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Potential use of sweet potato leaves for human consumption

Abstract – The objective of this work was to select sweet potato (*Ipomoea batatas*) genotypes with leaves with potential to be used for human consumption. Twenty-six experimental genotypes and four commercial cultivars were tested in a randomized complete block design with three replicates and ten plants per plot. The trial was carried out in the municipality of Lavras, in the state of Minas Gerais, Brazil. Leaf shape and lobe, aerial-part yield, edible-leaf yield, edible-leaf percentage, edible-leaf dry mass, and latex production, as well as leaf total chlorophyll, pH, soluble solids contents, titratable acidity, total phenolic compounds, and anthocyanin contents, were evaluated. Roots were characterized as to their pulp and peel colors. Fifteen genotypes presented the highest aerial-part (29.6 to 51.8 Mg ha^{-1}) and edible-leaf (7.8 to 12.7 Mg ha^{-1}) yields. In the biochemical analysis, high contents of chlorophyll, total phenolics, and anthocyanins were observed. In addition, pH, soluble solids, and leaf titratable acidity did not differ significantly among the evaluated genotypes. Leaves of ten genotypes are recommended for human consumption.

Index terms: *Ipomoea batatas*, biochemical analysis, human feeding, yield potential.

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Uso potencial de folhas de batata-doce para consumo humano

Resumo – O objetivo deste trabalho foi selecionar genótipos de batata-doce (*Ipomoea batatas*) com folhas com potencial para serem usadas para consumo humano. Vinte e seis genótipos experimentais e quatro cultivares comerciais foram testados em delineamento de blocos ao acaso, com três repetições e dez plantas por parcela. O ensaio foi realizado no município de Lavras, no estado de Minas Gerais, Brasil. Foram avaliados formato e lóbulo da folha, produção da parte aérea, produção de folhas comestíveis, percentagem de folha comestível, massa seca de folha comestível e produção de látex, bem como clorofila total, pH, conteúdo de sólidos solúveis, acidez titulável, compostos fenólicos totais e teor de antocianinas das folhas. As raízes foram caracterizadas quanto às cores da sua polpa e casca. Quinze genótipos apresentaram as maiores produtividades de parte aérea (29,6 a 51,8 Mg ha^{-1}) e de folhas comestíveis (7,8 a 12,7 Mg ha^{-1}). Nas análises bioquímicas, foram observados altos teores de clorofila, compostos fenólicos totais e antocianinas. Além disso, pH, sólidos solúveis e acidez titulável foliar não diferiram significativamente entre os genótipos avaliados. As folhas de dez genótipos são recomendadas para alimentação humana.

Termos para indexação: *Ipomoea batatas*, análise bioquímica, alimentação humana, potencial de produção.

Introduction

Sweet potato [*Ipomoea batatas* (L.) Lam.] is an important food worldwide, being the seventeenth most produced crop in 2020 (FAO, 2022). In the Brazilian territory, the crop is widespread and cultivated mostly in small farms (Maia & Oliveira, 2022), which is attributed to the plant's endurance, good nutritional content, low production costs, wide adaptation to soil and climate, and drought tolerance (Pedrosa et al., 2015). Moreover, due to its high genetic diversity, the species has a broad range of uses (Silva et al., 2022), being a promising alternative raw material for biofuel production (Torquato-Tavares et al., 2017; Silva et al., 2019) and for food, paper, and cosmetic industries, as well as for human nutrition and animal feeding (Donato et al., 2020).

Although the consumption of sweet potato leaves was observed in traditional communities, this habit became unusual over the years in most countries where the crop is produced (Jang & Koh, 2019). In Brazil, the majority of the population only consumes the tubers and discards the leaves, increasing crop residues (Andrade Júnior et al., 2012), which, when not discarded properly, lead to the contamination and degradation of the environment (Silva et al., 2015). This confirms that the misuse of food is one of the main causes of hunger worldwide and not the lack of production (FAO, 2019).

In this scenario, sweet potato leaves are a potential source of nutrients for human consumption and animal feeding, especially in poor diets (Jang & Koh, 2019). According to Sun et al. (2014), the leaves of this plant are rich in nutrients, such as proteins, essential amino acids, dietary fiber, polyphenols, minerals, organic compounds, and bioactive compounds; the latter include antioxidant substances that improve the immune system, reduce the risk of cardiovascular disease, decrease stress, and reduce the damage caused by free radicals. Furthermore, sweet potato leaves can be harvested several times throughout the year and easily processed, which facilitates their storage and transport, stimulating more studies on their consumption (Wang et al., 2016).

