

TRIAL RESULTS

# SPRING BARLEY

WEXFORD, IRELAND (2017)

## HIGHLIGHTS

POLY4 increased grain yield by up to 9%.

POLY4 fertilized barley achieved the highest grain yield with less K input compared to both MOP and SOP.

POLY4-fertilized barley had 55-61% less brackling than other potassium fertilizers.



# OVERVIEW

- Barley is the fourth largest cereal crop, after corn, rice and wheat, with over 144 million metric tonnes produced in 2017 – 2018 globally.<sup>1</sup>
- Over the last 15 years, Irish barley yields have been increasing by 0.79%<sup>1</sup> and production by 3% annually.<sup>2</sup> Spring barley is primarily used for feed production, with 87% going to the livestock sector. A significant proportion, 13%, is used for a premium market malting and roasting.<sup>3</sup>
- Barley yields are directly proportional to nitrogen uptake. Whilst application of N fertilizers will supply sufficient N to the crop, the efficiency of uptake can be limited by application timing and presence of Cl<sup>-</sup>.
- Irish farmers increasingly recognise the importance of sulphur and magnesium for barley crops, in addition to a long-standing requirement for K and P fertilizers.

# TREATMENT TABLE<sup>4-9</sup>

Treatment	Nutrients applied (kg ha <sup>-1</sup> )						
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MgO	S	Cl <sup>-</sup>
N + P + Ca (control)	150	121	0	144	0	0	0
MOP	150	121	48 – 145	144	0	0	38 -115
SOP	150	121	48 – 145	144	0	17 - 52	3 - 9
POLY4	150	121	48 – 145	202 – 317	20 – 61	65 – 195	10 - 31

# TRIAL OBJECTIVE

To establish the effectiveness of POLY4 as a multi-nutrient fertilizer for spring barley in Ireland.

- PARTNER:** Teagasc (Agriculture and Food Development Authority)
- LOCATION:** Ireland
- YEAR:** 2017

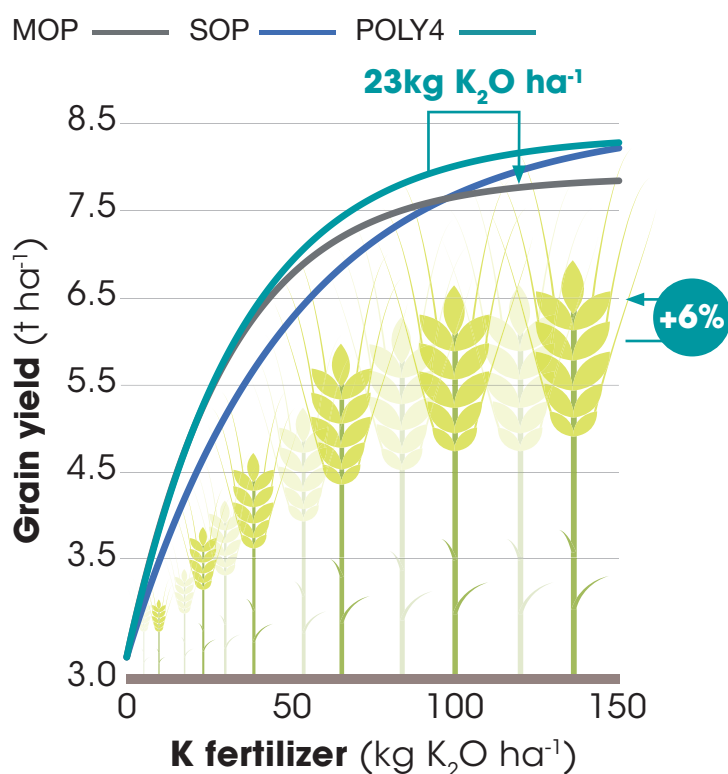
# METHODOLOGY

- In this trial, barley was grown on two sites that previously grew grass on one and corn on the other.
- The trial design at both sites was a randomised block with four replications.
- According to local practice all P and K fertilizers were applied as a basal application before drilling. The N fertilizer application was split (30 kg N ha<sup>-1</sup> basal application and 120 kg N ha<sup>-1</sup> applied one month after drilling).

