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SIRIUS MINERALS PLC

BRACKLING OF A BARLEY CROP FERTILIZED WITH POLY4 AND OTHER K FERTILIZERS

ASA & CSSA Annual Meeting 2018

Enhancing productivity in a changing climate

Presentation by Ross Mitchell

6 November 2018

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POLY4 GLOBAL AGRONOMY OVERVIEW

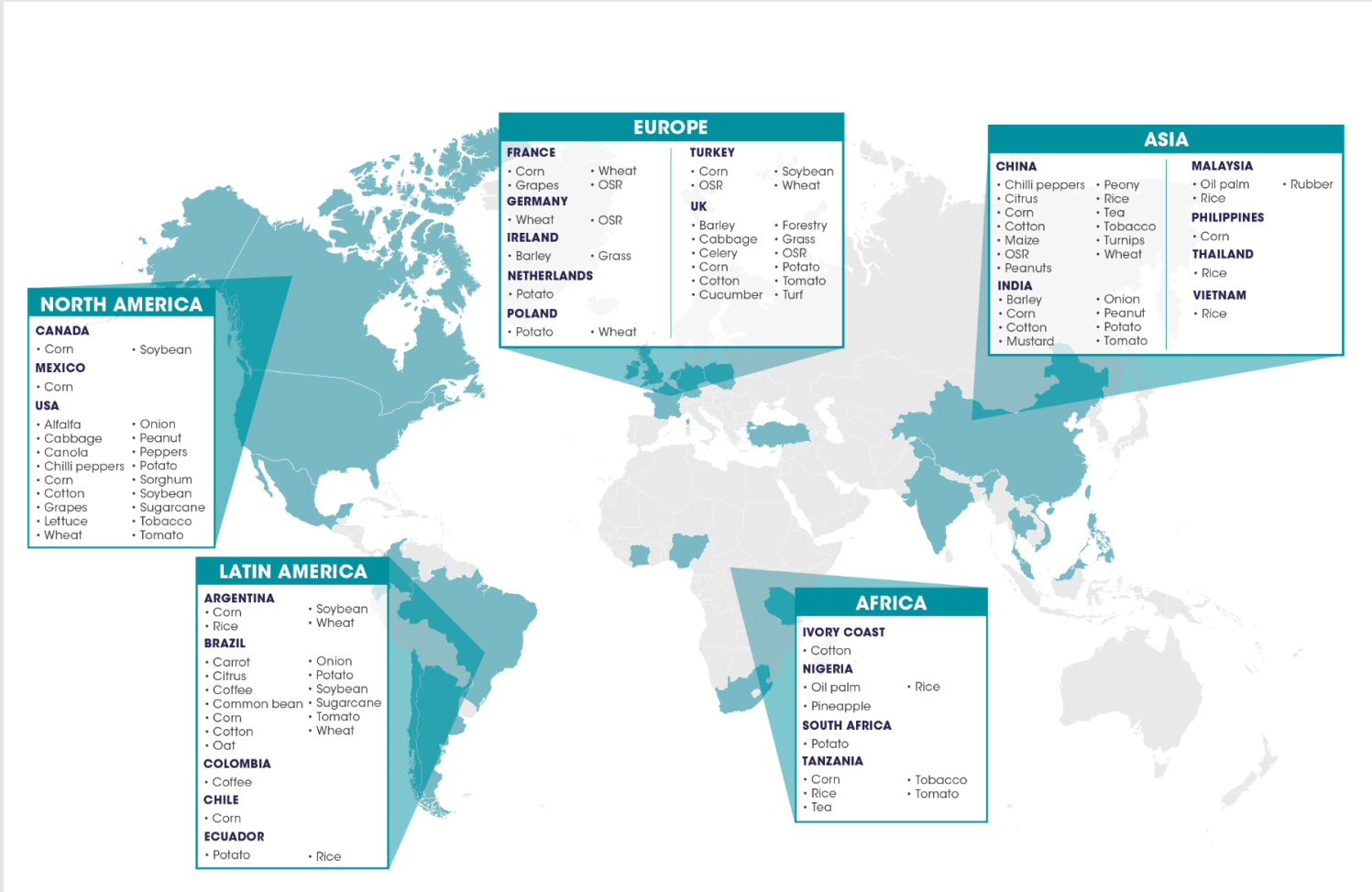
SIRIUS MINERALS R&D PROGRAMME

Trials
339

Crops
36

Countries
25

Collaborators
119



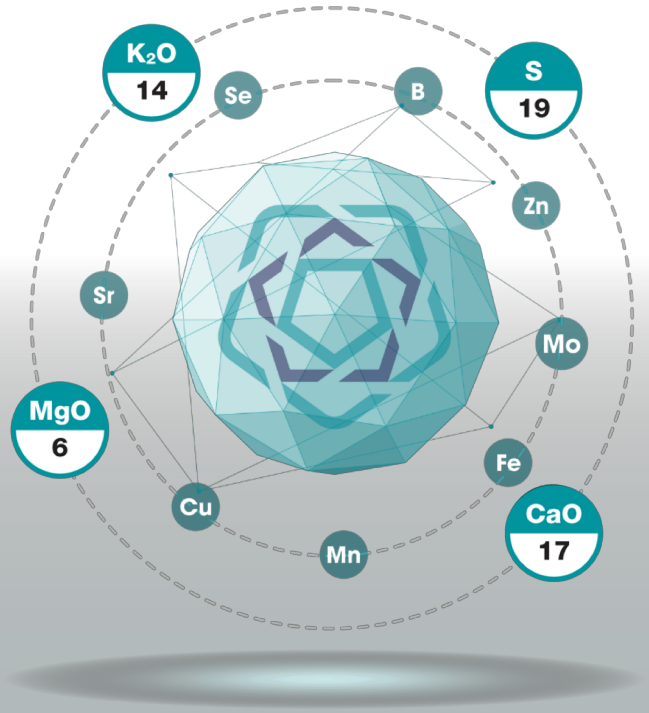
Notes: Trials as of September 2018

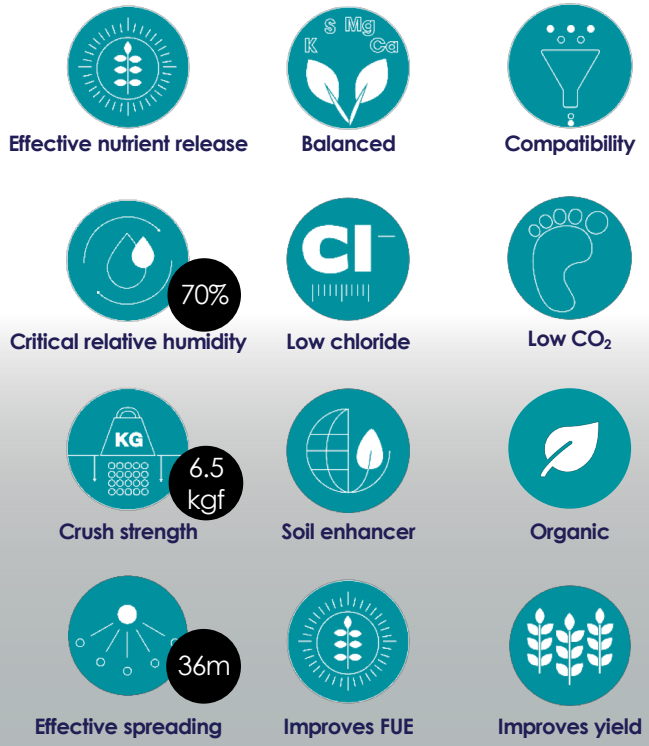
INTRODUCING POLY4

A single source of bulk nutrients as foundation for effective, efficient, flexible and sustainable fertilization.

Characteristics

- Improves yield and quality
- Straight or as part of a fertilizer blend
- Efficient nutrient release profile
- pH neutral





Notes: 1) Based on 90% polyhalite grade. Macro nutrients based on w/w % and micro nutrients based on mg kg^{-1}; micro nutrients' content: B 169, Zn 1.9, Mn 3.1, Mo 0.3, Se>0.5, FE>0.5, Cu 1.1, Sr 1414; 2) POLY4 is the trademark name for polyhalite products from the Sirius Minerals polyhalite project in North Yorkshire, *48% SO_3. B – boron, Cu – copper, Se – selenium, Zn – zinc, Fe – iron, Sr – strontium, Mo – molybdenum, Mn – manganese.

