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Reduction of interrow spacing in cassava (*Manihot esculenta* Crantz) production

Reducción del espaciamiento entre hileras en la producción de yuca (*Manihot esculenta*)

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ARTICLE DATA

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ABSTRACT

The interrow spacing commonly used in cassava cultivation in Brazil, especially in the Agreste region of Alagoas, ranges from 100 to 120cm. However, the reduction in row spacing can provide agronomic and environmental benefits in cassava cropping systems. Thus, this work aimed to evaluate the performance of two cassava varieties cultivated with reduced interrow spacing. Two experiments were conducted in the field, one in 2015/16 and another in 2017/18. A Split Plot design with four replications was used in both experiments. Four interrow spacing were evaluated in the main plot: 60, 80, 100 and 120cm, with plants spaced 60cm apart within rows, giving populations of 27,778, 20,833, 16,667 and 13,889 plants per hectare, respectively. In the subplots, two cassava varieties were evaluated: Caravela and Pretinha. An increase in interrow spacing promoted a linear reduction in the stem green mass of cassava. Plant height, leaf green mass, main stem diameter, root yield, tuberous root length, tuberous root diameter, flour percentage, flour yield, and starch content were not influenced by changes in interrow spacing. The Pretinha variety was superior to Caravela in the following evaluated traits: stem green mass, the diameter of tuberous roots, root yield, plant height, and flour yield. The results indicate the possibility of altering the interrow spacing in cassava to assist in the cultural management, without impacting crop yield.

Keywords: varieties; spacing; weeds; distance between the rows.

RESUMEN

El espaciamiento entre hileras comúnmente utilizado en el cultivo de yuca en Brasil, especialmente en la región de Agreste de Alagoas, varía de 100 a 120cm. Sin embargo, la reducción del espacio entre hileras puede promover ganancias agronómicas y ambientales en los sistemas de cultivo con yuca. Por lo tanto, el objetivo de este trabajo fue evaluar el comportamiento de dos variedades de yuca cultivadas con espaciamiento reducido entre hileras. Se realizaron dos experimentos en el campo, uno en el 2015/16 y otro en el 2017/18. El diseño experimental utilizado en ambos experimentos fue el de Parcelas Divididas con cuatro repeticiones. Se evaluaron cuatro espaciamientos entre filas en la parcela principal: 60, 80, 100 y 120cm, con plantas espaciadas 60cm dentro de las hileras, dando poblaciones de 27,778, 20,833, 16,667 y 13,889 plantas por hectárea, respectivamente. En las subparcelas se evaluaron dos variedades de yuca: Caravela y Pretinha. Un aumento en el espaciamiento entre hileras promovió una reducción lineal en la masa verde del tallo de la yuca. La altura de la planta, la masa verde de la hoja, el diámetro del tallo principal, el rendimiento de la raíz, la longitud de la raíz tuberosa, el diámetro de la raíz tuberosa, el porcentaje de harina, el rendimiento de la harina y el contenido de almidón no se vieron afectados por los cambios en el espaciamiento entre hileras. La variedad Pretinha fue superior a Caravela en las siguientes características evaluadas: masa verde del tallo, diámetro de raíces tuberosas, rendimiento de raíces, altura de planta y rendimiento de harina. Los resultados indican la posibilidad de alterar el espaciamiento entre hileras en la yuca para ayudar en el manejo cultural, sin afectar el rendimiento del cultivo.

Palabras clave: variedades; espaciamento; malezas; distancia entre hileras.

INTRODUCTION

Cassava is a crop of great importance for food security and income generation for countless families living in the Brazilian rural areas. In addition, cassava is used in animal feed and as a raw material for industry, demonstrating great versatility. Cassava is the second most important crop in the state of Alagoas, behind sugarcane. The Agreste region is responsible for about 60% of the cassava production area of Alagoas (IBGE, 2013), which according to Embrapa (2017) covers 21.5 thousand hectares.

