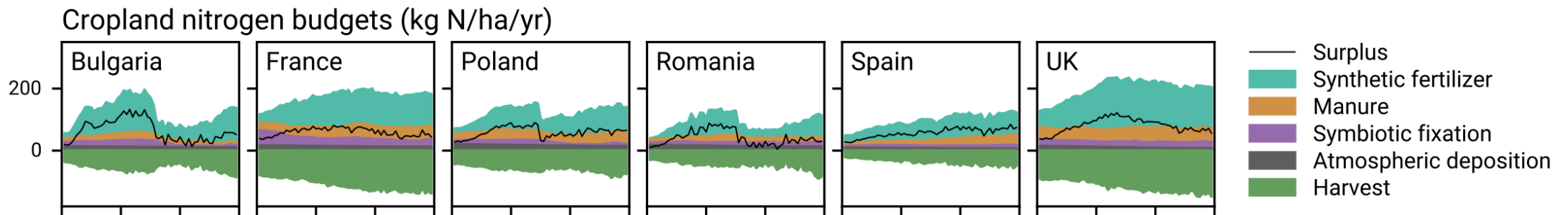# EuropeAgriDB v1.0: A New Detailed Database to Quantify Nitrogen Budgets in European Agriculture 1961−2019

Rasmus Einarsson, Alberto Sanz-Cobena, Eduardo Aguilera, Gilles Billen, Josette Garnier, Hans J.M. van Grinsven, & Luis Lassaletta

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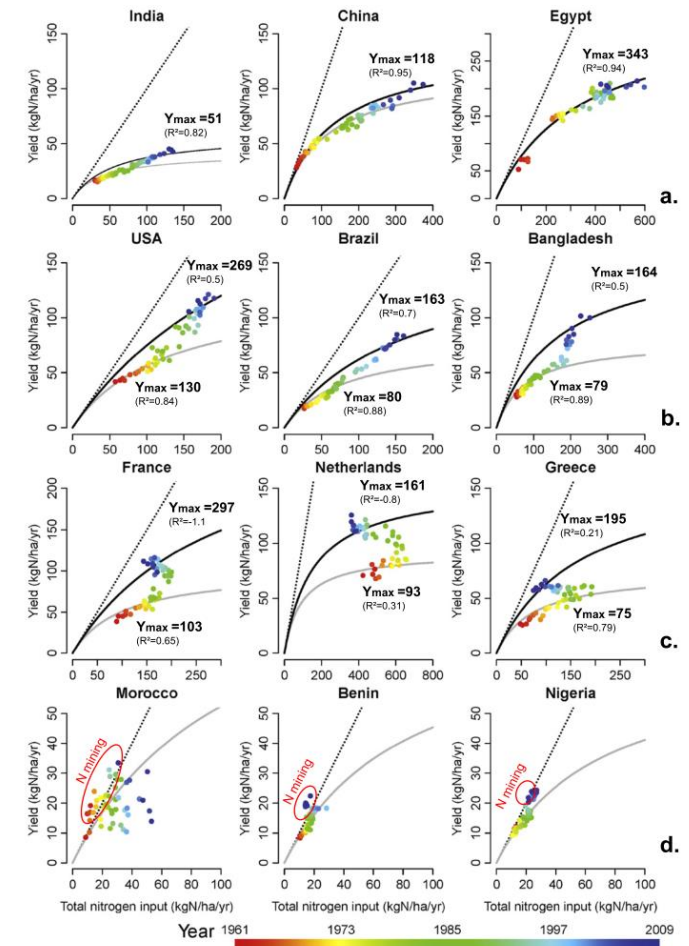
Cropland nitrogen budgets (kg N/ha/yr)

EuropeAgriDB v1.0

- Cropland N budgets 1961–2019 in 26 European countries
- Builds on established methods
  - Lassaletta et al. (2014)
- Higher detail possible in Europe thanks to combination of
  - FAOSTAT
  - Eurostat
  - national statistics
  - many other sources

50 year trends in nitrogen use efficiency of world cropping systems: the relationship between yield and nitrogen input to cropland

