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PRODUÇÃO E MATÉRIA SECA DO INHAME FERTIRRIGADO COM BIOFERTILIZANTE

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1 RESUMO

Objetivou-se avaliar a influência da aplicação de diferentes doses de biofertilizante via fertirrigação, sobre a produção e acúmulo de matéria seca de rizomas de inhame. O delineamento experimental utilizado foi em blocos casualizados, com cinco tratamentos e quatro repetições. Os tratamentos foram compostos por cinco doses de biofertilizante (D1 = 0 ml planta^{-1}; D2 = 30 ml planta^{-1}; D3 = 60 ml planta^{-1}; D4 = 90 ml planta^{-1}; D5 = 120 ml planta^{-1}). Aos 210 dias após o plantio realizou-se a colheita e através de pesagem com balança de precisão avaliou-se a produção e a matéria seca dos rizomas de inhame. Esses dados foram submetidos a análise de variância pelo teste F a 1 e 5%, e regressão polinomial. Constatou-se que o aumento das doses de biofertilizantes aplicado via fertirrigação possibilitou incremento na produção e matéria seca, mas com valores inferiores à média produtiva.

Palavras chaves: *Dioscorea cayennensis* Lam., Fertilidade, Irrigação.

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YAM PRODUCTION AND DRY MATTER FERTILIZED WITH BIOFERTILIZER

2 ABSTRACT

This study aimed to evaluate the influence of the application of different doses of biofertilizer via fertigation on the production and accumulation of dry matter of yam rhizomes. The experimental design used was in a randomized block, with five treatments and four replications. The treatments consisted of five doses of biofertilizer (D1 = 0 ml. plant^{-1}; D2 = 30 ml plant^{-1}; D3 = 60 ml plant^{-1}; D4 = 90 ml plant^{-1}; D5 = 120 ml plant^{-1}). At 210 days after planting, the harvest was carried out and, by weighing with a precision scale, the production and dry matter of the rhizomes of yam were evaluated. These data were submitted to analysis of variance by the F test at 1 and 5%, and polynomial regression. It was found that the increase in the doses of biofertilizers applied via fertigation allowed an increase in production and dry matter, but with values below the average production.

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3 INTRODUCTION

Yam (*Dioscorea cayennensis* Lam.), is an herbaceous plant with determinate growth habits, is annual or perennial, and is propagated vegetatively through the fragmentation of rhizomes (DANTAS et al., 2013). According to IBGE-SIDRA (2010), Northeast China is responsible for the production of 38.2 thousand tons of yam tubers. However, the productivity in this region is still low because of factors such as low soil fertility and salinity.

One way to increase soil fertility is by using biofertilizers, as these improve the physical, chemical, and biological properties of the soil, in addition to facilitating the absorption of essential elements for plants, allowing the plant to develop its full productive potential (SOUSA et al., 2018). Notably, biofertilizers also stand out for being low-cost and accessible inputs since they are based on the use of natural resources existing on the property and can be produced by the farmer himself (MEDEIROS et al., 2006).

Furthermore, to improve nutrient availability, techniques such as fertigation can be used. This involves applying fertilizer via irrigation water, resulting in lower losses than those resulting from conventional fertilization, provided that fertilizer is applied in increments according to the crop's nutrient absorption rate. Therefore, if this technique is combined with the use of biofertilizer, yam development and, consequently, production can increase.

Given these aspects, the objective of this work was to evaluate the influence of the application of different doses of biofertilizer via fertigation on the production and accumulation of dry matter in yam rhizomes.

4 MATERIALS AND METHODS

The study was conducted at the Federal Rural University of Pernambuco in the Serra Talhada Academic Unit (UFRPE/UAST), located 407.3 km from the capital Recife, Pernambuco. The experimental area is located at 07° 59' 31" South latitude and 38° 17' 54" West longitude, at an average altitude of 435 m. The experimental design was a randomized block design with five treatments and four replicates, totaling 20 experimental units. The treatments consisted of five different doses of biofertilizer (D1 = 0 ml plant $^{-1}$; D2 = 30 ml plant $^{-1}$; D3 = 60 ml plant $^{-1}$; D4 = 90 ml plant $^{-1}$; D5 = 120 ml plant $^{-1}$). The experimental unit was represented by 10 plants grown in ridge-type beds.

The ridges were formed with dimensions of 4.50 × 1.0 × 0.40 m in length, width, and height, respectively, spaced 1.5 m apart in the block. Planting was carried out at a spacing of 1.0 × 0.4 m between ridges and between plants at a depth of 0.10 m. Fertilization was carried out at the foundation of the crop and was increased to the soil, with a compound based on goat manure at the dose determined by EMATER-RO, which indicates a nitrogen requirement of 50 kg ha $^{-1}$, which was needed in the soil to meet the nutritional demand of the yam. The biofertilizer (Table 1) was prepared from plant materials and cattle and chicken manure according to the methodology described by Stuchi (2015).

Table 1. Chemical analysis of biofertilizer

Biofertilizer											
N	P	K	Here	Mg	B	Ass	Faith	Mn	Zn	In the	PH
---------- g L $^{-1}$ ---------					-------- mg L $^{-1}$ --------						
0.29	0.03	3	8	1.1	71.1	1	142	1	1	480	8.7

Source: Authors (2021).

Irrigation was conducted daily according to crop evapotranspiration (ETc), which is the product of Kc (crop coefficient), Kl (location coefficient), and ETo (reference evapotranspiration) and was calculated via the Penman–Monteith model (ALLEN et al., 1998). The water used for irrigation came from an artesian well and had an electrical conductivity of 4.08 dS m $^{-1}$. Fertigation was carried out every 20 days, starting at 60 days after planting (DAP).

