Morphological Description of Selected Pigeonpea (*Cajanus cajan* (L.) Millsp.) Lines

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MORPHOLOGICAL DESCRIPTION OF SELECTED PIGEONPEA (*Cajanus cajan* (L.) Millsp.) LINES

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Abstract

Seventeen pigeonpea pure line accessions selected for desirable forage traits and three commercial cultivars were described according to morphological characters. The following descriptors were used: growth habit, plant height, number of primary and secondary branches, stem color and thickness, leaf shape and hairiness, flower base and second color, pattern of flower streaks, flowering pattern, immature and mature pod color, pod form and hairiness, seed color pattern, base and second seed color, seed eye (region around hilum) color and seed shape and width**.** Each individual line and cultivar was satisfactorily distinguished from the others by the chosen characters.

Keywords: botanical description, pure lines, leguminous forage crop, phenotypic variation

Introduction

Pigeonpea is a valuable, multiple-use legume plant, adapted to a variety of tropical conditions. However, the commercial cultivars available in Brazil have problems such as low persistence, low leaf retention in the winter, low palatability and cultivar mixtures. Therefore, a breeding program was initiated aiming the development of cultivars with superior forage traits. Two collections were field-evaluated and forty-one accessions selected (Godoy et al.,

1994; 1997). Pure lines of these accessions were obtained through selection for predominant morphological traits previously observed in the field, in isolated conditions. Seventeen of the selected lines and three commercial cultivars were field-grown and their main morphological and botanical characteristics, described.

Material and Methods

Seventeen selected pure lines (Godoy et al., 1994; 1997) and three commercial cultivars (Anão, Caqui e Fava Larga) were planted in December 1998, in São Carlos (SP), Brazil (lat. 21° 54' S, long. 47° 48' W; 911 m a.s.l.), in five-row plots. Each row was 5 m long and spaces of 0.5 m and 0.25 were used among rows and plants, respectively. The plants were described according to growth habit, plant height, number of primary and secondary branches, stem color and thickness, leaf shape and hairiness, flower base and second color, pattern of flower streaks, flowering pattern, immature and mature pod color, pod form and hairiness, seed color pattern, base and second seed color, seed eye (region around hilum) color and seed shape and width. The description observed the IBPGR (1993) criteria but the British Colour Council (1938) standard was used for stem and flower colors.

Results and Discussion

Table 1 presents a partial morphological characterization of the selected genotypes. Only two lines presented a semi-spreading growth habit; the all others had intermediate stem thickness. The only thin-stem-line, g58-95, is an annual type and the shortest material in the collection, showing stability for this character, as did line g127-95, since both were selected for plant height (Godoy et al., 1994; 1997).

The number of primary branches varied from seven to twenty-one, but few genotypes had secondary branches. Most lines present narrow-elliptic leaflets; six of them, however, had

broad-elliptic leaflets and three, lanceolate. Only line g101-97 had a dense flower streak pattern, while all others presented a uniform pattern. Caqui has two streak patterns. Nine lines presented a determinate growth habit; among them are the three shortest genotypes, respectively, g58-95, g127-97 and Anão, the latter two being perennial types.

A wide variation on stem and flower colors was found. Line g17c-94 has lettuce green 861 stems, and so do Anão and g66-95, but also with dianthus purple 730 and lilac purple o31/1 as second colors, respectively; g101-97has lettuce green 861/2 and lilac purple o31/1 stems. Oxblood red oo823/2 is the stem color of g127-97; g29b-94 has oxblood red oo823/2 and willow green ooo862/1 stems, g146-97, oxblood red oo823 and willow green ooo862/1. Caqui presents oxblood red oo823/2 and lavender green ooo761/1 stems in separate plants; g18-95 and g6-95 have willow green stems, ooo862 and ooo862/1, respectively; g184-97 and g3-94, willow green ooo862/1 and ooo862/2, and oxblood red oo823/2; g154-95 and g124-95 have lilac purple o31/1 and lettuce green 861/2 stems; Fava Larga, fern green o862/2, g47-94, fern green o862/2 and dianthus purple 730. The remaining lines, g27-94, g19b-94, g167-97 and g58-95 have stems, respectively: lavender green ooo761/1, leek green ooo858/1, pansy purple 928/1 and willow green ooo862/1 and spinach green 960/1.