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BRACKLING OF A BARLEY CROP

INTRODUCTION AND TRIAL DESCRIPTION: 2017

Treatment[1]	N	P_2O_5	K_2O	CaO	MgO	S	Cl
N + P + Ca (control)	150	121	0	144	0	0	0
MOP	150	121	48 – 241	144	0	0	38 –115
SOP	150	121	48 – 241	144	0	17 – 52	3 – 9
POLY4	150	121	48 – 145	202 – 317	20 – 61	65 – 195	10 – 31

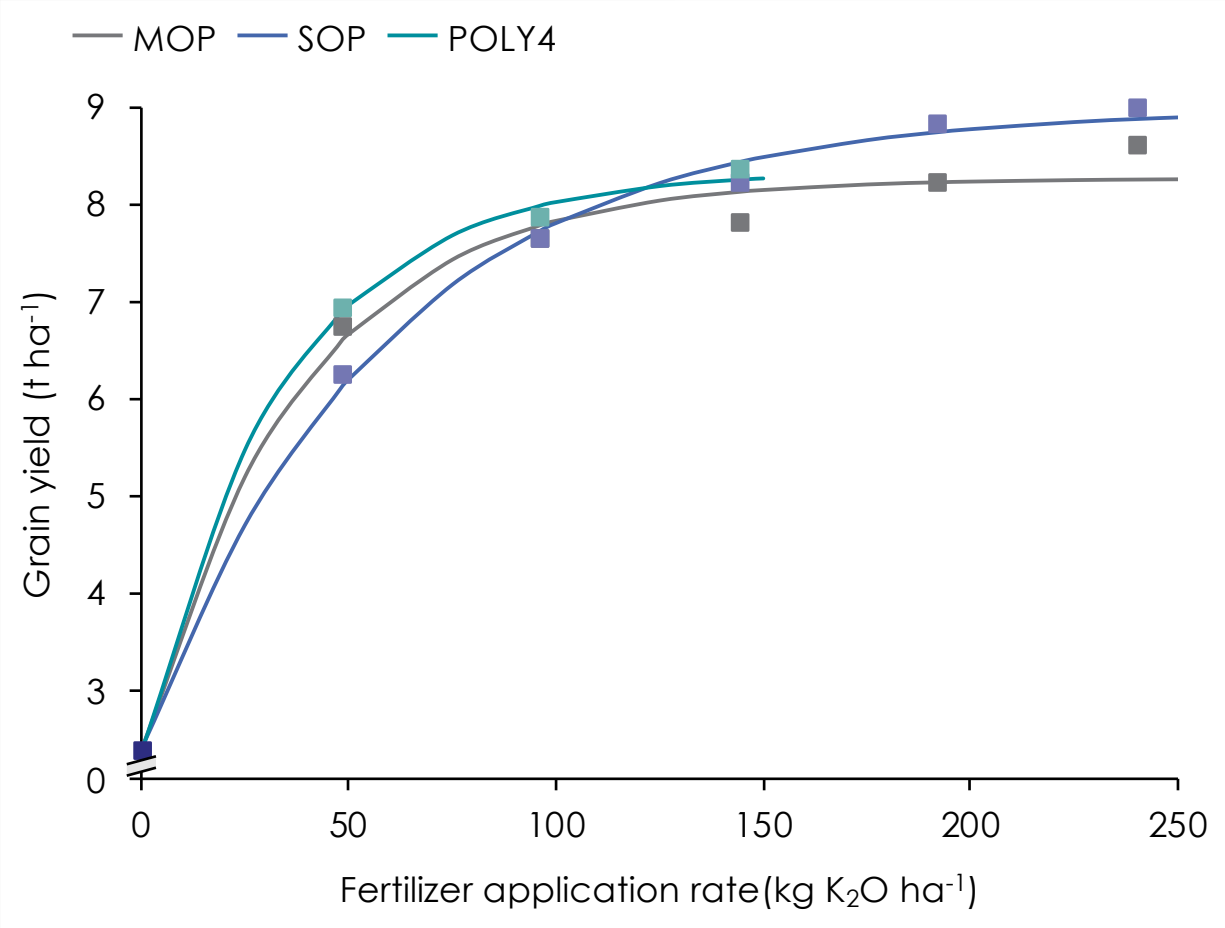
- Irish farmers typically apply K and are beginning to use S for their barley crops. Local recommendations for both sites were 133 kg K_2O ha^{-1} and 20 kg S ha^{-1}
- K inputs were supplied by muriate of potash (MOP), sulphate of potash (SOP) and POLY4.[1] Each K fertilizer added 48, 96 or 144 kg K_2O ha^{-1}. MOP and SOP were also applied at greater rates
- The trial was repeated on two sites with four replicates in randomised blocks. Only one site brackled. Data from this site only is presented

