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Fostering Insects in Agricultural Landscape Living Labs

Living Lab FInAL | Germany



Förderung von Insekten in Agrarlandschaften

FInAL is operating in landscape living labs (LLs) to co-develop insect-friendly and economically sustainable agroecosystem in three regions of Germany. Together with regional farmers and other actors, the LL co-designs transformation pathways for all in-field and off-field land-use types, specific for each of the three landscape LLs. Those pathways combine insect-promoting practices and

measures with mitigation of soil erosion, diversification of maize-dominated cropping systems or increased harnessing of beneficial insects for natural biocontrol. The success and degree of transformation and the effects on insect diversity, abundance, and ecosystem services as well as economic and social aspects are assessed at the landscape scale by a long-term monitoring, comparing landscape LLs with their respective reference landscapes.

Aim

The objective of FInAL is to develop, test and demonstrate agroecological farming practices, cultivation of novel crops and innovative measures for the promotion of insects in three typical and representative agricultural landscapes that serve as experimental spaces under real-world conditions. The aim is to achieve a long-term and resilient transformation towards insect-friendly agricultural landscapes. A fundamental, landscape-scale transformation is necessary to sustainably halt or even reverse the decline of insects in agricultural landscapes. In FInAL, the entire area of a landscape is therefore the object of analysis and targeted changes. The approach is fundamentally systemic, i.e., the landscape laboratories are conceived as agroecosystems, evaluated in an interdisciplinary, integrated and systemic way, and insect promotion is planned and implemented by taking social, landscape and agroecological principles into account, so that the transformation can develop its greatest possible potential.

Background information

The project FInAL is a cooperation of five partner organisations: Thünen Institute (Thünen; coordination), Julius Kühn Institute (JKI), Leibniz Centre of Agricultural Landscape Research (ZALF), Landwirtschaftskammer Niedersachsen (LWK), Bavarian State Research Center for Agriculture (LfL.). Scientists from the fields of ecology, economics, agronomy, social sciences, geography, along with regional landscape coordinators work together with about 70 local actors. FInAL started end of 2018 and is intended to run for up to 12 years.

Funding structure

The joint research project FInAL is funded by the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) via the Fachagentur Nachwachsende Rohstoffe e. V. (FNR).

Activities

- Landscape-scale long-term monitoring of key organism groups and ecosystem services as well as agroeconomic and social aspects take place since 2020 following a BACI design. Since 2022, baseline after the first implementation of measures. These transitions are also monitored.
- Co-Design and co-learning-based workshops and on-site visits with farmers and other actors take place each year since 2020.
- Insect-friendly measures are regionally tested, adopted and developed. These include mixed cropping, novel (perennial) crops, under-sowing, reduced tillage, renewable raw materials, reduced chemical input, integrated pest management, strip cultivation, diversified crop rotations.
- A mosaic of annual, perennial and permanent insect-facilitating measures is promoted to increase resource availability, reduce stress and provide habitats and habitat connectivity in space and time. Co-learning and Co-design processes in FInAL encourage innovative and sustainable thinking of farmers and other land-users.

Methods, stakeholder engagements and tools

- Transdisciplinary approach involving scientists from multiple disciplines, practitioners like farmers or municipal representatives. Landscape coordinators serve as regional points of contact.
- Co-Design and co-learning-based workshops and on-site visits with farmers and other actors.
- Co-design of insect-friendly measures and measure combinations to address goals like habitat connectivity on landscape scale.
- Farmers and other actors decide on which measures they implement. An open catalogue encompasses the co-designed measures.
- Economic assessment of overall cost-effectiveness, collaborative approaches for the implementation of measures, measure concepts, and value chains.
- Landscape-scale monitoring following BACI design. Key organism groups include wild bees, hoverflies, carabids, parasitoid wasps, semi-aquatic insects, etc.
- A transdisciplinary synthesis provides the basis for developing recommendations on upscaling and transferability of measures, monitoring and analyses methods (including spatio-temporal approaches), knowledge transfer on co-design processes and developed analyses as well as the assessment of barriers and potential degree of transformation.

Achievements

- Three Landscape Living Labs of 3 km x 3 km each with a reference landscape were established in Elm (Lower Saxony), Havelländisches Luch (Brandenburg) and Rottal (Bavaria).
- About 70 farmers and other actors in these landscapes joined the project on a long-term basis.
- For each Landscape Living Lab region-specific, ecologically sound and economically sustainable transformation pathways were co-designed to guide the transformation of the agricultural production and landscape structure.
- Insect-promoting goals like increase of habitat connectivity and of amount and temporal availability of resources in the framework of the co-designed region-specific pathways like erosion prevention, diversification of maize cultivation or increase of pollination and natural pest control are addressed.
- Landscape-scale long-term monitoring of key organism groups and ecosystem services, and of agroeconomic and social aspects was established in 2019 and continuously conducted.
- FInAL measures were so far implemented in a total area of 90-270 ha / landscape lab / year. Both area and number of measures with attributed higher ecological value increased in all landscape labs compared to the first implementation year 2022 with a trend towards more innovative and perennial or even permanent measures. In many cases, the complexity also increased, with, e. g., flower strips laid along the length of the field to divide it and to improve connectivity.

