

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

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Abstract

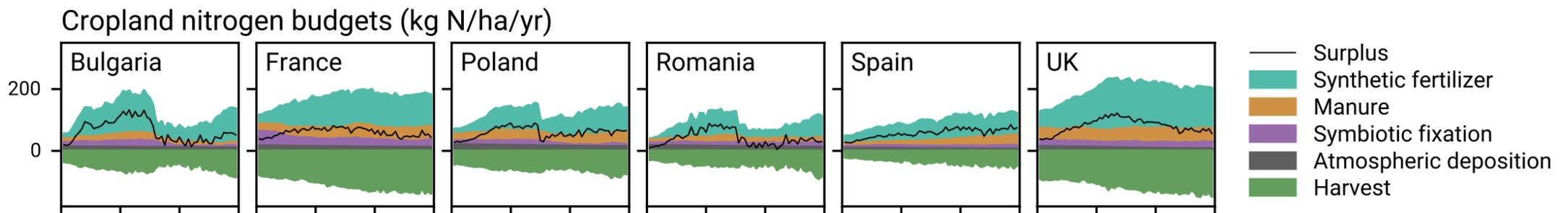
We present EuropeAgriDB v1.0, a dataset of crop production and nitrogen (N) flows in European cropland 1961–2019. The dataset covers 26 present-day countries, detailing the cropland N harvests in 17 crop categories as well as cropland N inputs in synthetic fertilizers, manure, symbiotic fixation, and atmospheric deposition. The study builds on established methods but goes beyond previous research by combining data from FAOSTAT, Eurostat, and a range of national data sources. A key contribution is the comprehensive and detailed coverage of crop production, in particular fodder crops such as temporary grassland, green maize, and forage legumes. For these crops, we have combined the Eurostat crop production statistics database with a range of national databases, statistical yearbooks, and other sources. For other arable and permanent crops, we use the FAOSTAT database which apart from fodder crops offers the longest and most complete time series of crop production. Our crop production dataset, divided into 17 crop categories, provides a solid basis for understanding how crop mix and productivity have varied over time. A second key contribution is the detailed estimation of synthetic N fertilizer application to cropland and permanent grassland. We have assembled a comprehensive dataset based on a wide range of data sources and devised a rigorous method to process it. The result, we believe, is to date the most comprehensive and consistent estimate of the allocation of synthetic N fertilizer between cropland and permanent grassland in Europe. In summary, EuropeAgriDB v1.0 is a detailed, complete, and consistent dataset which will be useful both to understand Europe's recent agricultural history and to make informed decisions about its future. This is particularly relevant in the current context of the EU Farm to Fork strategy, which requires major reduction in N inputs and surpluses and therefore the best possible quantification.

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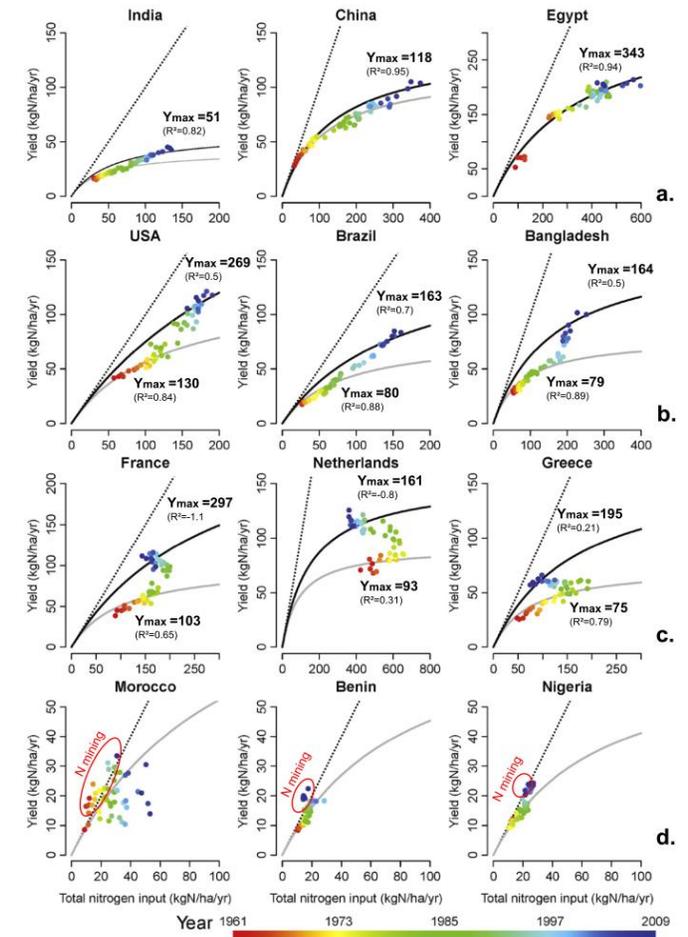


