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PEPPER FRUIT YIELD UNDER DIFFERENT FERTILIZER RATES IN REGIONS OF THE AMAZON

PRODUTIVIDADE DE FRUTOS DE PIMENTA SOB DIFERENTES DOSES DE FERTILIZANTES EM REGIÕES DA AMAZÔNIA

RENDIMIENTO DE FRUTOS DE PIMIENTO BAJO DIFERENTES DOSIS DE FERTILIZANTES EN REGIONES DE LA AMAZONÍA

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ABSTRACT

The municipality of Amajari is located in the northern region of Roraima, 156 km from the capital Boa Vista, and has 13,927 inhabitants. Rural producers use rudimentary techniques, do not receive training or incentives, and are not part of projects from public agencies. Thus, the adoption of public policies and technical support is essential to provide assistance to small-scale rural producers (MEGIDO, 2020). The objective was to evaluate pepper fruit yield under different fertilizer rates in regions of the Amazon. Under the studied conditions, it was observed that treatment A (300 kg/ha P_2O_5 and 240 kg/ha K_2O) provided the greatest increase in fresh and dry mass of pepper fruits, measured in grams.

Keywords: Family Farming. Capsicum. Vegetable Crop.

RESUMO

O município de Amajari, localiza-se ao norte de Roraima, a 156 km da capital Boa Vista possui 13.927 habitantes. Os produtores rurais usam técnicas rudimentares, não recebem capacitações, incentivos e nem fazem parte de projetos de órgãos públicos. Assim, é fundamental a adoção de políticas públicas e assessoria no sentido de fornecer assistência ao pequeno produtor rural (MEGIDO, 2020). Objetivou-se avaliar a produção de frutos de pimenta em diferentes doses de adubação regiões da Amazônia. Nas condições estudadas, observamos que o tratamento A (300 kg/ha P2O5 e 240 k/ha K2O) foi o que proporcionou maior incremento na massa da matéria fresca e seca de frutos de pimenta em gramas.

Palavras-chave: Agricultura Família. Capsicum. Hortaliça.

RESUMEN

El municipio de Amajari se ubica en el norte del estado de Roraima, a 156 km de la capital Boa Vista, y cuenta con 13.927 habitantes. Los productores rurales utilizan técnicas rudimentarias, no reciben capacitación ni incentivos, y no forman parte de proyectos de

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organismos públicos. Por lo tanto, es fundamental la adopción de políticas públicas y asesoría técnica para brindar apoyo al pequeño productor rural (MEGIDO, 2020). El objetivo fue evaluar el rendimiento de frutos de pimiento bajo diferentes dosis de fertilización en regiones de la Amazonía. En las condiciones estudiadas, se observó que el tratamiento A (300 kg/ha de P_2O_5 y 240 kg/ha de K_2O) fue el que proporcionó el mayor incremento en la masa fresca y seca de los frutos de pimiento, expresada en gramos.

Palabras clave: Agricultura Familiar. Capsicum. Hortaliza.

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1 INTRODUCTION

In Brazil, according to data from the 2017 Agricultural Census (IBGE, 2017), chili pepper production totaled 28,270 tons and generated revenue of R$ 98,561,000. Embrapa researchers dedicated exclusively to chili pepper research estimated total production at 280,000 tons (across an annual cultivated area of 13,000 hectares) and an annual market value of US$ 80 million. In other words, much higher. However, it is believed that even these figures are underestimated, as there is great difficulty in obtaining reliable statistical data on chili peppers, given that production is extremely fragmented and, almost always, is not the primary activity of the agricultural establishment (RIBEIRO et al., 2017).

“Brazilian family farming plays a major role in the Brazilian economy and serves as the economic foundation for 90% of Brazilian municipalities with up to 20,000 inhabitants, providing income for 40% of the economically active population” (SANTOS, 2021, p. 7). Pepper cultivation in Brazil has been expanding in recent years due to growing demand from domestic and international markets, leading to an expansion of cultivated area in several Brazilian states, primarily through family farming (OLIVEIRA et al., 2019).

The municipality of Amajari is located in the northern region of the state, 156 km from the capital, Boa Vista, and has a population of 13,927 (IBGE, 2022). Rural producers use rudimentary techniques, receive no training or incentives, and are not involved in public agency projects. Thus, it is essential to adopt public policies and provide advisory services to assist small-scale rural farmers (MEGIDO, 2020). The objective was to evaluate chili pepper production under different fertilizer application rates in regions of the Amazon.

2 METHODOLOGIES

The experiment was conducted from September 2024 to September 2025 in the municipality of Amajari, Roraima (RR), at latitude 03°39'11“ North, longitude 61°22'17” West, altitude 100 meters, Koppen-Geiger climate: Humid Equatorial (Af), on the grounds of the Federal Institute of Roraima – Amajari Campus.

