

**Supplementary Material:**

**Suppl. Table 1.** Average soil mineral nitrogen content [ $\text{kg ha}^{-1}$ ] measured in 0-90 cm soil depth three weeks in advance of organic fertilization in each trial environment.

Soil depth	Wiesengut 2020	Wiesengut 2021	Wittfelder Hof 2021
0-30 cm	53.5	106.7	72.3
30-60 cm	16.1	24.5	36.3
60-90 cm	6.2	12.4	11.1

**Suppl. Table 2.** Amount of fertilizer (potato protein liquid) applied [ $\text{kg plot}^{-1}$ ] and its corresponding nutritional loads [ $\text{kg ha}^{-1}$ ]. Fertilization level 0 refers to unfertilized plots, while plots fertilized at 110  $\text{kg nitrogen ha}^{-1}$  refer to fertilization level 1, and plots fertilized at 200  $\text{kg nitrogen ha}^{-1}$  refer to fertilization level 2. The target amount is defined by the sum of nitrogen from the soil stock and the applied amount of fertilizer.

Fertilization amounts [ $\text{kg plot}^{-1}$ ] and nutritional loads [ $\text{kg ha}^{-1}$ ]							
	Fertilization Level	PPL amount	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	MgO	S
Wiesengut 2020	0	0	0	0	0	0	0
	1	15.3	56	31	178	13	18
	2	39.8	146	80	465	33	46
Wiesengut 2021	0	0	0	0	0	0	0
	1	1.2	4	2	13	1	1
	2	28.2	94	51	299	21	30
Wittfelder Hof 2021	0	0	0	0	0	0	0
	1	11.4	38	21	121	9	12
	2	38.4	128	70	407	29	41

**Suppl. Table 3.** Absolute values of maize shoot dry weight (t dm ha<sup>-1</sup>), shoot nitrogen (N) uptake (kg N ha<sup>-1</sup>), grain yield (t dm ha<sup>-1</sup>), and total nitrogen uptake (kg N ha<sup>-1</sup>) of the controls (i.e. either non-inoculated plants or unfertilized plots) representing the origin (i.e. one hundred percent) of the coordinate system of Figure 3.

Year	Treatment	Stem elongation (BBCH 38)		Maturity (BBCH 90)	
		Shoot dry weight	Shoot N uptake	Grain yield	Total N uptake
		[t dm <sup>a</sup> ha <sup>-1</sup> ]	[kg ha <sup>-1</sup> ]	[t dm ha <sup>-1</sup> ]	[kg ha <sup>-1</sup> ]
2020	Non-inoculated	3.0	56.9	10.1	172.0
	Unfertilized	2.9	54.4	8.5	137.4
2021	Non-inoculated	6.5	139.8	12.3	233.5
	Unfertilized	6.9	139.5	12.6	229.6

<sup>a</sup> dm = dry matter with 0% moisture