To verify the influence of the various treatments at harvest time (210 DAP), yam rhizome production (kg plant $^{-1}$) and dry mass (kg plant $^{-1}$) were evaluated. To determine production, the rhizomes produced by each plot were weighed and then averaged for each plant. To determine dry mass, the rhizomes were sliced and placed in an oven at 65°C for 48 hours until a constant mass was obtained. The mass was verified via an analytical balance with 0.0001 g precision (MIRANDA & YOGUI, 2012). These data were analyzed via analysis of variance via the F test at 1% and 5% using Sisvar software and via polynomial regression via Sigmaplot software (Systat Software, Inc.).

5 RESULTS AND DISCUSSION

Table 2 shows a summary of the analysis of variance results, where a significant effect of biofertilizer dose on the production and dry mass of yam was observed (P<0.01).

Table 2. Summary of the analysis of variance for the variable production (kg. Plant $^{-1}$) and dry mass (kg plant $^{-1}$).

FV	GL	Production	Dry matter
		-------- Mean Square-------	
Block	3	0.017 ^{ns}	0.001 ^{ns}
Doses	4	0.054 **	0.002**
CV (%)	-	12.62	12.98

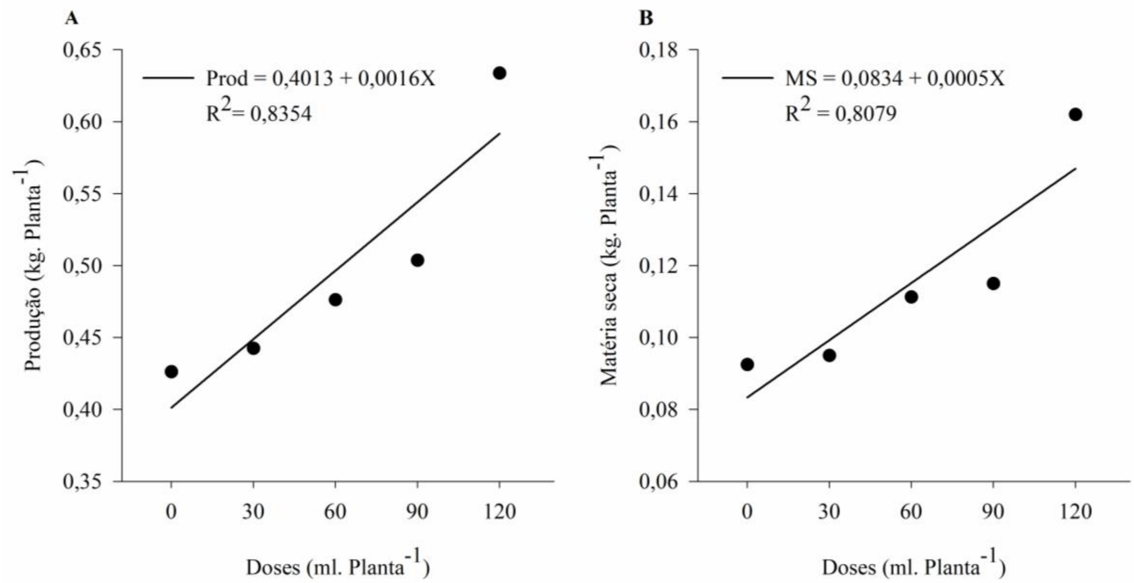
** significant at 1% probability; ns - not significant, by F test; GL – degree of freedom; CV – coefficient of variation.

Source: Authors (2021).

Figure 1 shows the regression for the variables production (1A) and total dry matter (1B), where it was verified that for both variables, the mathematical model that was best adjusted was the linear model. The increase in biofertilizer dose increased the productive variables, which was also observed by Silva et al. (2012), who worked with yam fertilized with cattle manure and biofertilizer applied to the soil and leaves.

The increase in productive variables as a function of increased dose denotes the beneficial effect of biofertilizers on the biochemical properties of the soil. According to Ronga et al. (2019), biofertilizers contain living microorganisms and natural substances that have the ability to improve the chemical and biological properties of the soil, in addition to acting as plant growth stimulants and soil fertility restorers.

Figure 1. Regression analysis for production (Prod) and dry matter (DM).



Source: Authors (2021).

As shown in Figure 1A, the maximum dose provided 0.60 kg plant $^{-1}$. Considering the adopted spacing (1.2 × 0.4 m), the production for one hectare would be 12.5 tons, similar to that established by Santos (1996), as the average productivity in the state of Paraíba. However, considering the dense cultivation as it was developed, it presented low productivity compared with the results of Oliveira et al. (2001) and Silva et al. (2012), who used denser cultivation than the present research and presented higher productivity only with marketable rhizomes. This low productivity may have occurred because of the high salinity of the water used in irrigation, given the sensitivity of the yam (O' SULLIVAN & ERNEST, 2007).

As shown in Figure 1B, through the regression equation, the maximum dose tested resulted in a dry matter content of 0.1434 kg plant $^{-1}$. Taking into account the production of this same dose of 0.60 kg plant $^{-1}$, the dry matter represents 23.9% of its constitution, which is lower than that reported by Oliveira (2007). However, this can be explained by the fact that the harvest was carried out early, since, according to Martin (1976), the factor that most affects the percentage of dry matter in yam is physiological maturity.

6 CONCLUSION

The biofertilizer dose influenced yam production and dry matter. Increasing the amount of biofertilizer applied via fertigation led to increased production and dry matter but at lower than average yields.

7 ACKNOWLEDGMENTS

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