

**CARROT** (*Daucus carota* subsp. *sativus*)  
**Alternaria Leaf Blight;** *Alternaria dauci*  
**Cercospora Leaf Blight;** *Cercospora carotae*

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### **Evaluation of carrot cultivars and breeding selections to identify resistance to foliar blights - Hancock 2007.**

Forty carrot cultivars and advanced breeding lines were evaluated for resistance to *Alternaria* leaf blight and *Cercospora* leaf spot in a trial at the Hancock Agricultural Research Station, Hancock, WI. Seeds of 18 cultivars and 22 advanced breeding populations were planted 7 May using a cone seeder push planter (slicing and cut-and-peel types, 24 seeds/ft) (dicing type, 12 seeds/ft). Each experimental plot consisted of two adjacent 10-ft-long test rows spaced 1 ft apart in the center portion of a 6-ft-wide planting bed. The trial was designed as a randomized complete block with three replications. To minimize interplot interference and provide more consistent inoculum across the trial, a guard row of commercial cultivar Heritage (susceptible, slicer type, 550,000 seeds/A) was planted on each side of each experimental plot on 7 May using a standard commercial planter. Sources of natural inoculum for both pathogens were available from nearby commercial carrot fields and no inoculation was necessary. The soil type was Plainfield sand with pH 6.1. Oat seed was sown on 6 Apr as a cover crop to provide early season wind protection. Fertilizer applications consisted of 0-0-60, 450 lb/A broadcast 3 Apr, pop-up fertilizer (3-18-18, 3 gal/A) during bed shaping on 3 May to aid in early seedling establishment, sidedress fertilizer consisting of NH<sub>3</sub>SO<sub>4</sub>, 100 lb/A, + mono-ammonium phosphate (11-52-0), 50 lb/A, + KMag, 200 lb/A, 22 Jun and foliar nitrogen applied through overhead irrigation (28% UAN, 30 lb/A 6 and 21 Aug; 40 lb/A 31 Aug). Vydate L, 0.5 gal/A was applied at planting and Asana XL (4 fl oz/A, 6 Jul) was applied for insect control. Herbicide applications included Poast (2.0 pt/A) + crop oil concentrate (10 fl oz/A) 5 Jun; Poast (1.5 pt/A) + crop oil concentrate (8 fl oz/A) 12 Jun; Lorox DF (0.75 lb/A) + Sencor DF (0.1 lb/A) + crop oil concentrate (8 fl oz/A) 14 Jun; Select (10.0 fl oz/A + crop oil concentrate (20 fl oz/A), 18 Jun and Lorox DF (0.75 lb/A) + Sencor DF (0.15 lb/A) 6 Jul. Fungicide sprays were not applied to this trial at any time during the season. Foliar disease severity was rated on four sections of the test rows in each plot from 3 Aug to 20 Sep using the Horsfall-Barratt (0-11) rating system. On 1 Oct, two 5 ft sections from each experimental plot (10 ft total) of 18 cultivars and advanced breeding lines were hand harvested and roots were graded into five size classes (based on diameter) and culls (misshapen or rotten). Roots from each size class were then grouped according to commercial processing standards for slicing and dicing carrots. The value of each trial entry was calculated from total yield without culls, according to standard processing contracts. No yield data were collected for the 22 breeding populations as roots were not consistent with standards for processing carrot type. These roots were harvested separately and will be used for future breeding purposes. Rainfall recorded during the growing season (in.) was: May (3.0); Jun (1.1); Jul (2.5); Aug (7.9); Sep (3.1). An additional 17.6 in. of water was applied as irrigation in 36 applications May-Sep.

Symptoms of foliar disease were first observed on 3 Aug. Disease steadily progressed until the final rating on 20 Sep. Bolero is considered to be one of the more disease tolerant cultivars evaluated over several years of field testing in Wisconsin. Several entries exhibited less disease than Bolero in the final rating and using the relative area under the disease progress curve (RAUDPC) as a measure of susceptibility. Nineteen entries exhibited more disease than Bolero (final rating and RAUDPC). Yields of named cultivars and advanced breeding lines ranged from 28.7 t/A (Bolero) to 12.3 t/A (Bastia). Gross values based on yield evaluated for a slicer contract varied from \$1370/A (Bolero) to \$409/A (PS 0710-1404). Gross values based on yield evaluated for a dicer contract varied from \$871/A (Carson) to \$42/A (NUN 8577). Carrot trials evaluating susceptibility to foliar diseases have been conducted in Wisconsin since 1993. We have observed significant changes in the quality and disease resistance of carrot entries in these trials. In conjunction with fungicide treatment and disease forecasting plots, we have observed greatly improved disease control with fewer fungicide sprays using less fungicide ai. Using improved cultivars with disease resistance, a scouting program to detect the first disease symptoms, the TomCast program and 15-20 DSV's to time fungicide sprays and reduced risk fungicides, disease control has been achieved with fewer fungicide inputs. This trial indicates that additional progress in improving resistance to foliar diseases is possible in the foreseeable future.

