

‘NuMex Heritage 6-4’ New Mexican Chile Pepper

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Additional index words. *Capsicum annuum*, heirloom, flavorful, open-pollinated

New Mexico State University has a long history of chile pepper (*Capsicum annuum* L.) improvement. The chile pepper improvement program began in 1888 with Dr. Fabian Garcia, who released the first New Mexican pod type. Today, all New Mexican pod type chile peppers commercially grown gained their genetic base from cultivars first developed at New Mexico State University. The New Mexico Chile Pepper Breeding and Genetics Program announces the release of ‘NuMex Heritage 6-4’ an open-pollinated, improved, New Mexican pod-type cultivar (Fig. 1). The name was chosen to distinguish the new selected cultivar from the original cultivar, New Mexico 6-4, while retaining its association. ‘NuMex Heritage 6-4’ has superior flavor compared with the currently grown standard green chile pepper.

Origin

In 1950, at New Mexico State University, Dr. Roy Harper released ‘New Mexico 6’, a selection made in 1947 from a non-designated local chile (Harper, 1950). In 1957 ‘New Mexico 6’ was modified by reducing the heat level of the pods and renamed ‘New Mexico 6-4’ (Coon et al., 2008). Unfortunately, over time, the purity and quality of ‘New Mexico 6-4’ have deteriorated or “run out” to use an industry term. The ‘New Mexico 6-4’ cultivar lost the very characteristics that made it so successful. Cultivars change over time for various reasons, including cross-pollination, seed mixes, mislabeling, etc. Changes seen in ‘New Mexico 6-4’ include variability in heat level, yield, maturity date, and plant habit as well as differences in fruit characteristics. Most importantly, growers state that ‘New Mexico 6-4’ lost its “traditional flavor.” There

is heightened interest in flavorful vegetables in the United States with organizations such as The Slow Food USA Ark of Taste promoting the principle of “rediscover, describe, and promote forgotten flavors around the country.” Because of the demand for better flavor, there is a need for flavor to be considered an important quality parameter in pepper breeding (Eggink et al., 2012; Jarret et al., 2007). Selection within a 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 cultivar New Mexico 6-4.

In 1998, a 200-seed sample of the original ‘New Mexico 6-4’ 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 ‘New Mexico 6-4’ in 1962 and placed it in cryogenic storage. The 200-seed sample of ‘New Mexico 6-4’ 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. In the third year a population of more than 1000 plants was grown at the Leyendecker Plant Science Research Center with members of the New Mexico Chile Commission invited to assist with selection, choosing those plants with superior phenotypic traits, including plants they felt captured the original taste and flavor of ‘New Mexico 6-4’. The single plant selections were caged, allowed to produce selfed seed, and re-planted in the fourth year in 30-foot observation plots for further selection. The best performing 27 breeding lines were then evaluated in 30-foot observation plots for another year. From those 27 breeding lines, six advanced breeding lines that demonstrated superior performance for yield and other horticultural traits were compared in replicated trials for 3 years. Breeding line 04C377 was chosen for release as ‘NuMex Heritage 6-4’.

Description and Performance

‘NuMex Heritage 6-4’ maintains the pod length, wall thickness, and heat level of the original ‘New Mexico 6-4’ (Table 1). ‘NuMex Heritage 6-4’ has significantly greater yield,

up to 32% higher, than the original ‘New Mexico 6-4’. The plants have single, strong main stems and are uniformly branching, providing foliage cover for sunscald protection and support for an excellent fruit set. Plants produce pods with a smooth, thick flesh ranging from 15 to 20 cm (6 to 8 inches) in length. A random sample of 10 fruits from each of four replications over the 3 years was used to determine the Scoville Heat Units (SHUs). ‘NuMex Heritage 6-4’ has a medium heat level of ≈1500 SHUs. 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). The calyx is easily removed from the pod by hand (personal observation).

Most importantly, ‘NuMex Heritage 6-4’ captured the traditional ‘New Mexico 6-4’ flavor. An organoleptic test in the field by members of the New Mexico Chile Commission determined that ‘NuMex Heritage 6-4’ possessed the traditional flavor associated with ‘New Mexico 6-4’. In addition, gas chromatograph 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 × 0.25-mm fused silica capillary, 0.25-μm film thickness) coupled to a Saturn 2000 ion trap mass spectrometer. A 0.5-g sample of fresh green chile 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-μm 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



Fig. 1. Fruits of ‘NuMex Heritage 6-4’.

Received for publication 5 Mar. 2012. Accepted for publication 2 Apr. 2012.

A contribution of the New Mexico Agricultural Experiment Station, New Mexico State Univ., Las Cruces, NM.

I gratefully acknowledge the technical assistance of Dr. Adrian Rodriguez for the gas chromatography in combination with a mass spectrometer analysis of volatile chemical compounds in the fruits and thank Dr. Eric Votava for his assistance in developing this cultivar.

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Table 1. Fruit yield, fruit characteristics, and plant characteristics for 'NuMex Heritage 6-4' and the 'New Mexico 6-4' compared over 3 years.

	Yield ^z (tons/acre)	Fruit length ^y (inches)	Wall thickness ^y (mm)	Heat ^x (SHU)
NuMex Heritage 6-4	21.3 ^w	6.7 NS	3.7 NS	1559 NS
New Mexico 6-4	17.1	6.6	3.8	1786

^zYield is the field green fruit yield less the weight of diseased or undesirable fruits.

^yFruit length and wall thickness were the average of 40 fruits.

^xScoville Heat Units (SHU), 1 mg·kg⁻¹ capsaicinoid = 16 SHU per dry weight basis.

^wSignificant at $P \leq 0.01$, NS = non-significant, by t test.

between 'NuMex Heritage 6-4' and 'AZ-20', a standard green chile cultivar currently grown. In total volatile compounds, 'AZ-20' had 48 and 'NuMex Heritage 6-4' had 306, an increase of more than sixfold.

Lastly, at New Mexico State University chile pepper field day lunches in 2009–2011, 'NuMex Heritage 6-4' roasted green chile was served. The attendees, which included researchers, staff, students, and the general public, all commented that it was the best-flavored green chile they had ever tasted (personal observation).

The cultivar is released for green chile use, so red pod characteristics were not measured, but anecdotal evidence from a New Mexico red chile pepper processor suggests red chile yield of 5000 pounds per acre in 2008 (personal communication).

Availability

'NuMex Heritage 6-4' is being offered by the Biad Chili Ltd. Co. to commercial growers. Seed can be obtained by contacting Mr. Chris Biad, 6060 S. Main Street, Mesilla Park, NM 88047, phone: (575) 525-0034. For requests of 1 pound 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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