RESPOSTA DE CULTIVARES DE ALGODOEIRO À ADUBAÇÃO NITROGENADA

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RESUMO: As respostas do algodoeiro (*Gossypium hirsutum* L.) à adubação nitrogenada pode variar de acordo com a cultivar utilizada. Com isso, objetivou-se com este estudo avaliar as respostas de duas cultivares de algodoeiro à adubação nitrogenada. O experimento foi conduzido em Área Experimental na Faculdade de Tecnologia Centec Cariri, situada no município de Juazeiro do Norte, Ceará. O delineamento estatístico utilizado foi o inteiramente casualizado, arranjado em esquema fatorial 4 x 2, correspondentes a quatro doses de nitrogênio (0, 60, 120 e 180 kg ha^{-1} de N equivalentes a 0, 50, 100 e 150% da recomendação de N para a cultura do algodão) versus duas cultivares (BRS 433FLB2RF e BRS RUBI), com 4 repetições. Aos 53 dias após a semeadura, as plantas foram coletadas, sendo realizada a contagem do número de folhas e de botões florais das plantas. As doses de 127,1 e 148,03 kg ha^{-1} de N maximizaram o número de folhas e de botões florais, respectivamente, do algodoeiro. As duas cultivares avaliadas responderam de maneira semelhante à adubação nitrogenada.

Palavras-chave: Cotonicultura, fertilidade do solo, ureia

RESPONSES OF COTTON CULTIVARS TO NITROGEN FERTILIZATION

ABSTRACT: The response of cotton (*Gossypium hirsutum* L.) to nitrogen fertilization may vary according to the cultivar used. Therefore, the objective of this study was to evaluate the responses of two cotton cultivars to nitrogen fertilization. The experiment was conducted in the experimental area at Centec Cariri Technology College, which is located in the city of Juazeiro do Norte, Ceará. The statistical design used was completely randomized, arranged in a 4 × 2 factorial scheme, corresponding to four nitrogen doses (0, 60, 120 and 180 kg ha^{-1} of N equivalent to 0, 50, 100 and 150% of the N recommendation for cotton crops) versus two cultivars (BRS 433FLB2RF and BRS RUBI), with 4 replicates. At 53 days after sowing, the plants were harvested, and the number of leaves and flower buds on the plants was counted. The N doses of 127.1 and 148.03 kg ha^{-1} maximized the number of leaves and flower buds, respectively, of the cotton plants. The two cultivars evaluated responded similarly to nitrogen fertilization.

Keywords: Cotton farming, soil fertility, urea.

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1 INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is an important fiber-producing crop in China, the USA, India, and Brazil (Snider *et al*., 2022; Feng; Chi; Dong, 2022). In Brazil, crop production is concentrated in the Central-West, Northeast, and Southeast Regions (IBGE, 2024). Since the 2015/16 harvest, the state of Ceará has undergone an evolution in cotton production, which represents, in addition to the aspects of volume growth, a characteristic of the resumption of cotton cultivation. These are the results of actions by farmers, companies, and government agencies, consolidated and officialized in 2017 with the launch of the Cotton Cultivation Modernization Program created with the objective of reviving cotton farming in Ceará (EMBRAPA, 2017).

For cotton crops to establish well in the field, the main management technique required is fertilization with macronutrients and micronutrients (Aguilar *et al*., 2021). Nitrogen (N) is the nutrient extracted from the soil in the greatest quantity by the crop and has a fundamental influence on the growth period, maturation time, productivity, and fiber quality (Khan *et al.*, 2017). Nitrogen deficiency or excess results in imbalances in growth, the photosynthetic rate, enzymatic activity, yield, and fiber quality (Coast *et al*., 2020; Echer; Cordeiro; Torre, 2020). In addition, the responses of cotton to nitrogen fertilization may vary according to the cultivar used. Therefore, the objective of this study was to evaluate the response of two cotton cultivars to nitrogen fertilization.

2 MATERIALS AND METHODS

The experiment was conducted in a greenhouse from October to December 2023 at Faculdade de Tecnologia Centec Cariri - FATEC Cariri, located in the municipality of Juazeiro do Norte - CE, with geographic coordinates of 07°12'47"S and 39°18'55"W. The municipality, which is located at an altitude of 377 m, has a climate between Tropical Semiarid and Tropical Semiarid Mild, with an average temperature of 24 to 26 °C and a rainy season from January to May. The average annual rainfall is 925 mm. The quarters of January, February and March are considered the rainiest (Lima; Ribeiro, 2012).

The statistical design used was completely randomized, arranged in a 4 × 2 factorial scheme, with the first factor of the scheme consisting of four nitrogen rates (0, 60, 120 and 180 kg ha $^{-1}$ of N equivalent to 0, 50, 100 and 150% of the N recommendation for cotton crops) and the second factor consisting of two cultivars (BRS 433FLB2RF and BRS RUBI), with four replicates. The experimental unit was represented by a pot with a capacity of 8 L. The reference rate (100% of the N recommended for the crop) corresponded to 120 kg ha $^{-1}$ of N (Ferreira; Carvalho, 2005), with 75,000 plants per hectare.

Sowing was carried out by placing four seeds per pot. A 2 cm layer of gravel was placed at the lower end of each pot, and the remainder was filled with soil. The soil used in the research was collected in the experimental area of Fatec Cariri at a depth of 0 to 20 cm and was sieved before the pots were filled. The soil had the following chemical and physical characteristics: electrical conductivity = 0.16 dS m $^{-1}$; pH = 7.2; P = 4 mg dm $^{-3}$; K = 0.20 cmolc dm $^{-3}$; Ca = 2.48 cmolc dm $^{-3}$; Mg = 0.49 cmolc dm $^{-3}$; Na = 0.02 cmolc dm $^{-3}$; Al = 0.0 cmolc dm $^{-3}$; MO = 3.9 g kg $^{-1}$; C = 2.3 g kg $^{-1}$; total sand = 850.60 g kg $^{-1}$; coarse sand = 499.20 g kg $^{-1}$; fine sand = 351.40 g kg $^{-1}$; silt = 8.65 g kg $^{-1}$; clay = 140.7 g kg $^{-1;}$ and textural class = loamy sand.

