‘NuMex Crimson’ Onion

Christopher S. Cramer¹ and Joe N. Corgan²

Department of Agronomy and Horticulture, Box 30003, MSC 3Q, New Mexico State University, Las Cruces, NM 88003-0003

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The New Mexico State Univ. Agricultural Experiment Station announces the release of ‘NuMex Crimson’ onion (*Allium cepa* L.). ‘NuMex Crimson’ is an open-pollinated, early maturing, single centered, bolting resistant, moderately pink root tolerant, firm, flat globe, short-day, red-colored onion cultivar with excellent internal and external red scale color for fall seeding in southern New Mexico and similar environments, maturing in late May when fall seeded in Las Cruces, N.M.

Origin

‘NuMex Crimson’ originated from an intercross in 1989 between ‘Kurenai’, ‘Rojo’, ‘Red Grano’, selections from a bolting resistant selection of ‘Texas Early Grano 502 PRR’, selections from ‘Peckham Yellow Sweet Spanish’, and selections from ‘Henry’s Special’ crossed with ‘Peckham Yellow Sweet Spanish’. ‘Kurenai’ is a short-day, red hybrid onion that matures early when fall-seeded in southern New Mexico. ‘Kurenai’ has uniform dark red to purple internal and external scale color. It is susceptible to pink root (*Phoma terrestris*) disease. ‘Rojo’ is a short-day, red onion that matures early when fall-seeded in southern New Mexico. It is an F₁ hybrid developed and released by Arco Seed Co. in 1987 (Tigchelaar, 1991). ‘Rojo’ has uniform dark red to purple internal and external scale color. Bulbs are large, thick, and flat shaped. ‘Rojo’ is pink root resistant and closely resembles ‘Red Granex’. ‘Red Grano’ is a short-day, open-pollinated red onion that matures early when fall-seeded in southern New Mexico. ‘Red Grano’ was developed by Dessert Seed Co. ‘Texas Grano 502 PRR’ is a pink-root-resistant selection from ‘Texas Grano 502’ (Corgan, 1984). ‘Texas Grano 502’ was selected from ‘New Mexico Early Grano’ that originated from lines introduced from Spain labeled as ‘Valencia Grano’ (Corgan, 1984; Garcia and Fite, 1931). ‘Texas Early Grano 502 PRR’ is a short-day, yellow onion that matures early when fall-planted in southern New Mexico. It is resistant to pink root when fall-planted. ‘Texas Early Grano 502 PRR’ is grano-shaped and produces large bulbs that are low in pungency and soluble solids, have soft flesh and

few dry scales, and store for short periods of time (Hawthorn, 1944). ‘Texas Early Grano 502 PRR’ has both normal (N) and sterile (S) cytoplasm (Havey and Bark, 1994). ‘Peckham Yellow Sweet Spanish’ is a selection out of ‘Yellow Sweet Spanish’. ‘Peckham Yellow Sweet Spanish’ is an intermediate-day, open-pollinated yellow onion. It is susceptible to Fusarium basal rot (*Fusarium oxysporum* f. sp. *cepae*) and pink root. It has a dark yellow outer dry scale. ‘Yellow Sweet Spanish’ was selected from ‘Riverside Sweet Spanish’ that was introduced from Spain in 1916. ‘Henry’s Special’ is a short-day, yellow onion that is pink root resistant. It is an F₁ hybrid developed and released by Arco Seed Co in 1965 (Tigchelaar, 1991). ‘Henry’s Special’ is susceptible to cold injury when over-wintered in southern New Mexico. It has thin, dry outer scales and a top-shaped bulb.

