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Performance of wheat cultivars in the state of Rio Grande do Sul, Brazil, 2016.

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The Brazilian Commission of Wheat and Triticale Research (BCWTR) annually conducts the State Test of Wheat Cultivars in Rio Grande do Sul state (STWC-RS), with the aim to support the indications of cultivars. This work evaluated wheat cultivar grain yield performance of STWC-RS in 2016. The grain yield of 29 wheat cultivars (Ametista, BRS 327, BRS 331, BRS Marcante, BRS Parrudo, BRS Reponte, Campeiro, CD 1104, CD 1440, CD 1805, Esporão, Jadeíte 11, LG Oro, LG Prisma, Marfim, ORS 1401, ORS Vintecinco, Quartzo, TBIO Iguaçu, TBIO Itaipu, TBIO Mestre, TBIO Noble, TBIO Pioneiro, TBIO Sintonia, TBIO Sinuelo, TBIO Sossego, TBIO Tibagi, TBIO Toruk, and Topazio) was studied in 14 environments (Coxilha, Cruz Alta, Não-Me-Toque, and Passo Fundo – season 1; Passo Fundo – season 2; Sertão and Vacaria – season 1; Vacaria – season 2; and Augusto Pestana, Eldorado do Sul, Ijuí, Santo Augusto, São Borja, and Três de Maio in Rio Grande do Sul in 2016). The experiments were in a randomized block design with three or four repetitions. Each plot consisted of five 5-m rows with a 0.2-m spacing between rows and a plant density of about 330 plants/m^2. Grain yield data (kg/ha) were subjected to individual analysis of variance (for each environment) and to grouped analysis of variance (for all environments). The grouped analysis of variance employed the mixed model (fixed cultivar effect and randomized environment effect). The grain yield performance of wheat cultivars was evaluated by analysis of adaptability and stability, employing the method of distance from the ideal cultivar, weighted by the coefficient of residual variation, proposed by Carneiro (1988). In this analysis, the ideal cultivar was considered as the cultivar with high grain yield, high stability, low sensitivity to adverse conditions of unfavorable environments, and an ability to respond positively to improvement of favorable environments. The general average of STWC-RS in 2016 was 5,499 kg/ha, the highest general average in the trial's history. The experiment conducted in season 1 in Passo Fundo had the highest wheat grain yield average; 6,796 kg/ha. The maximum wheat grain yield was 7,932 kg/ha in Não-Me-Toque (cultivar TBIO Toruk). The cultivars Quartzo, BRS Reponte, TBIO Toruk, ORS Vintecinco, and BRS 327 had adaptability and stability in favorable environments (environments with an average wheat grain yield higher than the general average). Cultivars TBIO Itaipu, BRS Reponte, Quartzo, TBIO Sinuelo, and TBIO Iguaçu cultivars had adaptability and stability in unfavorable environments (environments with an average wheat grain yield lower than the general average). In general, averaged over all environments, cultivars BRS Reponte (6,138 kg/ha), Quartzo (6,025 kg/ha), TBIO Itaipu (5,939 kg/ha), TBIO Sinuelo (5,817 kg/ha), and ORS Vintecinco (5,861 kg/ha) came closest to the ideal cultivar.

Reference.

Carneiro PCS. 1998. New methodologies for analyzing the stability and adaptability of behavior. Viçosa: UFV, 1998. Ph.D. Thesis (Genetics and Breeding), Post Graduate Program in Genetics and Breeding. Federal University of Viçosa, 1998. 168p.

Wheat crop in the state of Rio Grande do Sul, Brazil, 2016.

Ricardo Lima de Castro, Eduardo Caierão, Aldemir Pasinato, Pedro Luiz Scheeren, and Márcio Só e Silva.

Rio Grande do Sul state is one of the main wheat-producing states in Brazil. This study analyzed the wheat crop in Rio Grande do Sul in 2016. In 2016, Rio Grande do Sul harvested 778,486 ha of wheat (35.9 % of the total area harvested in Brazil), producing 2,541,889 tons of wheat (37.2% of the Brazilian production) with an average of grain yield of 3,265 kg/ha (110 kg/ha above the Brazilian average of 3,155 kg/ha). Among the geographical mesoregions of Rio Grande do Sul (Fig. 1, p. 6), the RS Northwest mesoregion harvested the largest wheat area, 617,066 ha (79.3% of the cropped area in the state) and had the largest production, 2,041,670 tons of grain (80.3% of the state production) (Table 1, p. 6). How-

ever, the average grain yield obtained in this mesoregion was the second highest of the state, 3,309 kg/ha (44 kg/ha above the state average) (Table 1). The RS Northeast mesoregion harvested 42,885 ha of wheat (5.5% of the cropped area in the state), produced 155,394 tons of wheat grain (6.1% of the state production), and had the highest average grain yield in the state (3,624 kg/ha, 359 kg/ha above the state average) (Table 1). The wheat crop in Rio Grande do Sul in 2016 had favorable weather conditions, with low temperatures in the winter and no late frost in the spring. Consequently, the average wheat grain yield in 2016 was the highest in the history of the Rio Grande do Sul state. Comparing the wheat crop data with the results of the State Test of Wheat Cultivars in the state of Rio Grande do Sul (STWC-RS) in 2016, we observed that the average wheat grain yield of commercial crops was 2,234 kg/ha below that of the average of STWC-RS (5,499 kg/ha).

