

**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 - Endeavor, 2002**

A field trial was established at Gumz Muck Farms LLC, near Endeavor, in central WI, on 10 May to evaluate 38 carrot cultivars and breeding selections for resistance to *Alternaria* and *Cercospora* leaf blights. Seeds were planted using a cone seeder with seeding rate adjusted according to carrot type (slicing, and cut-and-peel, approximately 24 seeds per ft; dicing type, approximately 12 seeds per ft). Each plot consisted of two 12-ft-long rows planted 1 ft apart in the center portion of a 6-ft-wide raised bed. A randomized complete block design with three replications was used. To minimize interplot interference and provide a uniform source of inoculum throughout the trial, a row of Heritage, susceptible to both pathogens, was machine-planted by the grower on each side of each test plot. Test plots were separated within the bed by 3-ft-long open buffer spaces. Soil type was Houghton muck. No fungicide was applied to the test plots. Fertilizer, herbicide and insecticide applications were done according to standard grower practices. Disease severity was rated on four 2-ft-long sections of each plot from 19 Jul to 10 Oct using the Horsfall-Barratt system (0-11). A 5-ft-long section of each of the two test rows (total of 10 ft of row) was hand dug from each plot on 10 Oct and the yield was graded by hand into five size categories (based on diam) and culls. The size categories were then grouped appropriately to conform to standards for slicing and dicing carrots. Yield values were calculated for each treatment based on typical processing contracts.

Disease developed slowly through most of the growing season, however by 13 Sep, disease severity had exceeded 30% on the most susceptible cultivars and breeding lines. Grower standard cultivar Gold King and susceptible check Lucky B are highly susceptible and both of these cultivars had an AUDPC (area under the disease progress curve) greater than 0.17. Conversely, the moderately resistant cultivar Bolero had an AUDPC of only 0.054. Bolero, 713087, Enterprise and Sirocco had AUDPC's significantly lower than Gold King and Lucky B. Of these entries, many did not exceed 10% disease severity until the rating on 20 Sep. Twenty-one entries yielded over 30 t/A. Nine entries yielded over 30 t/A and also had an AUDPC significantly less than Gold King. These entries included 713087, Enterprise, Carson, Bolero, Nagadir, REX-240, Bersky, Florida and Sirocco. The data suggest that these entries could be grown commercially without fungicide or with a reduced fungicide application program. Gross values based on typical slicing and dicing contracts were calculated for each cultivar and breeding line in the trial. The five entries with the highest gross values of yield graded as slicers included Bolero, Florida, Nikki, Bersky and Nimrod. The five entries with the highest gross values of yield graded as dicers consisted of 713087, Carson, Bradford, Florida and KXPC-042. Several of the entries with high levels of disease resistance and yields over 30 t/A, were among the lines with the highest gross values of yield. The number of roots with Aster yellows symptoms was higher in this trial when compared with the evaluation of the same varieties conducted at Hancock on sandy soil.

**Table 1. Processing type and source of seed for cultivars and breeding lines used in this trial.**

Cultivar or line	Source	Type	Cultivar or line	Source	Type	Cultivar or line	Source	Type
<b>Slicer Standards</b>			Florida	Bejo	<b>S</b>	REX-248	Sakata	<b>CP</b>
Bolero	Vilmorin	<b>S,CP</b>	Nagadir		<b>S</b>	REX-240		
Prospector	Seminis	<b>S</b>	Bradford		<b>D</b>	USDA 7241 B	P. Simon, USDA/UW	<b>CP</b>
Enterprise		<b>S</b>	Bersky		<b>S</b>	USDA 8378 B		<b>CP</b>
<b>Dicer Standards</b>			Lucky B		Chriseed	<b>S</b>	USDA 2254 B	Hort
Carson	Bejo	<b>D</b>	PS 103397	Seminis	<b>S</b>	REX-190	Sakata	<b>CP</b>
Gold King	Seminis	<b>D</b>	Prodigy		<b>D</b>	KXPC-042	Polonica	<b>S</b>
<b>Test Lines</b>			711150		<b>S</b>	Infinity	Bejo	<b>S</b>
Prime Cut 59	Sunseeds	<b>CP</b>	719116		<b>D</b>	Nimrod		<b>S</b>
SugarSnax 54		<b>CP</b>	713087		<b>D</b>	Interceptor		<b>S</b>
SRC 8503		<b>S</b>	80494	<b>D</b>	Nikki	<b>S</b>		
SBC J23	Sunseeds	<b>S</b>	Morecuts	Polonica	<b>CP</b>	Noveno		<b>S</b>
SBC J80		<b>CP</b>	KXPC-060		<b>S</b>	Sirocco	Seedway	<b>S</b>
Bremen	Bejo	<b>S</b>	Growers Choice		<b>S</b>			

