

Supplementary material for

Depletion, accumulation and availability of soil phosphorus in the Askov long-term field experiment

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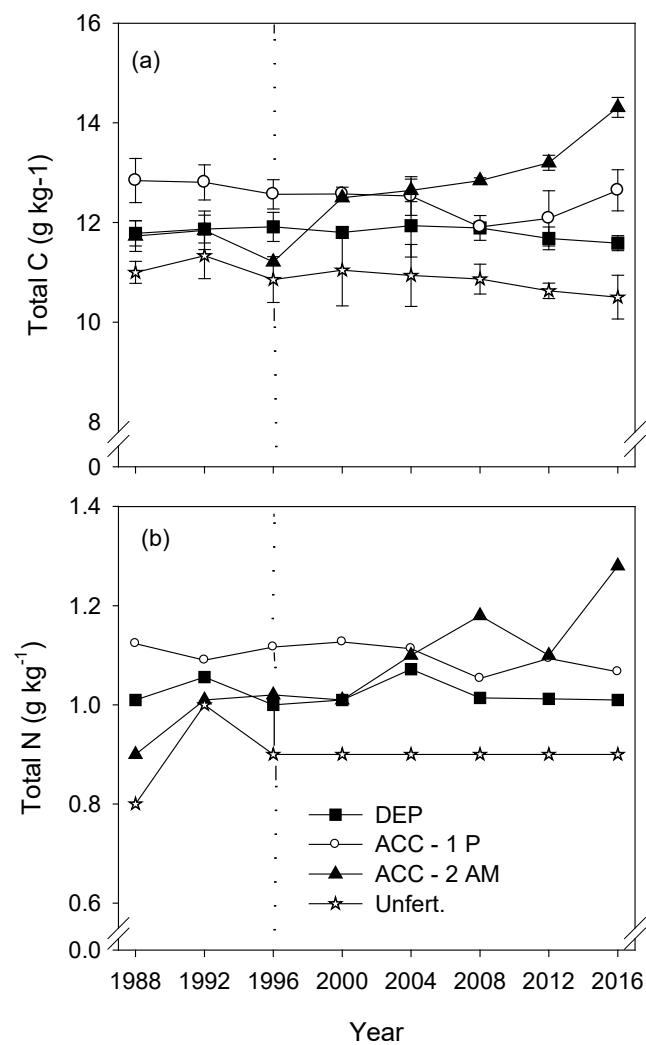


Fig. S1. Changes in soil total C (a) and total N (b) during 1988 to 2016. Error bars indicate standard error of means. Dashed line represents last year (1996) before treatment changes. See Table 1 for treatment codes.

Table S1. Effect of fertiliser treatment before treatment changes in 1997 on soil and winter wheat plant parameters. P_w and TP represent water-extractable P and total P respectively. Different letters within each column for each year denote significant differences among treatments (Tukey's HSD, $P < 0.05$). See Table 1 for treatment codes.

Year	Treatment code	Olsen P	P _w	TP	P _w /TP	Olsen P/TP	Total C	Total N	P conc. in grains	Grain yield	P offtake in grain
		mg kg ⁻¹			%		g kg ⁻¹		mg g ⁻¹	Mg ha ⁻¹	kg ha ⁻¹
1988/89	1 P, 1 NP, 1 PK	15.7b	3.9b	560b	0.7b	2.8b	11.8ab	1.0b	3.6b	1.9a	6.8b
	1 NK	5.8a	1.1a	457a	0.2a	1.2a	12.7b	1.1c	2.5a	2.7b	6.9b
	1 N, 1 K	4.9a	0.9a	425a	0.2a	1.1a	11.9ab	1.0ab	3.3b	1.7a	5.6ab
	Unfert	4.8a	1.1a	402a	0.3a	1.2a	11.0a	0.9a	3.2b	1.5a	4.8a
1992/93	1 P, 1 NP, 1 PK	16.4b	5.3b	567b	0.9b	2.9b	11.9ab	1.0a	4.0c	1.8b	6.9b
	1 NK	5.1a	1.2a	430a	0.3a	1.2a	12.6b	1.1a	2.5a	2.4b	5.8ab
	1 N, 1 K	5.9a	1.4a	422a	0.3a	1.4a	11.6ab	1.0a	3.1b	1.7ab	5.2ab
	Unfert	5.5a	1.4a	403a	0.4a	1.4a	11.0a	1.0a	4.0c	1.0a	4.0a
1996/97	1 P, 1 NP, 1 PK	16.1b	4.5b	558b	0.8b	2.9b	11.9ab	1.0ab	3.9c	2.0ab	8.0b
	1 NK	5.1a	1.0a	434a	0.2a	1.2a	12.7b	1.1b	3.5bc	2.0ab	7.0ab
	1 N, 1 K	7.4a	1.2a	416a	0.3a	1.8ab	11.5ab	1.0ab	2.9a	3.0b	8.8b
	Unfert	8.3a	2.1ab	450a	0.4ab	1.8a	11.0a	0.9a	3.4b	1.5a	5.2a