EuropeAgriDB v1.0

- 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 Lassaletta¹, Gilles Billen^{1,2}, Bruna Grizzetti³, Juliette Anglade¹ and Josette Garnier^{1,2}

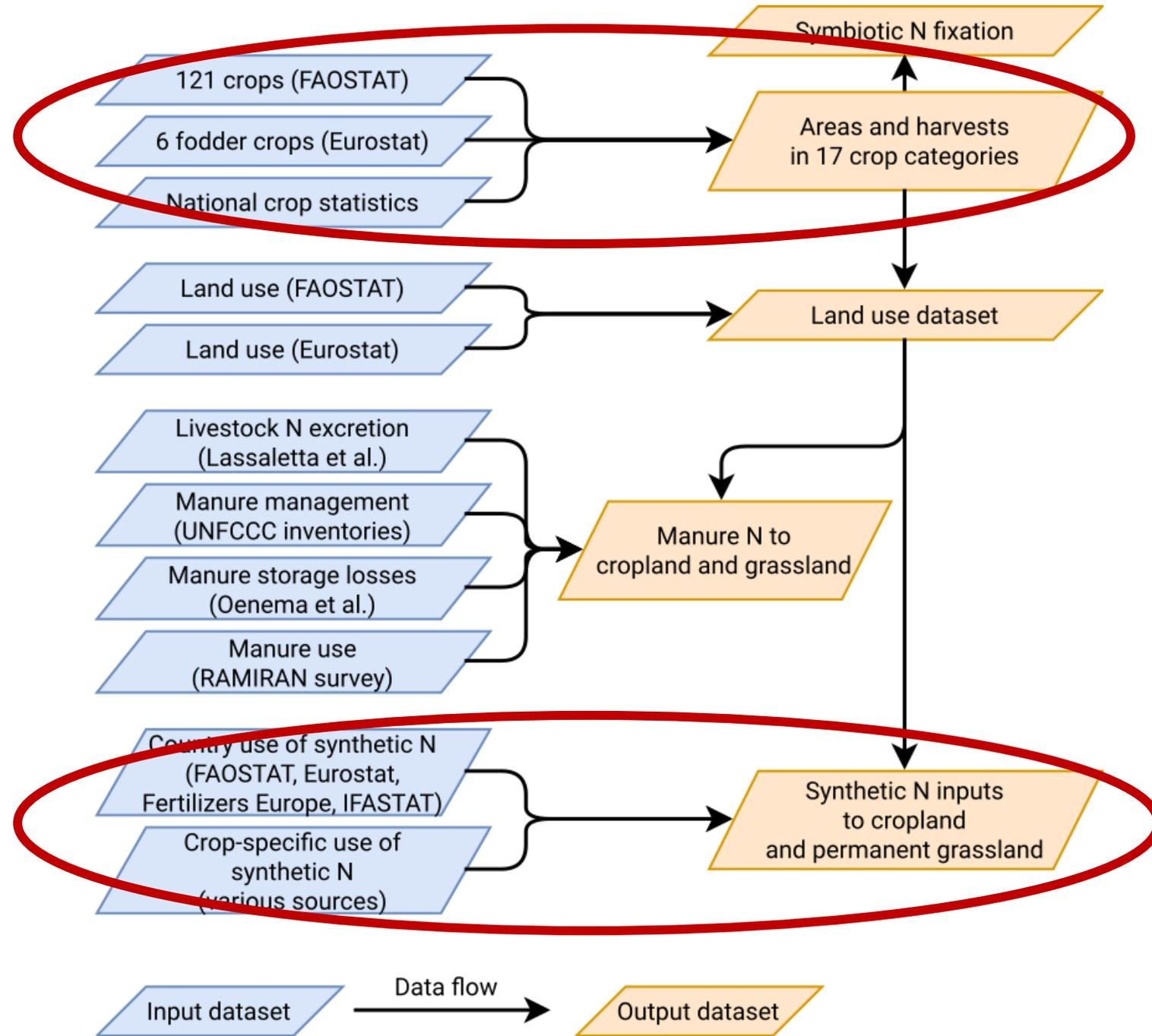


Cropland production

Agricultural land use

Manure N flows

Synthetic N fertilizers



Synthetic N to cropland and permanent grassland