Luis Lassaletta[1], Gilles Billen[1,2], Bruna Grizzetti[3], Juliette Anglade[1] and Josette Garnier[1,2]
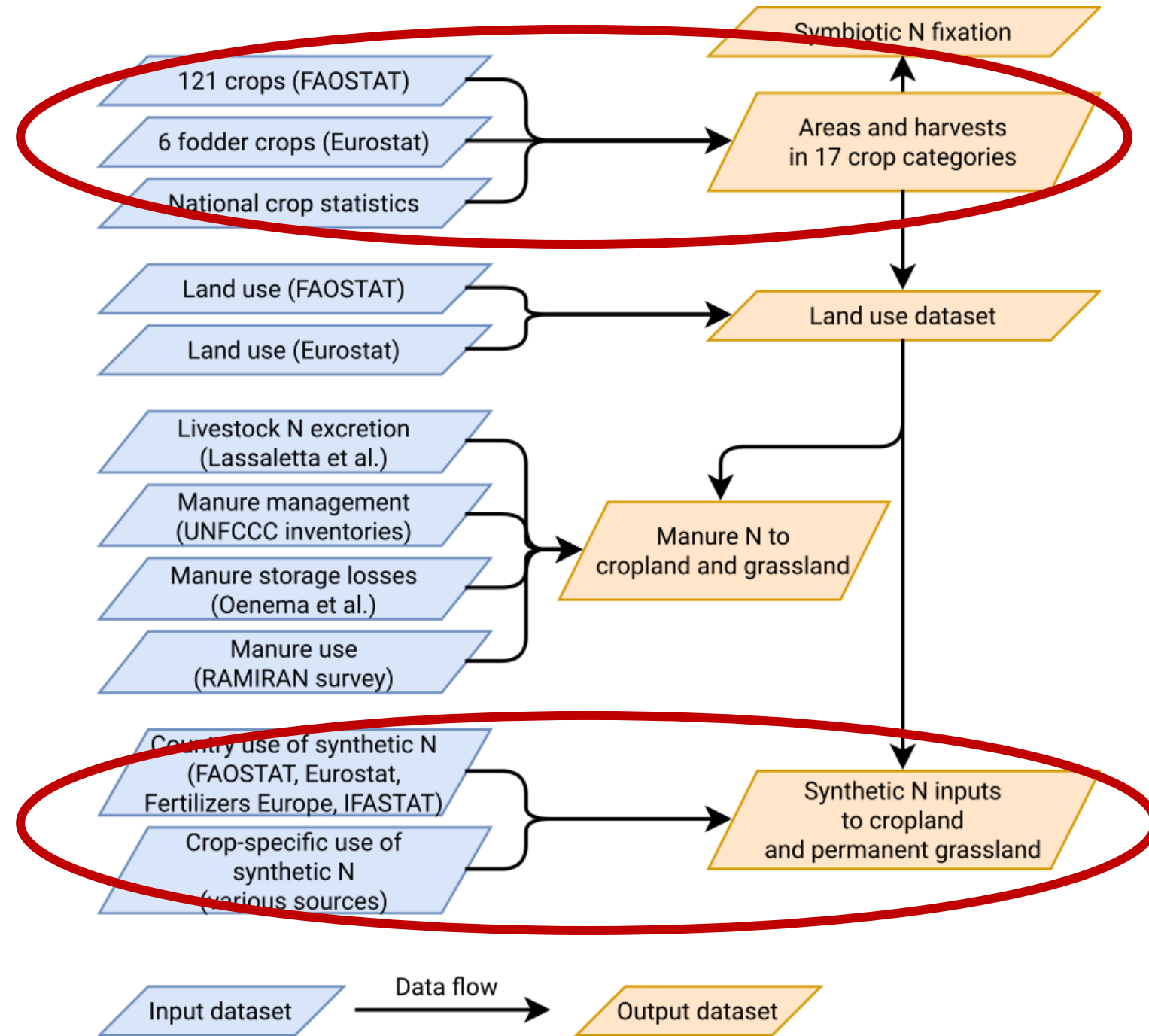
Cropland production

