WATER SALINITY AND NITROGEN FERTILIZATION IN THE PRODUCTION AND QUALITY OF GUAVA FRUITS

SALINIDADE DA ÁGUA E ADUBAÇÃO NITROGENADA NA PRODUÇÃO E QUALIDADE DE FRUTOS DE GOIABEIRA

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ABSTRACT: Using nitrogen (N) to increase plant tolerance to salinity has been tested in many species. However, in addition to controversial results, most studies are conducted with annual species and/or in the initial growth stage and there are almost no studies with perennial fruit crops in the production stage. Thus, this study aimed to evaluate the production components and post-harvest quality of ‘Paluma’ guava irrigated with water of increasing salinity in soil fertilized with N. The experiment was carried out for two years in drainage lysimeters in an experimental area of the Federal University of Campina Grande (UFCG), Pombal, PB, Brazil. The experimental design was in randomized blocks, in 5 x 4 factorial scheme, with of five levels of water salinity – ECw (NaCl) (0.3, 1.1, 1.9, 2.7 and 3.5 dS m^{-1}) and four N doses (ureia) (70, 100, 130 and 160% of the recommended dose - 541.1 mg of N dm^{-3} of soil per year), with three replicates. Number of fruits, mean fruit weight, production per plant, polar and equatorial diameters of fruit and contents of soluble solids and ascorbic acid (vitamin C) decreased linearly with the increase in irrigation water salinity from 0.3 dS m^{-1}. The interaction between water salinity and N doses and the isolated action of N did not interfere statistically with the studied variables.

KEYWORDS: *Psidium guajava* L. Irrigation. Soluble solids. pH. Titratable acidity.

INTRODUCTION

Guava has great importance among the fruit crops cultivated and commercially exploited in irrigated areas of Northeast Brazil, it stands out among the fruit crops with the highest economic value, due to its consumption being both *in natura* and as industrialized product, being one of the main factors of its exploitation (ALENCAR et al., 2016). This fruit has a characteristic flavor and aroma with high food value, and can be consumed in the form of concentrated juices, jams, jellies, liqueurs, ice creams (HERNANDES et al., 2012).

The semi-arid region of the Brazilian Northeast is characterized by high evapotranspiration rates, irregular rainfall, poor soil drainage and the water sources usually have electrical conductivity above 1.5 dS m^{-1}, which can limit agricultural production, causing morphological, physiological and biochemical alterations in plants, compromising fruit development, production and quality (NEVES et al., 2009; FREIRE et al., 2014; NUNES et al., 2017).

The effects of salts at high levels in the soil manifest through alterations in physical and chemical attributes, which reduce the osmotic potential of the soil solution, and through the direct action of specific ions on the mineral nutrition of the plants, culminating in yield loss (CAVALCANTE et al., 2009; DIAS et al., 2011). Concentrations of salts in the soil solution that limit plant growth and development vary widely among genotypes, but plant responses also depend on the salt levels, duration of plant exposure to saline stress, and stage of plant development (DEUNER et al., 2011).

In this context, several studies have been carried out with the purpose of verifying the effects of irrigation with different levels of water salinity on guava cultivation. Távora et al. (2001), analyzing the growth and water relations of guava seedlings 'Rica' variety, in nutrient solution, observed that the increase of electrical conductivity of irrigation water (ECw) from 1.6 to 16.2 dS m^{-1}, promoted a decrease

Received: 29/04/18
Accepted: 05/12/18
Biosci. J., Uberlândia, v. 35, n. 3, p. 837-848, May/June 2019
http://dx.doi.org/10.14393/BJ-v35n3a2019-42005

in the growth and physiology of guava plants, and obtained threshold salinity of the soil saturation extract of 1.2 dS m^{-1}. Souza et al. (2017) evaluating the growth of phytomass production and the quality of 'Crioula' guava rootstock under salt stress (ECw of 0.3 to 3.5 dS m^{-1}) verified that the irrigation with electrical conductivity of irrigation water above 0.3 dS m^{-1} adversely affected the formation of guava rootstocks.

