

‘NuMex Heritage Big Jim’ New Mexican Chile Pepper

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The New Mexico State University Chile Pepper Breeding and Genetics Program announces the release of ‘NuMex Heritage Big Jim’ chile pepper (*Capsicum annuum* L.). ‘NuMex Heritage Big Jim’ is an open-pollinated, improved, New Mexican pod-type cultivar. The name was chosen to distinguish the newly selected cultivar from the original cultivar, NuMex Big Jim, while retaining its association. ‘NuMex Heritage Big Jim’ has superior flavor, a uniform and higher heat level, greater plant and pod uniformity, and higher yield as compared with the current commercially available ‘NuMex Big Jim’ chile pepper.

There is a renewed interest in heirloom vegetables in the United States because of the variety of shapes, sizes, colors, and, most importantly, the flavor they provide (Creasy, 1999; McLaughlin, 2010). There is no official definition for what constitutes an heirloom vegetable. Most sources agree that heirloom cultivars, also called heritage or vintage cultivars, should be open-pollinated and have a well-established history (Harris, 2007; Iannotti, 2012). One such heirloom legacy is ‘NuMex Big Jim’. The New Mexican-type chile pepper cultivar, NuMex Big Jim, was released by New Mexico State University in 1975 (Nakayama, 1975). It is listed in the Guinness Book of Records as producing the world’s largest pepper pod at 33.75 cm (13.5 inches) long (Coon et al., 2008). Because of the large pods, the cultivar is a favorite of home gardeners and chefs for making chile relleno, a stuffed chile pepper pod.

Changes have occurred to the original ‘NuMex Big Jim’ that includes yield, maturity date, plant habit, and fruit characteristics. Growers state that ‘NuMex Big Jim’ fruit is much milder than it was in the past. Also, when released in 1975, one of the complaints about the original ‘NuMex Big Jim’ was that

the heat level (pungency) varied greatly from one plant to the next. It has been reported that ‘California Wonder’, another heirloom cultivar, is so variable that it should not be used as a control in experiments (Votava and Bosland, 2002). Selection within an heirloom cultivar to recreate as close as possible the original cultivar is termed a “rehabilitation” of the heirloom variety (Idlebrook, 2011). Therefore, a program was initiated to “rehabilitate” the current, commercially available cultivar NuMex Big Jim.

Growers requested our breeding program to rehabilitate the commercially available ‘NuMex Big Jim’ by selecting for a more uniform heat level, maturity date, plant habit, and increased yield. A similar request was given for ‘New Mexico 6-4’ and culminated in the release of ‘NuMex Heritage 6-4’ (Bosland, 2012).

Origin

In 1998, a 200-seed sample of ‘NuMex Big Jim’ was obtained from the Plant Germplasm Preservation Research Unit (PGPRU) at the National Center for Genetic Resources Preservation in Ft. Collins, CO. The PGPRU received the seed of ‘NuMex Big Jim’ in 1977 and placed it in cryogenic storage. It was our assumption that because the seed was deposited just two years after the release of ‘NuMex Big Jim’, it was genetically most similar to the original ‘NuMex Big Jim’. The 200-seed sample of ‘NuMex Big Jim’ from the PGPRU was first increased in a greenhouse and bulked. The next year, a larger seed increase was accomplished with 300 plants under isolation cages (Bosland, 1993) at the Leyendecker Plant Science Research Center, 5 km south of Las Cruces, NM. The field soil at the Leyendecker Plant Science Research Center is a Glendale loam (pH 7.7).

Standard cultural practices for chile pepper production in southern New Mexico were followed (Bosland and Walker, 2005). In the third year, a population of more than 1000 plants was grown at the Leyendecker Plant Science Research Center. Single plant selection with pedigree breeding was accomplished. A total of 55 plants were selected.

In 2002, the 55 single plant selections were evaluated in 30-foot observation plots. From those plots, 27 lines were selected, and at the same time, a seed increase of each of the 27 lines was accomplished under isolation cages. These advanced breeding lines demonstrating superior performance were compared for yield and other horticultural traits in a randomized complete block design with four replications during 2005, 2006, and 2007. The current commercially available ‘NuMex Big Jim’ was used as the control cultivar. By the third year of evaluation, accession 05C442 had established its superiority over the other accessions and was chosen to be released as ‘NuMex Heritage Big Jim’.

