

The New Mexican-type chile is an important ingredient in the Southwestern food industry. Chiles have grown from a regional food for tourists to an important international export. Improvement of New Mexican chile cultivars through breeding and genetics is a major research thrust at New Mexico State University (NMSU). With improved cultivars production costs decrease, yields increase, incomes increase, consumer costs decrease, and product quality improves.

NMSU has the longest continuous program of chile improvement in the world. The chile improvement program began in 1888 with Dr. Fabian Garcia. All New Mexican-type chiles grown today gained their genetic base from cultivars first developed at NMSU. Historically, the most important cultivar is ‘New Mexico No. 9.’ This cultivar and several others have a release date that is different than the published date because publishing the cultivar release is dependent on a journal’s reviewing and publishing schedule. It can take several years before the cultivar is seen in print.

In 1913, Dr. Garcia released ‘New Mexico No. 9’ (Garcia, 1921). This cultivar was important historically, not only because it was the first chile cultivar released from NMSU, but also because it introduced a new pod type—‘New Mexican’—to the world. Selecting for the New Mexican pods began in 1894 when Dr. Garcia began improving the local chiles grown by Hispanic gardeners around Las Cruces, NM. Today, the New Mexican pod type is also called long green or ‘Anaheim.’ Actually, the pod type is New Mexican, and chiles like ‘NuMex Big Jim’ and ‘Anaheim’ are cultivars within this pod type. ‘Anaheim’ seed originated in New Mexico and was taken to Anaheim, CA, where it was widely cultivated.

Chile’s most recognizable trait is heat. Capsaicinoids, chemical compounds produced in glands and vesicles on the fruit’s placenta, produce the heat sensation when chiles are consumed. While seeds are not the source of heat, they occasionally get splashed with the capsaicinoids because of their proximity to the placenta. The chile’s genetics, weather conditions, growing conditions, and fruit age affect capsaicinoid content and, thusly, the heat level. Plant breeders selectively develop cultivars

with varying degrees of heat. Growers can also control heat by subjecting their plants to different amounts of stress, because more stress means hotter pods. Thus, the chile heat levels listed are relative to the year and location grown.

This publication describes the cultivars released from NMSU. New Mexico’s chile growers plant most of the state’s chile acreage to cultivars developed at NMSU or to cultivars that have NMSU cultivars in their pedigrees. New Mexico growers were surveyed in 1998, and 50% of their chile pepper acreage was planted with an NMSU cultivar (Skaggs, 2000). Seeds for the NMSU cultivars are available from the Chile Pepper Institute ([www.chilepepperinstitute.org](http://www.chilepepperinstitute.org)).

## NEW MEXICO NO. 9

Before Dr. Garcia developed the New Mexican pod type, there was no control over the genetic constitution of the chile seeds planted, so farmers could never predict the size or heat of the pods. Dr. Garcia thought that if he made the chiles milder, consumption would increase among the Anglo population. He had two colors of chile to choose from, red (colorado) or black (negro); he chose the red strain. This was fortuitous for New Mexico because, 100 years later, chile (paprika) used as a red coloring agent has become an important part of the New Mexico chile industry. Dr. Garcia improved native chile through hybridization and selection. His goal was to produce a chile cultivar that was “larger, smoother, fleshier, more tapering and included a shoulder-less pod for canning purposes.” He selected 14 chile accessions growing in the Las Cruces area from three types, pasilla (dark brown), colorado, and negro chiles.

After nine years, only one line—‘New Mexico No. 9’—remained, and according to Dr. Garcia it had “proven to be the best.” He went on to say, “While ‘New Mexico No. 9’ is not quite as hot as most of the unim-

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**Table 1. Chile Cultivars Developed at New Mexico State University, Their Pod Types, Relative Heat Level, and Year of Official Release**

