

Eternal rye



The world's second oldest still ongoing long-term fertilization experiment was founded by Julius Kühn in 1878 to investigate the effects of mineral and organic (farm yard manure) fertilizers on rye yield and soil fertility. Six different treatments are analyzed, including mineral-only (NPK, PK), mineral-organic combined (FM+NPK), and organic-only (FM I and FM II) fertilizer application, and unfertilized plots (U). In 1953, after 60 years of application of farmyard manure, fertilization was discontinued in FM II plots, to explore its after-effects.

In 1961, after 83 years of only rye, each of six plots was divided into three subplots to compare continuous rye cropping with rye-potato-rotation and continuous maize cropping in their interactions with fertilization treatments.

The plots of FM+NPK had originally been established by Julius Kühn as pure mineral N fertilization, but were changed to a mineral-organic combination in 1990.

The field measures 6012 m² in total, each subplot is 290 m² (not randomized, no replicates).

Geographical position

Julius-Kühn-Field, Halle, 113 m above sea level	Eastern foreland of Harz Mountains (East Germany)	51° 28' 58.44 N 11° 58' 9.48 E
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Climate (1981-2010)

Annual mean air temperature	Annual average sum of precipitation	Average sum of precipitation April-July
9.7 °C	490 mm	48 mm

Soil conditions

Soil type	Sand	Silt	Clay	Humus content (A _p horizon)	Atmospheric N deposition
Sandy loess (80-120 cm)	69 %	22 %	9 %	2.1 to 2.6 %	40-50 kg/(ha*a)

Current experimental set-up (complete block design)

Section A – Silage maize monocropping					
FM I	PK	NPK	NPK+FM	U	FM II
Section B – Potato-winter rye rotation					
FM I	PK	NPK	NPK+FM	U	FM II
Section C – Winter rye monocropping					
FM I	PK	NPK	NPK+FM	U	FM II
60 kg N 20 kg P 60 kg K	24 kg P 75 kg K	60 kg N 24 kg P 75 kg K	120 kg N 44 kg P 135 kg K	-	43 kg N 13 kg P 40 kg K until 1952

N↑



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FM = Farmyard manure, U = unfertilized

Grain yield of winter rye: 10-year moving average

