‘NuMex Mirage’ Onion

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The New Mexico State Univ. Agricultural Experiment Station announces the release of ‘NuMex Mirage’ onion (*Allium cepa* L.). ‘NuMex Mirage’ is an open-pollinated, bolting-resistant, pink-root-resistant [causal agent, *Phoma terrestris* (Hansen)], firm, short-day, white skin onion cultivar for fall seeding in southern New Mexico and similar environments. ‘NuMex Mirage’ matures in late May when fall-seeded in Las Cruces, NM.

Origin

‘NuMex Mirage’ originated from several intercrosses between ‘Temprana’ and each of the following varieties: ‘Early Supreme’, ‘Southport White Globe’, ‘Ringmaster’, ‘White Creole’, and ‘New Mexico White Grano PRR’ (Fig. 1). The initial intercrosses that started the development of ‘NuMex Mirage’ closely follows the same starting genetic material for NM 899 that was released as germplasm by the New Mexico State University onion breeding program in 1992 (Corgan and Holland, 1992). ‘Temprana’ is a selection out of ‘New Mexico White Grano’ and was released by the New Mexico Agricultural Experiment Station in 1979 (Enzie and Corgan, 1979). ‘New Mexico White Grano’ was originally selected out of ‘New Mexico Early Grano’ in 1930 by the New Mexico Agricultural Experiment Station. ‘New Mexico White Grano’ produces high yields of large top-shaped white bulbs, is moderately pink root-resistant, and is susceptible to bolting. ‘Temprana’ is a short-day, white onion that matures early when fall-planted in southern New Mexico (Enzie and Corgan, 1979). It is top-shaped and produces large bulbs with characteristics similar to ‘Texas Early Grano 502 PRR’. ‘Temprana’ is resistant to bolting but susceptible to pink root. ‘Early Supreme’ is a short-day, F₁ hybrid, white onion that was developed by Dessert Seed Co. in 1964 (Havey, 2007). ‘Early Supreme’ produces very large to jumbo-sized, pungent, flattened globe-shaped bulbs that have very good pink root resis-

tance, intermediate fusarium basal rot resistance [causal agent, *Fusarium oxysporum* f. sp. *cepae* (H.N. Hans.) W.C. Snyder & H.N. Hans], and good bolting tolerance (Anonymous, 2007). ‘Early Supreme’ is not currently grown in New Mexico as a result of its poor adaptation. ‘Southport White Globe’ originated from the onion-growing district in Southport, CT (Magruder et al., 1941). It is an intermediate-day, white onion commonly grown in the northern United States for its firm to hard, medium-sized, slightly flattened to slightly oval-shaped bulbs that are relatively high in soluble solids and pungency and can be stored for long periods of time. ‘Southport White Globe’ is not adapted to southern New Mexico. ‘Ringmaster’ is a long-day, white sweet Spanish-type onion that matures late when spring-planted in southern New Mexico. It produces high yields of large globe bulbs and is moderately resistant to pink root. ‘White Creole’ is a short-day, open-pollinated cultivar that produces small, flat, hard bulbs that are strong in pungency and high in soluble solids (Magruder et al., 1941). It is often grown for the onion dehydration industry. ‘New Mexico White Grano PRR’ is a pink root-resistant selection of ‘New Mexico White Grano’ released in 1977 by the Dessert Seed Co. (Dessert, 1979).

From these intercrosses, a series of seven breeding lines were created in 1983 (Fig. 1). Each breeding line had ‘Temprana’ as a maternal parent in its pedigree such that each line possessed N cytoplasm. Cytoplasm type is maternally inherited in onions. Bulb selections were made in 1984 from the seven 1983 breeding lines and these selections were massed together in a single cage, numbered 85-1001 (Fig. 1). Crosses occurred between these bulb selections in May 1985. Seed from this cage was harvested in Aug. 1985 and sown for bulb selection in Sept. 1985. Bulb selection occurred in May 1986. Selected bulbs were stored until Sept. 1986. The selected bulbs were placed together in a field for crossing to occur between these plants in the following year, May 1987. At this time, the selected bulbs received a new number designation, 87-1, to refer to a new population. These entire events comprise one cycle of phenotypic recurrent selection. After 87-1, nine additional cycles of phenotypic recurrent selection were conducted to develop ‘NuMex Mirage’. The selection criteria for these cycles of selection and any other previous selection conducted were for pink root and fusarium basal rot resistance, bolting

