POLY4

TRIAL RESULTS

TOBACCO

VIRGINIA, USA (2016)

HIGHLIGHTS

POLY4 improved tobacco yield.

POLY4 increased tobacco quality including increased cured leaf K uptake of 9%.

The POLY4 fertilizer programme was more financially efficient than the standard programme increasing financial margin by US$355/ha.

POLY4 increased efficiency of fertilizer expenditure by 68%.

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TRIAL OBJECTIVE

To evaluate POLY4 in a commercial fertilizer programme for tobacco production in Virginia, USA.

OVERVIEW

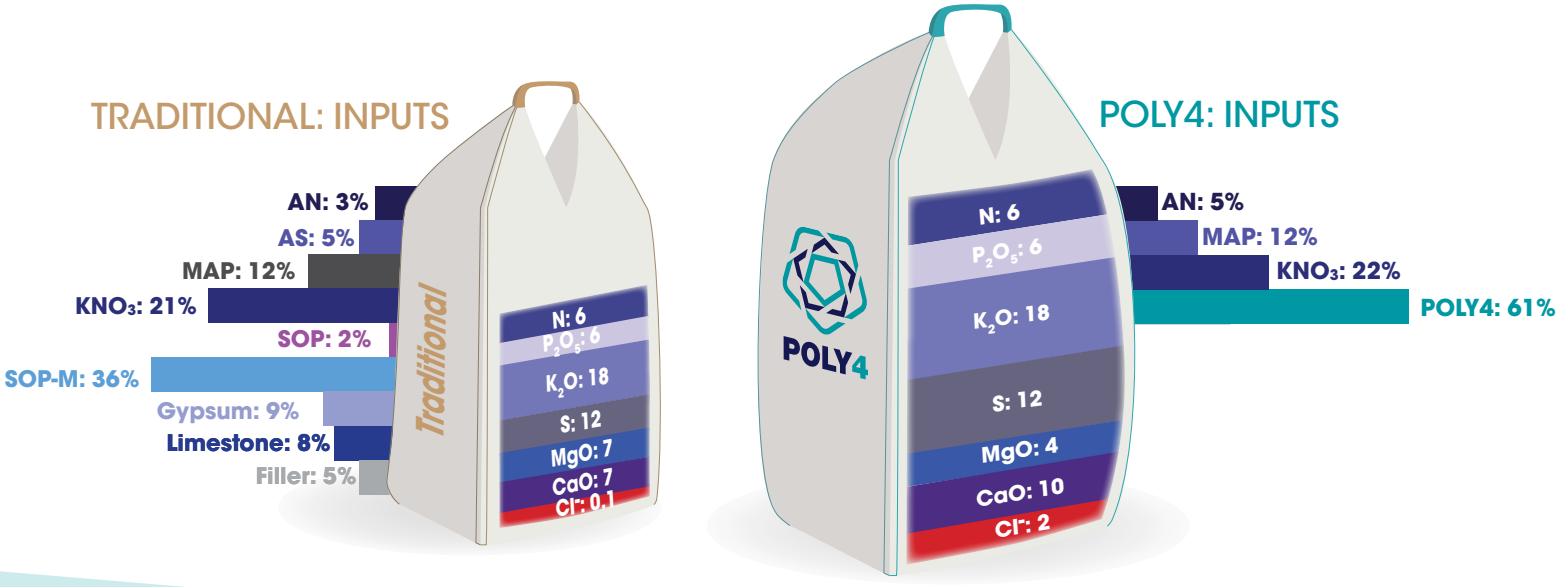
PARTNER: VIRGINIA TECH
LOCATION: VIRGINIA, USA
YEAR: 2016

- The United States has the fourth largest tobacco harvest in the world.[1]
- Virginia is the third largest tobacco producer in the United States.[2] In 2016, Virginia harvested 52 million tonnes of tobacco.[2]
- Tobacco has a large K requirement and is responsive to K fertilizer.
- The quality of tobacco can be degraded by excessive chloride in fertilizer.
- An opportunity exists for POLY4 to be a component of a blend for chloride sensitive crops such as tobacco.
- This trial compared a POLY4-based fertilizer programme with a typical local programme using similar nutrients.
- Treatments were replicated four times in a randomised block design.