KEY TAKEAWAY: **POLY4 AS A MULTI-NUTRIENT FERTILIZER FOR SPRING BARLEY IN IRELAND**

Notes: 1) All plots received 150 kg N ha^{-1},122 kg P_2O_5 ha^{-1} and 144 kg CaO ha^{-1} from CAN and TSP. Fertilizer analysis: MOP = 60% K_2O, 48% Cl; SOP = 50% K_2O, 18% S, 3% Cl; POLY4 = 14% K_2O, 17% CaO, 6% MgO19% S, Cl 3%; 2) Recommendations based on soil analysis from: Major and Micro Nutrient Advice for Productive Agricultural Crops (4th Edition, 2016); 3) Initial soil analysis for ex-grass site: pH 6.3, 2 mg P kg^{-1}, 17 mg K kg^{-1}; 4) Initial soil analysis for ex-corn site: pH 6.6, 4 mg P kg^{-1}, 56 mg K kg^{-1}.
Source: Teagasc (2017) 65000-TEAG-65011-17.

YIELD RESPONSE

- Yield responsive to K fertilizer
- Advantage of applying K and S
- Small yield advantage for POLY4



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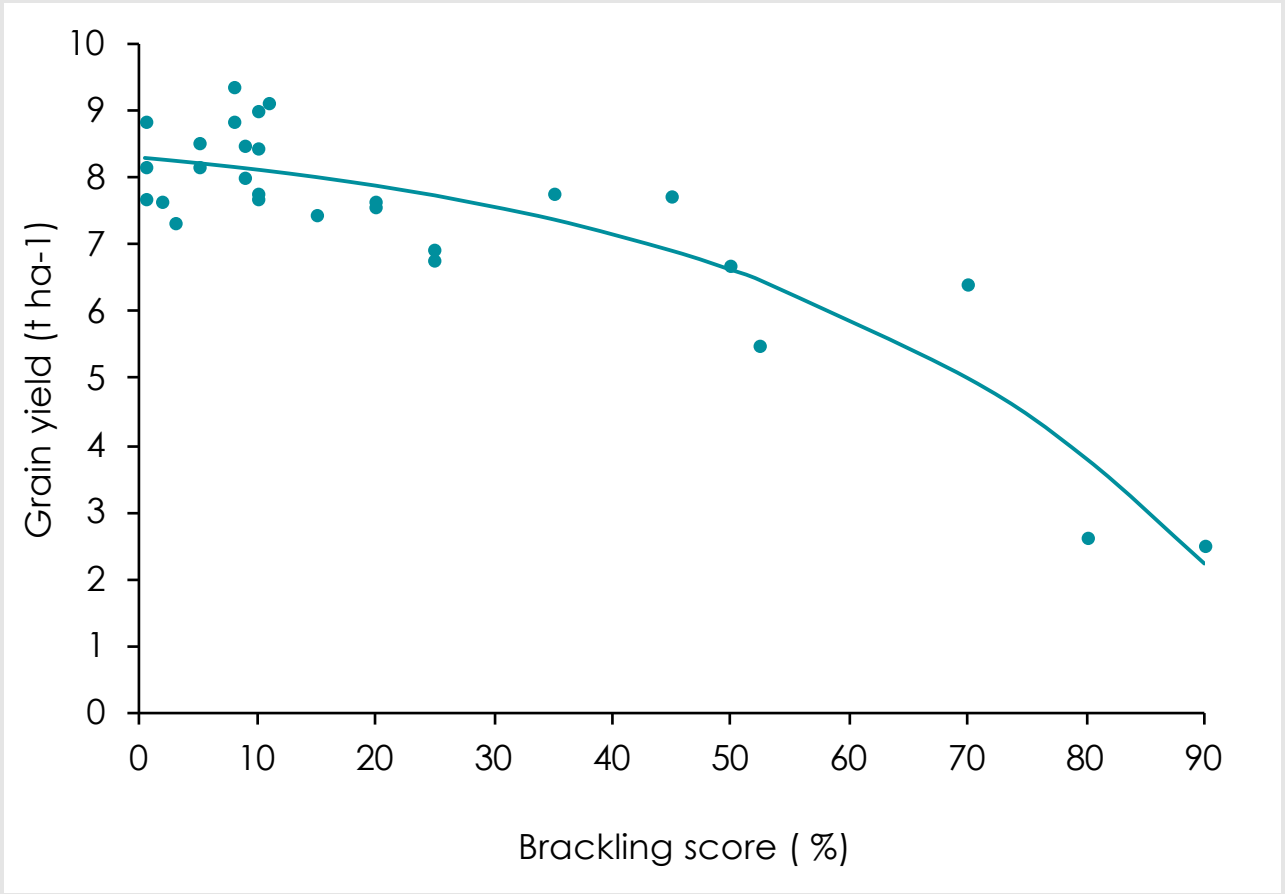
BARLEY YIELD AND BRACKLING

