'NuMex Sweetpak' Onion

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New Mexico State Univ. Agricultural Experiment Station announces the release of 'NuMex Sweetpak' onion (*Allium cepa* L.). 'NuMex Sweetpak' is a low pungency, early maturing, open-pollinated, short-day, yellow grano-type onion. This cultivar is ideal for fresh-market onion consumption. 'NuMex Sweetpak' matures in late May when fall planted in southern New Mexico.

Origin

'NuMex Sweetpak' originated from an intercross of Texas Grano 1015Y (Pike et al., 1988), Excel 986B, and a population of Texas Grano 502 PRR selected for bolting resistance. The Texas Grano 502 PRR bolting-resistant line was similar to 'NuMex BR1' (Corgan, 1984) for bolting resistance, but was not released as a cultivar. Excel 986B was developed by U.S. Dept. of Agriculture (USDA) researchers in Texas and was the maintainer line for the male-sterile parent of the yellow granex hybrid. The intercross was made in an isolation cage using 20 bulbs of Texas Grano 1015Y and 10 bulbs each of Excel 986B and Texas Grano 502 PRR, with honeybees as pollinators. Seed from the intercross was collected separately from each maternal parent in 1982. For three generations, selections were made from the progenies of each maternal parent and maintained as separate entries in the crossing cages. Mass selection was performed within each maternal line for early maturity, firmness, bulb shape, bolting resistance, and pink root [*Phoma terrestris* (Hansen)] resistance.

The main index for onion maturity is collapse of the tissues in the neck, resulting in lodging of the foliage. Selections were made for maturity in late May in Las Cruces, N.M., when fall seeded. Selected bulbs were nearly round. Selection for pink root resistance was accomplished by growing onion populations in soil severely infested with the pink root fungus. The field had been planted continuously to onions for 8 years, purposely to develop high inoculum levels for pink root resis-

tance selection. Bulbs with <20% pink roots were selected. For bolting resistance, populations were planted 1 to 10 Sept. to achieve >50% bolting; only nonbolting plants were selected.

In Sept. 1990, seeds from the fourth intercross generation from the Texas Grano 1015Y maternal line were planted for bulb production. In May 1991, selections for early maturity, pink root resistance, and bulb shape were made in the field; the first selection for low pungency and single centers was made in the laboratory. Pungency was measured using the pyruvic acid (PA) technique (Wall and Corgan, 1992). Pyruvic acid is a by-product of the metabolic reactions producing pungency. Low PA production is correlated with low sensory perception of pungency (Wall and Corgan, 1992). Taste panels rated onions with PA levels <4.5 $\mu\text{mol}\cdot\text{g}^{-1}$ fresh weight (FW) as mild (Wall and Corgan, 1992). Single centers were evaluated by cutting each bulb transversely at the equatorial plate. Any bulb with one or two growing points within the center diameter of 3.5 cm was considered to be single-centered. The top portions of bulbs were analyzed for PA, and the bottom portions were saved for selected bulbs.

The selected bulbs (17) in 1991 had PA levels lower than 4.7 $\mu\text{mol}\cdot\text{g}^{-1}$ FW and a mean PA level of 4.2 $\mu\text{mol}\cdot\text{g}^{-1}$ FW. These bulbs were planted and intercrossed in an isolation cage, and the seed was collected individually from each bulb in 1992. The population was designated as 92-7 and consisted of 17 maternal, half-sib progeny lines. Seed of the half-sib lines was planted for bulb production, and another selection cycle was made in the field and laboratory in 1993. Selection was made among and within half-sib families in 1993. Selected bulbs (130) had PA levels lower than 3.8 $\mu\text{mol}\cdot\text{g}^{-1}$ FW and a mean PA concentration of 3.4 $\mu\text{mol}\cdot\text{g}^{-1}$ FW. These bulbs were intercrossed in 1994, and the seed was bulked and designated as 94-17. Mass selection within population 94-17 was performed in 1995. The selected bulbs (33) from population 94-17 had PA levels lower than 2.5 $\mu\text{mol}\cdot\text{g}^{-1}$ FW and a mean PA level of 1.9 $\mu\text{mol}\cdot\text{g}^{-1}$ FW; they were planted and intercrossed in an isolation cage to produce 'NuMex Sweetpak'.

Description and performance

'NuMex Sweetpak' is a short-day, yellow grano-type onion with an estimated adaptation range of 28° to 32°N latitude. Bulbs are large and nearly round with pale yellow, thin, outer scales and white interior. 'NuMex Sweetpak' has medium green foliage, and is recommended for fall seeding to provide a supply of low pungency onions during late May. Suggested planting dates at Las Cruces, N.M., are 1 to 10 Oct.

