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Original Article

Agronomic components of colored cotton cultivars as a function of potassium doses in the semiarid region[1]

Componentes agronômicos de cultivares de algodão colorido em função de doses de potássio no semiárido

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HIGHLIGHTS:

Application of K favors the cultivation of colored cotton under semiarid conditions.
Cultivar BRS Topázio has high lint yield performance even under low K availability in the semiarid region.
Meteorological and soil conditions in semiarid regions alter the response pattern of agronomic components in colored cotton.

ABSTRACT: Potassium is one of the most important nutrients for the cotton plant, being an element that participates in many physiological functions. In addition, its adequate availability favors better production performance of the crop. Therefore, the objective of this study was to evaluate the agronomic components in naturally colored cotton cultivars fertilized with potassium doses in the Brazilian semiarid region. For this, two experiments were conducted at Rafael Fernandes Experimental Farm, located in the municipality of Mossoró, RN, from July to November 2019 and July to November 2021. The experimental design was randomized blocks, arranged in split plots, with four repetitions. Potassium doses (0, 60, 120, 180, and 240 kg ha^{-1} of K_2O) were allocated in the plants; and four naturally colored cotton cultivars (BRS Rubi, BRS Safira, BRS Verde, and BRS Topázio) were allocated in the subplots. Colored cotton cultivars respond to potassium fertilization depending on the edaphoclimatic conditions to which they are exposed. BRS Topázio cultivar had higher lint cotton yield and fiber percentage in both growing seasons, highlighting its potential for the region. The dose of 240 kg ha^{-1} of K_2O increased the yield of colored cotton, in second crop cultivation. The cultivars BRS Safira, BRS Rubi, and BRS Verde were not very productive.

Key words: *Gossypium hirsutum* L., fertilization, lint yield, fiber

RESUMO: O potássio é um dos nutrientes mais importantes para o algodoeiro, sendo um elemento que participa de muitas funções fisiológicas na planta. Além disso, sua adequada disponibilidade favorece melhor desempenho produtivo à cultura. Logo, objetivou-se avaliar nesta pesquisa os componentes agronômicos em cultivares de algodão naturalmente colorido adubadas com doses de potássio no Semiárido brasileiro. Para isto, dois experimentos foram conduzidos na Fazenda Experimental Rafael Fernandes, localizada no município de Mossoró, RN, nos períodos de julho a novembro de 2019 e julho a novembro de 2021. O delineamento experimental foi o de blocos casualizados, arranjados em parcelas subdivididas, com quatro repetições. Nas parcelas, foram alocadas as doses de potássio (0, 60, 120, 180 e 240 kg ha^{-1} de K_2O); e, nas subparcelas, as quatro cultivares de algodão naturalmente colorido (BRS Rubi, BRS Safira, BRS Verde e BRS Topázio). As cultivares de algodão colorido respondem à adubação potássica em função das condições edafoclimáticas as quais estão expostas. A cultivar BRS Topázio obteve maior produtividade e porcentagem de fibra nas duas safras de cultivo, destacando o seu potencial para a região. A dose de 240 kg ha^{-1} de K_2O aumentou a produtividade do algodão colorido, em cultivo de segunda safra. As cultivares BRS Safira, BRS Rubi e BRS Verde foram pouco produtivas.

Palavras-chave: *Gossypium hirsutum*, adubação, produtividade de pluma, fibra

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Introduction

Naturally colored fiber cotton has aroused the interest of producers because it is a source of raw material for the textile industry. It also has great environmental importance as it eliminates the dyeing stage in the industry (Barbosa et al., 2019). However, the success of colored cotton is dependent on correct management, especially regarding its nutritional status (Tartaglia et al., 2020). It is known that potassium (K) is one of the nutrients most demanded by cotton crop, being important for plant development, production, and quality of fibers, as it performs numerous functions such as enzymatic activation, protein synthesis, photosynthesis and cell growth (Yao et al., 2022).

In addition, K contents in the soil can be easily changed, considering the texture of the soil and the concentration of the nutrient in the solution (Medeiros et al., 2014). Thus, the most used way to correct and supply K to plants is a mineral application via fertilizers. Zhao et al. (2019), when evaluating the effects of K doses (ranging from 0 to 300 kg ha^{-1} of K_2O), on white fiber cotton, found that this nutrient favors fiber quality, while Borin et al. (2017) found higher fiber yields, around 1,100 and 1,200 kg ha^{-1}, with doses of 40 and 80 kg ha^{-1} of K_2O. These results show that K fertilization is important, but the dose varies. Therefore, it is essential to adequately supply this nutrient to the soil to obtain satisfactory results (Tsialtas et al., 2016).

