

2007 ONION VARIETY TRIALS

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Introduction

The objective of the onion variety trials was to evaluate yellow, white, and red onion varieties for bulb yield, quality, and single centers. Five early-season varieties (four yellow, one red) were planted in March and were harvested and graded at the end of August. Fifty-four full-season varieties (42 yellow, 8 red, and 4 white) were planted in March, harvested in September 2007, and graded out of storage in January 2008. Each year, growers and seed industry representatives have the opportunity to examine the varieties at our annual Onion Variety Field Day in late August and during onion grading in early January. Varieties are evaluated for yield, grade, internal quality, and storability.

Methods

The onions were grown on an Owyhee silt loam previously planted to wheat. In the fall of 2006 the wheat stubble was shredded and the field was irrigated and disked. Soil analysis indicated the need for 172 lb phosphate (P_2O_5)/acre, 100 lb sulfur (S)/acre, 5 lb iron (Fe)/acre, 5 lb manganese (Mn)/acre, 2 lb copper (Cu)/acre, and 2 lb/acre of boron (B), which were broadcast in the fall of 2006 after disking. The field was then moldboard-plowed, groundhogged, roller-harrowed, fumigated with Telone® C-17 at 20 gal/acre, and bedded.

The full-season trial and the early maturing trial were planted adjacent to each other, on March 13, and in plots four double rows wide and 27 ft long. The early maturing trial had 5 varieties from 2 seed companies (Table 1) and the full-season trial had 54 varieties from 8 seed companies (Table 3). The experimental designs for both trials were randomized complete blocks with five replicates. A sixth nonrandomized replicate was planted for demonstrating onion variety performance to growers and seed company representatives.

Seed was planted in double rows spaced 3 inches apart at 9 seeds/ft of single row. Each double row was planted on beds spaced 22 inches apart. Planting was done with customized John Deere Flexi Planter units equipped with disc openers. The onion rows received 3.7 oz of Lorsban 15G® per 1,000 ft of row (0.82 lb ai/acre), and the soil surface was rolled on March 14. Onion emergence started on March 30. On May 4, alleys 4 ft wide were cut between plots, leaving plots 23 ft long. From May 7 through May 9, the seedlings were hand thinned to a plant population of 2 plants/ft of single row (6-inch spacing between individual onion plants, or 95,000 plants/acre).

The onions were managed to minimize yield reductions from weeds, pests, diseases, water stress, and nutrient deficiencies. Weeds were controlled with an application of Prowl® at 1 lb ai/acre on April 13. On May 18, Aza-Direct® at 0.0062 lb ai/acre and Success® at 0.25 lb ai/acre were applied for thrips control, and Select® at 0.25 lb ai/acre and Prowl at 0.24 lb ai/acre were applied for weed control. On June 1, Aza-Direct at 0.0062 lb ai/acre and Success at 0.25 lb ai/acre were applied for thrips control. Subsequent insecticide applications for thrips control were done aerially: June 16, Lannate® at 0.9 lb ai/acre; July 6, Carzol® at 1.15 lb ai/acre; July 15, Lannate at 0.9 lb ai/acre and Poast® at 0.28 lb ai/acre (grass control); and August 3, Lannate at 0.9 lb ai/acre.

The trial was furrow irrigated when the soil water tension at 8-inch depth reached 25 cb (1 cb = 1 kPa) (Shock et al. 2005). Starting in mid-June, soil water tension was monitored by six granular matrix sensors (GMS, Watermark Soil Moisture Sensors Model 200SS, Irrrometer Co. Inc., Riverside, CA) centered at 8-inch depth below the onion row. The sensors were automatically read three times a day with an AM-400 meter (Mike Hansen Co., East Wenatchee, WA). The last irrigation was on August 28.

The field was sidedressed with urea at 120 lb nitrogen (N)/acre on May 11. On June 11, the field was sidedressed with 100 lb N/acre as urea.

Onions in each plot were evaluated subjectively for maturity by visually rating the percentage of onions with the tops down and the percent dryness of the foliage. The percent maturity was calculated as the average percentage of onions with tops down and the percent dryness. The early maturing trial was evaluated for maturity on August 7 and 21, and the full-season trial was evaluated on August 23. The number of bolted onion plants in each plot was counted.

