CROP BREEDING AND APPLIED BIOTECHNOLOGY

CULTIVAR RELEASE

UC10: a new early Formosa papaya cultivar

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Crop Breeding and Applied Biotechnology
19: 131-134, 2019
Brazilian Society of Plant Breeding.
Printed in Brazil
http://dx.doi.org/10.1590/1984-70332019v19n1c18

Abstract: *UC10 is a new papaya cultivar, recommended to the southeast and northern regions of Brazil. It has a very good agronomic performance in and adaptation to these regions, with Formosa fruits of approximately 1.9 kg and yield of 260 t ha^{-1}. The cultivar has early fruit production, and fruits have excellent flavor.*

Keywords: *Carica papaya L., plant breeding, hybrid, early production.*

INTRODUCTION

Brazil stands out as one of the world's leading papaya (*Carica papaya* L.) producers, being India the first. In 2014, the Brazilian production of papaya was 1.60 million tons, corresponding to 12.7% of the world's papaya production, generating a total of U$$ 38.8 million (FAOSTAT 2017).

In that year, the largest Brazilian producers were the states of Bahia (368.875 tons) and Espírito Santo (311.150 tons). Together, they accounted for 65% of the Brazilian production, followed by the states of Ceará (115.525 tons), Rio Grande do Norte (86.342 tons), and Minas Gerais (43.556 tons) (IBGE 2019).

Despite the importance of papaya for the Brazilian agribusiness, all domestic production is concentrated primarily in the cultivation of four cultivars: 'Golden' and 'Sunrise Solo', from the Solo group, with small-fruit type (mean of 0.5 kg); and the hybrids 'Tainung 01' and 'Calimosa', from the Formosa group, with higher yield when compared with the varieties (Pereira et al. 2015).

The continued growth of papaya crop depends, among other factors, on the availability of new cultivars that are productive in and adapted to a wide range of growing environments and specific cultivars for each segment of the national and international market.

This paper aimed to describe the main traits of the new papaya cultivar indicated to the southeast and northern regions of Brazil in order to increase its use and make it known to the scientific community.

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Received: 18 April 2017
Accepted: 06 December 2017

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PEDIGREE AND BREEDING METHODOLOGY

Cultivar UC10 was obtained from a biparental cross between the genotypes UCJS-12 (originally from CNPMFT) and UCSekati (originally from Malaysia) of the Formosa group (Cardoso et al. 2014). The genotypes used as parents were selected by the pedigree method (Figure 1) and belong to the germplasm bank of the papaya breeding program UENF/Caliman (Pereira et al. 2015). The cross was carried out at Caliman Agrícola S/A, in Linhares, state of Espírito Santo (lat 19º 23' 28" S, long 40º 04' 20" W, and alt 33 m asl).

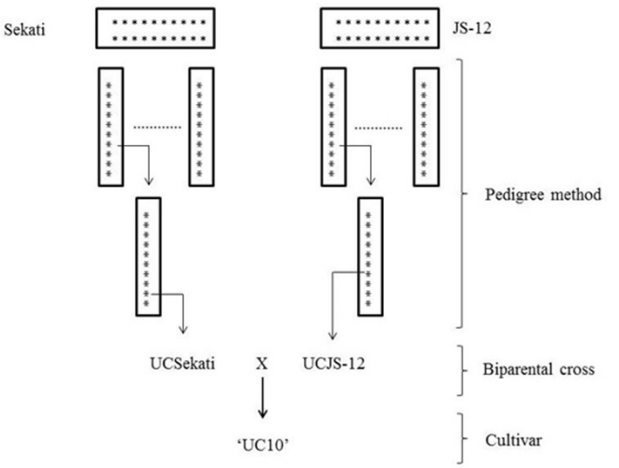

Figure 1. Pedigree of 'UC10' early papaya cultivar.

Cultivar UC10 was evaluated in two environments, Linhares (ES) and Pureza (RN), for two years (2012-2013). The experiment consisted of a completely randomized block design, with four replications and ten plants per plot, spaced at 3.6 m x 1.5 m (5.4 m^2) apart. Field data were collected during the harvest performed at 270, 360, 450, and 540 days after planting in each location. The following variables were measured: fruit length - FL (mm); fruit diameter - FD (mm); fruit weight - FW (kg); total soluble solids - TSS (°Brix); fruitless leaf axils - FLLA; Number of deformed fruits - NDF; Number of commercial fruits - NCF; Fruit yield - Yield (t ha^{-1}). Fruit yield was calculated by summing the number of commercial fruits in each season and environment, multiplying the result by the mean fruit weight in every season and environment, and converting to tons per hectare.

After data collection, fruits were subject to normality test (Kolmogorov-Smirnov) (Cruz et al. 2013) to check the consistency of the data to be evaluated by the analysis of variance in each season and cultivation environment. After the analysis per environment, the data were subject to the homogeneity test F max, described by Ramalho et al. (2012), to compare the variance of the residuals. The analysis of variance and mean comparison of each trait was carried out using the SAS® University Edition.