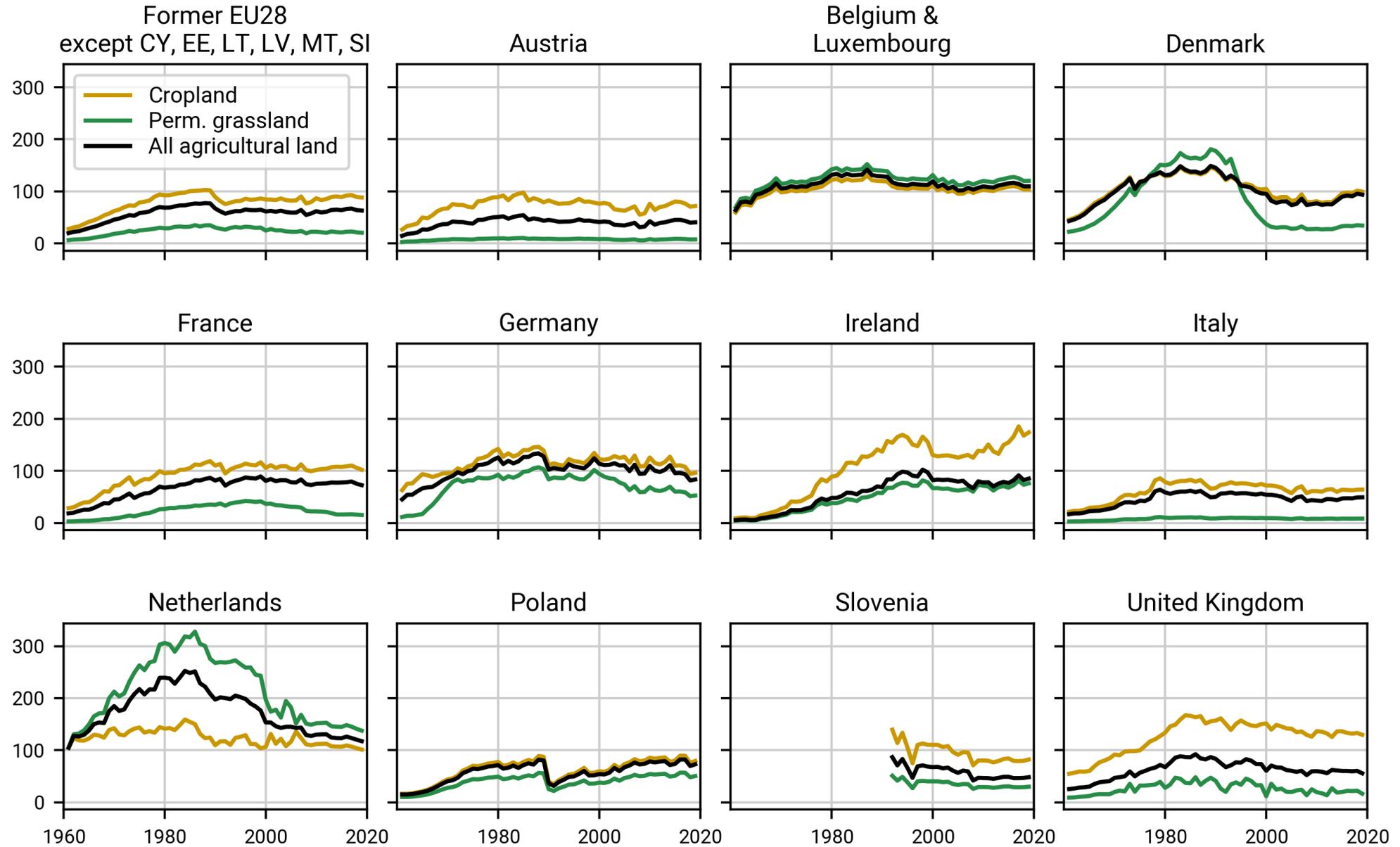
- Some European countries have a rich history of synthetic N inputs to permanent grassland
- But management varies a lot
- This complicates top-down estimates of **cropland** N budgets
- We systematically combined data sources on synthetic N inputs to cropland and grassland

