Performance of polyhalite as a multi nutrient fertilizer for potato in Brazil



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Potato Production in Brazil

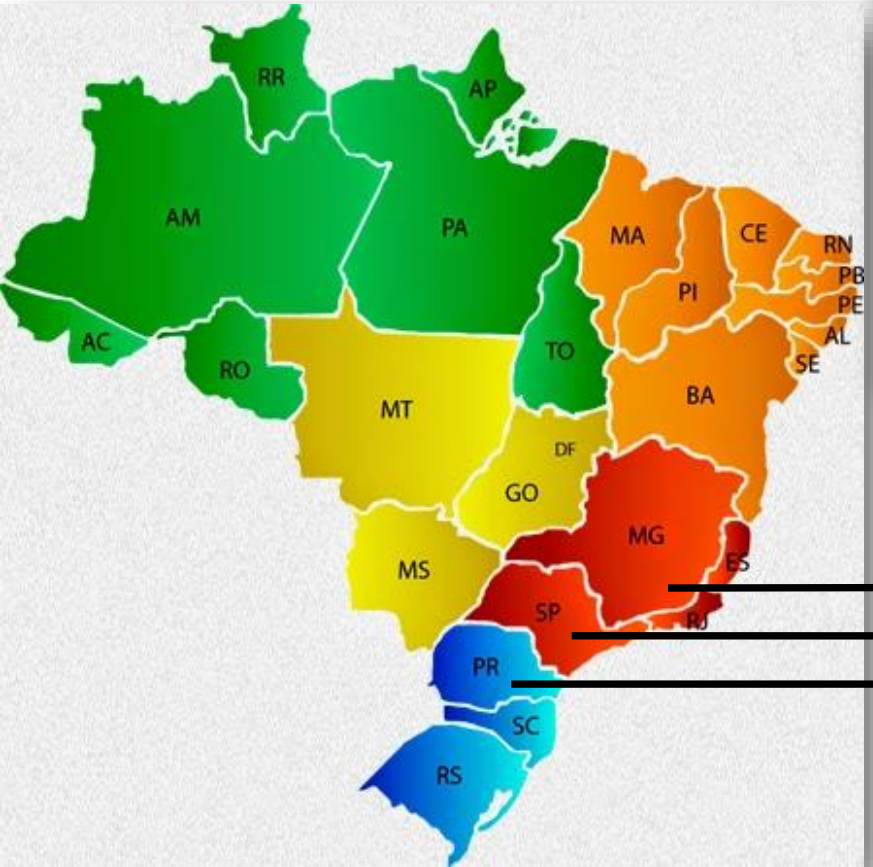
2016 -Brazilian Institute of Geography and Statistics- (IBGE)

Potato Production: 3,851.398 ton

Minas Gerais State (MG): 32.7% of total production

São Paulo State (SP): 17.3% of total production

Paraná State (PR): 21.3% of total production



Study- Potato- Tapira (MG) and Casa Branca (SP)

Soil Chemical Analysis of experimental sites

Site	pH	OM	P	K	Ca	Mg	S
		g/dm^3	mg/dm^3	$mmolc/dm^3$			mg/dm^3
Tapira	5.5	37.2	74.1	2.2	28.2	8.9	29.9
Casa Branca	4.9	18.4	4.6	1.1	14.6	4.4	3.6

Potato Varieties

Tapira (MG)

Asterix variety - Long oval uniform red tubers with yellow flesh.

French fries and processed products.

Casa Branca (SP)

Romeo variety – dark red tubers

Fried foods, baked foods and purees.

TREATMENTS	K_2O rate	Blend	N	P_2O_5	Ca	Mg	S
	----------Kg/ha----------						
Blend I	0	0	150	526	574	0	326
4-14-2 MOP + Urea + TSP + SSP	75	3750	150	526	574	0	326
4-14-4 MOP + Urea + TSP + SSP	150	3750	150	526	574	0	326
4-14-6 MOP + Urea + TSP + SSP	225	3750	150	526	574	0	326
4-14-8 MOP + Urea + TSP + SSP	300	3750	150	526	574	0	326
Blend II	0	0	150	526	65	19	102
4-14-2 Poly + Urea + MAP	75	3750	150	526	65	19	102
4-14-4 Poly + Urea + MAP	150	3750	150	526	130	39	204
4-14-6 Poly + Urea + MAP	225	3750	150	526	195	58	305
4-14-8 Poly + Urea + MAP	300	3750	150	526	260	78	407
Blend III	0	0	150	526	65	19	106
4-14-2 K_2SO_4 + Urea + MAP	75	3750	150	526	65	19	106
4-14-2 K_2SO_4 + Urea + MAP	150	3750	150	526	130	39	213
4-14-2 K_2SO_4 + Urea + MAP	225	3750	150	526	195	58	319
4-14-2 K_2SO_4 + Urea + MAP	300	3750	150	526	260	78	426

Fertilization pre-plant

Planting of potato seeds

Planting potato seeds:

Tapira: September 4th, 2015

Casa branca: July 28th, 2016

Evaluated characteristics

Soil sampling

Soil sampling for each plot: 0-20 cm

Period: pre-plant and after harvest

Chemical analysis: pH, EC, K, Ca, Mg and S

Sampling of leaves

Sampling of petioles and leaflets (Young expadend leaves)

- **Tapira (MG): 36, 63 and 84 days after planting (DAP).**
- **Casa Branca (SP): 26, 40, 57 and 71 DAP**
- **Chemical analysis – N, P, K, Ca, Mg andS**

Potato Harvest

Harvest:

Tapira: January 18th, 2016

Casa Branca: November 5th, 2016

Size of tubers:

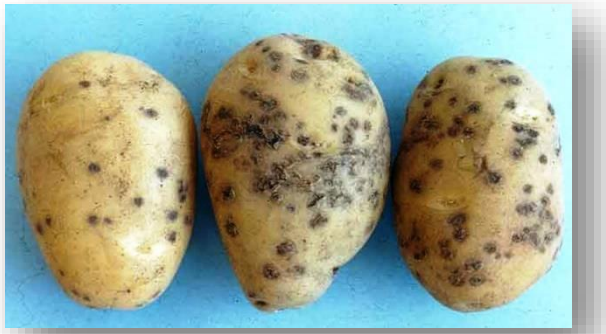
< 28 mm

28-33 mm

33-42 mm

42-70 mm

No commercial yield - Diseases



Spongospora subterranea

Streptomyces scabies

Pectobacterium carotovora **supspp.**

Meloydogyne **spp.**

No commercial yield - Physiological disturbs

Silking

Cracks

Greening

Lenticelose

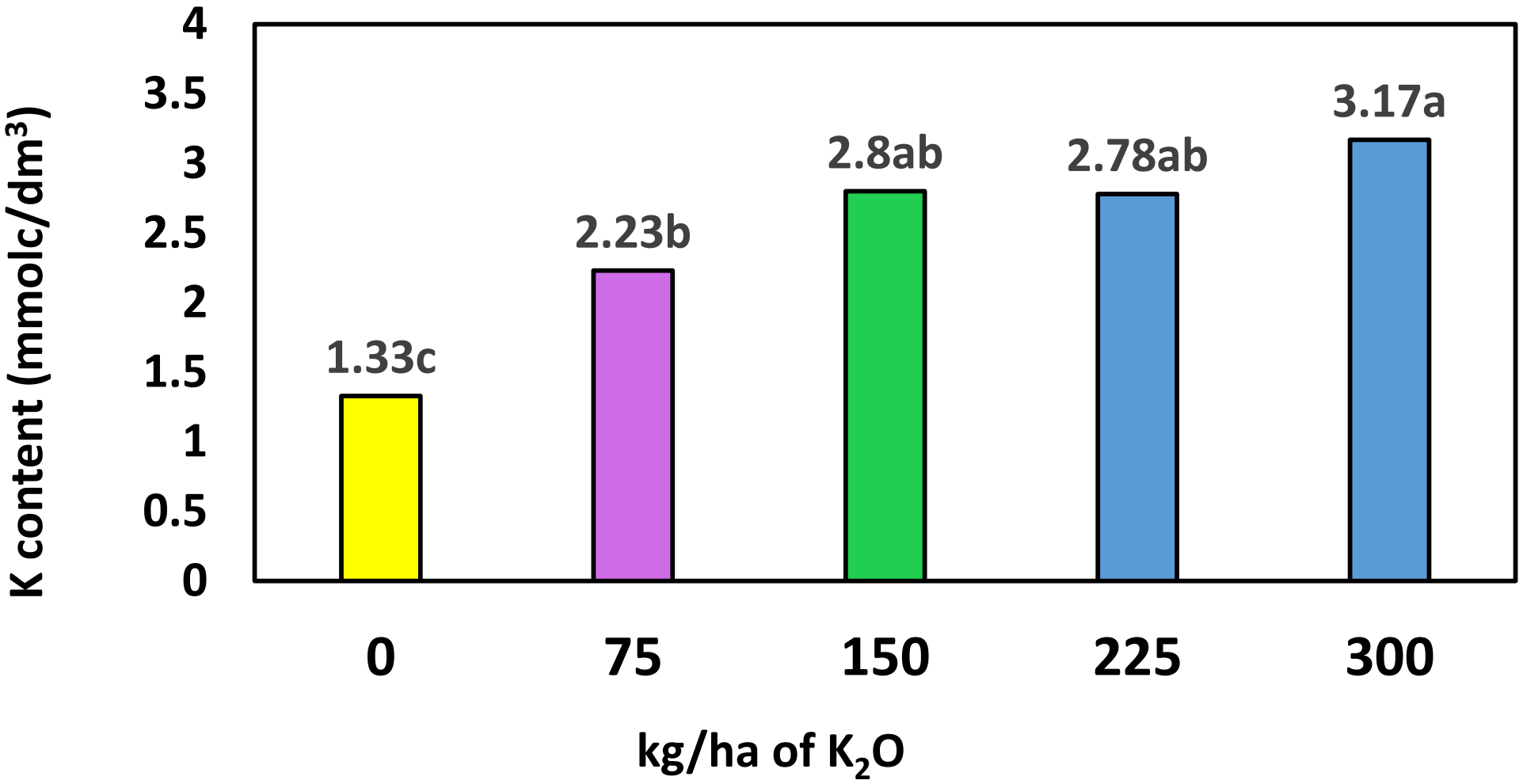
Potato quality

Qualitative characterisits:

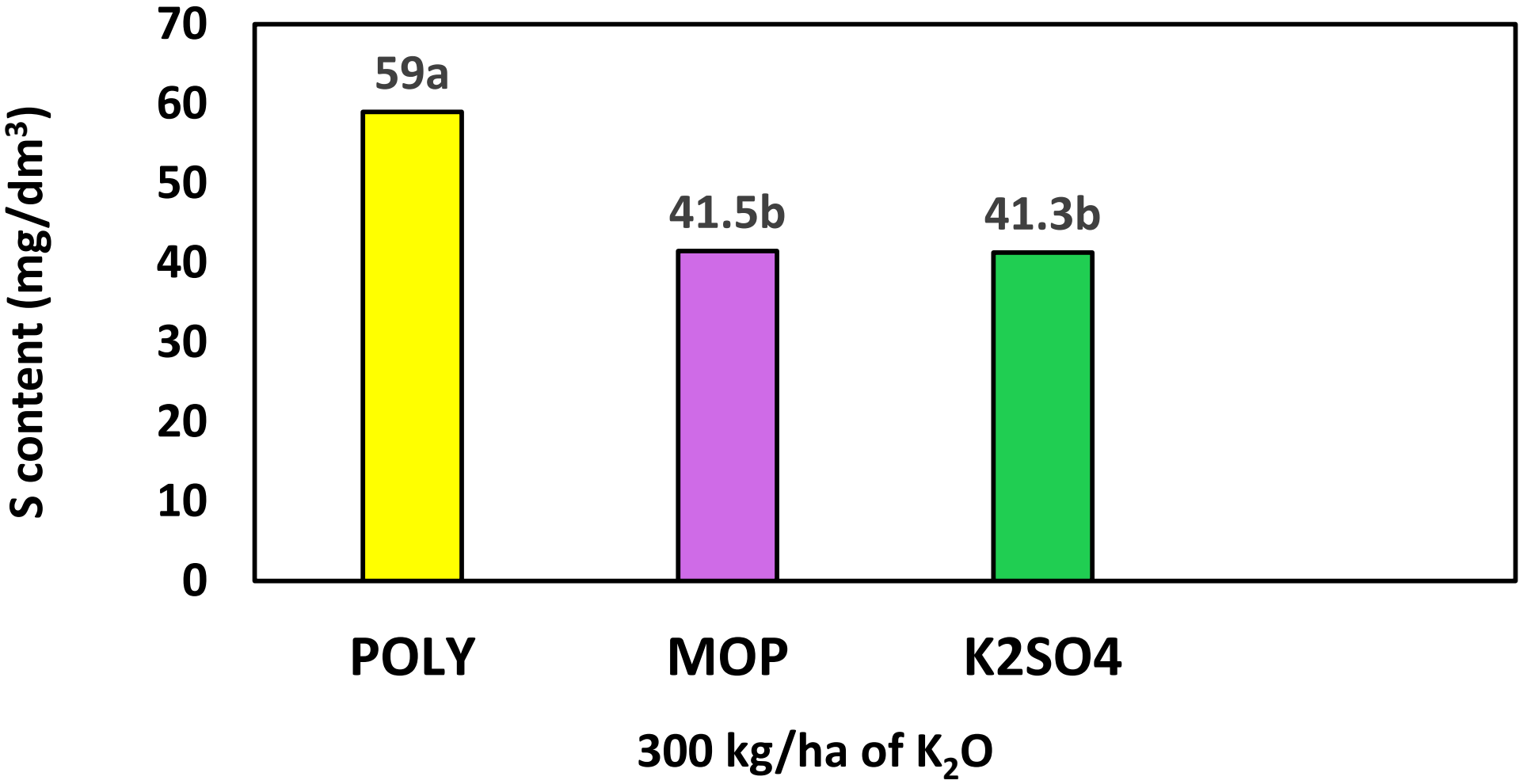
- **Starch**
- **Hardness**
- **Crunchiness**
- **Dry mass**
- **total soluble**
- **reducing sugar**
- **total soluble solids**

Results – Tapira (MG)