Although it has high socioeconomic importance, cassava is less beneficial for the edaphic environment, providing little protection of the soil against erosion, especially at the beginning of the growing cycle (Embrapa, 2003). Among the factors inherent to the crop and the agricultural practices employed that favor soil loss through erosion is: the use of conventional tillage system (Filho *et al.*, 2000; Pequeno *et al.*, 2007; Albuquerque *et al.*, 2012); need for soil tillage at harvest (Pequeno *et al.*, 2007; Lima *et al.*, 2015); slow initial plant growth (Putthacharoen *et al.*, 1998; Pequeno *et al.*, 2007; Albuquerque *et al.*, 2012); and use of wide row spacing (Putthacharoen *et al.*, 1998; Pequeno *et al.*, 2007; Lima *et al.*, 2015). In a study carried out in Indonesia, soil erosion losses of 2.5t ha^{-1} $month^{-1}$ were found in plots with cassava grown with row spacing of 100 and 50cm between plants within rows (Iijima *et al.*, 2004).

In the Agreste region of Alagoas, the interrow spacings most commonly used in cassava are 100 and 120cm, which creates the need for frequent manual weeding for weed control (Batista *et al.*, 2009). Slow initial growth and wider interrow spacing are also factors that predispose the cassava crop to greater weed interference (Azevêdo, 2000). In this context, weed control, which in the recent past was done by manual weeding, has become more reliant on chemical control, mainly due to the scarcity of labor and the increase in planted area, in addition to the adoption of monoculture rather than traditional intercropping (Silva *et al.*, 2011; Santiago *et al.*, 2015). However, chemical control should not be the only method employed for weed control, as it may promote the selection of herbicide-resistant weeds, as well as increase the risk for human health and environmental contamination.

An alternative method that can be implemented to manage the weed community in cassava involves adjustments in the spacing and organization of the crop plants (Silva *et al.*, 2012). The use of narrow row spacing has a direct effect on reducing the time to closure of the crop canopy, both distance between rows and the distance between plants in a row (Oliveira *et al.*, 1998). This fact demonstrates that the use of reduced spacing could be an important strategy to reduce the number of crop weeds, and even to reduce the herbicide doses employed.

Important crops such as maize have undergone reductions in their interrow spacing over time. Recommendations from the 1980s indicate the interrow spacing of 90cm is ideal for maize cultivation. Currently, the crop is mostly grown at spacings ranging from 45 to 50cm, representing a reduction of about 50% in the interrow distance (Gilo *et al.*, 2011).

Phytotechnical research on cassava cultivation should follow a similar strategy to contribute to production sustainability. Studies on cassava yield in response to spacing changes have shown varied results (Távora *et al.*, 1982; Takahashi & Guerini, 1998), a fact that may relate to the behavior of each cassava variety and interactions with the edaphoclimatic conditions of each locality. The wide variability in yield obtained using different spacings of cassava plants in different regions and with different varieties shows that there is no universal recipe.