Silva et al. (2017) analyzing the effects of irrigation water salinity (ECw ranging from 0.3 to 3.5 dS m^{-1}) on photosynthetic pigment content and foliar morphophysiology of guava seedlings cv. Paluma, found that the photosynthetic pigments in guava seedlings cv. Paluma were inhibited by increase in irrigation water salinity at 190 days after emergence, and saline stress was alleviated with nitrogen fertilization at a dose of 1004.9 mg of N dm^{-3} to ECw of 1.2 dS m^{-1}. However, these researches were restricted to the use of waters with different salinities during the formation of rootstocks, thus requiring new studies, especially to verify the effects of the use of saline waters on the guava cv. Paluma in the post-grafting phases.

One of the alternatives that can minimize the effects of irrigation with saline water is nitrogen fertilization. According to Andrade Junior et al. (2006), the increase in the dose of certain fertilizers applied in a crop considered sensitive to salinity can increase their degree of tolerance. According to Kafkafi (1984), salt-tolerant genotypes show higher K^+/Na^+, Ca^{2+}/Na^+ and NO_3^- /Cl^- in leaves compared to those salt-sensitive. In this way, supplementary application of N can increase NO_3^- absorption, in detriment to the Cl^-, reducing the Cl^-/N ratio in the leaves, which can reestablish the ionic homeostasis, favoring consequently the decrease of the effect of the saline stress in the plants. However, the results of studies involving salinity x nitrogen interaction are controversial, and in some cases no beneficial effect of N was observed in plants under salt stress (GIMENO et al., 2009; LACERDA et al., 2016).

As part of the synthesis of amino acids, proteins, coenzymes, nucleic acids, vitamins and chlorophyll among other organic compounds, nitrogen is involved in several biochemical reactions necessary to plant metabolism, many of them involved in the processes of photosynthesis and respiration (EPSTEIN & BLOOM, 2006). Thus nitrogen is one of the main strategies used to increase crop productivity (CHAVES et al., 2011).

Nitrogen (N) is the nutrient required in largest amount by most plants and the second most required by the guava crop in its initial development stage (FRANCO et al., 2007). A number of studies have been carried out with crops such as banana (MAIA et al., 2003), carambola (LEAL et al., 2007), guava (AMORIM et al., 2015) and castor bean (LIMA et al., 2015), and have shown beneficial effects of nitrogen application on plant growth and development. However, studies related to nitrogen application under salt stress conditions are scarce in guava, especially in the production phase.

In this context, this study aimed to evaluate the effects of saline water and N doses on the production components and fruit quality of guava in two production cycles.

MATERIAL AND METHODS

The experiment was conducted in pots adapted as lysimeters under field conditions from October 2015 to November 2017 at the Center of Sciences and Agri-Food Technology (CCTA) of the Federal University of Campina Grande (UFCG), Pombal, PB, Brazil (6º48'16'' S; 37º49'15'' W; 144 m). According to Köppen's classification, the climate of the region is classified as hot and semi-arid (BSh), with mean annual temperature of 28 ºC and rainfall of about 750mm distributed in the rainy season with the highest rainfall índices from January to April. The meteorological data (Figure 1) during the experimental period were collected at an automatic meteorological station located in the municipality of Patos-PB (INMET, 2017).

The experimental design was randomized blocks, in a 5 x 4 factorial scheme, corresponding to five levels of irrigation water salinity – ECw (0.3, 1.1, 1.9, 2.7 and 3.5 dS m^{-1}) and four doses of N (70, 100, 130 and 160% of the recommendation), with three replicates and one plant per plot. The dose relative to 100% corresponded to 541.1 mg of N dm^3 of soil per year, recommended for greenhouse experiments (SILVA et al., 2015).

Electrical conductivity levels were obtained by dissolving NaCl in water from the local supply system (ECw = 0.3 dS m^{-1}) and the amount of NaCl was determined considering the relationship between ECw and concentration of salts ($mmol_c$ L^{-1} = 10*ECw dS m^{-1}) reported by Richards (1954).

The soil used in the experiment was classified as eutrophic Fluvic Neosol of sandy loam texture non saline and non sodic (EMBRAPA, 2013). Samples of this soil were collected in the 0-20 cm layer (A horizon) and then analysed in the Laboratory of Soils and Plant Nutrition of the UFCG, Campus of Pombal. Its chemical and physical characteristics, obtained according to Donagema et al. (2011), are presented in Table 1.

