

TRIAL RESULTS

POTATO

BULANDSHAHR (UTTAR PRADESH), INDIA (2018)

HIGHLIGHTS

POLY4 improved early growth parameters: plant height, crop canopy and leaf greenness.

POLY4 increased total potato yield by 11% and marketable yield by 15% over MOP + S.

POLY4 application reduced the proportion of non-marketable potato tubers by 27% compared to MOP + S.

Financial margins were increased by US\$192/ha when POLY4 replaced MOP + S.

TRIAL OBJECTIVE

To assess the response of potato yield and quality to POLY4 fertilizer in India.

Leading states for potato production in India are:

Province	Production (Mmt)
Uttar Pradesh	13.9
West Bengal	8.4
Bihar	6.4
Gujarat	3.6
Madhya Pradesh	3.2

OVERVIEW

PARTNER: Sardar Vallabhbhai Patel University of Agriculture and Technology.

LOCATION: Bulandshahar

YEAR: 2018

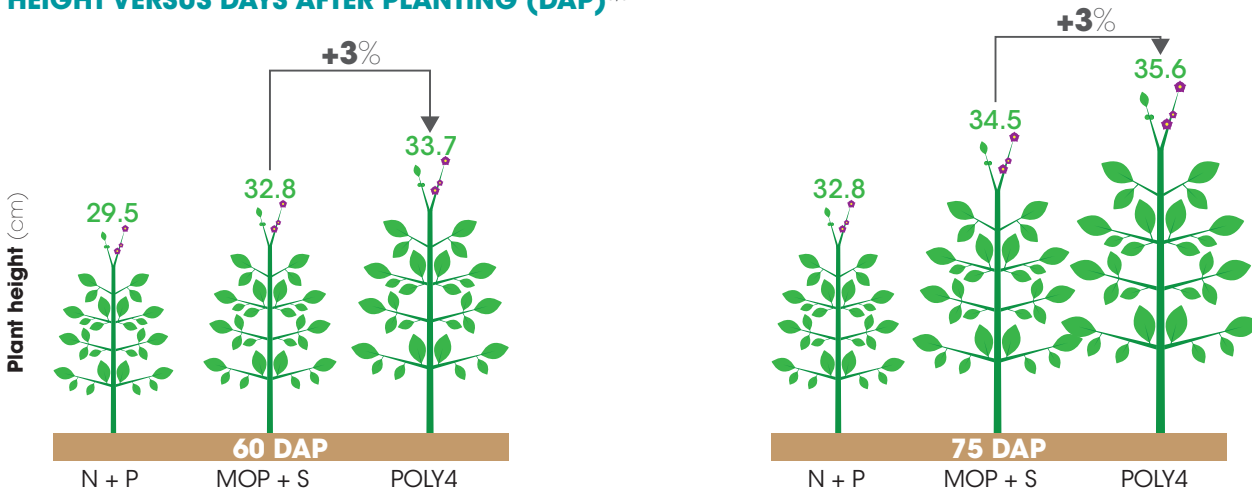
- 2.2 million hectares of potato were planted in India in 2017–2018 with total annual production of 49 Million metric tonnes (Mmt).¹
- The trial was in Uttar Pradesh which produced more potatoes than any other state in India.¹
- The potato variety used was Kufri Bahar – a variety grown for table potatoes.
- The performance of POLY4 was tested against recommended application rates of K₂O and S by locally-typical MOP and elemental sulphur fertilizer.
- The trial was a randomised block design with three replicates.
- Potato yield data is presented for 100 kg K₂O ha⁻¹