However, sweet potato breeding programs aiming to select genotypes with leaves more suitable for human consumption are still scarce. This shows the importance of assessing leaf agronomic and chemical characteristics to aid in the selection of promising genotypes and in the promotion of their commercial use.

The objective of this work was to select sweet potato genotypes with leaves with potential to be used for human consumption.

Materials and methods

The experiment was conducted at Centro de Desenvolvimento e Transferência de Tecnologia of Universidade Federal de Lavras (UFLA), from April to October 2019, in the municipality of Ijaci, in the state of Minas Gerais, Brazil (21º09'51"S, 44º55'02"W, at 833 m above sea level).

Thirty sweet potato genotypes from the Germplasm Bank of UFLA were evaluated in a randomized complete block design with three replicates. The block consisted of 30 plots with ten plants each, spaced at 0.30 m. Four genotypes (commercial cultivars) were used as control treatments: Beauregard, Brazlândia Roxa, Princesa, and Uruguaiana. The leaf shapes of each genotype are presented in Figure 1.

To obtain the sweet potatoes, parts of stems measuring 30 cm were buried manually at a depth of 20 cm. Then, the plants were irrigated daily using a drip tape. Weed control was done manually as needed, but pest and disease control was not necessary.

The leaves to be analyzed were collected 75 days after planting when the aerial part (stems and leaves) of the plant was well developed. The leaves were morphoagronomically characterized according to the specific descriptors proposed by Huamán (1991), using a grading scale to determine the general shape and number of leaf lobes, latex production in petioles, and total chlorophyll content. Latex, the milky sap used by plants as a natural defense against herbivorous, was measured because it affects the palatability of the leaves and makes them improper for human consumption, specifically for the risk group consisting of people allergic to the substance (Nucera et al., 2020). To determine the amount of latex produced, first a blade was used to make a transverse incision in the petiole, leaving a section with 5.0 cm of length. Then, after 10 s, the produced latex was scored using a five-point scale, ranging from 1 to 5, representing no latex at all and latex forming drops, respectively. In each plot, four leaves of the upper third of the plant were used to measure total chlorophyll content with the