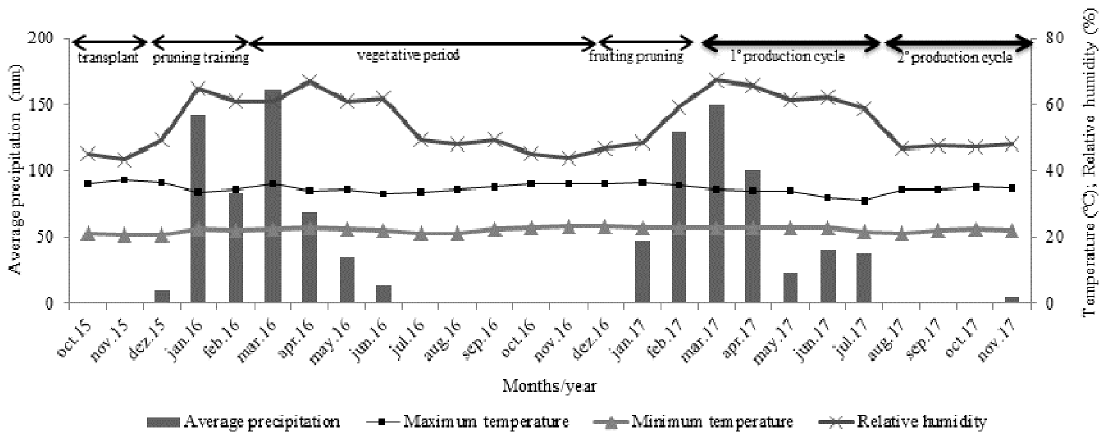

Figure 1. Mean monthly weather data during the experimental period from October 2015 to November 2017.

Table 1. Chemical and physical characteristics of the soil used for guava cultivation cv. Paluma.

Textural classification	Bulk density kg dm^{-3}	Total porosity %	Organic matter g kg^{-1}	P mg dm^{-3}	Exchange complex Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}
					----------- cmol$_c$ dm^{-3} ------------			
Sandy loam	1.3	47.0	32	17	5.4	4.1	2.21	0.28

Saturation extract									
pH_{se}	EC_{se} dS m^{-1}	Ca^{2+}	Mg^{2+}	K^{+}	Na^{+}	Cl^{-}	SO_4^{2-}	CO_3^{2-}	HCO_3^{-}
		....................mmol$_c$ dm^{-3}....................							
7.41	1.21	2.50	3.75	4.74	3.02	7.50	3.10	0.00	5.63

pHse = pH of the saturation extract of soil; ECse = Electrical conductivity of saturation extract of soil at 25 °C.
Fonte: Silva et al. (2015)

The cultivar 'Paluma' was selected as scion because it is a vigorous genotype with easy propagation and good tolerance to pests and diseases, especially rust (*Puccinia psidii* Wint.) (MANICA et at., 2001). In addition, it is easily available and the most cultivated in Brazil, particularly lacking evaluation of tolerance to salinity in interaction with N doses (DIAS et al., 2012).

In October 2015, when the scion seedlings of 'Paluma' guava had four pairs of true leaves, they were transplanted to 150 dm^3 lysimeters perforated at the bottom to allow free drainage. The lysimeters were filled using 150 kg of substrate composed of Fluvic Neosol and sand, at proportion of 85 and 15%, respectively. After placed in the lysimeters, the material was brought to field capacity using water with ECw of 0.3 dS m^{-1}.

Fertilization at planting was manually performed by applying, in each lysimeter, 190 g of single superphosphate (single dose at planting) and 17 g of potassium chloride split into three parts, 1/3 of the recommended dose applied at planting and the other 2/3 split into two equal portions applied at 30 and 60 days after transplanting (DAT).

Application of treatments began at 15 DAT and irrigations using salinized waters were performed, according to the treatment, based on plant water demand, determined by the difference between the volumes applied and drained in the previous irrigation, estimated by drainage lysimetry, maintaining soil moisture close to field capacity during the experimental period. Irrigations were applied twice a day, in the early morning and late afternoon, except in periods of rain. After 40 days, the water volume applied through irrigation was adjusted to provide a leaching fraction of 0.15 as a management practice to avoid excessive accumulation of salts in the soil.

Treatment with N fertilization began at 25 DAT, through fertigation, split into 28 weekly applications. 1/5 of the dose was applied in the first eight weeks because the root system occupied only a small volume in the lysimeter. The rest of the N was equally split over 20 weeks. Urea (45% N) was used as N source, being dissolved in water (ECw= 0.3 dS m^{-1}) and applied in all treatments.