**D = Dice, S = Slice, CP = Cut and peel**

**Table 2. Severity of leaf blight on carrot cultivars and breeding selections.**

Cultivar or breeding selection	% Foliage infection (Alternaria and Cercospora blight - combined) <sup>1</sup>											Relative AUDPC <sup>2</sup>
	19 Jul	25 Jul	6 Aug	13 Aug	21 Aug	28 Aug	5 Sep	13 Sep	20 Sep	27 Sep	10 Oct	
<b>Slicer Standards</b>												
Bolero	0.8	1.0	0.6	1.2	2.3	2.7	5.1	5.9	7.8	12.1	19.5	0.054
Prospector	0.6	1.6	1.2	1.6	3.1	4.3	6.6	9.0	13.3	21.1	55.2	0.106
Enterprise	0.8	1.0	0.8	1.6	2.5	3.3	7.6	9.8	12.5	21.1	32.3	0.086
<b>Dicer Standards</b>												
Carson	0.8	1.2	0.6	2.1	3.7	4.1	5.3	14.8	21.9	28.9	51.0	0.123
Gold King	0.5	2.1	2.3	2.1	5.5	6.4	8.0	30.2	32.8	53.6	85.2	0.212
<b>Test Lines</b>												
Prime Cut 59	0.4	1.4	1.6	5.7	10.7	13.0	14.8	28.1	40.9	43.5	69.0	0.211
SugarSnax 54	0.9	1.0	1.4	2.5	5.5	6.6	9.8	34.0	34.5	38.8	60.4	0.179
SRC 8503	1.0	1.0	1.8	3.5	9.0	11.1	9.8	24.0	37.2	33.9	55.7	0.172
SBC J23	0.6	1.0	1.8	2.3	5.3	6.6	10.0	25.5	35.9	31.5	71.4	0.173
SBC J80	1.4	1.0	1.2	2.7	4.9	12.7	11.3	34.9	43.8	55.5	72.7	0.224
Bremen	0.8	1.0	1.6	3.3	3.7	4.5	9.0	25.0	24.7	36.7	61.7	0.158
Florida	0.6	1.0	0.6	3.5	3.7	4.7	8.0	16.0	20.3	27.3	49.5	0.124
Nagadir	0.4	0.4	1.6	2.1	2.9	3.7	6.4	13.3	23.0	27.1	57.3	0.125
Bradford	0.8	0.8	0.8	2.0	3.7	4.9	7.6	15.6	32.3	43.8	85.9	0.180
Bersky	1.4	0.2	0.8	1.8	2.5	2.9	5.9	10.2	12.1	19.5	55.7	0.100
Lucky B	0.4	0.8	0.4	2.1	3.7	5.9	10.2	20.3	35.4	37.2	72.9	0.172
PS 103397	0.6	0.6	1.2	4.9	7.0	16.2	13.7	33.1	30.2	34.6	62.5	0.187
Prodigy	0.8	1.4	2.0	4.9	5.1	8.0	11.3	29.2	26.6	40.1	67.2	0.181
711150	0.2	0.8	1.0	4.9	5.5	9.0	11.7	24.7	25.0	37.5	58.9	0.165
719116	0.8	1.6	1.6	5.1	5.1	10.2	21.9	40.9	37.5	42.2	68.2	0.216
713087	0.2	0.4	0.8	3.3	2.5	4.5	6.8	10.5	10.5	14.1	32.8	0.078
80494	1.2	1.6	1.4	2.3	4.9	8.2	9.0	19.7	21.1	30.2	55.2	0.141
Morecuts	0.4	1.6	1.2	2.5	3.3	5.5	6.4	19.5	12.9	18.0	49.5	0.109
KXPC-060	1.0	0.8	1.0	2.3	2.1	4.9	5.1	23.4	17.6	22.9	56.8	0.124
Growers Choice	1.4	0.8	1.2	2.5	2.9	5.5	8.0	22.0	22.7	28.1	51.0	0.133
REX-248	1.6	1.2	2.1	3.5	7.6	10.1	13.2	27.3	19.5	25.8	55.2	0.152
REX-240	0.2	1.0	1.2	4.5	4.7	7.4	7.4	14.8	23.4	25.0	44.8	0.123
USDA 7241 B	0.8	1.1	1.9	11.0	17.2	29.6	21.8	47.8	60.8	62.2	77.2	0.307
USDA 8378 B	1.0	1.0	1.7	2.9	6.9	7.0	23.7	33.6	65.4	70.7	74.8	0.271
USDA 2254 B	0.5	2.3	1.7	3.8	7.6	12.3	20.8	45.6	35.9	49.8	82.0	0.242
REX-190	0.6	0.8	1.0	2.0	2.5	4.3	6.0	15.6	20.3	28.1	46.4	0.117
KXPC-042	0.6	1.4	1.2	3.5	4.7	8.4	7.6	24.1	27.0	38.3	56.0	0.160
Infinity	0.4	1.6	2.5	4.3	5.5	7.8	11.7	39.1	36.5	39.6	66.4	0.198
Nimrod	0.8	1.6	1.2	3.5	2.3	7.4	14.1	41.7	43.0	49.0	79.2	0.224
Interceptor	1.0	1.6	2.1	4.3	5.9	13.9	13.7	24.9	24.2	35.4	62.0	0.173
Nikki	0.6	1.4	1.2	2.9	5.3	8.2	13.7	32.8	32.8	46.9	85.2	0.212
Noveno	1.4	1.2	1.2	2.0	3.7	5.3	6.8	19.5	24.2	29.4	58.9	0.139
Sirocco	0.2	0.2	1.0	1.8	2.7	2.3	5.5	9.0	10.9	14.8	45.8	0.084
<b>Pr&gt;F <sup>3</sup></b>	0.72	<0.01	0.07	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>LSD <sup>3</sup></b>	NS	0.9	1.2*	4.0*	5.2	8.9	8.1	20.9	18.9	20.1	20.5	0.080

