

## Collection and morphological characterization of sweet potato landraces in north of Rio de Janeiro state

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### ABSTRACT

The traditional farmers play an important role in plant genetic resources conservation. Collecting the germplasm maintained by these farmers is a very important action to avoid genetic variability losses. The goals of this work were to collect sweet potato from farms in the north of Rio de Janeiro state; to gather information regarding to the farmers profile, and to characterize the sweet potato landraces collected using morphological descriptors. Fifty three farms were visited in six collection expedition and 46 accessions were collected. During the visits the farmers were interviewed using a query with ten items. Six root traits and eight descriptors for vegetative parts were used for morphological characterization. The data were analyzed based on Cole-Rodgers distance and clustering was done with UPGMA method. Familiar agriculture with subsistence objective was observed and sweet potato was cultivated by 72% of the farmers at least for more than a decade, supporting the observation that this vegetable is traditionally cultivated in small areas in the specific region. The morphological characterization was efficient to detect genetic variability among accessions, revealing that traditional farmers from Campos dos Goytacazes and São João da Barra are responsible for sweet potato genotypes conservation with expressive genetic diversity in their properties. There was no relationship between genetic distance and collecting areas.

**Keywords:** *Ipomoea batatas*, genetic resources, traditional agriculture, germplasm characterization, agrobiodiversity.

### RESUMO

#### Coleta e caracterização morfológica de variedades locais de batata-doce no norte do Rio de Janeiro

Os agricultores tradicionais têm um papel fundamental na conservação dos recursos genéticos vegetais e a coleta de germoplasma mantido por esses produtores é muito importante para evitar a perda da variabilidade genética. Os objetivos deste trabalho foram coletar germoplasma de batata-doce em propriedades rurais situadas no norte do estado do Rio de Janeiro; levantar informações quanto ao perfil dos produtores rurais visitados durante as coletas, e caracterizar morfológicamente as variedades locais de batata-doce coletadas. Em seis viagens de coleta foram visitadas 53 propriedades rurais, e coletados 46 acessos. Em todas as visitas foi possível entrevistar o produtor por meio de questionário contendo dez itens. Para a caracterização, foram usados seis caracteres de raiz e oito da parte aérea. A análise dos dados foi efetuada com o uso da distância de Cole-Rodgers e o agrupamento foi gerado com o método UPGMA. Foi constatado predomínio da agricultura familiar, voltada para subsistência, sendo que 72% dos agricultores cultivavam a batata-doce há mais de uma década, o que evidencia a tradição de cultivo desta hortaliça em pequenas áreas na região. A caracterização morfológica foi eficiente para detectar a variabilidade genética entre os acessos, demonstrando que os agricultores tradicionais dos municípios de Campos dos Goytacazes e São João da Barra detêm genótipos de batata-doce com expressiva diversidade genética em suas propriedades. Não foi detectada correlação entre a distância genética e os locais de coleta.

**Palavras-chave:** *Ipomoea batatas*, recursos genéticos, agricultura tradicional, caracterização de germoplasma, agrobiodiversidade.

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The sweet potato (*Ipomoea batatas*) belongs to the Convolvulaceae family and is cropped throughout Brazil. It is a rustic crop which produces well in poor nutrients soils conditions, and it is often related to low incidence of pests or limiting diseases, high drought tolerance and low production cost (Roesler *et al.*, 2008). Because of this rusticity, sweet potato is very frequently associated with small farmers which are responsible for maintenance of many genetic diversity of the crop in on farm conservation.

One of the main characteristics of

the sweet potato is its high phenotypic and genotypic variability (Vilas Boas *et al.*, 1999; Veasey *et al.*, 2007) that confers adaptability to different edaphoclimatic conditions. The sweet potato has been cropped empirically by most farmers (Zero & Lima, 2005) and much of what is known about the sweet potato comes from popular knowledge. The occurrence of the same cultivar with different names and vice versa is quite common (Daros *et al.*, 2002). This way, collecting sweet potato germplasm in rural properties

would implicate in a situation which two different accessions in a gene bank could correspond to the same genotype. Duplicate genotypes in gene banks can be identified by, for example, morphological characterization of the germplasm which is normally the most feasible way to quantify its genetic diversity and has been frequently used (Rabbani *et al.*, 1998; Ritschel *et al.*, 2002). Morphological characterization activities make available information on the conserved germplasm, placing it in the most effective form for use, and it is

important to emphasize that the value of the germplasm increases as it becomes known and documented (Painting *et al.*, 1995; Sudré *et al.*, 2010).