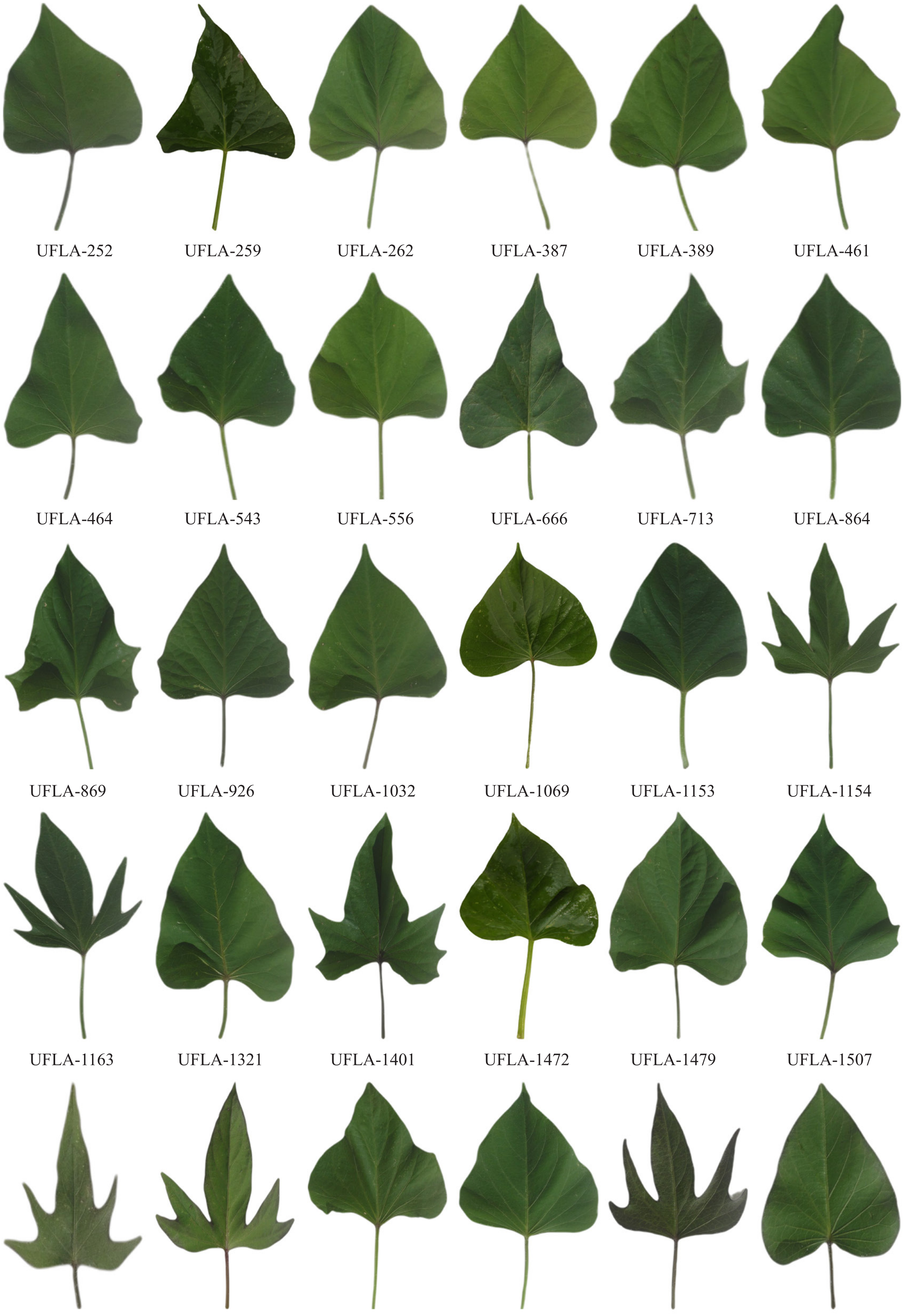

Figure 1. Phenotypic characterization of leaves of 30 sweet potato (*Ipomea batatas*) genotypes. Photos by André Boscolo Nogueira da Gama.

ClorofiLOG CFL1030 device (Falker, Porto Alegre, RS, Brazil). The average values of latex and total chlorophyll production in the plot were determined from the average of the four evaluated leaves.

Afterwards, in each plot, the stems and leaves of two plants were harvested to determine the aerial-part yield (Mg ha^{-1}). The leaves with the petiole were cut at a distance of 5.0 cm from their base. The productivity of edible leaves was obtained using all healthy leaves collected from the apex of the stem up to 50 cm toward the ground. The aim was to collect young leaves, which are usually more tasteful and tender; therefore, leaves with signs of senescence, diseases, or spots were discarded. Then, the percentage of edible leaves was calculated by dividing the yield of edible leaves by that of the aerial part. To determine dry mass, approximately 200 g of edible leaves were weighed per plot. For this, the leaves were chopped and heated in the TE-394/3 forced-air circulation oven (Tecnal, Piracicaba, SP, Brazil), at 65°C, until they reached a constant mass, which occurred between 48 and 72 hours.

To determine pH, titratable acidity, soluble solids, total phenolic compounds, and anthocyanins, leaf samples were collected, preserved in a polystyrene container with ice, and transported to a laboratory. There, the leaves were carefully washed to remove soil residues and were, then, packed, identified, and stored in a freezer at -18ºC to preserve their chemical characteristics until analysis.

pH, titratable acidity (in citric acid percentage), and soluble solids (in percentage) were obtained using the Tec-7 benchtop pH meter (Tecnal, Piracicaba, SP, Brazil), the method described by Institute Adolfo Lutz (Zenebon et al., 2008), and the PAL-1 pocket refractometer (Atago Brasil Ltda, Ribeirão Preto, SP, Brazil), respectively. Total phenolic compounds were determined by the Folin-Ciocalteau method (Waterhouse, 2002), with results expressed in gallic acid equivalents (GAE) per 100 g of fresh weight (mg 100 g^{-1} GAE), whereas anthocyanin content was obtained using the method of Barcia et al. (2012), with results expressed in cyanidin-3-glucoside equivalents (C3GE) per 100 g of fresh weight (mg 100 g^{-1} C3GE).