'NuMex Sweetpak' resembles 'NuMex Sunlite', but is less pungent (Table 1). Replicated field trials comparing 'NuMex Sweetpak'

Table 1. Performance of 'NuMex Sweetpak' onion, 'NuMex Sunlite' (control) and line 94-5-1 grown on soil severely infested with the pink root pathogen (*Phoma terrestris*) and harvested in 1995 and 1997.

Cultivar	Pungency as PA ^z ($\mu\text{mol}\cdot\text{g}^{-1}$ FW)	Single centers (%)	Wt/bulb (g)	Bolting (%)	Date of maturity	Plants/plot ^y (no.)	Yield ^y (t·ha ⁻¹)
<i>Seeded 29 Sept. 1994</i>							
NuMex Sweetpak	3.19 a ^x	47 a	439	0.6	26 May	48	75.1
Line 94-5-1 ^w	5.06 b	3 b	432	1.0	31 May	58	91.1
NuMex Sunlite	--- ^v	---	428	0	4 June	49	75.3
			NS	NS	NS	NS	NS
<i>Seeded 4 Sept. 1996</i>							
NuMex Sweetpak	4.68 a	58	395	36 b	25 May	57	53.3
Line 94-5-1	6.39 b	---	389	9 a	23 May	47	61.5
NuMex Sunlite	5.54 b	50	394	17 a	26 May	57	71.0
Fisher's LSD _{0.05}	0.85	NS	NS	11.9	NS	9.9	NS
<i>Seeded 20 Sept. 1996</i>							
NuMex Sweetpak	4.46 a	43 a	433	7 b	27 May	45	63.3 b
94-5-1	5.69 b	8 b	407	1 a	24 May	58	87.6 a
NuMex Sunlite	6.13 b	63 a	373	1 a	25 May	65	90.3 a
Fisher's LSD _{0.05}	0.90	23.8	NS	3.2	NS	13.8	15.3
<i>Transplanted 5 Feb. 1997</i>							
NuMex Sweetpak	3.87 a	77	230 b	---	28 May	59	55.5
NuMex Sunlite	4.39 b	79	267 a	---	2 June	59	64.6
Fisher's LSD _{0.05}	0.47	NS	31.3		NS	NS	NS

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^zPA = pyruvic acid.

^yField plots were 2.4 m long and 1 m wide with four rows per bed for seeded trials and two rows per bed for transplants.

^xPungency and single center means are averages of 50 and 100 observations, respectively.

^wLine 94-5-1 had the same parental background as 'NuMex Sweetpak', but was not selected for low pungency.

^vNot measured.

NS Nonsignificant at $P \leq 0.05$.

(96-37) with 'NuMex Sunlite' and the breeding line 94-5-1 were conducted in Las Cruces, N.M., with two fall seeding dates and from spring transplants (Table 1). 'NuMex Sunlite' was developed by selection for bolting and pink root resistance from Texas Grano 502 PRR (Corgan, 1988), and matures at the same time as 'NuMex Sweetpak'. The line 94-5-1 had the same parental background as 'NuMex Sweetpak', but was not selected for low pungency.

All data were subjected to analysis of variance for a randomized complete-block design with five replications. In the laboratory, 10 bulbs of each cultivar were analyzed from each replication (total of 50) for pungency, and 20 bulbs per replication were cut laterally to evaluate the percentage of single centers.

Pungency of 'NuMex Sweetpak' was significantly less than those of 'NuMex Sunlite' and line 94-5-1. The average PA concentration over three tests was $4.3 \mu\text{mol}\cdot\text{g}^{-1}$ FW for

'NuMex Sweetpak' as compared to $5.4 \mu\text{mol}\cdot\text{g}^{-1}$ FW for 'NuMex Sunlite' (Table 1). Data from the bulbs harvested in 1997 indicated that the percentages of single centers from 'NuMex Sweetpak' and 'NuMex Sunlite' were similar. The bolting percentage of 'NuMex Sweetpak' was not significantly different from that of the unselected line or of 'NuMex Sunlite' in the bulbs harvested in 1995, although the percentage of bolting increased in the 1997 harvest of 'NuMex Sweetpak'. The yields were not significantly different in three of four trials. For 'NuMex Sweetpak' onions direct seeded on 20 Sept. 1996, a poorer stand reduced yields relative to those of 'NuMex Sunlite' and line 94-5-1.

Availability

Small samples of breeder's seed are available from Marisa Wall. Foundation seed can

be purchased from the New Mexico Crop Improvement Association, Box 3CI, New Mexico State Univ., Las Cruces, NM 88003. An application for Plant Variety Protection has been filed. Certified seed propagation for sale will be authorized through the New Mexico Crop Improvement Association.

Literature Cited

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