The initial cross was made in 1989 by intercrossing the six parents in a common pollination cage, using honey bees as the pollen vector. Only seeds from the ‘Kurenai’ parent were collected and planted. Since ‘Kurenai’ is a hybrid, ‘NuMex Crimson’ likely possesses S cytoplasm. The following year, bulbs with excellent red scale color, bolting resistance, good root development, and a thick flat shape were

selected using phenotypic evaluation. Selection was done at field maturity from fall seeding near Las Cruces, N.M. The selections were made from fields that contained high inoculum levels for *Phoma terrestris* (Hansen), causal organism of pink root, and *Fusarium oxysporum* f. sp. *cepae* [(H.N. Hans.) W.C. Snyder & H.N. Hans], causal organism of Fusarium basal rot. The selected bulbs were intercrossed and the resulting seed was planted in 1991. In 1992, 1994, 1996, 1998, and 2000, selections were made using phenotypic recurrent evaluation, and each year’s selections were intercrossed to form the next generation following recurrent selection methods. For each selection, red bulbs that possessed early bulb maturity, uniform maturity, pink root resistance, bolting resistance, round bulb shape, uniform shape, hard bulb firmness, and excellent red internal and external scale color were selected. For the last two selections, bulbs were selected that possessed a single growing point or multiple growing points within 1.3 cm from the center of the bulb when cut transversely at the vertical middle of the bulb. These bulbs were advanced to the next cycle by planting the bottom half of the bulb. For the selections made in 1998, selections were made from both direct-seeded and transplanted plants.

Selection for bolting resistance was done from field plantings that possessed 70% or more plants with scapes at harvest time. Seed was planted around 1 Sept. to promote scape 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 pink root and Fusarium basal rot resistance was accomplished by planting selections in fields that were severely infested with *P. terrestris*, the causal organism of pink root and *F. o. f. sp. cepae*, the causal organism

Table 1. Performance of ‘NuMex Crimson’ and ‘Cardinal’ onions when grown on soil moderately infested with the pink root (*Phoma terrestris*) and the Fusarium basal rot (*Fusarium oxysporum* f. sp. *cepae*) pathogens at the Fabian Garcia Research Center, Las Cruces, N.M., from 1997 to 2001.

Cultivar	Marketable yield (%) ^z	Marketable yield (t·ha ⁻¹) ^y	Avg bulb wt (g) ^x	Single centers (%) ^w
<i>1997–98 (16 Sept. 1997 planting date)</i>				
Cardinal	88	47.7	204	---
NuMex Crimson	90	50.6	201	---
	NS	NS	NS	---
<i>1998–99 (15 Sept. 1998 planting date)</i>				
Cardinal	85	42.8	289	27.2
NuMex Crimson	87	59.4	298	62.3
	NS	+	NS	*
<i>1999–2000 (20 Sept. 1999 planting date)</i>				
Cardinal	90	34.5	250	41.3
NuMex Crimson	93	49.5	298	88.2
	NS	+	NS	**
<i>2000–01 (14 Sept. 2000 planting date)</i>				
Cardinal	96	53.2	284	19.5
NuMex Crimson	99	62.9	309	54.7
	NS	NS	NS	**

^zPercentage of marketable yield was calculated by dividing marketable bulb weight by total bulb weight.

^yMarketable bulb yield was calculated by weighing the marketable bulbs per plot and adjusting the plot size to 1 ha.

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

^wThe percentage of bulbs with single centers (single growing point) 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 or significant at $P = 0.10, 0.05$, and 0.01 , respectively. Test was conducted at $\alpha = 0.05$.

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¹Assistant Professor of Horticulture.

²Professor Emeritus and Jose Fernandez Chair of Crop Production.

for Fusarium basal rot. At bulb maturity, bulbs were rated for the incidence of pink root on their root system. 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 bulb shape was for a flat globe shape, and for a bulb that was more rounded, deeper than a typical thick, flat granex shape. Selection for bulb shape uniformity was for bulbs of the same size to possess the same desired shape. Selection for bulb scale color was based on the color of the dry outer and fleshy inner bulb scales. Selection for bulb or scale color was for a color that was comparable to 'Kurenai'. Selection for bulb shape and color was subjective, based on 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 to select bulbs that matured the last week of May.