Onions in each plot of the full-season trial were evaluated subjectively for severity of symptoms of iris yellow spot virus (IYSV) and powdery mildew (*Leveillula taurica*) on August 22. Each plot was rated for both diseases on a scale of 0 to 5, where 0 = no symptoms, 1 = 1 to 25 percent of foliage diseased, 2 = 26 to 50 percent of foliage diseased, 3 = 51 to 75 percent of foliage diseased, 4 = 76 to 99 percent of foliage diseased, and 5 = 100 percent of foliage diseased.

At harvest, bulbs from one of the border rows in each plot of both trials were rated for single centers. Twenty-five consecutive onions ranging in diameter from 3.5 to 4.25 inches were rated. The onions were cut equatorially through the bulb middle and, if

multiple centered, the long axis of the inside diameter of the first single ring was measured. These multiple-centered onions were ranked according to the diameter of the first single ring: small had diameters less than 1.5 inches, medium had diameters from 1.5 to 2.25 inches, and large had diameters greater than 2.25 inches. Onions were considered functionally single centered for processing if they were single centered or had a small multiple center.

Onions from the middle two double rows in each plot in the early maturity trial were lifted, topped by hand, and bagged on August 21. On August 23 the onions were graded.

During grading, bulbs were separated according to quality: bulbs without blemishes (No. 1s), split bulbs (No. 2s), neck rot (bulbs infected with the fungus *Botrytis allii* in the neck or side), plate rot (bulbs infected with the fungus *Fusarium oxysporum*), and black mold (bulbs infected with the fungus *Aspergillus niger*). The No. 1 bulbs were graded according to diameter: small (<2.25 inches), medium (2.25-3 inches), jumbo (3-4 inches), colossal (4-4.25 inches), and supercolossal (>4.25 inches). Bulb counts per 50 lb of supercolossal onions were determined for each plot of every variety by weighing and counting all supercolossal bulbs during grading.

The onions in the full-season trial were lifted on September 10 to field cure. Onions from the middle two rows in each plot of the full-season trial were topped by hand and bagged on September 17. The bags were put in storage on September 26. The storage shed was ventilated to maintain air temperature as close to 34°F as possible. Onions from the full-season trial were graded out of storage on January 14 and 15, 2008.

Varietal differences were compared using analysis of variance. Means separation was determined using Fisher's least significant difference test at the 5 percent probability level, LSD (0.05). The varieties from each of the early maturity and full-season trials were compared for yield, grade, internal quality, and disease expression. Results are listed in tables 1-4 in alphabetical order by company. The LSD (0.05) values in each table should be considered when comparisons are made between varieties for significant differences in performance characteristics. Differences between varieties equal to or greater than the LSD value for a characteristic should exist before any variety is considered different from any other variety in that characteristic. Variety performance will vary by year. Growers are encouraged to review performance over a number of years before choosing a variety to plant.

Results

Early Maturing Trial

The percentage of single-centered bulbs averaged 18.4 percent and ranged from 0.8 percent for 'Renegade', to 44 percent for 'Montero' (Table 1). The percentage of onions that were functionally single centered averaged 27.5 percent and ranged from 1.6 percent for Renegade to 60 percent for Montero.

Total yield averaged 1,082 cwt/acre and ranged from 700.5 cwt/acre for 'XON-216' to 1,263 cwt/acre for 'Ovation' (Table 2). Ovation and 'Spanish Medallion' were among the varieties with the highest total yield, marketable yield, and supercolossal yield.

Full Season Trial

The percentage of single-centered bulbs averaged 32.3 percent and ranged from 1.6 percent for 'Frontier', to 81.6 percent for 'Ringleader' (Table 3). The percentage of onions that were functionally single centered averaged 40.7 percent and ranged from 3.2 percent for 'Peso' to 87.2 percent for 'Generation X'. Generation X, 'Arcero', Ringleader, 'Joaquin', 'Cometa', 'Harmony', and 'Evolution' had 80 percent or higher functionally single-centered bulbs.

