

Research Report to Oregon Processed Vegetable Commission
1986

Title of Project: Effects of nitrogen fertilizer rates and within-row spacing on carrot root yields and root characteristics

Project Leaders and Departments: H. J. Mack, Horticulture
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Project Status: Continuing - revised project - (completion-June 1988)

Project Funding by Commission: For this reporting period: \$3,500.
Funds were used for establishing and maintaining plots, land use charges, student labor, plant and soil analyses, and travel. Project was also supported by Oregon Agricultural Experiment Station funds.

Objectives:

1. To evaluate the effects of 5 nitrogen rates and 2 within-row spacings on yield and root characteristics of Royal Chantenay carrots at North Willamette Experiment Station and Oregon State University Vegetable Research Farm.
2. To evaluate the effects of supplemental nitrogen rates, in addition to grower's base rates of N on yield at 5 grower locations (Red Cored Chantenay).
3. To determine N concentrations in carrot leaf sample from each of the experimental locations.

Report Progress:

Trials were conducted in 1986 at the North Willamette Experiment Station (NWES), OSU Vegetable Research Farm (VRF), and at five grower locations to evaluate the effect of N rates on yield and root characteristics (in some cases) of carrots. Nitrogen rates were 50, 85, 120, 155, and 190 pounds/acre at NWES and VRF. The base rates of nitrogen varied at each of the grower locations and were supplemented to have differential rates as high as about 180-200 lbs N/A. Nitrogen applications were made before or at the time that roots were 1/2 to 3/4 inch in diameter (by early to mid July). Two in-row densities were included at NWES in 24-inch rows, and at the other locations, stand counts were made at harvest to determine the in-row densities. Harvest dates ranged from October 11 to October 24.

Total yields tended to be highest at NWES and VRF with 85 lbs N/A, (Tables 1 and 3 and the figure). The response to N application was not consistent at the grower locations; in some cases there was a slight increase in yield from N applications higher than the grower rates, and in others, there was a slight decrease. Results of plant analyses are not available at this time.

Size distribution of roots was influenced primarily by in-row density but highest N rates tended to increase the percentage of roots 2-2.5 inches in diameter. Results from the NWES trial indicated that root length did not vary with any treatment.

Observations on splitting (cracking) and rotting or pitting of roots, made at NWES and VRF, indicated that there was a trend for an increase in rots and cracking at higher N rates (Tables 2 and 3).

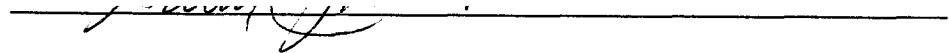
Summary:

These results indicate that N rates of 85-120 lbs/A appear to be adequate for good yields of Red Cored and Royal Chantenay carrots. Further work appears to be justified, however, to see whether or not results would be similar in a different year, at different locations, and at different densities.

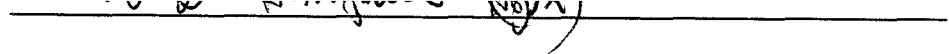
Signatures:

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Project Leaders

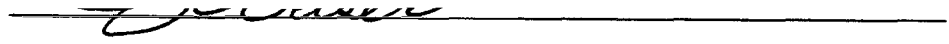


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Table 1
 1986 Summary of Nitrogen Rates and Density on Yield and Size Distribution
 of Carrot Roots

