

**Carrot** (*Daucus carota*)  
Leaf Blights; *Alternaria dauci*  
*Cercospora carotae*

S.A. Johnston & M.D. Zimmerman  
Rutgers Agricultural Research &  
Extension Center, Bridgeton, NJ 08302

EVALUATION OF PROCESSING CARROT VARIETIES FOR RESISTANCE TO LEAF BLIGHTS, 2002: The experiment was conducted in a field (Aura sandy loam, pH-6.6) on the Rutgers Agricultural Research & Extension Center, Bridgeton, NJ. In the fall of 2001, the field was fumigated with Vapam HL (75 gal/A) for soil-borne fungal plant pathogens and weed control. On 23 Apr fertilizer (40 lb/A of N-P-K) was applied and incorporated. On 7 May, Treflan 4E (1 pt/A) was applied preplant incorporated for weed control. On 8 May, carrots were seeded into the field with a Planet Jr. seeder with the seeding rate adjusted for each variety depending upon seed size. Plots consisted of 2, 15-ft-long rows on low beds spaced 5-ft apart with 5-ft fallow breaks down the row between plots. Varieties were replicated 4 times in a randomized complete block design. On 12, 20 Jun, 1, 11, 19 and 26 Jul, Lorox (1 lb/A) was applied post emergence for weed control (nutsedge). Rainfall was 3.4 in. in Apr, 3.8 in. in May, 6.1 in. in Jun, 2.0 in. in Jul, 2.9 in. in Aug, 2.5 in. in Sep and 5.8 in. in Oct. Supplemental overhead irrigation was applied as needed. On 8 Jul, 7, 25 Sep, and 8, 22 Oct plots were visually evaluated for the percentage of foliage infected with leaf blights. On 8 Oct, plots were observed for the presence of seed stalks. On 7 Nov, all of the foliage was removed from all of the plants in each plot leaving no petiole tissue on the carrots. On 8 Nov, the soil in each plot was loosened using a "V-ripper" that had a shank positioned between each row and on the outside of each plot. On 8 (replicates 1 & 2) and 11 (replicates 3 & 4) Nov, carrots were manually harvested and weighed for yield determination. For replicates 3 & 4, carrots were graded for size (2 size categories: 1 ¼"-2" diameter and ≥2" diameter), forks, and cracking; and, each category was rated on a scale of 1-5 (few – many or none-severe).

The growing season was unusually hot and dry. Leaf blights began to develop in the field in early July; however, an extended dry period ensued until mid-September resulting in low level of spread of leaf blights in the field. The variety, 'Bolero', resulted in the least amount of leaf blights of all of the varieties. The variety stood out among all varieties as having the most healthy leaf tissue present. By the last evaluation date at the end of October, 'Early Gold', 'Danvers 126', and all of the SDC varieties, except SDC 1374, had the greatest amount of leaf blights present. 'Fontana' had a significantly larger area under the disease progress curve than the other varieties. There were no significant differences in yield among the varieties. Therefore, the level of leaf blights present on varieties did not significantly impact yield. This is probably due to the late occurrence of leaf blights during the season. There were few differences in horticultural quality factors among varieties. From the 2 replicate sample only the variety, 'Early Gold', had a significantly lesser amount of 1 ¼"-2" diameter size carrots than the other varieties. There were no significant differences in the amount of ≥2" diameter carrots, amount of forking and the amount of growth cracks among varieties. Few seed stalks (bolting) were observed among varieties in the trial. At 8 Oct evaluation date only the variety, 'Bolero', had seed stalks present. A total of 6 seed stalks were observed in all 4 replicates.

Table 1. Effect of varietal resistance on *Alternaria* and *Cercospora* leaf blight of carrots.

