



Potassium solubilization in phonolite rock by diazotrophic bacteria

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Introduction

❖ Some strains of nitrogen fixing bacteria, besides fixing the N_2 , can produce phytohormones, controlling pathogens, solubilizing minerals containing phosphorus (P) and potassium (K), contributing to plant growth.

❖ However, there is a need to evaluate the potential of these bacteria to solubilize other minerals containing elements of economic importance such as potassium (K), an essential nutrient for plants, imported in large scale in Brazil, representing approximately 90 % of the total used in agriculture.

❖ Therefore, the aim of this study was to evaluate potassium solubilization (K) of phonolite rock by strains of associative nitrogen fixing bacteria supplied with two different carbon sources.

Methods

❖ The experiment was carried in a completely randomized factorial, 13 x 2 (12 bacterial strains and a control without inoculation) and two carbon sources (glucose and sucrose) with four replications. After the growth, the supernatant was separated by centrifugation and analyzed for the final pH value and the content of K.

❖ These bacteria were isolated from four culture media (VMY JNFb, LGI and NFB) semi-solid and semi-selective for the genus: Burkholderia - VMY Herbaspirillum -JNFb, Amazon Azospirillum - LGI and Azospirillum spp. - NFb. Twelve bacterial strains were cultured for seven days at 25°C in liquid conditions "Aleksandrov" supplemented with phonolite rock powder.

Acknowledgements



Results

Table 1. Values of pH and soluble potassium (K in mg dm⁻³) determined at 7 days of culture of the bacteria in culture medium containing sucrose as carbon source and phonolite as the source of K. In addition to sucrose, glucose was also tested as a source of carbon.

	Sucrose	Sucrose	Glucose	Glucose
	pH	K (mg dm ⁻³)	pH	K (mg dm ⁻³)
Control Treatment	6,84 a	11,75 d	7.03 a	11,00 e
UNIFENAS 100-01	4,88 c	115.50 a	4.97 c	106.25 c
UNIFENAS 100-13	4,76 c	97.50 b	4.16 d	138.50 a
UNIFENAS 100-16	4,41 d	101.25 b	4.36 d	96.00 c
UNIFENAS 100-21	4,40 d	120.75 a	4.14 d	117.50 b
UNIFENAS 100-26	4,82 c	103.25 b	3.54 f	112.50 b
UNIFENAS 100-27	6,74 a	58.50 c	4.19 d	55.75 d
UNIFENAS 100-39	4,30 d	103.25 b	3.86 e	115.25 b
UNIFENAS 100-40	3,87 d	109.25 b	3.99 e	106.75 c
UNIFENAS 100-79	4,41 d	76.75 c	3.89 e	114.75 b
UNIFENAS 100-85	5,72 b	74.50 c	5.44 b	43.75 d
UNIFENAS 100-93	5,76 b	73.25 c	4.73 c	54.25 d
UNIFENAS 100-94	4,59 c	130.25 a	3.90 e	132.75 a

Conclusion

All diazotrophic bacterial strains contributed to increase the release of K when compared to the control treatment. The strain UNIFENAS 100-94 solubilized 130 mg L⁻¹ K in the presence of the two carbon sources, indicating the potential use of these diazotrophic bacterial strains for K solubilizing from crushed phonolithic rock .