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BRS Juruti: the first Brazilian habanero-type hot pepper cultivar

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ABSTRACT

The Habanero hot pepper group is not well known in Brazil, despite its origin in the Amazon. Nevertheless, domestic and international markets have been increasing the demand for this type of hot pepper. The Brazilian agroindustry is interested in supplying part of this demand with high quality products and competitive prices, and it needs well-adapted cultivars. To fill this gap, Embrapa Vegetables developed the Habanero pepper cultivar BRS Juruti, which meets the demands of both the market for fresh fruit and the processing agroindustry of mash and sauces. Cultivar BRS Juruti has red fruits and yields around 50 t/ha (36,000 plants/ha). Fruit pungency is circa 260,000 SHU and fruits have high content of vitamin C (122 mg/100 g). BRS Juruti is resistant to several viruses, *Oidiopsis sicula*, and *Meloidogyne javanica*, and presents intermediate resistance to key bacterial diseases; and is highly uniform in comparison with the original population. Cultivar BRS Juruti is recommended for open field (specially adapted to the Central Region of Brazil), as well as greenhouse/screenhouse cultivation. BRS Juruti has been registered (RNC 32010) and protected (DOU 01/09/2015) in the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA). Breeders' seed is being made available to interested parties in the private sector.

Keywords: *Capsicum chinense*, breeding, resistance, processing, capsaicin.

RESUMO

BRS Juruti: primeira cultivar brasileira de pimenta habanero

A pimenta do tipo habanero não é muito conhecida no Brasil, apesar de sua origem na Amazônia. Recentemente, os mercados nacionais e internacionais têm aumentado a demanda por esse tipo de pimenta. A agroindústria brasileira está interessada em atender parte dessa demanda com produtos de alta qualidade e com preços competitivos, mas, para isso, necessita de cultivares bem adaptadas às nossas condições edafoclimáticas. A cultivar de pimenta habanero BRS Juruti foi desenvolvida pela Embrapa Hortaliças visando tanto o mercado de frutos frescos como a indústria processadora de pastas e molhos. A cultivar BRS Juruti tem frutos de coloração vermelha quando maduros, é altamente uniforme e apresenta potencial produtivo de cerca de 50 t/ha (36.000 plantas/ha). Os frutos da cultivar BRS Juruti têm pungência de cerca de 260.000 SHU e alto teor de vitamina C (122 mg/100 g de fruto). A cultivar BRS Juruti é resistente a vários vírus, *Oidiopsis sicula* e *Meloidogyne javanica*, e apresenta resistência intermediária a doenças bacterianas. A cultivar BRS Juruti é recomendada para cultivo em campo aberto (especialmente adaptada à Região Central do Brasil), bem como para cultivo protegido. A cultivar BRS Juruti foi registrada (RNC 32010) e protegida (DOU 01/09/2015) no Ministério da Agricultura, Pecuária e Abastecimento (MAPA). Sementes genéticas da cultivar BRS Juruti serão disponibilizadas ao setor privado.

Palavras chave: *Capsicum chinense*, melhoramento, resistência, processamento, capsaicina.

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The production of hot peppers in Brazil has, as its key pillar, small, family-run farms. It is, therefore, of high social importance. Peppers in many cases are the primary source of income of these families, and the integration between small farmers and the *Capsicum* processing industry is an important characteristic of this segment (Reifschneider, 2000). Habanero-type peppers (*Capsicum chinense*) are beginning to be of interest to the Brazilian market; so far, there have been no cultivars specifically developed to

Brazilian agroecosystems. The habanero group is not well known in Brazil, despite its origin in the Amazon. Nevertheless, domestic and international markets have been increasing the demand for this type of pepper, particularly in the United States of America and Europe, in the form of mash. The Brazilian agroindustry is interested in supplying part of this demand with high quality products and competitive prices, and it needs well-adapted cultivars. A significant breeding effort to provide the sector with high-yielding cultivars

is made by Embrapa Vegetable's *Capsicum* breeding program, which has been supported by the The National Council for Scientific and Technological Development (CNPq) and the private sector.

A typical habanero plant is a bush with about 1 m in height and intermediate or erect growth habit. Its pod is lantern-shaped and is green in color when immature and red, orange, yellow, white or brown when ripe. Fruit size ranges from 2.9 to 6.0 cm long by 2.5 to 4.6 cm wide and 7 to 12

g (Votava & Bosland, 2004; DeWitt & Bosland, 2006; Pino *et al.*, 2006; DeWitt & Bosland, 2009; Fery & Thies, 2010; Crosby *et al.*, 2013; Reifschneider *et al.*, 2014). The habanero pepper has high heat with pungency ranging from 250,000 to 700,000 SHU (Scoville Heat Units) (Canto-Flick *et al.*, 2008).