At 60 DAT, branches were selected with respect to size, vigor and health, and pruning was performed to standardize the plants, leaving three main branches per plant, the ones responsible for forming the base of the crown, as recommended by EMBRAPA (2010). In February 2017, plants were subjected to continuous fruit pruning (only mature branches capable of flowering were pruned, leaving 15 cm in length on average).

The first production cycle began at 30 days after fruit pruning, i.e., from March to July 2017 (flowering-fruiting-maturation). The second cycle began subsequently, i.e., from August to November of the same year (Figure 1).

The following parameters were determined at harvest: number of fruits (NF), mean fruit weight (MFW), production per plant (PP), polar (FPD) and equatorial diameter of fruit (FED).

Titratable acidity was determined by the volumetric titration method, which is based on the reaction of neutralization of acids with standard alkali solution (0.1 N sodium hydroxide) and alcoholic solution of 0.5% phenolphthalein. After preparation, the sample was titrated until the equivalence point or endpoint, pink color (IAL, 2008). Acidity was expressed in meq NaOH $100g^{-1}$ of guava pulp.

The content of soluble solids (SS) was determined by direct reading in refractometer, according to the methodology of the Association of Official Analytical Chemists - International (AOAC, 1995).

Ascorbic acid content was determined in the natural pulp immediately after preparation by the Tillmans method (titration), which is based on the reduction of 2-6-dichlorophenolindophenol (DFI) by the ascorbic acid. DFI in basic or neutral medium is blue, in acid medium it is pink, and its reduced form is colorless. The endpoint of the titration is detected by the change from colorless to pink, when the first drop of DFI solution is introduced in the system, with the ascorbic acid already consumed (IAL, 2008). The results were expressed in mg of ascorbic acid per 100 g of guava pulp.

After verification of the homogeneity of the variances, the data obtained were subjected to analysis of variance by the F-test at the 0.05 and 0.01 probability level and in the cases of significance, linear and quadratic polynomial regression analysis was performed using statistical software SISVAR-ESAL (FERREIRA, 2011).

RESULTS AND DISCUSSION

None of the variables in Table 2 was affected by the interaction between water salinity and N doses or by the isolated effect of N, but all variables were influenced ($p<0.01$) by irrigation water salinity. The absence of a significant effect of N doses on the studied variables was possibly due to the source of N fertilizer (urea) used associated with high volatilization potential (low relative humidity and high temperatures) and/or N applied may have inhibited its interaction with water salinity, independently of the growing cycle. Thus, the results achieved in this study (Table 2 and 3) indicate that the factors studied are not interdependent on the variables evaluated. These results are in agreement with other authors (GIMENO et al., 2009; LACERDA et al., 2016), who also did not find any beneficial effect of the supplemental application of N in plants under salt stress.

Table 2. Summary of F test for number of fruits (NF), mean fruit weight (MFW), production per plant (PP), polar (FPD) and equatorial diameter (FED) of guava cv. 'Paluma' under saline water irrigation and nitrogen doses.

Source of variation	F Test									
	Cycle 1					Cycle 2				
	NF	MFW	PP	FDP	FED	NF	MFW	PP	FDP	FED
Salinity (S)	**	**	**	**	**	**	**	**	**	**
Linear regression	**	**	**	**	**	**	**	**	**	**
Quad. regression	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
N dose (ND)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Linear regression	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Quad. regression	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Interaction (SxND)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Blocks	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
CV(%)	12.2	29.6	39.8	11.2	8.4	10.9	14.7	12,0	5.1	5.9

** significant at 0.01 probability level; [ns] not significant at 0.05 probability level.

The increase in salt concentration in the irrigation water linearly inhibited the productive capacity of guava plants, in both cycles, as indicated in Figure 2. The number of fruits harvested (NF) decreased by 4.77 and 8.57% per unit increase in irrigation water salinity, with losses of 15.46 and 28.13% between plants subjected to ECw levels of 0.3 and 3.5 dS m^{-1}, in the first and second crop cycles, respectively (Figure 2A). Thus, the intensification in the effects of the stress became evident as the levels of irrigation water salinity increased, and the greatest reduction occurred in the number of fruits per plant in the second production cycle. The increase in the effects are also related to the time of plant exposure to saline stress conditions, that causes intensification of osmotic effects and excessive accumulation of potentially toxic ions in the plant tissues (FLOWERS, 2004), causing decrease in growth and consequently the production of plants (MUNNS & TESTER, 2008). Lima et al. (2018), while evaluating the production of the West Indian cherry, post grafting, as a function of irrigation with waters of different salinities (ECw of 0.8 and 3.8 dS m^{-1}) also observed decrease in the total number of fruits as ECw increased from 0.8 to 3.8 dS m^{-1}.