**Table 1. Severity of foliar disease symptoms on carrot cultivars and breeding selections.**

Cultivar or breeding selection	Source	Type <sup>1</sup>	% Disease severity (Alternaria and Cercospora blight - combined) <sup>2</sup>				Relative AUDPC <sup>3</sup>
			3 Aug	15 Aug	28 Aug	20 Sep	
<b>Slicer Standards</b>							
Bolero	Vilmorin	S	0.0	5.7	10.9	20.3	0.104
Enterprise	Seminis	S	2.5	8.0	22.3	44.3	0.214
<b>Dicer Standards</b>							
Carson	Bejo	D	2.1	5.3	13.7	35.4	0.153
Cupar	Bejo	D	2.0	3.7	14.1	44.8	0.172
<b>Test Lines</b>							
Abledo	Seminis	D	3.5	9.4	28.3	24.2	0.193
Abundance	Seminis	D	9.4	43.8	59.4	35.7	0.434
Bastia	Bejo	S	6.0	21.1	40.6	52.1	0.340
Nayarit	Bejo	S	2.7	17.2	40.6	37.0	0.289
NBC M493	Nunhems	S	4.3	8.8	16.4	24.0	0.147
NBC M522	Nunhems	S,CP	2.1	6.2	17.6	34.9	0.168
Nervi	Bejo	S	3.3	24.2	47.9	52.6	0.373
Nevada	Bejo	S	1.0	13.5	27.0	24.2	0.195
NUN 8577	Nunhems	S,CP	3.1	6.6	14.5	28.1	0.143
PS 0710-1404	Seminis	S	2.3	8.2	16.4	40.6	0.183
PS 0710-3217	Seminis	D	3.1	10.5	27.5	47.9	0.249
Texto	Vilmorin	S	1.8	7.0	19.5	40.6	0.191
Uppercut 25	Nunhems	S,CP	1.4	4.7	10.2	18.7	0.097
VAC-48	Vilmorin	D	1.2	5.3	10.9	17.6	0.098
62000-03-06	USDA-UW	BP	2.1	8.0	13.7	13.3	0.107
62005X63110	USDA-UW	BP	0.3	8.8	12.9	32.8	0.150
62009	USDA-UW	BP	0.8	3.3	5.9	13.7	0.064
62081/62079	USDA-UW	BP	0.4	5.5	9.8	36.3	0.143
62076-77	USDA-UW	BP	2.5	8.8	20.3	30.7	0.176
62018-19	USDA-UW	BP	2.7	10.5	12.5	13.7	0.110
62021-23-25	USDA-UW	BP	0.4	3.3	5.3	18.5	0.073
62009 OC	USDA-UW	BP	1.8	5.3	10.3	12.5	0.085
62020 OC	USDA-UW	BP	1.8	4.1	9.6	16.1	0.087
62029-30	USDA-UW	BP	2.3	6.0	10.3	11.3	0.085
62026	USDA-UW	BP	1.6	5.7	9.4	18.0	0.095
62043-45-52	USDA-UW	BP	0.6	3.1	5.7	9.0	0.052
62044	USDA-UW	BP	---	---	---	---	.
62057-59	USDA-UW	BP	2.0	7.0	13.7	37.0	0.161
62092X62034	USDA-UW	BP	1.2	2.3	5.3	16.4	0.065
62085-95	USDA-UW	BP	0.0	2.9	5.3	8.6	0.048
79330	USDA-UW	BP	1.0	3.1	5.5	10.2	0.054
79336	USDA-UW	BP	0.8	2.9	5.1	15.2	0.064
79340	USDA-UW	BP	1.4	3.1	6.0	11.7	0.061
79346	USDA-UW	BP	2.3	4.9	7.0	5.9	0.056
79348	USDA-UW	BP	1.8	3.1	5.5	7.0	0.048
79350	USDA-UW	BP	0.6	3.7	5.7	9.4	0.054
Pr > F <sup>4</sup>			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
LSD			2.7	6.8	12.3	15.6	0.072

