

## ‘UENF Rioparaíba’: a new common bean cultivar

Messias Gonzaga Pereira<sup>1\*</sup>, Elba Honorato Ribeiro<sup>1</sup>, Renato Santa-Catarina<sup>1</sup> and José Manoel de Miranda<sup>1</sup>

Crop Breeding and Applied Biotechnology  
18: 437-439, 2018  
Brazilian Society of Plant Breeding.  
Printed in Brazil  
<http://dx.doi.org/10.1590/1984-70332018v18n4c64>

**Abstract:** UENF Rioparaíba common bean cultivar from the black commercial group has a high grain yield (2351 kg ha<sup>-1</sup>), stability, and wide adaptation to the Northern and Northwestern regions of the state of Rio de Janeiro. The new cultivar contains 20.7% crude protein and has a mass of 1000 seeds equals to 256.8 g.

**Keywords:** *Phaseolus vulgaris* L., protein, grain yield, plant breeding.

### INTRODUCTION

Brazil is one of the leading producer and consumer of common bean (*Phaseolus vulgaris* L.) worldwide. In the 2017/2018 harvest season, Brazil produced 3.12 million tons of common bean in a total cultivated area of 3.18 million hectares, with grain yield of 981 kg ha<sup>-1</sup> (CONAB 2018).

Ramalho (2011) stated that the average gain in some of the most important crops in the country is 4.85% per year. Approximately 50% of this progress is ascribed to breeding. Disease resistance and tolerance to different abiotic factors are attributes of common bean breeding programs, whose primary objective is yield increase. Also, technological traits of the grains must be considered, as they determine product acceptance by consumers (Carbonell et al. 2003).

Common bean is cultivated in almost all Brazilian states. Moreover, it is grown in three different seasons, under different production systems, from subsistence agriculture to production processes that include modern technologies (Yokoyama 2002).

This wide range of conditions to which the common bean is subjected demands adapted cultivars. Therefore, in breeding programs, field test evaluations must be conducted in several environments to obtain a reasonable estimate of genotype x environment interaction. However, the simple knowledge of this interaction does not provide details on the performance of each genotype in the environmental variations (Cruz et al. 2004). Thus, the analysis of adaptability and stability allows greater safety in cultivars recommendation (Melo et al. 2007).

This paper aimed to describe the main traits of the new common bean cultivar from the black commercial group adapted to the Northern and Northwestern regions of the state of Rio de Janeiro, developed by UENF.

### PEDIGREE AND BREEDING METHODOLOGY

‘UENF Rioparaíba’ was developed by the common bean breeding program of Universidade Estadual do Norte Fluminense Darcy Ribeiro – UENF. The new

**\*Corresponding author:**  
E-mail: messiasgpereira@gmail.com

**Received:** 06 January 2017  
**Accepted:** 03 August 2018

<sup>1</sup> Universidade Estadual do Norte Fluminense  
Darcy Ribeiro, Av. Alberto Lamego 2000,  
Parque Califórnia, s/n, 28.013-602, Campos  
dos Goytacazes, RJ, Brazil

cultivar was originated from a bi-parental cross between Ouro Negro × Xodó, performed in 1995 (Figure 1). The generation was advanced in two cycles per year, in Campos dos Goytacazes (lat 21°45' S, long 41°20' W, alt 11 m asl), in the northern state of Rio de Janeiro. The procedure was carried out by the single seed descent method (SSD), up to the F<sub>6</sub> generation, when plants were selected. This same generation advancement methodology was also for the development of cultivar UENF 2014 (Pereira et al., 2018). Each F<sub>6</sub> plant originated a Recombinant Inbred Line (RIL), and the RIL number 129 was selected and registered in the Ministry of Agriculture, Livestock, and Supply - MAPA under the name 'UENF Rioparaíba.' This cultivar is adapted to the Northern and Northwestern regions of the state of Rio de Janeiro.