Cultivar	Pod Type	Heat Level (SHU)*	Year
New Mexico No. 9	New Mexican	1,000–1,500	1921
New Mexico No. 6	New Mexican	700–900	1950
Sandia	New Mexican	1,500–2,000	1956
New Mexico 6-4	New Mexican	300–500	1958
Rio Grande 21	New Mexican	500–700	1967
NuMex Big Jim	New Mexican	500–2,000	1975
Española Improved	New Mexican	1,500–2,000	1984
NuMex R Naky	New Mexican	260–760	1985
NuMex Sunrise, NuMex Sunset, NuMex Eclipse	New Mexican	300–500	1988
NuMex Centennial	Piquin	**	1989
NuMex Conquistador	New Mexican	0	1989
NuMex Sweet	New Mexican	200–300	1990
NuMex Joe E. Parker	New Mexican	800–900	1990
NuMex Sunglo, NuMex Sunflare, NuMex Sunburst	de Arbol	**	1991
NuMex Bailey Piquin	Piquin	90,000–100,000	1991
NuMex Mirasol	Mirasol	**	1991
NuMex Twilight	Piquin	**	1993
NuMex Vaquero	Jalapeño	25,000–30,000	1997
NuMex Piñata	Jalapeño	45,000–50,000	1998
NuMex Primavera	Jalapeño	8,500–9,000	1998
NuMex Nematador	Cayenne	15,500–16,000	2003
NuMex Garnet	New Mexican	150–160	2004
NuMex Suave Red	Habanero	774	2004
NuMex Suave Orange	Habanero	335	2004
NuMex Holiday Ornaments	Piquin	**	2007
Heritage New Mexico 6-4	New Mexican	350	2008
Heritage NuMex Big Jim	New Mexican	500–1,000	2008

\* SHU = Scoville Heat Units

\*\* Mainly used as an ornamental

proved varieties, it seems to be hot enough. Most of the plants produce pods having the characteristics desired, but there are always some plants in the field which tend to revert back; consequently, it is very necessary to select the seed in the field” (Garcia, 1921). Heat of ‘New Mexico No. 9’ is estimated to have been in the range of 1,000 to 1,500 Scoville Heat Units (SHU), because it was reported to be twice as hot as ‘New Mexico No. 6’ (Harper, 1950). In retrospect, it was serendipitous that Dr. Garcia picked the pasilla, colorado, and negro types; these types probably intercrossed and produced progeny that contained novel gene combinations, allowing him to select for the new pod type and cultivar.

Dr. Garcia also said, “No special effort [has been] made to produce a blight [chile wilt] resistant strain at this time. Naturally in the work of roguing and selection, incidentally the hardier and more blight resistant plants were also selected. While this [chile] variety, at the present time, is not entirely immune to the blight, it does show that it is not so susceptible to the wilt as the unimproved varieties. It is hoped that in the near future more intensive work can be undertaken to produce and establish an absolutely blight resistant variety.” ‘New Mexico No. 9’ had uniform heat and a standard pod size and shape. It became the chile standard until 1950, and helped establish the Mexican food industry in the United States.

## **NEW MEXICO NO. 6**

In 1950, Dr. Roy Harper released 'New Mexico No. 6' from a selection made in 1947 from an undesignated local chile (Harper, 1950). It yielded 23% more dry chile than 'New Mexico No. 9,' and was particularly well suited for the processing industry and for producing green chile for the fresh market. It produced a high proportion of large, smooth, thick-fleshed pods that ranged from 6 to 8 inches in length and averaged 2 inches in width. The pods were long-elliptical to oblong in shape, bluntly pointed, and small-based in proportion to their size. The shoulders of the green pods were generally well rounded and smooth. 'New Mexico No. 6' produced a higher proportion of well shaped pods than 'Anaheim.' The pods were a uniform medium green in color. The fruit had thick walls and dried more slowly than those of 'New Mexico No. 9,' and its heat level ranged from 700 to 900 SHU—half that of 'New Mexico No. 9.' Under average conditions, 'New Mexico No. 6' plants branched lower and did not grow as tall as 'New Mexico No. 9.'

In 1957, 'New Mexico No. 6' was made less hot, and renamed 'New Mexico 6-4.' It was released to a local green chile processor and is still a popular chile cultivar. 'New Mexico 6-4' matures earlier than 'New Mexico No. 9.' The fruit is thick-fleshed, medium green, very smooth with well rounded shoulders, blunt-tipped, and suitable for canning.

