CULTIVAR RELEASE

‘BRS Savana (BRS TR135)’: A wheat cultivar for central Brazil with good resistance to blast

Vanoli Fronza[1*], Joaquim Soares Sobrinho[1], Pedro Luiz Scheeren[2], Eduardo Caierão[2], Ricardo Lima de Castro[2], Jorge Henrique Chagas[3], Julio Cesar Albrecht[3], João Leodato Nunes Maciel[2], Martha Zavariz de Miranda[2], Luciano Consoli[2] and Gisele Abigail Montan Torres[2]

Crop Breeding and Applied Biotechnology
26(1): e548026113, 2026
Brazilian Society of Plant Breeding.
Printed in Brazil
http://dx.doi.org/10.1590/1984-70332026v26n1c13

Abstract: *‘BRS Savana (BRS TR135)’ is a wheat cultivar with early maturity, good flour quality, and moderate resistance to wheat head blast (conferred by the 2NS segment). This cultivar is recommended for cultivation under rainfed conditions in central Brazil (MG, GO, DF, and part of SP, MS, MT, and BA).*

Keywords: Triticum aestivum *L.,* Pyricularia oryzae *Triticum, savanna biome*

INTRODUCTION

In central Brazil, with predominance of the savanna biome, wheat can be grown in a rainfed system as a second crop in areas with an altitude of at least 700 m above sea level, generally following the soybean crop. Under these conditions, wheat is sown between the beginning of March to the end of April, depending on the agricultural climate risk zone for each location (MAPA 2025).

Heat and drought tolerance and resistance to wheat blast are the main requirements for wheat cultivars grown in a rainfed system in the Central region of Brazil. Wheat breeders have focused on increasing wheat growing by farmers and also on increasing the production stability of wheat cultivars. In this regard, in 2012, Embrapa Wheat established the Advanced Tropical Wheat Center in Uberaba, in the state of Minas Gerais, in partnership with the Minas Gerais Agricultural Research Agency (Epamig) to promote the development of new cultivars more adapted to rainfed conditions in the Brazilian savanna and Atlantic Forest biomes. In addition to rainfed system, the Advanced Tropical Wheat Center also works with the wheat breeding program of Embrapa for irrigated system, and has recently developed a new soft wheat cultivar (BRS TR013) adapted to the biscuit industry (Caierão et al. 2025).

This study describes the development of a new wheat cultivar specifically adapted to rainfed conditions in the Central region of Brazil and that exhibits good resistance to wheat head blast, the main wheat disease in the region.

GENETIC ORIGIN AND DEVELOPMENT

The wheat cultivar BRS Savana (BRS TR135) originated from a cross carried out in a screened environment in the winter of 2012 at Embrapa Wheat (Passo

***Corresponding author:**
E-mail: vanoli.fronza@embrapa.br

Received: 27 November 2025
Accepted: 22 December 2025
Published: 11 February 2026

[1] Embrapa Trigo, Núcleo Avançado de Trigo Tropical, Rua Afonso Rato, 1301, 38060-040, Uberaba, MG, Brazil
[2] Embrapa Trigo, Rodovia BR 285, km 294, s/n, 990001-970, Passo Fundo, RS, Brazil
[3] Embrapa Cerrados, Rodovia BR 020, km 18, s/n, 73310-970, Planaltina, DF, Brazil

Fundo, RS, Brazil) and was registered as F132782. This single cross was between the cultivar Embrapa 21 and the line CPAC 07434, obtained from Embrapa Cerrados (Planaltina, DF). CPAC 07434 originated from the cross Taurus/BRS 254. In the winter of 2013, the F_1 generation was grown in pots in a screened environment at Embrapa Wheat and harvested in bulk, generating the F132782-Z population. The F_2 generation was grown in the field in Uberaba, MG, under rainfed conditions (second harvest) in 2014 using the pedigree method, and plant 1U was selected. The F_3 generation was advanced in a screened area at Embrapa Wheat in 2014 using the pedigree method, and plant 953F was selected. The F_4 generation was grown in the field in Uberaba under rainfed conditions in 2015 using the pedigree method, with the selection of plant 1U. The F_5 generation was advanced in a screened environment at Embrapa Wheat later in 2015 using the pedigree method, with the selection of plant 952F. The F_6 generation was grown in the field in Uberaba under rainfed conditions in 2016 using the pedigree method, and plant 1U was selected. The F_7 generation was grown in the field in Uberaba under rainfed conditions in 2017 using a modified bulk method.