Embrapa's *Capsicum* breeding program is considered to be the largest public investment in pepper breeding in Brazil and has targeted different pepper-types and species. Since 1980's, this breeding program has released several cultivars, inbred lines, populations, and hybrids resistant to different pathogens (Reifschneider *et al.*, 2013). Most recent efforts are concentrated on the development of new, uniform, high yielding, high nutrition and disease resistant habanero-type cultivars. In 2011, a synthetic base population of habanero with a broad genetic base was established. Such population will certainly be the source for the selection of new cultivars in the next 20-30 years (Reifschneider *et al.*, 2014). In parallel, habanero pepper lines with superior characteristics were developed for the Brazilian market. The main objective of this work was to develop a habanero-type cultivar with high pungency, yield, and uniformity, to meet both the market for fresh fruit and processing agroindustry and adapted to the Central region of Brazil.

PEDIGREE

BRS Juruti (Figure 1) was derived from the segregating population CNPH 4159, which is part of the germplasm collection of *Capsicum* spp. at Embrapa Vegetables. Five generations of plant selection and selfing were performed until the progenies showed no segregation. During each generation, selection for agronomic and processing traits relevant to the industry was undertaken. Selection was based on plant and fruit characteristics, such as plant architecture and height, shape and size of fruit, mature fruit color, pungency, high yield, and disease resistance. BRS Juruti has red fruits and yields around 50 t/ha (36,000 plants/



Figure 1. Ripe fruits of habanero pepper cultivar BRS Juruti with the typical dark red color (frutos maduros da cultivar de pimenta habanero BRS Juruti com a típica coloração vermelho escuro). Brasília, Embrapa Hortaliças, 2015.

ha). Fruit pungency is *circa* 260,000 SHU and fruits have high content of vitamin C (122 mg/100 g). BRS Juruti is resistant to several viruses, *Oidiopsis sicula*, *Meloidogyne javanica*, and presents intermediate resistance to key bacterial diseases; and is highly uniform in comparison with the original population. The new cultivar has been registered (RNC 32010) and protected (DOU 01/09/2015) in the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA). Breeders' seed is being made available to interested parties in the private sector.

PERFORMANCE

BRS Juruti plant presents intermediate growth habit, and is around 90 cm high by 60 cm wide. Pods are lantern-shaped, the standard shape of habaneros, turn from light green to bright red when mature, are 5.1 cm long by 4.2 cm wide and have 1.9 mm in wall thickness. In growing conditions of Central Brazil during the dry season, harvest of ripe fruit begins around 90 days after seedlings transplanting. Fruits are very hot, with 260,000 SHU (Scoville Heat Unit) of total capsaicinoids (197,600 SHU of capsaicin, 59,800 SHU of

dihydrocapsaicin and 2,600 SHU of norcapsaicin). Vitamin C content reaches 122 mg/100 g of fruit (Teodoro *et al.*, 2013).

BRS Juruti presents field resistance to the tospovirus Tomato Spotted Wilt Virus (TSWV), Pepper Yellow Mosaic Virus (PepYMV), and Potato Virus Y (PVY); resistance to powdery mildew (*Oidiopsis sicula*) and to *Meloidogyne javanica*; and intermediate resistance to *Ralstonia solanacearum* biovar 1, *Xanthomonas euvesicatoria* and *X. gardneri*.

BRS Juruti demands high temperature for growing. It is sensitive to low temperatures and intolerant to frost. In temperate climate regions, cultivar BRS Juruti should be grown in the months of higher temperatures, to favor germination, plant growth and fruit set. BRS Juruti is recommended for open field (specially adapted for the Central Region of Brazil), as well as for greenhouse/screenhouse cultivation. It was evaluated in several Brazilian states (SP, MG, GO, and DF), demonstrating good adaptation and high yield, which reached 26 to 50 t/ha, depending on the spacing used and the region. The open pollinated cultivar BRS Juruti has consistently had yields higher than the american hybrid 'Caro-Tex-312' (28.9 t/ha, 32,600 plants/ha) (Crosby *et al.*,

2013).

BRS Juruti was developed to meet both the fresh fruit market and the processing industries, particularly for the production of hot pepper paste (“mash”) and sauces, in addition to the potential use for the dehydration of whole fruit to obtain spicy paprika. Many gourmet products use habanero pepper for aggregating pungency, flavor and taste, such as fruit jellies, flavored vinegars, and different kinds of seasoning powder, nuts, potato chips, cookies, cheeses and sausages.

SEED MAINTENANCE AND DISTRIBUTION

Embrapa Vegetables will provide seeds of BRS Juruti, under contract, to interested seed-producing companies.

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