- More K ➡ more yield
- More K ➡ less brackling



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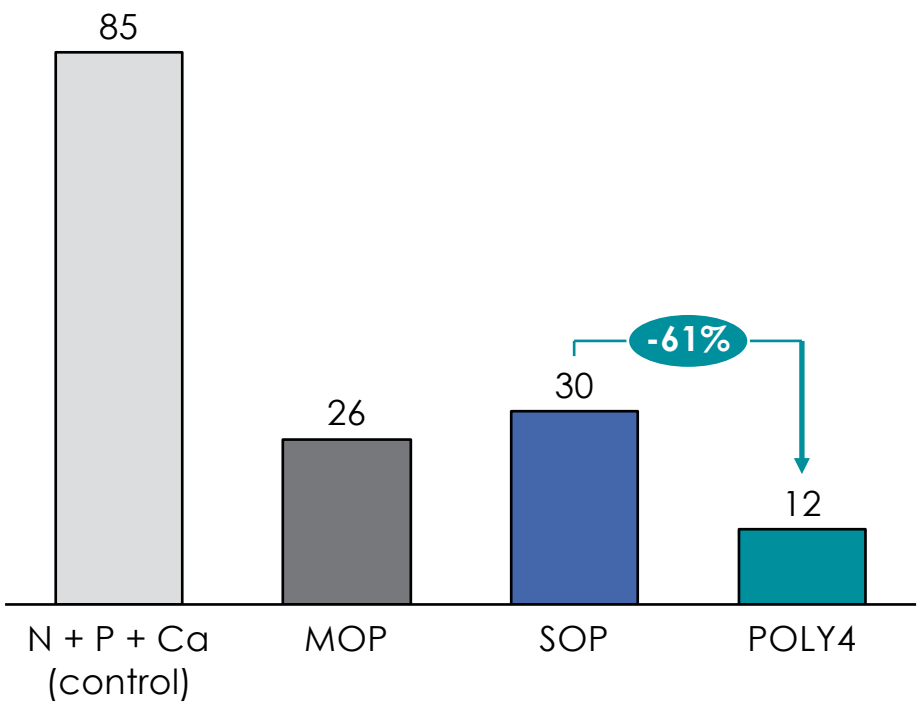
AGRONOMY: BRACKLING

Brackling score (%)[1,2]



