

**Data from: Permanent grasslands in Europe: land use change and intensification decrease their multifunctionality**

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**Related publication:**

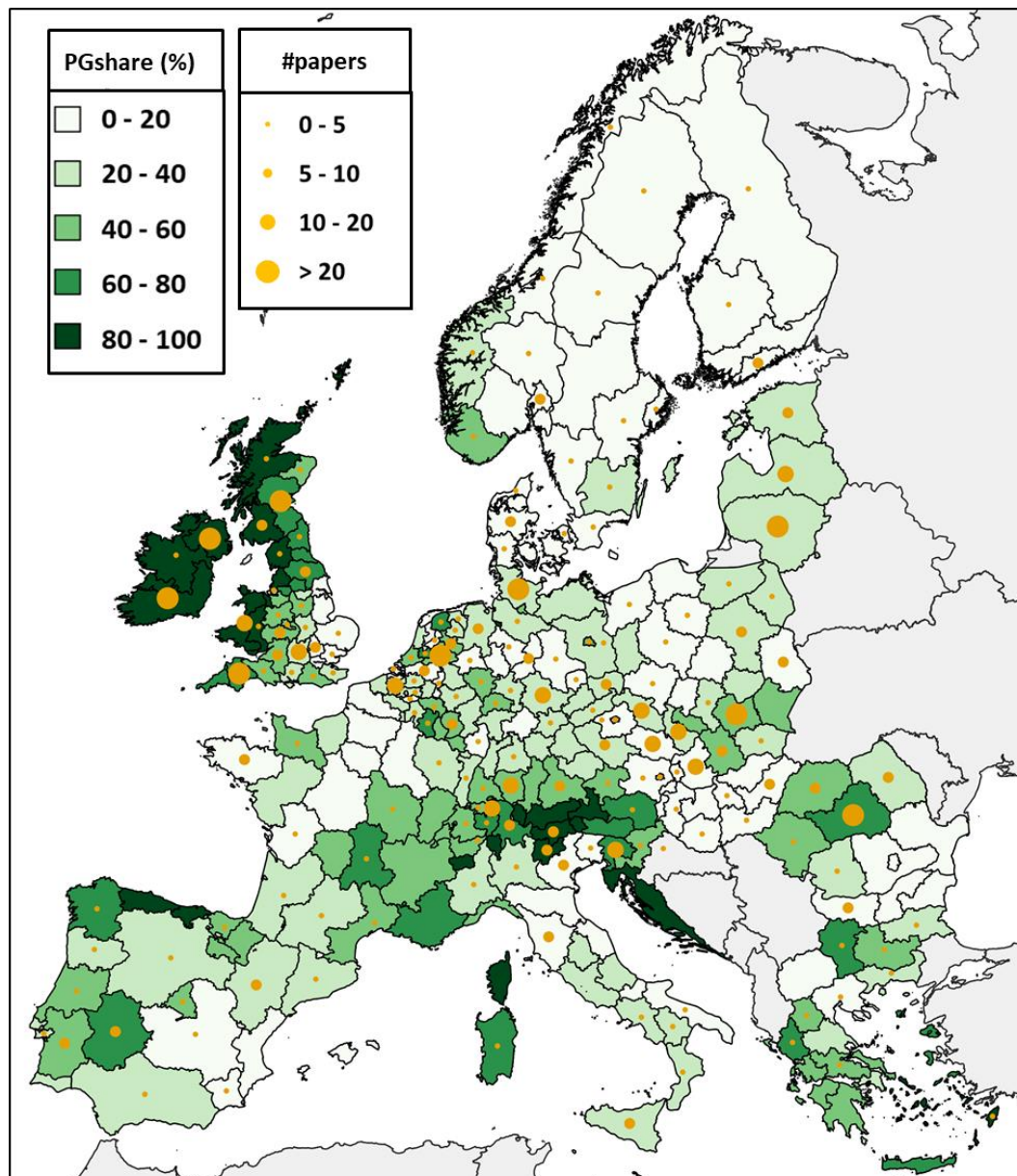
Schils RLM, Bufer C, Rhymer C, Francksen R, Klaus VH, Abdalla , Milazzo F, Lellei-Kovács E, ten Berge H, Bertora C, Chodkiewicz A, Dămătîrcă C, Feigenwinter I, Fernández-Rebollo P, Ghiasi S, Hejduk S, Hiron M, Janicka M, Pellaton R, Smith K, Thorman R, Vanwalleggem T, Williams J, Zavattaro L, Kampen J, Derkx R, Smith P, Whittingham MJ, Buchmann N, Newell Price P (2022) Permanent grasslands in Europe: land use change and intensification decrease their multifunctionality. *Agriculture, Ecosystems and Environment*. DOI...

**Keywords:**

agro-ecology, ecosystem services, grassland, land use change, systematic literature review

**Spatial coverage:**

Geographical distribution, across NUTS2 regions in Europe, of included papers (#papers), published since 1980, and the share of permanent grassland (PGshare) in the total utilised agricultural area (UAA); data from 2016, except Norway and Macedonia from 2013 (Eurostat, 2020); grey areas indicate no data.