Variety	Leaf blight rating <sup>1</sup>					AUDPC <sup>2</sup>
	8 Jul	7 Sep	25 Sep	8 Oct	22 Oct	
Danvers 126 .....	2.2	27.5b-e	67.5ab	63.8ab	72.5a	892.3bc
Bolero.....	2.0	12.5f	25.0c	16.2d	27.5e	338.6f
Early Gold.....	2.8	23.8de	63.8b	53.8bc	75.0a	815.2c-e
Fontana.....	2.0	43.8a	75.0a	66.2ab	58.8bc	1064.3a
Goliath .....	2.2	33.8a-c	67.5ab	55.0bc	51.2cd	887.3bc
Recoleta.....	1.5	26.2c-e	62.5b	45.0c	53.8cd	758.8de
SDC 1374 .....	1.8	36.2ab	65.0b	50.0c	43.8d	868.5b-d
SDC 1767.....	1.5	18.8ef	62.5b	48.8c	62.5a-c	712.7e
SDC 1779.....	2.0	28.8b-d	70.0ab	73.8a	63.8a-c	930.8b
SDC 1801.....	2.0	27.5b-e	66.2b	63.8ab	68.8ab	879.0bc

<sup>1</sup> Severity of leaf blight symptoms were rated on a scale of 1-100 (none – severe) by visually examining the entire plot. No attempt was made to evaluate symptoms of *Alternaria* and *Cercospora* blights separately. Data was Arcsine transformed for statistical analyses. Actual disease assessments are reported with statistical separations based on arcsine transformed data analyses.

<sup>2</sup> AUDPC = Area under the disease progress curve. Data for each assessment date were plotted on a graph and the area under the line was calculated for each variety providing a measure of the severity of disease throughout the season.

Table 2. Variety, seed planter setting, yield, and gross value of yield for carrot cultivars.

Variety (Source)	Planet Jr. Setting	Yield (T/A)	Price/Ton (\$)	Gross Value of
				Yield (\$)
Danvers 126 (Stokes).....	7	14.8	90.0	1332.0
Bolero (Vimorin) .....	5	14.2	90.0	1278.0
Early Gold (Stokes).....	8	12.7	90.0	1143.0
Fontana (Vilmorin) .....	4	14.2	90.0	1278.0
Goliath (Stokes) .....	6	16.2	90.0	1458.0
Recoleta (Stokes) .....	7	16.6	90.0	1494.0
SDC 1374 (CSC) <sup>1</sup> .....	5	13.5	90.0	1215.0
SDC 1767 (CSC) .....	6	15.0	90.0	1350.0
SDC 1779 (CSC) .....	6	13.2	90.0	1188.0
SDC 1801 (CSC) .....	6	14.0	90.0	1260.0
LSD (P≥0.05).....	--	ns	--	--

<sup>1</sup> CSC = Campbell Soup Company

Table 3. Yield quality for carrot cultivars.

Variety	Quality <sup>1</sup>			
	1 ¼-2 <sup>2</sup>	>2 <sup>2</sup>	Forks <sup>3</sup>	Cracks <sup>3</sup>
Danvers 126 .....	5.0a	2.0ns	2.5ns	5.0ns
Bolero.....	5.0a	1.5	3.0	2.5
Early Gold.....	2.5b	2.0	2.0	5.0
Fontana.....	5.0a	1.0	2.0	3.5
Goliath.....	4.5a	1.5	3.0	5.0
Recoleta.....	5.0a	1.0	3.5	4.0
SDC 1374.....	5.0a	2.0	2.0	4.0
SDC 1767.....	4.5a	3.0	3.5	3.0
SDC 1779.....	4.5a	2.0	2.0	4.0
SDC 1801.....	4.5a	2.5	3.0	3.5
LSD (P≥0.05).....	1.2	1.3	2.0	1.7

<sup>1</sup> All carrots harvested from replicates 3 & 4 were visually rated for size and quality defects.

<sup>2</sup> Rated 1-5 (few – many)

<sup>3</sup> Rated 1-5 (none – severe)