In this context, K fertilizer can contribute to improving the development and establishment of colored cotton in semi-arid regions. However, the environmental conditions of the cultivation region, as well as the possible divergence between cultivars regarding the demand for K, imply different needs regarding the supply of this nutrient. Therefore, the objective of present study was to evaluate agronomic components of colored cotton cultivars fertilized with K doses in the Brazilian semiarid region.

Material and Methods

The experiments were carried out in the 2019 and 2021 crop years at the Rafael Fernandes Experimental Farm (5° 03' 31.00" S, 37° 23' 47.57" W at an 80 m altitude). The Experimental Farm belongs to Universidade Federal Rural do Semi-Árido -UFERSA and is located in the municipality of Mossoró, RN, Brazil. The climate of this region based on the climate classification established by Köppen is characterized as BSh, warm semi-arid tropical, with average temperature of 27.4 °C and irregular annual rainfall, on average 673.9 mm (Alvares et al., 2013). The soil of the area is classified as Argissolo Vermelho Distrófico Típico (*Ultisol*) (Rêgo et al., 2016).

The meteorological data, during the experiment corresponding to two agricultural crops, 2019 and 2021, were obtained from the Automatic Weather Station installed at the Experimental Farm (Figure 1).

Experimental design used was randomized blocks, with four replications and in a split plot scheme. Thus, five doses of K were allocated in the plots (0, 60, 120, 180, and 240 kg ha^{-1} of K_2O), and four colored cotton cultivars (BRS Rubi, BRS Safira, BRS Topázio, and BRS Verde) were allocated in the subplots. The doses were selected based on the most responsive range of cotton crop found in the literature (from 0 to 300 kg ha^{-1}) (Zhao et al., 2019), with interval according to the reference dose (60 kg ha^{-1} of K_2O) considering the levels of K contained in the soil (Gomes & Coutinho, 2008). The cultivars were selected because they are among the most cultivated by producers in the region.

Before setting up each experiment, soil samples were collected at a depth of 0-0.20 m. The samples were sent to the Laboratório de Análise de Solo, Água e Planta (LASAP), at UFERSA, for chemical and physical characterization of the soil of the experimental areas (Table 1).

Soil tillage was performed conventionally; operations were carried out with a heavy harrow to incorporate the remaining plant material in the area and leveling harrow to homogenize the soil surface. Liming was not performed.

Based on soil analysis (Table 1), balanced fertilization with nitrogen and phosphorus was determined, providing the equivalent to 90 kg ha^{-1} of N and 80 kg ha^{-1} of P_2O_5 for irrigated cotton (Gomes & Coutinho, 2008). Nitrogen was supplied in the form of urea (46% N) and monoammonium phosphate (MAP - 61% P_2O_5, 12% N), and potassium in the form of potassium chloride (KCl - 61% K_2O). Phosphorus

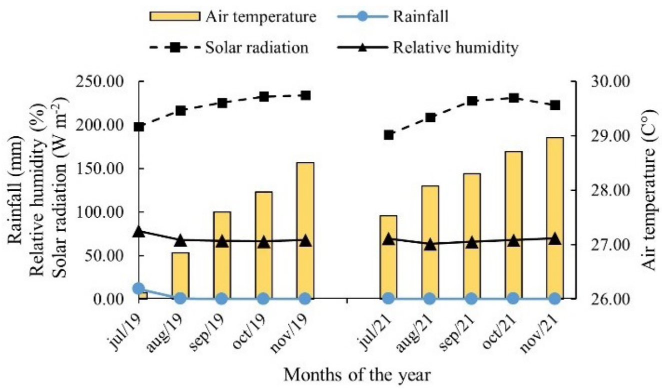

Figure 1. Average air temperature, rainfall, relative air humidity, and solar radiation during two crop cycles (2019 and 2021)

Table 1. Chemical analysis and particle-size characterization of the soil in the experimental areas (depth 0-0.20 m) in the 2019 and 2021 crop cycles

Depth (m)	pH	*P (mg dm^{-3})	*K^+	*Na^+	Ca^{2+}	Mg^{2+}	Al^{3+}	Sand	Silt	Clay
			($cmol_c$ dm^{-3})					(kg kg^{-1})		
					Crop - 2019					
0 - 0.20	7.50	8.00	0.10	0.04	1.30	0.20	0.00	0.90	0.03	0.07
					Crop - 2021					
0 - 0.20	5.60	4.20	0.11	0.01	0.78	0.30	0.00	0.90	0.03	0.07

