CROP BREEDING AND APPLIED BIOTECHNOLOGY

CULTIVAR RELEASE

IAC Obatã 4739 – dwarf arabic coffee cultivar with yellow fruits and resistant to leaf rust

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Crop Breeding and Applied Biotechnology
18: 330-333, 2018
Brazilian Society of Plant Breeding.
Printed in Brazil
http://dx.doi.org/10.1590/1984-70332018v18n3c49

Abstract: *Cultivar IAC Obatã 4739 was derived from a cross between coffee tree IAC 1669-20-1 and cultivar Catuaí Amarelo IAC 62. It is short and high-yielding, rust-resistant, has large and yellow fruits, medium to late maturation, excellent cup quality, and responds effectively to irrigation.*

Key words*: Coffea arabica, cup quality, Hemileia vastatrix.*

INTRODUCTION

Production cost is one of the most decisive factors for the competitiveness of Brazilian coffee. The magnitude varies according to the cultivation region, level of technological practices and crop management, but particularly the cultivars, which are largely susceptible to coffee rust, caused by the fungus *Hemileia vastatrix*, the main coffee disease in Brazil.

The development of rust-resistant cultivars is one of the most urgent targets of coffee breeding programs, since the genetic diversity related to the pathogenicity observed in *Hemileia vastatrix* species on coffee trees in Brazil is very high.

Cultivar IAC Obatã 4739, selected by the Agronomic Institute of Campinas (IAC), is a new option for coffee producers. Its fruits are large and yellow, the trees very productive and resistant to several fungus races occurring in Brazil, mainly the races I, II, III, X, XV, XVII, XXIII, and XXIV that infect *Coffea arabica*, as well as race XXII, isolated from coffee progenies of Híbrido de Timor CIFC 832/2. Other morphological, technological and agronomic characteristics of this cultivar are described below.

BREEDING PROCESS

Cultivar IAC Obatã 4739 was derived in 1983 from a natural cross between the coffee tree IAC 1669-20-1 C 16B, in the F_1RC_1 generation and cultivar Catuaí Amarelo IAC 62, both participants in the progeny test EP 289, established in Garça, SP (Fazuoli et al. 2007).

The experiment was installed with the planting of two seedlings per pit, labelled A and B. Seeds of red-colored fruits of plant B of pit 16, of the coffee tree IAC 1669-20-1, harvested in 1984, were sown and the seedlings grown for planting in a field experiment with the F_1RC_2 generation, in the same year. Seeds of coffee trees of this generation, planted in Garça, SP, with orange fruits, were

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Received: 18 July 2017
Accepted: 22 January 2018

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used to establish seedlings for planting of the F_2RC_2 generation in two municipalities of the state of São Paulo (Garça and Ribeirão Corrente). In these different experiments, the best coffee trees were selected and plants with yellow fruits and similar agronomic characteristics to those of red-fruit cultivar Obatã IAC 1669-20 were selected. The generations of the yellow-fruit trees of IAC 1669-20-1 were advanced at an experimental station of the Instituto Agronômico de Campinas (IAC), in Mococa, SP, at the Polo Regional Nordeste Paulista - APTA, on the farm Fazenda da Mata, in Garça, SP, on the farms Monte Alegre and Água Limpa, in Ribeirão Corrente, SP, and on the Fazenda Capoerinha, in Alfenas, Minas Gerais (MG). At the IAC Experimental Center in Campinas, selection was initiated in 2001, with coffee trees of the F_5RC_2 generation. Thus, several generations were subjected to selection, using the genealogical method. The population of selected yellow-fruit coffee trees in the F_7RC_2 generation with rust resistance was designated IAC Obatã 4739 (Figure 1).