Total yield out of storage averaged 1,030 cwt/acre and ranged from 484.5 cwt/acre for 'DPS 1415' to 1,379.4 cwt/acre for 'Charismatic' (Table 4). Charismatic, 'OLYS05N5', Harmony, 'Ranchero', and 'Vaquero' were among the varieties with the highest total yield. Charismatic, OLYS05N5, Vaquero, Ranchero, and Evolution were among the varieties with the highest marketable yield. Supercolossal yield averaged 203 cwt/acre and ranged from zero for Frontier, 'DPS 1413', 'DPS 1414', 'DPS 1418' and 'DPS 1419' to 687.7 cwt/acre for Charismatic. Charismatic had the highest supercolossal yield followed by 'Maverick', Ranchero, Ringleader, and OLYS05N5.

Iris Yellow Spot Virus (IYSV)

Iris yellow spot virus severity in 2007 was substantially lower than in 2005 and 2006. The average IYSV severity rating (0-5) for Vaquero in the variety trial was 1.1, 2.9, and 0.6 in 2005, 2006, and 2007, respectively. Onion yields were much higher in 2007 than in 2005 and 2006 (Shock et al. 2006, 2007). The average total yield of Vaquero was 666, 644, and 1,331 cwt/acre in 2005, 2006, and 2007, respectively. In 2007, the subjective ratings of IYSV symptom severity for the full-season varieties (scale of 0-5) ranged from 0.4 for 'Milestone' to 1 for 'Sedona' (Table 3).

Powdery Mildew

Powdery mildew is a relatively recently discovered onion disease caused by the fungus *Leveillula taurica*. The symptoms are necrotic lesions on the leaf surface with occasional white powdery patches with irregular margins. Powdery mildew is not currently thought to result in economic losses because infestations are occurring very late in the season. At the Malheur Experiment Station, powdery mildew on onions was first noticed in late August of 2006 at very low levels on a few varieties. In 2007, the disease was first observed in mid-August. Subjective ratings of powdery mildew symptom severity for the full-season varieties, on a scale from 0 to 5, ranged from 0 for many varieties to 3.2 for Evolution. Evolution and Joaquin had the most severe powdery mildew symptoms.

References

Shock, C.C., R. Flock, E. Feibert, C.A. Shock, A. Pereira, and L. Jensen. 2005. Irrigation monitoring using soil water tension. Oregon State University Extension Service EM 8900.

Shock, C.C., E.B.G. Feibert, L.D. Saunders, L. Jensen, and K. Mohan. 2006. 2005 Onion Variety Trials. Oregon State University Agricultural Experiment Station Special Report 1070:42-53.

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Table 1. Maturity and bulb multiple-center ratings for early maturing varieties, Malheur Experiment Station, Oregon State University, Ontario, OR, 2007.

Seed company	Variety	Bulb color	Maturity Aug. 21 %	Multiple center			Single center	
				large	medium	small %	functional ^a	single
Nunhems	Renegade	Y	64.0	88.8	9.6	0.8	1.6	0.8
	Montero	Y	51.0	22.4	17.6	16.0	60.0	44.0
Sakata	Ovation	Y	50.0	54.4	13.6	9.6	32.0	22.4
	Spanish Medallion	Y	51.0	54.4	21.6	8.0	24.0	16.0
	XON-216	R	74.0	61.6	18.4	11.2	20.0	8.8
LSD (0.05)			5.4	27.7	NS	NS	21.3	17.9

^abullet + small double.

Table 2. Yield and grade performance of early maturing varieties, Malheur Experiment Station, Oregon State University, Ontario, OR, 2007.

Seed company	Variety	Bulb color	Total yield	Marketable yield by grade				Non-marketable yield			Bulb counts >4¼ in #/50 lb	
				Total	>4¼ in	4-4¼ in	3-4 in	2¼-3 in	No. 2s	Small		Total rot
cwt/acre												
Nunhems	Renegade	Y	1144.6	1064.5	255.7	539.9	265.1	3.8	77.8	1.1	0.1	29.3
	Montero	Y	1072.8	1068.8	221.3	541.8	302.6	3.1	3.2	0.7	0.0	31.7
Sakata	Ovation	Y	1263.1	1248.1	492.5	526.8	225.1	3.8	12.0	1.7	0.1	28.8
	Spanish Medallion	Y	1226.5	1196.3	544.0	475.6	174.5	2.2	26.3	1.5	0.2	28.5
	XON-216	R	700.5	686.7	8.5	113.4	534.5	30.2	7.4	3.6	0.5	28.6
LSD (0.05)			83.4	90.8	8.4	98.6	84.3	8.7	19.4	1.7	NS	NS

Table 3. Bulb multiple-center rating, iris yellow spot virus (IYSV), powdery mildew (PM) rating, maturity, and bolting for full-season varieties, Malheur Experiment Station, Oregon State University, Ontario, OR, 2007. Continued on next page.