The genotypes were also described as to their leaf shape, number of leaf lobes, and tuber peel and pulp colors.

The data were analyzed using the one-way analysis of variance (ANOVA). The assumptions for ANOVA were checked. The tests of Shapiro-Wilk, Barlett, and Durbin-Watson were used to check for normality, homoscedasticity, and independence of errors, respectively, at 5% probability. All assumptions were met and, therefore, data transformation was not required. Means were compared by Scott-Knott's test, also at 5% probability. The R software, version 4.0, was used for the analysis (R Core Team, 2020).

Results and Discussion

The descriptive analysis of the morphoagronomic traits of the sweet potato genotypes is presented in Table 1. The observed tuber pulp colors were: cream (56.7%), white (16.7%), yellow (13.3%), and pink to purple (10%). As to tuber peel, the colors were: pink (46.7%), cream (36.7%), and purple (13.3%). The genotypes that stood out were cultivar Beauregard and UFLA-1479, the only ones with a dark-orange pulp and a yellow peel, respectively. The most common leaf shapes were triangular (53.3%), cordate (23.3%), and lobed (23.3%). One lobe leave occurred in 76.7% of the genotypes and five lobe leaves in 23.3% (Figure 1). These results indicate genetic variability that may meet different demands of the sweet potato consumer market.

Regarding the yield of the aerial part of the plant, 15 genotypes showed the highest values ranging from 29.6 to 51.8 Mg ha^{-1} (Table 2), which surpassed those of 19.7 and 41.9 Mg ha^{-1} found by Andrade Júnior et al. (2012) and Donato et al. (2020), respectively. These different results may be related to the period that the aerial parts were harvested. Viana et al. (2011) observed that, as the plant develops toward the tuberization phase, the growth of the aerial part declines, suggesting that an early harvest may result in a higher yield of edible leaves. This shows the need of further research to determine the best harvest period in order to achieve a higher production of young leaves.

Regarding edible-leaf yield, 16 genotypes produced between 7.8 and 12.7 Mg ha^{-1} (Table 2). Among these, 15 also presented the highest aerial-part yields.

As to percentage of edible leaves (ELP), the studied genotypes differed significantly (Table 2). Cultivar Beauregard presented the highest ELP of 54.2%, but the lowest aerial-part and edible-leaf yields of 3.0 and

1.6 Mg ha^{-1}, respectively. A high ELP, ranging from 36.7 to 41.4%, was observed for genotypes UFLA-262, UFLA-387, UFLA-1507, and cultivar Uruguaiana; however, only UFLA-1507 also showed a high edible-leaf yield.

Considering the dry mass of edible leaves, no significant differences were observed among genotypes (Table 2), with values ranging from 9.80 to 12.69%. In the literature, dry mass measurements varied from 13.72 to 14.37% (Mwanri et al., 2011) and from 15.57 to 19.18% (Hossain et al., 2018) when sweet potato was harvested 45 and 90 days after planting, respectively. The observed differences may once again be related to the development stage of the plant, whose dry mass of the aerial part increases as the growth cycle progresses (Viana et al., 2011; Figueiredo et al., 2012).

In terms of latex production, the evaluated genotypes differed significantly, with 67% of them scoring from 2.33 to 3.67 in the used scale (Table 3).

Table 1. Root color and leaf type of sweet potato (*Ipomea batatas*) genotypes.

Genotype	Root		Leaf type	
	Pulp color	Peel color	Shape	Lobe
UFLA-252	White	Pink	Triangular	1
UFLA-259	Yellow	Pink	Triangular	1
UFLA-262	Cream	Cream	Cordate	1
UFLA-387	White	Cream	Triangular	1
UFLA-389	Cream	Pink	Triangular	1
UFLA-461	Pink to purple	Purple	Triangular	1
UFLA-464	Cream	Pink	Cordate	1
UFLA-543	Cream	Cream	Triangular	1
UFLA-556	Yellow	Cream	Triangular	1
UFLA-666	Cream	Pink	Cordate	1
UFLA-713	Cream	Pink	Triangular	1
UFLA-864	White	Cream	Triangular	1
UFLA-869	Cream	Purple	Lobed	5
UFLA-926	Cream	Pink	Triangular	1
UFLA-1032	Cream	Pink	Triangular	1
UFLA-1069	Cream	Pink	Cordate	1
UFLA-1153	Cream	Cream	Triangular	1
UFLA-1154	Pink to purple	Cream	Lobed	5
UFLA-1163	White	Cream	Lobed	5
UFLA-1321	White	Pink	Cordate	1
UFLA-1401	Pink to purple	Purple	Lobed	5
UFLA-1472	Cream	Pink	Triangular	1
UFLA-1479	Cream	Yellow	Cordate	1
UFLA-1507	Cream	Cream	Triangular	1
UFVJM-58	Cream	Cream	Lobed	5
UFVJM-61	Cream	Pink	Lobed	5
'Beauregard'	Dark orange	Pink	Triangular	1
'Brazlândia Roxa'	Yellow	Purple	Triangular	1
'Princesa'	Cream	Cream	Lobed	5
'Uruguaiana'	Yellow	Pink	Cordate	1

