

BRS Anauê and BRS Boyrá: the first cultivars of ornamental pineapple developed in Brazil

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Abstract: *BRS Anauê and BRS Boyrá are two ornamental pineapple cultivars bred for landscaping and cut flower and mini fruit production. They are characterized by intense colors, absence of spines, a long peduncle and high durability. In Brazil, they are the first pineapple cultivars officially released for commercial ornamental purposes.*

Keywords: *Ananas comosus (L.) Merrill, breeding, ornamental plant, landscaping, cut flowers, mini fruits.*

INTRODUCTION

Ornamental pineapple [*Ananas comosus* (L.) Merrill] varieties, with their exotic features and colorful leaves and small fruits, are a novelty on the floriculture market. No official data of production and sale of ornamental pineapple plants and flowers in Brazil and worldwide are available. In Brazil, the production is concentrated in the Northeast region (Donato et al. 2018). Some varieties are already grown commercially in Brazil, such as *A. comosus* var. *erectifolius* and *A. comosus* var. *bracteatus*, mainly in the states of Ceará and Rio Grande do Norte, from where they are exported to the United States and European countries (Brainer and Oliveira 2007).

In the search for new ornamental cultivars since 2003, the Brazilian Agricultural Research Corporation (Embrapa) has conducted studies to characterize, select and hybridize the varieties preserved in a germplasm bank with more than 700 accessions (Souza et al. 2006, Souza et al. 2009a, Souza et al. 2012a, Souza et al. 2014). The development of new cultivars requires agronomic, phytosanitary and postharvest evaluations, to select hybrids with commercially important traits that are also resistant to the main crop pests and diseases (Souza et al. 2009a, Souza et al. 2014, Souza et al. 2019). The main commercial characteristics of ornamental pineapple, according to market standards, are a deformation-free peduncle (fruit-supporting stem), longer than 40 cm, and attractive and well-formed infructescences (Souza et al. 2014, Lima et al. 2017).

The cultivars BRS Anauê and BRS Boyrá meet the beauty and quality requirements for floral stems required by the global market, as shown by surveys conducted at various international fairs (Donato et al. 2018). They can be used for landscaping and/or production of mini fruits and cut flowers. The production system for both cultivars was developed by Embrapa in partnership with the export company ABX Tropical Flowers, based in the state of Rio Grande do Norte. In addition, a system for organic production of BRS Anauê was developed

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in partnership with the rural elementary school Tina de Carvalho, supported by the Foundation José Carvalho, in the county of Entre Rios, Bahia.

The objective of this report is to present these two ornamental pineapple varieties to the scientific community and flower producers, by describing their characteristics and properties of novelty, homogeneity and genetic stability, according to the standards of the National Plant Variety Protection Service (SNPC) of Brazil.

ORIGIN AND DEVELOPMENT OF THE CULTIVARS

BRS Boyrá and BRS Anauê were developed on an experimental farm of the research unit Embrapa Cassava and Fruits (Embrapa Mandioca e Fruticultura) in Cruz das Almas, Bahia, from controlled crosses of two botanical varieties (*A. comosus* var. *bracteatus* and *A. comosus* var. *erectifolius*) (Souza et al. 2014). Selection was based on the morphological descriptors developed for pineapple, published by the International Board for Plant Genetic Resources (IBPGR 1991). The genetic resources of a progeny represented by 1,207 spineless plants were used, because 4,923 plants with spines and other undesirable traits were excluded during preselection.

The characterization of these plants resulted in the selection of 64 promising varieties, categorized according to the intended main use, i.e., for landscaping, as potted plants, or for the production of cut flowers, cut foliage or ornamental mini fruits (Souza et al. 2014).

The seedlings for the agronomic validation tests were produced by micropropagation, as described by Souza et al. (2012b). The tests for resistance to fusariosis (*Fusarium guttiforme* Nirenberg & O'Donnell) were carried out according to Souza et al. (2011). Among the selected varieties, BRS Anauê and BRS Boyrá stood out as having the quality attributes demanded by the cut flower and ornamental plant segment, aside from a good reproductive potential.