Some spikes without wheat blast symptoms were selected and threshed together, resulting in a group of plants with the selection history 30U. To increase seed quantity, the F_8 generation was grown in a screened environment at Embrapa Wheat later in 2017, establishing the line, with the selection history 950F. In 2018, under rainfed conditions in Uberaba, the line was evaluated as an observation plot (OP) together with several lines from Embrapa Wheat. It was selected for experimental trials and was designated as PF 180135. In 2019, the PF 180135 line was part of the New Lines Collection and was evaluated under rainfed conditions in Uberaba and in Planaltina, DF (Embrapa Cerrados). In 2020, the PF 180135 line participated in Preliminary Trials in Uberaba and Madre de Deus de Minas, MG, and in Planaltina, DF (Embrapa Cerrados). In 2021 and 2022, PF 180135 was evaluated in Value for Cultivation and Use (VCU) trials conducted by Embrapa Wheat and its partners in the Central region of Brazil in the states of Minas Gerais, Goiás, and Mato Grosso, as well as in the Distrito Federal, all under rainfed conditions. In 2024, PF 180135 was registered with the Ministry of Agriculture and Livestock of Brazil as cultivar BRS TR135 and received the commercial name 'BRS Savana'.

PERFORMANCE AND DESCRIPTION

The performance of the cultivar BRS Savana was compared with TBIO Aton and TBIO Duque, two cultivars recommended for rainfed conditions in the Central region of Brazil that carry the 2NS chromosomal segment, which confers partial resistance to wheat head blast (*Pyricularia oryzae* Triticum). The 2NS segment, introgressed from *Aegilops ventricosa*, is currently the main source of genetic resistance to wheat head blast and was discovered by Cruz et al. (2016). More recently, Vancini et al. (2023) demonstrated that the 2NS translocation carries a major locus with a dominant allele for resistance to wheat head blast. The line CPAC 07434 was the donor of 2NS (Ferreira et al. 2018) to 'BRS Savana", and the presence of this segment was confirmed by molecular markers during the first year of VCU trials. During the 2021 and 2022 seasons, BRS Savana was evaluated in eleven environments (Table 1) and achieved a mean grain yield of 2839 kg ha^{-1}, which was 4.8% higher than the mean yield of the check cultivars TBIO Aton and TBIO Duque (Table 2). In the 2021 crop season, which was the driest year, 'BRS Savana' was in the highest yielding group in six environments, and was in the third group, together with the check cultivars, in one environment. That year, 'BRS Savana' outyielded the check cultivars by 7.1%. In the 2022 crop season 'BRS Savana' was in the second highest yielding group in three out of

Table 1. Locations, sowing dates (in March), and number of trials conducted in the VCU evaluation period for registration of 'BRS Savana' for growing under rainfed conditions in homogeneous adaptation region 4 for wheat cultivars

Location	State	Altitude (m)	Latitude	Longitude	Sowing date	No. of trials	
						2021	2022
Madre de Deus de Minas	MG	1020	21° 27' 06" S	44° 19' 14" W	23	1	-
São Gonçalo do Sapucaí	MG	880	21° 52' 30" S	45° 30' 19" W	22	-	1
São Gotardo	MG	1170	19° 16' 33" S	46° 06' 16" W	26 and 29	1	1
Uberaba	MG	1000	19° 33' 14" S	47° 46' 04" W	18 and 19	1	1
Brasília (PAD-DF)	DF	940	15° 50' 51" S	47° 35' 20" W	17 and 17	1	1
Planaltina (CPAC)	DF	990	15° 36' 06" S	47° 43' 02" W	10	1	-
Rio Verde	GO	760	17° 47' 10" S	50° 57' 42" W	15	1	-
Campo Verde	MT	760	15° 31' 40" S	55° 18' 28" W	8	1	-

Table 2. Grain yield (kg ha^{-1}) of 'BRS Savana' under rainfed conditions at different locations in homogeneous adaptation region 4 for wheat cultivars compared with the check cultivars (TBIO Aton and TBIO Duque), and the coefficient of variation (CV) for each VCU trial during the 2021 and 2022 crop seasons

Year	Location[1]	BRS Savana	---	TBIO Aton	TBIO Duque	CA[2]	%[3]	CV (%)
2021	MDM	5843 a	---	6446 a	5780 a	6113	95.6	9.8
	SG	1801 c	---	1460 c	1682 c	1571	114.6	9.8
	UBA	1500 a	---	1439 b	1354 b	1397	107.4	12.1
	CPAC	3427 a	---	3383 a	2558 c	2971	115.3	8.0
	PAD-DF	3848 a	---	3888 a	2720 c	3304	116.5	7.1
	RV	1714 a	---	1604 b	1465 b	1535	111.7	12.0
	CV	2133 a	---	2157 a	1906 a	2032	105.0	16.7
	Mean	2895	---	2911	2495	2703	107.1	-
	%[4]	107.1	---	107.7	92.3	100.0	-	-
2022	SGS	1931 b	---	2057 a	1578 b	1817	106.3	13.9
	SG	2946 b	---	2519 c	2603 c	2561	115.0	8.6
	UBA	2263 b	---	2486 a	2361 a	2423	93.4	12.3
	PAD-DF	3996 c	---	4268 b	3875 c	4071	98.2	7.9
	Mean	2784	---	2833	2604	2718	102.4	-
	%[4]	101.9	---	104.2	95.8	100.0	-	-
21/22	Mean	2839	---	2872	2549	2710	104.8	-
	%[4]	104.8	---	106.0	94.1	100.0	-	-