*Extractant: Mehlich 1; The elements Ca^{2+}, Mg^{2+} and Al^{3+} were extracted with 1 mol KCl in a soil:extractant ratio of 1:10

was applied before planting, with 100% of the recommended dose as basal dose, and the application was carried out via fertigation. Nitrogen and potassium were applied before planting, as a basal dose, but two more applications were made throughout the cycle, at intervals of 20 days from one to the other. The first fertilization (basal dose) corresponded to 50% of the total recommended dose, and the remaining applications corresponded to 25% each of the total dose. All fertilization operations, from those prior to planting to subsequent ones, were carried out via fertigation. A micronutrient compound was also provided, with the dose corresponding to 1 kg ha^{-1} of the commercial product Rexolin® BRA (2.10% of B, 0.36% of Cu, 2.66% of Fe, 2.48% of Mn, 0.036% of Mo, and 3.38% of Zn), with application made at the appearance of floral buds (approximately 50 days after sowing). The compound was also applied by fertigation through fertilizer tanks.

Each subplot consisted of four rows of plants, with 19 plants per row, and planting spacing of 0.20 m between plants and 0.70 m between rows, with a total area of 10.64 m^2 (3.8 × 2.8 m). Only the two central rows were considered for observation, excluding the plants at the ends (borders), which totaled 34 plants in the observation area of each experimental subplot. The total area of each experiment was 851.2 m², and the population density of the experimental area was equivalent to 71,428 plants ha^{-1}.

A localized drip irrigation system was used, with emitters spaced 0.20 m apart and with flow rate of 1.6 L h^{-1}, and the average daily depth (6.39 mm in the first crop and 6.47 mm in the second crop) was applied based on the daily evapotranspiration of cotton, using the crop coefficient (Kc) (Allen et al., 1998). The initial, mid-season, and late-season reference Kc values were 0.35, 1.10, and 0.39 for the crop in 2019, and 0.36, 1.15, and 0.45 for the crop in 2021. Irrigation was suspended at 115 and 110 days after sowing for the first and second crop, respectively. Thus, the total depths corresponded to 685 and 662 mm in the first and second crop, respectively.

Sowing was performed manually, with three seeds per hole, at a depth of approximately 0.05 m. Thinning was performed when the plants had three definitive leaves, keeping one plant per hole. As phytosanitary control, three manual weeding operations were performed during the cotton cycle, at intervals of twenty days, for weed control in the first and second crop.

Harvest started at 106 (2019 crop) and 102 (2021 crop) days after sowing (DAS), being performed manually. The first harvest corresponded to the harvest of the bolls of the lower third of the plant (Tartaglia et al., 2020). The last two harvests were carried out weekly, according to the opening of the other bolls. All plants in the observation area were harvested. The 2019 crop cycle lasted 133 days and the 2021 crop cycle lasted 123 days.

The variables evaluated were number of bolls per plant (NBP), dry matter of the plant aerial part (DMAP), seed cotton yield (SCY), lint cotton yield (LCY), and fiber percentage (F%).

NBP was determined by counting the bolls of two plants of each treatment at the time of harvest. For the determination of DMAP (stem, leaves and fruits) two plants were collected per experimental unit on the day of the last harvest, and the parts were packed in paper bags and dried in forced air circulation oven at a temperature 65 °C until reached constant weight. Then, they were weighed on a digital scale, and the average per plant was obtained, with the values expressed in grams.

SCY was determined by weighing cotton in seed harvested within the observation area on a digital scale and converting the value to kg ha^{-1}. LCY was obtained by multiplying the seed cotton yield (kg ha^{-1}) by the fiber percentage evaluated with the HVI (High Volume Instrument) testing machine in the laboratory of the Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), in Campina Grande-PB.

Finally, cultivars were classified as to the response and efficiency to the use of K fertilization, following the method proposed by Fageria & Kluthcouski (1980), using a graphic representation, on the Cartesian plane. Efficiency was defined through the average value for low-nutrient crop yield and the response to the use of the nutrient was obtained by the difference in crop yield in an environment with high and low nutrient level, divided by the difference between doses, according to the equation:

$$RI = \frac{LC_{HK} - LC_{LP}}{DK}$$

where:

RI - response index;

LC_{HK} - lint cotton yield (kg ha^{-1}) with high potassium level (240 kg ha^{-1} of K_2O);

LC_{LP} - lint cotton yield (kg ha^{-1}) with low potassium level (0 kg ha^{-1} of K_2O); and,

DK - difference between potassium doses (kg ha^{-1}).

The data were subjected to analysis of variance (ANOVA), and the crop yields were evaluated separately. When the homogeneity of variances between crops was observed, joint analysis was applied. The means of qualitative treatments, in cases of significant effect, were compared by Tukey test at 0.05 probability level, while the data referring to quantitative factors were subjected to regression analysis, using the SISVAR program (Ferreira, 2014).