Rural communities can contribute to the use and conservation of germplasm adapted to the agricultural ecosystems of the agricultural communities (Almekinders & Elings, 2001). Family agriculture is an economic segment that generates employment and income for many Brazilians and small farmers depend on this income and benefits to ensure the survival of their children and other dependents (Brasil, 2009). The practice of cropping local varieties is intrinsically linked to the cultural context related to the lifestyle of the families and their associated traditional knowledge (Albagli & Maciel, 2004).

Despite of the importance of maintaining the crops genetic variability that exists on small farms, the modernizations of agriculture and rural exodus have caused loss of genetic diversity in crops, including the sweet potato. Thus it is essential to collect and to conserve germplasm and keep it in organized collections for later characterization, evaluation and documentation (Cabral *et al.*, 2010). This way it will be possible to estimate the real variability maintained to make the conserved germplasm available for effective use by researchers in several areas such as breeders and botanists or even the farmers themselves.

The objectives of the present study were to collect local sweet potato varieties on farms in the northern region of Rio de Janeiro state; to gather information regarding the profile of the farmers who traditionally cultivate and maintain sweet potato germplasm and to characterize the accessions collected based on morphological descriptors.

## MATERIAL AND METHODS

Six collection expeditions were made from March to April 2009 and roots from 46 sweet potato accessions were collected on small rural properties located in the north of Rio de Janeiro state including the municipalities of Campos dos Goytacazes and São João

da Barra (Table 1). A GPS (global positioning system) equipment was used to geo-reference the collection points. The collection locations were defined with support from the *Empresa de Assistência Técnica e Extensão Rural do Rio de Janeiro* (Emater-Rio). At the time of collection, each farmer answered a questionnaire previously designed to understand his profile, considering the following items: farmers' name; collection location; local name for the sweet potato; procedence of the cropped genotypes; end destination for the product; pest and disease incidence in the crop; chemical product application; annual yield and time the farmer had exercised this activity. Considering that the collection was made on commercial fields of small farmers, and meaning to cause no financial loss for the farmers and because the crop is propagated by vegetative propagation, only three roots from each accession, representative of the field, were collected in each location sampled.

The roots collected from the farmers were taken to the *Laboratório de Melhoramento Genético Vegetal* (LMGV) at UENF on the same day and characterized shortly after collection, considering six root morphological descriptors (shape, surface defects, skin color, skin color intensity, flesh color and secondary flesh color) proposed by Huamán (1991). After characterization, the roots were kept under ambient conditions in the Plant Genetic Resources Sector of the LMGV at 25°C and approximately 75% humidity for 30 days until six or eight sprouts had formed, that were then transferred to 5 L pots to multiply the accessions in a greenhouse. At this phase, the accessions were characterized by eight sweet potato-specific morphological descriptors (Huamán, 1991) (Table 2).

Ninety days after transplant the characteristics of the vegetative part were assessed, by sampling eight leaves and roots from each accession in the greenhouse. The data obtained for both the roots and canopy were analyzed using the Genes program (Cruz, 2006) to obtain the similarity matrix and by the R program (<http://www.r-project.org>) to obtain the dendrogram. The Cole-

Rodgers *et al.* (1997) distance was used to calculate the genetic distance matrix and the dendrogram was obtained by the Unweighted Paired Group Method using Arithmetic averages (UPGMA).

## RESULTS AND DISCUSSION

Fifty-three farms were visited in the six collection trips, including 31 locations in the municipalities of Campos dos Goytacazes and São João da Barra. Sweet potato germplasm was collected in 46 locations visited, because on some farms the root was not yet available or the farmer had abandoned the crop. A predominance of traditional family agriculture was observed, and about 72% of the rural producers interviewed said they had planted sweet potato for more than a decade. The main advantage emphasized by the rural producers was the regularity of the crop production, and most reported disadvantages with low prices and difficulty in marketing production. Products characteristic of traditional agriculture include pineapple, yam, cassava, corn, sugarcane, sweet potato and other crops. However, few are produced regularly and only sweet potato is produced with greater frequency (Targino & Couto, 2007).