Chrome yellow 605 is the predominant flower base color, presented by Anão, Caqui, Fava Larga, g3-94, g18-95, g17c-94, g27-94, g29b-94, g47-94, g58-95, g66-95, g101-97, g124-95, g146-97, g154-95, g167-97 and g184-97. This same color with a spot carmine rose 621 at the base of the flag is the base color of g19b-94; g127-97 has lemon yellow 4 as its base color, and g6/95, mimosa yellow 602/2. More variation was found for the flower second color: g124-95 and g167-97, have it chrome yellow 605/1 with camellia rose 622/1 streaks; g6-95, g27-94, g58-95, g146-97, g154-95 and g184-97, have it mimosa yellow 602; g17c-94, mimosa yellow 602/1 and Anão, g3-94 and g29b-94, 602/2; g47-94 and g101-97, mimosa yellow 602 with beetroot purple 830/3 streaks, g66-95 with camellia rose 622/1streaks, and

g127-97, with claret rose o21/1 streaks. Fava Larga had plants with primrose yellow 601/1 with carmine rose 621 streaks and plants with Ruby red 827/1 with maroon 1030 streaks. The same happens with Caqui (currant red 821 and mimosa yellow 602 with rhodonite red oo22/1). The latter type was also found in g19b-94. Magenta rose o27/1, is the second flower color of g18-95.

Caqui presented brown and light green immature pods in different plants; g66-95, purple with green streaks; g6-95, g17c-94, g27-94 and g146-97, green: g3-94, g58-95 and g184-97, light green; g29b-94, very light green; g19b-94, green with light purple streaks; g47-94 e g101-97, green with violet spots; g124-95, g154-95 and g167-97, green with dark violet streaks; g18-95, green with dark violet spots; Anão, dark green and g127-97, dark green with dark violet spots.

The following mature pod colors were observed: g18-95 and g58-95, light brown; g124-95 and g167-97, brown with violet streaks; Anão, Fava Larga, g3-94, g17c-94, g27-94, g184-97, straw; Caqui, straw with dark violet streaks; g146-97, ocher straw; g101-97, g66-95, g154-95, g19b-94 and g127-97, straw with violet brown, purple, violet and dark violet streaks, respectively; g47-94, g6-95 and g29b-94 also straw, but with dark spots on the suture line and between the grains and with small violet spots for the latter two. Only Anão and g66-95 have glabrous pods.

IBPGR (1993) classified seed color pattern as plain, mottled, speckled, mottled and speckled and ringed. Anão, g3-94, g6-95, g27-94, g124-95 and g127-97 are of the first type, g29b-94 and g101-97 of the second type; g17c-94, g18-95, g58-95 and g66-95, belong to the third group, Fava Larga, g19b-94, g47-94 and g167-97 to the fourth and g184-97, g146-97 and g154-95 have a ringed pattern. Caqui presents plain and speckled and mottled seeds.

Out of ten possible color groups proposed by IBPGR (1993) for base and second seed color, six were found: g18-95, g29b-94, g47-94, g146-97 and g184-97 have white seeds

(yellow-white group 158C); g17c-94, light gray (gray brown group 199B); Fava Larga, cream (grayed-white group 156C). Anão, g3-94, g6-95, g27-94, g58-95, g66-95 and g127-97, reddish-brown (reddish-brown group 200D), and so does Caqui, which also has white seeds (yellow-white group 158C); g19b-94, g101-97, g124-95, g154-95 and g167-97 have light brown seeds (yellow-orange group 22C). The second seed color of g17c-94 and g146-97 is light gray (gray-brown group 199B); Fava Larga, g19b-94, g29b-94, g47-94, g101-97, g154-95, g167-97 and Caqui (white seed plants), have it reddish-brown (reddish-brown group 200D); g18-95, g58-95, g66-95 e g184-97, light brown (yellow-orange group 22C).