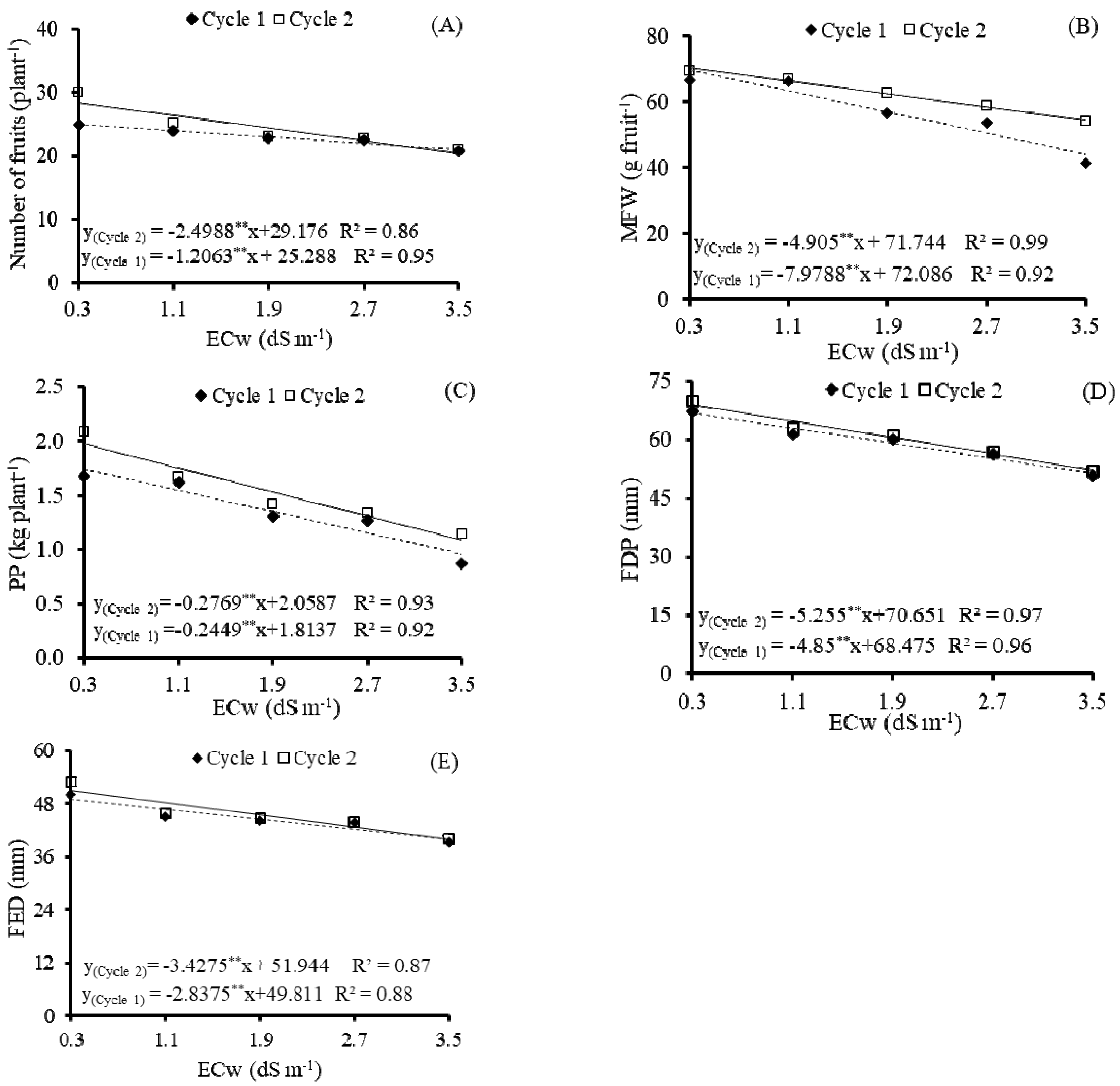

Figure 2. Number of fruits (A), mean fruit weight - MFW (B), production per plant - PP (C), polar - FPD (D) and equatorial fruit diameter - FED (E) of guava cv. 'Paluma', subjected to different irrigation water salinity (ECw) in the first and second production cycles.