After the generations advancement, the obtained RILs plus four control cultivars were evaluated in yield trials from 2002 to 2006. The 30 superior RILs were selected based mainly on grain yield. Yield trials were conducted in the North and Northwest regions of the state of Rio de Janeiro, in Campos dos Goytacazes (lat 21° 45' S, long 41° 20' W, alt 11 m asl), Bom Jesus do Itabapoana (lat 21° 08' S, long 41° 40' W, alt 88 m asl), and Itaocara (lat 21° 40' S, long 42° 04' W, alt 76 m asl). In 2008, the 30 superior RILs were evaluated in four yield trials in two locations (Campos dos Goytacazes and Itaocara), from April to August and from September to December.

In 2010 and 2011, six yield trials were conducted according to the rules of the VCU (Value of Cultivation and Use) of the Brazilian Government. In these yield trials, 29 lines and three control cultivars (Xamego, BR1-Xodó, and BR3-Ipanema) were evaluated. Yield trials were carried out from April to August in 2010 and 2011, in two locations in Campos dos Goytacazes (Colégio Agrícola Antonio Sarlo and Centro Estadual de Pesquisa em Agroenergia e Aproveitamento de Resíduos - CEPAAAR) and one location in Itaocara-RJ, (Centro Estadual de Pesquisa e Desenvolvimento da Pecuária Leiteira - CEPDPL), totaling six yield trials (Table 1).

**PERFORMANCE**

The common bean cultivar UENF Rioparaíba showed grain yield average equal to 2351 kg ha<sup>-1</sup>, being superior to the control cultivars: 30.76%, in relation to Xamego; 22.56%, in relation to BR1-Xodó; and 9.10%, in relation to Ipanema (Table 1). The new cultivar is an excellent choice for producers in the North and Northwest regions of the state of Rio de Janeiro, mainly because of its superiority in grain yield when compared with that of the control cultivars that are recommended for cropping in this state.

**OTHER CHARACTERISTICS**

The common bean cultivar UENF Rioparaíba has a plant height of 71.84 cm; indeterminate growth habit; less development of lateral branches due to the strong apical dominance of the main stem. The cultivar flowering occurs at 30.2 days after germination, and flowers are violet. The pods are green with purple stripes when ripe, and yellow with spots or stripes when dried, reaching harvest maturity at 81.8 days after seedlings emergence. The seeds of 'UENF Rioparaíba' exhibit black integument, opaque brightness, oblong format, 256.78 g of 1000 seeds mass, and 113.7% of seed water absorption when compared with its initial mass. The cooking time of 'UENF Rioparaíba' is 26.2 minutes,

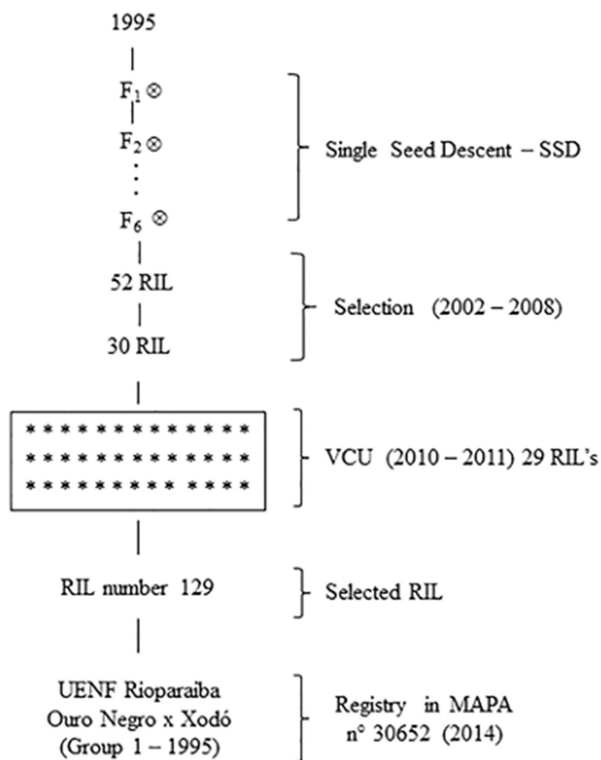


Figure 1. Pedigree of the common bean cultivar UENF Rioparaíba.