Results and Discussion

For all variables, it was possible to perform joint analysis, as there was a triple interaction ($p < 0.01$) between treatments (crop year, K doses, and cultivars), except for fiber percentage, which showed a double interaction between crops and cultivars. Thus, it is possible to observe the effect of K for most of the agronomic characteristics evaluated, in addition to the influence of the conditions of the region during the two agricultural crop years.

In the first crop (Figure 2A), it was observed that the cultivars BRS Rubi and BRS Topázio obtained lower NBP as K doses increased. Therefore, the maximum values were 11.90 and 11.88 bolls, respectively, with the dose 0 kg ha^{-1} of K_2O, which suggests that both cultivars were not sensitive to soils with lower K availability, under the environmental conditions of the first crop. Conversely, the cultivars BRS Verde and BRS Safira responded to K fertilization with a maximum of 10.25

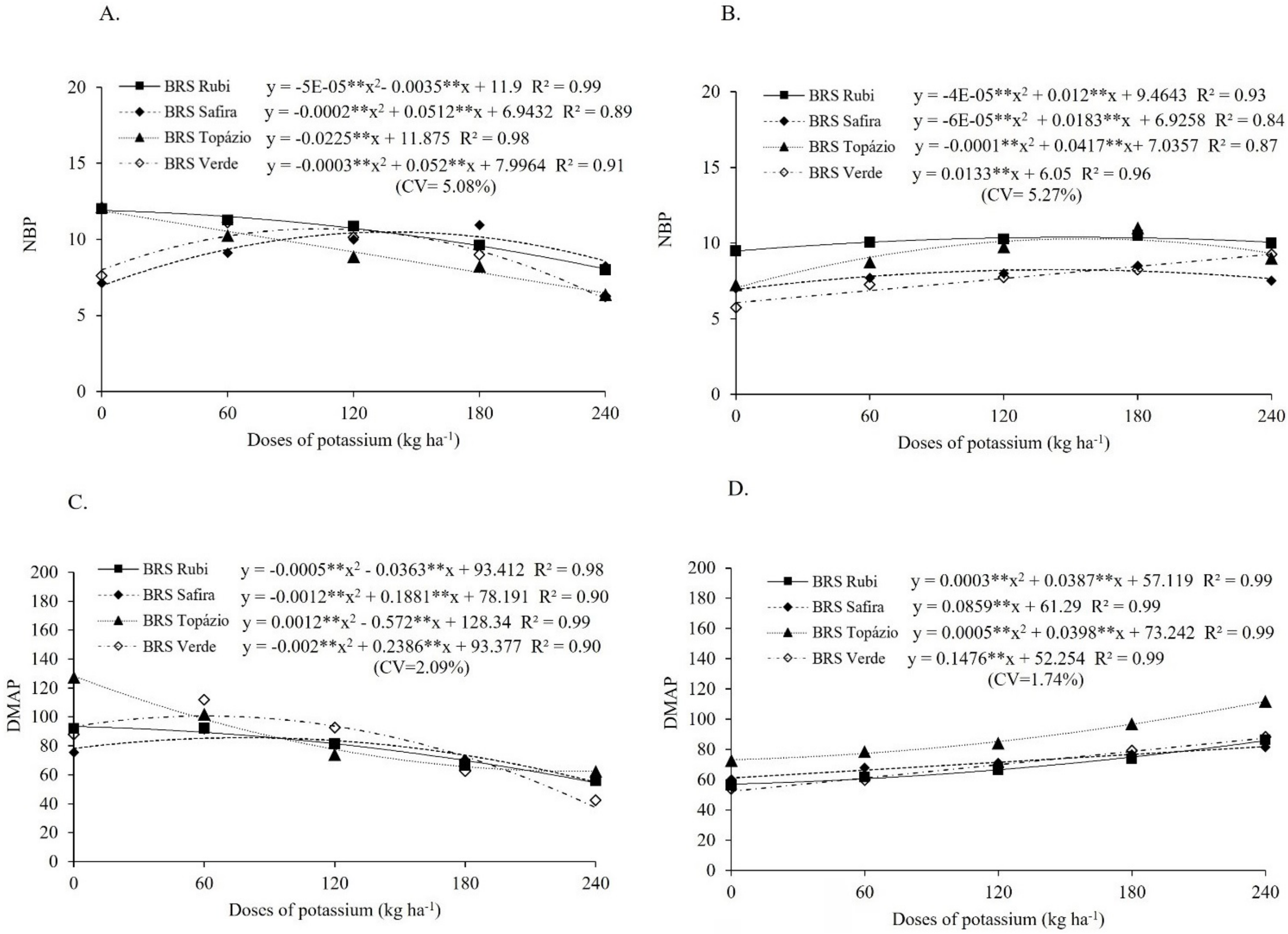

Figure 2. Number of bolls per plant (NBP) and dry matter of the plant aerial part (DMAP) in colored cotton cultivars fertilized with potassium doses in two crop years, 2019 (A, C) and 2021 (B, D)

and 10.22 bolls as a function of K_2O doses of 86 and 127 kg ha^{-1}, respectively.