Seed company	Variety	Bulb color	Multiple center			Single center		Disease severity rating ^b		Maturity	Bolting
			large	medium	small	functional ^a	single	IYSV	PM	August 23	
			----- % -----					----- 0-5 -----		----- % -----	
A. Takii	Centerstone	Y	41.6	34.4	8.8	24.0	15.2	0.5	0.0	69.0	0.0
	Frontier	Y	47.2	38.4	12.8	14.4	1.6	na ^c	na	86.0	0.0
	T-433	Y	61.6	28.0	8.0	10.4	2.4	0.5	0.7	60.0	0.0
	Milestone	Y	28.8	42.4	12.8	28.8	16.0	0.4	0.0	77.0	0.0
	Ruby Ring	R	10.4	38.7	15.7	50.9	35.2	0.5	0.0	76.0	0.0
Bejo	Calibra	Y	71.2	23.2	1.6	5.6	4.0	0.5	0.0	70.0	0.0
	Crocket	Y	40.8	46.4	8.8	12.8	4.0	0.5	0.0	49.0	0.2
	Desperado	Y	52.8	31.2	8.0	16.0	8.0	0.5	0.1	61.0	0.1
	Delgado	Y	59.2	27.2	4.0	13.6	9.6	0.6	0.1	56.0	0.0
	Peso	Y	80.0	16.8	0.8	3.2	2.4	0.5	0.3	53.0	0.4
	Red Bull	R	36.0	43.2	7.2	20.8	13.6	0.8	0.0	65.0	0.0
	Sedona	Y	39.2	34.4	9.6	26.4	16.8	1.0	0.5	59.0	0.8
	Derby F1	Y	91.2	4.8	0.8	4.0	3.2	0.5	0.0	72.0	0.0
	BGS 231	Y	72.8	23.2	0.8	4.0	3.2	0.5	0.0	48.0	0.2
	Crookham	Harmony	Y	10.4	8.8	0.8	80.8	80.0	0.5	0.5	51.0
Sweet Perfection		Y	34.4	20.8	3.2	44.8	41.6	0.6	0.0	53.0	0.7
OLYS03-207		Y	16.0	11.2	1.6	72.8	71.2	0.6	0.7	39.0	0.0
OLYS05N5		Y	16.8	12.0	2.4	71.2	68.8	0.6	0.4	38.0	1.3
OLYX00-23		Y	20.8	21.6	5.6	57.6	52.0	0.6	0.2	57.0	0.3
D. Palmer	Mesquite06	Y	53.6	21.6	2.4	24.8	22.4	0.5	0.2	37.5	1.1
	Tequila06	Y	40.8	20.8	4.8	38.4	33.6	0.5	0.0	51.0	1.3
	Evolution	Y	9.6	10.4	4.8	80.0	75.2	0.7	3.2	22.0	0.3
	Generation X	Y	2.4	10.4	10.4	87.2	76.8	0.9	1.5	44.0	0.0
	DPS1413	Y	39.2	20.0	23.2	40.8	17.6	na	na	89.0	0.0
	DPS1414	Y	20.9	30.6	27.6	48.5	20.9	na	na	85.0	0.0
	DPS1415	Y	42.4	24.0	11.2	33.6	22.4	na	na	87.0	0.0
	DPS1416	Y	33.6	36.0	15.2	30.4	15.2	na	na	89.0	0.0
	DPS1417	Y	46.4	28.0	9.6	25.6	16.0	0.5	0.0	77.0	0.0
	DPS1418	Y	15.2	38.4	25.6	46.4	20.8	na	na	85.0	0.0