The increase in irrigation water salinity linearly inhibited mean fruit weight (MFW) in both production cycles (Figure 2B), respectively at rates of 7.32 and 4.46 g per unit increase in the electrical conductivity of the irrigation water. The values decreased from 68.69 to 44.16 g $fruit^{-1}$ and from

70.27 to 54.57 g fruit^{-1} between plants subjected to 0.3 and 3.5 dS m^{-1}, causing losses of 36.63 and 22.33% in the first and second cycles, respectively. The effect of saline stress on the nutrient uptake reduce crop production initially by the osmotic effects, causing water deficiency, and later by the ionic effects, impairing the balance in the absorption of essential nutrients for plants (MUNNS & TESTER, 2008; BEZERRA et al., 2018). These interactions affecting nutrient availability, absorption and transport are highly complex independently of saline conditions, however, salinity adds an even higher level of complexity, which alters the activity of ions in solution and the processes of absorption, transport, assimilation and distribution (SILVA et al., 2011). In this way, it ends up harming crop production. Choudhury et al. (2001), studying the fruit quality in the guava cv. 'Paluma', under field conditions and in non-saline environment, claim that fruits with mean weight higher than 150 g are the most preferred by the consumers. Thus, the fruits obtained in the present study are below the commercial standard with respect to weight, and the mean fruit weight suffered the most intense effect of salinity in comparison to the other production variables.

Production per plant (PP) decreased by 0.244 and 0.276 kg plant^{-1} per unit increase in the electrical conductivity of the irrigation water in the first and second cycles, respectively (Figure 2C). The values decreased from 1.740 to 0.957 kg plant^{-1} and from 1.975 to 1.089 kg plant^{-1} between plants irrigated with ECw levels of 0.3 and 3.5 dS m^{-1}, causing losses of 45.03 and 44.85% in the first and second cycles, respectively. There was decrease in fruit production in guava plants (both in number and weight), due to the increase in water salinity. The production obtained in the second cycle was higher than in the first cycle, probably due to the occurrence of higher rainfall volume, causing leaching of salts. The decrease in fruit production in guava plants (both in number and weight), due to the increase in water salinity, should also be related to the action of the osmotic component, besides the possibility of occurrence of ionic toxicity (especially Na^+ and Cl^-), which hinders the entry of water into the cells (SANTOS et al., 2012), promoting negative interference in the processes of CO_2 assimilation, translocation of carbohydrates and the diversion of energy to other processes, such as: osmotic adjustment, synthesis of compatible solutes, repair of damage caused by salinity and maintenance of basic metabolic processes (LUCENA et al., 2012). Lima et al. (2018) in a study with the cultivation of grafted West Indian cherry under conditions of saline stress, also verified a decrease in the production of fresh fruit mass due to the increase in levels of irrigation water salinity.

Based on an analysis in terms of relative production, it can be observed that 90% yields are obtained, that is, with losses of up to 10%, with salinity of 0.96 dS m^{-1}. It is worth noting that this level of loss of production is considered acceptable by several authors (FAGERIA; GHEYI, 1997; AYERS; WESTCOT, 1999), being indicative of the limit that brackish water can be used for guava irrigation without significant losses of production. In addition, it is emphasized that cultivation was carried out under field conditions, and that in part of the year the soil moisture is maintained by rainfall (Figure 1).

Regarding the external physical quality of the fruits, polar diameter (FPD) decreased by 7.08 and 7.43% per unit increase in ECw in the first and second cycles, respectively (Figure 2D). The losses were equal to 23.15 and 24.34% between plants irrigated using water with lowest and highest ECw levels, in the first and second cycles, respectively. Fruit equatorial diameter (FED) also decreased linearly by 5.69 and 6.59% per unit increase in ECw, in the first and second cycles, respectively (Figure 2E). In the comparison between plants subjected to the highest (3.5 dS m^{-1}) and lowest (0.3 dS m^{-1}) salinity levels, there were reductions of 18.54 and 21.54% in FED in the first and second production cycles, respectively. In crops growing under saline stress conditions, a reduction in the size of the fruits can occur, due to the changes that affect the assimilation of CO_2, also by the reduction of the rate of division and cell elongation. The stress causes a reduction in turgescence pressure due to the decrease in water content, affecting negatively cell wall expansion, plant growth and consequently reduced fruit production (Freire et al., 2010).