1. Carrot processing type. D = Dice, S = Slice, CP = Cut and peel, BP=Breeding population
2. Severity of leaf blight symptoms was rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage dead). Symptoms of Alternaria leaf blight and Cercospora leaf spot were not separated. Ratings were converted to % foliar severity.
3. Relative area under the disease progress curve (RAUDPC). Disease severity for each date was plotted on a graph and the area under the resulting curve was calculated by for each treatment, providing a measure of the relative disease severity over the season. A severity rating of 100% for the entire season would produce a value of 1.0. All relative AUDPC values are expressed as a proportion of this value.
4. An analysis of variance was performed on the data and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05). NS =not significant at  $P = 0.05$ .

**Table 3. Yield, size distribution and gross value for carrot cultivars and breeding selections.**

Cultivar or breeding selection	Total yield (t/A) <sup>1</sup>				Percentage of yield for carrot diameter (in.)				% culls	Yield graded as slicers <sup>2</sup>				Yield graded as dicers <sup>2</sup>			
	< 0.75		0.75 - 1.25		1.25 - 1.63		> 1.63			Dis-cards	Price/t (\$)	Gross value of yield (\$)	Percentage of Yield		Dis-cards	Price/t (\$)	Gross value of yield (\$)
	< 0.75	0.75 - 1.25	1.25 - 1.63	> 1.63	> 1.63	> 2"	1.25 - 2"	> 2"									
<b>Slicer Standards</b>																	
Bolero	28.7	8.2	53.0	30.4	3.8	0.0	4.7	83.3	3.8	12.9	54.7	1370.1	34.1	0.0	65.9	34.3	338.2
Enterprise	18.6	18.9	61.1	15.5	0.0	0.0	4.5	76.6	0.0	23.4	54.7	775.7	15.5	0.0	84.5	34.3	99.5
<b>Dicer Standards</b>																	
Carson	28.5	0.2	9.4	37.7	26.4	25.1	1.2	47.1	51.5	1.4	45.5	1285.3	64.1	25.1	10.8	34.3	871.1
Cupar	24.9	1.3	13.4	46.4	17.4	20.0	1.5	59.8	37.4	2.7	49.5	1190.5	63.9	20.0	16.1	34.3	728.6
<b>Test Line</b>																	
Abledo	25.4	2.1	14.7	36.7	20.1	22.8	3.6	51.4	43.0	5.7	47.5	1132.9	56.8	22.8	20.3	34.3	691.3
Abundance	16.9	1.0	32.2	52.2	7.1	2.6	4.9	84.4	9.7	5.9	53.9	855.8	59.3	2.6	38.1	34.3	360.6
Bastia	12.3	9.7	59.4	21.8	2.4	0.0	6.7	81.2	2.4	16.4	54.7	570.5	24.2	0.0	75.8	34.3	106.9
Nayarit	20.4	21.7	58.3	16.5	0.0	0.0	3.5	74.7	0.0	25.3	54.7	836.6	16.5	0.0	83.5	34.3	116.9
NBC M493	16.7	25.1	34.3	15.9	0.0	0.0	24.7	50.2	0.0	49.8	54.7	480.5	15.9	0.0	84.1	34.3	102.8
NBC M522	18.6	21.1	48.2	13.5	1.2	0.0	16.0	61.8	1.2	37.1	54.7	653.9	14.7	0.0	85.3	34.3	97.8
Nervi	14.8	18.3	68.0	12.3	0.0	0.0	1.4	80.3	0.0	19.7	54.7	647.3	12.3	0.0	87.7	34.3	61.3
Nevada	22.6	11.8	66.6	13.9	1.6	0.0	6.3	80.4	1.6	18.0	54.7	1014.0	15.4	0.0	84.6	34.3	121.0
NUN 8577	19.5	20.7	64.2	5.3	1.1	0.0	8.6	69.5	1.1	29.3	54.7	755.9	6.4	0.0	93.6	34.3	42.3
PS 0710-1404	14.2	24.8	37.7	10.9	0.0	0.0	26.6	48.6	0.0	51.4	54.7	409.0	10.9	0.0	89.1	34.3	51.4
PS 0710-3217	24.0	1.1	10.2	37.4	26.1	17.8	7.4	47.6	43.9	8.5	46.5	1015.6	63.5	17.8	18.7	34.3	666.4
Texto	14.2	16.1	59.8	15.1	0.0	0.0	9.0	74.9	0.0	25.1	54.7	575.8	15.1	0.0	84.9	34.3	73.8
Uppercut 25	22.1	31.2	50.7	7.9	0.0	0.0	10.3	58.6	0.0	41.4	54.7	705.6	7.9	0.0	92.1	34.3	61.3
VAC-48	20.1	0.6	6.1	27.1	25.0	32.1	9.2	33.2	57.1	9.7	43.6	806.1	52.1	32.1	15.8	34.6	592.3
Pr>F <sup>3</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.48	<0.01
LSD <sup>3</sup>	6.2	11.6	12.2	16.3	8.4	12.1	16.7	21.5	13.5	15.7	3.0	314.7	17.7	12.1	12.1	NS	166.1

