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BRSMG Predileta: irrigated rice cultivar for lowlands in Minas Gerais, Brazil

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ABSTRACT - *The cultivar of irrigated rice BRSMG Predileta has high grain yield, resistance to the main rice diseases and produces good quality grains for industry and cooking. It was recommended in 2007 by the Genetic Improvement Program for lowland rice in Minas Gerais, developed by EPAMIG in partnership with Embrapa Arroz e Feijão.*

Key words: Oryza sativa, genetic improvement, variety.

INTRODUCTION

The rice of wetlands and of flood-irrigated areas together accounted for 57% of the total production in the state of Minas Gerais (MG) in the harvest of 2006. The remainder (43%) was produced in upland fields (IBGE 2006). The in-state rice production supplies no more than about 20% of the total consumption of the population in MG per year. Despite the favorable market conditions for expansion of rice production in the state, the total rice area has decreased in the last years and the crop has been replaced by soybean and corn, which are considered more profitable products with better market prospects, mainly for export. In this context, research with rice is a key to increase productivity, production and improve the quality of the final product.

The process of cultivar recommendation for commercial plantations is dynamic, that is, new varieties are periodically released to replace less productive and/or commercially less accepted cultivars. Along this line of action, the research consortium of the Agricultural Research Company of Minas Gerais (EPAMIG) and Embrapa Rice and Beans tests various lines and cultivars every year at different locations in Minas Gerais in a program of rice genetic improvement, aiming to offer specific options of cultivars to rice farmers, suitable for their wetland fields. As a recent contribution

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to these integrated studies, a new rice cultivar was made available to rice producers in MG in 2007, under the name BRSMG Predileta.

Genealogy and Breeding Method

BRSMG Predileta was derived from the triple cross CNAx4267, originated from artificial pollination of F1 plants of the simple cross Metica 1/WC56 with pollen of line CNA6080, at Embrapa Rice and Beans, in 1989 (Figure 1).

Individual plants were selected by the pedigree method in F_1 (1990-91), F_2 (1991-92), F_3 (1992-93) and in F_5 (1994-95), whereas in F_4 (1993-94) no selection was performed within lines, but each line was selected and harvested in bulk. In all these generations, the selection always aimed at an improved plant architecture (lower height, high tillering and upright leaves, with good insertion of the panicle), disease resistance and long thin grains.

In F_6 (1995-96), the line CNAx4267-4-4-B-4 was selected and registered in the active genebank of Embrapa Rice and Beans under code CNA8575 and was introduced in Minas Gerais in 1996/97 with this identification, into a network of observation trials of irrigated rice lines, which was then conducted cooperatively by several Brazilian institutions involved with rice improvement (Morais et al. 2006)

Considered promising in the preliminary yield trials, in Leopoldina and Lambari in 1997/98, the CNA8575 was included in tests to assess the value for Cultivation and Use (VCU) program for rice improvement, conducted by EPAMIG, in eight growing seasons (1998/99 to 2005/06). The results of these tests indicated the superior performance of the cultivar, resulting in the recommendation for cultivation under continuous flood irrigation in all regions of Minas Gerais, from 2007 onwards (EPAMIG 2007). In addition, the line was specifically tested for resistance to diseases and pests and was included in the program of seed purification and genetic seed production. The DUS tests (distinctness, uniformity and stability) were conducted on the Fazenda Palmital of Embrapa Rice and Beans, in the county of Goiania-GO.

Performance Traits

BRSMG Predileta was assessed in 16 VCU trials conducted in Minas Gerais, from 1998/1999 to 2005/2006. In each growing season, 25 genotypes were evaluated, including five control cultivars (BR IRGA - 409, Jequitibá, Rio Grande, Ourominas, Seleta). The tests were conducted on experimental farms of EPAMIG (in Janaúba, Lambari, Leopoldina and Prudente de Morais) on wetland fields under continuous flood irrigation, in a random block design, with 3 replications. Ecery year, after the final overall evaluations of all tests, the less promising lines were discarded and replaced by others selected in preliminary tests; the remaining ones were evaluated in the following growing season. The $9m^2$ plots contained 6 rows, 5 m long, spaced 0.3 m apart. The sowing density was 150 seeds m^{-1} and data were collected from the four central meters of the four internal rows, comprising an area of $4,8m^2$.

The following traits were evaluated: leaf color; pubescence; flag leaf angle; tillering; sterile lemmas color; apex color at maturity; presence of awns; natural grain loss; grain yield; plant height; cycle until flowering and until maturity; lodging; disease incidence; husked grain size; weight of 1000 grains; industrial yield; grain class; gelatinization temperature and amylose content. These assessments were based on the Handbook of Research Methods in Rice published by EMBRAPA Rice and Beans (EMBRAPA 1977).