Seed company	Variety	Bulb color	Multiple center			Single center		Disease severity rating ^b		Maturity August 23	Bolting
			large	medium	small	functional ^a	single	IYSV	PM		
			%					0-5		%	
D. Palmer	DPS1419	Y	30.4	33.6	19.2	36.0	16.8	0.5	0.0	80.0	0.0
	DPS3052	R	68.0	12.8	8.8	19.2	10.4	0.6	0.1	61.0	0.0
	DPS3055	R	80.8	14.4	3.2	4.8	1.6	0.6	0.0	61.0	0.0
	DPS3058	R	48.0	20.8	16.8	31.2	14.4	0.5	0.0	63.0	0.0
	DPS3062	R	56.7	22.8	4.6	20.4	15.8	0.5	0.0	60.0	0.1
Global Genetics	Maverick	Y	48.8	19.2	4.8	32.0	27.2	0.7	0.6	40.0	0.4
	Ringleader	Y	9.6	6.4	2.4	84.0	81.6	0.5	0.1	50.0	0.2
	Outlaw	Y	28.0	36.8	12.8	35.2	22.4	0.5	0.0	62.0	0.0
	6093	Y	19.2	9.6	6.4	71.2	64.8	0.7	0.8	29.0	1.1
Nunhems	Granero	Y	14.4	19.2	1.6	66.4	64.8	0.9	1.0	39.0	0.4
	Montero	Y	13.6	24.8	14.4	61.6	47.2	0.5	0.0	64.0	0.2
	Pandero	Y	25.6	29.6	6.4	44.8	38.4	0.6	0.1	42.0	0.7
	Ranchero	Y	20.8	26.4	9.6	52.8	43.2	0.5	0.0	52.0	0.2
	Salsa	R	52.0	32.0	7.0	16.0	9.0	0.6	0.0	68.0	0.0
	Vaquero	Y	12.8	19.2	8.0	68.0	60.0	0.6	0.1	57.0	0.1
	Arcero	Y	5.6	8.8	8.8	85.6	76.8	0.8	0.0	49.0	0.0
	Joaquin	Y	8.8	8.0	4.8	83.2	78.4	0.7	2.2	20.0	0.4
	Cometa	W	6.4	11.2	10.4	82.4	72.0	0.5	0.2	50.0	1.2
Sakata	XON-670W	W	16.0	26.4	10.4	57.6	47.2	0.5	0.0	53.0	2.7
Seminis	Affirmed	Y	17.6	30.4	9.6	52.0	42.4	0.5	0.1	43.0	0.6
	Charismatic	Y	21.6	31.2	3.2	47.2	44.0	0.5	0.7	41.0	0.4
	Monarchos	Y	13.6	22.4	4.8	64.0	59.2	0.5	0.1	42.0	0.0
	Mercury	R	58.4	30.4	8.8	11.2	2.4	0.5	0.0	77.0	0.0
	Toluca	W	38.4	32.0	8.0	29.6	21.6	0.5	0.0	39.0	0.0
	Orizaba	W	44.8	30.4	11.2	24.8	13.6	0.5	0.0	51.0	0.6
LSD (0.05)			14.0	12.6	9.4	14.4	11.2	0.3	0.4	8.3	0.7

^a single + small double

^b IYSV = iris yellow spot virus; PM = powdery mildew. 0 = no symptoms, 1 = 1-25% of foliage diseased, 2 = 26-50% of foliage diseased, 3 = 51-75% of foliage diseased, 4 = 76-99% of foliage diseased, and 5 = 100% of foliage diseased.

^cna = data not available due to variety being fully mature at rating.

Table 4. Yield and grade of full-season experimental and commercial onion varieties graded out of storage in January 2008, Malheur Experiment Station, Oregon State University, Ontario, OR. Continued on next page.