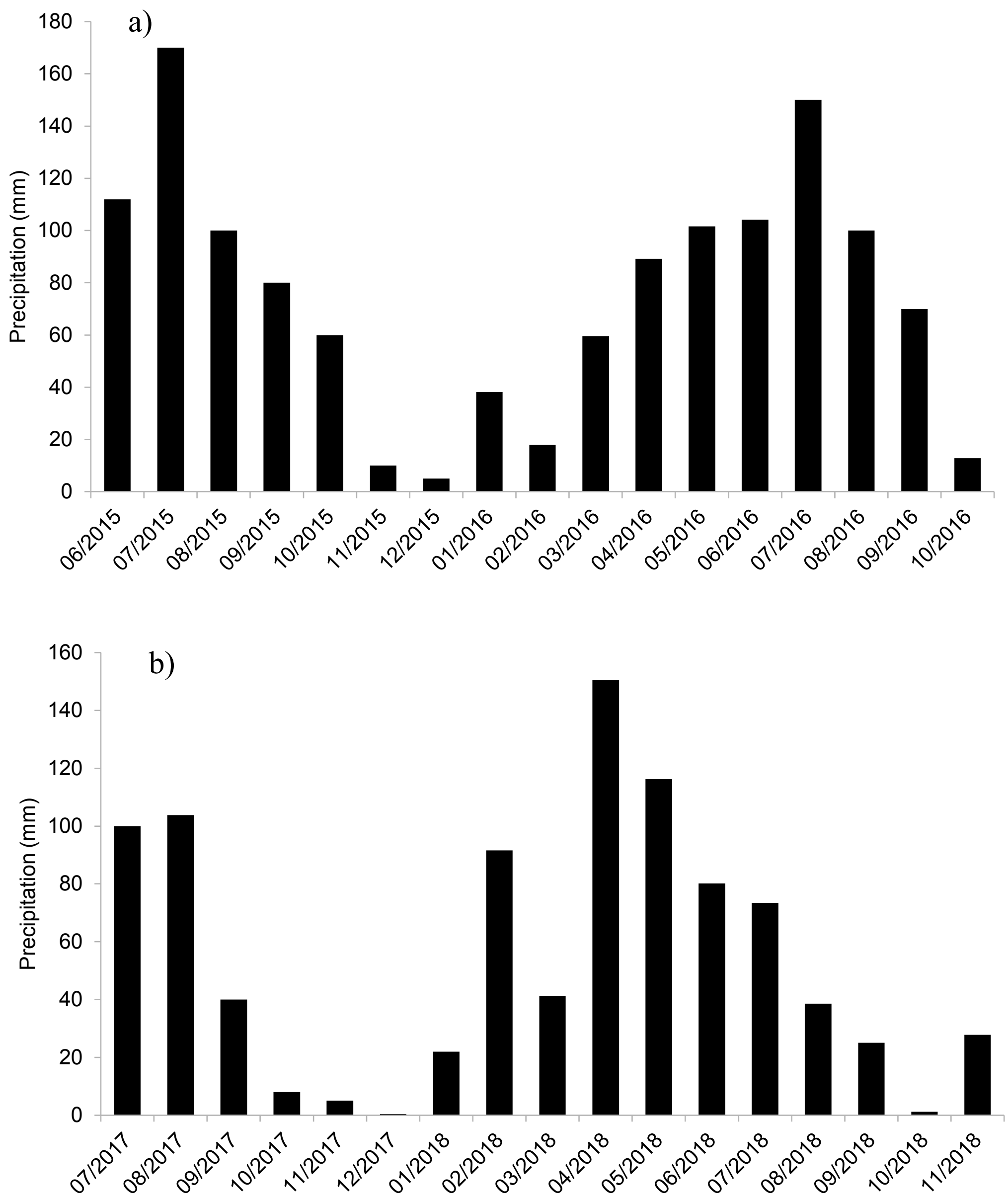
Thus, it is important to carry out regional experiments, using representative varieties of the production system, to define recommendations adapted to each situation. In this context, this work aimed to evaluate the performance of two cassava varieties typically grown in the Agreste region of Alagoas, Brazil, cultivated at reduced plant spacing.

MATERIALS AND METHODS

Two experiments were carried out in the Agreste region of Alagoas State in Brazil, one in the 2015/16 in the municipality of Arapiraca, and the other in the 2017/18 in the municipality of Limoeiro de Anadia. The geographical coordinates are: Arapiraca: 09º48'53"S, 36º34'25" W and 250m elevation; Limoeiro de Anadia: 09º44'31"S, 36º30'45" W and 172m elevation.

The predominant climate is a tropical climate with a summer dry season (type As). The average annual temperature and precipitation are 23.8°C and 730.5mm and 24.6°C and 946.6mm, respectively, for Arapiraca and Limoeiro de Anadia (Weatherbase, 2022). Precipitation data recorded while conducting the experiments are in Figure 1.