In the second crop year (Figure 2B), all cultivars responded to K fertilization. The cultivar BRS Topázio reached maximum NBP of 11.38 with the estimated dose of 208 kg ha^{-1} of K_2O, followed by BRS Rubi with 10.36 bolls under the dose of 150 kg ha^{-1} of K_2O. BRS Verde reached 9.24 bolls with the maximum dose of 240 kg ha^{-1} of K_2O, and BRS Safira reached 8.32 bolls with the dose of 148 kg ha^{-1} of K_2O.

Potassium influenced NBP (Figures 2A and 2B), for being a nutrient that actively participates in plant development, production, and fiber quality. The values found in this study for NBP in both crops are above the range observed by Borin et al. (2017), when studying the lint cotton yield of narrow-row cotton in the second crop year in response to nitrogen and potassium fertilization. However, there was divergence between the crops. According to White (2013), appropriate level of K may differ in different crops, which is in accordance with what was observed in this study. The same author also points out that among crops there are differences in the temporal demand of K, and this is tied to the individual phenology of cultivated crops.

The cultivars BRS Topázio and BRS Verde reached maximum values of 128.34 and 100.49 g per plant for DMAP with 0 and 60 kg ha^{-1} of K_2O, respectively, in the 2019 crop (Figure 2C). The cultivar BRS Rubi reached the highest mass, 93.41 g per plant, with the dose of 0 kg ha^{-1} of K_2O. BRS Safira reached DMAP of 85.53 g per plant using 78 kg ha^{-1} of K_2O. In the 2021 crop (Figure 2D), all cultivars obtained increments as K doses increased, with the highest values for DMAP of 111.59, 87.68, 83.69 and 81.91 g per plant for the cultivars BRS Topázio, BRS Verde, BRS Rubi, and BRS Safira, respectively, using the dose of 240 kg ha^{-1} of K_2O.

The DMAP values obtained in the first year (Figure 2C) were higher than those of the second crop (Figure 2D). The variations in meteorological parameters (Figure 1), mainly higher precipitation and lower temperature in the first year, may have stimulated vegetative growth and consequently led to higher amount of dry matter. In addition, these variations affected the duration of the cycle, with a reduction of ten days in the second crop cultivation. In this context, it is emphasized that the study region has conditions in which its maximum temperatures usually exceed the optimum temperature for crops and can cause a negative effect on plant growth and development. Thus, the increase in temperatures accelerates the development of the crop, which will tend to reach its energy requirement to complete its cycle earlier (Cavalcante Junior et al., 2018).

The cultivars BRS Topázio and BRS Verde also obtained higher SCY, corresponding to 3,338.10 and 2,619.68 kg ha^{-1}, attributed to the use of 0 and 110 kg ha^{-1} of K_2O, in the first crop (Figure 3A). These cultivars were followed by BRS Safira, with SCY of 2,396.56 kg ha^{-1} at the maximum K dose applied