Seed company	Variety	Bulb color	Total yield	Marketable yield by grade					Non-marketable yield					Bulb counts >4¼ in	Thrips damage ^a	
				Total	>4¼ in	4-4¼ in	3-4 in	2¼-3 in	No. 2s	Small	Total rot	Neck rot	Plate rot			
----- cwt/acre -----														#/50 lb	0-10	
														-- % of total yield --		
A. Takii	Centerstone	Y	1083.8	1034.0	111.6	457.4	439.2	25.9	17.1	8.3	2.3	1.1	1.1	29.5		
	Frontier	Y	600.6	566.1	0.0	21.0	490.9	54.2	9.0	14.6	1.8	0.0	1.8			
	T-433	Y	1094.2	967.3	321.0	278.6	331.4	36.3	78.8	6.2	3.2	1.0	2.3	28.5		
	Milestone	Y	806.3	788.7	5.7	160.4	598.4	24.3	1.1	12.6	0.5	0.2	0.2	36.3		
	Ruby Ring	R	758.8	713.4	1.7	55.0	610.9	45.8	21.2	21.1	0.4	0.0	0.4	30.2	1.0	
Bejo	Calibra	Y	950.9	890.6	28.5	332.3	515.7	14.0	39.0	10.0	1.2	0.0	1.2	28.7		
	Crocket	Y	1052.3	1010.1	73.1	390.9	512.3	33.8	27.8	10.5	0.4	0.0	0.4	29.0		
	Desperado	Y	1184.3	1083.0	223.5	495.2	348.7	15.6	72.8	11.8	1.4	0.7	0.7	27.9		
	Delgado	Y	1101.1	1024.0	139.6	462.4	400.9	21.1	60.0	5.2	1.1	0.5	0.6	31.5		
	Peso	Y	1176.2	998.7	270.2	469.2	245.6	13.8	140.1	2.5	3.0	2.4	0.6	27.2		
	Red Bull	R	755.0	724.2	16.6	151.7	527.6	28.4	11.6	16.2	0.4	0.1	0.3	30.8	0.0	
	Sedona	Y	1148.3	1081.3	150.3	528.5	378.4	24.1	39.6	11.6	1.3	1.2	0.2	27.4		
	Derby F1	Y	1119.2	765.9	92.3	311.4	350.8	11.5	187.9	5.2	14.5	4.5	10.0	26.8		
	BGS 231	Y	1034.9	927.5	87.9	400.0	411.8	27.7	89.7	8.1	0.9	0.3	0.7	28.9		
Crookham	Harmony	Y	1321.2	1228.3	444.6	535.0	213.2	35.5	43.3	15.3	2.6	2.6	0.0	29.3		
	Sweet Perfection	Y	1226.7	1076.2	437.1	456.3	171.5	11.3	96.1	1.7	4.2	2.7	1.5	27.8		
	OLYS03-207	Y	1204.4	1117.0	315.3	505.2	284.1	12.4	27.4	11.0	4.3	2.9	1.4	31.4		
	OLYS05N5	Y	1371.7	1303.2	502.3	524.1	254.7	22.1	26.0	8.4	2.5	1.6	0.9	30.1		
	OLYX00-23	Y	1083.7	1042.0	106.6	510.0	397.3	28.2	23.5	10.6	0.7	0.5	0.3	31.1		
D. Palmer	Mesquite06	Y	1240.5	1110.3	468.1	419.6	217.5	5.1	95.6	6.8	2.2	1.6	0.7	28.5		
	Tequila06	Y	1257.7	1147.7	311.8	525.3	292.3	18.3	71.4	13.6	2.0	0.8	1.2	28.3		
	Evolution	Y	1283.7	1239.6	425.3	584.0	214.8	15.5	21.9	5.6	1.3	0.5	0.7	29.6		
	Generation X	Y	1180.6	1160.1	103.1	622.8	419.4	14.9	6.8	5.1	0.7	0.1	0.6	29.0		
	DPS1413	Y	641.6	606.9	0.0	41.1	509.6	56.3	14.6	15.4	0.7	0.0	0.7			
	DPS1414	Y	656.9	625.3	0.0	35.1	546.0	44.2	13.3	13.0	0.8	0.1	0.7			
	DPS1415	Y	484.5	431.1	2.3	34.4	314.3	80.1	24.8	23.3	1.1	0.5	0.7	22.7		
	DPS1416	Y	606.3	545.3	4.2	19.2	469.2	52.6	36.0	17.1	1.3	0.5	0.8	24.5		
D. Palmer	DPS1417	Y	708.0	641.8	28.9	141.5	423.0	48.4	37.2	19.0	1.2	0.4	0.8	29.1		