TREATMENT TABLE[3]

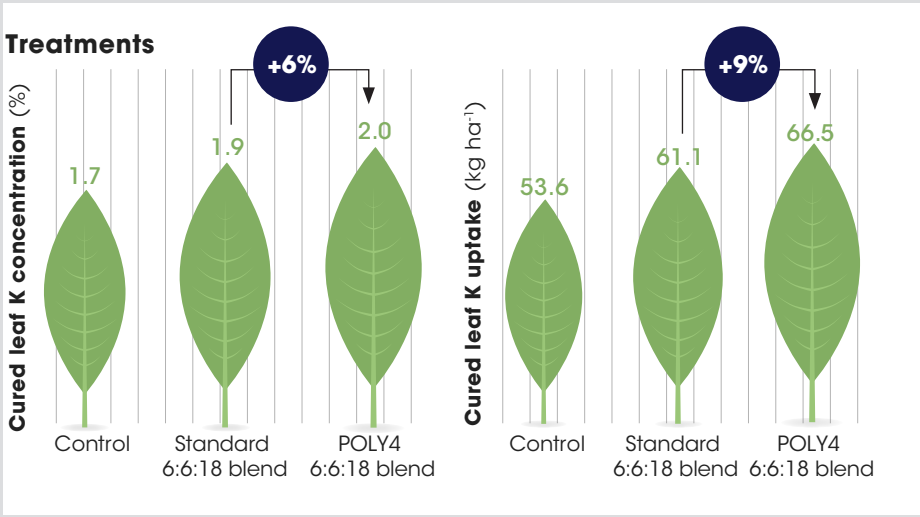
TREATMENTS	AVERAGE NUTRIENTS APPLIED (kg ha^{-1})						
	N	P_2O_5	K_2O	CaO	MgO	S	Cl^-
Control	50	50	0	0	0	0	0
Standard 6:6:18 blend	50	50	150	53	54	95	1
POLY4 6:6:18 blend	50	50	150	84	31	97	15

NPK ANALYSIS OF 6:6:18 BLEND

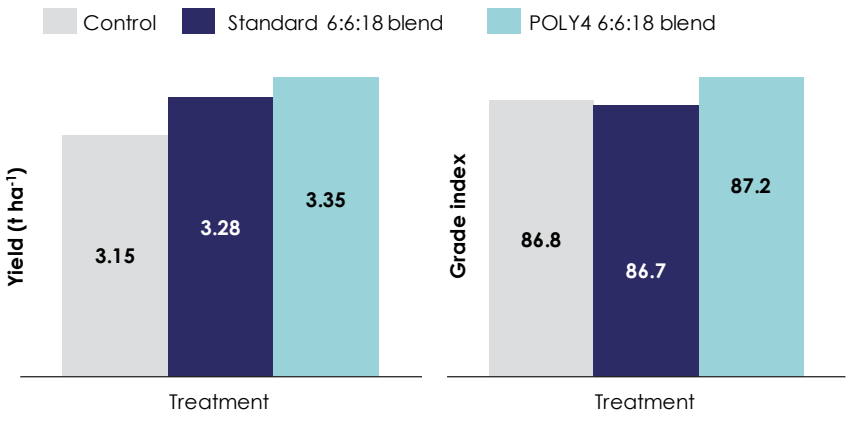


LEAF POTASSIUM CONCENTRATION AND UPTAKE[4,5]

- A key indicator of tobacco quality is the speed of leaf burning. Application of POLY4 6:6:18 blend provided the best quality tobacco, which in turn can positively impact the crop's economic value.
- The use of POLY4 increased both leaf K concentration by 6% and total K uptake into tobacco leaves by 9% compared to the standard 6:6:18 blend.



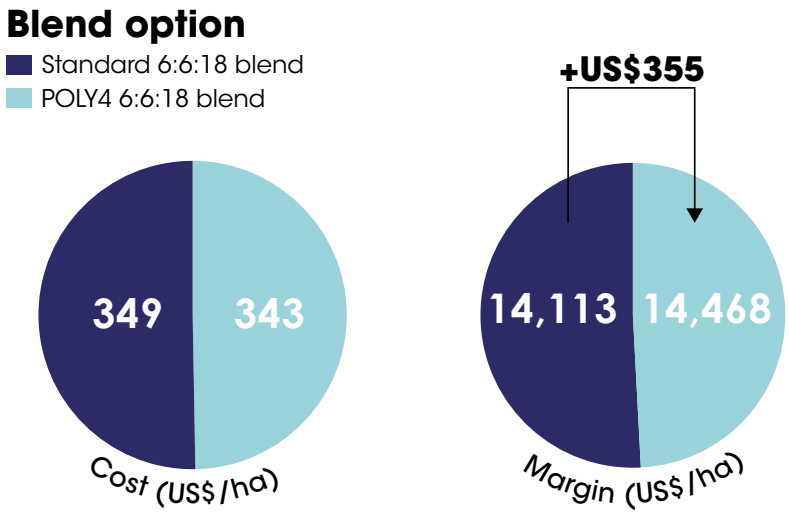
YIELD AND GRADE INDEX[4,5,10]