It was also observed that sweet potato was planted for subsistence on the properties visited. Sweet potato has been cropped empirically over time by rural families, usually with other vegetables as an alternative in case there is a fall in price of one of the products cropped. According to Souza *et al.* (2008), one of the characteristics of family production is polycropping. Although they cultivate a main product for the market, small farmers generally dedicate themselves to other activities, either to commercialize or simply for the family subsistence.

According to the questionnaire, it was further observed that investment in the sweet potato crop is very low and the main argument mentioned against increasing technology for this crop is that the profits are small, a fact resulting from the small production volume. It is important to emphasize that the cost estimated with production reflect

**Table 1.** Identification of sweet potato accessions, with their number in the collection, common name, municipality of origin, latitude and longitude of the collection points (identificação dos acessos de batata-doce, com a respectiva numeração na coleção, nome comum, município de procedência, e valores de latitude e longitude dos pontos de coleta). Campos dos Goytacazes, UENF, 2009.

Number	Accession	Common Name	Procedence	Latitude	Longitude
1	UENF 1917	Três meses	Campos dos Goytacazes	21°54'27.3"	41°02'30.2"
2	UENF 1918	Comum	Campos dos Goytacazes	21°57'04.9"	41°03'46.9"
3	UENF 1919	Comum	Campos dos Goytacazes	21°57'57.5"	41°14'34.8"
4	UENF 1920	Comum	Campos dos Goytacazes	21°57'08.5"	41°08'19.2"
5	UENF 1921	Rosa	Campos dos Goytacazes	21°37'06.1"	41°13'20.1"
6	UENF 1922	Branca	Campos dos Goytacazes	21°37'21.4"	41°13'12.2"
7	UENF 1923	Marron	Campos dos Goytacazes	21°37'21.4"	41°13'12.2"
8	UENF 1924	Comum	Campos dos Goytacazes	21°37'21.4"	41°13'12.2"
9	UENF 1925	Banha de Galinha	Campos dos Goytacazes	21°39'01.7"	41°11'20.2"
10	UENF 1926	Comum	Campos dos Goytacazes	21°39'01.7"	41°11'20.2"
11	UENF 1930	Rosada	São João da Barra	21°46'30.8"	41°18'35.2"
12	UENF 1931	Comum	Campos dos Goytacazes	21°46'30.8"	41°18'35.2"
13	UENF 1932	Comum	São João da Barra	21°45'41.2"	41°17'26.7"
14	UENF 1933	Comum	Campos dos Goytacazes	21°45'38.2"	41°18'15.7"
15	UENF 1935	Comum	São João da Barra	21°45'29.3"	41°19'33.6"
16	UENF 1936	Comum	Campos dos Goytacazes	21°46'07.3"	41°19'44.1"
17	UENF 1937	Comum	São João da Barra	21°46'31.6"	41°19'11.1"
18	UENF 1941	Comum	São João da Barra	21°44'56.7"	41°19'34.3"
19	UENF 1946	Comum	São João da Barra	21°45'43.2"	41°19'34.3"
20	UENF 1948	Comum	São João da Barra	21°45'29.4"	41°20'25.6"
21	UENF 1949	Vermelha	Campos dos Goytacazes	21°57'05.1"	41°03'45.7"
22	UENF 1950	Penquinha	Campos dos Goytacazes	21°56'13.4"	41°00'24.0"
23	UENF 1951	Comum	Campos dos Goytacazes	21°56'31.1"	41°00'13.8"
24	UENF 1952	Vermelha	São João da Barra	21°56'00.0"	40°59'53.4"
25	UENF 1953	Três meses	São João da Barra	21°56'03.2"	40°59'28.0"
26	UENF 1954	Comum	Campos dos Goytacazes	21°49'24.7"	41°17'45.2"
27	UENF 1955	Rosada	Campos dos Goytacazes	21°54'31.8"	41°16'32.4"
28	UENF 1956	Branca	Campos dos Goytacazes	21°57'41.0"	41°14'17.7"
29	UENF 1957	Comum	Campos dos Goytacazes	21°57'58.2"	41°14'35.5"
30	UENF 1958	Roxa	Campos dos Goytacazes	22°05'09.2"	41°10'09.7"
31	UENF 1959	Dr. Ney	Campos dos Goytacazes	22°05'00.7"	41°10'07.5"
32	UENF 1960	Rainha	Campos dos Goytacazes	21°36'33.6"	41°18'59.2"
33	UENF 1961	Rainha	Campos dos Goytacazes	21°38'26.4"	41°16'55.4"
34	UENF 1962	Comum	Campos dos Goytacazes	21°38'08.6"	41°16'32.3"
35	UENF 1963	Branca	Campos dos Goytacazes	21°37'06.1"	41°13'20.1"
36	UENF 1964	Rosada	Campos dos Goytacazes	21°37'06.1"	41°13'20.1"
37	UENF 1965	Penquinha	Campos dos Goytacazes	21°37'07.4"	41°13'23.4"
38	UENF 1966	Roxa	Campos dos Goytacazes	21°37'09.4"	41°13'23.4"
39	UENF 1967	Graúda	Campos dos Goytacazes	21°36'42.8"	41°13'11.4"
40	UENF 1968	Vermelha	Campos dos Goytacazes	21°37'11.4"	41°14'15.7"
41	UENF 1969	Costa	São João da Barra	21°43'48.1"	41°07'48.8"
42	UENF 1970	Penquinha	São João da Barra	21°54'28.8"	41°05'46.6"
43	UENF 1971	Vermelha	São João da Barra	21°53'53.9"	41°05'40.5"
44	UENF 1972	Rosada	São João da Barra	21°53'53.9"	41°05'40.5"
45	UENF 1973	Comum	Campos dos Goytacazes	21°26'46.2"	41°23'59.9"
46	UENF 1974	Graúda	Campos dos Goytacazes	21°25'17.8"	41°23'52.3"

