

## CULTIVAR RELEASE

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### CD 123 - Wheat bread for white flour in cool regions of Brazil

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**Abstract** – *Cultivar CD 123 is recommendable for the wheat-growing regions 1, 2 and 3 of the States of Rio Grande do Sul, Santa Catarina and Paraná. It is a white flour wheat destined for production in cooler regions. The mean potential yield is 3514 kg ha<sup>-1</sup>, exceeding that of the control cultivars by 5%.*

**Key words:** wheat breeding, earliness, baking quality.

#### INTRODUCTION

Wheat is one of the most important crops for human consumption, as one of the three highest-yielding grain crops in the world. An increase in wheat yield has been sought through plant breeding, by means of adapted varieties and use of appropriate technologies for each growing region. The increase in grain yield associated with morphological changes in plants, mainly of the grain number and harvest index, has contributed to raise the productivity (Sayre et al. 1997).

Producers are generally interested in early-maturity cultivars, in order to anticipate wheat harvest and the sowing of the following crop. Cultivar CD 123 is launched on the market as early-maturity cultivar, as its parent cultivar CD 108, which is already available for cultivation in the hotter regions of Brazil (Franco et al. 2004).

#### BREEDING METHODS

Cultivar CD 123 was derived from the cross between the cultivars BRS 177 and CD 108, by Cooperativa Central de Pesquisa Agrícola (COODETEC), in 2000, in Palotina. The F<sub>1</sub> seeds were sown in November 2000, in a greenhouse in Cascavel, and at maturation the plants of each population were bulk harvested, originating the F<sub>2</sub> seeds. The F<sub>2</sub> seeds were sown in a greenhouse in March 2001 in Cascavel, and selected by the method of mass improvement. The F<sub>3</sub> seeds were sown in Guarapuava in July 2001 and selected

by the pedigree method. The seeds of the F<sub>4</sub> and F<sub>5</sub> generations were sown in Guarapuava in June, respectively, in 2002 and 2003, and selected by the pedigree method. The F<sub>6</sub> seeds were sown in Guarapuava in June 2004 and the plots with uniform plants were bulk-harvested, originating several sister lines. Cultivar CD 123, with the pedigree CC15210 CC15451-0T-5G-5G-1G-0G, was derived from the best of these lines.

#### PERFORMANCE CHARACTERISTICS

Cultivar CD 123 was evaluated in preliminary grain yield tests in 2005, in Cascavel and Palotina, with better performance than the controls. In 2006, it was integrated in the tests of VCU (Value for Cultivation and Use) at various locations and sowing times, in different States of Brazil, under the experimental name CD 0665, and maintained in these trials until 2010. The VCU tests were carried out in each wheat-growing region (Embrapa Trigo 2006), i.e., in Guarapuava, Castro, Campos Novos, Não-Me-Toque, Cruz Alta, Lagoa Vermelha, and Vacaria - Region 1; in Cascavel, Campo Mourão, Abelardo Luz, Santo Augusto, Santa Rosa, São Luiz Gonzaga, and Cachoeira do Sul - Region 2; in Palotina Arapongas and Goioerê - Region 3. The locations were not the same in all years. Distinct environments promote the choice of genotypes more adapted (Oliveira et al 2012, Benin et al. 2013). The number of test locations per region in the experimental years is shown in Table 1.

The experiment was laid out in a randomized block design

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with three replications, in plots consisting of six 5-m rows of, spaced 0.20 m apart, sown mechanically. Fertilization and pest and disease control were performed according to technical guidelines (Reunião 2008). Before sowing, the seeds were treated with the insecticides imidacloprid + triadimenol. The traits grain yield, days from emergence to heading, days from emergence to maturity, plant height, lodging, test weight, 1000-grain weight, and gluten strength were evaluated. At strategic locations, collections of genotypes of the VCU trials were grown. These plants were not protected against foliar diseases, to observe, among others, diseases such as leaf rust, leaf spots, powdery mildew, head blight, and common wheat mosaic virus.

Table 2 shows the grain yield means in wheat growing regions 1, 2 and 3, where cultivar CD 123 produced 5%, 4% and 5% higher yields than the mean of the two best controls, respectively. In view of to the good performance, cultivar CD 123 was indicated for cultivation in the above regions, in the States of Rio Grande do Sul, Santa Catarina and Paraná.

Cultivar CD 123 has a short cycle, good plant health, and lodging and pre-harvest sprouting tolerance. In warmer regions, it belongs to the extra strong wheat class and bread in cooler regions, to the bread-making class with W values

from 221 to 295, being considered an white flour wheat in the cooler regions. The cultivar was then registered by the National Plant Variety Protection Service of the Ministry of Agriculture (Brasil 2010).