Table 2. Aerial-part yield (APY), edible-leaf yield (ELY), edible-leaf percentage (ELP), and edible-leaf dry mass (ELDM) of sweet potato (Ipomea batatas) genotypes[(1)].

Genotype	APY	ELY	ELP	ELDM
	--------(Mg ha^{-1})-------		------------(%)----------	
UFLA-252	36.1a	9.9a	27.3d	12.03
UFLA-259	29.6a	8.8a	29.8c	10.80
UFLA-262	19.6b	7.3b	37.3b	11.52
UFLA-387	17.4b	6.8b	39.0b	12.69
UFLA-389	35.2a	9.1a	25.7d	11.67
UFLA-461	51.8a	11.5a	22.3d	12.05
UFLA-464	30.0a	8.1a	26.8d	10.95
UFLA-543	15.8b	5.4b	34.2c	10.93
UFLA-556	41.9a	10.3a	24.5d	11.32
UFLA-666	33.1a	10.5a	31.7c	12.06
UFLA-713	33.3a	10.1a	30.4c	10.84
UFLA-864	27.8b	8.4a	30.0c	12.13
UFLA-869	36.2a	11.9a	33.0c	11.36
UFLA-926	36.1a	9.1a	25.2d	11.12
UFLA-1032	36.1a	11.1a	30.8c	10.49
UFLA-1069	23.7b	7.8a	32.8c	10.66
UFLA-1153	34.0a	10.3a	30.1c	9.80
UFLA-1154	33.6a	10.7a	31.8c	11.56
UFLA-1163	45.5a	11.4a	25.0d	12.59
UFLA-1321	25.7b	6.1b	23.8d	12.32
UFLA-1401	24.6b	8.3a	33.6c	11.78
UFLA-1472	9.1b	2.0b	32.8c	10.63
UFLA-1479	23.3b	5.3b	22.7d	12.64
UFLA-1507	24.1b	8.9a	36.7b	11.83
UFVJM-58	27.2b	6.0b	22.1d	11.74
UFVJM-61	44.3a	12.7a	28.6d	10.94
'Beauregard'	3.0b	1.6b	54.2a	12.28
'Brazlândia Roxa'	26.6b	6.7b	25.3d	11.46
'Princesa'	26.3b	5.7b	21.7d	12.14
'Uruguaiana'	8.3b	3.4b	41.4b	12.26
Average	28.60	8.20	30.40	11.55
P-value (genotype)	≤0.01	≤0.01	≤0.01	0.06
CV (%)	41.40	36.80	14.90	8.51

[(1)]Means followed by different letters, in the same column, differ from each other by Scott-Knott's test, at 5% probability.

As to total chlorophyl contents, genotypes UFVJM-58, cultivar Princess, cultivar Uruguaiana, and UFLA-1472 presented the highest values, ranging from 49.77 to 54.37 (Table 3). Also for sweet potato, Pepó (2018) reported similar values from 38.89 to 50.31. Likewise, Shitikova & Povarnitsyna (2022) obtained similar results, which varied from 34.08 to 48.38, when studying six varieties of sweet potato. According to Rocha & Reed (2014), the presence of chlorophyll at high levels is interesting because of its antioxidant and medicinal properties.