Soil fertility – K content

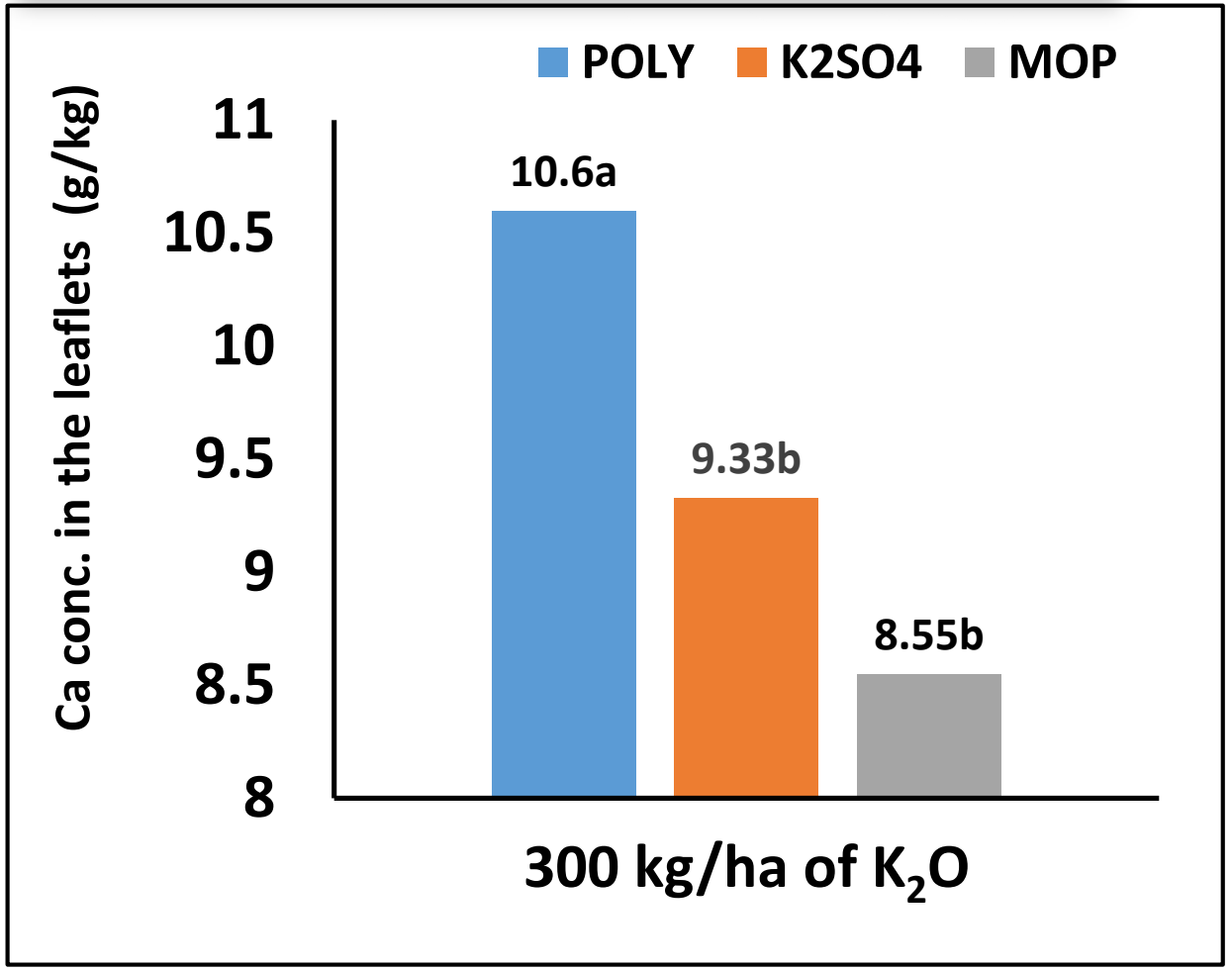


Soil fertility – S content

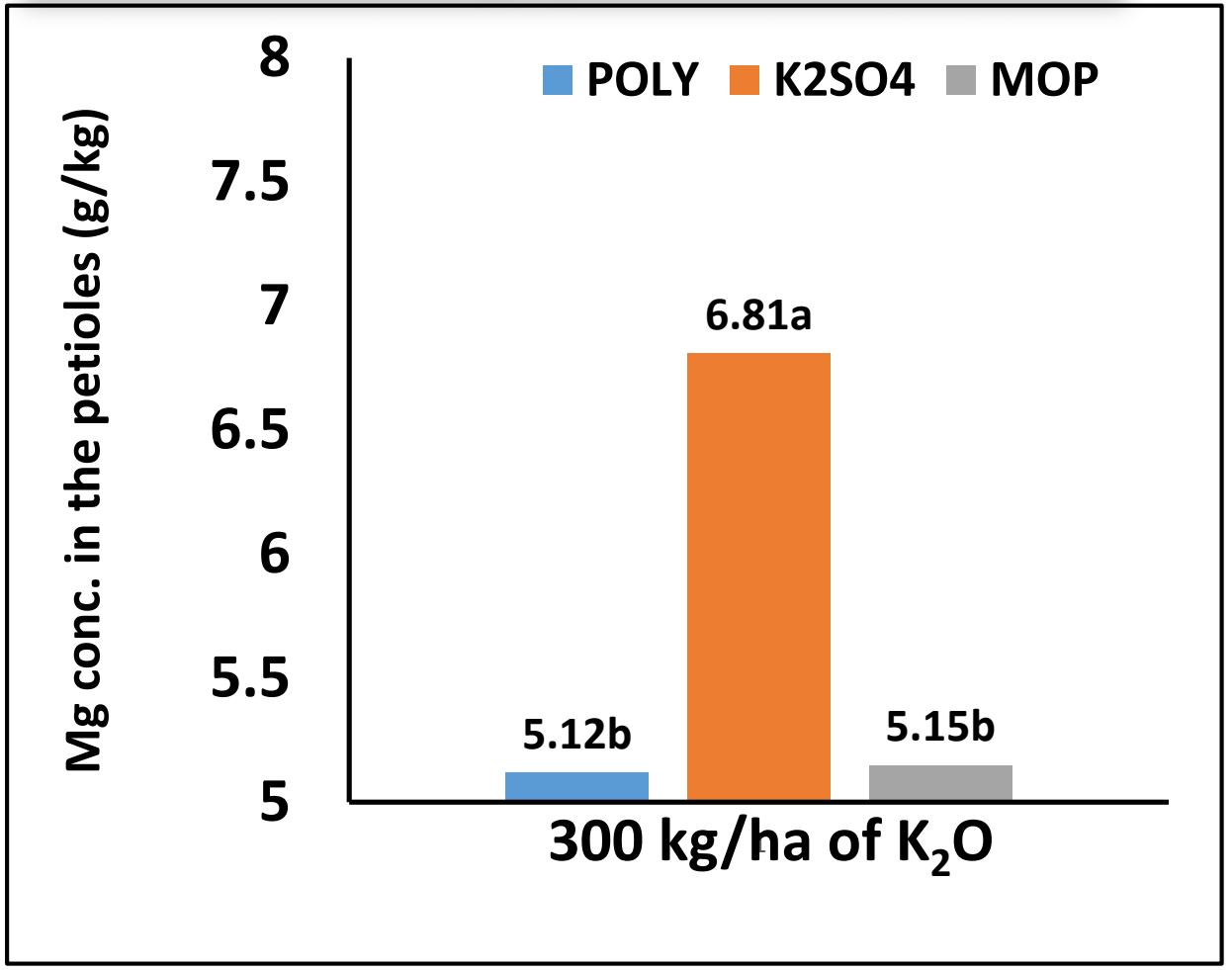


Leaf nutrient - Ca and Mg contents at 36 DAP

Interation Source X rates at 36 DAP
Ca - Leaflet

