ITEMS FROM BRAZIL

BRAZILIAN AGRICULTURAL RESEARCH CORPORATION — EMBRAPA
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Wheat in Brazil – the 2011 crop year.

Eduardo Caierão, Pedro L. Scheeren, Márcio Só e Silva, Ricardo Lima de Castro, Adeliano Cargnin, and Edina Moresco.

In the 2011 crop year, Brazilian wheat production was about 6 x 10^6 tons (Conab 2012), which is enough to supply 50% of the domestic demand (Table 1). The deficit in production makes Brazil the largest country that imports wheat. The south region, comprised of the states of Rio Grande do Sul, Santa Catarina, and Paraná, accounts for 94,6% of the national production. Nonetheless, due to the characteristics of the cultivation system, the average grain yield is not the highest in the country.

Table 1. Area of cultivation, total production, and grain yield of wheat in Brazil in 2011 (Source: CONAB, 2012).

Region	Area (ha x 1,000)	Production (t x 1,000)	Grain yield (kg/ha)
North	—	—	—
Northeast	—	—	—
Central–West	45.3	109.0	2,406.0
Southeast	70.0	200.8	2,869.0
South	2,050.9	5,478.8	2,671.0
Brazil	**2,166.2**	**5,788.6**	**2,632.0**

In 2011, the wheat area cultivated was higher than that in 2010 (2,166.2 against 2,149.8). However, the total production and average grain yield/ha achieved in 2011 were about 1.6% smaller than those of 2010. The grain yield average in the Southern Region of Brazil in the 2011 crop season was one of the highest in the history. Low temperatures during the vegetative stage and grain filling associated with sunny days contributed to the high productivity. The grain quality was good as well.

Reference.

CONAB. 2012. Companhia Nacional de Abastecimento. Central de Informações Agropecuárias/Grãos/Trigo. Disponível em: http://www.conab.gov.br/conabweb/index.php?PAG=131.

Development of wheat germ plasm to biotic and abiotic stresses.

Adeliano Cargnin, Flávio Santana, Luciano Consoli, Marcos Vinicios Fabris, Eduardo Caierão, Pedro Luiz Scheeren, Marcio Só e Silva, Edina Moresco, Ricardo Lima de Castro.

Global warming, based on climate change predictions, demands genetic progress and improvements in production systems in order to explore crop potential by reducing losses caused by biotic and abiotic features. High rainfall from the heading to harvest, which is usual in Brazil, can trigger wheat to sprout and lead to losses for farmers, disparaging the product for the bakery trade (industrial quality). The high level of crop diseases in Brazil, especially Fusarium head blight and wheat blast, work as barriers against an increase in the national wheat production. One strategy to improve the grain production is to exploit the genetic resources and make them available to breeding programs. Hence, our goal is to develop new wheat lines resistant/tolerant to the main biotic (Fusarium head blight and wheat blast) and abiotic stresses (wheat sprouting). The backcross method will be used to transfer resistant/tolerant alleles to potential recurrent parents (cultivars or elite wheat lines). Because the donors will be mainly germ plasm from the wheat core collection, which has been characterized for their resistance/tolerance, as well other genotypes from the Germplasm Bank known for carry other desired features, especially from synthetic wheats of related species (*Aegilops* and *Agropyron*). Resistant/tolerant plants will be selected from each generation for total of three generations of backcrosses (BC_1 to BC_3), following by another three generations of self pollination (BC_3F_1 to BC_3F_3). The four, best BC_3F_3 lines with regard to agronomic features will be genotyped by microsatellite markers. The conversion index of the new, resistant/tolerant lines should vary. As a consequence, only that one with the highest index will become an advanced line. Therefore, these new lines will represent new options for growing or even a new, genetically diverse, wheat genotype resistant/tolerant to biotic and abiotic stresses available to wheat-breeding programs.

Inoculant promotes wheat yield increase.

Ricardo Lima de Castro, Giandro Duarte Teixeira, Thiago Mignoni de Lima, Eduardo Caierão, and Adeliano Cargnin.

Azospirillum brasiliense is a facultative, endophytic bacteria capable of fixing nitrogen from the atmosphere, providing part of the N required to the associated plant. The bacteria also may induce plant hormones, which stimulate the growth of plant roots, improves water and nutrient absorption, and increases chlorophyll content of the leaves and tolerance to stress, especially that caused by drought. Field experiments at Fepagro Nordeste, Vacaria, with five wheat cultivars from the state of Rio Grande do Sul, Brazil, evaluated the effect of *A. brasiliense* inoculant on wheat yield. Wheat seed inoculated with *A. brasiliense* increased grain yield from 165 to 555 kg/ha (3–15%). Considering the statistical analysis, in 67% of the experiments, the grain yield average from the inoculated treatments were higher than that from the non-inoculated treatments (Tukey Test, $p \leq 0.05$). This technology may reduce the economic and environmental costs related to the production, transport, and use of nitrogen fertilizers for the wheat crop. As a follow-up step ro these studies, a core collection of genotypes from the active germ plasm bank of Embrapa Trigo are under testing to observe the response to inoculation with *A. brasiliense*.

ITEMS FROM GERMANY

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Haplotype analysis of molecular markers linked to stem rust resistance genes in Ethiopian durum wheat cultivars and landraces.

Wheat is one of the most important cereals cultivated in Ethiopia. In the country, more than 70 bread and 30 durum wheat cultivars have been released for production since the 1940s. However, the national average yield of wheat is still about 1.4 tons/ha. Even though over 30 fungal diseases of wheat have been identified in Ethiopia, stem rust, caused by *Puccinia graminis* Pers. f. sp. *tritici* (Pgt), is a major production constraint in most wheat-growing areas and causes up to 100% yield losses in epidemic outbreaks. The recent emergence of wheat stem rust race Ug99 (TTKSK) and related strains threaten Ethiopian as well as world wheat production because they overcome widely used resistance genes that had been effective for many years. The major cause that aggrivates the ineffectiveness of Ethiopian wheat cultivars against stem rust is the narrow genetic base on which breeding for resistance has been founded, however, little is known about the resistance genotypes of Ethiopian tetraploid wheat cultivars and landraces.

Our objective was to identify the stem rust resistance genes that are present in the Ethiopian tetraploid wheat cultivars and landraces using molecular markers and assess which genes are effective for current Ethiopian stem rust races of Pgt including Ug99. A total of 58 tetraploid wheat accessions consisting of 22 Ethiopian cultivars released during from 1966–2009, four ICARDA cultivars, and 27 landraces were genotyped using 17 molecular markers (SSR, EST, and InDel) linked or diagnostic for stem rust resistance genes *Sr2*, *Sr13*, *Sr22*, and *Sr35*. Haplotype analysis indicated that many of the Ethiopian durum wheat cultivars carried *Sr13*. The resistant cultivar Sebatel showed a haplotype for *Sr2* and *Sr22* and cultivar Boohai for *Sr22*. However, further evaluation for the diagnostic value of these haplotypes is needed. This study is the first report on the presence of stem rust resistance genes in Ethiopian durum wheat cultivars and tetraploid landraces based on linked or associated molecular markers and may help to identify cultivars carrying resistant