

'NuMex Garnet' Paprika

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The New Mexico Agricultural Experiment Station announces the release of 'NuMex Garnet', an open-pollinated, paprika-type chile pepper (*Capsicum annuum* L.) with high extractable color and low pungency (Fig. 1). The high extractable color, high percent dry matter, and low pungency of 'NuMex Garnet' make this cultivar particularly suited for pigment extraction.

In the United States and in international trade, paprika is the term used for a nonpungent or low pungency [Scoville heat units (SHUs) <700] red chile pepper (Wall and Bosland, 1998). About 15% to 20% of the paprika production in southern New Mexico and surrounding areas goes into oleoresin production, in which the carotenoid pigments are extracted and used as a natural red colorant. Extractable color is determined using a procedure developed by the American Spice Trade Association (ASTA, 1985) and the Association of Official Analytical Chemists (AOAC, 1984). The measurement of total pigment content in a chile sample is expressed in ASTA units. Optimum extraction efficiency for oleoresin production is obtained with high ASTA color cultivars. Non-pungent or low-pungency cultivars are used for pigment extraction because the capsaicinoids that confer pungency to chile are undesirable in oleoresin for the colorant market.

Origin

'NuMex Garnet' originated from a cross between a selection from 'B-18', a New Mexico cultivar, and a single plant selection from PA-5, a breeding line developed by the Texas Agricultural Experiment Station (TAES) (Fig. 2). Many undocumented chile cultivars that have undergone multiple generations of phenotypic selection are grown in New Mexico. 'B-18' is an example of one of these undocumented New Mexico cultivars. 'B-18' is a paprika with high extractable color that varies for pungency and is maintained by the Biad Chili Co. (Leasburg, N.M.). 'B-18' plants have an open plant habit, with a large yield of high dry matter fruit. A single plant was selected for high extractable color (ASTA), nonpungency, and heavy fruit set. The plant was self-pollinated, and a plant

from the subsequent progeny was the maternal parent for the initial cross that produced 'NuMex Garnet'. The paternal parent was a single plant selection from TAES paprika line, PA-5. The plant was selected for compact plant habit and abundant low-pungency fruit.

Seed from the F₂ generation was planted and evaluated in a field at the Leyendecker Plant Science Center, 2.5 km south of Las Cruces in southern New Mexico. A single plant selection from this population was the precursor for



Fig. 1. Fruit of 'NuMex Garnet' paprika.

'NuMex Garnet'. The plant was selected for high extractable color (ASTA), high dry matter fruit, heavy fruit set, and low pungency. Low pungency was selected initially by taste and then confirmed with high performance liquid chromatography (HPLC) (Collins et al., 1995). Five generations of self-pollinated seed lots, with removal of off-type plants, were subsequently produced in insect-proof seed cages. The seed from multiple plants was bulked for each of the five generations. The cultivar was evaluated in replicated plots in southeast (Artesia) and south central (Las Cruces) New Mexico. At each site, the experimental design was a randomized complete block with five replications. The cultivar was released in 2002 based on its field performance.

Description and performance

'NuMex Garnet' is an open-pollinated, low-pungency, paprika-type chile pepper with

Single plant selection from B-18

↓ ⊗

91C505-3

↓ ⊗

92C1613 x Single plant selection from TAES PA-5

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93C1453 F₁

↓ ⊗

94C230 F₂

↓

96C2740-4 Single plant selection

↓ ⊗

Self-pollination and roguing for 5 generations

↓

'NuMex Garnet'

Fig. 2. Pedigree for 'NuMex Garnet' paprika (*Capsicum annuum* L.).

Table 1. Average color, dry weight yield, and dry matter content from replicated plots in Las Cruces, N.M. for 'NuMex Garnet', 'B-18', 'Sonora', and 'NuMex Conquistador' chile peppers.

Cultivar	Extractable color ^a (ASTA)	Dry yield ^b (kg·ha ⁻¹)	Dry matter ^c (%)
NuMex Garnet	303 a ^x	4,157 ab	39.6 a
B-18	261 b	4,632 a	32.6 b
Sonora	232 c	4,434 ab	25.9 c
NuMex Conquistador	216 c	3,573 b	23.3 c

^aRepresents combined data for replicated plot trials from 4 years (1998 to 2001) at the Leyendecker Plant Sciences Center near Las Cruces, N.M. Fruit for color analysis were ground with stems and seeds.

^bRepresents combined data for replicated plot trials from the 2000 and 2001 seasons at the Leyendecker Plant Sciences Center near Las Cruces, N.M.