## **HERITAGE NEW MEXICO 6-4**

In 2002, original seed of 'New Mexico 6-4' was obtained from the National Seed Storage Lab in Fort Collins, CO, to develop a genetically superior chile cultivar that would help New Mexico growers compete in the global market, as well as capture the original flavor of 'New Mexico 6-4.' The New Mexico Chile Commission members made selections from 27 breeding lines of the original 'New Mexico 6-4'; six of the best-performing lines were chosen and re-tested. Selections were made based on horticultural characteristics that were most important to the New Mexico chile industry, including high yield, uniform heat level, improved fruit qualities, easy destemming, and, most importantly, traditional flavor. The result, 'Heritage New Mexico 6-4,' is recognized for producing pods with a smooth, thick flesh ranging from 6 to 8 inches in length. It has a heat level of 350 SHU and its yields are higher than the original 'New Mexico 6-4.'

## **SANDIA (SANDIA A)**

Dr. Harper released 'Sandia' in 1956. He originally called it 'Sandia A,' but in 1967 the New Mexico Crop Improvement Association met and decided to change the name to simply 'Sandia.' The cultivar originated

from a hybridization between 'New Mexico No. 9' and a California Anaheim-type cultivar. It matured earlier than 'New Mexico No. 9.' 'Sandia' produced long, straight, medium-wide pods with medium-thick walls; its pods had a slightly roughened surface, but were devoid of severe folds that were commonly present on 'Anaheim.' 'Sandia' pods were slightly flattened and had the greatest width toward the stem end, its shoulders were rounded, and the pods tapered gradually to the blossom end. Mature 'Sandia' pods averaged 6.6 inches in length and 1.58 inches at their widest dimension. The pod's flesh portion averaged 62.6% of the total weight of the dry red fruit; this was similar to 'New Mexico No. 9' and slightly less than the average for 'Anaheim.' Green pod yields of 'Sandia' averaged 12,207 lbs/acre. Average yields were 33% higher than those of 'New Mexico No. 9,' but less than 'New Mexico No. 6.' 'Sandia' plants set fruit well on the lower nodes during high temperature periods. Plants were upright in growth habit and averaged 24 to 30 inches in height. The cultivar, which is considered hot, has a heat level of 1,500–2,000 SHU, and is popular with home gardeners.

## **RIO GRANDE 21**

A selection from a hybridization between 'New Mexico No. 6' and 'Anaheim' produced 'Rio Grande 21'; Dr. Harper released it in 1967 (Harper, 1967). The cultivar was similar in maturity to 'New Mexico No. 9.' It produced large, smooth, green pods with thick flesh. Mature succulent pods were slightly flattened, elliptical in shape, with a slight longitudinal depression toward the blossom end. The stem end was cylindrical and without prominent shoulders. The blossom end tapered to a medium point that did not have prominent lobes. 'Rio Grande 21' mature pods averaged 6.70 inches in length and 1.73 inches at their widest. 'Rio Grande 21' averaged 8.5 mature green and 44.3 dry red pods per pound. The fleshy, dry portion of the pod, exclusive of stem and seeds, averaged 66.2% of the dry red fruit's total weight—higher than the average for either 'Anaheim' or 'New Mexico No. 9.' The cultivar's green pod yield averaged 15,436 lbs/acre. It was reported that 'Rio Grande 21' plants showed a slight tendency for poor fruit set during extremely high temperature periods. The lower nodes on some plants were devoid of fruit, and heavy fruit set on the upper nodes resulted in a spreading-type plant. Plants were normally 24 to 32 inches in height. Today, this cultivar is not grown widely in New Mexico.

## **NUMEX BIG JIM**

Released by Dr. Roy Nakayama in 1975, 'NuMex Big Jim' is listed in the Guinness Book of Records as the

world's largest chile (Nakayama, 1975). It produces long, thick, smooth, fleshy fruits. Mature green fruits are moderately flattened. The round-shouldered fruit tapers to a hook at the apex. Mature green fruit averages 7.68 inches in length and 1.89 inches in width. It has a slightly higher heat than 'New Mexico 6-4,' but not as high as 'Rio Grande 21' and 'Sandia.' Heat level varies from plant to plant, with some plants producing mild pods and others producing hot pods. In addition to use as green chile, the fruit was adapted for dry red chile products and is higher in extractable red color than 'New Mexico 6-4.' Mature green fruit color ranges from light to medium green. Fruit set is more concentrated and is thought to be adapted to mechanical harvesting. Its average yield for green chile is 31,761 lbs/acre. Plant height averages 16 to 26 inches. Because of the large pods, the cultivar is a favorite of home gardeners and chefs for making chile rellenos, a stuffed chile pod.