Description and performance

'NuMex Crimson' is an open-pollinated, early maturing, short-day, flat globe onion that matures from 24 to 29 May when fall seeded in Las Cruces, N.M. Suggested planting dates at Las Cruces are 15 Sept. to 1 Oct. 'NuMex Crimson' has excellent external and internal red scale color, excellent bolting resistance, a high percentage of single centered bulbs, moderate pink root tolerance, a flat globe shape, and firm bulbs.

Replicated field trials were conducted in 1997–98, 1998–99, 1999–2000, and 2000–01 comparing 'NuMex Crimson' to 'Cardinal', an F₁ hybrid (Tables 1 and 2). 'Cardinal' is commonly grown commercially in New Mexico as a fall-seeded, short-day, overwintered, red onion for late May to early June maturity. 'NuMex Crimson' possessed a higher percentage of bulbs with single centers than 'Cardinal' (Table 1). In 2 years, 'NuMex Crimson' produced a higher marketable bulb yield than 'Cardinal' (Table 1). For percentage marketable yield and average bulb weight, 'NuMex Crimson' was comparable to 'Cardinal' (Table 1). For

Table 2. Performance of 'NuMex Crimson' and 'Cardinal' when grown on soil moderately infested with the pink root (*Phoma terrestris*) and the Fusarium basal rot (*Fusarium oxysporum* f. sp. *cepae*) pathogens at the Fabian Garcia Research Center, Las Cruces, N.M., from 1997 to 2001.

Cultivar	Maturity (DAS) ^z	Scapes (%) ^y	Pink root severity rating ^x	Pink root incidence (%) ^w	Fusarium basal rot severity rating ^v	Fusarium basal rot incidence (%) ^u
1997–98 (16 Sept. 1997 planting date)						
Cardinal	252	0.7	5.0	---	---	---
NuMex Crimson	251	2.2	4.1	---	---	---
	NS	NS	NS	---	---	---
1998–99 (15 Sept. 1998 planting date)						
Cardinal	258	0.0	7.4	---	---	---
NuMex Crimson	251	0.0	4.5	---	---	---
	NS	NS	*	---	---	---
1999–2000 (20 Sept. 1999 planting date)						
Cardinal	253	0.0	4.2	100	5.7	99
NuMex Crimson	252	0.0	3.1	99	3.4	66
	NS	NS	NS	NS	*	*
2000–01 (14 Sept. 2000 planting date)						
Cardinal	258	0.0	3.6	99	5.0	91
NuMex Crimson	255	0.0	1.8	65	2.4	58
	NS	NS	+	**	*	*

^zAn entry was harvested when all four replications had 80% of their tops down within the plot. A plot was considered matured when 80% of the tops were down. Days after seeding.

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

^xRoot systems of 25 bulbs per plot were rated based on a scale of 1 (no infected roots) to 9 (completely infected roots).

^wPercentage of bulbs with pink root.

^vCut basal plates of 25 bulbs per plot were rated based on a scale of 1 (no disease tissue) to 9 (70% or more of basal plate decayed).

^uPercentage of bulbs with Fusarium basal plate rot.

NS, +, *, ** Nonsignificant or significant at $P = 0.10$, 0.05 , and 0.01 , respectively. Test was conducted at $\alpha = 0.05$.

2 years, 'NuMex Crimson' had a lower pink root severity rating than 'Cardinal' (Table 2). In 2000, 'NuMex Crimson' had a lower pink root incidence (percentage of bulbs exhibiting pink root symptoms) than 'Cardinal' (Table 2). For the two years measured, 'NuMex Crimson' had a lower Fusarium basal rot severity rating and incidence than 'Cardinal' (Table 2). 'NuMex Crimson' and 'Cardinal' were similar in maturity date and lack of seedstalk formation (Table 2).

Availability

Currently, 'NuMex Crimson' is being produced, marketed, and sold exclusively by Lockhart Seed Co., Inc., Stockton, Calif. Application for Plant Variety Protection has been filed.

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