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Loss of agrobiodiversity in Germany and its possible solutions

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Structure

- Quantification of biodiversity loss
- Main drivers of agrobiodiversity loss
- Organic farming
- Agroforestry

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Quantification of agrobiodiversity loss

- Insect biomass decreased about 76% in the last three decades
- Loss of 36% of the farmland bird population in just ten years
- Arable land has low plant diversity

  (3-6 species $100\mathrm{m}^{-2}$)

(Seifert et al., 2015; Hallmann et al., 2017)

Agrobiodiversity loss - insects

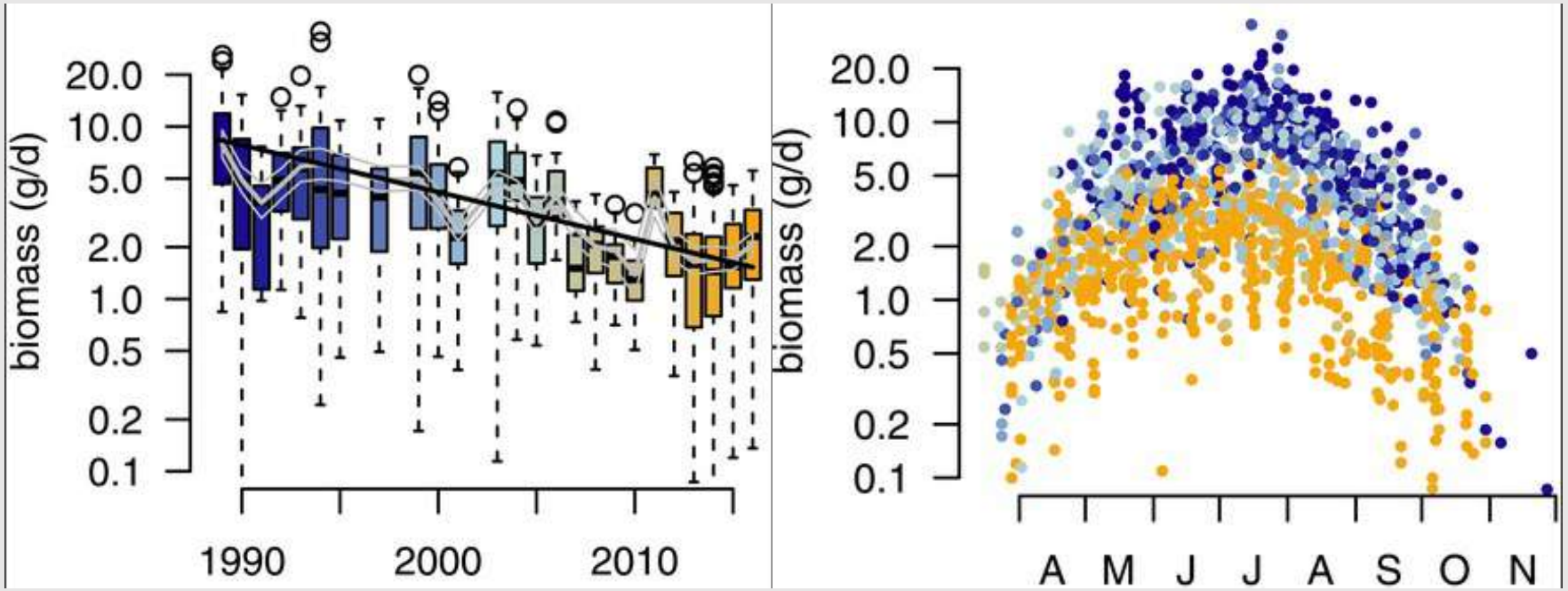

Fig. 1: l.: Boxplots depict the distribution of insect biomass in each year. r.: Seasonal distribution of insect biomass (Hallmann et al., 2017).

***->** reduced provisioning services*

Main drivers of agrobiodiversity loss

- Low use of robust varieties and therefore higher preventive use of synthetic herbicides, insecticides, fungicides etc.
- Overfertilization due to high use of high-soluble fertilizers and concentrated animal farming
- Fragmentation, loss of natural structures as habitats; big scale farming
- Decrease in species-rich land use types

(NAdWL, 2018)

Fig. 2: Field-size differences between West and East Germany (Batary et al., 2017).