TREATMENT TABLE²⁻⁵

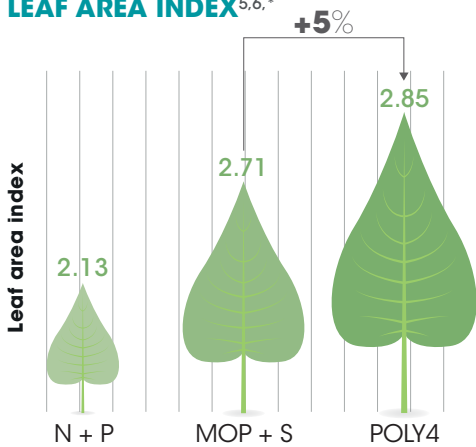
Treatments	Nutrients applied (kg ha ⁻¹)						
	N	P ₂ O ₅	K ₂ O	S	MgO	CaO	Cl ⁻³
N + P (control)	180	80	0	0	0	0	0
POLY4 50	180	80	50	68	21	61	11
POLY4 100	180	80	100	136	43	121	21
POLY4 150	180	80	150	204	64	182	32
MOP50 + S	180	80	50	68	0	0	40
MOP100 + S	180	80	100	136	0	0	80
MOP150 + S	180	80	150	204	0	0	120
MOP + POLY4 (25:75)	180	80	100	102	32	91	36
MOP + POLY4 (50:50)	180	80	100	68	21	61	51
MOP + POLY4 (75:25)	180	80	100	34	11	30	63

EARLY CROP GROWTH²⁻⁵

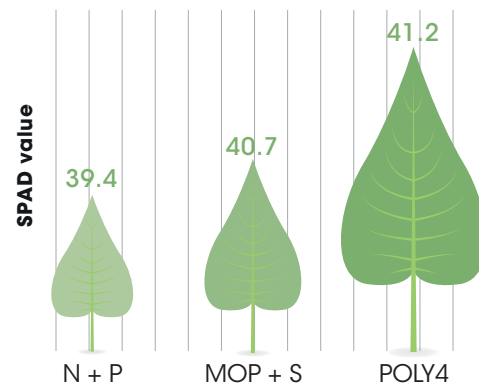
HEIGHT VERSUS DAYS AFTER PLANTING (DAP)^{5,6}



LEAF AREA INDEX^{5,6,*}



SPAD VALUE^{5,6,*}

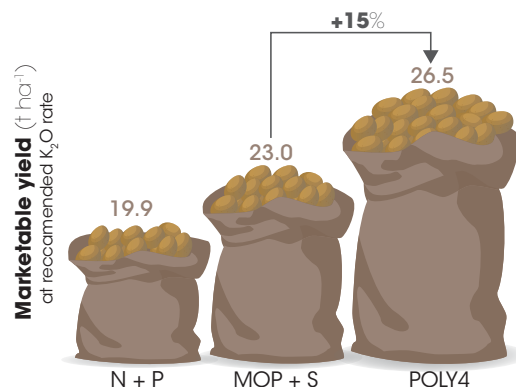
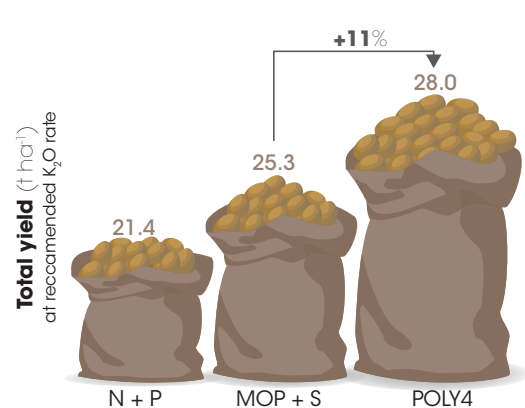


- Plant height and leaf area index allow plants to shade-out weeds that otherwise compete for space, nutrients and water.
- POLY4 increased crop growth compared to MOP + S at 60 and 75 DAP.
- POLY4 improved leaf area index (LAI) by 5% compared to MOP + S. Higher LAI means the crop