**Temporal coverage:**

1980 - 2019

**This dataset contains the following files:**

AGEE\_Schils\_data.csv

AGEE\_Schils\_references.pdf

**Explanation of variables:**

*AGEE\_Schils\_data.csv*

Nr_contrast	Unique record number for contrasts
Nr_reference	Number of reference
Category	Ecosystem service
Endnote_ID	Reference number in Endnote library
ID	Reference ID
Reviewer	Number of reviewer
Author	First author
Year	Year of publication
Country	Country where research was conducted
BioGeoRegion	Biogeographic region where research was conducted
Duration	Number of years experiment was conducted
Comparison	Description of comparison; one out of 8 possible comparisons
<i>Score_Pollinators</i>	Outcome of comparison
<i>Eval_Pollinators</i>	Basis of evidence
<i>Score_Threatened</i>	Outcome of comparison
<i>Eval_Threatened</i>	Basis of evidence
<i>Score_PlantRichness</i>	Outcome of comparison
<i>Eval_PlantRichness</i>	Basis of evidence
<i>Score_N2O</i>	Outcome of comparison
<i>Eval_N2O</i>	Basis of evidence
<i>Score_CH4</i>	Outcome of comparison
<i>Eval_CH4</i>	Basis of evidence
<i>Score_CO2</i>	Outcome of comparison
<i>Eval_CO2</i>	Basis of evidence
<i>Score_CarboSeq</i>	Outcome of comparison
<i>Eval_CarboSeq</i>	Basis of evidence
<i>Score_NO3</i>	Outcome of comparison
<i>Eval_NO3</i>	Basis of evidence
<i>Score_P</i>	Outcome of comparison
<i>Eval_P</i>	Basis of evidence
<i>Score_Recreation</i>	Outcome of comparison
<i>Eval_Recreation</i>	Basis of evidence
<i>Score_Aesthetics</i>	Outcome of comparison
<i>Eval_Aesthetics</i>	Basis of evidence
<i>Score_HydrConduc</i>	Outcome of comparison
<i>Eval_HydrConduc</i>	Basis of evidence
<i>Score_BulkDensity</i>	Outcome of comparison

<i>Eval_BulkDensity</i>	Basis of evidence
<i>Score_SoilLoss</i>	Outcome of comparison
<i>Eval_SoilLoss</i>	Basis of evidence
<i>Score_Runoff</i>	Outcome of comparison
<i>Eval_Runoff</i>	Basis of evidence
<i>Score_Yield</i>	Outcome of comparison
<i>Eval_Yield</i>	Basis of evidence
<i>Score_Energy</i>	Outcome of comparison
<i>Eval_Energy</i>	Basis of evidence
<i>Score_protein</i>	Outcome of comparison
<i>Eval_protein</i>	Basis of evidence

*AGEE\_Schils\_references.pdf*

Number	Record number
ID	Reference ID
Category	Ecosystem service
Endnote_ID	Reference number in Endnote library
Reference	Reference details

## **Methods, materials and software:**

*(See related publication for more details and supporting tables and figures)*

### *Permanent grassland*

We used the European Union's definition of permanent grassland, as land used to grow grasses or other herbaceous forage that has not been included in the crop rotation of the holding for a duration of five years or longer.

### *Indicators of ecosystem services*

We selected a set of indicators that comprised a cross-cutting representation of biodiversity and ecosystem services of permanent grasslands.

### *Search strategy – inclusion criteria*

In the fourth quarter of 2019, we searched the Scopus and CAB abstracts databases for grassland studies on 19 indicators of ecosystem services in Europe, published in the English language from 1980 onwards. Search strings were evaluated and refined in several steps by assessing the relevance of the papers returned, and by checking against key papers in the field. A wide range of search terms were used to cover the diversity of methods used to assess the provision of ecosystem services of permanent grasslands. We developed a search string for the concept “grass”, and combined this, using an AND-operator, with the search string for each one of the 19 ecosystem service indicators.

We combined the 19 sets of search results into de-duplicated Endnote libraries, one for each ecosystem service. The papers, including abstracts, were uploaded to the dedicated systematic review analysis software ‘EPPI reviewer 4 tool’ (<http://eppi.ioe.ac.uk/cms/>), as six corresponding reviews.

### *Exclusion criteria*

Titles and abstracts were screened in two stages, using the following same set of exclusion criteria:

- Not in the English language.

- Outside these Natura 2000 biogeographic zones of interest: Alpine, Atlantic, Boreal, Continental, Mediterranean or Pannonian. Biogeographical boundaries are a combination of official delineations used in the Habitats Directive (92/43/EEC) and for the EMERALD Network under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). They are independent of political boundaries of Emerald Network countries or EU Member States (<https://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-3>).
- Outside these countries in Europe: Member states of the EU-28 or Albania, Belarus, Bosnia Herzegovina, Kosovo, Macedonia, Moldova, Montenegro, Norway, Serbia, Switzerland or Ukraine.
- Unit of study was not grassland.
- The outcome was not one of the 19 indicators of interest.
- Papers on urban amenity grasses.
- Reviews.
- Modelling studies.
- Experiments under controlled conditions: laboratories, greenhouses or pots.

#### *Study selection on contrasts*

The papers retained after the title and abstract screening contained the body of literature on European experimental studies, published after 1980 and in the English language, and on one or more of the 19 indicators for grassland. From this set of 11,619 papers, we selected papers that contained at least one of eight experimental contrasts in land use (permanent grassland versus cropland, forest or temporary grassland) or contrasts in management (sward renewal, legume presence, number of species, defoliation frequency and nitrogen input).

#### *Data extraction*

After screening for eligible contrasts, we retained 3,664 studies for full text screening. Retrieved papers were read and either extracted or excluded with reasons. Data from valid sampled full text papers were extracted using a data extraction form, developed in MS Excel. Each paper consisted of at least one contrast and in total the 696 papers contained 1032 eligible experimental contrasts, which we define as a 'case'. Here, we registered the outcome: no conclusion, favourable, neutral or unfavourable. The outcome was based on the numerical data and statistical significance in tables, figures, or text, or based on authors' claims in the text.

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