### **HERITAGE NUMEX BIG JIM**

As with 'Heritage New Mexico 6-4,' the original seed for 'Heritage NuMex Big Jim' was obtained from the National Seed Storage Lab to develop a more uniform, thick-walled chile with a consistent medium heat level. The New Mexico Chile Commission members made selections from 40 breeding lines of the original 'NuMex Big Jim,' and six of the best-performing lines were chosen and re-tested. Selections were made based on the most important horticultural characteristics that were important to the New Mexico chile industry, including high yield, uniform heat level, improved fruit qualities, easy de-stemming, and traditional flavor. 'Heritage NuMex Big Jim' has large, flattened, thick-walled mature green fruit with round shoulders. The heat level for 'Heritage NuMex Big Jim' is between 500 and 1,000 SHU and is more uniform than the current 'NuMex Big Jim.'

### **ESPAÑOLA IMPROVED**

Dr. Nakayama and Dr. Frank Matta released 'Española Improved' in 1984 (Matta & Nakayama, 1984). This cultivar resulted from a hybridization between 'Sandia' and a Northern New Mexico strain of chile. It is an early-maturing red chile cultivar (155 days). It was bred for earliness and adapted to the shorter growing season in north-central New Mexico. It produces long, smooth, fleshy fruit with broad shoulders tapering to a sharp point at the apex. This shape is common among native pod shapes in the area. The mature, dark green fruit of 'Española Improved' average 6.18 inches in length and 1.23 inches in width. Relatively high green pod yields, fruit size, and marketable characteristics (long, smooth pods) make it superior to native strains for use as green

chile. Fruit are also adapted for dry red products; its smooth, well-shaped pod dries well. It has high heat levels, 1,500 to 2,000 SHU. It has been a popular cultivar for Northern New Mexico and other areas needing an early-maturing cultivar.

### **NUMEX R NAKY**

Dr. Nakayama released 'NuMex R Naky' in 1985 and named it after his wife, Rose (Nakayama & Matta, 1985). Its pedigree includes 'Rio Grande 21,' 'New Mexico 6-4,' Bulgarian paprika, and an early-maturing native type. It sets fruit under high temperatures and low humidity. Its yield in Las Cruces is 30,930 lbs/acre, significantly higher than 'New Mexico 6-4' (22,783 lbs/acre). When red color was measured using the American Spice Trade Association (ASTA) method, it had a color rating of 188 ASTA, which was better than 'New Mexico 6-4' (127 ASTA). The heat level was 260 to 760 SHU, making it a very mild cultivar. The pod is slightly longer and wider than 'New Mexico 6-4.' 'NuMex R Naky' is used as a paprika cultivar in New Mexico because of its low heat level. (Paprika is defined in the United States as red pepper powder with undetectable or low heat.)

### **NUMEX SUNRISE, NUMEX SUNSET, AND NUMEX ECLIPSE**

These three cultivars were released in 1988 by Drs. Paul Bosland, Jaime Iglesias, and Steve Tanksley. The cultivars were unique in providing alternative mature fruit color in the New Mexican pod type (Bosland et al., 1990). 'NuMex Sunrise,' 'NuMex Sunset,' and 'NuMex Eclipse' have fruits that start green, and then turn yellow, orange, and brown, respectively. They are used primarily as ornamental chiles. It has been a New Mexican tradition to harvest and string mature red chile pods into ristras. Ristras are hung near the entrance of homes as symbols of hospitality and good luck. Only chile types that dehydrate sufficiently to eliminate rotting can be used to make ristras. All three cultivars originated from a hybridization between 'Permagreen,' a green bell pepper, and 'New Mexico 6-4.' They are similar in heat level to 'New Mexico 6-4.'

### **NUMEX CENTENNIAL**

'NuMex Centennial' was the first ornamental chile released from NMSU intended for growing in small containers (Bosland & Iglesias, 1994). It was released in 1988 to celebrate NMSU's centennial celebration. Many seed companies offer seeds of this cultivar, unfortunately under different names. The semi-compact plant was developed for the commercial greenhouse industry,

but it is suitable for cultivation in a formal garden bed. 'NuMex Centennial' has purple flowers and purple foliage. The fruit are purple, then ripen to yellow, orange, and, finally, red. It was selected from a seed accession acquired from Chihuahua, Mexico.