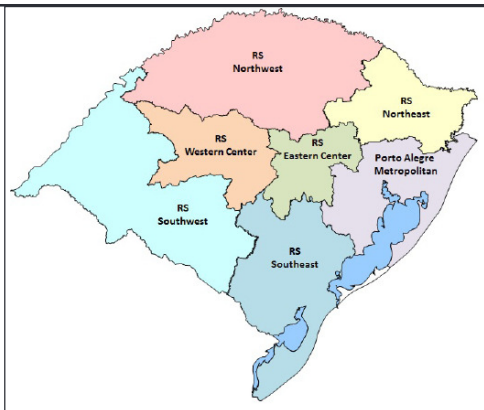

Fig. 1. Mesoregions in the state of Rio Grande do Sul, Brazil.

Reference.

IBGE. 2018. Sistema IBGE de Recuperação Automática - SIDRA. Available at: <https://sidra.ibge.gov.br/tabela/5457>. Acessed 23 March, 2018. Note: Aggregated database of studies and research conducted by IBGE.

Table 1. Area harvested, production, and average of grain yield of wheat in each of the mesoregions (see Fig. 1) of the state of Rio Grande do Sul, Brazil, in 2016 (Source: IBGE. 2018).

Mesoregion	Area harvested		Production		Grain yield (kg/ha)
	ha	%	tons	%	
RS Northwest	617,066	79.3	2,041,670	80.3	3,309
RS Northeast	42,885	5.5	155,394	6.1	3,624
RS Western Center	51,687	6.6	167,953	6.6	3,249
RS Eastern Center	11,325	1.5	27,943	1.1	2,467
Porto Alegre Metropolitan	2,100	0.3	5,160	0.2	2,457
RS Southwest	46,503	6.0	127,599	5.0	2,744
RS Southeast	6,920	0.9	16,170	0.6	2,337
Rio Grande do Sul State	778,486	100.0	2,541,889	100.0	3,265

A history of wheat cultivars released by Embrapa in 45 years of research.

Eduardo Caierão, Ricardo Lima de Castro, Márcio Só e Silva, and Pedro Luiz Scheeren.

Genetic breeding of wheat in Brazil truly began in 1919, when the Ministério da Agricultura, Pecuária e Abastecimento (Ministry of Agriculture, Livestock, and Food), created experimental stations in Alfredo Chaves, RS (now Veranópolis, RS) and Ponta Grossa, PR. The station in Veranópolis, later incorporated in the Department of Agriculture of the State of Rio Grande do Sul (now the Fundação Estadual de Pesquisa Agropecuária – Fepagro (State Crop and Livestock Research Foundation)), was the site where genetic breeding first began in Brazil. These activities were led by the researcher Carlos Gaier. The first strategies were selections of wheat genotypes within local (colonial) cultivars and, soon after, in 1926, the creation of the first hybrids. Crosses between the cultivars Polyssú (Beckman 1954) and Alfredo Chaves resulted in important cultivars at the beginning of the century in Brazil (Sousa 2004). Almost simultaneously, in 1937, the Instituto Agronômico de Campinas (IAC, Campinas Agronomical Institute) also carried out its first crosses with wheat. These two institutions, allied with the other Organizações Estaduais de Pesquisa Agropecuária (OEPAS, or State Crop and Livestock Research Organizations), contributed to the genetic breeding of Brazilian wheat in various aspects, but mainly through developing the genetic base. Some cultivars developed in the first half of the last century are used as sources of resistance to biotic and abiotic stresses in current hybridizations. In this respect, even now, the institutions cited above are either protagonists or partners of other breeders in the continuing work of developing new wheat cultivars in Brazil.

In the 1970s, scientific research in wheat developed significantly with the creation of research centers by agricultural cooperatives in the state of Rio Grande do Sul (CEP/Fecotrigo, currently CCGL TEC) and in the state of Paraná (Ocepar, currently Coodetec), responsible for generating dozens of wheat cultivars of economic importance. Examples of this were the cultivars CEP 24 (in Rio Grande do Sul) and CD 104 (in Paraná). Moreover, in that decade there was the creation of the Instituto Agronômico do Paraná–IAPAR (Agronomical Institute of Parana) and expansion of the work of the IAC. More than 70 wheat cultivars have already been released by IAPAR and IAC, which also shows their importance in the development of wheat in Brazil. In 1974, the Empresa Brasileira de Pesquisa Agropecuária–Embrapa