As observed for the number of fruits, polar diameter and equatorial diameter, the increase of salts in the irrigation water led to significant reduction in the mean weight of guava fruits (Figure 2B). Such decrease can be an effect of the toxic action of Na^+ and Cl^- ions above the limit tolerated by the plants and may have caused reduction in the absorption of water and nutrients; consequently, it may have led to ionic imbalance and damage in plant metabolism, culminating in losses of growth and production (MUNNS; TESTER, 2008; NIVAS et al., 2011; MARSCHENER, 2012). However, under the conditions of the present study, it can be claimed that water salinity negatively influenced the mean weight of guava fruits, leading to values below the marketing standards.

The interaction between water salinity and N doses did not have significant effect on the chemical composition of 'Paluma' guava fruits (Table 3). Nitrogen doses also had no effect on the post-harvest chemical quality of the fruit pulp.

Table 3. Summary of F test for pH, titratable acidity – TA, soluble solids – SS and ascorbic acid – AA in the pulp of guava fruits, cv. 'Paluma', under different irrigation water salinity and nitrogen doses.

Source of variation	F Test						
	Cycle 1			Cycle 2			
	pH	AT[1]	SS	pH	AT	SS	AA
Salinity (S)	ns	ns	**	ns	ns	**	**
Linear regression	ns	ns	**	ns	ns	**	**
Quad. regression	ns	ns	ns	ns	ns	ns	ns
N dose (ND)	ns	ns	ns	ns	ns	ns	ns
Linear regression	ns	ns	ns	ns	ns	ns	ns
Quad. regression	ns	ns	ns	ns	ns	ns	ns
Interaction (SxND)	ns	ns	ns	ns	ns	ns	ns
Blocks	ns	ns	ns	ns	ns	ns	ns
CV(%)	0.5	12.7	7.9	6.1	18.8	2.9	32.6

** significant at 0.01 probability level by F test; [ns] not significant by F test. [1] Statistical analysis carried out after data transformation to $\sqrt{x+1}$.

According to the regression equations (Figure 3A), the increase in water salinity linearly reduced the content of soluble solids (SS) of guava fruits, causing reductions of 5.36% ºBrix (first cycle) and 6.43% ºBrix (second cycle) per unit increase in ECw. The value of ºBrix decreased from 10.62 to 8.77 and from 12.32 to 9.37 ºBrix between plants irrigated using water with ECw of 0.3 and 3.5 dS m^{-1}, leading to losses of 17.43 and 23.97% in the SS content, respectively. The increased salinity of irrigation water must have elevated Na^+ and Cl^- contents in leaf tissues in guava plants, which probably inhibited the activity of organic compounds, modifying biochemical processes and plant physiology. Salt-induced changes in physiological process, such as photosynthetic activities and translocation rate of assimilates, can cause negative influence on qualitative attributes of the fruits, such as soluble solids contents (DIAS et al., 2011). The values of ºBrix for the lowest level of electrical conductivity (0.3 dS m^{-1}) in the present study are similar to those reported by Maia et al. (1998), who determined the ºBrix of four varieties of guava and found values between 11.00 and 12.10 ºBrix. Dias et al. (2011) evaluating the effects of irrigation water salinity (ECw ranging from 0.5 to 4.5 dS m^{-1}) on the chemical qualities of yellow passion fruit, also observed a decrease of 0.74 ºBrix with per unit increase of ECw.