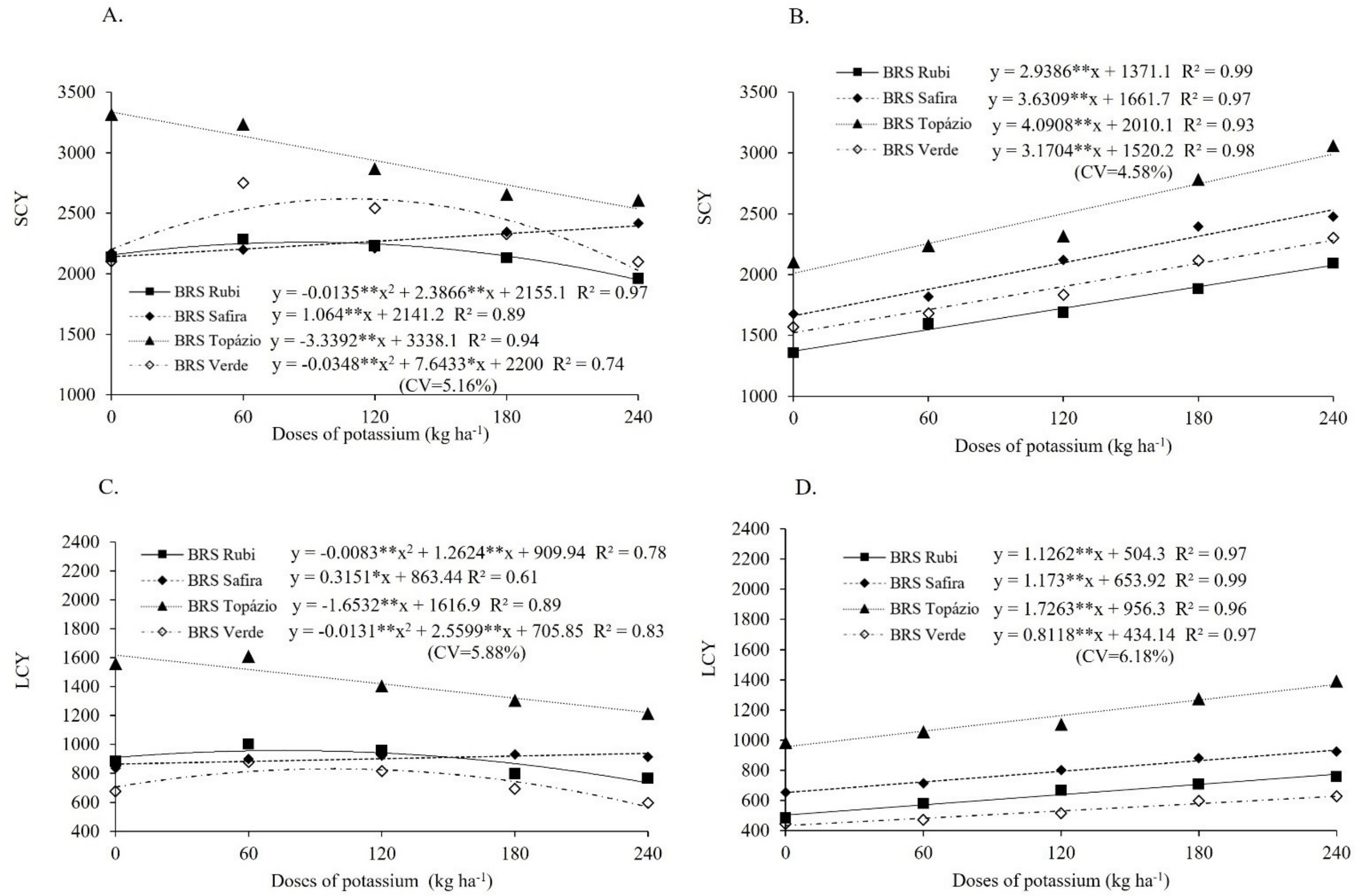

Figure 3. Seed cotton yield - SCY (A, B) and lint cotton yield - LCY (C, D) of colored cotton cultivars fertilized with potassium doses in two crop years, 2019 (A, C) and 2021 (B, D)

to the soil (240 kg ha^{-1} of K_2O), while for the cultivar BRS Rubi, the maximum of 2,260.58 kg ha^{-1} was obtained with the estimated dose of 88 kg ha^{-1} of K_2O. On the other hand, in the second crop (Figure 3B) all cultivars obtained higher SCY with the maximum dose of 240 kg ha^{-1} of K_2O. Thus, the maximum yields were 2,991.89, 2,533.12, 2,281.10, and 2,076.36 kg ha^{-1} for the cultivars BRS Topázio, BRS Safira, BRS Verde, and BRS Rubi. The increments compared to the treatment without K application were respectively 32.82, 34.40, 33.56, and 33.97%.

The results obtained for SCY (Figures 3A and 3B) are comparable to those obtained by Tariq et al. (2018) and Hussain et al. (2021), who reported that cotton yield increased with K application. In the first case, approximately 4,000 kg ha^{-1} was obtained for the white cotton cultivar CIM-616 with the use of the 200 kg ha^{-1} K_2O dose combined with 4 foliar sprays of 2% potassium nitrate (KNO_3) (Tariq et al., 2018). In the second, 3,175 kg ha^{-1} was obtained for the cultivar CYTO-301 with the dose of 120 kg ha^{-1} of K_2O (Hussain et al., 2021). In this study, the colored cotton cultivars responded differently to the K increment in the soil, specifically in the first year of cultivation. This suggests that these cultivars have divergent mechanisms for greater use of K depending on the conditions to which they are exposed. According to Ragel et al. (2019), plants accumulate large amounts of K^+ in their vacuoles, exceeding their purely nutritional needs. In addition, K can significantly affect the absorption and utilization of other nutrients. High concentrations of K in soil solution can impair the absorption of magnesium (Mg) and may induce its deficiency (Tränkner et al., 2018). Insufficient or excessive supply of K can also inhibit carbon (C) assimilation by leaves and the transport of photosynthetic products from leaves to roots (Xu et al., 2020). In this context, the low assimilation of C and other compounds, induced by K, can result in lower accumulation of carbohydrates, which will consequently reduce lint yield.