- 1 Severity of leaf blight symptoms was rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage dead). No attempt was made to evaluate symptoms of Alternaria and Cercospora blights separately. Ratings were converted to percent foliage infection.
- 2 Relative area under the disease progress curve. Data for each date were plotted on a graph and the area under the line was calculated for each treatment providing a measure of the relative severity of disease throughout the season. A disease rating of 100% foliage infection for the entire season would produce a value of 1.0. All relative AUDPC values are expressed as a proportion of this value. Either decreased disease severity or later disease development will contribute to lower relative areas under the disease progress curve.
- 3 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at  $P = 0.10$  (\* indicates significant at  $P 0.10$  but not 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 (inches)					% culls	Yield graded as slicers <sup>2</sup>					Yield graded as dicers <sup>2</sup>				# of roots with Aster yellows symptoms	
		< 3/4	3/4 - 1 1/4	1 1/4 - 1 5/8	1 5/8 - 2	> 2		Percentage of yield			Price/ t (\$)	Gross value of yield (\$)	1 1/4 - 2"	> 2"	Dis-cards	Price/ t (\$)		Gross value of yield (\$)
								3/4 - 1 5/8"	> 1 5/8"	Dis-cards								
<b>Slicer Standards</b>																		
Bolero	52.3	2.6	33.2	38.5	15.6	7.3	2.8	71.7	22.9	5.4	39.9	1967.7	54.2	7.3	38.5	17.1	557.2	12
Prospector	25.3	2.6	24.1	29.2	15.9	11.2	17.0	53.3	27.1	19.6	40.3	832.1	45.2	11.2	43.7	17.1	244.6	7
Enterprise	34.0	6.6	27.2	39.4	14.7	5.3	6.8	66.6	20.0	13.4	40.1	1190.2	54.0	5.3	40.6	17.1	351.8	10
<b>Dicer Standards</b>																		
Carson	41.7	0.0	2.9	14.1	25.7	51.1	6.2	17.0	76.9	6.2	35.9	1401.7	39.8	51.1	9.0	17.5	666.7	43
Gold King	25.5	0.0	1.7	7.5	25.2	52.7	12.9	9.2	77.9	12.9	35.9	803.0	32.7	52.7	14.6	17.5	384.8	1
<b>Test Lines</b>																		
Prime Cut 59	32.3	14.9	56.1	18.7	1.7	0.0	8.6	74.8	1.7	23.5	42.7	1056.9	20.4	0.0	79.6	17.1	110.7	25
SugarSnax 54	29.9	11.7	44.0	16.2	2.4	0.0	25.7	60.2	2.4	37.4	42.7	786.3	18.6	0.0	81.4	17.1	92.3	8
SRC 8503	39.3	15.1	40.3	17.1	5.5	4.6	17.3	57.4	10.1	32.4	41.6	1065.5	22.7	4.6	72.7	17.1	210.2	26
SBC J23	21.4	13.4	30.1	24.8	12.1	4.6	15.1	54.9	16.7	28.5	40.9	617.7	36.9	4.6	58.5	17.1	150.5	27
SBC J80	19.1	10.5	37.6	25.6	1.7	0.0	24.6	63.2	1.7	35.1	42.7	529.0	27.3	0.0	72.7	17.1	87.5	16
Bremen	36.3	5.7	35.2	31.6	7.8	10.7	9.0	66.8	18.5	14.7	40.4	1252.2	39.4	10.7	49.9	17.1	313.8	20
Florida	49.2	1.9	24.5	43.9	19.5	8.5	1.8	68.4	27.9	3.7	39.0	1841.2	63.3	8.5	28.2	17.1	609.8	14
Nagadir	41.4	2.8	30.9	35.2	19.9	6.2	5.0	66.1	26.1	7.8	40.3	1525.8	55.1	6.2	38.7	17.1	439.4	18
Bradford	40.8	0.2	1.8	13.2	26.5	51.1	7.2	15.0	77.5	7.5	35.9	1359.2	39.7	51.1	9.3	17.8	657.3	12
Bersky	45.5	1.2	20.4	43.4	14.8	7.2	12.9	63.8	22.0	14.2	40.1	1566.6	58.3	7.2	34.6	17.1	515.3	29
Lucky B	27.8	1.0	15.7	33.5	21.3	15.2	13.3	49.2	36.5	14.3	38.2	898.3	54.8	15.2	30.0	17.1	341.6	13
PS 103397	33.5	7.5	36.5	38.9	9.5	1.7	6.0	75.4	11.1	13.4	42.1	1221.4	48.3	1.7	50.0	17.1	287.7	15
Prodigy	31.6	0.1	8.9	30.5	30.5	26.1	3.9	39.4	56.6	4.0	36.3	1102.6	61.0	26.1	12.9	17.1	473.0	18
711150	28.7	14.2	48.5	23.3	2.2	0.0	11.7	71.8	2.2	25.9	42.7	908.8	25.6	0.0	74.5	17.1	122.7	14
719116	37.9	0.9	9.3	35.7	24.8	20.7	8.6	45.0	45.5	9.5	36.8	1273.6	60.5	20.7	18.8	17.1	529.0	21
713087	45.7	0.0	5.5	17.9	19.3	50.6	6.7	23.4	69.9	6.7	35.9	1528.6	37.1	50.6	12.2	17.5	702.1	9
80494	36.2	0.4	8.2	24.7	31.3	22.0	13.4	32.9	53.4	13.8	36.8	1133.9	56.0	22.0	21.9	17.1	481.7	9
Morecuts	27.5	6.9	22.8	25.1	9.3	3.8	32.1	47.9	13.1	39.0	42.1	666.6	34.4	3.8	61.8	17.1	176.2	16
KXPC-060	19.6	6.1	39.3	45.7	4.4	0.0	4.6	85.0	4.4	10.6	42.7	743.8	50.1	0.0	49.9	17.1	166.2	8
Growers Choice	28.1	1.6	17.4	33.3	8.1	13.8	25.8	50.7	21.8	27.4	40.4	835.8	41.4	13.8	44.8	17.1	272.8	8
REX-248	22.9	13.0	43.7	12.6	0.0	0.7	29.9	56.3	0.7	43.0	42.7	577.5	12.6	0.7	86.7	17.1	54.7	18
REX-240	37.2	2.6	22.6	26.9	12.7	15.4	19.7	49.6	28.1	22.4	39.3	1130.5	39.6	15.4	45.0	17.1	368.1	31
USDA 7241 B	13.5	18.0	4.6	41.9	12.8	0.0	22.7	46.5	12.8	40.7	41.6	352.7	54.7	0.0	45.3	17.1	129.8	2
USDA 8378 B	5.9	30.4	8.3	0.0	10.9	16.2	34.1	8.3	27.2	64.5	39.5	76.0	10.9	16.2	72.8	17.1	20.3	1
USDA 2254 B	12.6	7.2	40.3	33.4	3.3	1.4	14.4	73.7	4.7	21.6	42.7	419.4	36.7	1.4	61.9	17.1	79.4	17
REX-190	23.9	10.9	32.6	15.2	5.0	0.0	36.4	47.8	5.0	47.3	42.4	519.0	20.2	0.0	79.8	17.1	79.6	8
KXPC-042	44.9	0.5	14.3	32.6	22.0	21.0	9.7	46.8	42.9	10.2	37.6	1509.3	54.5	21.0	24.5	17.1	589.1	11
Infinity	28.7	15.6	54.6	24.7	0.0	0.0	5.1	79.3	0.0	20.7	42.7	961.8	24.7	0.0	75.3	17.1	119.4	22
Nimrod	40.6	1.4	30.5	47.6	10.6	3.5	6.4	78.1	14.1	7.8	41.3	1541.6	58.2	3.5	38.3	17.1	432.0	18