The majority of the lines present reddish brown seed eye (reddish-brown group 200D). Anão has it dark gray (black group 202B); g19b-94 and g101-97, light brown (yellow-orange group 22C); g 146-97, dark purple (black group 202A). This seed eye is narrow for g27-94, g47-94, g154-95 and g184-97, medium for Anão, g6-95, g17c-94, g29b-94, g58-95, g66-95, g101-97, g146-97 and g167-97, and wide for the other lines.

Anão, Caqui, g18-95, g19b-94, g127-97, g146-97, g154-95 and g167-97 have elongated seeds. Fava Larga, g17c-94, g27-94, g29b-94, g101-97 and g184-97 have oval seeds. Caqui and the others, square seeds.

All lines have glabrous leaves and only five genotypes with cylindrical pods were found.

Fava Larga presented two characters for stem color and flower second color, and Caqui, for most of the characters and that did not occur for Anão and the selected lines. This description also shows that the seventeen lines are different from one another and from the commercial cultivars and provide tools for their identification.

References

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Table 1. Some characteristics of pigeon-pea genotypes*.

Genotype	Growth Habit	Stem Thickness (mm)	Plant height (cm)	Number of branches Primary	Number of branches Secondary	Leaflet Shape	Flower Streak pattern	Flower Flowering pattern	Pod Form
Anão	Erect	Intermediate	105	14	-	NE	U	D	Cylindrical
Caqui	Erect	Thick	167	12	-	BE	U, S	I	Flat
Fava Larga	Erect	Thick	167	14	2	BE	M	I	Flat
g3-94	Erect	Intermediate	195	11	2	BE	U	I	Flat
g6-95	Erect	Intermediate	155	12	1	NE	U	D	Cylindrical
g17c-94	SS	Intermediate	120	12	-	L	U	D	Cylindrical
g18-95	Erect	Intermediate	163	11	-	L	U	D	Flat
g19b-94	Erect	Thick	163	19	6	BE	M	I	Flat
g27-94	Erect	Intermediate	180	11	-	NE	U	D	Flat
g29b-94	SS	Intermediate	190	10	3	L	U	I	Flat
g47-94	Erect	Intermediate	150	10	-	BE	M	D	Flat
g58-95	Erect	Thin	65	7	-	NE	U	D	Cylindrical
g66-95	Erect	Intermediate	187	10	rare	BE	S	D	Flat
g101-97	Erect	Intermediate	187	9	2	NE	D	I	Flat
g124-95	Erect	Intermediate	180	14	2	NE	M	I	Flat
g127-97	Erect	Intermediate	90	12	-	NE	S	D	Cylindrical
g146-97	Erect	Thick	185	17	2	NE	U	I	Flat
g154-95	Erect	Intermediate	195	17	-	NE	U	I	Flat
g167-97	Erect	Intermediate	188	21	1	NE	S	I	Flat
g184-97	Erect	Intermediate	180	19	3	NE	U	I	Flat

***** Growth habit: erect, semi-spreading (SS), spreading and trailing, stem thickness (thin < 5 mm, intermediate: 5 mm - 13 mm or thick: >13 mm]; Leaflet shapes: lanceolate (L), narrow elliptic (NE), broad elliptic (BE) and obcordate; Flower streak pattern: sparse streaks (S), medium amount of streaks (M), dense streaks (D) and uniform coverage of second color (U); Flowering patterns: determinate (D), semi-determinate and indeterminate (I); Pod form: cylindrical or flat. (IBPGR, 1993)