- Brackling is when the stem buckles, but not at the base or top
- Brackling can: decrease yield, cause deterioration of grain quality, and increase cost and difficulty of harvest
- Potassium increases straw strength so contributes to better resistance to brackling
- All K fertilizers significantly reduced brackling
- POLY4-fertilized barley had 55-61% less brackling than other potassium fertilizers

KEY TAKEAWAY: **POLY4-FERTILIZED BARLEY HAD LESS BRACKLING.**

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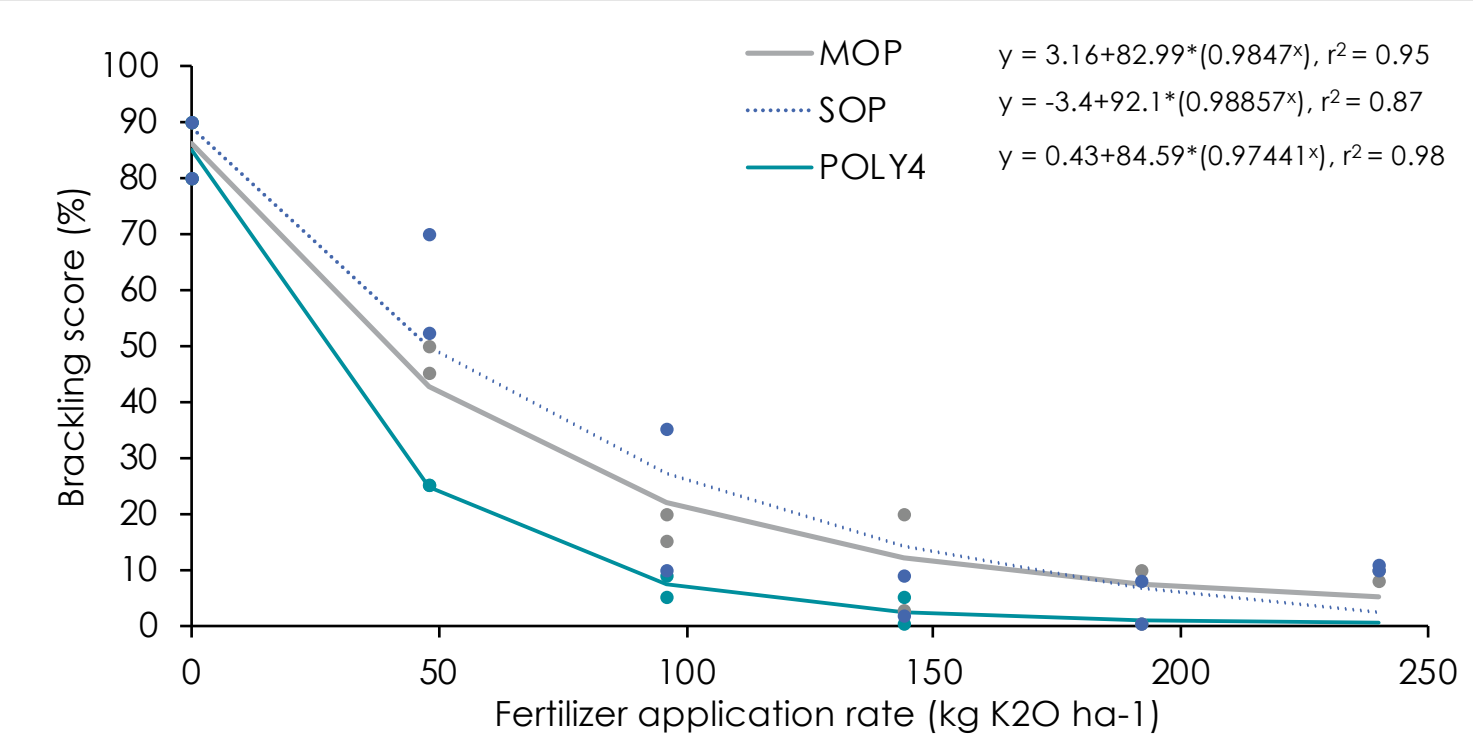
BRACKLING

- Less brackling when more K fertilizer was applied.
- Little difference in brackling when MOP or SOP are the K fertilizer.
- At the same K rate there was less brackling when POLY4 was applied.