1 A 5-ft section of row was hand dug from each of the 2 rows in each plot with exception of wild accessions and yield was converted to t/A. Hand digging is likely to result in a higher apparent yield as fewer carrots are lost compared to mechanical digging. Carrots were graded into five size classes and culls (misshapen or rotted). The size classes were then grouped appropriately to conform to standards for dicing or slicing carrots. Breeding lines were not harvested for yield evaluation.

2 For comparison, values are calculated based on typical 2003(dicer) or 2004 (slicer) processing contracts for uncrowned carrots.  
 • Dicing carrot contract: Minimum size accepted is 1.25 inch; discard class includes culls and carrots below the minimum diameter. Dicing base price per ton is: >90% of crop over 2in. diameter - \$44.65; 81-90% > 2in. - \$41.80; 71-80% > 2in. - \$38.15; 61-70% > 2in. - \$36.60; 51-60% > 2in. - \$35.40; < 51% > 2in. - \$34.25.

• Slicing carrot contract: Minimum size accepted is 3/4 inch diameter; discard class includes culls and carrots below the minimum diameter. Slicing base price per ton is: < 10% over 1.75in. diameter - \$54.70; 10-19% > 1.75in. - \$53.90; 20-29% > 1.75in. - \$52.40; 30-39% > 1.75in. - \$49.40; 40-49% > 1.75in. - \$46.45; >49% > 1.75in. - \$43.60.

3 An analysis of variance was performed on the data and Fisher's protected least significant difference (LSD) ( $\alpha = 0.05$ ) was calculated. NS = not significant at  $P=0.05$

**Table 4. Data ranked according to disease and yield measurements. (Footnotes are at the end of section E.)**

**A. Sorted by Disease severity 9/20 (% , increasing)**

Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$) <sup>2</sup>		Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$) <sup>2</sup>	
				Slicers	Dicers					Slicers	Dicers
79346	5.9	0.056				Abledo	24.2	0.193	25.4	1132.9	691.3
79348	7.0	0.048				Nevada	24.2	0.195	22.6	1014.0	121.0
62085-95	8.6	0.048				NUN 8577	28.1	0.143	19.5	755.9	42.3
62043-45-52	9.0	0.052				62076-77	30.7	0.176			
79350	9.4	0.054				62005X63110	32.8	0.150			
79330	10.2	0.054				NBC M522	34.9	0.168	18.6	653.9	97.8
62029-30	11.3	0.085				Carson	35.4	0.153	28.5	1285.3	871.1
79340	11.7	0.061				Abundance	35.7	0.434	16.9	855.8	360.6
62009 OC	12.5	0.085				62081/62079	36.3	0.143			
62000-03-06	13.3	0.107				Nayarit	37.0	0.289	20.4	836.6	116.9
62009	13.7	0.064				62057-59	37.0	0.161			
62018-19	13.7	0.110				PS 0710-1404	40.6	0.183	14.2	409.0	51.4
79336	15.2	0.064				Texto	40.6	0.191	14.2	575.8	73.8
62020 OC	16.1	0.087				Enterprise	44.3	0.214	18.6	775.7	99.5
62092X62034	16.4	0.065				Cupar	44.8	0.172	24.9	1190.5	728.6
VAC-48	17.6	0.098	20.1	806.1	592.3	PS 0710-3217	47.9	0.249	24.0	1015.6	666.4
62026	18.0	0.095				Bastia	52.1	0.340	12.3	570.5	106.9
62021-23-25	18.5	0.073				Nervi	52.6	0.373	14.8	647.3	61.3
Uppercut 25	18.7	0.097	22.1	705.6	61.3	Pr>F <sup>3</sup>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bolero	20.3	0.104	28.7	1370.1	338.2	LSD <sup>3</sup>	15.6	0.060	6.2	314.7	166.1
NBC M493	24.0	0.147	16.7	480.5	102.8						