### **NUMEX CONQUISTADOR**

'NuMex Conquistador' was released in 1989 and originated as a single plant selection from 'New Mexico 6-4,' a hot cultivar (Bosland et al., 1991). 'NuMex Conquistador,' a no-heat cultivar, is considered to be a paprika-type chile. The fruits have round shoulders, pointed tips, a smooth surface, thick flesh, and two locules. The average fruit length is 6.18 inches and fruit weight averages 2.76 ounces. Plants have a single, strong main stem with sturdy branches. Average plant height is 29.5 inches and plant width is 25.0 inches, which is similar to that of 'New Mexico 6-4' and 'NuMex R Naky.' High performance liquid chromatography analysis revealed that capsaicinoid levels are less than 10 ppm, which is below the level that humans can taste. This cultivar is used as a paprika cultivar in the mature red stage; in the green stage it is stuffed with jalapeño flavored cheese to produce chile rellenos with uniform heat levels. 'NuMex Conquistador' has an ASTA rating of 168, significantly higher than 'NuMex R. Naky' and 'New Mexico 6-4' (Bosland et. al, 1991).

### **NUMEX JOE E. PARKER**

The name of this cultivar was selected to honor Mr. Joe E. Parker of Las Cruces, a 1950 graduate of NMSU's College of Agriculture and Home Economics (Bosland et al., 1993). Mr. Parker assisted in evaluating this specific selection. 'NuMex Joe E. Parker' originated as a single plant selection from a field planted to an open-pollinated population of 'New Mexico 6-4.' 'NuMex Joe E. Parker' was released in 1990 and is recommended for green and red chile production in southern New Mexico. This cultivar exhibits less variability for horticultural traits than 'New Mexico 6-4,' the standard chile cultivar for southern New Mexico. 'NuMex Joe E. Parker' plants have single, strong main stems and are uniformly branched, providing foliage cover for sunscald protection and support for an excellent fruit set. 'NuMex Joe E. Parker' has a plant height between 24 and 30 inches. In addition, there are no significant differences between it and 'New Mexico 6-4' for heat levels, fruit width, green fruit color, or days to maturity (149 days). The major features of this cultivar are red chile yield, fruit wall thickness, outstanding mature green chile yield, and red chile yield after a harvest of green fruit, which are all better than 'New Mexico 6-4.' The increased fruit set after the first green harvest results in a high "red after

green" dry fruit yield, which gives the grower the choice of either continuous picking of a green crop or a green chile harvest followed by a later red fruit harvest. After peeling, a thicker fruit wall produces a higher "pack-out" yield of green chile than thin-walled fruits. 'NuMex Joe E. Parker' has a high percentage (88%) of two locule fruit, a desirable characteristic for canning whole pods. Its 122 ASTA red color is similar to that of 'New Mexico 6-4,' while its heat is in the mild range at 811 SHU. 'NuMex Joe E. Parker' is also resistant to tobacco mosaic virus (TMV).

### **NUMEX SWEET**

A paprika-type or low heat chile that was released in 1990, 'NuMex Sweet' originated as a single plant selection from a field planted to an open-pollinated population of 'New Mexico 6-4,' a hot New Mexican-type chile cultivar (Bosland et al., 1993). A single plant was increased in the greenhouse after three generations of selfing and tested over two years in field trials. This cultivar incorporates the plant and fruit characteristics, determined by the paprika processors, as an ideal paprika-type chile. 'NuMex Sweet' is a low heat, round shouldered, pointed tip, smooth fruited, two locule, high colored, New Mexican-type chile with an ASTA rating of 157. It exhibits less variability for horticultural traits than 'New Mexico 6-4' or 'NuMex R Naky.' The plant has a single, strong main stem and sturdy branches that provide foliage cover for sunscald protection and support for an excellent fruit set. Plant height and width of 24 and 30 inches, respectively, are similar to 'NuMex Conquistador' and 'NuMex R Naky.' Fruit thickness of 'NuMex Sweet' is less than 'NuMex Conquistador' or 'NuMex R Naky,' allowing for greater "dry down" in the field. 'NuMex Sweet' has a heat level of 302 SHU. The most remarkable characteristic of 'NuMex Sweet' is the outstanding yield of a single harvest of dry red at 7,781 lbs/acre. This yield is 40% greater than 'NuMex R Naky,' a standard New Mexico paprika cultivar.