Agricultural land use

Manure N flows

Synthetic N fertilizers

Synthetic N to cropland and permanent grassland

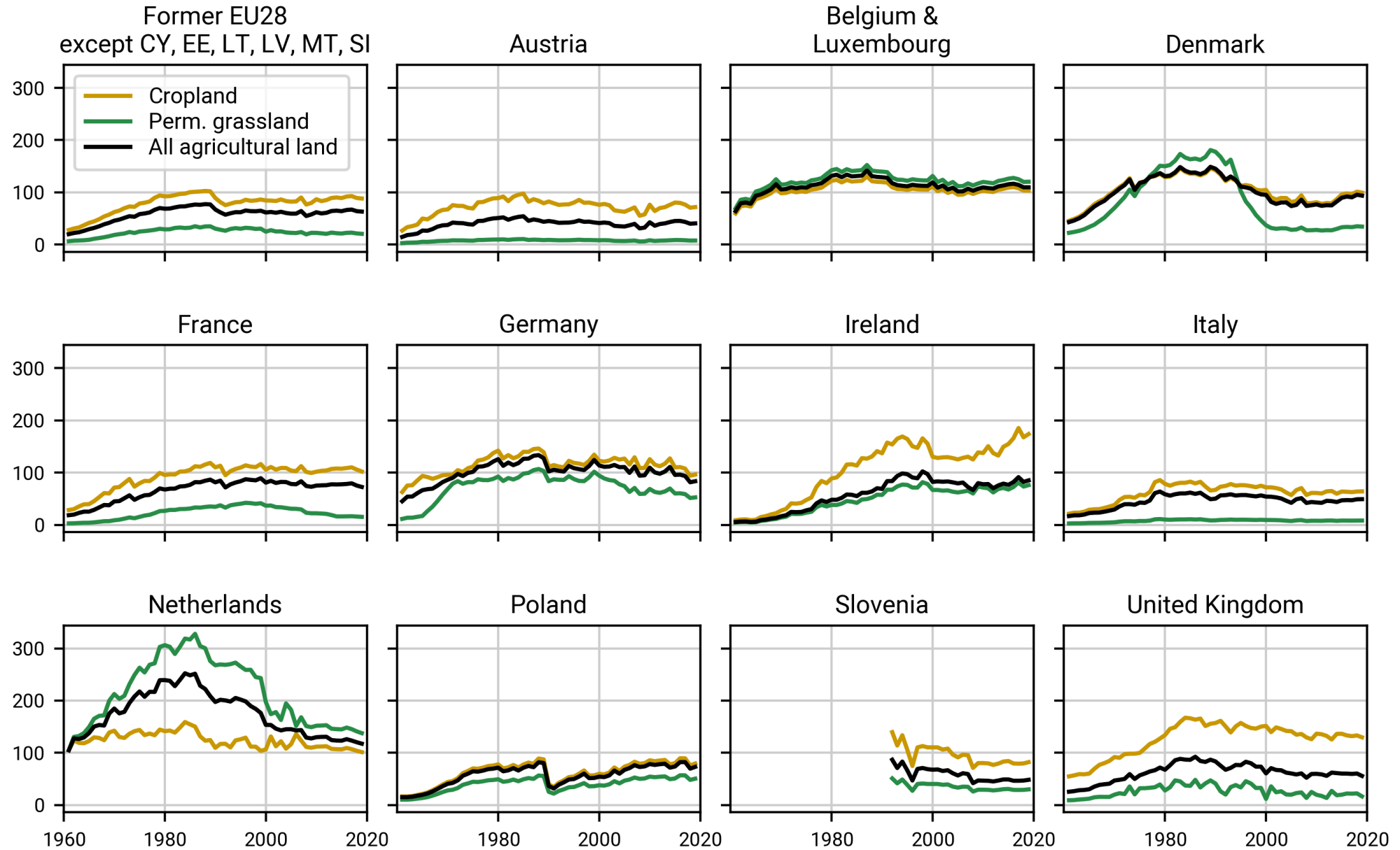- Some European countries have a rich history of synthetic N inputs to permanent grassland

- But management varies a lot

- This complicates top-down estimates of **cropland** N budgets

- We systematically combined data sources on synthetic N inputs to cropland and grassland

Typical permanent grassland in the Netherlands

Typical permanent grassland in Spain

Result: Estimated synthetic N inputs (kg N/ha/y)

Data availability on crop areas and N harvests

	All crops except fodder*	Fodder* crops
FAOSTAT	Almost 100% since 1961	Very limited
Eurostat	Generally good from around EU accession (varies)	
National statistics	Not investigated	Varies widely

* fodder: temporary grassland, forage legumes, green maize, other plants harvested green, fodder roots