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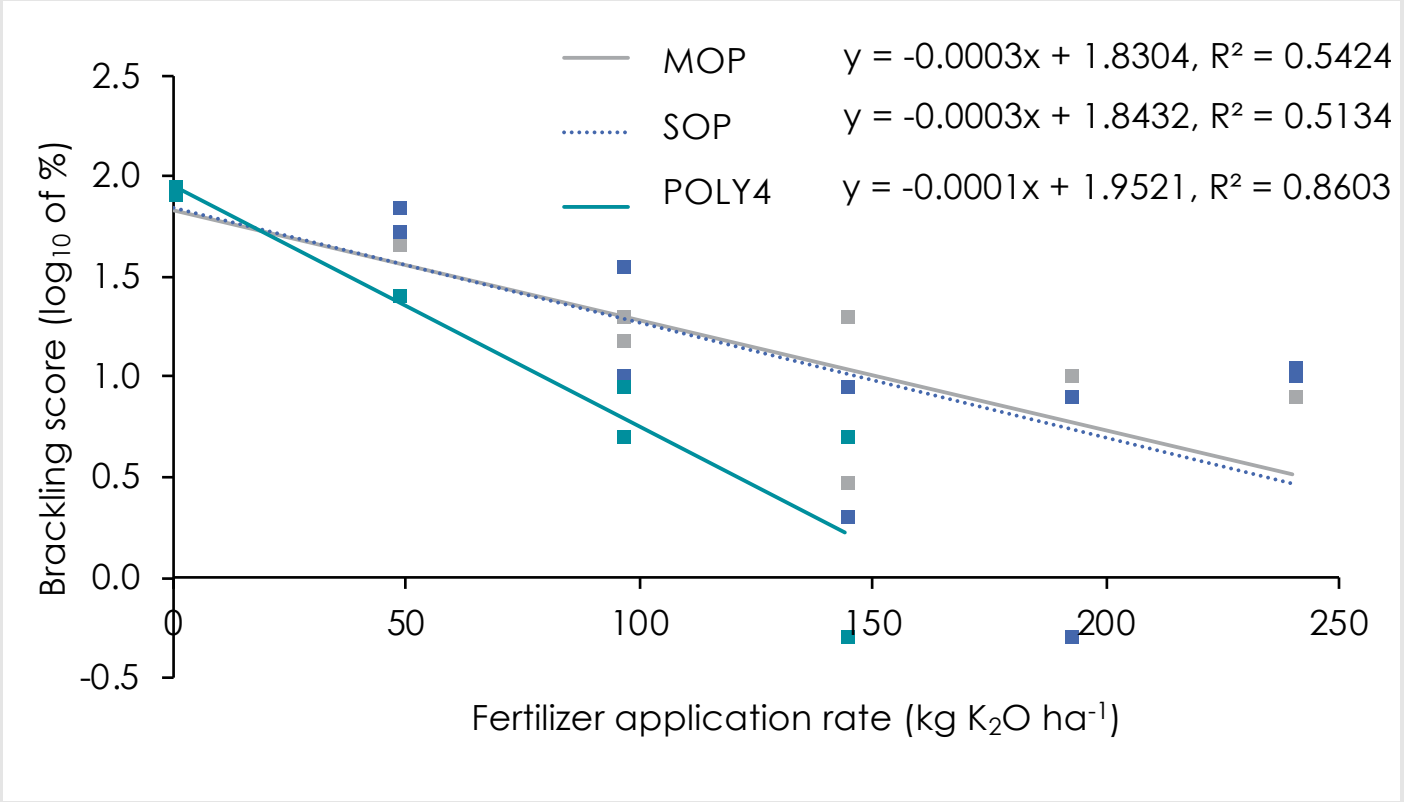
BRACKLING