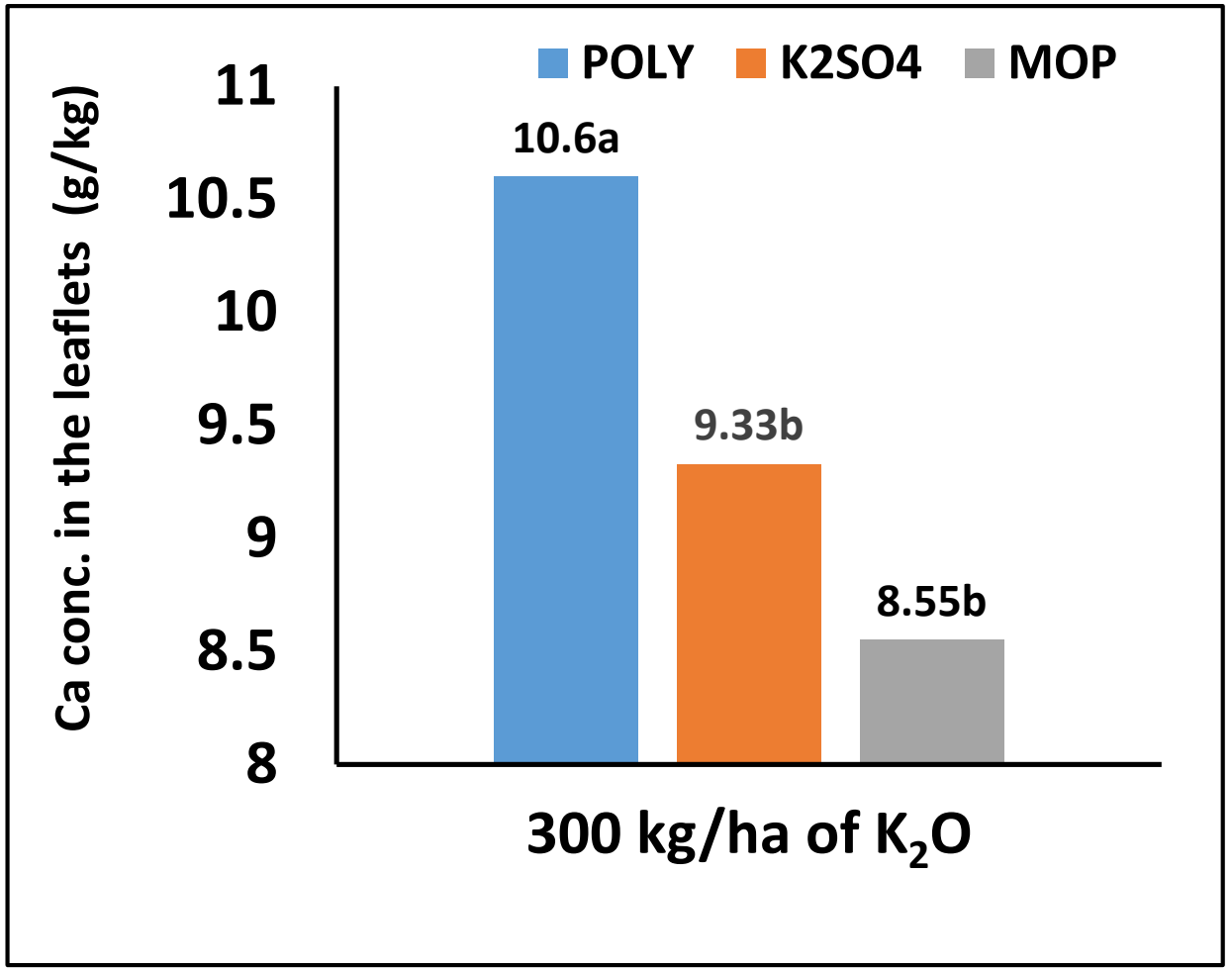


Interation Source X rates at 36 DAP
Mg - petiole

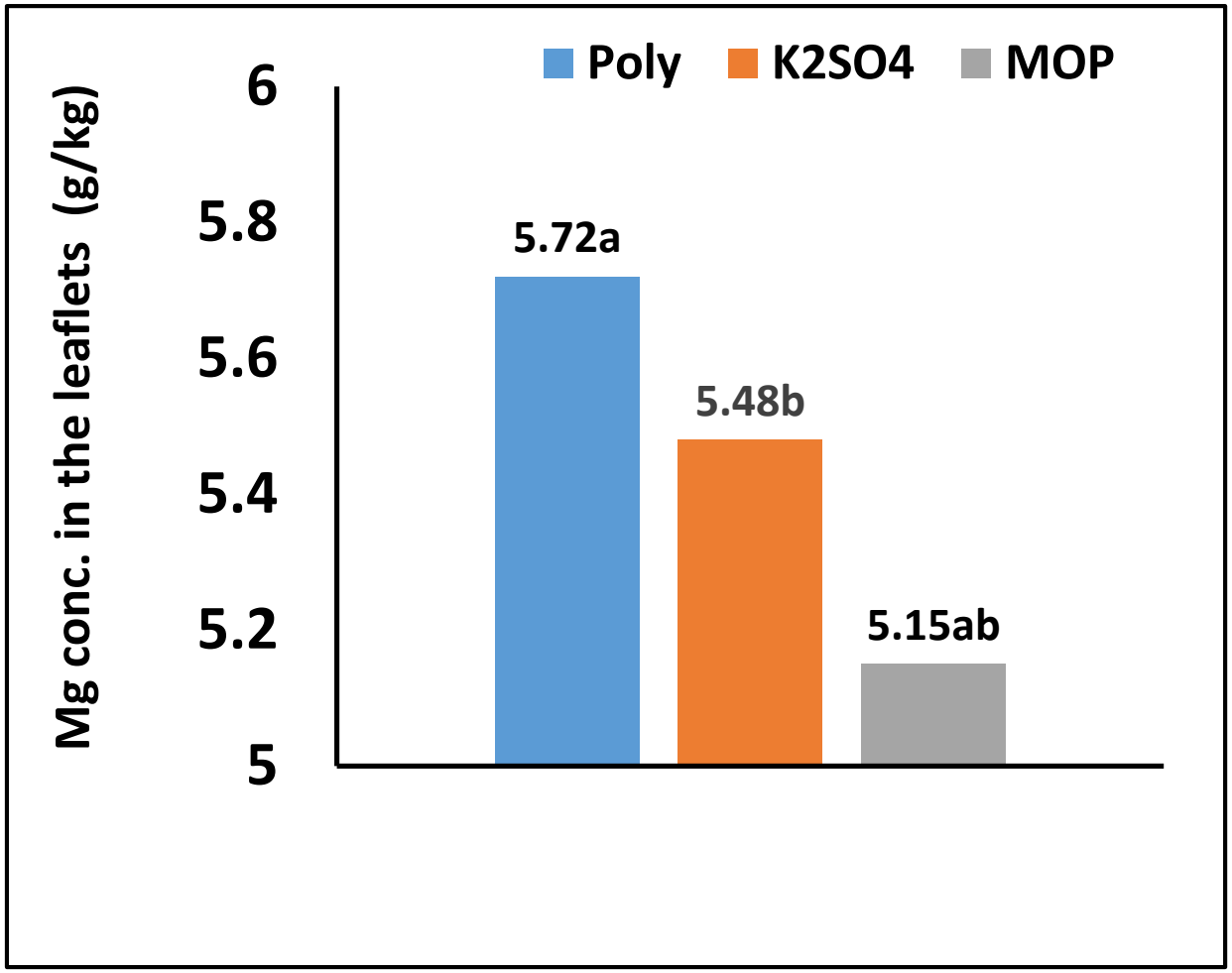


Leaf nutrient - Ca and Mg contents at 63 DAP

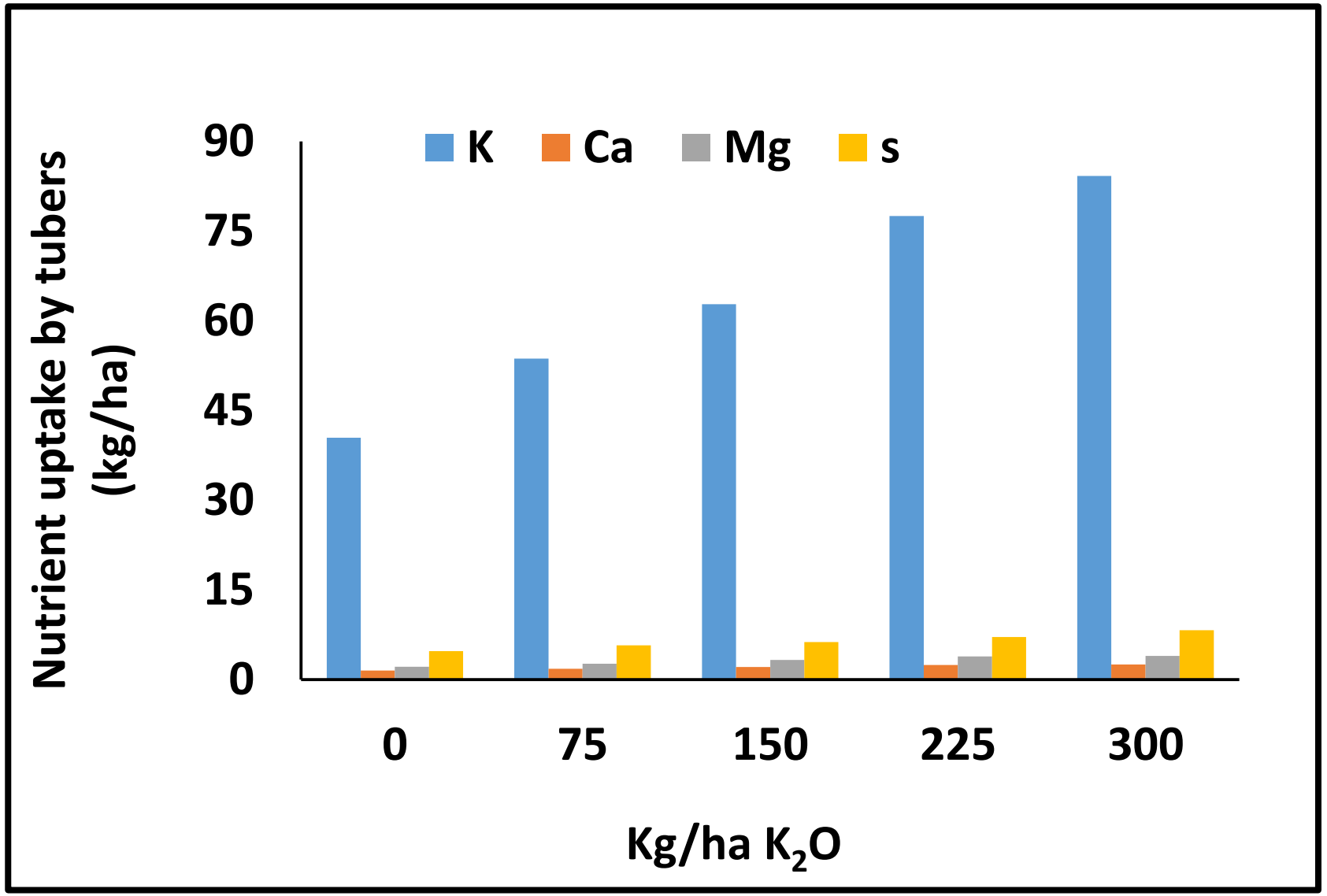
Interation Source X rates - Ca - Leaflet



