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

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EVALUATION OF PROCESSING CARROT VARIETIES FOR RESISTANCE TO LEAF BLIGHTS, 2003

The experiment was conducted in a field (Aura sandy loam, pH 6.9) on the Rutgers Agricultural Research and Extension Center, Bridgeton, NJ. On 16 April the field was fumigated with Vapam HL (75 gal/A) for soil borne fungal pathogens and weed control. On 6 May, Treflan 4E (22 oz/A) was applied preplant and incorporated for weed control. On 14 and 15 May, carrots were seeded into the field with a Planet Jr. seeder with the seeding rate adjusted for each variety according to seed size. Plots consisted of 2, 15 ft. long rows on low beds spaced 5-ft apart with a 6-ft fallow area down each between plots. Varieties were replicated 4 times in a complete randomized block design. On 16 May Dual Magnum (12 oz/A) was applied and incorporated for weed control. On 25 Jun, Lorox (1 lb/A) was applied post emergence for weed control (nutsedge). On 31 Jul and 13 Aug, Guthion (1 gal/A) was applied for the insect control. Rainfall was 3.25 in. in May, 6.19 in. in Jun, 4.72 in. in Jul, 4.69 in. in Aug, and 4.73 in. in Sep (rainfall for Oct and Nov not available). Supplemental overhead irrigation was applied as needed. Plots were evaluated visually for the percentage of leaf blights on 24 Jul, 29 Aug, and 18 Sep. On 4 Nov, all of the foliage was removed from all of the plants in each plot leaving no petiole tissue on the carrots. On 5 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 5 Nov, carrots were manually harvested. On 5 & 6 Nov, carrots were weighed and graded for yield determinations. Grading categories included total weight, weight of carrots with cracking, weight of carrots with forking, and weight of carrots with greater than 1 ¼" diameter.

The growing season was unusually cool. Long periods of leaf wetness led to the development of foliar blight in early July, and disease progressed steadily throughout the summer. 'Bolero' consistently had the least amount of leaf blights throughout the season, as evidenced by its significantly low AUDPC. In addition to 'Bolero', 'Arrowhead' and 719116 stood out by mid-September as having the least amount of foliar blight, as shown by the rating and their small areas under the disease progress curve. 'Fontana', 'Early Gold', 'Bradford', SDC varieties 1767 and 1779 had the greatest amount of foliar blight at the last evaluation date. Other varieties with low AUDPC values are: 'Carson', 'Florida', and SDC 1801, . Yields of 'Bolero', 713087, and 'Carson' were significantly high. Differences in horticultural characteristics were also observed. SDC 1767 and 1779 had the highest percentages of carrots with growth cracking, while 'Bolero' and 'Canada' had the lowest percentages of carrots with growth cracking. 'Bolero', 'Recoleta', and SDC 1801 had high percentages of carrots with forking, while 'Florida' and 'Canada' had the lowest percentages. Only 'Arrowhead' had significantly

fewer carrots over 1 ¼ ″ diameter than the other varieties. No seed stalks (bolting) were observed.

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

	Leaf blight rating[1]			
Variety (source)	**24 Jul**	**29 Aug**	**18 Sep**	**AUDPC[2]**
Danvers 126 (Stokes)	12.0	37.6c-e	53.0a-e	900.3de
Bolero (Vilmorin)	5.7	26.2e	40.6fg	621.4f
Early Gold (Seminis)	17.8	46.5a-c	53.8a-e	1079.7a-c
Fontana (Vilmorin)	17.8	54.5a	57.6ab	1212.1a
Goliath (Seminis)	20.2	42.8a-c	52.4a-e	1042.9a-d
Recoleta (Seminis)	15.4	39.1cd	52.4a-e	947.2c-e
SDC 1374 (Campbell)	18.2	46.3a-c	53.8a-e	1079.4a-c
SDC 1767 (Campbell)	11.8	42.6a-c	58.4ab	994.8b-d
SDC 1779 (Campbell)	13.6	36.3c-e	59.3a	925.9c-e
SDC 1801 (Campbell)	11.8	36.8c-e	51.6b-e	878.7de
713087 (Seminis)	20.6	40.6b-d	47.2ef	990.1cd
719116 (Seminis)	16.8	37.6c-e	42.8fg	891.6de
Bradford (Bejo)	15.0	53.1ab	58.4ab	1169.7ab
Canada (Bejo)	17.4	35.7c-e	54.4a-d	928.1c-e
Carson (Bejo)	18.3	28.4de	50.2de	813.9e
Florida (Bejo)	10.7	37.8c-e	50.8c-e	878.8de
Arrowhead (Sakata)	15.4	34.2c-e	37.0g	803.0e
LSD (P>0.05)	ns	12.5	7.2	175.2

[1]Leaf blight ratings based on a total percentage of infected foliage. Ratings were not done separately for Alternaria and Cercospora. Data was arc sine transformed for statistical analyses.

[2]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, yield, and gross value of yield for carrot cultivars.

Variety (source)	**Yield (T/A)**	**Gross Value of Yield ($)**
Danvers 126 (Stokes)	11.7bc	1053.00
Bolero (Vilmorin)	20.6a	1854..00
Early Gold (Seminis)	7.5d-g	675.00

Fontana (Vilmorin)	9.5b-g	855.00
Goliath (Seminis)	6.5e-g	585.00
Recoleta (Seminis)	10.3b-e	927.00
SDC 1374 (Campbell)	7.8c-g	702.00
SDC 1767 (Campbell)	9.9b-f	891.00
SDC 1779 (Campbell)	6.1fg	549.00
SDC 1801 (Campbell)	5.6g	504.00
713087 (Seminis)	17.5a	1575.00
719116 (Seminis)	9.6b-g	864.00
Bradford (Bejo)	8.1c-g	729.00
Canada (Bejo)	10.8b-d	972.00
Carson (Bejo)	18.2a	1638.00
Florida (Bejo)	13.2b	1188.00
Arrowhead (Sakata)	11.8bc	1062.00

Table 3. Yield Quality for Carrot Cultivars

		Quality[1]	
Variety (source)	**% Cracks**	**% Forks**	**% >1 ¼″**
Danvers 126 (Stokes)	28.1de	11.4b-e	22.9ab
Bolero (Vilmorin)	20.1e	21.1a	25.8a
Early Gold (Seminis)	26.2de	9.9c-f	20.9ab
Fontana (Vilmorin)	26.5de	6.6d-f	21.4ab
Goliath (Seminis)	38.7a-c	12.7b-e	22.7ab
Recoleta (Seminis)	21.1e	19.5ab	18.3ab
SDC 1374 (Campbell)	24.8de	11.8b-e	24.2a
SDC 1767 (Campbell)	41.8a	14.2a-d	21.6ab
SDC 1779 (Campbell)	39.3ab	15.0a-c	23.6a
SDC 1801 (Campbell)	28.4de	21.2a	27.6a
713087 (Seminis)	31.0b-d	13.8a-d	21.2ab
719116 (Seminis)	31.2b-d	11.5b-e	13.8b
Bradford (Bejo)	22.7de	6.9c-f	22.0ab
Canada (Bejo)	20.3e	4.9ef	25.3a
Carson (Bejo)	21.8de	8.1c-f	27.6a
Florida (Bejo)	22.6de	2.6f	18.5ab
Arrowhead (Sakata)	29.4c-e	14.0a-c	1.8c

[1] Data has been arc sine transformed