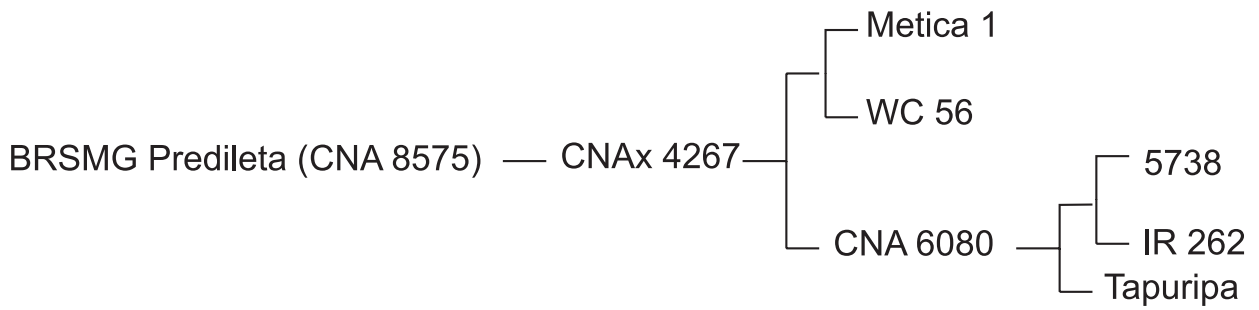

Figure 1. Pedigree of BRSMG Predileta

The main botanical, morphological and phonological traits evaluated of cultivar BRSMG Predileta are listed in Table 1. The cultivar belongs to the modern rice group, with upright leaves, high tillering, midsize and lodging resistance. The resistance to leaf blast and panicle blast as well as to leaf spot and grain spot is moderate. On the other hand it is susceptible to leaf scald. At maturity, the glumellae turn golden, and the apex brown or sometimes white, with the presence of awns of different sizes. The cycle until maturity lasts around 138 days. The results of analyses of some grain traits of BRSMG Predileta are shown in Table 2. The grains are long and thin ("agulhinha") as generally preferred by consumers and industry. The performance of this cultivar was excellent in processed grain yield (67%) and whole grain yield (60%). In the analysis of cooking quality of BRSMG Predileta grains, carried out in laboratories of EMBRAPA Rice and beans, high amylose levels (30%) and intermediate gelatinization temperatures (footnote 4), conferring a high cooking quality. The cooked grains are loose and soft.

The mean grain yield of BRSMG Predileta and control cultivars (Rio Grande, Jequitibá and IRGA BR-409) in 13 to 16 tests in Minas Gerais, over eight growing seasons (1998/1999 to 2005/06) are given in Table 3. The cultivar BRSMG Predileta, with a grain yield of 6,818kg ha^{-1} was statistically (p£0.05) similar to the cultivars Rio Grande and Jequitibá and exceeded IRGA BR-409.

Table 1. Botanical, morphological and phenological plant traits of cultivar BRSMG Predileta, as observed in 16 VCU trials

Plant traits	Description
Leaf color	Dark green
Leaf pubescence	medium pubescence
Flag leaf angle	upright
Tillering	high
Mean flowering – 50% panicles emerged	105 days
Cycle to maturity	135-140 days
Plant height	96 cm
Lodging	Resistant
Disease resistance to:	
Leaf blast	Moderately resistant
Panicle blast	Moderately resistant
Brown spot	Moderately resistant
Grain spot	Moderately resistant
Leaf scald	Suscpetible
Glumella color	Golden
Apex color at maturity	Brown and sometimes white
Presence of awns	Present (different sizes)
Natural grain loss	Intermediate

Production of foundation seed

Foundation seed of cultivar BRSMG Predileta is produced by the Empresa de Pesquisa Agropecuaria de Minas Gerais (EPAMIG).

Table 2. Grain traits of cultivar BRSMG Predileta in 16 VCU trials

Grain traits	Description
Husked grain length	7.45 mm
Husked grain width	2.12 mm
Length/width ratio	3.51
Weight of 1000 grains	25.9 g
Class	Long-thin
Processed grain yield	67%
Whole grain yield	60%
Amylose content	30%
Gelatinization temperature	Score 4

Table 3. Mean grain yield (kg ha^{-1}) of the new cultivar BRSMG Predileta and the controls

Cultivars	Grain yield (kg ha^{-1})								Weighted mean** (kg ha^{-1})	Yield increase over control cultivars
	1998/99 (2)*	1999/00 (3)	2000/01 (2)	2001/02 (2)	2002/03 (2)	2003/04 (2)	2004/05 (1)	2005/06 (2)		
BRSMG Predileta	7,574	6,010	7,842	7,589	6,217	5,927	6,854	6,950	6,818 a	-
Rio Grande	6,181	-	7,661	7,066	5,838	4,938	6,285	6,781	6,401 ab	6.12%
Jequitibá	5,626	5,770	7,000	6,302	5,701	5,151	5,935	6,922	6,040 ab	11.41%
BRIRGA-409	4,660	5,434	6,619	6,161	5,112	5,618	5,327	7,234	5,777 b	15.27%

* number of trials in each growing season.
** Means followed by the same letter are not significantly different by Duncan´s test at 5% probability.

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