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**BioBio indicator factsheet**

# Crop Richness (CropRich)

Refers to Chapter 5 ‘Habitat indicators’ of the Guidebook ‘Biodiversity Indicators for European Farming Systems’

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**Agroscope Reckenholz-Tänikon**
**Research Station ART**

# Crop Richness (CropRich)

## Description

Number of crops cultivated on a farm on a per hectare basis. Crops considered are arable crops (including forage and sown grassland), vegetables and tree crops. The indicator relates to the areal farm habitats, excluding woods and forest, permanent grassland, sparsely vegetated semi-natural habitats and all linear habitats. The **unit** of measurement is the number of crop types per hectare of farm area. **Sub-indicators** can be generated from the data for crop categories (arable crops, vegetable crops, tree crops etc.).
CropRich is applicable for arable farming systems but not for grassland farming systems that have mainly permanent grassland. Crop Richness is standardised to a per area basis to correct for differences in farm sizes.

## Surveyor skills

The collection of crop species data using questionnaires to farmers means that surveyors require no detailed agronomical or ecological skills.

## Data collection method

The data survey is performed using a questionnaire[1]. Low effort.

## Calculation method

Crop Richness (CropRich) is calculated as the total number of crop species divided by farm size:

$$CropRich = \frac{N}{UAA}$$

*CropR* being Crop Richness, N being the total number of crop types (including sown forage crops, vegetable crops, tree crops) and UAA being the farm size (Utilized Agricultural Area) in hectares to standardize for farm area. For small farms <1ha this standardization would lead to artificially high values due to mathematical reasons. CropRich should therefore not be calculated for farms <1ha.

## Results from BioBio case studies

The graph shows an example of the Crop Richness indicator for the 16 arable farms in the Austrian case study. The values differ by a factor of eight, farm n° 15 managing eight times more crops (per hectare) than farm n° 2.

## Estimated effort and costs (labour effort required, analysis)

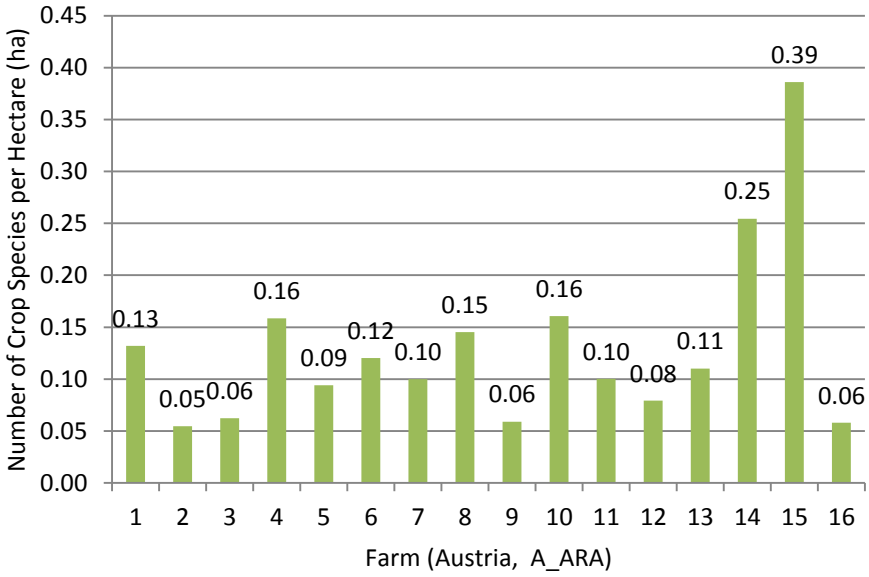
Cost and time effort of this questionnaire-derived indicator is low, especially if integrated into existing reporting systems required of farmers.

*Examples of crop richness. Large field of crop monocultures in Switzerland and small, diverse inter-cropped fields in Uganda. Photos: Debra Bailey and Felix Herzog, Agroscope*

## Crop Richness as a change indicator

A decreasing indicator value (at constant farm size / crop area) may indicate increased specialization of the farm business and abandonment of specific crops. As each crop type offers (slightly) different habitat conditions for farm wildlife, a reduction in the number of crops results in pressure on species diversity.

[1] Dennis P. et al. 2012. Biodiversity in organic and low-input farming systems. ALTERRA Report 2308.




*Crop richness per farm in the Austrian case study farms.*

## Interpretation

'Crop Richness' is similar to 'Habitat Richness' but is restricted to frequently disturbed farm habitats (arable, fruit and vegetable crops). 'Habitat Richness' on the other hand also includes permanent grassland and semi-natural habitats as well as all linear elements.

'Crop Richness' has been shown to positively correlate with the diversity of arthropods in arable landscapes across Europe[2], which confirms that they act as habitats for different arthropod groups. An increased number of (arthropod) species can therefore be expected if CropRich values increase. Wild plant species richness principally depends on the richness (and area) of semi-natural habitats rather than CropRich, probably due to weed control in crops.

Interpretations and comparison between different case study areas have to take into account farming system properties. For example, vineyards in Italy have a lower value than mixed systems, e.g. in the German case study.

[2] Billeter et al., 2008. Indicators for biodiversity in agricultural landscapes: a pan-European study. *Journal of Applied Ecology* 45, 141–150.

This factsheet is part of the Guidelines **Biodiversity Indicators for European Farming Systems**.
More detailed information on the set of indicators developed in the EU FP7 research project BIOBIO (Biodiversity indicators for organic and low input farming systems, KBBE-227161) is given in a printed report, published as ART Publication Series Nr. 17. The report can be downloaded from the BIOBIO website.
Printed versions can be ordered at www.agroscope.admin.ch or at Agroscope, Reckenholzstrasse 191, 8046 Zurich, Switzerland

## BIOBIO Indicator Factsheets

| **Genetic diversity** | |
|---|---|
| Breeds: | Number and amount of different breeds |
| CultDiv: | Number and amount of different varieties |
| CropOrig: | Origin of crops |

| **Species diversity** | |
|---|---|
| Plants: | Vascular plants |
| Bees: | Wild bees and bumblebees |
| Spiders: | Spiders |
| Earthworms: | Earthworms |

| **Habitat diversity** | |
|---|---|
| HabRich: | Habitat richness |
| HabDiv: | Habitat diversity |
| PatchS: | Average size of habitat patches |
| LinHab: | Length of linear habitats |
| CropR: | Crop richness |
| ShrubHab: | Percentage of farmland with shrubs |
| TreeHab: | Tree habitats |
| SemiNat: | Percentage of semi-natural habitats |

| **Indirect management indicators / parameters** | |
|---|---|
| EnerIn: | Total direct and indirect energy input |
| IntExt: | Intensification/Extensification - Expenditure on inputs |
| MinFert: | Area with use of mineral nitrogen fertiliser |
| NitroIn: | Total nitrogen input |
| FieldOp: | Field operations |
| PestUse: | Pesticide use |
| AvStock: | Average stocking rate |
| Graze: | Grazing intensity |