### **NUMEX SUNBURST, NUMEX SUNFLARE, AND NUMEX SUNGLO**

These three cultivars provide a source for making "mini-ristras" and chile wreaths (Bosland, 1992). Immature fruit color is green, while mature fruit color is orange, red, and yellow for 'NuMex Sunburst,' 'NuMex Sunflare,' and 'NuMex Sunglo,' respectively. They were developed at the request of New Mexico chile producers interested in producing mini-ristras. A mini-ristra is made of chiles that are smaller than the usual New Mexican-type. The mini-ristra chiles are popular as tourist items because they are easier to transport than traditional New Mexican-type ristras. They were derived

by pedigree breeding from a seed source from India and were released in 1991. Individual plants were self-pollinated in the greenhouse for five generations, and then grown and evaluated in the field for two years. Dr. Bosland selected for traits deemed essential for ristra use. These included, but were not limited to, mature fruit color, non-corkiness, pointed tip, round shoulder, attached calyx, appropriate fruit length and width, and a compact plant habit. The fruits dry down on the plant under the environmental conditions of southern New Mexico. The plants have an upright, semi-determinate and non-spreading growth habit. The fruits are pendulate with an attached calyx. Leaves are sufficiently dense on the plant to prevent solar injury to the pods. 'NuMex Sunglo,' 'NuMex Sunflare,' and 'NuMex Sunburst' have pod lengths of 3.26, 2.87, and 2.78 inches, respectively, while pod widths are 0.54, 0.40, and 0.50 inches, respectively. The fruit sizes are in the range of the chile types known as de Arbol chiles. All three cultivars are hot; however, the heat level has not been measured.

### **NUMEX BAILEY PIQUIN**

This cultivar, released in 1991, was named in honor of Mr. Alton L. Bailey, NMSU Extension vegetable specialist emeritus, who helped evaluate this selection (Bosland & Iglesias, 1992). This machine-harvestable chile piquin originated as a single plant selection from an open-pollinated accession collected in the Caribbean area of Mexico. It has an upright, semi-determinant, and non-spreading plant growth and produces fruits that are upright and set high on the plant canopy. 'NuMex Bailey Piquin' is the first machine-harvestable piquin. It is homozygous for the deciduous fruit characteristic allowing fruit separation from the calyx at maturity. This trait allows the fruit to be shaken from the plant by a machine. A one-row harvester has been developed; it shakes the plant and an attached conveyor belt carries the fruits to the rear of the machine for collection. Dried fruit powder has a heat level of 97,000 SHU. In trials at Las Cruces, dry fruit yield averaged 3,984 lbs/acre.

### **NUMEX MIRASOL**

The word *mirasol* in Spanish means looking at the sun, and this cultivar is called *mirasol* because the fruit are erect and point to the sun. 'NuMex Mirasol' was developed over six years using a pedigree breeding method that included hybridization and repeated single plant selections. Dr. Bosland and Dr. Max Gonzalez released the cultivar in 1993. It originated from a hybridization between 'La Blanca' and 'Santaka.' Selection was carried out for upright fruit, fruit size and color, the number of fruits per cluster, and the number of clusters per plant. At maturity, it is a multi-stemmed bush,

23.8 inches tall and 15.3 inches wide. The fruit is green when immature and turns red at maturity. The fruit are hot. Each plant produced an average of 15.7 fruit clusters per plant, with 4 fruits per cluster. Fruits are 2.17 inches long and 0.75 inches wide. The fruits are conic shaped and have two locules. 'NuMex Mirasol' is used both as an ornamental on wreaths and a ground powder in cooking.