Thus, the two cultivars were evaluated in DHS (distinguishability, homogeneity and stability) tests, according to the SNPC requirements, and the agronomic value was confirmed by the company ABX Tropical Flowers, in the city of Ceará-Mirim, Rio Grande do Norte, and at the rural school Tina de Carvalho/ Foundation José Carvalho, in Entre Rios, Bahia (Costa Junior et al. 2016). The evaluated aspects were based on a list of 30 quantitative and qualitative morphological descriptors developed for DHS testing by the Brazilian Ministry of Agriculture, Livestock and Supply (MAPA).

PERFORMANCE

The duration of the phenological stages between planting and flowering (Table 1) are fundamental for the planning and cultivation of ornamental pineapple cultivars.

Cultivar BRS Anauê has a medium height (between 54 and 67 cm), semi-upright growth habit, short leaves (46 to 63 cm long), without anthocyanin variegation, greenish-yellow color, no spines, peduncle length of 37 to 45 cm, reddish syncarp (compound fruit), two-colored crown (green on the edges and red in the center) and balanced crown/syncarp ratios (ratios close to 1, for both length and diameter). The plant produces abundant tillers and is resistant to pineapple fusariosis.

Table 1. Duration of phenological stages (days) between planting and flowering of the cultivars BRS Anauê and BRS Boyrá after floral induction

Physiological stages	BRS Anauê		BRS Boyrá	
	1st Cycle	2nd Cycle	1st Cycle	2nd Cycle
Induction/bud emergence	29.35 ± 1.14	26.72 ± 2.02	40.80 ± 3.08	40.20 ± 2.45
Induction/first flower	51.65 ± 2.76	50.60 ± 1.08	51.16 ± 0.42	48.32 ± 0.33
Planting/bud emergence	469.38 ± 1.12	361.72 ± 1.02	480.80 ± 3.05	420.18 ± 3.21
Bud emergence/last flower	40.75 ± 1.89	40.40 ± 2.12	28.80 ± 3.02	27.30 ± 2.40
First flower/last flower	18.45 ± 2.95	16.52 ± 1.42	18.44 ± 0.12	18.19 ± 0.63
Induction/last flower	70.10 ± 0.41	67.12 ± 2.54	69.60 ± 0.39	68.97 ± 0.45
Planting/last flower	510.10 ± 0.41	402.12 ± 1.54	509.60 ± 4.31	447.48 ± 4.32



Figure 1. Ornamental pineapple cultivars BRS Anauê and BRS Boyrá developed by Embrapa Cassava and Tropical Fruits, Cruz das Almas, Bahia, Brazil. a) Cultivars BRS Anauê (left) and BRS Boyrá (right) in the field. b) Mini fruits of BRS Anauê (left) and BRS Boyrá (right). c-g) BRS Anauê in different forms and uses: cut flowers (c-e); cut foliage (f). (g-i) BRS Boyrá in different forms and uses: cut flowers (g-h) and cut foliage (i).

On the other hand, BRS Boyrá has a high stature (> 72 cm), upright growth habit, long leaves (> 71 cm), purplish-gray to green leaves, no spines, a peduncle longer than 36 cm, syncarp, reddish-gray crown and balanced crown/syncarp ratios. The plant also produces abundant tillers, but is moderately susceptible to pineapple fusariosis.

The main product of commercial interest of both cultivars is the floral cut stem. Each plant produces one floral stem per cultivation cycle, so the yield corresponds to the number of plants grown per hectare. BRS Anauê can be planted at a density of 80,000 plants ha⁻¹ and BRS Boyrá at 70,000 plants ha⁻¹.

These two cultivars differ from those currently available on the market, especially in terms of leaf, syncarp and crown colors. Both cultivars are mainly intended for cut flower production, but are also excellent for landscaping, as potted plants or for ornamental mini fruit production (Figure 1). The main characteristics of the two cultivars were evaluated in two production cycles (Tables 2 and 3).