Typical permanent grassland in the Netherlands



Typical permanent grassland in Spain

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



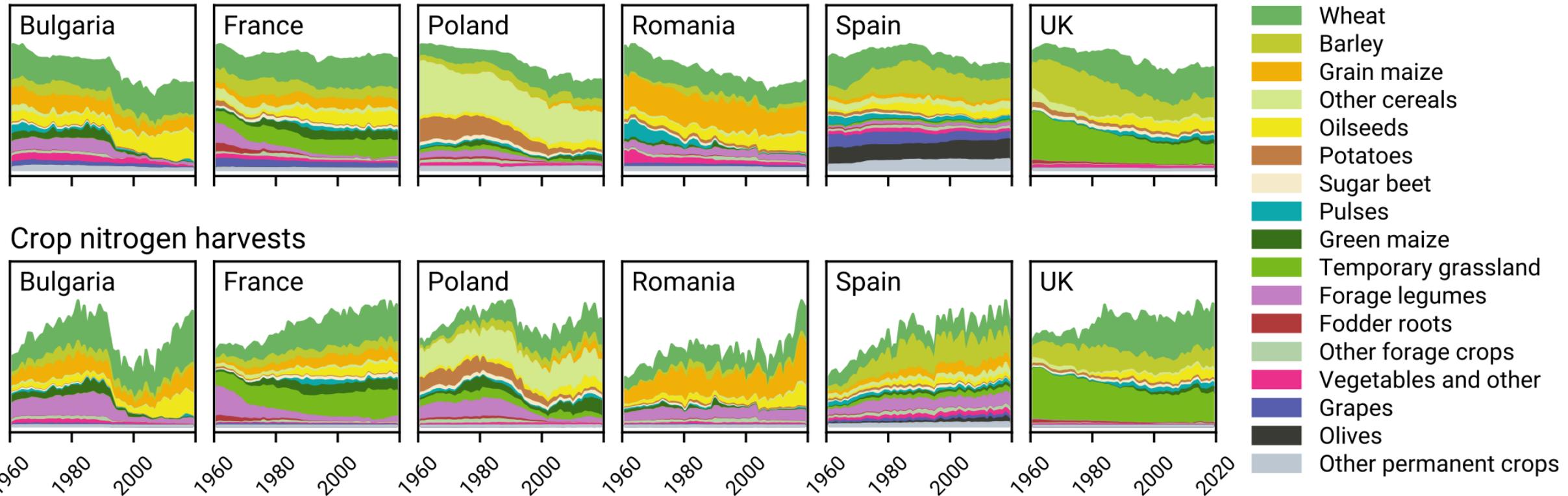
Data availability on crop areas and N harvests