For the variable LCY, it was observed that the cultivar BRS Topázio stood out again with maximum value (1,616.90 kg ha^{-1}) without K fertilization in the first crop year (Figure 3C). This cultivar was followed by BRS Rubi with LCY of 957.94 kg ha^{-1} as a function of the dose 76 kg ha^{-1} of K_2O. BRS Safira reached 939.06 kg ha^{-1} and BRS Verde reached 830.91 kg ha^{-1}, and these values were attributed to the use of doses of 240 and 98 kg ha^{-1} of K_2O, respectively. In the second crop (Figure 3D), all cultivars obtained increments as a function of K fertilization. The highest LCY values were 1,370.61, 935.44, 774.59 and 628.97 kg ha^{-1} for the cultivars BRS Topázio, BRS Safira, BRS Rubi and BRS Verde, respectively, with the use of the maximum dose of 240 kg ha^{-1} of K_2O.

For LCY (Figures 3C and 3D), the cultivar BRS Topázio was the most productive in both crop years, which reflects the best potential of this cultivar for the family agriculture of the semi-arid region and greater adaptation to the edaphoclimatic conditions of the region. Increased lint cotton yield and dry matter of aerial part indicate double suitability, either for the production of fiber destined to the textile industry or for animal feed given the production potential of the aerial part, which makes cotton a crop of good strategic options for the region.

The cultivar BRS Topázio reached a higher F% in the two agricultural crop years (Table 2). BRS Rubi and BRS Safira obtained higher F% in the 2019 crop compared to the 2021 crop, while the cultivar BRS Verde was the one that obtained the lowest percentage among the cultivars evaluated in the two crops.

According to Cunha Neto et al. (2015), BRS Topázio is much superior to other colored cultivars because it has undergone the process of genetic improvement for a longer period. As for the F% obtained by the cultivars (Table 2), the values were higher than those established by Carvalho et al. (2011) for most cultivars. This indicates that this quality attribute was achieved among the colored cotton cultivars grown in a semiarid region, regardless of the treatment used.

For the classification of cultivars (Figure 4), the response index was represented in the abscissas axis (X), and the efficiency in the use of K in the axis of the ordinates (Y), with the point of origin of the axes being the efficiency and the average response of the cultivars. Efficient and responsive cultivars are represented in quadrant I; the not efficient and responsive cultivars are represented in quadrant II; the not efficient and not responsive cultivars are represented in quadrant III; and the efficient and not responsive cultivars are represented in quadrant IV.

In the 2019 crop year, the cultivar BRS Safira was classified as efficient and responsive and BRS Topázio as efficient and not responsive, with higher average yield when cultivated in low-K environments compared to the other cultivars; therefore, they are represented in the first and fourth quadrant (Figure 4A). The cultivar BRS Verde in turn was not efficient, but responsive to K fertilization, nonetheless with an index lower than 1, being represented in quadrant II. The cultivar BRS Rubi, despite having higher lint cotton yield than BRS Verde, was classified as not efficient and not responsive, because both the production, which reflects the efficiency of use, and the index remained below the average.

For the 2021 crop year, a change was observed in the classification of most cultivars, which began to integrate different quadrants from that of the previous crop, except only for the cultivar BRS Rubi, which had the same classification (Figure 4B). The cultivar BRS Topázio was represented in quadrant I (efficient and responsive) and the cultivars BRS Verde and BRS Safira in quadrant III (not efficient and not responsive).

The classification (Figure 4), regarding the efficiency of use and response of cultivars to K, makes it possible to establish that those belonging to the not efficient and responsive group are indicated for producers who have a better technological level, since there is a need for more specific management, with the implementation of fertilization. Conversely, those of the efficient and not responsive group are recommended for cultivation with

Table 2. Average values for fiber percentage (F%) in colored cotton cultivars cultivated in two crop years

Crop year	Cultivars			
	BRS Rubi	BRS Safira	BRS Topázio	BRS Verde
2019	41.29 aB	39.40 aC	46.86 aA	31.01 aD
2021	35.18 bC	37.83 bB	46.39 aA	28.02 bD

[1]Means followed by the same lowercase letters in the column and different uppercase letters in the row do not differ from each other, at 0.05 probability level, by Tukey test