The soil in Arapiraca was identified as *Latossolo Vermelho* and that in Limoeiro de Anadia as *Latossolo Amarelo* according to the Brazilian soil classification system (Embrapa, 2018). Prior to the installation of the experiments, soil samples were collected from the experimental areas, and presented the following physicochemical characteristics: Arapiraca (2015/16): pH in H_2O of 5.1; 1.9cmol$_c$ dm^{-3} of $H^+ + Al^{+3}$; 0.08cmol$_c$ dm^{-3} of Al^{+3}; 0.7cmol$_c$ dm^{-3} of Ca^{+2}; 0.6cmol$_c$ dm^{-3} Mg^{+2}; 19mg dm^{-3} of K^+; 56mg dm^{-3} of P; 0.62% M.O.; 185g kg^{-1} of clay, 261g kg^{-1} of silt and 554g kg^{-1} sand (sandy loam texture); Limoeiro de Anadia (2017/18): pH in H_2O of 5.1; 2.2cmol$_c$ dm^{-3} of $H^+ + Al^{+3}$; 0.08cmol$_c$ dm^{-3} of Al^{+3}; 1.2cmol$_c$ dm^{-3} of Ca^{+2}; 0.6cmol$_c$ dm^{-3} Mg^{+2}; 18mg dm^{-3} of K^+; 3mg dm^{-3} of P; 1.18% M.O.; 183g kg^{-1} of clay, 259g kg^{-1} of silt, 588g kg^{-1} of sand (sandy loam texture).



Total precipitation in 2015/16 and 2016/17 seasons of, respectively, 1,280.6 and 924.8mm.

Figure 1. Precipitation data (mm) during the experimental period. a) Arapiraca (AL), 2015/16; and b) Limoeiro de Anadia (AL), 2017/18.

Before the planting of both experiments, the soil was tilled using a plow followed by two harrowing. After soil preparation, 15cm deep furrows were mechanically opened. For planting, 20cm of stem cuttings were used and sowed at 10cm deep, at 60cm intervals in the rows. The Arapiraca experiment was installed on June 16, 2015, and harvesting was performed on October 13, 2016, giving approximately 16 months of the growing season. The Limoeiro de Anadia experiment was installed on July 3, 2017, and harvesting was carried out on November 7, 2018, also giving a growing period of about 16 months.

In the Arapiraca experiment the equivalent of 15kg ha^{-1} of urea (45% N), 34kg ha^{-1} of potassium chloride (60% K_2O), and 20kg ha^{-1} simple superphosphate (18% P_2O_5) was applied at planting. In the Limoeiro de Anadia experiment 15kg ha^{-1} of urea (45% N), 34kg ha^{-1} of potassium chloride (60% K_2O), and 10kg ha^{-1} simple superphosphate (18% P_2O_5) were applied. The day after planting, the pre-emergence herbicides clomazone (1,260g ha^{-1}) and flumioxazin (100g ha^{-1}) were applied throughout both experimental areas. At 60 days after planting, 75kg ha^{-1} of urea (45% N) was applied. All other cultural treatments were carried out so that the cassava plants were exposed only to the effect of the treatments evaluated in the experiments.

In both experiments, the experimental design used was a randomized complete block design, and the treatments were distributed in a split-plot scheme with four replications. Four interrow spacings were evaluated in the main plot: 60, 80, 100, and 120cm, which represent the respective populations of 27,778, 20,833, 16,667 and 13,889 plants per hectare. The subplots evaluated two varieties of cassava: Caravela and Pretinha, both of which are widely cultivated in the region (Santiago *et al.*, 2018). In Arapiraca the subplots were 10 x 7.2m (72m^2), while in Limoeiro de Anadia the subplots were 7.2 x 7.2m (51.84m^2), with a useful area of four central rows, discounting 0.8m from the beginning and end of each row.

In both experiments, at the time of harvest, the following evaluations were performed: green stem mass (kg ha^{-1}); green leaf mass (kg ha^{-1}); root length (cm); root diameter (mm); and root yield (kg ha^{-1}). In the experiment conducted in Limoeiro de Anadia, the following variables were also evaluated at harvest: plant height (m); main stem diameter (mm); flour percentage (%); flour yield (Mg ha^{-1}), and starch content (%). Statistical analyses of the experiments were performed using SISVAR software (Ferreira, 2011). For the traits common to both experiments a joint analysis was performed and for the traits that were evaluated only in the Limoeiro de Anadia experiment, traditional variance analysis was performed. The joint analysis of the experiments was performed based on the ratio between the largest and the smallest residual mean square, assuming that values greater than seven showed that the residual variances between the experiments were not homogeneous (Pimentel-Gomes, 2000). When a significant effect was found between factors, or between the levels of each factor, the means of the factors were compared using the F test (for varieties) and regression (for interrow spacing) ($p \leq 0.05$).