PERFORMANCE

UC10 cultivar participated in the Value of Cultivation and Use trials - VCU from 2012 to 2013, being compared with 'Tainung 01', a reference cultivar (control). In these tests, the mean yield of 'UC10' was 260.01 t ha^{-1}, and the mean yield of 'Tainung 01' was 185.75 t ha^{-1} (Table 1). When comparing the two cultivars, the relative yield of 'UC10' was 40% higher than the mean yield of 'Tainung 01'.

'UC10' reached higher sensory acceptance than 'Tainung 01', presenting higher means for the trait's aroma, flavor, texture, global impression, internal appearance, and external appearance. The purchase intention attributed by consumers of 'UC10' was higher than that of 'Tainung 01'. The consumers attributed top scores to this cultivar for the categories purchase intent during the tasting and purchase intent in relation to fruit internal and external appearance (Table 2).

The observation of the frequency distribution of the score related to sensory variables is interpreted in terms of the acceptance area (score ≥ 6) and rejection area (score ≤ 5) (Berilli et al. 2011, Viana et al. 2012). Despite presenting some traits outside the acceptance area, 'UC10' is situated within the acceptance range regarding the proper sensory

Table 1. Performance of 'UC10' and 'Tainung 01' papaya cultivars in four cropping seasons, in Pureza, RN, and Linhares, ES, Brazil

Cultivar	Pureza (RN)				Linhares (ES)				Average
	TSS[1]	NCF[2]	FW[3]	Yield[4]	TSS	NCF	FW	Yield	Yield
'UC10'	-	80.5	1.952	292.39	9.8	61.12	1.919	227.64	260.01
'Tainung 01'	-	62.9	1.507	174.60	9.0	63.12	1.600	196.91	185.75

[1] TSS: total soluble solids content (°Brix); [2] NCF: number of commercial fruits; [3] FW: fruit weight (kg); [4] Yield (t ha^{-1}).

Table 2. Mean sensory acceptance and purchase intention of 'UC10' and 'Tainung 01' cultivars, attributed by consumers in 2014, Campos dos Goytacazes, RJ, Brazil

Cultivar	Acceptance						Purchase intent		
	Aroma	Flavor	Texture	GI[1]	EA[2]	IA[3]	PI1[4]	PI2[5]	PI3[6]
'UC10'	6.24	6.99	7.08	6.76	6.20	7.16	4.04	3.36	3.92
'Tainung 01'	5.24	4.62	4.78	4.88	5.80	4.48	2.34	3.12	2.22

[1] GI: global impression; [2] EA: external appearance; [3] IA: internal appearance; [4] PI1: purchase intent evaluated during the tasting; [5] PI2: purchase intent in relation to the external appearance; [6] PI3: purchase intent in relation to the internal appearance.

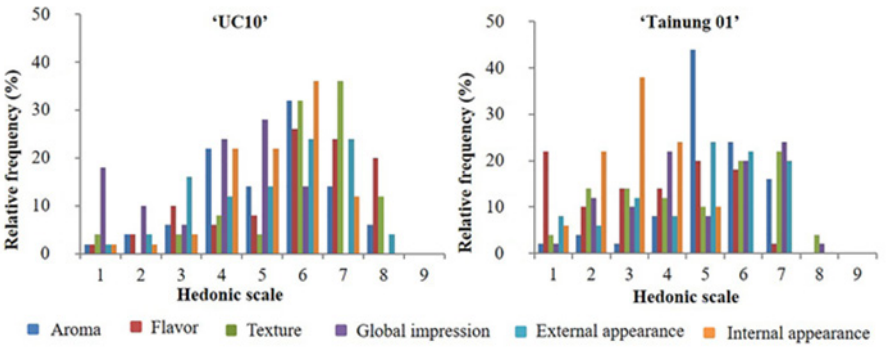

Figure 2. Frequency distribution of responses of consumers (n=50), in %, for acceptance of the sensory traits for the 'UC10' and 'Tainung 01' cultivars on a 9-point hedonic scale (1: dislike extremely; 2: dislike very much; 3: dislike moderately; 4: dislike slightly; 5: neither liked nor disliked; 6: like slightly; 7: like moderately; 8: liked very much; 9: liked extremely).

traits, such as taste, flavor, and global impression. 'Tainung 01' had most of the scores related to taste located in the rejection area, which did not occur with 'UC10' (Figure 2).

OTHER CHARACTERISTICS

'UC10' is an early fruit–production cultivar, with oblong, large fruits (mean of 1.9 kg), and long petioles (about 5 cm). The fruit presents dark green color when immature and light-yellow color when ripe, with slightly red pulp, and mean thickness of 3.5 cm (measured from the fruit peel to the central cavity), and small central cavity. The plant has reduced size, reaching up to 2.5 m of plant height and 0.5 m of insertion of the first fruits.

SEED PRODUCTION AND DISTRIBUTION

'UC10' was registered by the Ministry of Agriculture, Livestock and Supply - MAPA in 2014, under the registration number 32358. The seeds of this cultivar are produced in the seed production area of Caliman Agrícola S/A Company. The company is responsible for the production of hybrid seeds. Feltrin Seeds Company is responsible for seeds commercialization and distribution.

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