**Table 2.** Morphological descriptors used to evaluate roots and vegetative parts of sweet potato accessions collected in north of Rio de Janeiro state (descritores morfológicos utilizados para avaliar as raízes e parte vegetativa dos acessos de batata-doce coletados na região norte do estado do Rio de Janeiro). Campos dos Goytacazes, UENF, 2009.

Descriptor	Phenotypes
<b>Root</b>	
Shape	1= round; 2= round elliptic; 3= elliptic; 4= ovate; 5= obovate; 6= oblong; 7= long oblong; 8= long elliptic; 9= long irregular or curved
Surface defects	0= absent; 1= alligator-like skin; 2= veins; 3= shallow horizontal constrictions; 4= deep horizontal constrictions; 5= shallow longitudinal grooves; 6= deep longitudinal grooves; 7= deep constrictions and deep grooves
Skin color	1= white; 2= cream; 3= yellow; 4= orange; 5= brownish orange; 6= pink; 7= red; 8= purple-red; 9= dark purple
Skin color intensity	1= pale; 2= intermediate; 3= dark
Flesh color	1= white; 2= cream; 3= dark cream; 4= pale yellow; 5= dark yellow; 6= pale orange; 7= intermediate orange; 8= dark orange; 9= strongly pigmented with anthocyanins
Flesh secondary color	0= absent; 1= white; 2= cream; 3= yellow; 4= orange; 5= pink; 6= red; 7= purple red; 8= purple; 9= dark purple
<b>Leaf</b>	
General outline	1= rounded; 2= reniform; 3= cordate; 4= triangular; 5= hastate; 6= lobed; 7= almost divided
Lobe type	1= no lateral lobes; 2= very slight (teeth); 3= slight; 4= moderate; 5= deep; 6= very deep
Lobe number	1= one; 2= two; 3= three
Shape of central lobe	1= toothed; 2= triangular; 3= semi-circular; 4= semi-elliptic; 5= elliptic; 6= lanceolate; 7= oblanceolate; 8= linear
Mature leaf color	1= yellow-green; 2= green; 3= green with purple edge; 4= greyish-green; 5= green with purple veins on upper surface; 6= slightly purple; 7= mostly purple; 8= green upper surface, purple lower surface; 9= purple on both surfaces
Immature leaf color	1= yellow-green; 2= green; 3= green with purple edge; 4= greyish-green; 5= green with purple veins on upper surface; 6= slightly purple; 7= mostly purple; 8= green upper surface, purple lower surface; 9= purple on both surfaces
Leaf size	3= small (<8 cm); 5= medium (8-15 cm); 7= large (16-25 cm); 9= very large (>25 cm)
Petiole pigmentation	1= green; 2= Green with purple near stem; 3= Green with purple near leaf; 4= Green with purple at both ends; 5= Green with purple spots throughout petiole; 6= Green with purple stripes; 7= purple with green near leaf; 8= some petioles purple, some others green; 9= totally or mostly purple

the situation of the family farmers in the northern Fluminense region in the state of Rio de Janeiro who generally develop their activities with a very low technological standard and do not use, for example, irrigation that is a very important technique in the region that is characterized by periods of low rainfall (Souza *et al.*, 2008).