RESULTS AND DISCUSSION

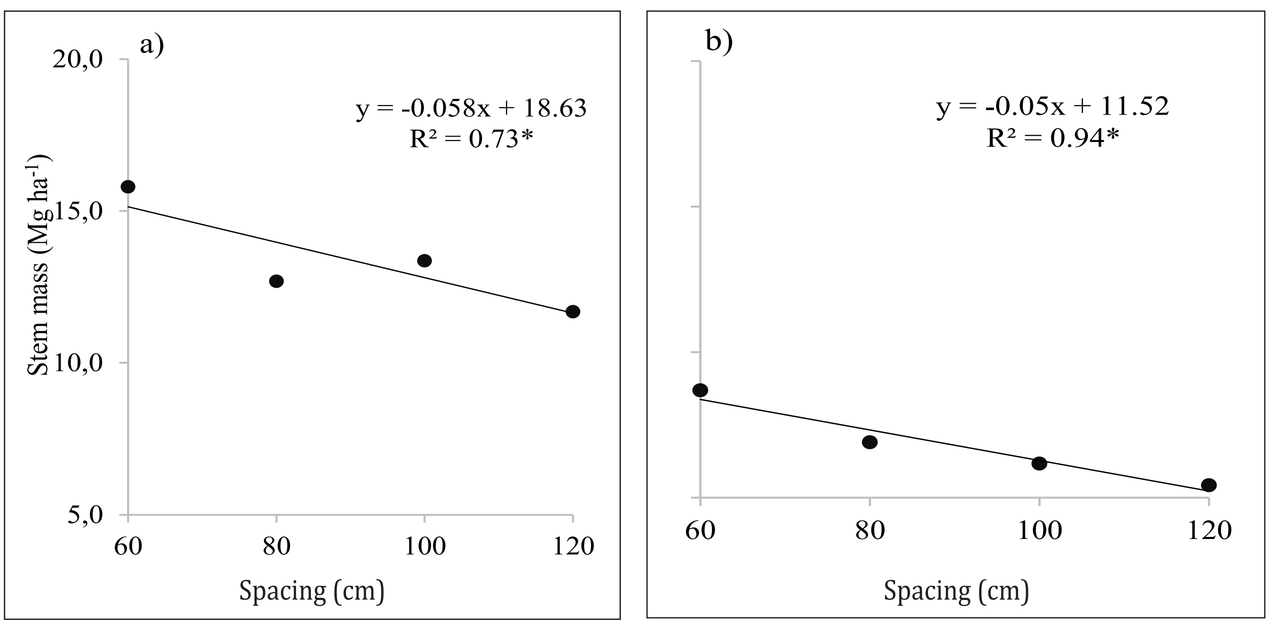
The summary of the analysis of variance of the experiments carried out with the cassava crop is presented in Table 1. For the variable stem mass, there was an isolated effect of the factors experiment, variety, and spacing between rows. For leaf mass, a significant effect of the experiment was observed, in addition to the interaction between experiment and variety. In contrast, for root length, only the isolated effect of the experiment was observed, while for root diameter and root productivity, a significant effect was observed for the experiment and cassava variety.

Table 1. Analysis of variance (calculated F values) for stem mass (SM), leaf mass (LM), root length (TRL), root diameter (TRD), and root yield (RY) of two cassava varieties cultivated at different interrow spacings. Arapiraca (AL), 2015/16 and Limoeiro de Anadia (AL), 2017/18.

FV	GL	Calculated F				
		SM	LM	TRL	TRD	RY
Experiment (E)	1	130.40**	482.99**	60.02**	120.72**	126.90**
Variety (V)	1	14.12**	1.22	0.64	22.34**	28.08**
Spacing (S)	3	7.94**	0.67	0.42	1.37	0.56
E x V	1	2.85	3.52*	1.74	1.58	0.11
E x S	3	0.30	2.08	0.82	0.56	1.06
V x S	3	1.82	0.87	0.96	0.37	0.14
E x V x S	3	0.45	0.47	0.53	0.28	0.18
CV (%)		22.53	25.70	9.77	7.58	23.36

*, **: Significant by the F test at 5 and 1 %, respectively.