Cultivar or breeding selection	Total yield (t/A) <sup>1</sup>	Percentage of yield for carrot diameter (inches)					% culls	Yield graded as slicers <sup>2</sup>					Yield graded as dicers <sup>2</sup>				# of roots with Aster yellows symptoms	
		< 3/4	3/4 - 1 1/4	1 1/4 - 1 5/8	1 5/8 - 2	> 2		Percentage of yield			Price/ t (\$)	Gross value of yield (\$)	Percentage of yield		Price/ t (\$)	Gross value of yield (\$)		
								3/4 - 1 5/8"	> 1 5/8"	Dis-cards			1 1/4 - 2"	> 2"				Dis-cards
Interceptor	28.5	28.2	37.5	5.1	0.0	0.0	29.2	42.6	0.0	57.4	42.7	485.6	5.1	0.0	94.9	17.1	25.3	17
Nikki	42.2	2.1	34.9	39.3	13.4	6.1	4.3	74.1	19.5	6.4	41.0	1615.1	52.6	6.1	41.3	17.1	440.1	12
Noveno	31.2	0.8	24.0	33.4	18.2	20.6	3.0	57.5	38.8	3.8	39.3	1176.6	51.6	20.6	27.8	17.3	386.9	15
Sirocco	39.8	2.7	31.1	42.1	6.9	3.2	14.1	73.1	10.1	16.8	42.1	1394.3	49.0	3.2	47.9	17.1	354.4	15
Pr > F <sup>3</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.19	<0.01	0.02
LSD <sup>3</sup>	9.6	8.9	16.3	15.8	12.6	15.0	21.8*	24.3	19.5	19.5	2.3	358.3	18.7	15.0	19.1	NS	157.7	16.5