Agricultural land use in Germany

- At all: 16.7 Mio. ha are used for agricultural purpose
- 11.7 Mio. ha as arable land; rest is grassland and permanent crops (fruit and wine)

- Main crops:
  - wheat (2.9 Mio. ha)
  - silo maize (2.0 Mio. ha)
  - barley (1.6 Mio. ha)
  - canola (1.2 Mio. ha)

- Typical conventional crop rotations:
  - wheat – barley – canola
  - maize – winter cover crop (rye) - maize

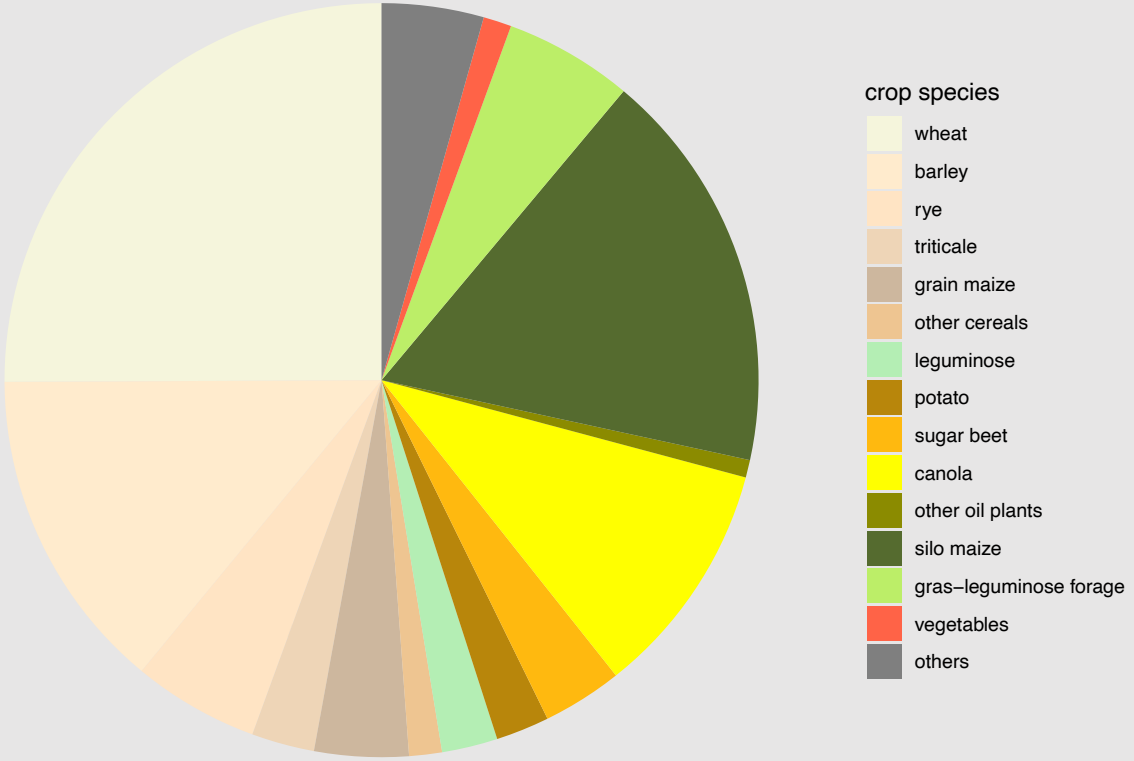

Fig. 3: Proportion of total land use by crop species in 2023 (own representation based on Destatis, 2024).

Organic farming

- Law of organic farming (EU):
  - Prohibition of GMO, synthetic pesticides and artificial high-soluble fertiliser
  - Organic N-application is limited on 170 kg N $\mathrm{ha}^{-1}\mathrm{a}^{-1}$ (EU, 2018)

- other private labels developed the idea of organic farming and have tighter regulations
  - Bioland: biodiversity programms for example higher diversity in crop rotations; purchasing of organic fertilizers is limited (Bioland, 2024)
  - Demeter: animal farming is mandatory; 10% of farm land must be reserved for biodiversity; max. 112kg N $\mathrm{ha}^{-1}\mathrm{a}^{-1}$; usage of special compounds (Demeter, 2024)

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Organic farming and biodiversity

- Number of plant species on the field was 95% higher; number of plant species beside the fields was increased by 21%
- Number of insect species increased by 23%
- Number of bird species gone up by 35% as the abundance

-> higher biodiversity due to organic practices

(Sanders & Heß, 2019)

Agroforestry as part of the solution

- Integration of woody perennials in arable cropland -> alley cropping
- Creates various ecological niches for plants, insects, mammals etc.
- Diversifies the structures and connects biospheres in fragmented landscapes

-> especially the combination of organic farming and agroforestry is enhancing biodiversity

(Tsonkova et al., 2012; Torralba et al.; 2016)

Fig. 4: Typical alley cropping systems located in East Germany (MLUK, 2019).

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Thanks for your attention!

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