Publications

Scientific Papers

- Busse, M., Bartels, A., Beutnagel, H. K., Fick-Haas, V., Glemnitz, M., Holzhauer, St. I. J., Plaas, E., Scharschmidt, P., Dauber, J. (2024). Conceptualizing and reflecting co-design processes for the transformation towards insect-friendly agricultural landscapes - Experiences from transdisciplinary processes in three German landscape labs. Journal of Innovation Management 12 (3). DOI: doi.org/10.24840/2183-0606_012.003_0012
- Häfner, B., Schulte auf'm Erley, G., Gabriel, D., Herden, A., Höppner, F., Dauber, J., Nürnberger, F. (2024) Arthropod activity density and predation are

supported

- by mixed cropping of maize with common sainfoin (*Onobrychis viciifolia*) and reduced tillage. Entomologia Experimentalis et Applicata, 00:1–14. <https://doi.org/10.1111/eea.13508>
- Trau, F. N., Lorenz, S. (2024). Status Quo der Fauna von Insekten mit aquatischen Lebensphasen – Erhebungen innerhalb des Projekts “FinAL – Förderung von Insekten in Agrarlandschaften”, Berichte aus dem Julius Kühn-Institut. Julius Kühn-Institut. <https://doi.org/10.5073/20240411-080031-0>
- Busse, M., Zscheischler, J., Zoll, F., Rogga, S., Siebert, R. (2023) Co-design approaches in land use related sustainability science - a systematic review. Land Use Policy 129, Article 106623. <https://doi.org/10.1016/j.landusepol.2023.106623>
- Häfner, B., Dauber, J., Schittenhelm, S., Böning, L. M., Darnauer, M., Wenkebach, L. L., Nürnberger, F. (2023) The perennial biogas crops cup plant (*Silphium perfoliatum* L.) and field grass pose better autumn and overwintering habitats for arthropods than silage maize (*Zea mays* L.). GCB Bioenergy 15: 346–364. <https://doi.org/10.1111/gcbb.13027>
- Dierh Lobe, P. D., Schulte auf'm Erley, G., Höppner, F., Schrader, S. (2023) Nematode abundances community diversity under energy crop (maize and sainfoin) cultivation in annual and perennial cropping systems. Biomass and Bioenergy 175, 106844. <https://doi.org/10.1016/j.biombioe.2023.106844>
- Hölting, L., Busse, M., Bülow, S., Engler, J. O., Hagemann, N., Joormann, I., Kernecker, M. L., Larondelle, N., Sturm, A., Turkelboom, F., Wätzold, F., & Cord, A. F. (2022) Co-design: Working with farmers in Europe to halt the loss of biological diversity. Ecological Solutions and Evidence, 3(3), e12169. <https://doi.org/10.1002/2688-8319.12169>
- Busse, M., Zoll, F., Siebert, R., Bartels, A., Bokelmann, A., Scharschmidt, P. (2021) How farmers think about insects: perceptions of biodiversity, biodiversity loss and attitudes towards insect-friendly farming practices. Biodivers Conserv 30, 3045–3066. <https://doi.org/10.1007/s10531-021-02235-2>

Practice briefs

- <https://www.final-projekt.de/aus-der-praxis/practice-briefs>

Podcasts

- <https://www.thuenen.de/de/news...>
- <https://www.ardaudioblog.de/en>

- <https://www.dluduniohiek.de/ep...>

Videos



- [Projekt im Rottal: Insekten schützen auf Acker und Wiese | Unser Land | BR Fernsehen | Fernsehen | BR.de](#)

Photos



FinAI project collage 2024



CoDesign: planning with actors. Source:
Veronika Fick-Haas/LfL/FInAL



Fieldday ELM Holzhauser (2024).
Source: Stephanie Holzhauser/TI-BD/
FInAL





2nd year of a multi-annual flower strip.
Source: Veronika Fick-Haas/LfL/FInAL

Multi-annual flower strip deviding fields. Source: Annette Bartels/LWK/FInAL



Strip cultivation: winterwheat vs. sunflower.
Source: Annette Bartels/LWK/FInAL



Undersown clover in maize. Source: Veronika Fick-Haas/LfL/FInAL



Old grass strip. Source: Bastian Häfner/TI-BD/FInAL

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