- 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. Yield may not represent typical commercial yield as carrots were hand dug resulting in fewer harvested roots left behind in the field.
- Values are calculated based on typical 2001(dicer) or 2002 (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 2" diameter - \$22.33; 81-90% > 2" - \$20.90; 71-80% > 2" - \$19.01; 61-70% > 2" - \$18.30; 51-60% > 2" - \$17.70; < 51% > 2" - \$17.13.
  - 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 3/4" diameter - \$42.69; 10-19% > 1 3/4" - \$41.80; 20-29% > 1 3/4" - \$39.30; 30-39% > 1 3/4" - \$38.50; 40-49% > 1 3/4" - \$37.21; >49% > 1 3/4" - \$35.91.
- Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at P = 0.10 (\* indicates significant at P 0.10 but not at P=0.05).

**Table 4. Data ranked according to disease and yield measurements**

Sorted by % Foliage Infection 9/27 (increasing)

Cultivar or Breeding Selection	Disease Severity (%) 9/27 <sup>1</sup>	Relative AUDPC <sup>2</sup>	Total Yield (t/A) <sup>3</sup>	Gross Value of Yield (\$)		Cultivar or Breeding Selection	Disease Severity (%) 9/27 <sup>1</sup>	Relative AUDPC <sup>2</sup>	Total Yield (t/A) <sup>3</sup>	Gross Value of Yield (\$)	
				Slicers <sup>4</sup>	Dicers <sup>4</sup>					Slicers <sup>4</sup>	Dicers <sup>4</sup>
Bolero	12.1	0.054	52.3	1967.7	557.2	Interceptor	35.4	0.173	28.5	485.6	25.3
713087	14.1	0.078	45.7	1528.6	702.1	Bremen	36.7	0.158	36.3	1252.2	313.8
Sirocco	14.8	0.084	39.8	1394.3	354.4	Lucky B	37.2	0.172	27.8	898.3	341.6
Morecuts	18.0	0.109	27.5	666.6	176.2	711150	37.5	0.165	28.7	908.8	122.7
Bersky	19.5	0.100	45.5	1566.6	515.3	KXPC-042	38.3	0.160	44.9	1509.3	589.1
Prospector	21.1	0.106	25.3	832.1	244.6	SugarSnax 54	38.8	0.179	29.9	786.3	92.3
Enterprise	21.1	0.086	34.0	1190.2	351.8	Infinity	39.6	0.198	28.7	961.8	119.4
KXPC-060	22.9	0.124	19.6	743.8	166.2	Prodigy	40.1	0.181	31.6	1102.6	473.0
REX-240	25.0	0.123	37.2	1130.5	368.1	719116	42.2	0.216	37.9	1273.6	529.0
REX-248	25.8	0.152	22.9	577.5	54.7	Prime Cut 59	43.5	0.211	32.3	1056.9	110.7
Nagadir	27.1	0.125	41.4	1525.8	439.4	Bradford	43.8	0.180	40.8	1359.2	657.3
Florida	27.3	0.124	49.2	1841.2	609.8	Nikki	46.9	0.212	42.2	1615.1	440.1
Growers Choice	28.1	0.133	28.1	835.8	272.8	Nimrod	49.0	0.224	40.6	1541.6	432.0
REX-190	28.1	0.117	23.9	519.0	79.6	USDA 2254 B	49.8	0.242	12.6	419.4	79.4
Carson	28.9	0.123	41.7	1401.7	666.7	Gold King	53.6	0.212	25.5	803.0	384.8
Noveno	29.4	0.139	31.2	1176.6	386.9	SBC J80	55.5	0.224	19.1	529.0	87.5
80494	30.2	0.141	36.2	1133.9	481.7	USDA 7241 B	62.2	0.307	13.5	352.7	129.8
SBC J23	31.5	0.173	21.4	617.7	150.5	USDA 8378 B	70.7	0.271	5.9	76.0	20.3
SRC 8503	33.9	0.172	39.3	1065.5	210.2	Pr > F <sup>5</sup>	<0.01	<0.01	<0.01	<0.01	<0.01
PS 103397	34.6	0.187	33.5	1221.4	287.7	LSD <sup>5</sup>	20.1	0.080	9.6	358.3	157.7