The soil in the experimental area was a previously cultivated dystrophic Yellow Latosol (LAd), with a sandy texture and gentle topography. Chemical analysis of the soil sample from the area used, collected from a depth of 0–0.20 m, was performed at the soil laboratory of the IFRR Novo Paraíso Campus, with the following results: pH in H_2O 5.62; P and K (on Mehlich 1) 2.04 and 28 mg/dm³, respectively; Ca^{2+} + Mg^{2+} and Al^{3+} (in KCl) 2.3

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and 4.05 Cmolc/dm³ respectively; H+Al (in calcium acetate) 2.06 Cmolc/dm³. The cultivated species was Capsicum frutescens – hot pepper, of the Solanaceae family.

The experiment, consisting of four treatments and five replicates, was as follows: A – 300 kg/ha (P_2O_5) and 240 kg/ha (K_2O); B – 300 kg/ha (P_2O_5) and 120 kg/ha (K_2O); C – 150 kg/ha (P_2O_5) and 240 kg/ha (K_2O); and D – 150 kg/ha (P_2O_5) and 120 kg/ha (K_2O), totaling 20 plots. Fifty kilograms per hectare of limestone filler were applied, with two plants grown per 5-kg pot. Harvesting took place eight months after planting, and the following were evaluated: fresh fruit mass (FFM), dry fruit mass (DFM), dry mass of the aerial part (DMA) and dry mass of the root (DMR), and the ratio of dry mass of the aerial part to dry mass of the root (DMA/DMR).

The experiment was set up using a completely randomized design, and the results were subjected to analysis of variance at the 1% significance level using the F-test; Tukey's test was applied at the 5% significance level in cases where the F-test indicated significant treatment effects. The statistical software R was used for data analysis.

3 RESULTS AND DISCUSSION

Table 1 shows that all variables analyzed—including fresh weight and dry weight of fruit, dry weight of the aboveground biomass, and dry weight of the roots—were influenced by fertilization at the 1% significance level according to the F-test. However, the ratio of dry weight of the aboveground biomass to dry weight of the roots did not show a significant effect according to the F-test.

Table 1

Summary of the analysis of variance for fresh fruit mass (FFM), dry fruit mass (DFM), dry mass of the aerial parts (DMA), and dry root mass (DRM) of chili peppers grown under 4 different fertilizer combinations (P_2O_5 and K_2O)

		FFM	DFM	DMA	DMR	DAM/DMR
	GI	----------Medium square----------				
Treatment	3	725,12**	224,85**	249,92**	192,32**	0,1086^{NS}
Error	16	20,57	2,95	2,75	5,12	0,0382
c.v.(%)		13,81	11,64	8,84	16,71	13,47
General average		32,85	14,75	18,75	13,55	1,45

Source: FIDELIS and RAMOS (2025). ** Significant at the 1% probability level according to the F-test; NS: not significant.

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Table 2 shows that fertilizer application rates of 300 kg/ha of P_2O_5 and 240 kg/ha of K_2O resulted in the greatest increases in fresh and dry fruit weight under the conditions studied. According to Embrapa (2008, cited in Alcântara and Ribeiro, p. 85), "Most bulletins do not include recommendations for chili pepper cultivation." The authors "therefore suggest following the recommendations for bell pepper cultivation, which is similar to chili pepper cultivation." According to the study by the 5th Approximation (1999, cited in Casali and Fontes, p. 181), "for bell peppers, when there is low availability of phosphorus and potassium in the soil, doses of 300 and 240 kg/ha of P_2O_5 and K_2O" respectively are recommended, corroborating the findings here.

Table 2

Mean fresh fruit mass (FFM), dry fruit mass (DFM), dry mass of the aerial parts (DMA), and dry root mass (DMR) of chili peppers in grams after 8 months of cultivation under different fertilization treatments

Treatment	FFM	DFM	DMA	DMR
A - 300 kg/ha P_2O_5 e 240 k/ha K_2O	48,40 a	23,60 a	26,80 a	20,80 a
B - 300 kg/ha P_2O_5 e 120 k/ha K_2O	32,00 b	15,60 b	22,40 b	16,60 b
C - 150 kg/ha P_2O_5 e 240 k/ha K_2O	32,00 b	12,00 b	14,20 c	9,60 c
D - 150 kg/ha P_2O_5 e 120 k/ha K_2O	19,00 c	7,80 c	11,60 c	7,20 c

Source: FIDELIS and RAMOS (2025). Means followed by the same letter in the columns do not differ from one another at the 5% significance level according to Tukey's test.

4 CONCLUSIONS

Under the conditions studied, we observed that treatment A (300 kg/ha P_2O_5 and 240 kg/ha K_2O) resulted in the greatest increase in the fresh and dry mass of chili pepper fruits in grams.

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