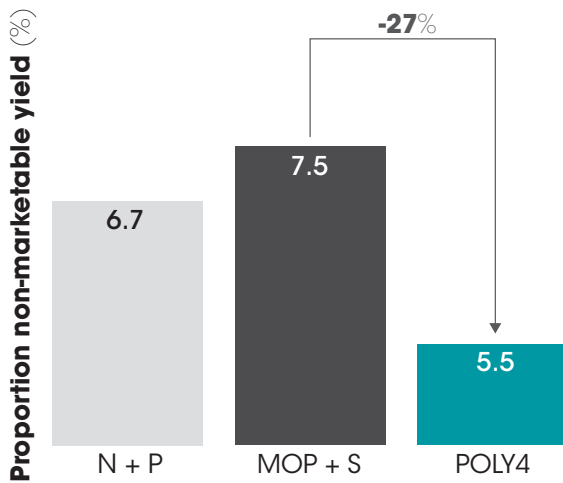
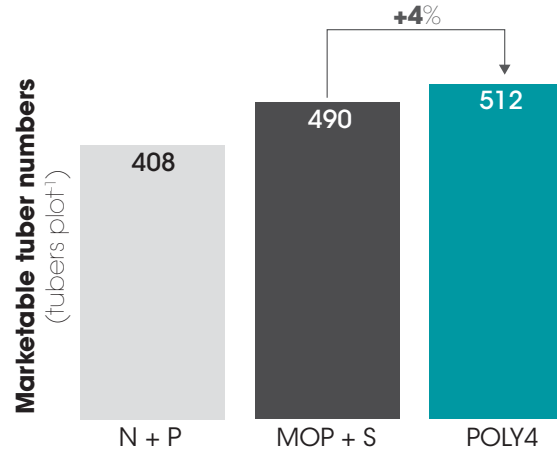
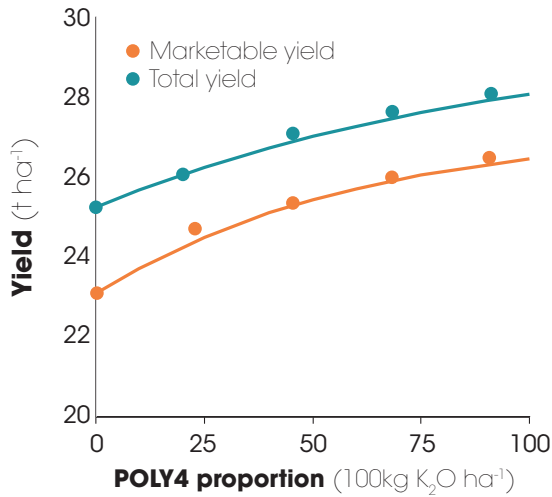
has a denser canopy cover which leads to better weed control and greater light interception for photosynthesis.

- Soil-plant analysis development (SPAD) is a measure of the greenness, which is proportionate to the chlorophyll content of leaves. The POLY4 treatment had a higher SPAD value.

POTATO YIELD²⁻⁵



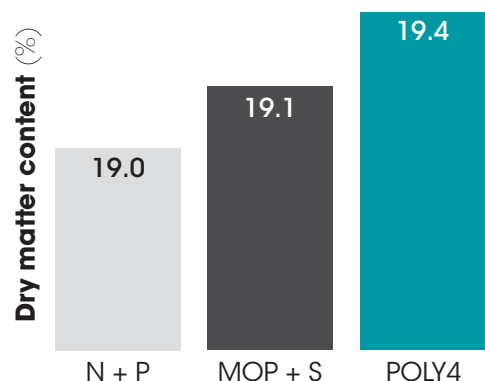
POTATO YIELD²⁻⁵ continued...