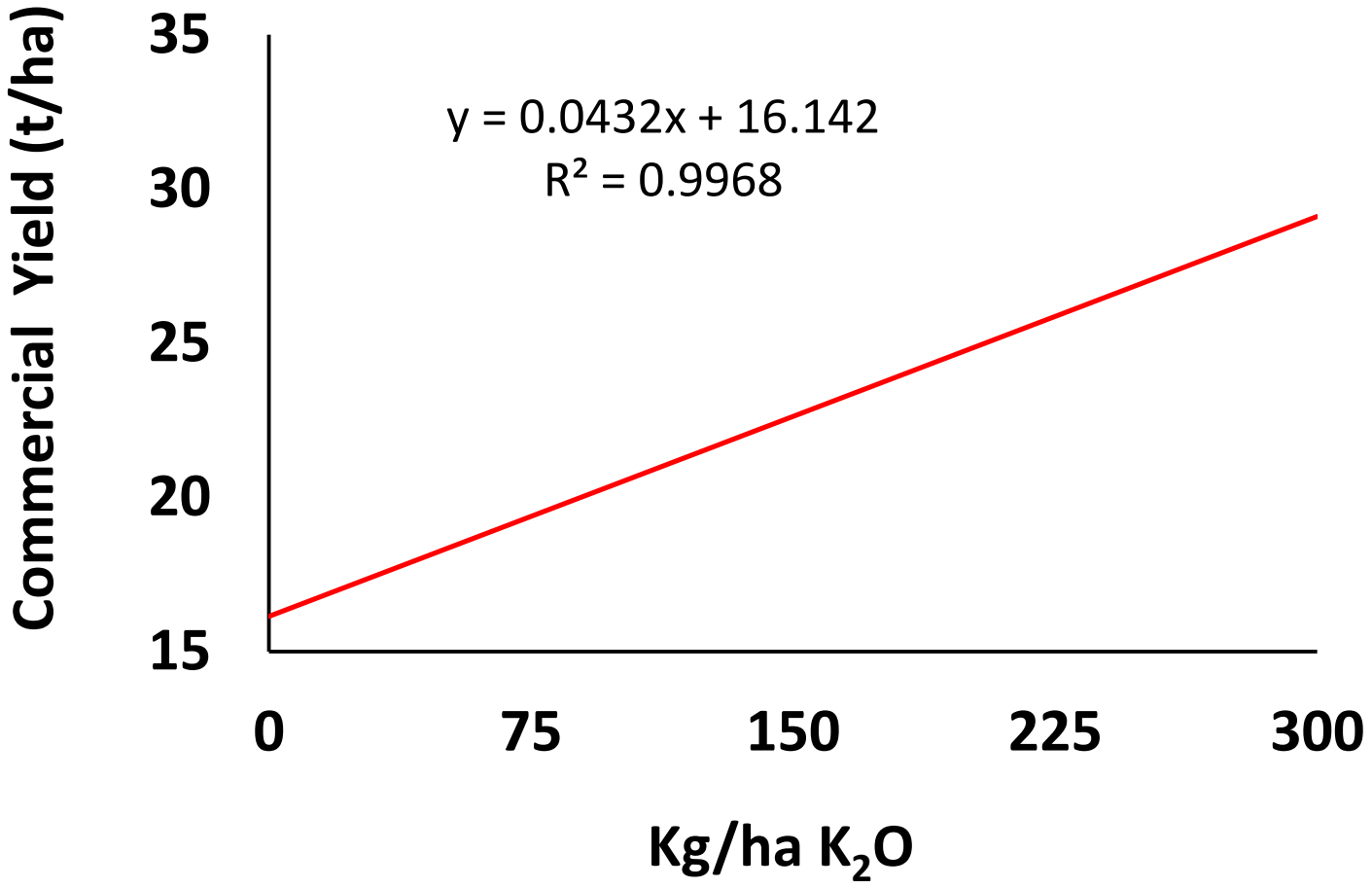
Effects of K sources - Mg - Leaflet



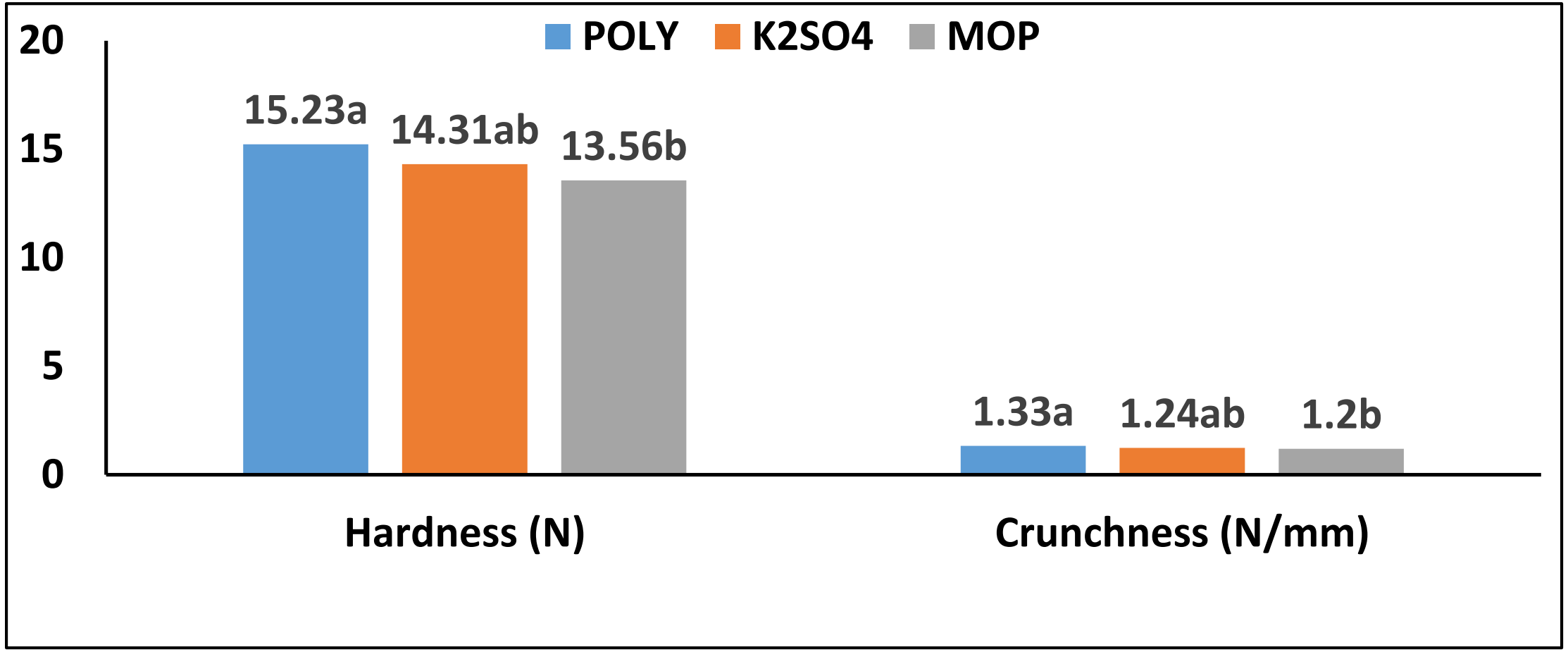
Nutrient uptakes - tubers



Commercial yield

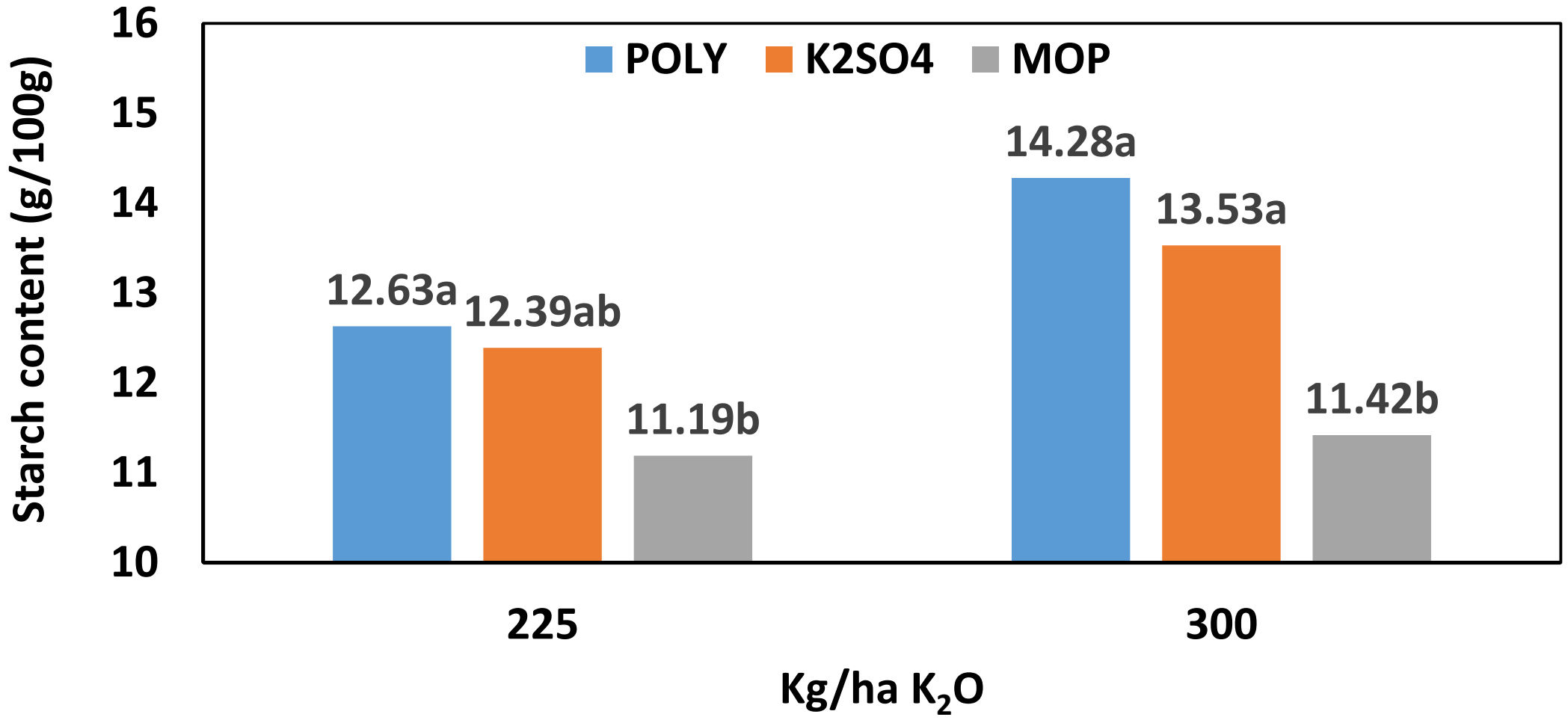


Quality potato