Description

‘NuMex Heritage Big Jim’ did not differ from the commercially available ‘NuMex Big Jim’ in plant height, plant width, or maturity date (data not shown). The plants of ‘NuMex Heritage Big Jim’ have single, strong main stems and are uniformly branching, providing foliage cover for sunscald protection and support for an excellent fruit set. ‘NuMex Heritage Big Jim’ did not differ in pod length and wall thickness as compared with the commercially available ‘NuMex Big Jim’ (Table 1). Plants produce pods with a smooth, thick flesh ranging from 15 to 20 cm (6 to 8 inches) in length (Fig. 1). ‘NuMex Heritage Big Jim’ averaged an 11% increase in yield as compared with the commercial ‘NuMex Big Jim’.

The heat level, an important quality trait, has been stabilized and is significantly higher. The heat level was determined by a reverse-phase high-performance liquid chromatography system with fluorescence detectors. This system is an efficient, reliable, and reproducible method (Collins et al., 1995). A random sample of 10 fruits from each of four replications over the three years determined the Scoville Heat Units (SHUs). ‘NuMex Heritage Big Jim’ has a relative high heat level of 9000 SHUs that is $\approx 45\%$ higher in heat level than the original ‘NuMex Big Jim’. Because

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Table 1. Fruit yield and fruit characteristics for ‘NuMex Heritage Big Jim’ and the current commercially available ‘NuMex Big Jim’ compared over the years 2005, 2006, and 2007.

	Yield ^a (tons/acre)	Fruit length ^b cm (inches)	Wall thickness ^c (mm)	Heat ^d SHU
NuMex Heritage Big Jim	20.5 a	19.15 (7.54) a	4.49 a	9482 a
NuMex Big Jim	18.5 b	18.14 (7.15) a	4.71 a	6510 b

^aYield is the field green fruit yield less the weight of diseased or undesirable fruits from four replications per year.

^bFruit length and wall thickness were the average of 10 fruits from each of four replications over three years.

^cScoville Heat Units (SHUs) were calculated from the conversion of 1 mg·kg⁻¹ capsaicinoid = 16 SHU per dry weight basis. The average SHU was obtained from 10 fruits from each of four replications over three years.



Fig. 1. Fruits of 'NuMex Heritage Big Jim'.

the plant-to-plant variation in heat was noted when the original 'NuMex Big Jim' was released, a decision had to be made to select for a certain heat level for the 'NuMex Heritage Big Jim', and we chose the hotter level of New Mexican pod types. The calyx is easily removed from the pod by hand (personal observation). Most importantly, 'NuMex Heritage Big Jim' captured the traditional New Mexican pod-type flavor. An organoleptic test in the field by members of the New Mexico Chile Commission, ≈ 15 individuals, determined that 'NuMex Heritage Big Jim' possessed the traditional flavor associated with New Mexican-type chile peppers.

In addition, gas chromatography in combination with a mass spectrometer quantified the increase in flavor (volatile components) (Rodriguez-Burruezo et al., 2010). The fruit volatile fraction of green mature pods was isolated by solid phase microextraction (SPME) and analyzed by gas chromatography–mass spectrometry. Solid phase microextraction analysis was done using a Varian Model 3400 GC with a RTX-5 column (30 m \times 0.25-mm fused silica capillary, 0.25-mm film thickness) coupled to a Saturn 2000 ion trap

mass spectrometer. A 0.5-g sample of fresh green chile pepper tissue was sealed into a 2-mL autosampler vial followed by SPME analysis. The vial was heated for 5 min at 60 °C and a 100-mm polydimethylsiloxane fiber (Supelco) was exposed for 2 min. The fiber was allowed to desorb in the injector for 1 min. The mass spectrometry produced a mass chromatogram showing the number of volatile compounds in the samples. Remarkable differences were found for the amount of volatile compounds between 'NuMex Heritage Big Jim' and 'AZ-20', a standard green chile New Mexican pod type currently grown in southern New Mexico. In total volatile compounds, 'AZ-20' had 48, whereas 'NuMex Heritage Big Jim' had 207, an increase of more than 3-fold.

Availability

'NuMex Heritage Big Jim' is being offered by the Biad Chili Ltd. Co. to commercial growers. Seed can be obtained by contacting Biad Chili, 6060 S. Main Street, Mesilla Park, NM 88047, phone (575) 525-0034. For requests of 5 pounds or less, the seed is

available from the Chile Pepper Institute, New Mexico State University, P.O. Box 30003, MSC 3Q, Las Cruces, NM 88003. The Chile Pepper Institute can be contacted at <<http://www.chilepepperinstitute.org>>, hotchile@nmsu.edu, or phone: (575) 646-3028.

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