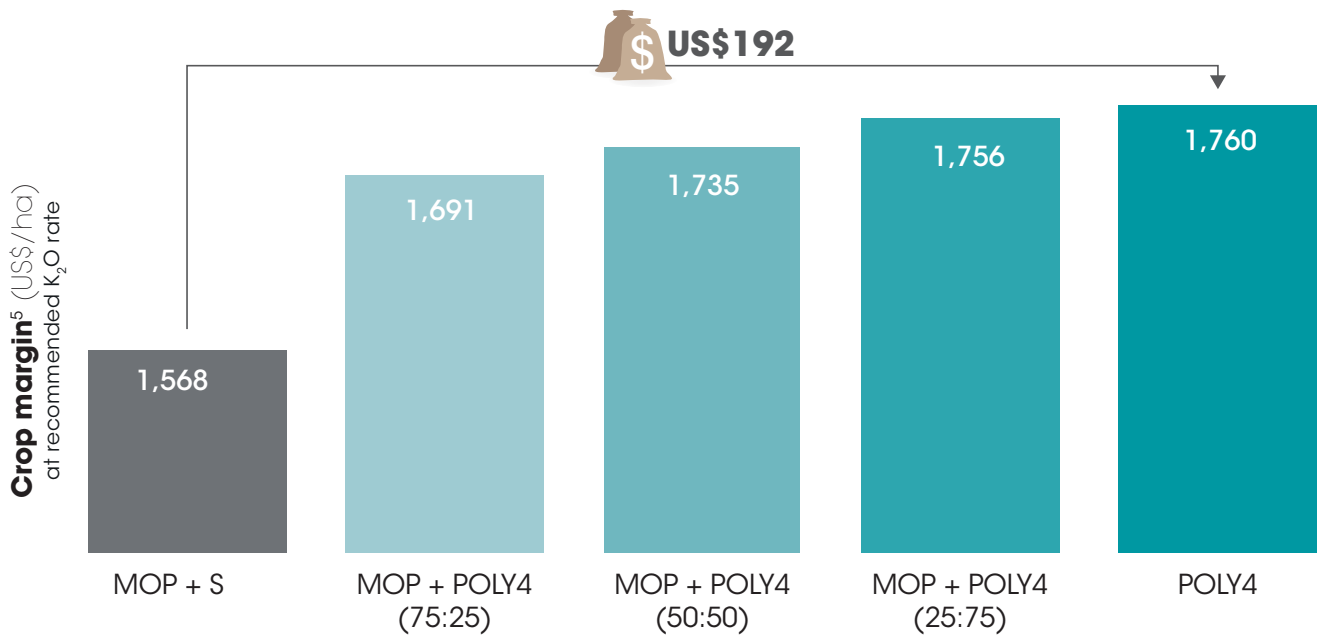
- Compared to MOP + S, POLY4 fertilizer increased total and marketable yield.
- Yields were also significantly⁵ higher in response to increased proportion of POLY4 in the fertilizer blend.
- Tubers that weighed less than 25 g were considered as non-marketable.
- POLY4 increased the number of marketable tubers compared to MOP + S.
- The proportion of potato yield that was non-marketable was reduced by 27%.