Ten days after sowing (DAS), thinning was performed, leaving one plant per pot. Nitrogen fertilization (0, 60, 120 and 180 kg ha $^{-1}$ equivalent to 0, 50, 100 and 150% of the N recommendation for the crop) and potassium fertilization (50 kg ha $^{-1}$ of K_2O) were split, with 25% applied at thinning and the remainder applied in two equal splits at 15 and 30 days after thinning. At sowing, 7.7 g of simple superphosphate was applied per pot. The nitrogen and potassium sources used were urea (45% N) and potassium chloride (60% K_2O), respectively.

Irrigation was carried out daily manually, slowly until the water in the pot was drained, thus reaching field capacity.

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At 53 DAS, the plants were collected, and the numbers of leaves and flower buds were counted. To obtain the number of leaves, only the leaves that were photosynthetically active were considered.

The results obtained were subjected to analysis of variance, and depending on the significance level in the F test for the nitrogen doses, polynomial regression analysis was performed, adopting a significance level of 1 or 5%, presenting the best-fit polynomial models. For the effects of the cultivars, the Tukey mean comparison test was adopted at the 5% significance level. Statistical analyses were performed via SISVAR® statistical *software*, version 5.3 (Ferreira, 2019), and the graphs were generated via Excel.

3 RESULTS AND DISCUSSION

The number of leaves and buds was influenced in an isolated manner only by nitrogen dose ($p<0.01$) (Table 1), indicating that the two cotton cultivars used in the present study responded similarly to nitrogen fertilization.

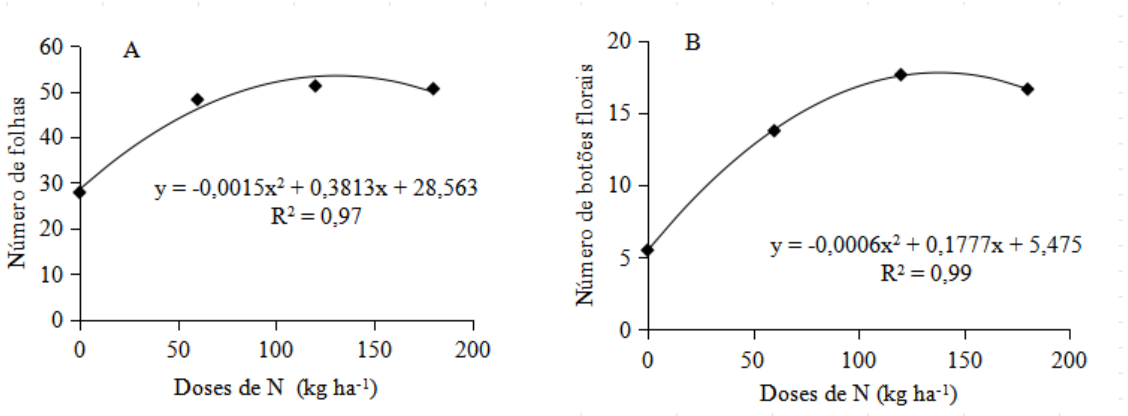
Table 1. Summary of analysis of variance for the number of leaves (NF) and flower buds (NBF) of cotton cultivars grown under different nitrogen (N) doses.

Source of Variation	mean square		
	GL	NF	NBF
N doses	3	996.08 **	242.08 **
Cultivars	1	91.12 ns	0.50 ns
N Rates x Cultivars	3	54.70 ns	18.25 ns
Coefficient of Variation (%)		11.91	21.58

GL = degree of freedom; ** = significant at 1%; ns = not significant ($p<0.05$).
Source: discussed by the authors

Nitrogen fertilization increased the number of leaves to the estimated dose of 127.1 kg ha $^{-1}$ of N, resulting in a maximum value of 52.79, followed by a reduction to the dose of 180 kg ha $^{-1}$ of N (Figure 1A). Similarly, Silva *et al*. (2023) reported that, in the same crop, a N dose of 127.5 kg ha $^{-1}$ maximized the number of leaves. According to Wu *et al*. (2023), the application of nitrogen at the appropriate dose increases not only the number of leaves but also the leaf area, light interception, photosynthetic activity and fiber quality.

Figure 1. Numbers of leaves (A) and flower buds (B) of cotton plants grown under different nitrogen doses.



Source: discussed by the authors

In terms of the number of flower buds, the highest value (18.63) was obtained when an estimated dose of 148.03 kg ha $^{-1}$ N was applied, which corresponds to an increase of 238.7% compared with the value obtained in plants that did not receive nitrogen fertilization (Figure

1B). In an experiment conducted under field conditions in China, Ali and Hameed (2011) reported that the highest number of flower buds was obtained at a N dose of 160 kg ha $^{-1}$. According to Medeiros, Gheyi and Soares (2010), when nitrogen is applied at adequate doses, not only increases the number of flower buds but also reduces the duration of their emission.

4 CONCLUSIONS

The doses of 127.1 and 148.03 kg ha $^{-1}$ of nitrogen maximized the number of leaves and flower buds, respectively, of the cotton plants.

The two cultivars evaluated (BRS 433FLB2RF and BRS RUBI) responded similarly to nitrogen fertilization.

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