Table S2. Effect of fertiliser treatment after treatment conversions in 1997 on soil and plant parameters. P_w and TP represent water-extractable P and total P respectively. Different letters within each column for each year denote significant differences among treatments (Tukey's HSD, $P < 0.05$). See Table 1 for treatment codes.

Year	Treatment code	Olsen P	P _w	TP	P _w /TP	Olsen P/TP	Total C	Total N	P conc. in grain	Grain yield	P offtake in grain
		mg kg ⁻¹			%	g kg ⁻¹		mg g ⁻¹	Mg ha ⁻¹	kg ha ⁻¹	
2000/01	DEP	13.6c	3.8c	531b	0.7c	2.6c	11.8ab	1.0a	3.9 ns	2.7b	10.6b
	ACC-1 P	4.4a	1.0a	469ab	0.2a	0.9a	12.6b	1.1b	3.8 ns	2.1b	8.2b
	ACC-2 AM	9.7c	2.2b	492ab	0.4b	2.0b	12.3ab	1.0a	4.2 ns	3.3b	13.9b
	Unfert	4.9a	1.1a	406a	0.3a	1.2a	10.9a	0.9a	3.6 ns	1.1a	3.9a
2004/05	DEP	11.7b	2.9b	506b	0.6c	2.3b	11.9 ns	1.0ab	3.7b	2.7b	9.9b
	ACC-1 P	5.6a	1.1a	512b	0.2a	1.1a	12.7ns	1.1b	3.1a	2.3b	7.3a
	ACC-2 AM	9.8b	2.1b	489ab	0.4bc	2.1b	12.8 ns	1.1b	3.0a	6.8c	20.2c
	Unfert	5.6a	1.1a	399a	0.3ab	1.4a	10.9 ns	0.9a	3.7b	1.6a	5.9a
2008/09	DEP	9.3b	2.3b	502b	0.5b	1.8b	11.9b	1.0b	3.2b	3.7b	11.9b
	ACC-1 P	4.3a	0.9a	490b	0.2a	0.9a	12.1b	1.1b	2.6a	3.2ab	8.3a
	ACC-2 AM	10.2b	2.6b	507b	0.5b	2.0b	12.7b	1.2c	3.2ab	8.3c	26.3c
	Unfert	4.4a	0.9a	399a	0.2a	1.1a	11.0a	0.9a	2.7a	2.6a	7.2a
2012/13	DEP	8.5b	2.2b	506b	0.4b	1.7b	11.7b	1.0ab	3.1bc	3.7b	11.5b
	ACC-1 P	3.9a	1.0a	476b	0.2a	0.8a	12.1bc	1.1bc	2.8a	3.0a	8.3a
	ACC-2 AM	14.7c	4.3c	468ab	0.9c	3.2c	13.3c	1.2c	3.3c	7.5c	25.0c
	Unfert	4.3a	1.1a	393a	0.3a	1.1a	10.6a	0.9a	2.9ab	2.7a	7.9a

2016/17	DEP	7.1c	1.7b	502b	0.3b	1.4b	11.6b	1.0b	3.2b	4.3b	13.4b
	ACC-1 P	4.8b	1.1a	481b	0.2a	1.0a	12.6bc	1.1b	2.9b	4.3b	12.6b
	ACC-2 AM	16.3d	4.8c	495b	1.0c	3.3c	14.1c	1.3c	3.3b	9.0c	29.6c
	Unfert	3.2a	0.7a	382a	0.2a	0.8a	10.5a	0.9a	2.5a	2.9a	7.1a