It was observed that 88% of the sweet potato producers commercialize the product using an intermediary. Studies by Guanziroli & Cardim (2000) on the degree of integration of family farmers with the market concluded that family agriculture has difficulties to

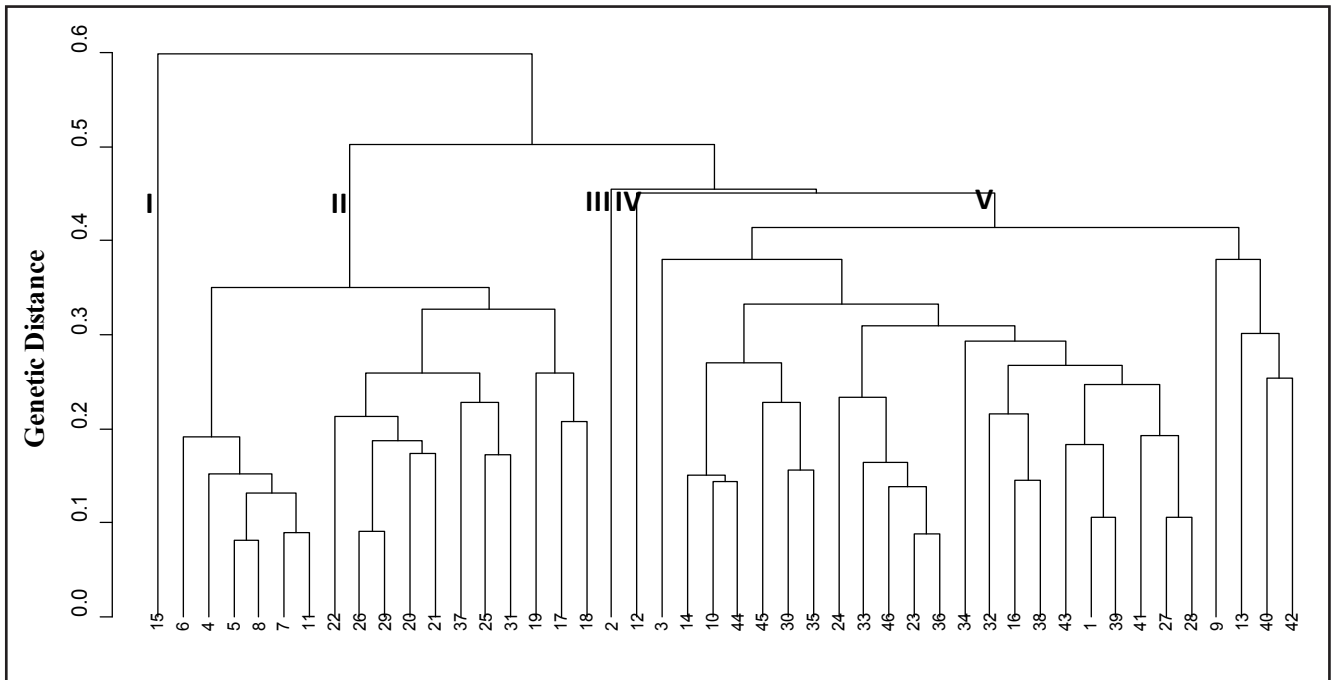
integrate with the market and requires an intermediary in most cases.

Fertilizer or chemical products are not frequently applied. It was also observed that the size of the area cultivated with sweet potato ranged from plantations in very small areas (approximately 0.2 ha), sometimes in the back yard, and reached a maximum of 2 ha.

While carrying out the interviews by questionnaires, many farmers showed their dissatisfaction and uncertainty of continuing to plant sweet potato because of the many difficulties, especially with marketing the produce, climatic

instability (some producers have lost all their production because of heavy rains) and the absence of a substitute to run the rural property, because the producers' children have no interest in remaining in the countryside and go to the cities to study and/or obtain jobs with better income. This emphasizes the importance of collecting and maintaining this germplasm by public research institutions to preserve the genetic variability of these typical small producer crops.

