EVALUATION OF THE EFFECTIVENESS OF ROCK DUST ON THE PERFORMANCE OF TWO TYPES OF SWEET CASSAVA

Fernanda Pereira de Souza[1]
Eder de Souza Martins[2]
Luise Lottici Krahl[3]
Eduardo Alano Vieira[4]
Josefino de Freitas Fialho [5]
Gabriel Soares Ribeiro[6]
Omid Afzalalghom (Translator) [7]

Abstract

The effect of rock dust on agronomic performance was evaluated using two varieties of sweet cassava. The study was conducted at Embrapa Cerrados in Planaltina, Federal District. Four sources of potassium were tested, and the soluble fertiliser KCl, representing the full conventional treatment. A randomised block experimental design with three repetitions was used. Agronomic evaluations were made at twelve months after planting. The means of the Japonesinha variety fertilised with the types of rock dust tested were found to be greater than the means from the other treatments, including the variety treated by conventional fertiliser. This fact shows that the effects of silicate rocks also depend on the genetic characteristics of the cultivated plants.

Keywords: sweet cassava, rock dust, potassium, latosol

Introduction

In the Federal District region and surrounding areas, the cultivation of sweet cassava varieties presents expansion potential, since the consumer market is growing, profitability is high and the producers have

1 Geography student from Universidade Estadual de Goiás – UEG, UnU Formosa– GO, fernandasouza92@gmail.com; [2]Researcher at Embrapa Cerrados, Planaltina – Federal District, eder.martins@embrapa.br; [3]Master's student at Universidade de Brasília – UnB, luisekrahl@yahoo.com.br; [4]Researcher at Embrapa Cerrados, Planaltina – Federal District, eduardo.alano@embrapa.br; [5]Researcher at Embrapa Cerrados, Planaltina – Federal District, josefino.fialho@embrapa.br; [6]Chemistry at Universidade Estadual de Goiás – UEG, UnU Formosa – GO, gabrielspurgeon.s@gmail.com; [7] Senior Translator at Remineralize the Earth (www.remineralize.org)

a tradition of producing cassava (Aguiar *et al., 2005)*. Despite the soil condition of the Cerrado having low indices of natural fertility and elevated acidity, such characteristics can be overcome with the use of correctives and fertilisers for cassava cultivation, with the biggest responses being to fertilisation with potassium (K), phosphorus (P), nitrogen (N) and zinc (Z) (Fialho & Vieira, 2011). For this reason, the use of finely ground silicate rocks with significant levels of potassium can be an alternative in the production of sweet cassava as they are a good soil conditioner and source of nutrients, which improves the soil physicochemical properties (Nascimento & Loureiro, 2004). The objective of this study was to evaluate the effect of using rock dust on the agronomic performance of two varieties of sweet cassava.

Material and Methods

The study was conducted during the 2010/11 harvest, in the vicinity of Embrapa Cerrados in Planaltina, Federal District, in soil classified as yellow latosol (pH = 5.8; P = 0.6 mg dm^{-3}; K = 44 mg dm^{-3}; Ca = 2.24 cmol dm^{-3}, Mg = 0.64 $cmol_c$ dm^{-3} and SB = 2.99 $cmol_c$ dm^{-3}). Two varieties of sweet cassava were tested (Japonesinha and Amarela Rio) and four sources of potassium: biotite schist, phonolite, ThermoPotash and the soluble fertiliser KCl, representing the full conventional treatment (Table 1).

A randomised block experimental design with three repetitions was used. Each plot was composed of 5 lines with 12 plants, in a 1.2 m x 0.8 m space, with 24 plants in the central area.

Table 1. Description of the treatments used in the study.

Varieties		**Fertilisations**	
V1	Japonesinha	A1	Biotite Schist
V2	Amarela Rio	A2	Phonolite
		A3	ThermoPotash
		A4	Conventional

The conventional treatment involved applying fertiliser in quantities normally used in cassava cultivation, according to the needs of the soil

(20 kg ha^{-1} of P_2O_5 and 40 kg ha^{-1} of K_2O). The treatments with rock dust received a dose of 80 kg ha^{-1} of K_2O, equivalent to the application of 2 t ha^{-1} of biotite schist and 1 t ha^{-1} for the phonolite and the ThermoPotash. The fertilisation with P was the same in all the treatments, with an application of 20 kg ha^{-1} of P_2O_5. The fertiliser was applied to the row of plants and incorporated (Figure 1).