	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

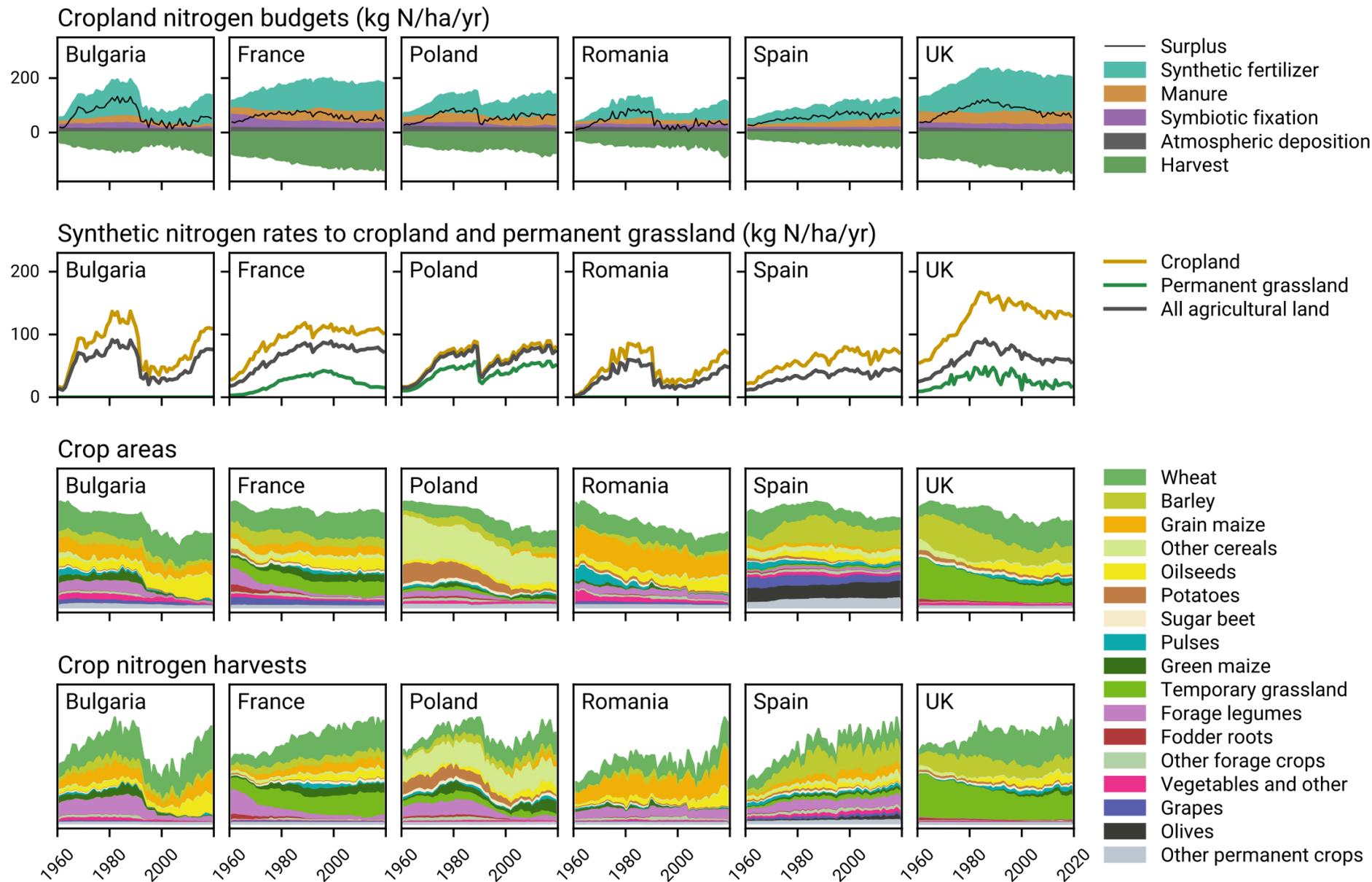
Crop areas



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



scientific **data**



OPEN

DATA DESCRIPTOR

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

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