- Same data – log scale



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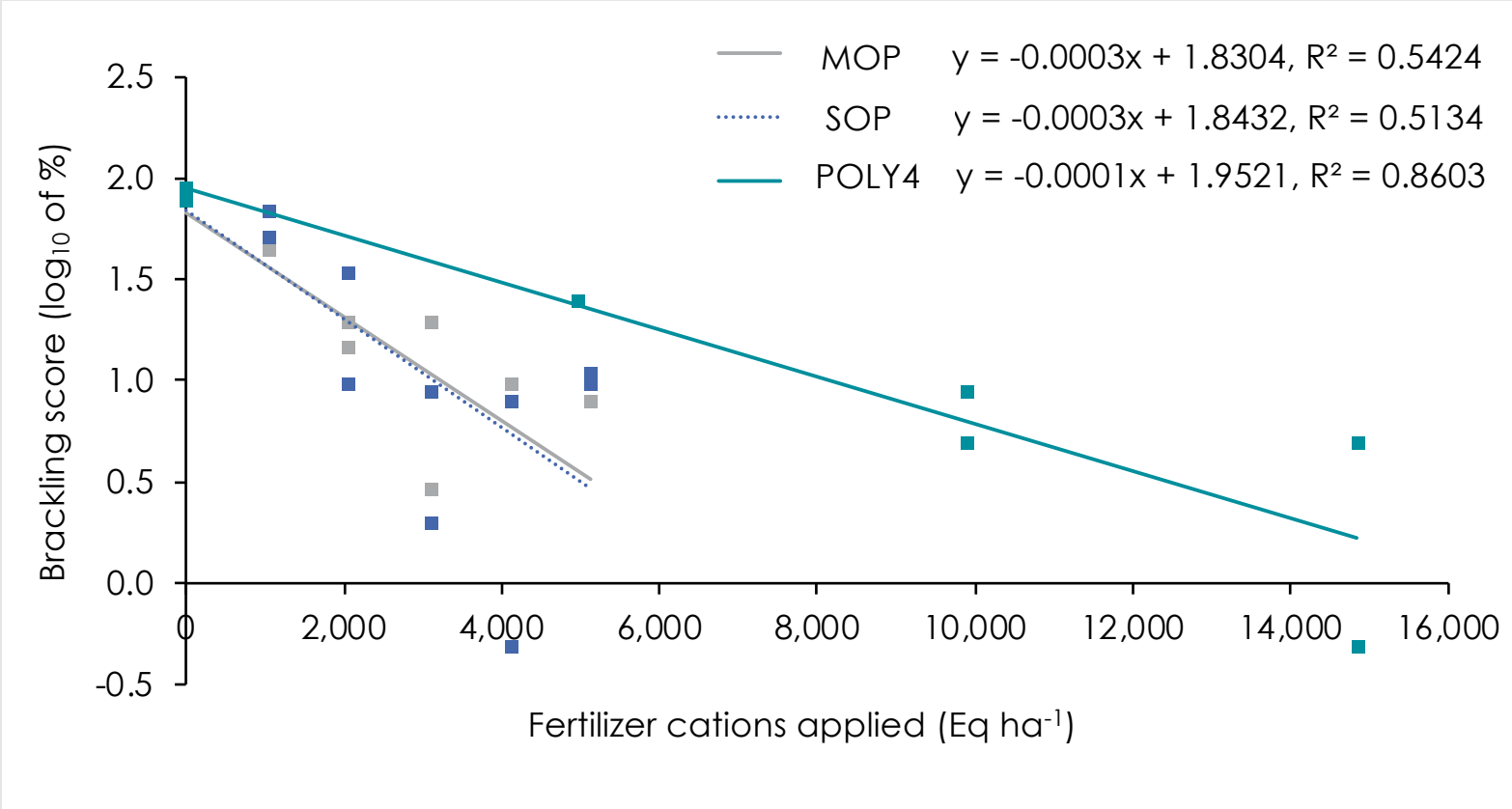
BRACKLING

- Do other cations contribute to less brackling?
- NB: Ca added to all treatments with N fertilizer
- POLY4 added extra cations (Mg and more Ca) and there was less brackling
- K was more effective



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CONCLUSIONS

- POLY4 added extra nutrients and had greater yields
- POLY4 added extra cations and had less brackling
- K was the most effective cation at reducing brackling

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THANK YOU

Any questions please contact:

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