A linear reduction in stem mass was verified with increasing cassava interrow spacing in the two experiments conducted in the Agreste region of Alagoas (Figure 2). The larger number of plants in the plots with the smallest spacing may explain this finding. This result corroborates results from Távora *et al.* (1982), who reported a tendency for an increase in the production of cassava branches with a denser plant population.



a) Arapiraca; b) Limoeiro de Anadia. * Significant regression ($p \leq 0.05$).

Figure 2. Stem mass of cassava cultivated at different interrow spacings. Arapiraca (AL), 2015/16 and Limoeiro de Anadia (AL), 2017/18.

The Pretinha variety presented a higher stem mass compared to the Caravela variety, a fact verified both in the experiment conducted in Arapiraca (2015/16) and in the Limoeiro de Anadia experiment (2017/18) (Table 2). About stem production by cassava plants, the cassava plants in Arapiraca produced almost twice the stem mass of those grown in Limoeiro de Anadia. Although roots are the main economic product of cassava, the stem can be sold in the form of cuttings for new plantings, and can also be supplied with chopped leaves and petioles in feed for animals such as dairy cattle. According to Costa (2016), cassava shoots (leaves and branches), mainly from the upper third of the stem, have been used in animal feed, especially in fresh, hay, and silage form. For this reason, the production of the cassava shoot also provides extra income for the cassava producers in the Agreste region.

In Arapiraca the Pretinha variety yielded a greater leaf mass than the Caravela variety, whereas in Limoeiro de Anadia there was no difference regarding this variable between the two varieties (Table 2). As already observed for the stems, the leaf yield of cassava plants in Arapiraca was higher than that in Limoeiro de Anadia, differing significantly in the joint analysis of the experiments. Unlike the pattern observed about stem mass, increasing or decreasing the interrow spacing did not influence the cassava leaf mass of the varieties evaluated.

For the variable tuberous root length, no effects of interrow spacing or variety were observed, either in Arapiraca (2015/16) or Limoeiro de Anadia (2017/18). This result contrasts with that reported by Silva *et al.* (2013), who found a reduction in root length with an increase in cassava plant population density. A higher mean root length was generally observed in the experiment conducted in Arapiraca (30.34cm) compared to that of Limoeiro de Anadia (25.10cm) (Table 2).

The tuberous roots of the Pretinha variety presented a larger average diameter than those of the Caravela variety in both experiments (Table 2). Larger root diameters were observed in the Arapiraca experiment, which followed the same behavior as for the other evaluated characteristics. The evaluated spacing did not influence the root diameter of the two varieties. Pinho *et al.* (1995) reported that the root diameter increases continuously until the moment of harvest, and is the component of production that most correlates with root yield.

The root mass, which represents the cassava root yield, was statistically similar at all interrow spacings, in both the Pretinha and Caravela varieties, and also in the two years (2015/16 and 2017/18) in which the experiments were performed. This result is consistent with that found by Nunes *et al.* (1976), who reported no differences in cassava root yield in trials in Rio de Janeiro State when cultivated at the interrow spacing of 100, 120, and 140cm. However, the variability in terms of results in the literature is great when evaluating the influence of plant spacing and density on yield per cassava root area.

Among the spatial arrangements that have produced the highest yields in previous studies are 80 x 80cm (Pinheiro *et al.*, 2011; Streck *et al.*, 2014); 82 x 82cm (Távora *et al.*, 1982); 90 x 55cm (Bicudo and Takahashi, 2007); 100 x 50cm (Aguiar *et al.*, 2011); and 100 x 60cm (Takahashi and Guerini, 1998). Oliveira *et al.* (1998) found an increase in root yield with an increasing number of plants in the row, only for a non-branching cassava variety, demonstrating that the definition of ideal spacing depends on the cassava variety grown.

Table 2. Agronomic characteristics of two cassava varieties cultivated at different interrow spacings. Arapiraca (AL), 2015/16 and Limoeiro de Anadia (AL), 2017/18.