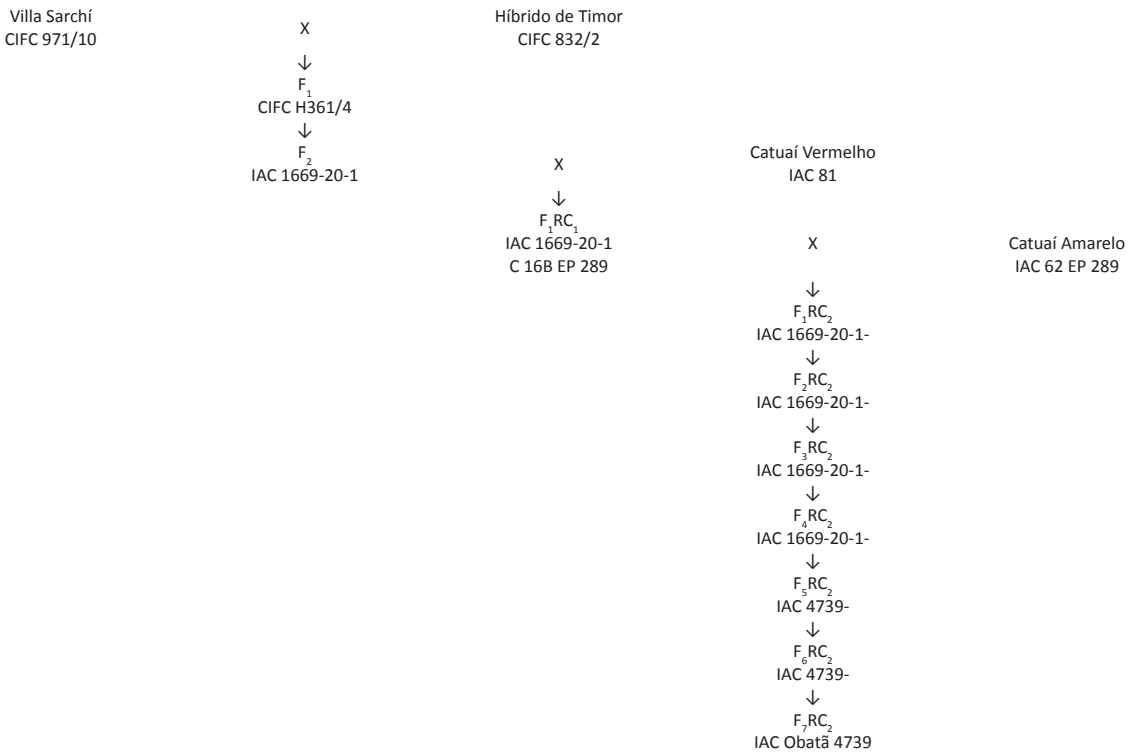

Figure 1. Genealogy of the *Coffea arabica* cultivar IAC Obatã 4739.

PERFORMANCE

Cultivar IAC Obatã 4739 was evaluated in rainfed and irrigated field experiments, in regions suited for *C. arabica* cultivation in the states of São Paulo and Minas Gerais. The results related to the mean yield of the cultivar in bags of green coffee ha^{-1} $year^{-1}$ are listed in Table 1. Differences were observed in growth and yield of the trees of cultivar IAC Obatã 4739, between rainfed and irrigated management of the cultivars used as controls.

In the irrigated area, in Gália, SP, the mean yield of five harvests of cultivar IAC Obatã 4739 was 83.2 bags of green coffee ha^{-1} $year^{-1}$, while the experimental control cultivar Catuaí Amarelo IAC 62 produced 59.4 bags of green coffee ha^{-1} $year^{-1}$.

In rainfed areas, the mean yield of cultivar IAC Obatã 4739 ranged from 28.7 to 60 bags of green coffee ha^{-1} $year^{-1}$, while the means of Catuaí Vermelho IAC 24, Catuaí Vermelho IAC 99, Catuaí Amarelo IAC 17, and Catuaí Amarelo IAC 62, used as control in eight experiments, ranged from 32.0 to 40.0 bags of green coffee ha^{-1} $year^{-1}$.

Based on the experimental results, cultivar IAC Obatã 4739 is recommended for planting in areas suited for arabica coffee cultivation, mainly in areas without severe drought. The cultivar should preferably be planted in irrigated areas.

OTHER TRAITS

The yellow fruits of cultivar IAC Obatã 4739 are a consequence of the homozygotic expression of the allele *xc* (*xanthocarpa*) (Krug and Carvalho 1940), representing the main difference in relation to red-fruit cultivar Obatã IAC 1669-20 (Bettencourt and Fazuoli 2008). The maturation of the fruits of cultivar IAC Obatã 4739 is medium to late and, in some regions, later than that of cultivar Catuaí Amarelo IAC 62. It has short compact plants, short internodes, broad and green leaves when young, and large fruits. The canopy height and diameter are similar to those of cultivar Catuaí Amarelo IAC 62. The percentage of normal flat beans is higher than 85% and the mean bean size around 17. The output, i.e., the relation of the green to dry coffee weight, is close to 50%.

The cultivar is resistant to the coffee rust races I, II, III, X, XV, XVII, XXII, XXIII, and XXIV, caused by *H. vastatrix*, susceptible to coffee-leaf miner *Leucoptera coffeella*, coffee berry borer *Hypothenemus hampei* and brown-eye spot disease *Cercospora coffeicola*. Resistance to coffee rust allows cultivation without fungicide application and may have a reducing impact on crop production costs and the risk of environmental pollution.

Sensory analyses carried out in 2015 and 2016 in Patrocínio, MG, using the SCAA protocol (Lingle 2001), revealed the excellent cup quality of this cultivar, similar to that of the red-fruit cultivar Obatã IAC 1669-20 and of cultivar Catuaí Amarelo IAC 17, both used as experimental controls in the tests (Table 2).