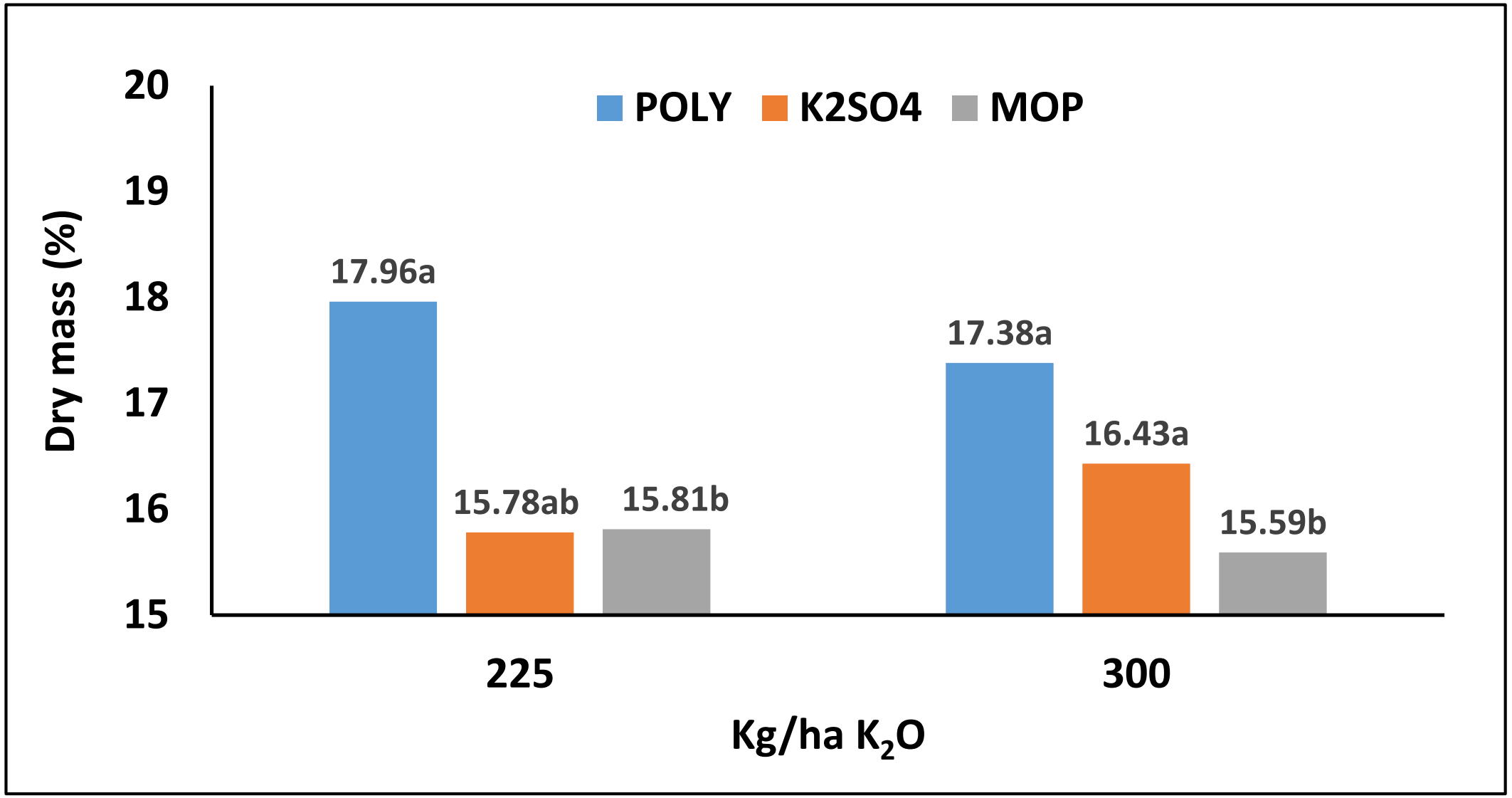


Quality potato – Starch content

Interation Source X rates

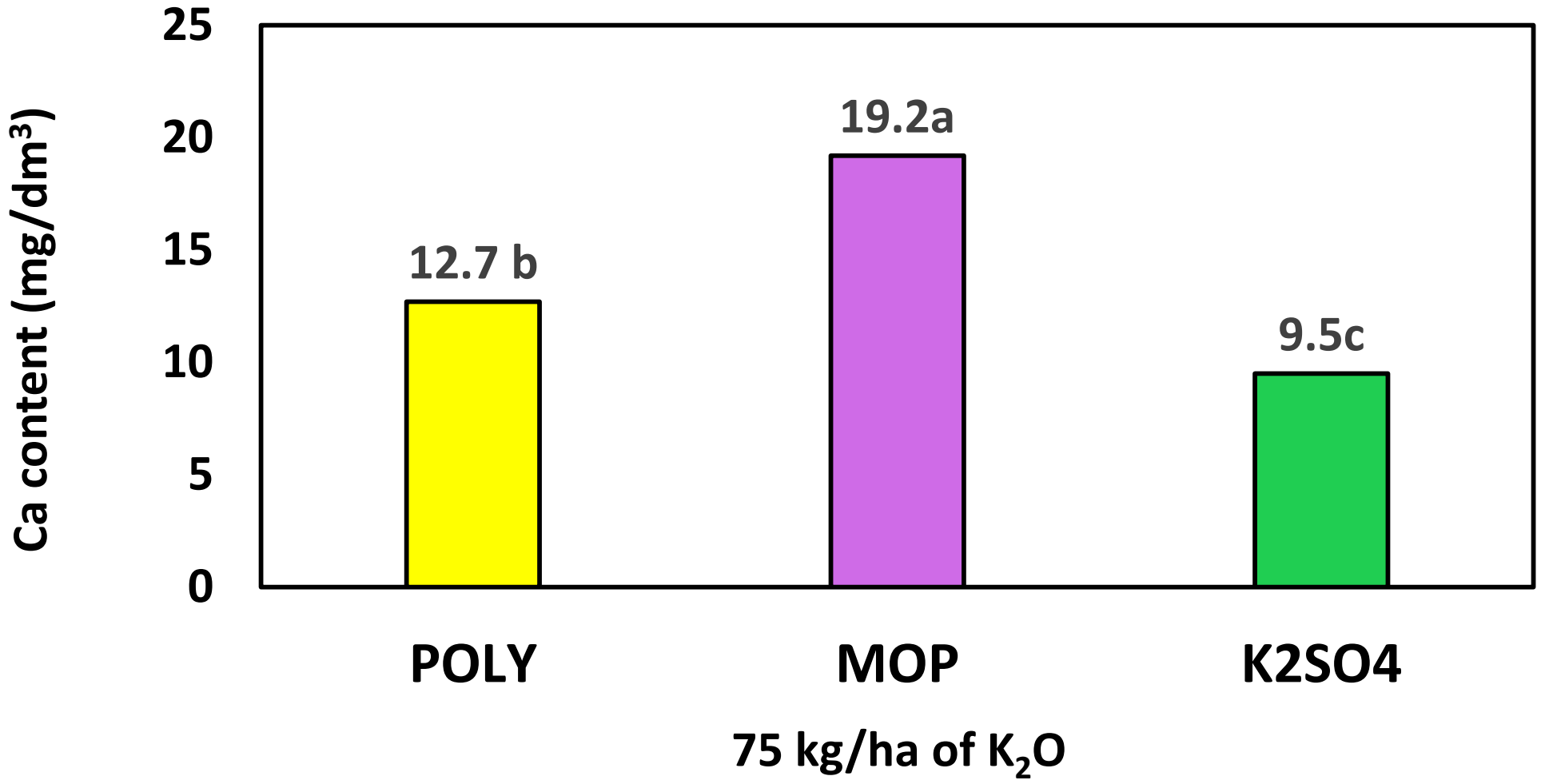


Quality potato

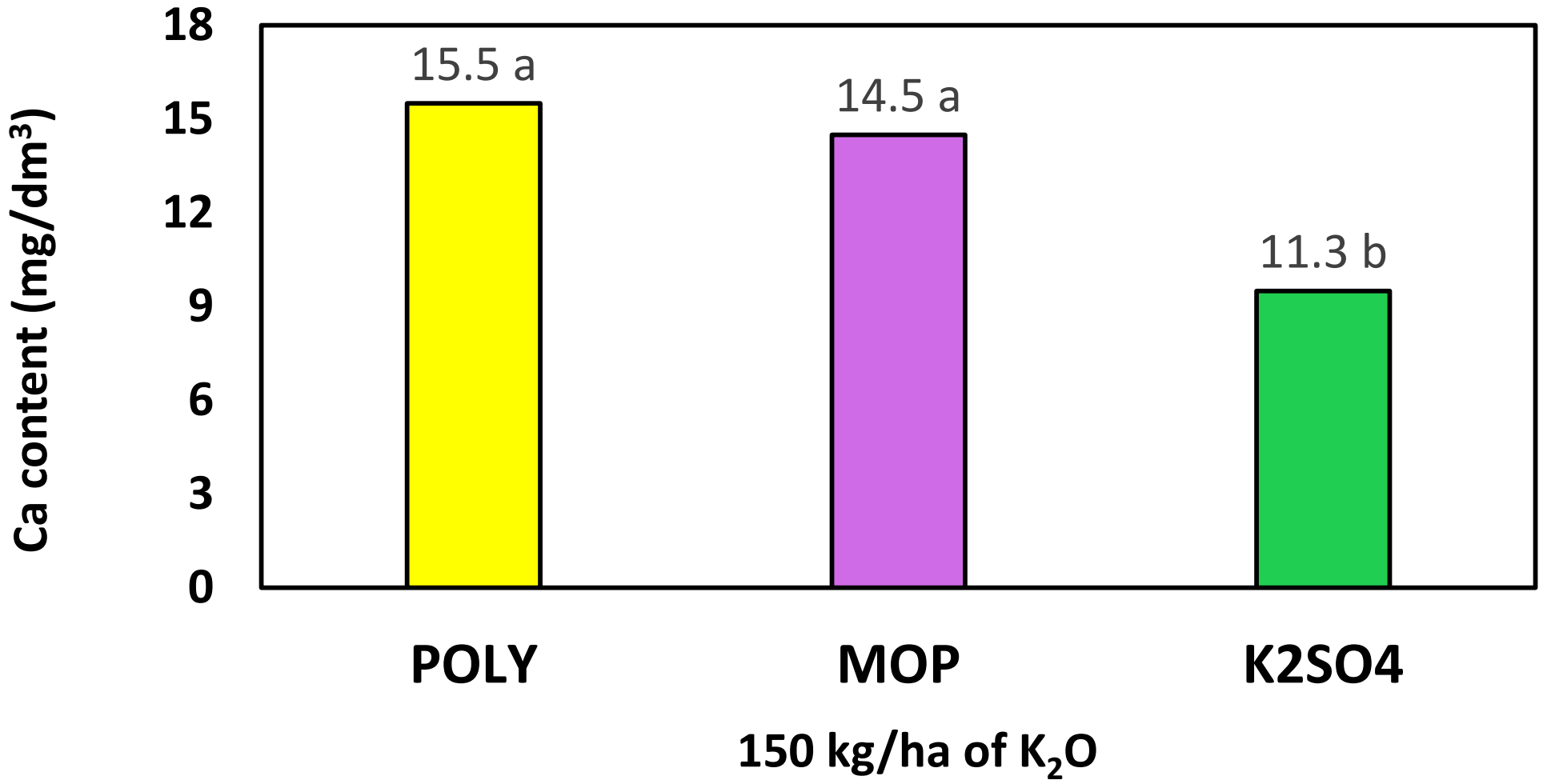


Results – Casa Branca (SP)