Interrow spacing (cm)	Arapiraca (2015/16)			Limoeiro de Anadia (2017/18)		
	Caravela	Pretinha	Mean	Caravela	Pretinha	Mean
	Stem mass (Mg ha^{-1})					
60	15.16	16.43	15.80	6.73	11.19	8.96
80	11.07	14.31	12.69	5.31	8.51	6.91
100	12.42	14.33	13.37	4.50	7.86	6.18
120	12.53	10.84	11.69	4.72	6.15	5.44
Mean	12.80 a	13.98 a		5.32 b	8.43 a	
Experiment mean	13.39 a			6.87 b		
	Leaf mass (Mg ha^{-1})					
60	3.03	3.15	3.09	0.77	0.67	0.72
80	3.09	3.10	3.10	0.66	0.48	0.57
100	2.68	3.10	2.89	0.53	0.48	0.51
120	3.02	3.88	3.45	0.37	0.34	0.36
Mean	2.95 b	3.31 a		0.59	0.49	
Experiment mean	3.13 a			0.54 b		
	Root length (cm)					
60	28.85	32.95	30.90	23.45	24.25	23.85
80	29.76	30.35	30.05	26.05	24.25	25.15
100	29.90	31.20	30.55	26.80	25.55	26.17
120	30.00	29.75	29.87	24.80	25.65	25.22
Mean	29.62	31.06		25.27	24.92	
Experiment mean	30.34 a			25.10 b		
	Root diameter (mm)					
60	66.60	76.65	71.62	56.92	63.30	60.11
80	72.05	79.50	75.77	58.67	61.10	59.89
100	73.35	79.30	76.32	59.00	65.70	62.35
120	72.60	79.95	76.26	59.91	62.27	61.10
Mean	71.15 b	78.85 a		58.63 b	63.09 a	
Experiment mean	75.00 a			60.86 b		
	Root yield (Mg ha^{-1})					
60	28.99	35.26	32.13	13.13	23.80	18.47
80	27.13	34.75	30.95	12.07	19.06	15.57
100	26.38	33.83	30.11	12.50	20.30	16.40
120	29.91	36.12	33.02	10.40	16.17	13.29
Mean	28.10 b	34.99 a		12.03 b	19.83 a	
Experiment mean	31.55 a			15.93 b		

* Means followed by different letters differ significantly from each other test by F test ($p \leq 0.05$).

The Pretinha variety presented the highest root yield in both experiments, producing, on average, the equivalent of 35Mg ha^{-1}, higher than the average for Alagoas State, which was 12.06Mg ha^{-1} in the 2018 season (IBGE, 2019). The Arapiraca experiment had an average yield of 31.55Mg ha^{-1}, higher than the average of the Limoeiro de Anadia experiment (15.93Mg ha^{-1}) (Table 2). The production of dry biomass in the roots is directly linked to the cassava variety, the place of cultivation, and the harvesting season (Oliveira *et al.*, 2019).

The higher total precipitation in Arapiraca (355.8 mm more about total precipitation in Limoeiro de Anadia) during the study period may explain the better performance of both varieties at that site, including root yield. Moreover, the P content in the soil of Limoeiro de Anadia was initially very low, being only 3mg dm^{-3}, which may also have decisively influenced the lower cassava performance in this production environment. As attested by Pereira *et al.* (2012), the cassava crop usually responds to phosphate fertilization, because Brazilian soils are generally poor in this nutrient.

In the experiment conducted in Limoeiro de Anadia, the cassava interrow spacings evaluated did not influence plant height, main stem diameter, flour percentage, flour yield, or starch content (Table 3), the only variables that were evaluated in this experiment, due to the greater availability of funds raised during the project. Streck *et al.* (2014) evaluated four equidistant spacing (80 x 80; 100 x 100; 120 x 120; and 150 x 150cm) and found no differences in cassava height. Távora *et al.* (1982) found no significant effects of plant population on the root starch content of two cassava varieties grown in Ceará State.

Table 3. Summary of the analysis of (calculated F values) for the traits plant height (PH), main stem diameter (SD), flour percentage (FP), flour yield (FY), and starch content (SC). Limoeiro de Anadia (AL), 2017/18.

