



CD 116: A healthy wheat cultivar with industrial quality

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ABSTRACT – Cultivar CD 116 was developed by the Cooperativa Central de Pesquisa Agrícola (COODETEC) and is suitable for cultivation in the states of Paraná, São Paulo, Mato Grosso do Sul, Mato Grosso, Minas Gerais, Goiás, and Distrito Federal. CD 116 is tolerant to the major diseases, particularly blast, has a high industrial grain quality and mean yield of 3908 kg ha⁻¹, exceeding the control cultivars by 6%.

Key words: breeding program, blast, grain yield.

INTRODUCTION

In the genetic improvement of plants, three prerequisites are condition to establish a desired genotype: a) presence of genetic variability, b) efficiency in the selection of promising genotypes, c) identification of the genotypes best adapted to the environment. In direct support of successful breeding of superior genotypes, a profound knowledge of the germplasm, the choice of variability sources and, mainly, the parents used in artificial crosses, play a major role. However, selection is essential in the identification of superior genotypes (Carvalho et al. 2008). With a view to developing cultivars adapted to different wheat regions in Brazil and the neighboring countries, hundreds of lines in different environments are evaluated every year by COODETEC. Among other

traits, cultivars with a high grain yield potential, tolerance to pre-harvest sprouting, disease resistance and industrial quality are desirable. The industrial quality, according to Mittelmann et al. (2000), represents an opportunity to aggregate market value to agricultural products. To meet these demands, COODETEC has released the wheat cultivar CD 116 on the market, a cultivar with high potential for grain yield, high industrial quality, good health and blast tolerance.

PEDIGREE AND BREEDING METHODS

Cultivar CD 116 was derived from a cross between the genotypes MILAN and MUNIA, in Obregon, Mexico. The segregating generations and selections were developed in Obregon and Toluca, Mexico. In 1996,

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several lines were selected in the F₇ generation by the mass method, in Toluca, Mexico. These lines were sown in 1997, in Palotina, Paraná, Brazil. The segregating progenies were included in another selection procedure, by the pedigree method, repeating the selection process in 1998. Plots with uniform plants were harvested in bulk, resulting in several lines, which were evaluated for grain yield and agronomic traits; in the following year one of these lines (CDI 200205) led to CD 116. The pedigree of this cultivar is MSS92MO1740S-015M-0Y-0Y-050M-11Y-0M-1P-0p.

PERFORMANCE

Line CDI 200205 was evaluated in preliminary tests in 2000 and 2001 and was included in the tests of VCU (Value for Cultivation and Use) in 2002. The VCU tests were conducted observing the new wheat regions (shown in Figure 1) (Embrapa 2006). For the wheat region VCU II, tests were conducted in 2003, in Cascavel (four seasons), Campo Mourão and Mariópolis; in 2004 in Cascavel (two seasons), Campo Mourão, Mariópolis and Itaberá; in 2005 in Cascavel (three seasons) and Campo Mourão, in 2006 in Cascavel (two seasons), Mariópolis and Itaberá in 2007 in Cascavel (three seasons), Campo Mourão and Itaberá.

In the wheat region VCU III, tests were conducted in 2003, in Palotina (four seasons), Araçongas, Leopoldina, Londrina, Santa Mariana, Maracaju, Dourados, and in Cândido Motta; in 2004, in Palotina (three seasons), Umuarama, Centenário do Sul, Nova Fátima, Dourados, São Gabriel do Oeste, and Cândido Motta; in 2005, in Palotina (four seasons), Nova Fátima, Araçongas, Dourados and Cândido Motta; in 2006, Pallottine (three seasons), Araçongas, Dourados and São Gabriel do Oeste; and in 2007, in Palotina (four seasons), Dourados (two seasons), Ponta Porã and Assis.

In the wheat region VCU IV, tests were conducted in 2003, in Cristalina and Rio Verde (three seasons); in 2004, Cristalina, Unai and São Gotardo; in 2005, in Paraúna, Unai, São Gotardo; in 2006, in Cristalina, Catalão, Paracatu and São Gotardo; and in 2007, in Catalão, Paracatu and São Gotardo.

The experiment had a completely randomized block design with three replications, in plots of 6 rows, 5 m long, spaced 0.20 m between rows, sown mechanically. The fertilization and disease and pest control were according to technical recommendations. Prior to sowing, the seeds were treated with Imidacloprid + Triadimenol. The following traits were measured: grain

yield, days from emergence to heading, days from emergence to maturity, plant height, lodging, hectoliter weight, weight of 1000 grains and general gluten strength.

In the VCU tests, genotype collections were grown at strategic locations without shoot disease control, to evaluate the disease incidence of leaf rust, leaf spots, powdery mildew and blast (Reis and Casa, 2007).

Table 1 shows the mean grain yield in the VCU wheat regions II, III and IV, where the grain yield of cultivar CD 116 was 7%, 5% and 6%, respectively, above the mean of the two best controls. Due to the good performance, cultivar CD 116 was indicated for planting in the regions mentioned above, in the states of Paraná, São Paulo, Mato Grosso do Sul, Mato Grosso, Goiás, Minas Gerais and Distrito Federal. It was registered by the National Service for Cultivar Protection of the Ministry of Agriculture (Brazil 2008).

