PERFORMANCE OF POLY4 AS A MULTI-NUTRIENT FERTILIZER FOR WHEAT IN POLAND AND EUROPEAN CEREALS

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Winter wheat trial locations in Poland

Overview and trial design

- Wheat is the largest crop by area in Poland (2.4 Mha)[1] and is widely grown across Poland's agricultural areas.
- While the average wheat yield in Poland is 4.5 t ha^{-1}, the average yield achieved in this trial was 6.3 t ha^{-1}.
- Polish wheat farmers typically apply MOP as their K_2O fertilizer. Farmers also apply S as ammonium sulphate (AS).
- All fertilizers were applied to good farming practice.
- The trial compared K fertilizer from POLY4 and MOP + POLY4 mix with the industry standard MOP and MOP + AS.
- The trial was conducted at four sites: two in each of eastern and western Poland.
- Sites were selected to be representative of Polish arable soils where farmers would typically apply K fertilizer.
- The trial was a randomised block design with four replications.

Treatment table

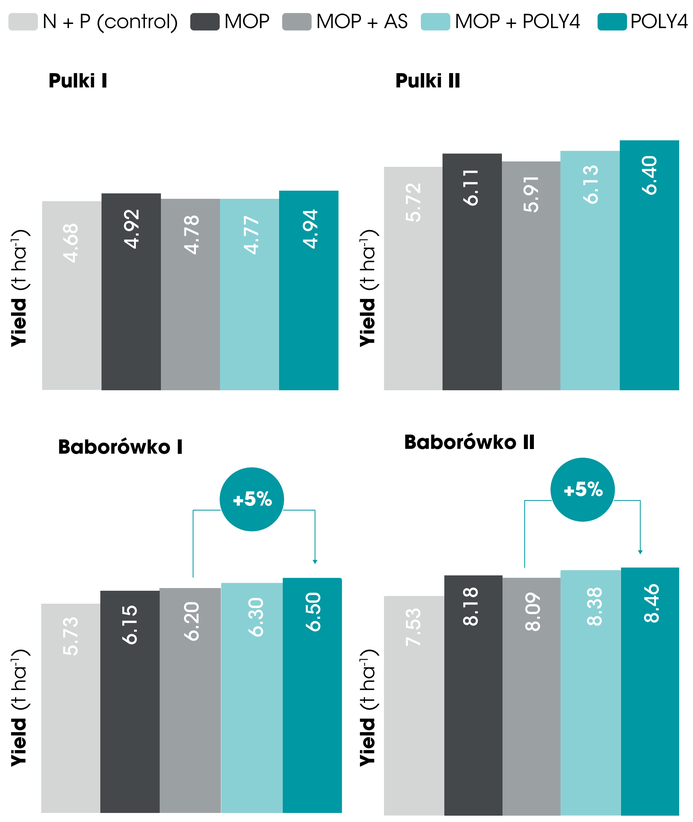
Treatments	Nutrients applied (kg ha^{-1})						
	N	P_2O_5	K_2O	S	CaO	MgO	Cl^-
N + P (control)	190	50	0	0	0	0	0
MOP	190	50	75	0	0	0	60
MOP + AS	190	50	75	30	0	0	60
MOP + POLY4 (70:30)	190	50	75	30	27	9	47
POLY4	190	50	75	102	91	32	16

Initial soil analysis[2]

Nutrients	Amount of nutrients in soil (mg kg^{-1})			
	Pulki I	Pulki II	Baborówko I	Baborówko II
P	116	301	170	87
K	180	150	104	112
Mg	29	59	39	25
S	5	3	4	5

Winter wheat yield

- Potassium treated wheat yields were numerically greater than the N + P (control) yields at all sites.[3]
- Fertilizer treatments only increased yields significantly at the Baborówko sites. Subsequent analysis is for these sites only.
- POLY4 significantly increased yield compared to all other treatments at the site with the lowest concentration of available soil K (Baborówko I: 104 mg K kg^{-1}).
- Yield benefits from other added S were not consistent.



Financial return[4,5]

Baborówko sites

US$/ha	MOP + AS	MOP + POLY4	Difference
Fertilizer cost	190	208	-18
Crop value	1,129	1,159	+30
Fertilizer margin	939	951	+13

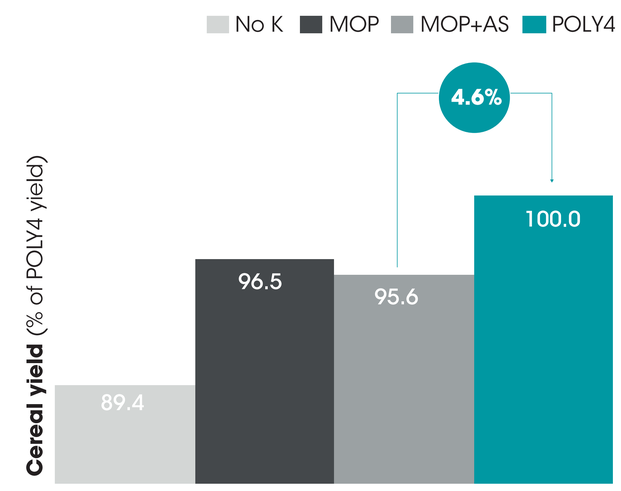
- MOP + POLY4 fertilizer treatment gave the best financial returns.

Good fertilizer practice

- Adding K to standard N + P fertilizer increased yield at all four sites.
- POLY4 and MOP + POLY4 treatments consistently outperformed MOP + AS.
- Application of POLY4 as a proportion of K-fertilizer to European cereals is recommended.

Cereal yield across eleven European trials

- POLY4 fertilizer programme increased yields in ten out of eleven trials compared to MOP.
- POLY4 fertilizer programme increased yields in five out of seven trials compared to MOP + AS.



Notes: 1) EuroStat (2016); 2) Soil pH: Pulki I: pH (H_2O) 6.6 , pH (KCl) 5.5; Pulki II: pH (H_2O) 6.8, pH (KCl) 5.9; Baborówko I: pH (H_2O) 6.3, pH (KCl) 6.1; Baborówko II: pH (H_2O) 6.0, pH (KCl) 4.7; 3) Results presented are based on data from GENSTAT ANOVA at K_2O rate of 75 kg ha^{-1}; 4) Total fertilizer cost includes spreading (US$20/t) and prices of fertilizer: urea US$243/t, ammonium sulphate (AS) US$135/t, diammonium phosphate (DAP) US$398/t, muriate of potash (MOP) US$320/t, and POLY4 US$200/t; 5) Crop value is based on wheat price of US$158/t.

Sources: Institute of Soil Science & Plant Cultivation, Pulawy (2017); 49000-PUL-49010-16; 18000-SGS-18010-14; 49000-PUL-49010-16; 57000-HUT-57010-16; 65000-TEAG-65011-17; 8000-WCC-8016-16.

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