resistance, clean white dry scale color, lack of bulb scale greening, lack of bulb scale discoloration, hard bulb firmness, uniform bulb maturity, round to high globe bulb shape, uniform bulb shape, and earlier bulb maturity than NM 899.

Selections were made from fields in Las Cruces, NM, that contained high inoculum levels of *P. terrestris* and *F. oxysporum* f. sp. *cepae*. At bulb maturity, bulbs were rated for incidence of pink root. Only bulbs that possessed a healthy root system with minimal symptoms of pink root were selected. At bulb maturity, bulbs possessing *Fusarium* basal rot were not selected. During storage, bulbs that developed fusarium basal rot were discarded. Selection for bolting resistance was done in field plantings that possessed 70% or more plants with seedstalks at harvest time. Seed was planted approximately 1 Sept. to promote seedstalk formation. This date is 3 to 4 weeks earlier than the earliest recommended planting date for fall-planted onions in southern New Mexico.

Selection for bulb shape was for a round to deep, globe shape. Selection for bulb shape uniformity was for bulbs of the same size possessing the same desired shape. Selection for bulb scale color was based on the color of the dry outer bulb scales. Bulbs in which the outer scales tended to turn green or dirty white in color were not selected. Selection for bulb shape and color was based on subjective visual observation. Selection for bulb firmness was based on a subjective evaluation of the amount of bulb scale resistance when a force was applied to the bulb. Selection for bulb maturity was based on a desired harvest date of the fourth week of May. Starting with the breeding line, 01-28, in 2001, two cycles of selection were conducted for a single growing point or multiple centers with a small diameter in the center of the bulb when cut transversely at the vertical center.

Description and Performance

‘NuMex Mirage’ is a short-day, open-pollinated, white, high globe onion that matures from 20 May to 29 May when fall-sown in Las Cruces, NM (Table 1). Suggested planting dates at Las Cruces are 20 to 25 Sept. It has excellent bolting resistance and will tolerate early seeding dates. ‘Texas Early White’, which is the current white onion cultivar grown in southern New Mexico for late May maturity, does not have good bolting resistance. When compared with ‘Texas Early White’ in replicated field trials over 3 years, ‘NuMex Mirage’ produced fewer seedstalks in each year (Table 1). As a result of less seedstalk production, ‘NuMex Mirage’ produced a greater marketable bulb yield than ‘Texas Early White’ in 2 of the 3 years tested (Table 1). ‘NuMex Mirage’ was comparable to ‘Texas Early White’ with respect to bulb maturity date, average bulb size, percentage of single-centered bulbs, and pink root and fusarium basal rot disease severity and incidence (Table 1 and data not shown). Based on the values obtained for pink

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Fig. 1. Pedigree of 'NuMex Mirage'.

Table 1. Bulb maturity, seedstalk production, marketable yield, average bulb weight, and percentage of single centers of NuMex Mirage as compared with Texas Early White when grown on soil moderately infested with pink root and *Fusarium* basal rot pathogens at the Fabian Garcia Research Center, Las Cruces, NM, from 2003 to 2006.

Cultivar	Maturity date ^z	Seedstalks (%) ^y	Marketable yield (t·ha ⁻¹) ^x	Avg bulb wt (g) ^w	Single centers (%) ^v
2003–2004					
NuMex Mirage	May 23	12.4	33.1	241	52.0
Texas Early White	May 14	55.8	15.0	247	58.1
	*	*	*	NS	NS
2004–2005					
NuMex Mirage	May 29	0.0	52.3	275	55.0
Texas Early White	May 31	29.1	44.4	321	43.6
	NS	**	NS	NS	*
2005–2006					
NuMex Mirage	May 20	0.0	60.6	301	31.0
Texas Early White	May 19	50.6	26.2	301	46.2
	NS	**	**	NS	NS

^zA plot was considered mature when 80% of the tops were down and was harvested at that time.

