



14 - 16 August 2026

Berlin, Germany

Crop Diversification in Poland: A Temporal and Spatial Approach

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Abstract

A fundamental element shaping biodiversity in agriculture is the crop structure on farms. A varied and even crop structure (a large number of different crops, covering similar areas) positively influences the diversity and abundance of fauna and flora species in a given area, in contrast to a simplified cropping structure, where, in extreme cases, only one (monoculture) or several species are grown in a given area (often for several years). Crop diversification involves maintaining an appropriate number and area of crops on arable land on a farm in a given year. The main goal of the research is to identify and assess trends in crop structure changes in Poland (in 2020-2025) and analyze their spatial diversification at the local (municipal) level. The analysis is based on detailed statistical data on 327 crop species. Advanced geographic information system (GIS) tools and spatial statistics methods were used, including local spatial autocorrelation indices (LISA) and diversity indices (Simpson). Areas of strong specialization (primarily in industrial and cereal crops) and "enclaves of diversity" related to horticulture and niche crops were identified. Particular attention was paid to the most important crops constituting the core of agricultural land in Poland (permanent grasslands, winter wheat, grain maize, winter rapeseed, and winter triticale). The high spatial resolution of the research, combined with the wide spectrum of species analyzed, allows for precise monitoring of agroecosystem transformation. The results are crucial for shaping local agricultural support policies, planning adaptation measures to climate change, and protecting agrobiodiversity in the context of the European Green Deal.

Keywords: diversity; biodiversity; farms; agricultural geography; Common Agricultural Policy