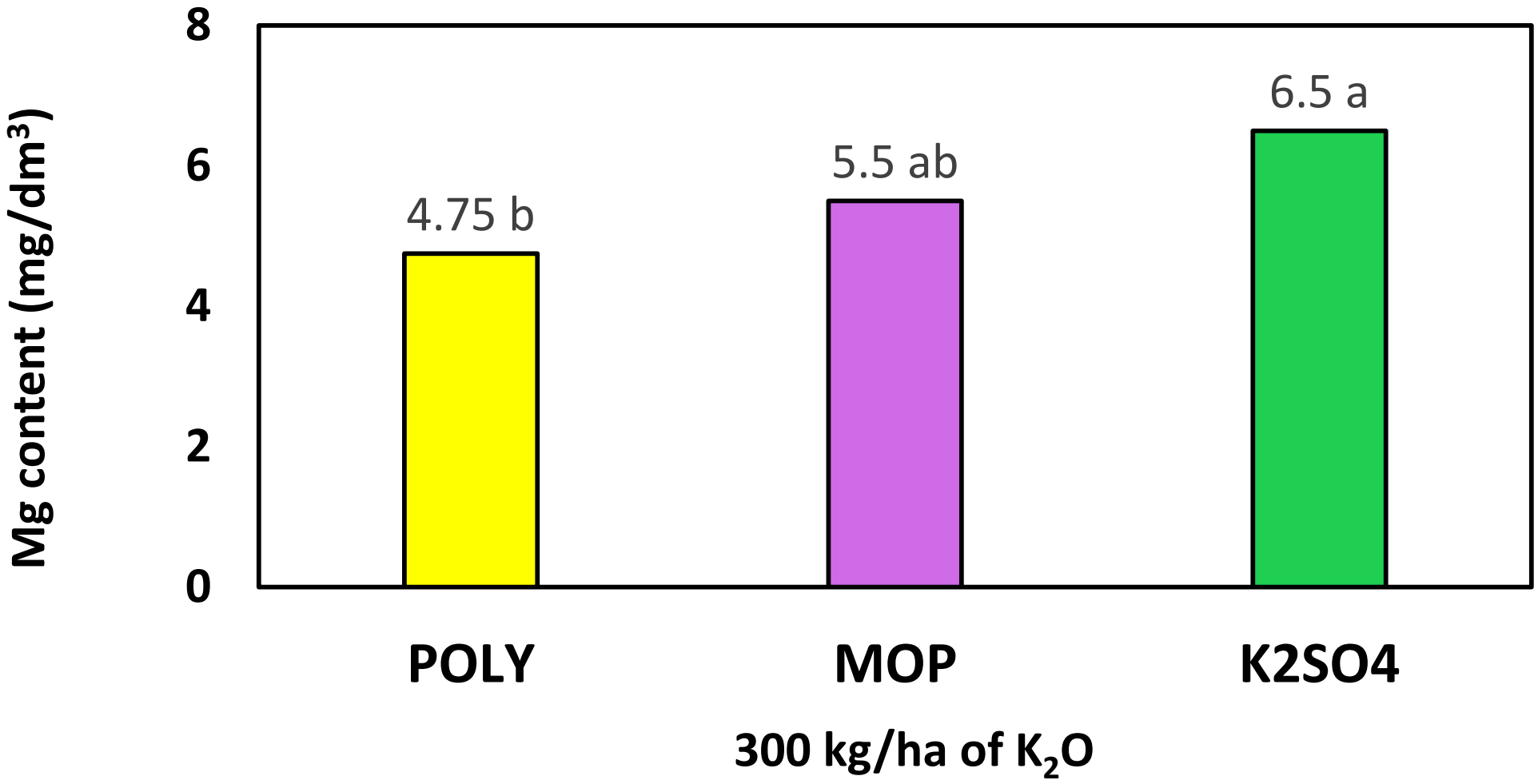
Soil fertility – Ca content



Soil fertility – Ca content



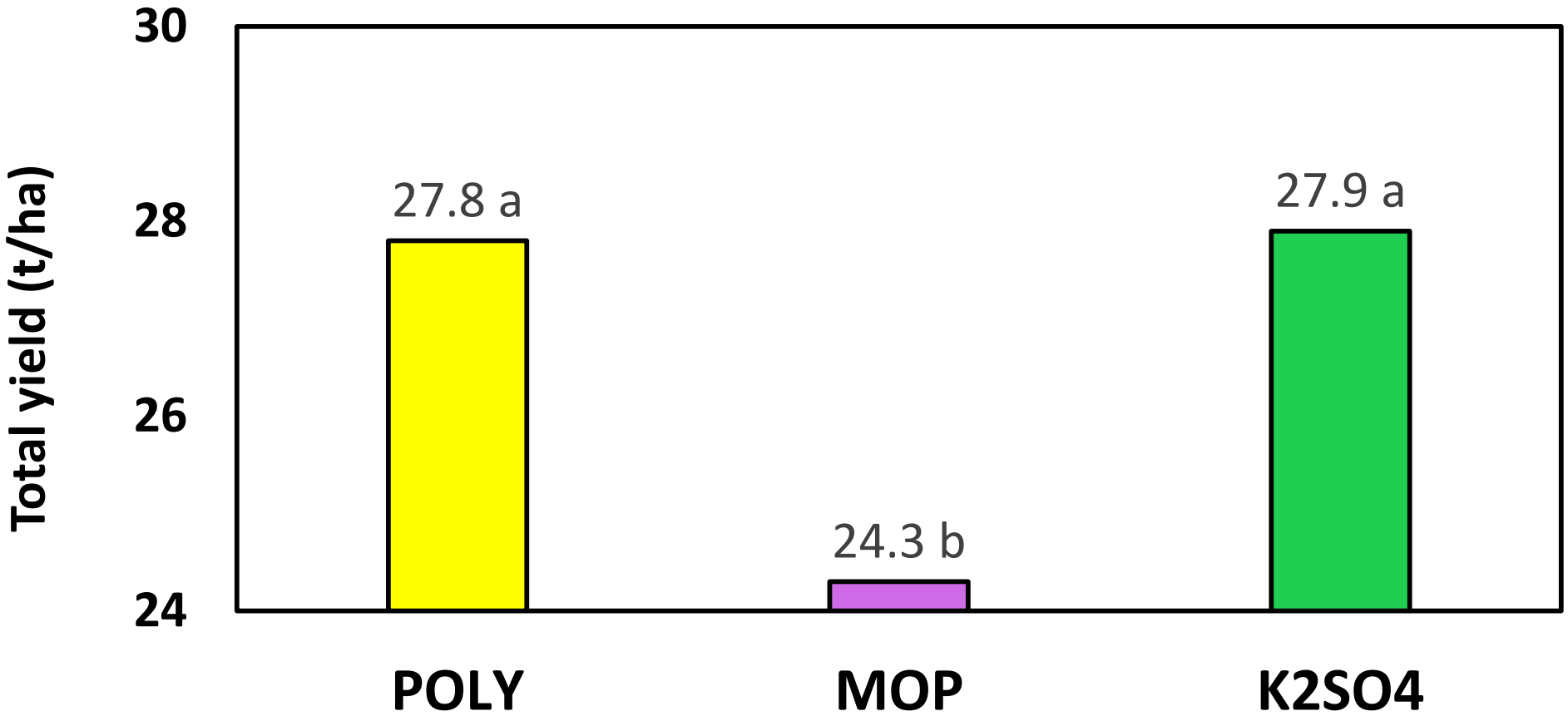
Soil fertility – Mg content



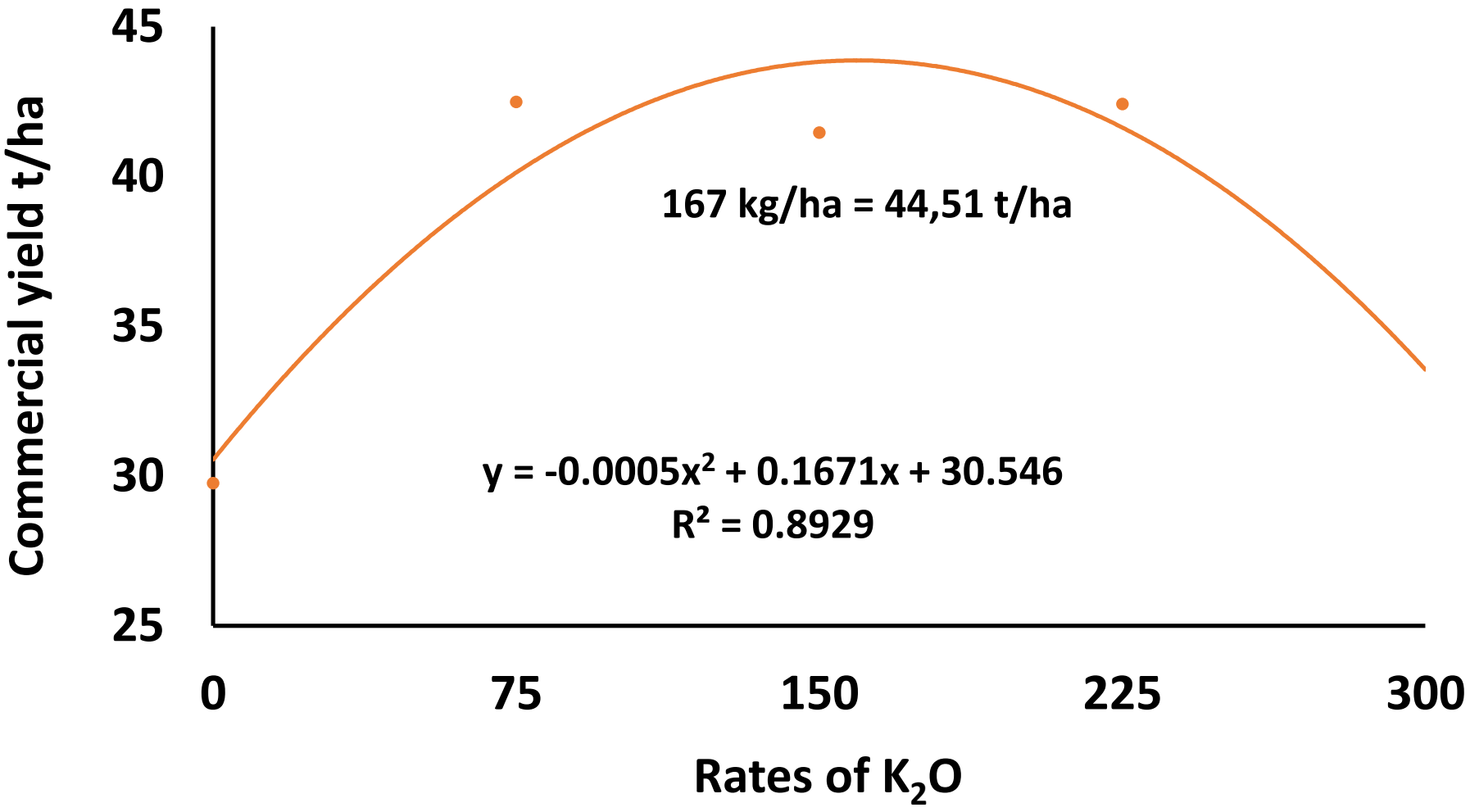
Leaf nutrient – Mg and S contents in the leaflets

Fertilizer	Mg content in the leaflet at 26 DAT	Mg content in the leaflet at 40 DAT	S content in the leaflet at 57 DAT
MOP	3.66 b	3.34 b	2.78 b
SOP	4.31 a	4.84 a	3.63 a
POLY	4.18 a	4.71 a	3.11 a

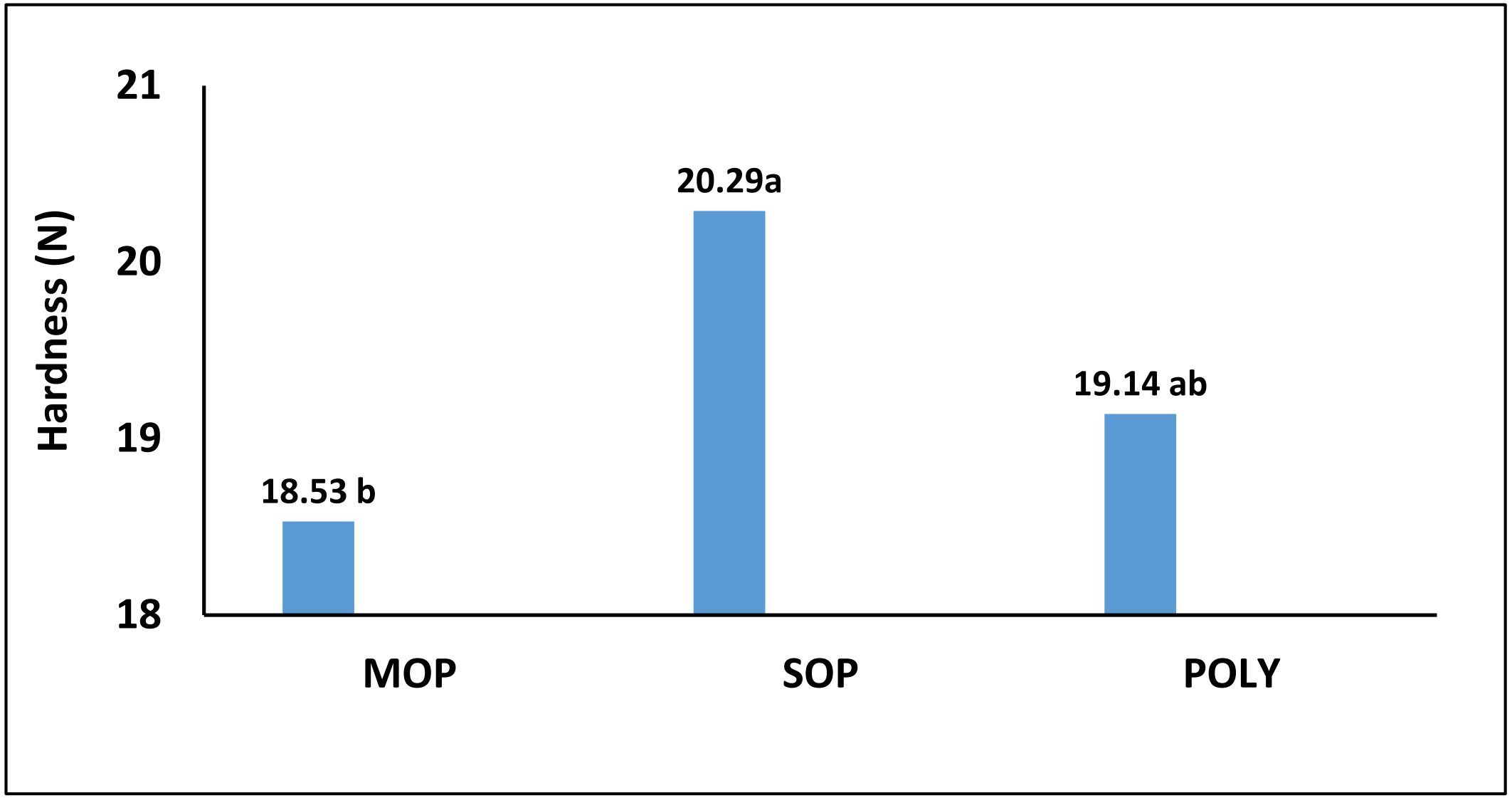
Total Yield



Commercial yield



Quality potato



Conclusions

a) The effect of polyhalite on commercial yield depends on the soil fertility, considering K, Ca, Mg and S as source of nutrients:

The K rates improved the potato commercial yield at Tapira (MG).

The amount of 167 kg K_2O ha^{-1} improved the potato commercial yield at Casa Branca (SP)

c) Polyhalite fertilizer improves the important characteristics of potato quality as starch content, hardness and crunchiness.

Thank you!!!