[1] MDM: Madre de Deus de Minas, Minas Gerais; SG: São Gotardo, Minas Gerais; UBA: Uberaba, Minas Gerais; CPAC: Embrapa Cerrados, Planaltina, Distrito Federal; PAD-DF: Programa de Assentamento Dirigido do Distrito Federal, Brasília, Distrito Federal; RV: Rio Verde, Goiás; CV: Campo Verde, Mato Grosso; SGS: São Gonçalo do Sapucaí, Minas Gerais; [2] Check cultivar average; [3] Percent grain yield of the cultivar BRS Savana compared to the mean of the check cultivars in each trial; [4] Percent grain yield of the cultivar compared to the mean of the check cultivars in each season. Means followed by the same letter in the same row belong to the same group according to the Scott-Knott test at 5% probability. --- Data not shown for other genotypes.

four locations. Its mean yield (2784 kg ha^{-1}) was similar to that of the best check, TBIO Aton (2833 kg ha^{-1}), and it had a 2.4% higher mean yield than the mean of the check cultivars.

In adaptability and stability analyses, using the methodology of Annicchiarico (1992), 'BRS Savana' achieved the highest recommendation index (107.1%) among all cultivars evaluated in the 2021 cropping season (Table 3). In the 2022 cropping season, its recommendation index (99.0%) was surpassed only by 'TBIO Aton' among the cultivars with the 2NS segment. Thus, based on its yield performance and the presence of the 2NS segment (like the controls TBIO Aton and TBIO Duque), BRS Savana was released as a new cultivar for homogeneous adaptation region 4 for wheat cultivars (Cunha et al. 2006) in the states of Minas Gerais and Goiás, the Distrito Federal, and parts of the states of São Paulo, Mato Grosso do Sul, Mato Grosso, and Bahia for growing under rainfed conditions. BRS Savana is also the first wheat cultivar of Embrapa to carry the 2NS segment.

BRS Savana has early maturity, with approximately 48 days from emergence to heading and 97 days from emergence to physiological maturity. Mean plant height of the cultivar is approximately 70 cm, and it exhibits good resistance to lodging. In the greenhouse, BRS Savana is susceptible to yellow spot (*Drechslera tritici-repentis*) and brown spot (*Bipolaris sorokiniana*). Reaction to wheat head blast (*Pirycularia oryzae* Triticum) was assessed under field and greenhouse conditions, and the cultivar was classified as moderately resistant. The response of the line PF 180135 to wheat head blast under greenhouse conditions was presented in the study of Silva et al. (2025), which was conducted at Embrapa Wheat, and PF 180135 was among the most resistant genotypes. In the final evaluation of the severity of head blast symptoms (at 11 days after inoculation), PF 180135 (later designated cultivar BRS Savana) was among the three most resistant genotypes, showing approximately 10% severity, which was significantly lower than that of the cultivars TBIO Aton (approximately 55% severity) and TBIO Duque (approximately 40% severity).

Regarding industrial quality of the flour, the cultivar BRS Savana is classified as Bread Wheat, with mean gluten strength of 302 × 10^{-4} J, ranging from 255 to 368 × 10^{-4} J. Farinographic analysis showed mean dough stability of 12.9 minutes. Flour color analysis using a Minolta® colorimeter (under the CIEL*a*b* system) exhibited a mean value of L* of 92.93 (ranging from 92.29 to 93.58) and of b* of 10.34 (ranging from 9.69 to 10.77).

Table 3. Adaptability and stability analyses using the methodology of Annicchiarico (1992) for the new cultivar BRS Savana and other cultivars evaluated in the VCU trials conducted in homogeneous adaptation region 4 for wheat cultivars under rainfed conditions during the 2021 and 2022 crop seasons

	2021			2022		
	Mean yield	Deviation	Wi[1]	Mean yield	Deviation	Wi[1]
Cultivar	(kg ha^{-1})	(%)	(%)	(kg ha^{-1})	(%)	(%)
BRS Savana[2]	2895	4.30	107.1	2784	6.72	99.0
BR 18-Terena	2694	8.92	95.2	2884	12.49	99.7
BRS 264	2733	9.78	96.4	2922	3.53	106.4
BRS 404	2914	8.99	102.1	2988	2.02	109.3
ORS Feroz[2]	2576	6.20	91.6	2286	7.53	79.3
ORS Guardião[2]	2508	6.20	91.5	2490	8.31	85.0
ORS Senna[2]	2272	8.89	79.1	-	-	-
ORS 1403[2]	2580	15.75	93.0	-	-	-
TBIO Aton[2]	2911	11.13	99.6	2832	6.45	100.9
TBIO Duque[2]	2495	8.85	88.4	2605	7.26	90.9
TBIO Sintonia[2]	2468	14.21	83.2	2527	2.62	91.1
TBIO Sossego[2]	2688	8.92	97.2	-	-	-

[1] Recommendation index.

