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EFFICIENCY OF POLYHALITE AS A FERTILIZER FOR BANANA IN BRAZIL

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INTRODUCTION

Banana cultivation covers a large area in Brazil and is the most consumed fruit the country, generating US$4.5 billion in income for farmers in 2016.

Fertilization with KCl at high rates is common in the management of the crop, which leaves soils with a high concentration of potassium (K) and usually high salinity. This can influence the development of plants and their nutrition, mainly with calcium (Ca) and magnesium (Mg).

OBJECTIVE

Evaluate the yield and quality of banana to test the substitution of KCl fertilizer as a source of K, with a natural fertilizer obtained from the processing of the mineral Polyhalite, which contains 14% K_2O, 12% Ca, 3.6% Mg, 19.2% sulfur (S), and reduced chlorine (Cl) and sodium (Na) contents compared to KCl.

MATERIALS AND METHODS

- **Location:** Lagoinha farm, Juquia, Sao Paulo state, Brazil

- **Soil:** 430 g kg^{-1} clay, 280 g kg^{-1} sand, 290 g kg^{-1} silt and 0-20 layer fertility (Table 1)

Table 1. *Chemical characteristics of soil before planting*

O.M.	pH	P_{Resin}	K	Ca	Mg	Na	Al	H+Al
g dm^{-3}	$CaCl_2$	mg dm^{-3}	$cmol_c$ dm^{-3}					
64,0	5,7	597	7,9	115	47	0,5	0,0	22,0

SB	CEC	V	S	B	Cu	Fe	Mn	Zn
$cmol_c$ dm^{-3}		%	mg dm^{-3}					
170,4	192,4	89	33	4.5	9	102	38	6

O.M. (sodium dichromate 4N e H_2SO_4 10N); P, K, Ca, Mg (Resin), Na (Mehlich); aluminium (Al) (KCl); H+Al (SMP); S (calcium phosphate); boron (B) (hot water); copper (Cu), iron (Fe), manganese (Mn), zinc (Zn) (DTPA)

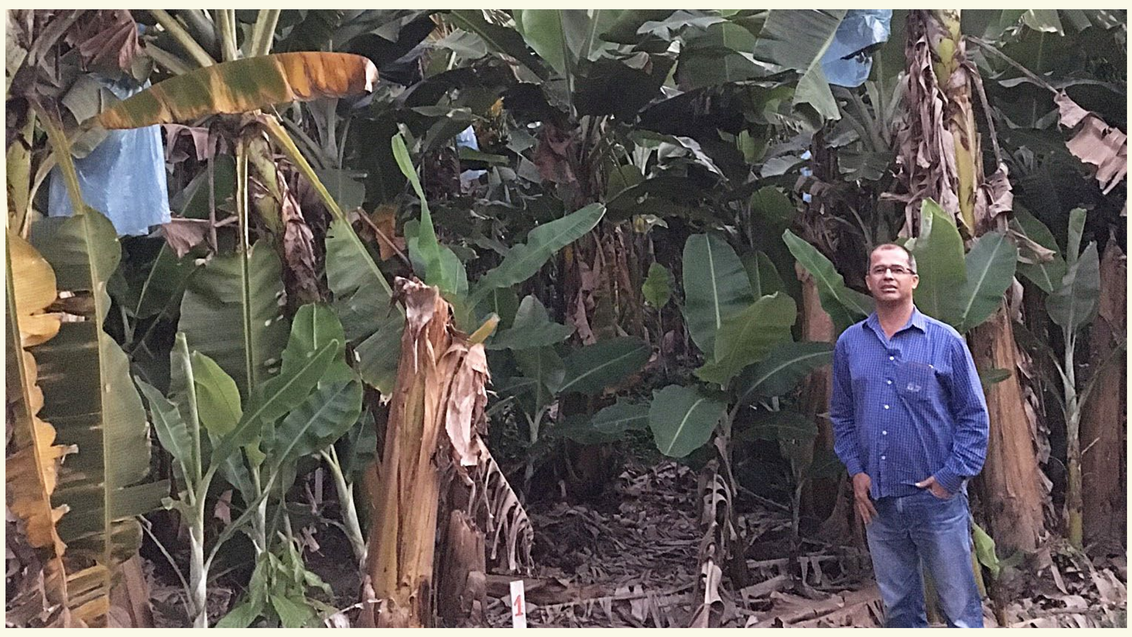
- **Experimental design:** eight treatments in four randomized blocks;

- **Variety:** Cavendish (Nanica), 15 years

- **Treatments:** Blends of KCl and Polyhalite, taking into consideration the weight of the fertilizers, to supply a 360 kg ha^{-1} K_2O rate:
  1. Control, without K application;
  2. 100% KCl;
  3. 80% KCl/20% Polyhalite;
  4. 60% KCl/40% Polyhalite;
  5. 50% KCl/50% Polyhalite
  6. 40% KCl/60% Polyhalite
  7. 20% KCl/80% Polyhalite
  8. 100% Polyhalite

  - Applied on soil surface. Two replications with the same rates: first in November 2016; second in January 2017.
  - Other fertilizations: 100 kg ha of P_2O_5 (MAP) plus 250 kg ha^{-1} of nitrogen (N) (ammonium nitrate) were applied at the same time as other treatments.

- **Evaluations**
  - Vigor of bunches on June 9th 2017: grades from 0 to 10 (low to high).
  - Diameter of stems (in cm) on August 10th 2017.
  - Average weight (in kg) of each bunch obtained during harvest in the last week of August 2017; converted to t ha^{-1} of bananas.



RESULTS AND DISCUSSION

Analysis of variance	Vigor of bunches	Diameter of stems	Banana yields
F treatments	2,78*	4,57**	5,17**
Average	8,12	85,58	27,93
Standard deviation	0,81	2,83	1,05
MSD (5%)	1,93	6,70	2,49
CV (%)	10,03	3,30	3,76
Tukey test 5%			
Zero K_2O	7,70 ab	82,33 b	26,82 bc
100% KCl	6,88 b	81,50 b	26,43 c
80% KCl + 20% Polyhalite	8,00 ab	87,75 ab	27,56 abc
60% KCl + 40% Polyhalite	8,13 ab	88,17 ab	27,49 abc
50% KCl + 50% Polyhalite	8,38 ab	86,50 ab	29,12 ab
40% KCl + 60% Polyhalite	8,75 ab	89,17 a	29,91 a
20% KCl + 80% Polyhalite	9,13 a	86,83 ab	28,71 abc
100% Polyhalite	8,00 ab	82,42 b	27,41 bc

Level of significance: **: 1%; *: 5%. MSD: minimal significative difference; CV: coefficient of variation.

CONCLUSIONS

- Polyhalite increased the vigor of bunches and slightly increased the diameter of stems;
- Partial replacement of KCl by Polyhalite increased crop productivity;
- Polyhalite in the blend with KCl at the ratios between 50 and 60% led to the greatest increases, even in high fertility soils.

ACKNOWLEDGMENT

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