The recommendations for crop management of the two cultivars are described in the Embrapa Document Series 169, entitled “Produção de abacaxizeiro ornamental para flor de corte” (available only in Portuguese – “Production of ornamental pineapple plants as cut flower”). The recommended postharvest treatment is to wash the peduncle and crown to remove trichomes, without affecting the syncarp. After this washing, the stem color and quality appear more clearly. The post-harvest durability of the stem is good (~ 15 days).

Table 2. Quantitative morphological traits of the cultivars BRS Anauê and BRS Boyrá

Variables	BRS Anauê		BRS Boyrá	
	1st Cycle	2nd Cycle	1st Cycle	2nd Cycle
Plant height (cm)	60.75 ± 6.44	62.65 ± 5.09	87.11 ± 14.22	93.84 ± 7.49
Leaf length (cm)	53.10 ± 6.50	59.10 ± 4.58	80.99 ± 9.61	79.54 ± 6.28
Leaf width (cm)	3.57 ± 0.20	3.58 ± 0.39	3.99 ± 0.67	4.72 ± 0.32
Peduncle length (cm)	40.20 ± 2.87	42.00 ± 3.41	40.45 ± 4.11	46.28 ± 5.33
Peduncle diameter (cm)	0.90 ± 0.10	0.91 ± 0.08	1.25 ± 0.13	1.62 ± 0.17
Syncarp length (cm)	3.91 ± 0.57	3.98 ± 0.24	5.05 ± 0.65	5.72 ± 0.67
Syncarp diameter (cm)	3.82 ± 0.57	3.74 ± 0.24	3.99 ± 0.46	4.37 ± 0.20
Crown length (cm)	3.39 ± 0.51	3.14 ± 0.45	4.27 ± 0.55	5.07 ± 0.60
Crown diameter (cm)	3.56 ± 0.47	3.79 ± 0.38	3.83 ± 0.27	4.40 ± 0.48

Table 3. Quantitative morphological traits of the cultivars BRS Anauê and BRS Boyrá

Descriptors ¹	BRS Anauê	BRS Boyrá
Growth habit	Semi-upright	Upright
Leaf variegation	Absent	Present
Distribution of variegation	-	Marginal
Main color of the upper leaf surface	Greenish-yellow	Purplish-gray
Leaf anthocyanin pigmentation	Absent	Present
Spines on leaves	Absent	Absent
Undulating leaf edges	Absent	Absent
Peduncle form	Upright	Upright
External color of syncarp skin	Red	Reddish-gray
Syncarp shape	Cylindrical	Cylindrical
Fruitlet bract tip shape	Sharp	Sharp
Bract overlap over fruitlets	Total	Total
Color of fruitlet bracts	Red	Reddish-gray
Bracts at crown base	Present	Absent
Color of crown base bracts in relation to crown	Different	-
Color of crown bracts	Red	Reddish-gray
Crown/syncarp length ratio	Low	Low
Crown/syncarp diameter ratio	Low	Low
Number of crown colors	Two	One
Shape of crown leaf tip	Moderately sharp	Very sharp
Fusariosis reaction	Resistant	Mod. susceptible

Descriptors used in distinguishability, homogeneity and stability (DHS) tests of cultivars, according to the Brazilian Ministry of Agriculture, Livestock and Supply (MAPA).

SEED PRODUCTION

Both cultivars were registered (no. 35771 -BRS Anauê and no. 35772 -BRS Boyrá) by the Brazilian Ministry of Agriculture, Livestock and Supply, and with intellectual property protection numbers 20170217 (BRS Anauê) and 20170218 (BRS Boyrá). The parent plants of both cultivars are maintained in a greenhouse and also *in vitro*, under the responsibility of Embrapa Cassava and Fruits. The Secretariat of Innovation and Business of Embrapa (Secretaria de Inovação e Negócios da Embrapa) produces licensed seed of both cultivars.

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