Variation was observed in the six traits studied in the morphological variability estimate of the root descriptor,



**Figure 1.** Dendrogram of genetic dissimilarity based on root and vegetative parts descriptors, among 46 sweet potato accessions collected from farms in the north of Rio de Janeiro state (dendrograma de dissimilaridade genética, com base em descritores radiculares e da parte vegetativa, entre 46 acessos de batata-doce coletados em propriedades rurais na região norte do estado do Rio de Janeiro). Campos dos Goytacazes, UENF, 2009.

with different frequencies for each phenotypic class.

Great variability was detected for root shape, with seven classes: round (8.7%); elliptic round (2.2%); oval (19.6%); obovate (4.3%); long oblong (2.2%); long elliptic (6.5%) and long irregular (56.5%). Ritschel & Huamán (2002) studied 324 sweet potato accessions and found eight phenotypic classes, with a predominance of those classified as long elliptic (42.5%) and irregular (21.1%). However, none of the accessions assessed in the present study was oval in shape.

For the surface defect variable, roots were observed without defects (67.4%), alligator skin (22.2%), vein-type defects (17.4%), horizontal surface constrictions (22.2%) and horizontal surface cracks (8.7%). Similar results were obtained by Daros *et al.* (2002) and Cavalcante (2008) who observed all the descriptors in the present study in different proportions. Cavalcante (2008) did not observe predominance of a single class for this descriptor, while Daros *et al.* (2002) observed predominance of the root classes with vein-type defects and surface constrictions.

The predominant color of the root skin of the accessions characterized was classified as pink (84.8%), along with the colorings cream (10.8%), orangey-brown (2.2%) and dark purple (2.2%). Daros *et al.* (2002) reported the pink color as predominant (50%). However, Chávez *et al.* (2006) and Veasey *et al.* (2007) reported predominance of cream coloring while Ritschel & Huamán (2002) classified the skin color as white for 41.2% of the accessions, and the second greatest frequency was for the pink coloring, represented by 28.6% of the accessions studied.

The intensity of the skin color was characterized as pale for 19.6% of the accessions, intermediate for 43.4% and dark for 37%. Similarly Daros *et al.* (2002) and Cavalcante (2008) observed all the intensities for root skin color, but the intermediate intensity predominated.

Low variability for the root flesh coloring characteristic was detected, 93.5% of the accessions had cream colored pulp and 6.5% had white pulp. Ritschel & Huamán (2002) observed predominance of the cream color in 75.1% of the germplasm assessed. Veasey *et al.* (2007) characterized 73%

of the genotypes with cream-colored flesh. Chávez *et al.* (2006) observed a great diversity of colors for flesh, but the cream-colored predominated in agreement with the present study and the other authors quoted.

The secondary flesh coloring characteristic of the pulp was absent in 76.1% and yellow for 23.9% of the accessions. Chávez *et al.* (2006) classified 48.6% of the accessions without secondary pulp. Ritschel & Huamán (2002) described 50.2% of the accessions with no secondary coloring and 46.2% with yellow secondary pulp coloring similar to the data obtained in the present study.

Generally the skin color and root shape characteristics showed the greatest variability, and can be considered an important descriptor in accession clustering, contributing with significant differentiation to the groups. These variables were also mainly responsible for the genetic divergence in the results obtained by Oliveira *et al.* (2000) and Cavalcante *et al.* (2009). On the other hand, Veasey *et al.* (2007) described the secondary pulp coloring diversity, shape and the root surface defects as factors

that most contributed to diversity. In the present study the characteristics that contributed least to divergence were pulp coloring and secondary root pulp coloring, 93.5% of the accessions had cream-colored pulp and 76.1% did not have a secondary pulp color.

High phenotypic variability was observed for the root descriptors. Similar results were reported by Daros *et al.* (2002) and Chávez *et al.* (2006) when they assessed 14 and 52 accessions, respectively, based on morphological descriptors for the roots. It is also important that roots collected in the same location or in very close locations had high phenotypic variability, evidence of the cropping of different traditional sweet potato varieties by the rural producers in the northern region of the state of Rio de Janeiro.

Variation was observed for the eight qualitative traits of the canopy of the 46 sweet potato accessions studied, represented by a high number of phenotypic classes, with a significant percentage of individuals in each class.

