



CULTIVAR RELEASE

UFUS Guarani: new soybean cultivar for the state Minas Gerais

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ABSTRACT - *Day by day alternatives in genetic improvement are being sought to ensure higher crop productivity. UFUS Guarani developed by the Federal University of Uberlandia is resistant to natural dehiscence and to the diseases: Sudden death syndrome (SDS), frog-eye leaf spot, downy mildew, bacterial pustule, stem canker and stem necrosis; the potential yield is 3494 kg ha⁻¹, the grain oil content is 18% and protein content 38%.*

Key words: *Glycine max*, genetic improvement, disease resistance.

INTRODUCTION

The productivity of soybean (*Glycine max* L. Merrill) has increased enormously while losses in the production process have been reduced. The crop has a special position in the Brazilian agribusiness segment, expanding the agricultural front by the development of new cultivars with broad adaptation to different climate conditions, tolerance to biotic and abiotic factors, pest and disease resistance, and mainly with a high yield per planted area.

It is essential that during the development of a cultivar the line in question be evaluated at several sites and in different years due to the genotype - environment interaction, so as to express the entire genetic potential of the line, minimizing environmental effects as far as possible.

The genetic diversity of the commercial soybean cultivars is low due to the small number of ancestors, resulting in a narrow genetic base. However, each year genetically divergent parents are hybridized in new combinations, expanding the genetic and morphological

diversity which, according to Nogueira et al. (2009), is the result of the efforts of a series of breeding programs.

Thus, the improvement programs have favored the productive sector, bringing new cultivars on the market that are more productive and tolerant to adversity. In the case of common bean for example, the cultivar IAC-Boreal has increased tolerance to anthracnose, a major cause of crop losses, as well as a higher yield (Chiorato et al. 2008). The purpose of divulging the soybean cultivars recommended specifically for cultivation in each state is to inform technicians and entrepreneurs in the productive sector about the technical advance achieved every year in the creation of new cultivars of the crop (Embrapa 2008).

The breeding program of the Federal University of Uberlandia (UFU) was initiated in 1995 with a Research Center base at the Fazenda Capim Branco in Uberlândia, Minas Gerais, and sub-centers at five other locations (Alto Taquari, Mato Grosso; Chapadinha, Maranhão; Luis Eduardo Magalhães, Bahia; Bom Jesus, Piauí; and Uberaba, Minas Gerais) for experimental studies of genetics and

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crop breeding. As results of studies of the program, the first two cultivars called UFU Impacta and UFU Riqueza were released in 2003, both registered and protected by patent by the plant variety protection service of Brazil (Serviço Nacional de Proteção de Cultivares - SNPC) of the Ministry of Agriculture. In 2004 and 2005, two other cultivars, UFU Milionária and UFU Xavante, were released, both registered and currently in the final process of patenting.

The cultivar UFUS Guarani was developed at UFU, in Uberlândia, MG, to make a cultivar available for producers and companies that would provide some advantage over the others on the market. The cultivar is high-yielding, resistant to the major crop diseases, lodging-resistant and has indeterminate growth habit and a regular cycle (emergence to harvest) of 123 days.

Improvement methods

The UFUS Guarani cultivar was derived from the biparental cross between the cultivars FT 2000 and Emgopa 302, at UFU, Uberlândia-MG, in 1996. The Single Seed Descent method was used to establish segregating generations. Over the generations, low-yielding and the most pest and disease-susceptible plants were eliminated. The cross was named 96UFU80 until plant selection and harvest in the growing season 2000. At harvest, the line 96UFU80-78 was identified as promising, in view of its tolerance to various diseases that had attacked the area during plant development.

First field tests were performed in the growing season of 1999, giving rise to the progenies, from which the best plants were selected and in the following year the best progenies. In the 2000/2001 season, the lines were first tested in final trials, where the best genotype was selected, to be included in the VCU trials in three consecutive years 2000/2001/2002 in four counties of Minas Gerais. Throughout the development, this genotype was reported to be outstanding among the other lineages tested in line 99UFU80-78 with regard to disease resistance, productivity and yield stability; it was named UFU-302 and subsequently UFUS Guarani. The production of genetic seed was initiated in 2007.