[2] Contains the 2NS segment.

OTHER TRAITS

'BRS Savana' has light-colored, awned, and pyramidal-shaped spikes. Flag leaves are intermediate, with light-colored auricles. The glumes average 10 mm in length, with a straight shoulder shape. The seeds are hard, light red in color, and oval shaped.

BASIC SEED PRODUCTION

Embrapa Wheat (Rodovia BR 285, km 294, Caixa Postal 58, 99001-970, Passo Fundo, Rio Grande do Sul, Brazil) is authorized to license seed producers to produce, multiply, and sell protected cultivars to grain farmers in accordance with Law no. 9456/97.

ACKNOWLEDGMENTS

The authors thank their partners in field trials: Fazenda Nossa Senhora da Abadia (Uberaba, Minas Gerais), Fazenda Liberdade (Madre de Deus de Minas, Minas Gerais), Coopadap (São Gotardo, Minas Gerais), Fazenda Araçá Vermelho (Brasília, Distrito Federal), UniRV – Universidade de Rio Verde (Rio Verde, Goiás), IFMT – Instituto Federal de Educação, Ciência e Tecnologia de Mato Grosso, Assist Consultoria Agronômica (Campo Verde, Mato Grosso), and Fazenda Nacional Agrofarm (São Gonçalo do Sapucaí, Minas Gerais). The Wheat Breeding Program was supported by grants from Embrapa (SEG 02.11.08.001.00.00 and 32.16.04.032.00.00).

DATA AVAILABILITY

The data generated and/or analyzed during the current research are available from the corresponding author upon reasonable request.

REFERENCES

Annicchiarico P (1992) Cultivar adaptation and recommendation from alfalfa trials in Northern Italy. **Journal of Genetics and Breeding 46**: 269-278.

Caierão E, Fronza V, Soares Sobrinho J, Miranda MZ, Castro RL, Scheeren PL, Chagas JH, Albrecht JC, Maciel JLN, Consoli L and Torres GAM (2025) BRS TR013 - a soft wheat cultivar for the Brazilian Cerrado region. **Crop Breeding and Applied Biotechnology 25**: e53352547.

Cruz CD, Peterson GL, Bockus WW, Kankanala P, Dubcovsky J, Jordan

KW, Akhunov E, Chumley F, Baldelomar FD and Valent B (2016) The 2NS translocation from *Aegilops ventricosa* confers resistance to the *Triticum* pathotype of *Magnaporthe oryzae*. **Crop Science 56**: 990-1000.

Cunha GR, Scheeren PL, Pires JLF, Maluf JRT, Pasinato A, Caierão E, Silva MS, Dotto SR, Campos LAC, Felício JC, Castro RL, Marchioro V, Riede CR, Rosa Filho O, Tonon VD and Svoboda LH (2006) Regiões de adaptação para trigo no Brasil. Embrapa Trigo, Passo Fundo, 35p. (**Information Bulletin, 20**).

Ferreira JR, Vancini C, Deuner CC, Torres GAM, Consoli L, Seixas CDS, Dianese AC, Goulart ACP and Soto-Gozáles HH (2018) Absence of 2NS/2AS in wheat resistance sources to *Magnaporthe oryzae* in Brazil. Embrapa, Passo Fundo, 21p. (**Information Bulletin, 91**).

MAPA - Ministério da Agricultura, Pecuária e Abastecimento (2025) Zoneamento agrícola. Available at <https://mapa-indicadores.agricultura.gov.br/publico/extensions/Zarc/Zarc.html>. Accessed on September 17, 2025.

Silva D, Mossolin M, Kovaleski M, Maciel JLN and Deuner CC (2025) Phenotypic reaction of wheat genotypes to blast and sporulation of *Pyricularia oryzae* Triticum. **Journal of Phytopathology 173**: e70066.

Vancini C, Torres GAM, Consoli L, Maciel JLN, Castro RL, Webber NF, Silveira DC and Deuner CC (2023) $2N^{V}S$ translocation presence and inheritance of resistance to head blast in wheat. **Pesquisa Agropecuária Brasileira 58**: e03038.