## OTHER TRAITS

Cultivar CD 123 has a short plant height (55-94 cm) and an early cycle (48-83 d from emergence to silking and 101-144 d from emergence to maturity). The means of these characteristics were 73 cm, 67 d and 122 d, respectively, and vary according to the climatic conditions, sowing dates and soil type. The CD 123 has fusiform ears and is moderately resistant to lodging and to pre-harvest sprouting.

The analysis of the processing or industrial quality, in 12 samples of experiments in different states, determined a mean gluten strength of 248 (W), which includes cultivar CD 123 in the group of bread wheat cultivars (Table 3) together with other bread wheat cultivars, CD 114 and CD 117, available on the market (Marchioro et al. 2007, Marchioro et al. 2009). Furthermore, cultivar CD 123 has the characteristics of white flour, i.e., its flour that can be used in the food industry to lighten darker flour shades. BRS 374 is also white flour cultivar (Caierão et al. 2013).

**Table 1.** Number of evaluations of cultivar CD 123 in Value for Cultivation and Use (VCU) tests, in the wheat-growing regions 1, 2 and 3, from 2006 to 2010 - Cascavel/2013

Brazil States	Wheat region 1					Wheat region 2					Wheat region 3		
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010	2008	2009	2010
PR	3	4	4	4	4	3	3	3	3	5	2	2	6
SC	-	1	1	1	1	-	1	2	2	2	-	-	-
RS	-	3	4	3	2	1	3	3	3	3	-	-	-

**Table 2.** Means of grain yield (kg ha<sup>-1</sup>) of cultivar CD 123 and the two best controls, in the wheat-growing regions 1, 2 and 3, from 2006 to 2010 - Cascavel/2013

Wheat region	Cultivar	2006	2007	2008	2009	2010	MEAN	%
1	CD 123	4065	3444	4033	3896	4119	3911	105
	Mean T*	3734	3372	3889	3585	4065	3729	100
2	CD 123	3371	3315	3246	3118	4034	3417	104
	Mean T*	3215	3132	3160	3030	3882	3284	100
3	CD 123	-	-	3011	3329	3300	3213	105
	Mean T*	-	-	2734	3238	3209	3060	100

\* The controls ÔNIX and SAFIRA were used for comparison in the wheat-growing regions 1 and 2 and BRS 208 and BRS Guamirim in region 3.

**Table 3.** Means of the traits days from emergence to heading (HD), days from emergence to maturity (MT), plant height (PH), lodging (LO), test weight (TW), general gluten strength (W), flour whiteness (FW), 1000-grain weight (GW), leaf rust (LR), leaf spot (LS), powdery mildew (PM), head blight (HB), wheat mosaic virus (WM) and blast (BL) of cultivar CD 123 and control ÔNIX, from 2006 to 2010 - Cascavel/2013

Cultivar	HD (days)	MT (days)	PH (cm)	LO (%)	TW (Kg hl <sup>-1</sup> )	FW (10 <sup>-4</sup> Joule)	W (0-100)	GW (g)	LR (%)	LS (gr 0-9)	PM (gr 0-9)	HB (gr 0-9)	WM (gr 0-9)	BL (gr 0-9)
CD 123	67	122	73	4	77	248	95	34	6	3.0	2.0	3.3	2.4	0.9
ÔNIX	74	127	82	8	77	251	92	35	48	3.5	1.9	3.0	2.0	0.9

The color of wheat flour is determined by a device known as a Minolta colorimeter that measures three color intensities: color L (whiteness), on a scale of 0 (black) to 100 (white); the closer to 100, the whiter is the flour; the wheat cultivars in Brazil range from 89 to 96; color a, ranging from -1.0 (tendency to green) to +1.0 (tendency to red); and color b, ranging from 6.0 (tendency to blue) to 10.0 (tendency to yellow). According to these parameters, the three color intensities are 95, 0.13 and 8.8, respectively, for cultivar CD 123.

In field experiments from 2005 to 2010, grades of disease response were determined on a 1-9 scale. The severity of leaf rust (*Puccinia triticina*) was low, indicating that the cultivar is moderately resistant. To leaf blotch and tan spot (*Bipolaris sorokiniana* and *Drechslera* spp) and glume blotch (*Stagonospora nodorum*), the severity indices were

medium, classifying the cultivar as moderately susceptible. In evaluations of powdery mildew (*Blumeria graminis* f.sp. *tritici*), low severity was recorded, corresponding to moderate resistance. Head blight severity (*Fusarium graminearum*) was medium to high, classifying the cultivar as moderately susceptible. CD 123 was also classified as moderately resistant to common mosaic virus and to blast (*Pyricularia grisea*) (Table 3).

## BASIC SEED PRODUCTION

Based on Law No. 9456/97, COODETEC (Cooperativa Central de Pesquisa Agrícola, BR 467 - km 98 - PO Box 301 – CEP: 85813-450, Cascavel - Paraná, Brazil) licenses seed companies to multiply and sell protected cultivars. Cultivar CD 123 was released on the market in 2011, with a seed availability of 4000 40-kg bags.

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