The following leaf shapes were observed: lobed (50%), triangular (37.8%), cordate (7.3%), lanceolate (3.7%) and round (1.2%). Cavalcante (2008) observed the same shapes in sweet potato accessions as in the present study. The authors observed a greater frequency of the lobed shape (45.5%), followed by the triangular (27.3%), lanceolate (18.2%) and cordate (9.1%) shapes. Daros *et al.* (2002) analyzed 14 sweet potato accessions and also observed that the lobed shape was predominant, corresponding to 93.0% of the accessions. However, Ritschel & Huamán (2002) in the assessment of sweet potato germplasm at *Embrapa Hortaliças* observed predominance of the cordate shape (49.7%).

The lobe type characteristic varied greatly among the accessions and five of the six forms of variations were found: no lobe (32.9%), very superficial lobe (12.2%), superficial (4.9%), moderate (36.6%), and deep 13.4%). However Veasey *et al.* (2007) observed a predominance of very superficial lobe (40%) and a much lower frequency of moderate lobe than in the present study, of around 15.0%.

Three categories were observed for the number of lobes: only one lobe (41.5%), three lobes (19.5%) and five lobes (39%). Ritschel & Huamán (2002) reported similar results, classifying 38.2% of the accessions with only one lobe and 36.4% with five lobes and these were the two highest frequencies, similar to the present study.

The central aspect of the leaf lobe was characterized as serrated (14.6%), triangular (36.6%), semi-elliptic (41.5%), elliptic (6.1%) and lanceolate (1.2%) showing great variability for this characteristic. Daros *et al.* (2002) and Chávez *et al.* (2006) also found great variation for this trait. However, divergent results were obtained by Cavalcante (2008), who characterized the genotypes in only two categories: 63.7% as semi-elliptic and 36.3% as triangular.

Two classes were observed for leaf size: small (34.1%) and medium (65.9%) Ritschel & Huamán (2002) classified the leaves of 80.2% of the accessions as medium-size while Daros *et al.* (2002) characterized 100% of the accessions as having medium-size leaves.

Most of the accessions showed a predominantly green mature leaf coloring (96.4%), and there were also some accessions with a purple under surface (3.6%). For the immature leaf coloring, green leaves were also predominant (65.8%) and the rest were represented by green leaves with purple edges and purple nervures on the lower surface (3.7%). Augustin *et al.* (2000) obtained 90% frequency for mature leaf green coloring. Veasey *et al.* (2007) similarly classified for mature leaf coloring 60% of the genotypes with green coloring and 40% with purple nervures on the lower surface. For immature leaf coloring, 50% of the leaves were classified as green with purple edges 20%, as green leaves, other colorings were also obtained but at lower frequencies.

The petiole coloring showed great variability of types: green (31.7%), green with scattered purple spots (1.2%), green with purple spots close to the leaf (46.3%) green with purple spots on both tips (9.8%) some purple

and other green petiole coloring (6.1%) and completely or mostly purple (4.9%). Daros *et al.* (2002) and Veasey *et al.* (2007) also reported great petiole coloring variability and detected greater heterogeneity of this characteristic.

The data were grouped by the UPGMA method and by the matrix generated by the Cole-Rodgers distance (Figure 1). The co-phenotypic correlation among the data of the distance matrix and clustering was 0.83. Sokal & Rohlf (1995) considered that values over 0.80 indicated good representativeness of the real distances among the genotypes by means of the graphic representation of the dendrogram.

Considering the abrupt change point on the dendrogram, the formation of five groups was observed, and group II and V consisted of most of the accessions, 17 and 26 accessions respectively (Figure 1). The other groups consisted of only one accession each. No definition was observed of the groups according to the collection location. The lack of correlation among the geographic and morphological distances may have been related to the intensive exchange of material for sweet potato planting among the farmers and the length of time that each family crops the same variety. Naskar (1996) and Veasey *et al.* (2007) also reported an absence in structuring among the morphological diversity and the collection locations and, according to these authors, the fact may be explained by the exchange system among neighboring farmers.

In spite of the innumerable bottlenecks and difficulties reported by the producers, the results allow the conclusion that there is still a tradition of cropping sweet potato among the small producers and that there is great variability among the genotypes planted in the northern region of Rio de Janeiro state. However, there is a great risk of losing this genetic resource, due to the tendency to abandon this activity on the part of the producers, among other factors, and it is up to public organs linked to agricultural teaching and research to take measures to collect and conserve this germplasm for future generations.

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