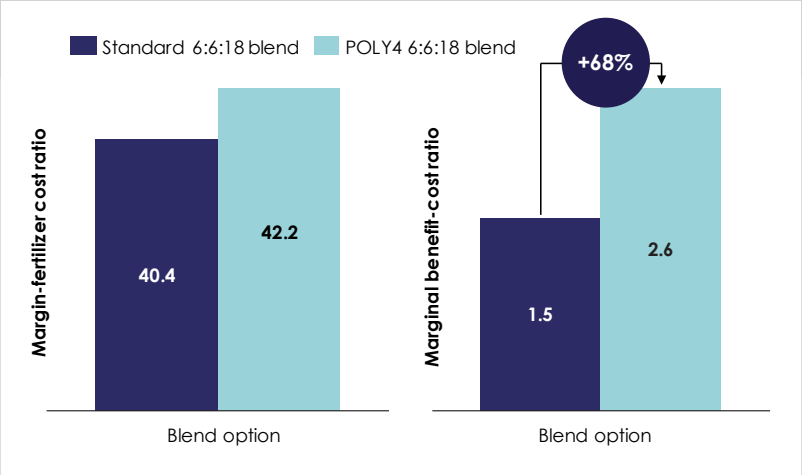


- Application of POLY4 blend increased the marketable leaf yield compared to the standard blend fertilizer treatments.
- Grade index measures tobacco quality on a scale of 1 to 100, with 100 representing the highest quality. The fertilizer mixture containing POLY4 had a greater tobacco grade index.

COST AND MARGIN[4,7,11]

- The POLY4 blend reduced the cost of the fertilizer programme by US$6/ha compared to the standard blend.
- The POLY4 fetilizer programme increased crop yield and deliverd a greater financial margin of US$355/ha.





MARGIN-FERTILIZER COST AND MARGINAL BENEFIT-COST RATIOS[4,6,8,9,11]

- Both ratios reflect greater financial efficiency of the POLY4 fertilizer programme compared to the standard blend.

See the formula used for calculations in the notes.

Notes: 1) FAO (Food and Agricultural Organisation Statistics, 2017); 2) USDA (United States Department of Agriculture, 2017); 3) Initial soil analysis: pH 6.1; P 37 mg kg^{-1}, K 47 mg kg^{-1}, Ca 262 mg kg^{-1}, Mg 60 mg kg^{-1}, available S 5 mg kg^{-1}; 4) Results presented are based on data from GENSTAT regression analysis at K_2O rate of 150 kg ha^{-1}; 5) The Standard blend contains: sulphate of potash (SOP), sulphate of potash with magnesium (SOP-M), potassium nitrate (KNO_3), gypsum, limestone, monoammonium phosphate (MAP), ammonium nitrate and ammonium sulphate. The POLY4 blend contains: POLY4, KNO_3, MAP and ammonium nitrate. 6) Fertilizer prices based on annual prices for the US in 2016: POLY4 (US$200/t), SOP-M (US$322/t), KNO3 (US$1000/t), gypsum (US$25/t), limestone (US$25/t), MAP (US$346/t), SOP (US$716/t), ammonium nitrate (US$276/t), ammonium sulphate (US$248/t), spreading cost (US$16.16/t); 7) Net return = crop output – (cost of fertilizer material + cost of fertilizer application); 8) Margin-fertilizer cost ratio (MFCR) = margin (US$/ha) divided by fertilizer cost (US$/ha); 9) The marginal benefit cost ratios were estimated using the benefit (value of the yield) of the control as reference; 10) Grade index measures tobacco quality on a ranking scale of 1 to 100, with 100 representing the highest quality; 11) The price tobacco from FAOSTAT (US$4416/t).

Sources: Virginia Tech (2016) 23000-VIR-23016-16