### **NUMEX TWILIGHT**

This ornamental chile has fruit color that ripens from purple to yellow to orange and lastly red (Bosland & Iglesias, 1994). The various fruit colors enhance the cultivar's value as commercial greenhouse potted plants, and 'NuMex Twilight' is well accepted by the potted plant industry. Unlike standard chile cultivars that have a dichotomous growth pattern, the polychotomous branching of the basal branches makes these ideal for container production. These semi-compact plants were developed for growing in small containers, but are suitable for cultivation in a formal garden bed. 'NuMex Twilight' has a white flower and green leaves, as compared to the purple flower and purple foliage of 'NuMex Centennial.' Also, the yellow fruit color stage is more pronounced in 'NuMex Twilight.' This cultivar has erect flower pedicels at anthesis, and fruits are upright and smooth with a cup-shaped calyx. Flowers begin to open at 120 days after sowing, and fruits mature to red in an additional 96 days. The plants grow erect and have stems with no pubescence. Leaf texture is smooth. Heat level and flavor were not evaluated. Seed of 'NuMex Twilight' was originally from Jalisco, Mexico, and the cultivar was derived from selection within the original population. 'NuMex Centennial' and 'NuMex Twilight' have been grown commercially in New Mexico as potted plants. Greenhouse growers have noted that, along with the polychotomous growth habit, the four stages of fruit color serve as important marketing traits. 'NuMex Twilight' also has become an important source of cucumber mosaic virus (CMV) resistance for plant breeders.

### **NUMEX VAQUERO**

'NuMex Vaquero' is an open-pollinated jalapeño that yields very well in southern New Mexico. It was released in 1997 by Dr. Bosland and Dr. Eric Votava. 'NuMex Vaquero' has 'Early Jalapeño,' 'TAM Jalapeño,' and 'Criollo de Morelos 334' in its pedigree. 'Criollo de Morelos 334' is a phytophthora blight resistant accession, but 'NuMex Vaquero' was not released as a tolerant cultivar because greenhouse testing indicated it was susceptible to aggressive strains of New Mexico *Phytophthora capsici*. However, it may exhibit field tolerance in some growing conditions. The pod is green

without purpling and has smooth skin (no corkiness), a blunted tip, rounded shoulders, multiple locules, and uniform heat. Fruits are 2.5 inches long and almost one inch wide. The heat level of 'NuMex Vaquero' is 25,000 to 30,000 SHU, similar to 'Early Jalapeño.' It has good jalapeño flavor with sweet walls. At the third node, the plants are about 6 inches tall, and are about 19 inches wide. In 1996, 'NuMex Vaquero' yielded 24,000 lbs/acre, the same as the F1 hybrid jalapeño 'Mitla.'

### **NUMEX PIÑATA**

Released in 1998, the jalapeño cultivar 'NuMex Piñata' originated spontaneously in the cultivar 'Early Jalapeño' (Votava & Bosland, 1998). 'NuMex Piñata' is unique in the transition of colors the fruit undergo as they mature. Immature fruit are light green, maturing to yellow, orange, and finally red. The fruit color of standard jalapeño cultivars changes from green to red. The foliage of 'Early Jalapeño' and other jalapeño cultivars is dark green while 'NuMex Piñata' has yellowish foliage. The inheritance of the foliage color and fruit color transition of 'NuMex Piñata' is due to a single homozygous recessive gene (Votava et al., 2000). The plant growth habit of 'NuMex Piñata' is smaller and tends to decline earlier in the season due to the lack of chlorophyll produced by the foliage. 'NuMex Piñata' is a unique jalapeño for making colorful salsa. It has kept the natural flavors and aromas of traditional jalapeños and is considered hot, with a heat level of 50,000 SHU. All plant and fruit characteristics, including plant height, yield, and pod width, are not significantly different from 'Early Jalapeño.' One difference is pod length, which is longer than 'Early Jalapeño.'

### **NUMEX PRIMAVERA**

'NuMex Primavera' is an open-pollinated cultivar that was developed using a pedigree breeding method that included several generations of hybridizations, selfing, and repeated single plant selection (Bosland et al., 1998). During each generation, selections were made based on the horticultural characteristics deemed important to the production and processing industries. Those characteristics included easy calyx detachment, dark green color with the absence of anthocyanin, little to no corkiness, and multiple locules. The fruit has rounded shoulders and a semi-pointed tip that is characteristic of the standard jalapeño shape. 'NuMex Primavera' displays a uniformly mild heat level of 8,594 SHU, much milder than industry standard jalapeños. 'NuMex Primavera' fruits are 2 inches long, 1 inch wide, and wall thickness is less than 0.25 inches. Plant height is 16.5 inches while plant width is 15 inches. 'NuMex Primavera' yields 16,591 lbs/acre in the field. It is a favorite of

home gardeners because of its mild heat and traditional flavors and aromas.