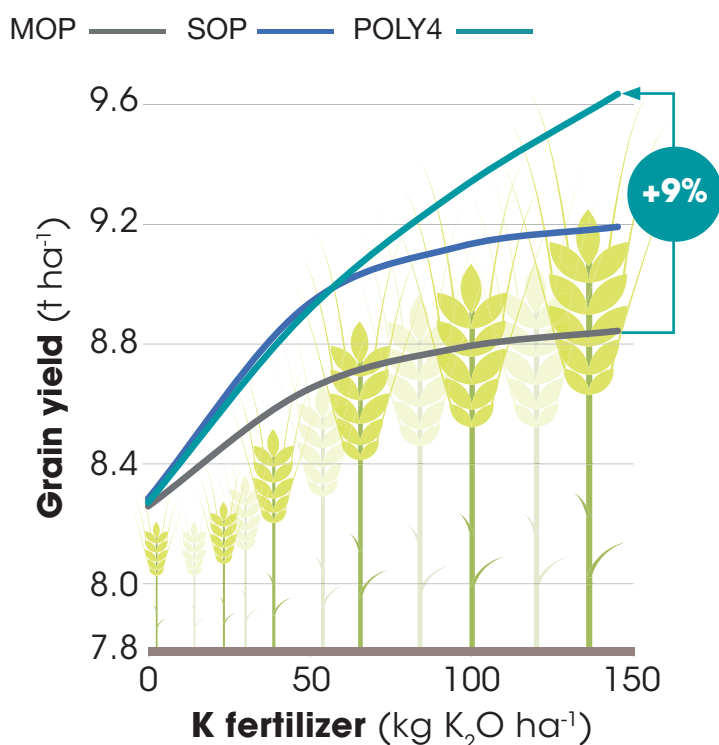


## PREVIOUSLY GRASS-GROWING SITE

- Even though all K fertilizers significantly increased yield, POLY4 fertilization achieved the highest yield at all fertilizer rates.
- Low K availability at zero application rate resulted in brackling contributing to yield loss.
- Fertilization with MOP did not match the yield achieved by POLY4, even when K inputs exceeded recommended rates. POLY4 yield was 6% higher than MOP.
- Fertilization with SOP only matched the yield achieved with POLY4 when it was applied above the recommended  $K_2O$  rate.
- To achieve 8 t ha<sup>-1</sup> yield increase, the barley crop needed an extra 23 kg  $K_2O$  ha<sup>-1</sup> as SOP compared to POLY4.
- POLY4 supplied additional S compared to MOP and SOP. In addition, POLY4 supplied Mg and Ca with all nutrients available simultaneously in one product.



## PREVIOUSLY CORN-GROWING SITE



- The POLY4 yield at the highest application rate was 0.5 t ha<sup>-1</sup> greater than SOP and 0.8 t ha<sup>-1</sup> greater than MOP.
- Barley fertilized with POLY4 and SOP achieved higher yield compared to MOP. The yield increase can be attributed to an S response.
- The SOP and POLY4 yields were similar when <60 kg K<sub>2</sub>O ha<sup>-1</sup> were applied. However, the POLY4 yield continued to increase at high K<sub>2</sub>O rates.
- POLY4 supplied additional S compared to MOP and SOP. In addition, POLY4 supplied Mg and Ca with all nutrients available simultaneously in one product.

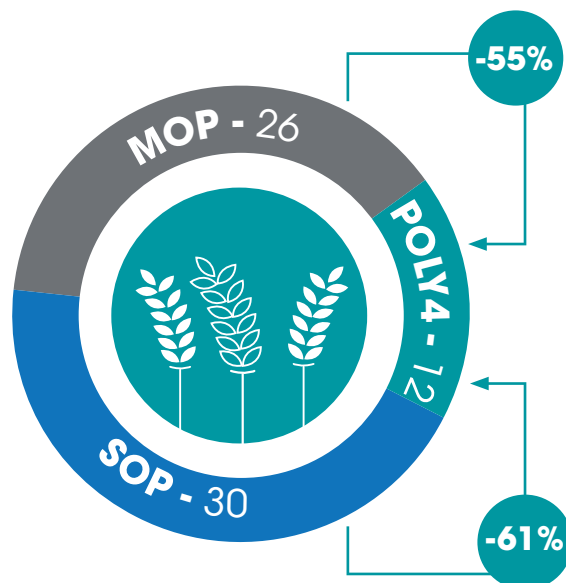




# BRACKLING AND STRAW STRENGTH<sup>5,6,7,10</sup>

- Straw characteristics, such as a high brackling score in barley, can have negative effects including decrease in yield, deterioration of grain quality and increase in costs due to difficulties at harvest. Brackling, which happens in the top-third of the stem, is a form of lodging where the mature stem buckles and breaks.
- Potassium increases straw strength improving resistance to brackling.
- All K fertilizers reduced brackling. However, POLY4-fertilized barley had 55-61% less brackling than other potassium fertilizers.

## BRACKLING SCORE (%)



Notes: 1) FAOSTAT 2017; 2) Based on FAOSTAT data between 2006-2016; 3) Teagasc (2018); 4) Recommendations based on soil analysis from: Major and Micro Nutrient Advice for Productive Agricultural Crops (4th Edition, 2016); 5) All plots received 150 kg N ha<sup>-1</sup>, 122 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> and 144 kg CaO ha<sup>-1</sup> from CAN and TSP; 6) GENSTAT regression; 7) Initial soil analysis for ex-grass site: pH 6.3, 2 mg P kg<sup>-1</sup>, 17 mg K kg<sup>-1</sup>; 8) Initial soil analysis for ex-corn site: pH 6.6, 4 mg P kg<sup>-1</sup>, 56 mg K kg<sup>-1</sup>; 9) Based on soil analysis, K fertilizer recommendations would identify the grass site as an index 1 and the corn site an index 2 according to Major and Micro Nutrient Advice for Productive Agricultural Crops, Teagasc, Wexford (4th edition, 2016); 10) K<sub>2</sub>O application rate was 96 kg K<sub>2</sub>O ha<sup>-1</sup>.

Source: Teagasc (2017) 65000-TEAG-65011-17

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