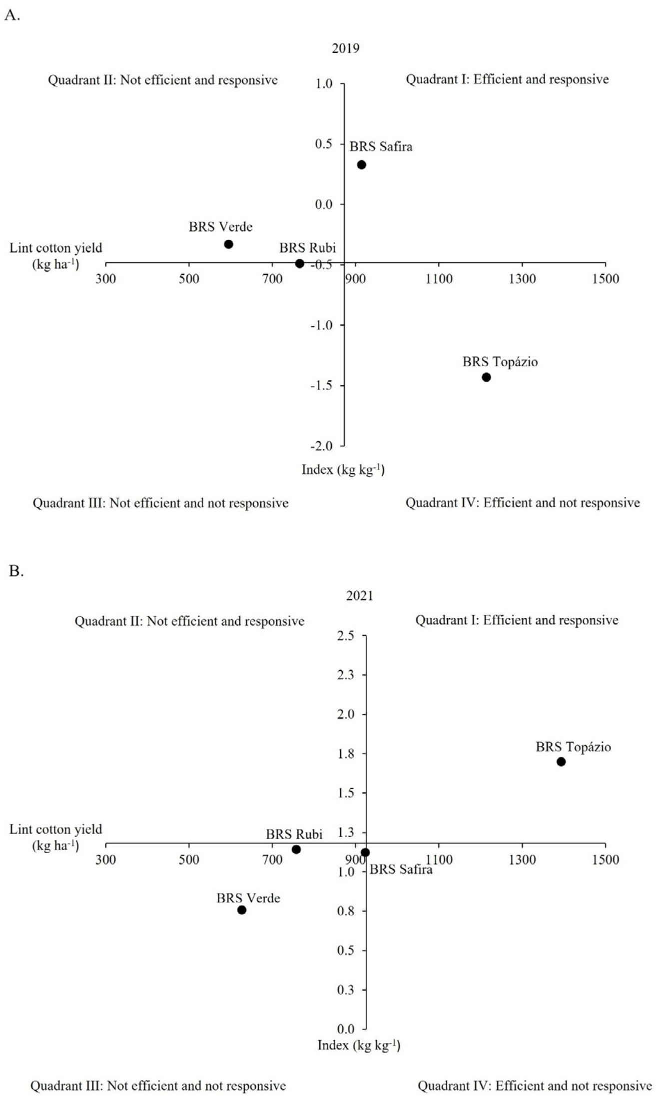

Figure 4. Classification of colored cotton cultivars regarding the response index and efficiency to potassium application for lint cotton yield in two crop years, 2019 (A) and 2021(B)

lower technological level, because they can produce satisfactorily, even under conditions of low K availability. Those located in the not efficient and not responsive group produce below average under high or low K level, i.e., regardless of the application of K, these cannot obtain good yield. Those located in the efficient and responsive group are more productive, compared to the others, under low K levels, and respond significantly to the increase of K in the soil. In our study, the classification of colored cotton cultivars by the method proposed by Fageria & Kluthcouski (1980) showed oscillations. Therefore, there was no common classification for cultivars between crops, except for BRS Rubi, which remained in the not efficient and not responsive group. These oscillations possibly occurred due to environmental conditions, which cannot be controlled, to which the cultivars were exposed in each crop year.

Therefore, the results show the complexity of the Cultivars x Environment interaction when it comes to naturally colored fiber cultivars, requiring the evaluation of cultivars in more locations and years. Major changes in the performance of genotypes in different locations suggest that it is desirable to develop genotypes for different locations (Carvalho et al., 2015). In addition, it is worth noting the importance of evaluating the chemical state of the soil. The hydrogen potential (pH), for example, can affect soil microbiology and the cation exchange process, impairing the efficiency of fertilization, which makes its control essential. In the case of this study, the pH remained within the range considered ideal for the availability of K, because its values were close to neutrality and the absence of aluminum (Al) (Table 1), according to Cotta (2016). Thus, it is assumed that there was no impairment in the absorption of this nutrient due to pH. Therefore, we propose that greater splitting of K doses should be tested in future studies, perhaps based on nutrient absorption rate during the phases of the crop cycle and mainly paying attention to the properties of the soil used. Furthermore, the interaction of this nutrient with others should always be checked, mainly the correct adjustment of the Ca:Mg:K ratio in the soil, bearing in mind that in the case of this study, a lower Ca content in the soil was observed (Table 1), in the second crop.

Conclusions

1. Colored cotton cultivars respond to potassium fertilization depending on the edaphoclimatic conditions to which they are exposed.

2. The BRS Topázio cultivar had higher lint cotton yield and fiber percentage in both growing seasons, highlighting its potential for the region.

3. The dose of 240 kg ha^{-1} of K_2O promoted greater yield of colored cotton, in the second crop year, considering soil with a lower Ca:Mg ratio and more critical climatic conditions, in the Brazilian semiarid region.

4. The cultivars BRS Safira, BRS Rubi, and BRS Verde were not very productive.

Acknowledgments

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