### **NUMEX NEMATADOR**

'NuMex Nematador' is an open-pollinated, nematode resistant, cayenne-type chile that was released in 2003 (Zewdie et al., 2003). Cayenne production in New Mexico was valued in excess of \$4.7 million at farm-gate because of the demand for cayenne mash, the core ingredient in hot sauce. 'NuMex Nematador' is adapted to southern New Mexico growing conditions and provides resistance to the southern root knot nematode, a major pest for cayenne producers. 'NuMex Nematador' was developed from the cultivar 'Large Red Thick,' and was evaluated for yield, heat level, desirable fruit characteristics, plant growth habits, and level of nematode resistance. 'NuMex Nematador' took an average of 99 days to first harvest from time of transplanting. Average fruit width was 0.6 inches, fruit length was 5.8 inches, and the heat level was rated at 15,989 SHU.

### **NUMEX GARNET**

'NuMex Garnet' was released in 2004 as an open-pollinated paprika-type chile with high extractable color (303 ASTA), and at 157 SHU is considered a very mild chile pepper (Walker et al., 2004). 'NuMex Garnet' originated from a hybridization between 'B-18' and a New Mexican-type cultivar. 'NuMex Garnet' was selected for compact growth habit, high yields, high extractable color, high dry matter in fruit, and low heat levels. It is predominantly suited for use as a natural red colorant in the form of powder or oleoresin. The fruits of 'NuMex Garnet' are not as wide but are longer than 'B-18,' while the fruit wall thickness is the same as 'B-18' and 'NuMex Conquistador.' Fruit width is 1.5 inches, length is 6.2 inches, and wall thickness is about 0.25 inches. 'NuMex Garnet' is an excellent candidate for machine harvesting because of the ease of stem detachment and fruit dispersal on the plant.

### **NUMEX SUAVE RED & NUMEX SUAVE ORANGE**

'NuMex Suave Red' and 'NuMex Suave Orange,' released in 2004, originated from a seed lot that was acquired by the NMSU Chile Breeding and Genetics Program from W. D. Adams, who commented on their mild nature (Votava & Bosland, 2004). He received seed from an anonymous individual who called the seeds aji red and aji yellow. The exact origins of these two accessions are unknown; however, they exhibit phenotypic similarities to other *C. chinense* pod types. Based on the large size of the fruits, these cultivars must have

originated from local or landrace varieties. Replicated field plot trials were performed in 2002 and compared to other habanero-type cultivars. ‘NuMex Suave Red’ and ‘NuMex Suave Orange’ are significantly milder than any other cultivar of *C. chinense*, with heat levels of 774 and 335 SHU, respectively. Fruit characteristics are similar to other habanero cultivars, including fruit weight, length, and width. The plant heights and widths are much greater than other habanero cultivars.

### **NMSU HOLIDAY ORNAMENTALS: NuMex Valentine’s Day, NuMex St. Patrick’s Day, NuMex Memorial Day, NuMex Halloween, NuMex Thanksgiving, and NuMex Christmas**

The NMSU Holiday Ornamental cultivars were developed for the potted plant and nursery industries. Plants were selected for horticultural characteristics that included a fuller as well as compact plant growth habit, upright fruit that spread over the top of the plant, heavy fruit set, the ability to be successfully grown in pots, attractive foliage, and speedy germination. ‘NuMex Memorial Day’ and ‘NuMex Thanksgiving’ originated from the hybridization of ‘Ivory’ by a dwarf plant in 1991. Single plant selections were made in the F2 generation, and then seven generations of selfing single plant selections were made for each. ‘NuMex Valentine’s Day,’ ‘NuMex St. Patrick’s Day,’ ‘NuMex Halloween,’ and ‘NuMex Christmas’ are from the hybridization of ‘Black Prince’ by ‘NuMex Thanksgiving’ in 1995. Single plant selections were made in the F2 generation, and five generations of selfing and subsequent single plant selections were made. Color transitions and pod shapes are ivory to red, with bullet shaped pods for ‘NuMex Valentine’s Day,’ light green to orange with a more rounded pod for ‘NuMex St. Patrick’s Day,’ ivory to lemon yellow with a round pod for ‘NuMex Memorial Day,’ black to orange with a bullet shaped pod for ‘NuMex Halloween,’ ivory to orange with a bullet shaped pod for ‘NuMex Thanksgiving,’ and dark green to red with bullet shaped pods for ‘NuMex Christmas.’

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