The values obtained for pH, soluble solids, and leaf titratable acidity did not differ significantly among the studied genotypes. In the case of pH, there was a slight variation from 6.35 to 6.68 (Table 3). These values are similar to those reported for lettuce (*Latuca sativa* L.), green onion (*Allium fistulosum* L.), carrot (*Daucus carota* L.), coriander (*Coriandrum sativum*

Table 3. Latex production (LP), total chlorophyll (TC), pH, soluble solids (SS), titratable acidity (TA), total phenolic compounds (TPC), and anthocyanins (ANT) of sweet potato (Ipomea batatas) genotypes[(1)].

Genotype	LP	TC	pH	SS (%)	TA[(2)] (%)	TPC[(3)] (mg 100 g^{-1} GAE)	ANT[(4)] (mg 100 g^{-1} C3GE)
UFLA-252	4.33b	43.83c	6.61	3.0	0.27	202.8a	75.8a
UFLA-259	5.00b	40.83c	6.52	4.3	0.31	230.0a	30.5b
UFLA-262	2.67a	39.90c	6.62	3.0	0.29	206.5a	34.1b
UFLA-387	3.33a	38.97c	6.46	4.7	0.28	192.4b	40.4b
UFLA-389	3.00a	38.40c	6.50	4.0	0.20	57.0d	33.3b
UFLA-461	4.00b	42.97c	6.50	3.7	0.26	110.0c	38.6b
UFLA-464	3.33a	46.83b	6.50	3.7	0.25	162.0b	58.1a
UFLA-543	3.00a	39.47c	6.68	4.0	0.23	266.0a	40.8b
UFLA-556	3.00a	41.77c	6.54	3.7	0.28	212.6a	36.1b
UFLA-666	3.67a	42.97c	6.35	4.0	0.29	55.3d	42.5b
UFLA-713	4.00b	38.33c	6.41	4.0	0.30	179.6b	40.6b
UFLA-864	2.67a	46.10b	6.62	3.3	0.33	198.4a	47.3b
UFLA-869	2.33a	46.77b	6.52	4.3	0.25	79.6d	58.9a
UFLA-926	3.00a	41.30c	6.53	3.7	0.26	154.0b	37.4b
UFLA-1032	3.00a	39.23c	6.48	3.7	0.25	220.3a	53.9a
UFLA-1069	3.67a	39.63c	6.51	4.3	0.30	142.4c	46.1b
UFLA-1153	3.00a	42.20c	6.57	3.3	0.22	202.5a	38.5b
UFLA-1154	3.67a	41.00c	6.56	3.3	0.22	153.8b	49.0b
UFLA-1163	4.00b	44.23c	6.47	3.7	0.33	87.0d	44.1b
UFLA-1321	3.33a	47.33b	6.58	3.7	0.32	74.1d	37.1b
UFLA-1401	3.67a	45.10c	6.49	3.7	0.29	158.0b	52.1a
UFLA-1472	4.33b	49.77a	6.39	4.0	0.28	140.1c	35.8b
UFLA-1479	3.33a	43.47c	6.52	4.0	0.26	227.8a	59.3a
UFLA-1507	3.67a	41.43c	6.50	4.3	0.28	243.8a	47.3b
UFVJM-58	5.00b	54.37a	6.58	4.0	0.29	122.9c	57.1a
UFVJM-61	4.67b	45.90b	6.53	4.7	0.32	121.0c	63.2a
'Beauregard'	4.00b	41.67c	6.54	4.7	0.29	174.5b	30.1b
'Brazlândia Roxa'	3.33a	43.50c	6.52	3.7	0.24	166.2b	43.2b
'Princesa'	4.33b	53.13a	6.52	4.3	0.30	131.5c	38.1b
'Uruguaiana'	3.67a	51.53a	6.58	3.7	0.26	189.7b	29.6b
Average	3.60	43.73	6.52	3.9	0.28	162.1	44.6
P-value (genotype)	≤0.01	≤0.01	0.44	0.22	0.48	≤0.01	≤0.01
CV (%)	15.73	7.51	1.8	17.87	20.73	19.92	22.73

[(1)]Means followed by different letters, in the same column, differ from each other by Scott-Knott's test, at 5% probability. [(2)]Expressed as percentage of grams of citric acid per 100 grams of sample. [(3)]Expressed as milligrams of gallic acid per 100 grams of fresh weight. [(4)]Expressed as milligrams of cyanidin-3-glycoside per 100 grams of fresh weight.