**Table 1.** Relative grain yield in kg ha<sup>-1</sup> of the common bean cultivar UENF and control cultivars in three environments and two years

Environment (E)	Year	Grain yield (kg ha <sup>-1</sup> )			
		UENF Rioparaíba	Xamego	BR1-Xodó	BR3-Ipanema
E1	2010	2372	1798	1912	2154
E2	2010	1988	948	1426	1835
E3	2010	2564	1853	1856	2417
E1	2011	2175	2283	2504	1992
E2	2011	2697	1960	2395	2363
E3	2011	2312	1945	1415	2170
Overall mean		2351	1798	1918	2155
Relative yield (%) <sup>1</sup>		-	30.76	22.56	9.10

<sup>1</sup> Relative yield (%) of UENF Rioparaíba common bean cultivar in relation to the control cultivars Xamego, BR1-Xodó, and BR3-Ipanema; E1: Centro Estadual de Pesquisa em Agroenergia e Aproveitamento de Resíduos - CEPAAAR, Campos dos Goytacazes-RJ.; E2: Colégio Agrícola Antonio Sarlo, Campos dos Goytacases-RJ.; E3: Centro Estadual de Pesquisa e Desenvolvimento da Pecuária Leiteira - CEPDPL, Itaocara-RJ.

and the seed has 20.7% of crude protein. This cultivar is moderately resistant to angular leaf spot and anthracnose and resistant to common bacterial blight and bean rust under the yield trials conditions.

## SEED PRODUCTION

The common bean cultivar UENF Rioparaíba was registered by the Ministry of Agriculture, Livestock and Supply - MAPA in 2014, under the number 30652. The seeds of this cultivar are produced in the seed production area of UENF, in Itaocara-RJ. The University is responsible for the production of cultivar UENF Rioparaíba seeds.

## REFERENCES

- Carbonell SAM, Carvalho CRL and Pereira VR (2003) Cooking quality parameters of common bean genotypes, sown in different seasons and locations. *Bragantia* **36**: 369-379.
- CONAB - Companhia Nacional de Abastecimento (2018) *Feijão total Brasil – serie histórica de área plantada 1976/77 a 2018/19*. Available at <<https://www.conab.gov.br/info-agro/safras/serie-historica-das-safras?start=20>>. Accessed on October 22, 2018.
- Cruz CD, Regazzi AJ and Carneiro PCS (2004) *Modelos biométricos aplicados ao melhoramento genético*. v.1, Editora UFV, Viçosa, 480p.
- MAPA (2014) *Ministério da Agricultura, Pecuária e Abastecimento. Cultivarweb Gerenciamento de Informação*. Available at <<http://extranet.agricultura.gov.br/php/snpc/culti>>.
- Melo LC, Melo PGS, Faria LC, Diaz JLC, Peloso MJ, Rava CA and Costa JGC (2007) Interaction with environment and stability of common bean genotypes in the South Centre Region of Brazil. *Pesquisa Agropecuária Brasileira* **42**: 715-723.
- Pereira MG, Santa-Catarina R, Ribeiro EH and Miranda JM (2018) UENF 2014: a new common bean cultivar. *Crop Breeding and Applied Biotechnology* **18**: 126-129.
- Ramalho MAP (2011) Breeding self-pollinated plants. *Crop Breeding and Applied Biotechnology* **S1**: 1-7.
- Yokoyama LP (2002) *Tendências de mercado e alternativas de comercialização do feijão*. Embrapa Arroz e Feijão, Santo Antônio de Goiás, 4p. (Comunicado Técnico, 43).