POTATO QUALITY: DRY MATTER CONTENT

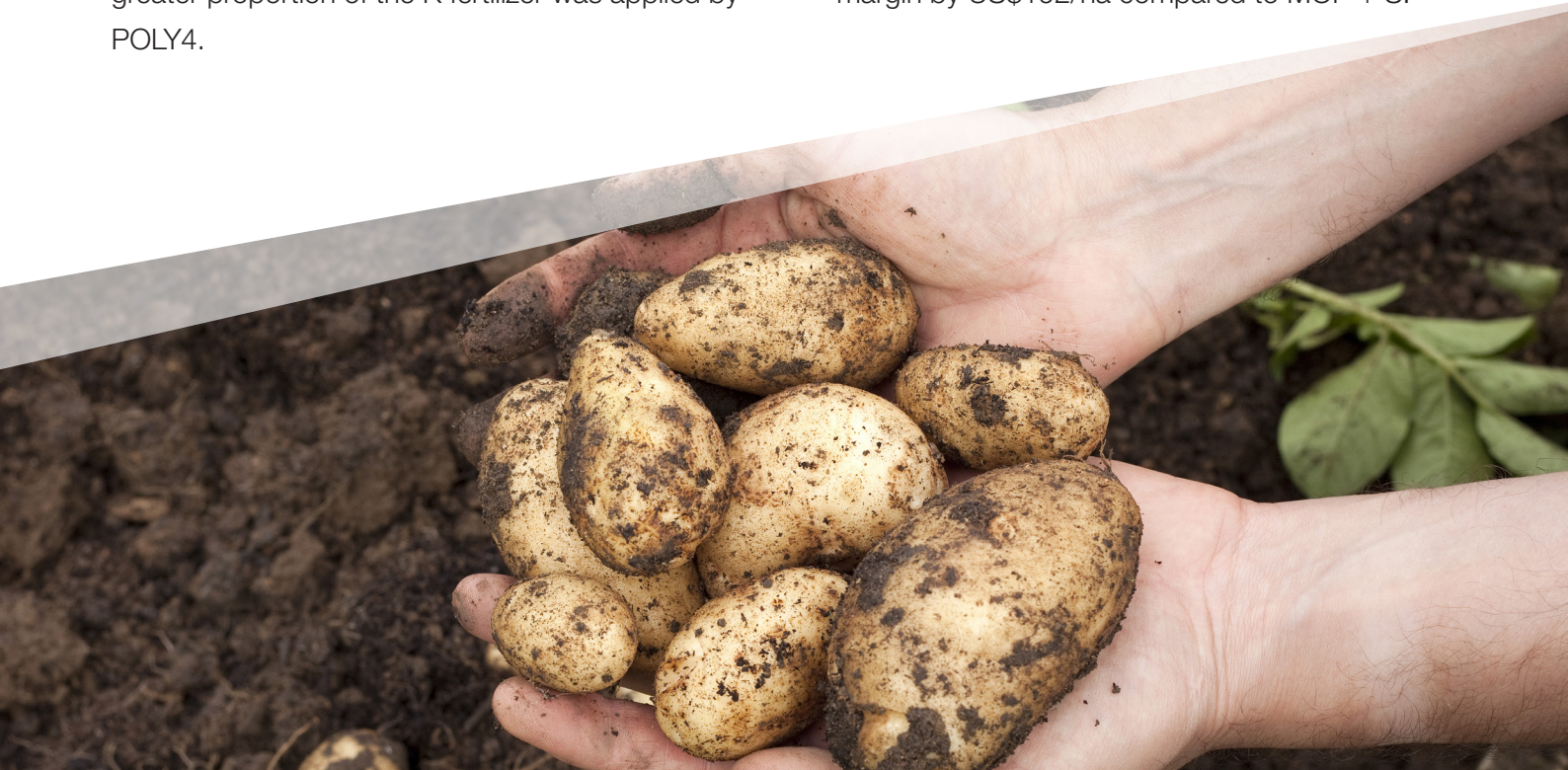
- Higher dry matter content (DM%) is the most important characteristic that helps to attract a price premium from the potato frying industry. For processing, high tuber dry matter content influences the oil absorption rate to achieve a good fry colour.
- DM% content was increased with the use of POLY4.



FINANCIAL ANALYSIS^{5,7}



- Farmer margins were increased progressively as a greater proportion of the K fertilizer was applied by POLY4.
- The POLY4 treatment gave the best additional margin by US\$192/ha compared to MOP + S.



Notes: 1) Statistics of Horticulture, Ministry of Agriculture & Farmers Welfare, India (2017); 2) Treatment table is based on the recommended K₂O rate of 100 kg K₂O ha⁻¹. MOP + S contains elemental sulphur with bentonite. All treatments received 180 kg N ha⁻¹ and 80 kg P ha⁻¹. MOP + POLY4 was used in a ratio of 66.7:33.3 K₂O; 3) POLY4 = 3 % Cl⁻, and MOP = 48% Cl⁻; Initial soil analysis: pH 7.5; 7 mg P kg⁻¹, 71 mg K kg⁻¹; and 7 mg S kg⁻¹; 4) pH and EC measured in a 1:2.5 soil:water extraction; 5) Results presented are based on data from GENSTAT factorial plus added control and regression analyses with significance tested at 5% level; 6) Measured 60 days after planting; 7) Fertilizer prices based on local prices: MOP (US\$194/t), POLY4 (US\$181/t), bentonite (US\$270/t). Analysis accounts for fertilizer application of spreading cost of US\$9.10/t. Potato price was US\$75/t. Margin = crop output (US\$/ha) minus (cost of fertilizer material plus spreading cost).

*Mean of K fertilizer

Source: Sardar Vallabhbhai Patel University of Agriculture and Technology (2018) 76000-SVPU-76010-17

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