OTHER TRAITS

The plant height of cultivar CD 116 is low (mean height of 77 cm), the cycle is early (63 days from emergence to heading and 119 days from emergence to maturity). The mean of each of the evaluated traits can be classified as moderately resistant to lodging, moderately susceptible to pre-harvest sprouting and moderately susceptible to aluminum-toxic soil.

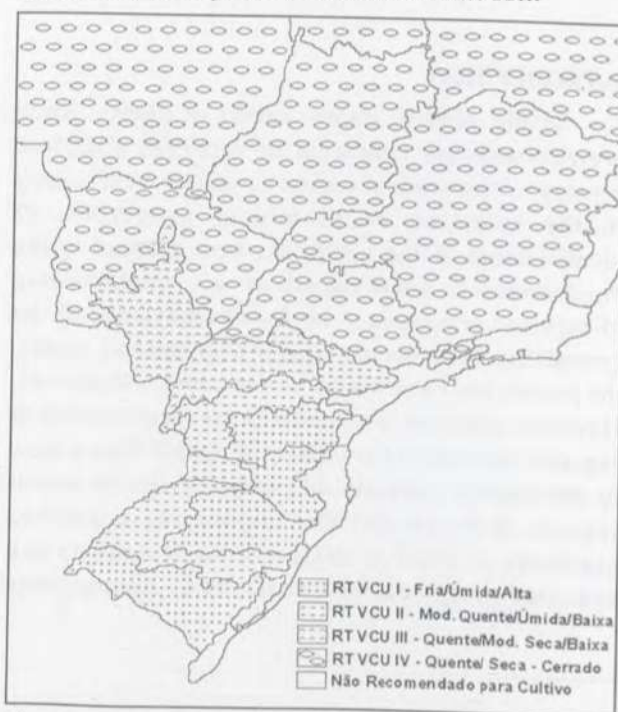


Figure 1. Adaptation regions for the VCU trials

Table 1. Means of grain yield (kg ha⁻¹) of cultivar CD 116 and mean of the two best cultivars, at the different locations in each VCU Wheat Region II, III and IV, from 2003 to 2007 - Cascavel/2008

Region	Cultivar	2003	2004	2005	2006	2007	Mean	%
VCU II	CD 116	3231	2854	2814	4101	3501	3300	107
	Mean T	3099	2834	2309	4006	3139	3077	100
VCU III	CD 116	2799	2643	2867	2995	3728	3006	105
	Mean T	2786	2513	2597	2787	3624	2861	100
VCU IV	CD 116	5764	5649	5488	5503	4644	5410	106
	Mean T	5528	5284	4990	5329	4316	5089	100

* the two best controls used in the comparison (T Mean) were ONIX and IPR 85 in 2004, BRS 208 and BRS 210 in 2005, 2006 and 2007, in Region II; IAPAR 53 and ONIX, in 2004, BRS 208 and BRS 210, in 2005 and 2006, and BRS 208 and IPR 85, in 2007, in Region III; and EMBRAPA 42 and BRS 210, in 2002, and BRS 207 and BRS 210, in 2005, 2006 and 2007, in Region IV

The results of the analysis of industrial quality detected a mean gluten strength of 318 (W), which includes the cultivar in the group of breeding wheat (Table 2).

The field evaluations from 2003 to 2007 provided details of the major diseases that attack the crop. The severity of powdery mildew (*Blumeria graminis* f.sp. *tritici*) was medium to low, in other words, the cultivar is moderately susceptible to this disease. For Fusarium head blight (*Fusarium graminearum*) the cultivar was classified as susceptible. For leaf spot (*Bipolares sorokiniana*) and glume blotch (*Septoria tritici* and *Stagonospora nodorum*) severity indices were determined, which classified CD 116 as moderately resistant. The mean severity of leaf rust (*Puccinia*

tritici) was low in field conditions, indicating that the cultivar is moderately resistant. A reduced incidence of blast (*Magnaporthe grisea*) was observed in the field, classifying the cultivar as moderately resistant (Table 2).

SEED MAINTENANCE AND DISTRIBUTION

Based on Law No. 9456/97, the COODETEC (BR 467, km 98, C.P. 301, 85813-450, Cascavel, PR, Brazil), licenses protected cultivars so contracted seed companies can multiply and sell them. Market developers of the institution distribute and sell the seeds, under the management of a Marketing Coordinator of Soybean and Wheat Distribution.

Table 2. Means of the traits days from emergence to heading (DH), days from emergence to maturation (DM), plant height (PH), lodging (LO), hectoliter weight (HW), general gluten strength (W), leaf rust (LR), leaf spot (LS) and glume blotch (GB) powdery mildew (PW) and blast (BS) of cultivar CD 116 and control IPR 85 - Cascavel/2008

Cultivar	DH (days)	DM (days)	PH (cm)	LO (%)	HW (Kg hl ⁻¹)	W (10 ⁴ Joule)	LR (%)	LS (grade 0-9)*	GB (grade 0-9)*	PW (grade 0-9)*	BS (grade 0-9)*
CD 116	63	118	77	3	78	318	3	2.4	1.3	1.9	0.8
IPR 85	59	116	76	14	79	372	11	1.8	0.8	0.8	1.2

*grade "0" is assigned when a plant has no infection symptoms and grade "9" for a severe infection of the whole plant

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