**Sorted by: Relative AUDPC (increasing)**

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
Bolero	12.1	0.054	52.3	1967.7	557.2
713087	14.1	0.078	45.7	1528.6	702.1
Sirocco	14.8	0.084	39.8	1394.3	354.4
Enterprise	21.1	0.086	34.0	1190.2	351.8
Bersky	19.5	0.100	45.5	1566.6	515.3
Prospector	21.1	0.106	25.3	832.1	244.6
Morecuts	18.0	0.109	27.5	666.6	176.2
REX-190	28.1	0.117	23.9	519.0	79.6
Carson	28.9	0.123	41.7	1401.7	666.7
REX-240	25.0	0.123	37.2	1130.5	368.1
Florida	27.3	0.124	49.2	1841.2	609.8
KXPC-060	22.9	0.124	19.6	743.8	166.2
Nagadir	27.1	0.125	41.4	1525.8	439.4
Growers Choice	28.1	0.133	28.1	835.8	272.8
Noveno	29.4	0.139	31.2	1176.6	386.9
80494	30.2	0.141	36.2	1133.9	481.7
REX-248	25.8	0.152	22.9	577.5	54.7
Bremen	36.7	0.158	36.3	1252.2	313.8
KXPC-042	38.3	0.160	44.9	1509.3	589.1
711150	37.5	0.165	28.7	908.8	122.7

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
Lucky B	37.2	0.172	27.8	898.3	341.6
SRC 8503	33.9	0.172	39.3	1065.5	210.2
Interceptor	35.4	0.173	28.5	485.6	25.3
SBC J23	31.5	0.173	21.4	617.7	150.5
SugarSnax 54	38.8	0.179	29.9	786.3	92.3
Bradford	43.8	0.180	40.8	1359.2	657.3
Prodigy	40.1	0.181	31.6	1102.6	473.0
PS 103397	34.6	0.187	33.5	1221.4	287.7
Infinity	39.6	0.198	28.7	961.8	119.4
Prime Cut 59	43.5	0.211	32.3	1056.9	110.7
Gold King	53.6	0.212	25.5	803.0	384.8
Nikki	46.9	0.212	42.2	1615.1	440.1
719116	42.2	0.216	37.9	1273.6	529.0
SBC J80	55.5	0.224	19.1	529.0	87.5
Nimrod	49.0	0.224	40.6	1541.6	432.0
USDA 2254 B	49.8	0.242	12.6	419.4	79.4
USDA 8378 B	70.7	0.271	5.9	76.0	20.3
USDA 7241 B	62.2	0.307	13.5	352.7	129.8
Pr > F <sup>3</sup>	<0.01	<0.01	<0.01	<0.01	<0.01
LSD <sup>3</sup>	20.1	0.080	9.6	358.3	157.7