Seed company	Variety	Bulb color	Total yield	Marketable yield by grade					Non-marketable yield					Bulb counts >4¼ in	Thrips damage ^a
				Total	>4¼ in	4-4¼ in	3-4 in	2¼-3 in	No. 2s	Small	Total rot	Neck rot	Plate rot		
				cwt/acre					-- % of total yield --					#/50 lb	0-10
	DPS1418	Y	594.2	568.7	0.0	25.2	490.9	52.6	6.8	17.0	0.4	0.1	0.2		
	DPS1419	Y	680.5	655.3	0.0	43.5	562.6	49.2	12.4	8.2	0.7	0.0	0.7		
	DPS3052	R	797.6	572.9	7.5	101.8	400.2	63.3	173.6	36.2	1.9	0.1	1.7	27.8	0.0
	DPS3055	R	802.0	501.5	1.4	65.8	387.2	47.0	266.7	17.7	2.0	0.7	1.2	37.8	0.0
	DPS3058	R	737.9	563.0	2.3	63.8	448.5	48.4	149.9	18.9	0.8	0.3	0.5	22.7	0.0
	DPS3062	R	722.9	540.8	5.0	95.9	403.9	36.0	156.5	15.9	1.4	1.0	0.3	30.2	0.3
Global Genetics	Maverick	Y	1254.9	1122.4	543.7	425.7	142.8	10.1	105.0	4.0	1.8	0.9	0.9	28.4	
	Ringleader	Y	1050.6	971.9	508.2	317.1	134.8	11.7	63.1	1.8	1.3	0.5	0.9	28.3	
	Outlaw	Y	958.4	913.3	96.1	362.9	428.7	25.6	25.5	8.9	1.1	0.2	0.9	28.9	
	6093	Y	1219.8	1146.1	317.5	533.2	277.9	17.4	34.4	8.0	2.6	1.3	1.3	31.2	
Nunhems	Granero	Y	1240.2	1199.6	270.6	634.4	282.7	12.0	20.6	9.4	0.9	0.6	0.3	29.6	
	Montero	Y	1140.0	1102.9	163.1	490.0	426.6	23.2	23.2	7.7	0.5	0.4	0.2	27.9	
	Pandero	Y	1174.8	1120.1	269.5	546.1	288.7	15.7	31.3	8.5	1.3	0.6	0.7	28.0	
	Ranchero	Y	1310.0	1260.8	531.9	528.7	181.8	18.5	19.0	4.7	1.9	1.2	0.7	28.1	
	Salsa	R	881.6	796.5	36.7	280.0	437.6	42.3	62.0	16.9	0.7	0.2	0.5	30.7	0.5
	Vaquero	Y	1309.1	1268.5	437.1	571.3	234.4	25.7	19.9	12.6	0.6	0.4	0.2	28.6	
	Arcero	Y	1107.5	1081.0	145.3	553.1	364.9	17.7	11.5	8.9	0.6	0.1	0.4	28.8	
	Joaquin	Y	1238.0	1189.4	371.5	534.6	267.4	15.8	18.9	8.2	1.7	0.8	1.0	29.5	
	Cometa	W	1255.4	1204.0	329.8	601.1	262.6	10.4	12.3	10.0	2.4	1.2	1.2	29.8	
Sakata	XON-670W	W	1166.4	1077.1	263.3	473.3	317.8	22.7	45.9	8.8	3.0	0.7	2.4	29.9	
Seminis	Affirmed	Y	1194.2	1147.0	495.2	475.4	164.0	12.4	23.5	4.6	1.6	0.5	1.1	27.8	
	Charismatic	Y	1379.4	1316.2	687.7	438.0	177.2	13.2	24.9	2.8	2.6	1.7	0.9	28.5	
	Monarchos	Y	1131.9	1108.5	314.0	578.6	205.7	10.3	3.4	2.4	1.6	0.3	1.2	28.5	
	Mercury	R	850.6	780.6	25.2	259.4	467.6	28.4	47.9	9.0	1.5	0.6	0.9	30.4	0.8
	Toluca	W	1177.1	1019.8	266.5	511.8	230.1	11.4	87.5	5.9	5.5	2.6	2.9	28.6	
	Orizaba	W	1130.5	942.2	186.6	470.2	270.7	14.8	62.1	4.5	11.0	7.5	3.5	27.5	
LSD (0.05)			115.4	108.7	87.1	84.4	102.6	21.1	40.3	11.5	2.7	1.7	1.8	3.3	

^a Thrips damage on the surface of red onions at the end of the storage January 14 and 15: 0 = least damage, 10 = most damage.