The participation of cultivar Bourbon in the development of cultivar IAC Obatã 4739 is estimated at around 68.8%. Its other morphological, technological and agronomic characteristics are listed in Table 3.

SEED MAINTENANCE AND DISTRIBUTION

Cultivar IAC Obatã 4739 was registered by the IAC in the National Cultivar Registry (Registro Nacional de Cultivares - RNC) on 12/18/2012 (Register No. 30009) and protected by the National Cultivar Protection Service (Serviço Nacional de Proteção de Cultivares - SNPC) on November 7, 2014 (Certificate No. 20150080). During the

Table 1. Mean yield of bags of green coffee ha^{-1} year^{-1} of cultivar IAC Obatã 4739, under irrigated and rainfed conditions.

Location	Harvest	Cultivar	
		IAC Obatã 4739	Control
Irrigated			
Gália, SP	5	83.2	59.4[1]
Rainfed			
Garça, SP	3	28.7	32.0[1]
Mococa, SP	8	33.8	32.3[2]
Mococa, SP	2	49.7	35.2[1]
Garça, SP	6	37.5	36.4[1]
Campinas, SP	3	60.0	38.8[1]
Ribeirão Corrente, SP	4	45.0	40.0[1]
Franca, SP	7	50.1	36.5[3]
Patrocínio, MG	4	55.8	32.1[4]

[1] Cultivar Catuaí Amarelo IAC 62; [2] Cultivar Catuaí Vermelho IAC 24; [3] Cultivar Catuaí Vermelho IAC 99; [4] Cultivar Catuaí Amarelo IAC 17

Table 2. Overall quality, in scores, according to the cupping protocol of the Specialty Coffee Association of America (SCAA), acidity, body and flavor-taste properties of the cup quality of the cultivars IAC Obatã 4739, Obatã IAC 1669-20, and Catuaí Amarelo IAC 17

Trait	Harvest	IAC Obatã 4739	Obatã IAC 1669-20	Catuaí Amarelo IAC 17
Overall quality (scores)	2015	82.5	81.5	82.5
	2016	83.0	83.0	85.0
Acidity	2015	Medium	High	High
	2016	Medium	Medium	Medium
Body	2015	High	Medium	Medium
	2016	Medium	Medium	High
Flavor-taste properties	2015	Nuts, stone fruit, chocolate, caramel	Chestnut, stone fruit, caramel, chocolate	Nuts, stone fruit, chocolate, caramel
	2016	Nuts, dry fruit, chocolate, caramel	Nuts, citrus fruit, chocolate, caramel	Floral, chestnut, stone fruit, chocolate, caramel, sweet, silky, creamy

Table 3. Morphological, technological and agronomic traits of cultivar IAC Obatã 4739 with the respective descriptions

Trait	Description[1]
Size (tree height)	Small (Catuaí)
Canopy radius	Small (Catuaí)
Canopy architecture	Cylindrical (Catuaí)
Internode length	Short (Catuaí)
Intensity plagiotropic branching	Between medium (Mundo Novo) and high (Catuaí)
Young leaf color	Green (Catuaí)
Leaf length	Long (Obatã IAC 1669-20)
Leaf width	Large (Obatã IAC 1669-20)
Leaf shape	Oval
Undulation of the leaf margin	Medium wavy (Mundo Novo)
Color of ripe fruits	Yellow
Fruit shape	Oblong (Mundo Novo)
Fruit size	Between medium (Mundo Novo) and large (Acaiá)
Grain length	Between medium (Mundo Novo) and long (Acaiá)
Grain width	Between medium (Mundo Novo') and large (Catuaí)
Maturation	Medium to late
Resistance to rust[2]	Resistant
Resistance to nematodes	Susceptible
Reaction to brown eye spot[3]	Susceptible
Cup quality	Similar to Catuaí Amarelo and Obatã IAC 1669-20

[1] Catuaí, Mundo Novo, Obatã IAC 1669-20 and Acaiá are Brazilian cultivars of *Coffea arabica*; [2] *Hemileia vastatrix Berkeley* & Broome; [3] *Cercospora coffeicola Berkeley* & Cooke.

experimental phase, cultivar IAC Obatã 4739 was designated Obatã Amarelo IAC 4739, the name that appears in the documents of cultivar protection. The IAC and APTA Polo Regional Nordeste Paulista are responsible for the production and distribution of genetic seeds.

ACKNOWLEDGEMENTS

The authors are grateful to the Consórcio Brasileiro de Pesquisa e Desenvolvimento do Café (CBP&D/Café) for financial support and a research scholarship to LCF and MTB, and indebted to the National Council for Scientific and Technological Development (CNPq) for a research scholarship to OGF (CNPq DT 308.634/2016-0).

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