**Sorted by: Total Yield (t/A) (decreasing)**

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
Bolero	12.1	0.054	52.3	1967.7	557.2
Florida	27.3	0.124	49.2	1841.2	609.8
713087	14.1	0.078	45.7	1528.6	702.1
Bersky	19.5	0.100	45.5	1566.6	515.3
KXPC-042	38.3	0.160	44.9	1509.3	589.1
Nikki	46.9	0.212	42.2	1615.1	440.1
Carson	28.9	0.123	41.7	1401.7	666.7
Nagadir	27.1	0.125	41.4	1525.8	439.4
Bradford	43.8	0.180	40.8	1359.2	657.3
Nimrod	49.0	0.224	40.6	1541.6	432.0
Sirocco	14.8	0.084	39.8	1394.3	354.4
SRC 8503	33.9	0.172	39.3	1065.5	210.2
719116	42.2	0.216	37.9	1273.6	529.0
REX-240	25.0	0.123	37.2	1130.5	368.1
Bremen	36.7	0.158	36.3	1252.2	313.8
80494	30.2	0.141	36.2	1133.9	481.7
Enterprise	21.1	0.086	34.0	1190.2	351.8
PS 103397	34.6	0.187	33.5	1221.4	287.7
Prime Cut 59	43.5	0.211	32.3	1056.9	110.7
Prodigy	40.1	0.181	31.6	1102.6	473.0

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
Noveno	29.4	0.139	31.2	1176.6	386.9
SugarSnax 54	38.8	0.179	29.9	786.3	92.3
Infinity	39.6	0.198	28.7	961.8	119.4
711150	37.5	0.165	28.7	908.8	122.7
Interceptor	35.4	0.173	28.5	485.6	25.3
Growers Choice	28.1	0.133	28.1	835.8	272.8
Lucky B	37.2	0.172	27.8	898.3	341.6
Morecuts	18.0	0.109	27.5	666.6	176.2
Gold King	53.6	0.212	25.5	803.0	384.8
Prospector	21.1	0.106	25.3	832.1	244.6
REX-190	28.1	0.117	23.9	519.0	79.6
REX-248	25.8	0.152	22.9	577.5	54.7
SBC J23	31.5	0.173	21.4	617.7	150.5
KXPC-060	22.9	0.124	19.6	743.8	166.2
SBC J80	55.5	0.224	19.1	529.0	87.5
USDA 7241 B	62.2	0.307	13.5	352.7	129.8
USDA 2254 B	49.8	0.242	12.6	419.4	79.4
USDA 8378 B	70.7	0.271	5.9	76.0	20.3
Pr > F <sup>3</sup>	<0.01	<0.01	<0.01	<0.01	<0.01
LSD <sup>3</sup>	20.1	0.080	9.6	358.3	157.7

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

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
Bolero	12.1	0.054	52.3	1967.7	557.2
Florida	27.3	0.124	49.2	1841.2	609.8
Nikki	46.9	0.212	42.2	1615.1	440.1
Bersky	19.5	0.100	45.5	1566.6	515.3
Nimrod	49.0	0.224	40.6	1541.6	432.0
713087	14.1	0.078	45.7	1528.6	702.1
Nagadir	27.1	0.125	41.4	1525.8	439.4
KXPC-042	38.3	0.160	44.9	1509.3	589.1
Carson	28.9	0.123	41.7	1401.7	666.7
Sirocco	14.8	0.084	39.8	1394.3	354.4

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
Bradford	43.8	0.180	40.8	1359.2	657.3
719116	42.2	0.216	37.9	1273.6	529.0
Bremen	36.7	0.158	36.3	1252.2	313.8
PS 103397	34.6	0.187	33.5	1221.4	287.7
Enterprise	21.1	0.086	34.0	1190.2	351.8
Noveno	29.4	0.139	31.2	1176.6	386.9
80494	30.2	0.141	36.2	1133.9	481.7
REX-240	25.0	0.123	37.2	1130.5	368.1
Prodigy	40.1	0.181	31.6	1102.6	473.0
SRC 8503	33.9	0.172	39.3	1065.5	210.2

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
Prime Cut 59	43.5	0.211	32.3	1056.9	110.7
Infinity	39.6	0.198	28.7	961.8	119.4
711150	37.5	0.165	28.7	908.8	122.7
Lucky B	37.2	0.172	27.8	898.3	341.6
Growers Choice	28.1	0.133	28.1	835.8	272.8
Prospector	21.1	0.106	25.3	832.1	244.6
Gold King	53.6	0.212	25.5	803.0	384.8
SugarSnax 54	38.8	0.179	29.9	786.3	92.3
KXPC-060	22.9	0.124	19.6	743.8	166.2
Morecuts	18.0	0.109	27.5	666.6	176.2

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
SBC J23	31.5	0.173	21.4	617.7	150.5
REX-248	25.8	0.152	22.9	577.5	54.7
SBC J80	55.5	0.224	19.1	529.0	87.5
REX-190	28.1	0.117	23.9	519.0	79.6
Interceptor	35.4	0.173	28.5	485.6	25.3
USDA 2254 B	49.8	0.242	12.6	419.4	79.4
USDA 7241 B	62.2	0.307	13.5	352.7	129.8
USDA 8378 B	70.7	0.271	5.9	76.0	20.3
Pr > F <sup>3</sup>	<0.01	<0.01	<0.01	<0.01	<0.01
LSD <sup>3</sup>	20.1	0.080	9.6	358.3	157.7