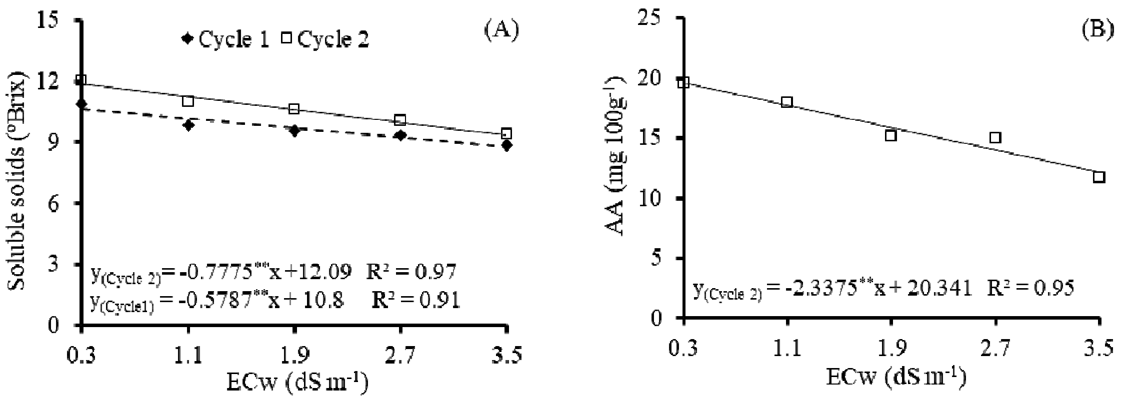

Figure 3. Contents of soluble solids (A) and ascorbic acid – AA (B) in the pulp of guava fruits, cv. 'Paluma', under increasing levels of irrigation water salinity in the first and second production cycles.

The increase in irrigation water salinity in the second cycle, reduced the contents of ascorbic acids in the fruits (Figure 3B) by 11.49% per unit increase in the electrical conductivity of the irrigation water. This result indicates a decrease of about 38.08% between plants subjected to irrigation with ECw levels of 0.3 and 3.5 dS m^{-1}. The trend of reduction in ascorbic acid content as the salt concentration of the water increased is compatible with the reduction in soluble solids content, evidenced in Figure 3A, since the production of ascorbic acid is related to the sugars present in the juice of the fruits, which synthesize ascorbic acid from hexose sugars, originally D-glucose or D-galactose (FORTALEZA et al., 2005; TAIZ; ZEIGER, 2006; RAIMUNDO et al., 2009). These results corroborate with those obtained by Freire et al. (2010), in a study evaluating the external and internal attributes of yellow passion fruit cultivated in lysimeters irrigated with saline waters (ECw of 0.5 and 4.5 dS m^{-1}), concluded that the highest levels of ascorbic acid were obtained in fruits of the plants irrigated with water of low salinity.

CONCLUSIONS

Increase in irrigation water salinity from 0.3 dS m^{-1} reduced the productive capacity and post-harvest quality of the pulp of fruits of guava, cv. 'Paluma'; water with ECw of up to 0.96 dS m^{-1} can be used with an acceptable reduction of 10% in the production per plant.

Production components, external attributes and chemical quality of pulp of guava were not affected by the interaction between water salinity and nitrogen doses or by the isolated action of nitrogen.

ACKNOWLEDGMENTS

The authors thank the National Council for Scientific and Technological Development (CNPq) for the financial support to the research and the Coordination for the Improvement of Higher Education Personnel (CAPES/FAPERO) for grant of scholarship to the first author.

RESUMO: O uso de nitrogênio como forma de aumentar a tolerância das plantas à salinidade tem sido testado em muitas espécies. No entanto, além de resultados controversos, se observa que a maioria dos estudos são realizados com espécies anuais e, ou na fase inicial de crescimento, sendo praticamente inexistentes estudos com frutíferas perenes em fase de produção. Nessa direção, o trabalho teve como objetivo avaliar os componentes de produção e a qualidade pós-colheita de goiabeira 'Paluma' irrigada com águas de salinidade crescente no solo com nitrogênio. O experimento foi conduzido durante dois anos em lisímetros de drenagem numa área experimental da Universidade Federal de Campina Grande (UFCG), Pombal, PB. O delineamento experimental foi em blocos casualizados, em esquema fatorial 5 x 4, com salinidades de água – CEa (NaCl) de 0,3, 1,1, 1,9, 2,7 e 3,5 dS m^{-1} e quatro doses de nitrogênio (ureia) de 70, 100, 130 e 160% da dose recomendada de 541,1 mg de N dm^{-3} por ano, com três repetições. A interação salinidade da água x doses de nitrogênio e ação isolada de N não influenciaram estatisticamente as variáveis estudadas. O número de frutos, a massa média de frutos, a produção por planta, o diâmetro polar e equatorial dos frutos, os teores de sólidos solúveis e ácido ascórbico (vitamina C), decresceram linearmente com o aumento da salinidade da água de irrigação a partir de 0,3 dS m^{-1}.

PALAVRAS-CHAVE: *Psidium guajava* L.. Irrigação. Sólidos solúveis. pH. Acidez titulável.

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