Result: a comprehensive dataset of cropland production

Crop areas

Bulgaria | France | Poland | Romania | Spain | UK

Crop nitrogen harvests

Bulgaria | France | Poland | Romania | Spain | UK

Legend:
- Wheat
- Barley
- Grain maize
- Other cereals
- Oilseeds
- Potatoes
- Sugar beet
- Pulses
- Green maize
- Temporary grassland
- Forage legumes
- Fodder roots
- Other forage crops
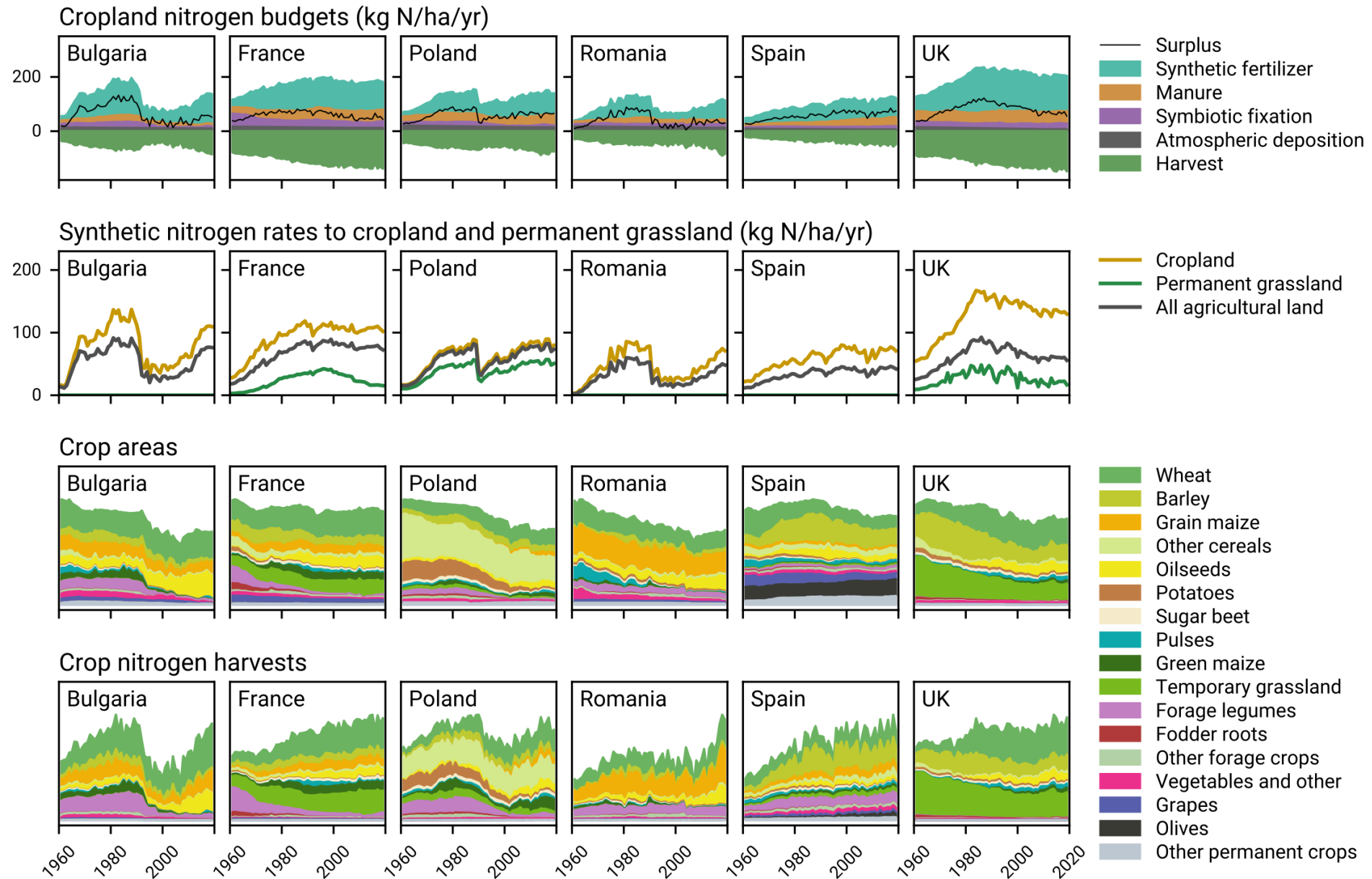- Vegetables and other
- Grapes
- Olives
- Other permanent crops

Fodder crops average 1961−2019:
20% of the harvested area, 37% of the harvested N

Examples from the 26 present-day countries in the database

Cropland nitrogen budgets (kg N/ha/yr)

Bulgaria   France   Poland   Romania   Spain   UK

- Surplus
- Synthetic fertilizer
- Manure
- Symbiotic fixation
- Atmospheric deposition
- Harvest

Synthetic nitrogen rates to cropland and permanent grassland (kg N/ha/yr)

Bulgaria   France   Poland   Romania   Spain   UK

- Cropland
- Permanent grassland
- All agricultural land

Crop areas

Bulgaria   France   Poland   Romania   Spain   UK

Crop nitrogen harvests

Bulgaria   France   Poland   Romania   Spain   UK

- Wheat
- Barley
- Grain maize
- Other cereals
- Oilseeds
- Potatoes
- Sugar beet
- Pulses
- Green maize
- Temporary grassland
- Forage legumes
- Fodder roots
- Other forage crops
- Vegetables and other
- Grapes
- Olives
- Other permanent crops

scientific **data**

Crop production and nitrogen use in European cropland and grassland 1961–2019

Rasmus Einarsson[1,2✉], Alberto Sanz-Cobena[3], Eduardo Aguilera[3], Gilles Billen[4], Josette Garnier[4], Hans J. M. van Grinsven[5] & Luis Lassaletta[2✉]

https://www.nature.com/articles/s41597-021-01061-z