FV	GL	Calculated F				
		PH	SD	FP	FY	SC
Variety (V)	1	17.85*	0.81	1.10	26.85*	1.11
Spacing (S)	3	0.53	2.32	0.31	1.89	0.31
V x S	3	0.05	1.28	0.49	0.66	0.50
CV (%)		6.78	6.90	6.08	27.54	4.24

*: Significant by the F test at 1%.

Pretinha plants were taller than the Caravela variety (Table 4). According to Gomes *et al.* (2007), the ideal size of cassava plants is not known. However, they stated that taller plants may favor crop management and harvesting, but are also more susceptible to lodging. The Pretinha variety also stood out about flour yield, producing on average the equivalent of 5.63Mg ha^{-1}, versus 3.36Mg ha^{-1} for the Caravela variety. Main stem diameter, flour percentage, and starch content did not differ between the two varieties evaluated in Limoeiro de Anadia.

Table 4. Agronomic and industrial traits of two cassava varieties cultivated at different interrow spacings. Limoeiro de Anadia (AL), 2017/18.

Interrow spacing (cm)	Caravela	Pretinha	Mean
	Plant height (cm)		
60	1.68	1.86	1.77
80	1.66	1.85	1.75
100	1.69	1.89	1.79
120	1.75	1.90	1.82
Mean	1.69 b	1.87 a	
	Main stem diameter (mm)		
60	20.07	22.30	21.18
80	21.93	21.67	21.80
100	22.35	22.77	22.56
120	23.27	22.82	23.05
Mean	21.91	22.39	
	Flour percentage (%)		
60	26.75	28.63	27.69
80	28.17	28.35	28.25
100	28.26	28.72	28.49
120	28.17	28.17	28.17
Mean	27.84	28.47	
	Flour yield (Mg ha^{-1})		
60	3.54	6.79	5.16
80	3.42	5.41	4.42
100	3.56	5.81	4.68
120	2.93	4.51	3.72
Mean	3.36 b	5.63 a	
	Starch content (%)		
60	29.21	30.63	29.92
80	30.28	30.42	30.35
100	30.35	30.70	30.52
120	30.27	30.27	30.27
Mean	30.03	30.51	

* Means followed by different letters differ significantly from each other test by F test ($p \leq 0.05$).

Despite generating greater investment in planting (larger number of furrows per area, greater amount of cutting, and greater need for labor), the possibility of using reduced interrow spacings, such as 60 or 80cm, could be an important strategy in areas with high levels of weed infestation. The reduction in spacing, associated with the use of cassava varieties with good growth patterns, such as Pretinha, causes the crop canopy to close more rapidly, shading the interrows early, and thus hindering the establishment/growth of weeds. Oliveira *et al.* (1998) studied the interaction between spacings and cassava varieties in São Paulo State and concluded that varieties with larger branches and smaller spacings favor the early closure of cassava plant crowns. The application of these techniques reduces the need for herbicides and/or reduces the amount of weeding needed, which represents a large part of the cost of cassava production in the Agreste region. Streck *et al.* (2014) found that canopy closure occurred more rapidly in treatments with smaller spacing in the Rio Grande do Sul State, which helped with weed control.

Most cassava grown in the Agreste region of Alagoas has an industrial purpose (flour production), and thus the adoption of a reduced spacing production system is favored since a root pattern that meets market requirements is not required for this purpose. Thus, the results of the present study indicate the possibility of altering the standard cassava interrow spacing in the Agreste region of Alagoas to assist in weed management, mitigation of erosive processes, costs of production, and environmental impact.

CONCLUSIONS

An increase in interrow spacing promotes a linear reduction in the green mass of Caravela and Pretinha cassava varieties, irrespective of the location of crop production.

Cassava crop traits such as plant height, green leaf mass, main stem diameter, root yield, root length, root diameter, flour percentage, flour yield, and starch content are not influenced by changes in interrow spacing, with variations in the range of 60 to 120cm.

The Pretinha variety is superior to the Caravela variety in the following evaluated characteristics: stem green mass, tuber diameter, root yield, plant height, and flour yield.

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