Performance characteristics

The new cultivar was tested in compliance with the requirements of the Ministry of Agriculture and Livestock for tests of Value for Cultivation and Use (VCU). It is recommended for cultivation in the State of Minas Gerais, in view of the better performance than of the controls

'Conquista' and 'UFV 19' in the growing seasons 2002/2003 and 2003/2004.

In the evaluations, the average yield of this cultivar was 3499 kg ha⁻¹, exceeding the controls 'Conquista' (3394 kg ha⁻¹) and 'UFV 19' (2974 kg ha⁻¹) (Table 1).

Table 1. Mean yield (MY) in kg ha⁻¹ and relative yield (RY) of the cultivar UFUS Guarani and two controls, in the growing seasons of 2002/2003 and 2003/2004, in four counties of Minas Gerais

Counties	Cultivar		
	UFV 19	Conquista	UFUS Guarani
		(kg ha ⁻¹)	
Uberlândia	3.248.00	3.038.00	3.954.00
Ituiutaba	3.032.00	3.250.00	3.546.00
Frutal	3.218.00	3.616.00	3.534.00
Iraí de Minas	2.397.00	3.662.00	2.960.00
MY (kg ha ⁻¹)	3.166.00	3301.00	3.778.00
RY (%)	100%	114.45%	119.33%

The grain oil content of 19% and protein content of 38% represent an option for raw material production for biodiesel or industrial use. Moreover, the productive potential exceeded 3954 kg ha⁻¹, provided that all recommended practices for the crop are applied.

Characteristics of the cultivar

The cultivar has the following characteristics: indeterminate growth habit, white flower color, light brown pubescence, black hilum, maturity of 123 days, average plant height of 81 cm and insertion height of the first pod of 12 cm, medium lodging resistance, high resistance to pod dehiscence (up to 15 days after the stage R8) and mean 100-seed weight of 16 grams.

In terms of resistance to pests and diseases, the cultivar is outstanding for being resistant to: stem canker - *Diaphorte phaseolorum* f. sp. *Meridionalis*; *Corynespora* leaf spot - *Corynespora cassiicola*; frog-eye leaf spot - *Cercospora sojina* (races 1-15 and race 23); powdery mildew - *Microspora diffusa*; sudden death syndrome (SDS) - *Fusarium solani*; brown stem rot - *Phialophora gregata*; bacterial pustule - *Xanthomonas campestris* pv. *glycines*; and Soybean mosaic virus - SMV, aside from the great advantage of facilitating fungicide application and penetration, due to the characteristic of indeterminate growth habit and medium maturity cycle. However, the cultivar is moderately susceptible to gall nematode *Meloidogyne incognita* and susceptible to the root-knot nematode *Meloidogyne javanica* and the soybean cyst nematode *Heterodera glycines* (Table 2).

Table 2. Disease resistance levels of cultivar UFUS Guarani

Diseases	Reaction			
	S	MS	MR	R
Brown spot			X	
Sudden death syndrome (SDS)				X
Frogeye leaf spot				X
Soybean mosaic virus			X	
Downy mildew				X
Powdery mildew			X	
Asian soybean rust		X		
Bacterial pustule				X
Stem canker				X
Stem necrosis				X
<i>Meloidogyne incognita</i>			X	
<i>Meloidogyne javanica</i>		X		

S: Susceptible, MS: Moderately Susceptible, MR: Moderately resistant, R: Resistant.

Basic seed production

Planting within the agroclimatic zoning of Minas Gerais is recommended, at a density of about 8-10 plants per meter, equivalent to 200-220 thousand plants per hectare, due to the indeterminate growth and tall plant height, and the descent from vigorous elite varieties, with excellent yield performance.

However, the traits of the cultivar make it an interesting option for soybean growers, who plan a

diversification and scaling of their production based on a more productive cultivar. The cycle is intermediate and adaptability good in the state of Minas Gerais; the planting period lasts from October 20 to December 12.

The UFU is responsible for the seed production of this cultivar. The cultivar UFUS Guarani is registered by MAPA / RNC (25 278); patent protection was granted on 08/04/2009 and the use of this cultivar is protected by MAPA/SNPC.

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