

Evaluation of varietal resistance to foliar diseases of carrot, 2024.

A carrot field trial was conducted at the Hancock Research Station in Hancock, WI, to evaluate varietal resistance to common foliar diseases of carrot in the Midwestern United States with and without fungicide management. Nine varieties were selected for evaluation (Table 1) and seeds were sown at approximately 250,000 seed/A with a push seeder on 17 June. The experimental design consisted of 4 replicates arranged in a randomized complete block design. Each treatment plot consisted of 4.5-ft-wide beds with three 18-ft-long seeding rows, 19 in. between rows on bed with 17 in. from row edge to bed edge. Twelve-ft fallow breaks were maintained between plots in the same row. Insecticide, herbicide, and fertilizer applications were made according to standard production practices for the region. Naturally occurring inocula of pathogens were present from nearby agricultural production fields and a neighboring carrot variety trial with no fungicides applied. Each variety was either not treated with fungicides or treated 4 times with a standard fungicide program (7 Aug = Bravo WS 720SC 1.5 pt/A + Kocide 3000 1.5 lb/A, 21 Aug = Bravo WS 720SC 1.5 pt/A + Merivon 4.18SC 5.5 fl oz/A, 4 Sep = Bravo WS 720SC 1.5 pt/A + Kocide 3000 1.5 lb/A, and 18 Sep = Bravo WS 720SC 1.5 pt/A + Merivon 4.18SC 5.5 fl oz/A). Disease assessments took place on 1 Aug, 19 Aug, 28 Aug, and 21 Sep using the Horsfall-Barratt scale (1-11) to assess foliar symptoms in each experimental plot. Foliar disease severity was combined for all pathogens present at each rating. The area under the disease progress curve (AUDPC) was determined by trapezoidal integration and then converted into relative AUDPC (RAUDPC), i.e. percentage of the maximum possible AUDPC for the whole period of the experiment. On 5 Oct, a 5-ft section was hand-harvested from each plot, carrot tops were removed, and carrots (roots) were weighed to determine yield. Precipitation in Hancock during the production season was 13.8 in. Supplemental irrigation was applied 26 times during the production season for an additional 10.1 in. All data were analyzed using ANOVA ($\alpha=0.05$) and Fisher's LSD at $\alpha=0.05$ (SAS Version 9.2).

Disease pressure was averaged for the production season. Yields and individual carrot sizes were significant when comparing between varieties, but there was not a significant effect from fungicide treatments on yield and sizing when compared to non-treated (P-value = 0.23 and 0.82, respectively). There was a significant decrease overall in disease (RAUDPC) across treatments when comparing fungicide-treated versus non-treated (P-value = 0.0019). Five varieties, Belgrado, Canberra, Caravel, Cupar, and Naval had significantly less disease when no fungicide was applied and may be less susceptible to foliar disease.

Variety	Yield (ton/A)		Individual Carrot Weight (lb)		RAUDPC ^z	
	No Fungicide	With Fungicide	No Fungicide	With Fungicide	No Fungicide	With Fungicide
Belgrado	31.7 d ^y	32.1 e	0.190 a	0.184 a	0.289 a	0.280 ab
Canberra	27.1 cd	25.4 cd	0.207 a	0.202 ab	0.310 a	0.264 ab
Caravel	25.4 bc	25.9 cd	0.256 a	0.228 ab	0.311 a	0.300 ab
Cupar	21.8 a-c	23.1 cd	0.279 a	0.280 ab	0.314 a	0.274 ab
Istanbul	21.6 a-c	27.3 cde	0.297 a	0.329 bc	0.383 b	0.317 bc
Moonraker	21.6 a-c	21.4 bc	0.706 c	0.749 d	0.435 b	0.443 e
Nantes	20.8 ab	14.9 a	0.273 a	0.175 a	0.426 b	0.398 de
Naval	23.2 bc	28.2 de	0.209 a	0.239 ab	0.285 a	0.242 a
SV4128DL	16.7 a	16.7 ab	0.538 b	0.462 c	0.407 b	0.370 cd

^zThe area under the disease progress curve (AUDPC) was determined by trapezoidal integration and then converted into relative AUDPC (RAUDPC).

^yColumn means with a letter in common or with no letter are not significantly different (Fisher's LSD, $P=0.05$).