because they may function as a source of propagules for colonising fields².

Applicability

The landscape complexity can be increased by decreasing plot sizes, including landscape elements such as trees and hedges (Figure 1), and increasing the diversity in cropping systems, e.g. by applying intercrops. In most cases increasing the landscape complexity and diversity requires many stakeholders in a region and governmental institutions to include it in their spacious planning.

Efficacy and core results

Strong evidence of the relationship between landscape complexity and weed pressure is limited. Nevertheless the following studies are relevant in terms of landscape complexity related to weeds:

- In an analysis of land-use, landscape changes and vegetation changes of weeds in a 4 km² area in Central Germany from 1953 to 2000 is concluded that:
 - o The spatial heterogeneity of the landscape matrix of fields decreased significantly over time.
 - o The average number of weed species per relevé as well as the average coverage of weed species decreased significantly.
 - o Especially the typical weed species decreased.

- o The total number of weed species increased.
- o The species richness in the fields are mainly influenced by the complexity of the landscape matrix and thus the area of the plot combined with the number of plot boundaries, and the land use intensity, especially the application of mineral fertilizers³.
- The weeds density in crops decreased in landscapes that had numerous and scattered meadows⁴.
- Landscape complexity had a limited effect on arable weed seedbanks⁵.

Extra information

See <https://iwmpraise.eu/publications/> for all crop diversification strategies and their definitions, and for more information on integrated weed management.



Figure 1 | A complex agricultural landscape with trees and hedges

- 1] Storkey, J., & Neve, P. (2018). What good is weed diversity?. *Weed Research*, 58(4), 239-243. doi: 10.1111/wre.12310
- 2] Flessner, M., Mirsky, S., Schwartz-Lazaro, L., Bagavathiannan, M., VanGessel, M., & Shergill, L. et al. (2021). From Spreader to Predator: Killing Weed Seeds with the Combine. *Crops & Soils*, 54(5), 40-45. doi: 10.1002/crso.20140
- 3] Baessler, C., & Klotz, S. (2006). Effects of changes in agricultural land-use on landscape structure and arable weed vegetation over the last 50 years. *Agriculture, Ecosystems & Environment*, 115(1-4), 43-50. doi: 10.1016/j.agee.2005.12.007
- 4] Ricci, B., Petit, S., Allanic, C., Langot, M., Parisey, N., & Poggi, S. (2018). How effective is large landscape-scale planning for reducing local weed infestations? A landscape-scale modelling approach. *Ecological Modelling*, 384, 221-232. doi: 10.1016/j.ecolmodel.2018.06.029

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