L.), cabbage (*Brassica oleracea* L.), basil (*Ocimum basilicum* L.), cucumber (*Cucumis sativus* L.), bell pepper (*Capsicum annuum* L.), radish (*Raphanus sativus* L.), rucola [*Eruca vesicaria* (L.) Cav.], and parsley [*Petroselinum crispum* (Mill.)] (Ferreira et al., 2015). Balanced pH values are crucial because they are related to a good digestion, more efficient nutrient absorption, and better preservation of plants after harvest (Rahman, 2020).

Soluble solid contents also varied slightly from 3.0 and 4.7% (Table 3). The obtained values are similar to those of 2.0, 3.7, and 2.54 found for lettuce, kale [*Brassica oleracea* subsp. *acephala* (DC.) Metzg.], and rucola, respectively (Pereira et al., 2016). Higher soluble solids contents in vegetables are desirable for consumption and in natura processing since they increase palatability (Sousa et al., 2011). Rêgo et al. (2009), for example, found that chili pepper (*Capsicum baccatum* L.) had a prominent sweet flavor with higher soluble solids contents.

Titratable acidity varied from 0.20 to 0.33% (Table 3), values similar to those of 0.30 and 0.37% found for kale and pepper, respectively (Pereira et al., 2016). According to the same authors, acidity is a sensory indicator, resulting in an acid or sour aroma and flavor. Therefore, a lower acidity, which increases the soluble solids/titratable acidity ratio, will result in a mild taste.

For total phenolic contents, the ten best values ranged from 198.4 to 266.0 mg 100 g^{-1} GAE (Table 3), which are similar to those of 212.7 to 258.5 mg 100 g^{-1} GAE reported by José et al. (2015). These values are higher than others obtained in the literature. In Romania, for example, Cioloca et al. (2021) found values from 40.1 to 120.5 mg 100 g^{-1} GAE in sweet potato leaves, whereas, in China, Jia et al. (2022) obtained values from 48.4 to 148.3 mg 100 g^{-1} GAE.

In general, high total phenolic contents are common in sweet potato leaves. In a research carried out in Singapore with 66 vegetables regularly sold in the local market, sweet potato leaves presented the second highest content of total phenols, which was 357 mg 100 g^{-1} GAE (Isabelle et al., 2010). According to these authors, differences in total phenolic contents are related to several factors, mainly genetics and cultivation conditions.

Anthocyanin contents varied significantly among the evaluated genotypes. The eight highest values ranged from 52.1 to 75.8 mg 100 g^{-1} C3GE (Table 3). Studying two sweet potato clones, José et al. (2015) found lower values of 30.3 to 33.5 mg 100 g^{-1} C3GE, whereas Vishnu et al. (2019) obtained an average value of 48.2 mg 100 g^{-1} C3GE. Jia et al. (2022), analyzing 11 varieties of sweet potato, reported values covering a wide range from 3.22 to 109.6 mg 100 g^{-1} C3GE.

The anthocyanin content found in sweet potato leaves is higher than those reported for European plum (*Prunus domestica* L.), Damask plum (*Prunus insititia* L.), Chino-Japanese plum (*Prunus salicina* Lindl.), apricot (*Prunus armeniaca* L.), raspberry (*Rubus idaeus* L.), black currant (*Ribes nigrum* L.), white currant (*Ribes rubrum* L.), apple (*Malus* × *domestica* Borkh.), strawberry (*Fragaria* × *ananassa* Duch.), pear (*Pyrus communis* L.), and peach [*Prunus persica* (L.) Batsch] (Contessa et al., 2013).

José et al. (2015) concluded that higher total polyphenol and anthocyanin contents increased the antibacterial activity of sweet potato leaf extracts. Therefore, the results obtained in the present study are an indicative of the potential of sweet potato leaves for human consumption and health improvement (Wang et al., 2016).

Conclusions

1. Sweet potato (*Ipomea batatas*) genotypes UFLA-252, UFLA-464, UFLA-556, UFLA-864, UFLA-869, UFLA-1032, UFLA-1153, UFLA-1154, UFLA-1401, and UFLA-1507 present the best leaf production and chemical composition, being suitable for human consumption.
2. Genotypes UFLA-259, UFLA-262, UFLA-543, UFLA-1479, UFVJM-58, and UFVJM-61 present a chemical composition of interest.

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