**B. Sorted By AUPDC (increasing)**

Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$) <sup>2</sup>		Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$) <sup>2</sup>	
				Slicers	Dicers					Slicers	Dicers
62085-95	8.6	0.048				62081/62079	36.3	0.143			
79348	7.0	0.048				NBC M493	24.0	0.147	16.7	480.5	102.8
62043-45-52	9.0	0.052				62005X63110	32.8	0.150			
79330	10.2	0.054				Carson	35.4	0.153	28.5	1285.3	871.1
79350	9.4	0.054				62057-59	37.0	0.161			
79346	5.9	0.056				NBC M522	34.9	0.168	18.6	653.9	97.8
79340	11.7	0.061				Cupar	44.8	0.172	24.9	1190.5	728.6
62009	13.7	0.064				62076-77	30.7	0.176			
79336	15.2	0.064				PS 0710-1404	40.6	0.183	14.2	409.0	51.4
62092X62034	16.4	0.065				Texto	40.6	0.191	14.2	575.8	73.8
62021-23-25	18.5	0.073				Abledo	24.2	0.193	25.4	1132.9	691.3
62009 OC	12.5	0.085				Nevada	24.2	0.195	22.6	1014.0	121.0
62029-30	11.3	0.085				Enterprise	44.3	0.214	18.6	775.7	99.5
62020 OC	16.1	0.087				PS 0710-3217	47.9	0.249	24.0	1015.6	666.4
62026	18.0	0.095				Nayarit	37.0	0.289	20.4	836.6	116.9
Uppercut 25	18.7	0.097	22.1	705.6	61.3	Bastia	52.1	0.340	12.3	570.5	106.9
VAC-48	17.6	0.098	20.1	806.1	592.3	Nervi	52.6	0.373	14.8	647.3	61.3
Bolero	20.3	0.104	28.7	1370.1	338.2	Abundance	35.7	0.434	16.9	855.8	360.6
62000-03-06	13.3	0.107				Pr>F <sup>3</sup>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
62018-19	13.7	0.110				LSD <sup>3</sup>	15.6	0.060	6.2	314.7	166.1
NUN 8577	28.1	0.143	19.5	755.9	42.3						

**C. Sorted by Total Yield (t/A, decreasing)**

Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$) <sup>2</sup>		Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$) <sup>2</sup>	
				Slicers	Dicers					Slicers	Dicers
Bolero	20.3	0.104	28.7	1370.1	338.2	Enterprise	44.3	0.214	18.6	775.7	99.5
Carson	35.4	0.153	28.5	1285.3	871.1	NBC M522	34.9	0.168	18.6	653.9	97.8
Abledo	24.2	0.193	25.4	1132.9	691.3	Abundance	35.7	0.434	16.9	855.8	360.6
Cupar	44.8	0.172	24.9	1190.5	728.6	NBC M493	24.0	0.147	16.7	480.5	102.8
PS 0710-3217	47.9	0.249	24.0	1015.6	666.4	Nervi	52.6	0.373	14.8	647.3	61.3
Nevada	24.2	0.195	22.6	1014.0	121.0	PS 0710-1404	40.6	0.183	14.2	409.0	51.4
Uppercut 25	18.7	0.097	22.1	705.6	61.3	Texto	40.6	0.191	14.2	575.8	73.8
Nayarit	37.0	0.289	20.4	836.6	116.9	Bastia	52.1	0.340	12.3	570.5	106.9
VAC-48	17.6	0.098	20.1	806.1	592.3	Pr>F <sup>3</sup>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
NUN 8577	28.1	0.143	19.5	755.9	42.3	LSD <sup>3</sup>	15.6	0.060	6.2	314.7	166.1

