

Field F: mineral and organic fertilization trial



In this extensive trial, different questions of mineral and organic fertilization are examined side by side. According to specific questions the experiment is divided into three sections (F1-3), which are divided into two sub-areas (a and b). The first part of the trial (F1a) compares complete mineral fertilization (NPK) with different deficiency treatments (NP, NK, PK) and unfertilized plots. Section F1b serves to study the combination of mineral and organic fertilization (farmyard manure; FY) with different application levels. Section F2 investigates straw (S) fertilization in combination with different amounts of mineral N fertilizers. In F2a, straw is applied every year. F2b served as a comparison with biennial straw application, but was terminated in 1992. Until 1971 on division F3 differently stored kinds of farmyard manure were compared. The aftereffects of manure application were studied until 1997, then F3 has been terminated.

The crop rotation is the same in all sections and currently includes *winter wheat – silage maize – spring barley – sugar beet – spring wheat – potato*, with only one crop being grown each year.

The field is 5250 m² in size, each plot measures 30 m² (4-6 replicates, not randomized).

Geographical position

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

Precipitation	Evaporation	Mean temperature
460-550 mm	450-460 mm	9.2 °C (until 1995)

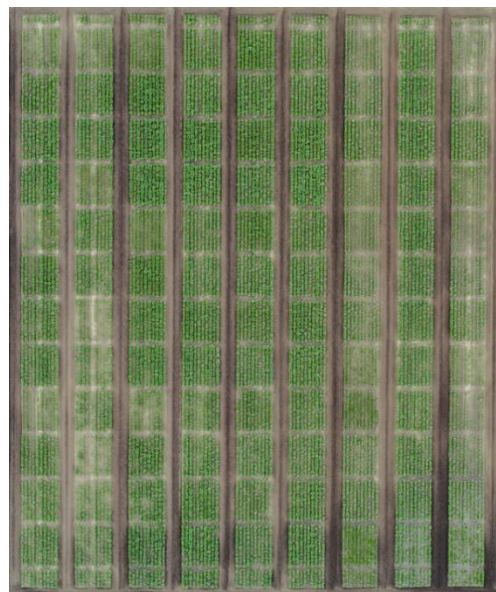
Soil conditions

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 systematic block design)

F1a			F1b			F2a		
PK	N1PK	PK	FY+2M	3M	FY+2M	S+200	200N	S+200
NK	NPK	NK	FY+M	FY	FY+M	S+100	100N	S+100
NP	N1PK	NP	2M	3M	2M	FY	0N	FY
0	NPK	0	M	FY	M	S+0	200N	S+0
PK	N1PK	PK	FY+2M	3M	FY+2M	S+200	100N	S+200
NK	NPK	NK	FY+M	FY	FY+M	S+100	0N	S+100
NP	N1PK	NP	2M	3M	2M	FY	200N	FY
0	NPK	0	M	FY	M	S+0	100N	S+0
PK	N1PK	PK	FY+2M	3M	FY+2M	S+200	0N	S+200
NK	NPK	NK	FY+M	FY	FY+M	S+100	200N	S+100
NP	N1PK	NP	2M	3M	2M	FY	100N	FY
0	NPK	0	M	FY	M	S+0	0N	S+0

N↑



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Fertilization rates (kg/ha/year)

1a	N		P*	K*	
	Root crop	Cereal			
0	0	0	0	0	
NP	100	50	60	0	
NK	100	50	0	300	
PK	0	0	60	300	
NPK	100	50	60	300	
N1PK	200	50	60	300	Double amount of N to root crops
1b					
M	50	50	40	200	
2M	100	50	60	300	Double mineral N fertilization, higher PK fertilization
3M	200	50	60	300	higher N application, PK like 2M
FY	0+(100)	50	20+(20)	100+(100)	The estimated amounts of nutrients applied with the farmyard manure are put in parentheses
FY*+M	50+(100)	50	40+(20)	200+(100)	
FY*+2M	100+(100)	50	60+(20)	300+(100)	
2a					
S+0	0	0	60	300	50 dt/ha straw, no mineral N fertilization
S+100	100	50	60	300	50 dt/ha straw plus mineral N fertilization
S+200	200	100	60	300	50 dt/ha straw plus double mineral N fertilization
FY	50	25	60	300	since 1997 biennial 400 dt/ha of manure to root crop
0N	0	0	60	300	No straw application, only mineral fertilization
100N	100	50	60	300	No straw application, only mineral fertilization
200N	200	100	60	300	No straw application, only mineral fertilization

* P, K, and 200 dt/ha farmyard (FY) manure applied biennially to root crops (including silage maize)