^cMean separation within columns by Duncan's multiple range test, $P \leq 0.05$.

Table 2. Average color, dry weight yield, and dry matter content from replicated plots² in Artesia, N.M., for 'NuMex Garnet', 'NuMex Conquistador', and 'NuMex Sweet' chile peppers in 1998.

Cultivar	Extractable color ^a (ASTA)	Dry yield (kg·ha ⁻¹)	Dry matter (%)
NuMex Garnet	244 a ^x	5,114 a	37.0 a
NuMex Conquistador	151 b	4,360 b	22.7 b
NuMex Sweet	148 b	3,843 b	24.5 b

²Plots were located at the Artesia Agricultural Science Center in Artesia, N.M.

^aFruit for color analysis were ground with stems and seeds.

^cMean separation within columns by Duncan's multiple range test, $P \leq 0.05$.

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CULTIVAR AND GERmplasm RELEASES

Table 3. Average fruit measurements and prefreeze fruit detachment force for 'Sonora', 'NuMex Conquistador', 'B-18', and 'NuMex Garnet' chile peppers from replicated plots^a in Las Cruces, N.M., in 2001.

Cultivar	Fruit width (cm)	Fruit length (cm)	Wall thickness (mm)	Fruit detachment (kg-tension)
Sonora	4.29 a ^y	15.75 a	0.564 a	0.472 a
NuMex Conquistador	4.08 a	12.63 b	0.420 b	0.369 b
B-18	3.18 b	10.52 c	0.300 b	0.339 b
NuMex Garnet	2.87 c	11.80 b	0.288 b	0.274 b

^aPlots were located at the Leyendecker Plant Science Center near Las Cruces, N.M.

^yMean separation within columns by Duncan's multiple range test, $P \leq 0.05$.

high extractable color and high percent dry matter. 'NuMex Garnet' is particularly suited for use as a natural red colorant in the form of powder or oleoresin.

Replicated field trials were conducted from 1998 to 2001 comparing 'NuMex Garnet' to several low-pungency, high-yielding, red chile cultivars commonly grown in New Mexico. The extractable color (ASTA units) of 'NuMex Garnet' was consistently high compared to the ASTA values of 'B-18', 'Sonora', 'NuMex Conquistador', and 'NuMex Sweet' in replicated field trials during 4 years of testing in different locations (Tables 1 and 2). The pungency level of 'NuMex Garnet' has been tested in replicated trials over 3 years using HPLC. The 3-year SHU average for this cultivar was 157 SHU, which is below the maximum allowable level for paprika (700 SHU).

'NuMex Garnet' is a high-yielding, high-dry-matter paprika. In replicated field trials in Las Cruces, yields for 'NuMex Garnet' were not significantly different from 'B-18', 'Sonora', and 'NuMex Conquistador', and dry matter values were higher than those of the

comparison cultivars (Tables 1). In Artesia, N.M., 'NuMex Garnet' had higher yields and dry matter content than 'NuMex Conquistador' and 'NuMex Sweet' (Table 2). 'NuMex Garnet' exhibits an open plant habit similar to 'B-18', with a dispersed fruit set. The fruit are not as wide but are longer than those of 'B-18'. The fruit wall thickness is less than 'Sonora', a thick-walled cultivar, but not different from 'B-18' and 'NuMex Conquistador' (Table 3).

Fruit detachment force was measured in 2001 before the season's first freeze to evaluate how 'NuMex Garnet' would perform for machine harvest. A cultivar with a low fruit detachment force tends to be suitable for mechanical harvest. Fruit detachment force was measured with an Omega Digital Force Gauge (model DFG51) in the tension setting. The highest force attained when pulling fruit from the plant was recorded. 'NuMex Garnet' fruit detached from the plant with less force than 'Sonora' fruit, but with a force similar to 'B-18' and 'NuMex Conquistador' fruit (Table 3). Although 'NuMex Garnet' has not been tested for machine harvest in replicated

field trials, the dispersed fruit set and ease of detachment suggests that 'NuMex Garnet' will be adapted to mechanical harvest.

Availability

Breeder's seed will be maintained by the New Mexico Chile Pepper Breeding Program for five years after the release date. Seed increases will be made in accordance with the guidelines outlined by the New Mexico Crop Improvement Association, Box 30003, MSC 3CI, New Mexico State Univ., Las Cruces, NM 88003. Application for Plant Variety Protection will be filed, and distribution of 'NuMex Garnet' seed will be handled through the New Mexico Crop Improvement Association.

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