**D. Sorted by Gross Value of Yield Graded as Slicers (decreasing)**

Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$)		Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>					Slicers <sup>2</sup>	Dicers <sup>2</sup>
Bolero	20.3	0.104	28.7	1370.1	338.2	NUN 8577	28.1	0.143	19.5	755.9	42.3
Carson	35.4	0.153	28.5	1285.3	871.1	Uppercut 25	18.7	0.097	22.1	705.6	61.3
Cupar	44.8	0.172	24.9	1190.5	728.6	NBC M522	34.9	0.168	18.6	653.9	97.8
Abledo	24.2	0.193	25.4	1132.9	691.3	Nervi	52.6	0.373	14.8	647.3	61.3
PS 0710-3217	47.9	0.249	24.0	1015.6	666.4	Texto	40.6	0.191	14.2	575.8	73.8
Nevada	24.2	0.195	22.6	1014.0	121.0	Bastia	52.1	0.340	12.3	570.5	106.9
Abundance	35.7	0.434	16.9	855.8	360.6	NBC M493	24.0	0.147	16.7	480.5	102.8
Nayarit	37.0	0.289	20.4	836.6	116.9	PS 0710-1404	40.6	0.183	14.2	409.0	51.4
VAC-48	17.6	0.098	20.1	806.1	592.3	Pr>F <sup>3</sup>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Enterprise	44.3	0.214	18.6	775.7	99.5	LSD <sup>3</sup>	15.6	0.060	6.2	314.7	166.1

**E. Sorted by Gross Value of Yield Graded as Dicers (decreasing)**

Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$)		Cultivar or breeding selection	% Disease severity 9/20	Relative AUDPC	Total yield (t/A) <sup>1</sup>	Gross value of yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>					Slicers <sup>2</sup>	Dicers <sup>2</sup>
Carson	35.4	0.153	28.5	1285.3	871.1	NBC M493	24.0	0.147	16.7	480.5	102.8
Cupar	44.8	0.172	24.9	1190.5	728.6	Enterprise	44.3	0.214	18.6	775.7	99.5
Abledo	24.2	0.193	25.4	1132.9	691.3	NBC M522	34.9	0.168	18.6	653.9	97.8
PS 0710-3217	47.9	0.249	24.0	1015.6	666.4	Texto	40.6	0.191	14.2	575.8	73.8
VAC-48	17.6	0.098	20.1	806.1	592.3	Nervi	52.6	0.373	14.8	647.3	61.3
Abundance	35.7	0.434	16.9	855.8	360.6	Uppercut 25	18.7	0.097	22.1	705.6	61.3
Bolero	20.3	0.104	28.7	1370.1	338.2	PS 0710-1404	40.6	0.183	14.2	409.0	51.4
Nevada	24.2	0.195	22.6	1014.0	121.0	NUN 8577	28.1	0.143	19.5	755.9	42.3
Nayarit	37.0	0.289	20.4	836.6	116.9	Pr>F <sup>3</sup>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bastia	52.1	0.340	12.3	570.5	106.9	LSD <sup>3</sup>	15.6	0.060	6.2	314.7	166.1

- 1 A 5-ft section of row was hand dug from each of the 2 rows in each plot with exception of wild accessions and yield was converted to t/A. Carrots were graded into five size classes and culls (misshapen or rotted). The size classes were then grouped appropriately to conform to standards for dicing or slicing carrots.
- 2 Values are calculated based on typical 2003(dicer) or 2004 (slicer) processing contracts for uncrowned carrots.
  - Dicing carrot contract: Minimum size accepted is 1 1/4 inch; discard class includes culls and carrots below the minimum diameter. Dicing base price per ton is: >90% of crop over 2in. diameter - \$44.65; 81-90% > 2in. - \$41.80; 71-80% > 2in. - \$38.15; 61-70% > 2in. - \$36.60; 51-60% > 2in. - \$35.40; < 51% > 2in. - \$34.25.
  - Slicing carrot contract: Minimum size accepted is 3/4 inch diameter; discard class includes culls and carrots below the minimum diameter. Slicing base price per ton is: < 10% over 1.75in. diameter - \$54.70; 10-19% > 1.75in. - \$53.90; 20-29% > 1.75in. - \$52.40; 30-39% > 1.75in. - \$49.40; 40-49% > 1.75in. - \$46.45; >49% > 1.75in. - \$43.60.
- 3 An analysis of variance was performed on the data and Fisher's protected least significant difference (LSD) ( $\alpha = 0.05$ ) was calculated. NS = not significant at  $P = 0.05$ .

