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CULTIVAR RELEASE

IPR 99 - Dwarf arabica coffee cultivar resistant to coffee ringspot virus

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Abstract – *'IPR 99' was derived from a cross between "Villa Sarchi 971/10" and "Hibrido de Timor 832/2". It is a dwarf cultivar, resistant to coffee ringspot virus, partially resistant to leaf rust with semi-late ripening. 'IPR 99' presents partial resistance to necrosis and mummification of young fruits on field conditions. It presents special cup quality and high yield in lower and higher temperature coffee regions in Paraná State.*

Key words: *Coffee leaf rust,* Coffea arabica*, crop breeding.*

INTRODUCTION

The coffee breeding program of the Agricultural Research Institute of Paraná (Instituto Agronômico do Paraná – IAPAR), in the State of Paraná, Brazil, has been active since 1973. The development of 'IPR 99' aimed at high yield per hectare, lower cost per bag, improved quality and better yield stability (Sera 2001).

'IPR 99', released in 2005, is a dwarf cultivar, resistant to coffee ringspot virus and partial resistance to leaf rust (*Hemileia vastatrix* Berk. et Br.) (Sera et al. 2010a) and presents semi-late ripening. Also presents on field conditions partial resistance to necrosis and mummification of young fruits. This cultivar is recommended for semi-dense, dense and super dense planting systems in lower and higher temperature areas with annual average between 19 and 22 ºC in the State of Paraná.

PEDIGREE AND IMPROVEMENT METHOD

IPR 99 was developed using the genealogical method. It was derived from a cross between "Villa Sarchi CIFC 971/10" (*Coffea arabica* L.) and "Hibrido de Timor CIFC 832/2" (interspecific hybrid between *C. arabica* and *C. canephora*), performed at the Coffee Rusts Research Center (Centro de Investigação das Ferrugens do Cafeeiro - CIFC), in Portugal, where it was named HW 361. The F_2 generation (HW 361-4) was received by the Instituto Agronômico de Campinas (IAC) and named C1816. In 1977, IAPAR introduced the F3 generation (C1816 - EP141 c.1567), named PR 77028. The F4 progeny PR LF 77028 was then selected. Individual plants were selected and advanced to F_5 generation, later named 'IPR 99', and released in 2005. Some progenies presenting higher percentage of plants with complete resistance to leaf rust were selected. These progenies were advanced to F_6 generation in 2009.

PERFORMANCE

'IPR 99' can be cultivated in regions with annual average temperature between 19 and 21 ºC such as Londrina (580 m altitude) and Congonhinhas (750 m altitude) municipalities, and in hot regions with 22 ºC annual average temperature, such as Itaguajé (350 m altitude) municipalities. The 'IPR 99' was evaluated in three locations of Paraná State, with 16 harvests, and it was more productive than 'IAPAR 59' and 'Catuaí Vermelho IAC 81' (Table 1).

IPR 99 is recommended for spacing between plants varying from 0.50 to 0.75m, depending on the local of cultivation and on the technologies used, such as fertilization, irrigation and pruning. In hot regions without irrigation, the spacing is narrower, since the canopy volume is usually smaller. Yield per plant could possibly increase

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Table 1. Annual average yield per hectare (bags of 60 kg ha^{-1}) of the 'IPR 99' in comparison with other cultivars (Paraná state, Brazil)

Cultivar[1]	Yield[2]	%[3]
IPR 99 (semi-late ripening)	56.07	108.20
Catuaí Vermelho IAC 81 (late ripening)	49.35 (51.82)	100.00
IAPAR 59 (semi-early ripening)	43.14 (45.30)	87.42

[1] With chemical control for coffee leaf rust.
[2] Mean of three locations of Paraná State with 16 harvests (spacing 2.75 x 0.60m).
[3] Relation between the mean yield of 'IPR 99' and 'Catuaí Vermelho IAC 81'.

by using wider spacing between plants; hence, it might be necessary more nutrition. The spacing between rows in mechanized intensive crop system can vary from 2.50 to 3.00 m according to the coffee crop area and the level of mechanization.

OTHER TRAITS

'IPR 99' presents semi-late ripening, which occurs before 'Catuaí'. At lower temperatures, with annual average between 19 and 20 ºC, the ripening occurs usually in July. At higher temperatures, with annual average between 21 and 22 ºC, the ripening occurs usually in May or June. In cool regions, 'IPR 99' must be planted in areas with reduced frost risk, since the fruit ripening is semi-late.

'IPR 99' can be used in association with other dwarf coffee cultivars with different ripening times (e.g. 'IAPAR 59' = semi-early, 'IPR 98' = medium, 'Catuaí' = late) in order to reduce the labor, infrastructure and equipment requirements. By using 'IPR 99' with other maturation cultivar groups for harvest in different times, the rain risk at harvest is reduced and it is easier and cheaper to produce quality coffee in the rainy and cool coffee regions of Paraná State.

The secondary plagiotropic branching of 'IPR 99' is lower than 'Catuaí' and higher than 'Mundo Novo'. 'IPR 99' has large and yellow fruits when ripe. The cup quality is equal or superior to cultivars of Mundo Novo germplasm. Coffee ringspot virus (= mancha anular) is a viral disease transmitted by the mite *Brevipalpus phoenicis* (Chagas 1973, 1988) that provokes severe damages in hot and drought regions. It was observed at field conditions that 'IPR 99' presents resistance.