Sorted by: Gross Value of Yield Graded as Dicers (decreasing)

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
713087	14.1	0.078	45.7	1528.6	702.1
Carson	28.9	0.123	41.7	1401.7	666.7
Bradford	43.8	0.180	40.8	1359.2	657.3
Florida	27.3	0.124	49.2	1841.2	609.8
KXPC-042	38.3	0.160	44.9	1509.3	589.1
Bolero	12.1	0.054	52.3	1967.7	557.2
719116	42.2	0.216	37.9	1273.6	529.0
Bersky	19.5	0.100	45.5	1566.6	515.3
80494	30.2	0.141	36.2	1133.9	481.7
Prodigy	40.1	0.181	31.6	1102.6	473.0
Nikki	46.9	0.212	42.2	1615.1	440.1
Nagadir	27.1	0.125	41.4	1525.8	439.4
Nimrod	49.0	0.224	40.6	1541.6	432.0
Noveno	29.4	0.139	31.2	1176.6	386.9
Gold King	53.6	0.212	25.5	803.0	384.8
REX-240	25.0	0.123	37.2	1130.5	368.1
Sirocco	14.8	0.084	39.8	1394.3	354.4
Enterprise	21.1	0.086	34.0	1190.2	351.8
Lucky B	37.2	0.172	27.8	898.3	341.6
Bremen	36.7	0.158	36.3	1252.2	313.8

Cultivar or Breeding Selection	Disease Severity (%) 9/27	Relative AUDPC	Total Yield (t/A) <sup>1</sup>	Gross Value of Yield (\$)	
				Slicers <sup>2</sup>	Dicers <sup>2</sup>
PS 103397	34.6	0.187	33.5	1221.4	287.7
Growers Choice	28.1	0.133	28.1	835.8	272.8
Prospector	21.1	0.106	25.3	832.1	244.6
SRC 8503	33.9	0.172	39.3	1065.5	210.2
Morecuts	18.0	0.109	27.5	666.6	176.2
KXPC-060	22.9	0.124	19.6	743.8	166.2
SBC J23	31.5	0.173	21.4	617.7	150.5
USDA 7241 B	62.2	0.307	13.5	352.7	129.8
711150	37.5	0.165	28.7	908.8	122.7
Infinity	39.6	0.198	28.7	961.8	119.4
Prime Cut 59	43.5	0.211	32.3	1056.9	110.7
SugarSnax 54	38.8	0.179	29.9	786.3	92.3
SBC J80	55.5	0.224	19.1	529.0	87.5
REX-190	28.1	0.117	23.9	519.0	79.6
USDA 2254 B	49.8	0.242	12.6	419.4	79.4
REX-248	25.8	0.152	22.9	577.5	54.7
Interceptor	35.4	0.173	28.5	485.6	25.3
USDA 8378 B	70.7	0.271	5.9	76.0	20.3
Pr > F <sup>3</sup>	<0.01	<0.01	<0.01	<0.01	<0.01
LSD <sup>3</sup>	20.1	0.080	9.6	358.3	157.7

- Severity of leaf blight symptoms was rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage dead). No attempt was made to evaluate symptoms of *Alternaria* and *Cercospora* blights separately. Ratings were converted to percent foliage infection.
- Relative area under the disease progress curve. Data for each date were plotted on a graph and the area under the line was calculated for each treatment providing a measure of the relative severity of disease throughout the season. A disease rating of 100% foliage infection for the entire season would produce a value of 1.0. All relative AUDPC values are expressed as a proportion of this value. Either decreased disease severity or later disease development will contribute to lower relative areas under the disease progress curve.
- 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. Yield may not represent typical commercial yield as carrots were hand dug resulting in fewer harvested roots left behind in the field.
- Values are calculated based on typical 2001 (dicer) or 2002 (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 2" diameter - \$22.33; 81-90% > 2" - \$20.90; 71-80% > 2" - \$19.01; 61-70% > 2" - \$18.30; 51-60% > 2" - \$17.70; < 51% > 2" - \$17.13.
  - 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 3/4" diameter - \$42.69; 10-19% > 1 3/4" - \$41.80; 20-29% > 1 3/4" - \$39.30; 30-39% > 1 3/4" - \$38.50; 40-49% > 1 3/4" - \$37.21; >49% > 1 3/4" - \$35.91.
- Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at  $P = 0.10$  (\* indicates significant at  $P = 0.10$  but not at  $P = 0.05$ ).

