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ITA

Spring triticale breeding program at Embrapa, Brazil

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Triticale research in Brazil started in the beginning of sixties with an introduction of octoploid collection. CIMMYT collections are the main genotype source. At Embrapa Trigo the programme is focused on broad adaptation, high yield and aluminum and disease tolerance. Beyond the CIMMYT cooperation, at Embrapa Trigo many crosses are made annually to improve genetic variability with new local octoploids to develop secondary hexaploid triticales, followed by strong grain, disease tolerance, plant type selection and others.

Introduction

Triticale (X *Triticosecale* Wittmack) is an important crop for the winter growing season in Southern Brazil. The total triticale area in 2005 was approximately 131,000 hectares and, the same area is estimated for 2006 in Brazil. The average grain yield was 2,200 kg ha^{-1} in 2005, without irrigation. Although, triticale production costs through the years were slightly lower than wheat, mainly due to a superior resistance to foliar diseases, the rainy environment associated to no-till system, with more humidity and stubble on surface soil, resulted in an increase on diseases selection pressure. Many released cultivars previously characterized as resistant to foliar diseases are now moderately susceptible or even susceptible. For more than a century, rye and wheat have been bred and grown in Brazil, contributing to the accumulation of favorable genes through natural selection. The adaptive value of these genes and genetic variability should be brought into national triticale breeding programs. Developing new hexaploid triticales will certainly need improved octoploid types. Crosses among these improved octoploid and hexaploid triticales, rye or wheat genotypes by back crosses to hexaploid triticale cultivars, need to be continuously made, in order to guarantee better selection efficiency.

The major challenges for Brazilian triticale breeding programs are increasing grain yield potential, disease resistance, and nutritional value; reducing pre-harvest sprouting; and improving or maintaining the adaptation to acid soils.

Materials and Methods

Two hundred and fifty to three hundred crosses between hexaploid triticales are carried out each year. Germplasm introduction is important source to increase the genetic variability and used to be the main source for developing new cultivars in Brazil, but currently, the genetic basis is increased and new triticale genotypes are developed by crossing wheat and rye cultivars adapted to Brazilian conditions. Field selection for plant type and diseases resistant plants is carried out from F2 onwards followed by severe screening for grain formation. Due to the great environment pressure, striken disease selections are

possible under natural conditions in early generations. In advanced stages (F6 or more), all lines selected are submitted to artificial inoculation for screening evaluation to scab, spot blotch, tan spot and blast and to agronomics evaluations and characterizations parallel to the yield and official trials.

Results and Discussion

The varieties Embrapa 53 (LT1117.82/Civet//Tatu), BRS 148 (Yogui/Tatu) and BRS 203 (LT-1/Rhino) developed by Embrapa Trigo with CIMMYT's cooperation, represented more than 70% of triticale seed availability in Brazil in 2004. In 2005, 'BRS Minotauro', the first truly Brazilian triticale cultivar, was registered. 'BRS Minotauro' is derived from a cross, made at Embrapa Trigo, between the primary octoploid 'OCTO 92-3' [hexaploid wheat line 'PF 89358' (BR 35*3//BR 14*2/LARGO) and the Brazilian rye 'Centeio BR 1'] crossed with the hexaploid triticale 'Triticale BR 4' (Beagle/Cinamon//Muskox).

New lines have been improved by crosses and selections to fulfill the requirements of cereal growers aiming, resistance or tolerance to the most important diseases, grain quality and broad adaptation.

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