Some progenies of 'IPR 99' present complete resistance to rust (Sera et al. 2010b), but probably this resistance will be defeated by new rust races in a short time. The resistance to leaf rust is partial in many progenies (Sera et al. 2010a) and it may require chemical control, but with a lower number of fungicide applications in comparison with susceptible cultivars.

'IPR 99' presents a good level of partial resistance (moderate resistance) to the symptoms of necrosis and mummification of fruits (Sera et al. 2005). These symptoms are being associated with the attack of *Colletotrichum* spp. or *Colletotrichum gloeosporioides* Penz (Juliatti and Silva 2001, Paradela-Filho et al. 2001). These and others traits are described in Table 2.

Table 2. Morphological, physiological and agronomic traits of the 'IPR 99' with the respective descriptions

Traits	**Descriptions**
Size (tree height)	Small (= 'IAPAR 59')
Canopy radius	Between small (='IAPAR 59') and medium (="Catuaí")
Canopy architecture	Cylindric (="Catuaí")
Internode lenght	Between short ('IAPAR 59') and medium ("Catuaí")
Secondary plagiotropic branching	Between medium ("Mundo Novo") and high ("Catuaí")
Young leaf colour	Green
Leaf size	Between medium and large (larger than "Mundo Novo")
Undulation of the leaf margin	Medium wavy ("Mundo Novo")
Colour of ripe fruits	Yellow
Fruit shape	Oblong ("Mundo Novo")
Fruit size	Between medium ("Mundo Novo") and large ("Acaiá")
Grain lenght	Between medium ("Mundo Novo") and long ("Acaiá")
Grain width	Between narrow ("Mundo Novo") and medium ("Acaiá")
Ripening cycle	Semi-late (between "Mundo Novo" and "Catuaí")
Resistance to rust	Partial resistance
Resistance to nematodes	Still not identified
Reaction to Brown Eye Spot (*Cercospora coffeicola*)	Susceptible
Cup quality	Similar or superior to "Mundo Novo"

SEED MAINTENANCE AND DISTRIBUTION

'IPR 99' is registered by the National Cultivar Registry (Registro Nacional de Cultivares - RNC) of the Ministry of Agriculture, Livestock and Supply (Ministério da Agricultura Pecuária e Abastecimento – MAPA) under the number 09949, in Brazil. IAPAR is in charge of genetic and basic seeds, and private seed producers who are registered in MAPA are responsible for certified seeds.

IPR 99 - Cultivar de café arábica de porte compacto resistente à mancha anular

Resumo – *'IPR 99' foi derivada do cruzamento entre "Villa Sarchi 971/10" e "Hibrido de Timor 832/2". 'IPR 99' é uma cultivar de porte baixo, resistente à mancha anular, parcialmente resistente à ferrugem, com maturação dos frutos semi-tardia. Em condições de campo, 'IPR 99' apresenta resistência parcial à necrose e mumificação de frutos jovens. Possui qualidade de bebida especial e alta produtividade nas regiões cafeeiras mais frias e mais quentes do Paraná.*

Palavras-chave: Coffea arabica*, ferrugem, melhoramento genético.*

REFERENCES

Chagas CM (1973) Associação do ácaro *Brevipalpus phoenicis* (Geijskes) à mancha anular do cafeeiro. **O Biológico 39**: 229-232.

Chagas CM (1988) Viroses, ou doenças semelhantes transmitidas por ácaros tenuipalpídeos: mancha anular do cafeeiro e leprose dos citros. **Fitopatologia Brasileira 13**: 92.

Juliatti FC and Silva SA (2001) Antracnose: *Colletotrichum gloesporioides* Penz e outras espécies. In Juliatti FC and Silva SA (eds.) **Manejo integrado de doenças na cafeicultura do cerrado**. Editora UFU, Uberlândia, p. 37-50.

Paradela-Filho O, Paradela AL, Thomaziello RA, Ribeiro IJA, Sugimori MH and Fazuoli LC (2001) O complexo *Colletotrichum* do cafeeiro. IAC, Campinas, 11p. (Boletim Técnico n. 191).

Sera T (2001) Coffee genetic breeding at IAPAR. **Crop Breeding and Applied Biotechnology 1:** 179-199.

Sera GH, Sera T, Ito DS, Doi DS, Ribeiro-Filho C, Mata JS and Azevedo JA (2005) Avaliação de cultivares de café arábica para resistência de campo a antracnose (*Colletotrichum gloeosporioides*) em região quente do Paraná. **SBPN Scientific Journal 9:** 26-27.

Sera GH, Sera T, Fonseca ICB and Ito DS (2010a) Resistência à ferrugem alaranjada em cultivares de café. **Coffee Science 5**: 59-66.

Sera GH, Sera T, Ito DS, Fonseca ICB, Kanayama FS, Del Grossi L and Shigueoka LH (2010b) Seleção para a resistência à ferrugem em progênies das cultivares de café IPR 99 e IPR 107. **Bragantia 69**: 547-554.