Figure 1. Experiment deployment. (a) application of the test rock dust; (b) application of KCl.

Twelve months after planting the following measurements were taken: height of first branch in metres (HFB); plant height in metres (PH), root yield in kg ha^{-1} (RY) and root starch content (SC) using hydrostatic balance. The data obtained were subjected to variance analysis and to Scott-Knott mean comparison tests.

Results and Discussion

The results revealed that there was no variation between the treatments in relation to the plant height, the height of the first branch, and the root starch content. The differences detected were genetic, depending upon the effect of the variety (Tables 2 and 3), as all of the treatments showed that the Amarela Rio had a higher first branch and greater starch content than the Japonesinha variety.

For the root yield variable, it was found that the averages of the Japonesinha variety fertilised with all of the evaluated rocks were greater

than the averages of the other treatments (Figure 2), including the treatment with conventional fertiliser. This suggests that the rocks had a possible positive effect on this variety (Table 3). On average the Japonesinha variety showed a productivity gain of 5000 kg ha^{-1} with fertilisation with rocks in relation to the other treatments (Table 2).

Table 2. Variance analysis of the height of the first branch in metres (HFB), height of plant in metres (HP), root yield in kg ha^{-1} (RY) and root starch content (SC) of two cultivars of sweet cassava evaluated with traditional fertiliser and with rock dust.

Source of variation	d.f.	Mean square			
		HFB	HP	RY	SC
$MS_{Residual}$	7	0.16*	0.18	4577723*	17.93*
$MS_{treatments}$	14	0.003	0.009	4958276	0.44
CV (%)		10.90	6.56	12.96	2.53

Table 3. Comparison of average height of first branch (HFB), root yield in kg ha^{-1} (RY) and root starch content (SC) in two cultivars of sweet cassava evaluated with traditional fertiliser and with rock dust.

Accessions	Characteristics		
	HFB	RY	SC
A3V1	0.28 B*	20500 A	24.03 B
A1V1	0.25 B	20320 A	23.85 B
A3V2	0.67 A	14069 B	28.53 A
A2V1	0.22 B	19320 A	23.63 B
A4V1	0.25 B	17458 B	24.30 B
A2V2	0.67 A	15458 B	28.22 A
A4V2	0.63 A	16195 B	28.70 A
A1V2	0.73 A	14174 B	28.58 A
Overall Avg.	0.46	17187	26.23
Amplitude#	0.51	6431	5.07

* Averages followed by letters differ by 5% significance amongst themselves by the Scott-Knott separation of means test.

difference between the highest and lowest average.

Figure 2. Detail of the varieties cultivated and evaluation of their yield.

Final Considerations

The results showed that potassium fertilisation with rock dust did not influence the height of the cassava plants, the height of the first branch or the starch content of the roots. The evaluations indicated a positive response in relation to the root yield of the Japonesinha variety fertilised with potassic rock dust, warranting further studies on the influence of fertilisation with rock dust on the root yield and seed quality of sweet cassava and showing that it is dependent upon the characteristics of the varieties.

Bibliographical References

AGUIAR, J.L.P.; BARRETO, B.; SOUSA, T.C. Cadeia produtiva da mandioca no Distrito Federal: caracterização do consumidor final. In: Congresso Brasileiro de Mandioca, 11. Resumos. Campo Grande: Embrapa Agropecuária Oeste. 2005.

FIALHO, J.F.; VIEIRA, E.A. Manejo do solo no cultivo de mandioca. In: FIALHO, J.F.; VIEIRA, E.A. (Ed.). Mandioca no Cerrado: orientações técnicas. Planaltina, DF: Embrapa Cerrados, 2011. p. 37-57.

NASCIMENTO, M,; LOUREIRO, F.E.L. Fertilizantes e sustentabilidade: o potássio na agricultura brasileira, fontes e rotas alternativas, Rio de Janeiro: CETEM/MCT, 2004, 66p, (Série Estudos e Documentos, 61).