^yThe percentage of seedstalks was determined at harvest and calculated by dividing the number of plants with seedstalks by the total number of plants per plot and multiplying by 100.

^xMarketable bulb yield (t·ha⁻¹) was calculated by weighing the marketable bulbs per plot and adjusting the plot size to 1 ha.

^wAverage bulb weight was calculated by dividing the marketable bulb weight by the number of marketable bulbs.

^vThe percentage of bulbs with single centers (single growing points) was determined by cutting each bulb transversely at the vertical center and measuring the number of growing points that extended 1.3 cm beyond the bulb's center.

NS,*,**Nonsignificant F test at $P = 0.05$, significant F test at $P = 0.05$, and significant F test at $P = 0.01$, respectively.

Table 2. Bulb height and bulb shape index of NuMex Mirage and Texas Early White when tested at the Fabian Garcia Science Center, Las Cruces, NM, during the 2004 to 2005 growing season.

Cultivar	Bulb ht (cm)	Bulb shape index ^z
NuMex Mirage	7.8	0.88
Texas Early White	7.4	0.77
	*	*

^zBulb shape index is calculated as bulb height divided by bulb diameter.

*Significant at $P = 0.05$.

root and fusarium basal rot severity, 'NuMex Mirage' would be considered moderately to highly resistant to pink root and highly resistant to fusarium basal rot. Bulbs of 'NuMex Mirage' tend to be deeper than bulbs of 'Texas Early White' because of a greater bulb height and bulb shape index (Table 2). In this bulb maturity class, bulbs of more depth are more desirable than bulbs of less depth. Bulbs of 'NuMex Mirage' possess a bright white dry scale that seldom exhibits staining or green- ing. 'NuMex Mirage' also produces very hard

bulbs. In 2005 to 2006, bulbs of 'NuMex Mirage' were rated 8.8 on a scale of 1 being very soft bulbs to 9 being very hard bulbs (data not shown). 'NuMex Mirage' should be well adapted to onion production areas that are prone to high levels of bolting and that grow overwintering, short-day onions.

Availability

Currently, 'NuMex Mirage' is being produced, marketed, and sold exclusively by Condor Seed Production, Yuma, AZ. Application for Plant Variety Protection will be filed.

Literature Cited

- Anonymous. 2007. Early supreme. Short day white type onion. Numhems TechReport. 17 Apr. 2007. <http://www.sunseeds.com/varieties/onions/pdf/techsheets/early_supreme.pdf>.
- Corgan, J.N. and M. Holland. 1992. NM899 onion germplasm release notice. NMSU Agr. Expt. Stn.
- Dessert, A.M. 1979. New Mexico White Grano PRR Plant variety protection certificate 7900086. 17 Apr. 2007. <<http://www.ams.usda.gov/science/PVPO/CertificateDatabase/certificate.asp?pv=7900086>>.
- Enzie, J.V. and J.N. Corgan. 1979. Temprana. An early maturing white grano onion. N.M. State Univ. Coop. Exten. Serv. Circ. 488.
- Havey, M.J. 2007. Onion (A-L), lists 1-26 combined. In: T.C. Wehner (ed.). Vegetable cultivar descriptions for North American. 17 Apr. 2007. <<http://cuke.hort.ncsu.edu/cucurbit/wehner/vegcult/onional.html>>.
- Magruder, R., R.E. Webster, H.A. Jones, T.E. Randall, G.B. Snyder, H.D. Brown, L.R. Hawthorn, and A.L. Wilson. 1941. Descriptions of types of principal American varieties of onions. U.S. Dept. Agr. Misc. Publ. 435.