Grower	Density (plants/ft)	N Rate (lbs/A)	Total Yield (T/A)	% Size Distribution (wt) of Roots				
				-1"	1-1.5"	1.5-2"	2-2.5"	+2.5"
W.G.	18	168	37.0	4	21	29	44	2
		203	36.0	6	28	32	30	4
B.K.	14	110	39.8	1	13	28	45	13
		145	38.7	2	9	31	42	16
		180	40.2	1	10	24	58	7
D.K.	15	165	37.5	3	21	41	32	3
		200	35.5	2	12	35	44	7
P.F. (18 inch rows)	22	50	44.6	11	29	33	24	3
		85	44.9	9	34	38	19	0
		120	45.6	10	23	36	28	3
		155	49.1	8	30	30	30	2
J.S.	43	65	38.0	20	48	27	5	0
		100	36.2	23	50	21	6	0
		135	34.3	25	56	16	2	1
		170	39.1	16	46	28	9	1
V.R.F.	29	50	50.6	8	23	33	28	8
		85	55.3	5	25	36	29	5
		120	45.5	9	35	28	22	6
		155	50.1	6	27	30	30	7
		190	46.1	6	21	32	34	7
N.W.E.S.	38	50	41.8	94		6		
	56	85	58.4	98		2		
	43	120	44.2	96		4		
	50	155	51.7	99		1		
	44	190	48.5	96		4		

**CARROT YIELDS, TONS PER ACRE
1986**

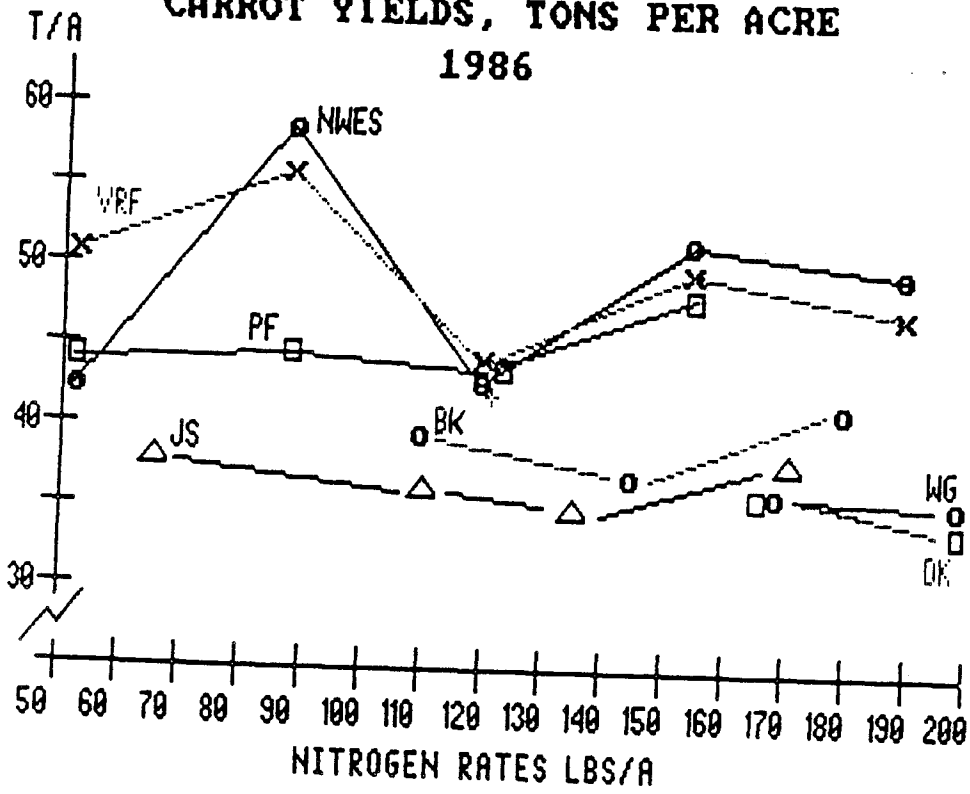


Table 2
 Effect of N Rates on Cracking (Splitting) and Rotting in Carrot Roots
 1986 (NWES and VRF)

N rate (lbs./A)	Cracking-Splitting-%			Rots-%		
	NWES	VRF		NWES	VRF	
		1-1.5"	1.5-2"		1-1.5"	1.5-2"
50	2.6	3	5	2.8	1	2
85	1.8	4	11	4.8	1	2
120	2.1	5	16	4.0	2	5
155	2.4	4	9	13.8	1	4
190	2.9	4	8	5.5	1	5

Table 3
Effect of N rate, plant population, and banded P on yield and root characteristics
of carrots (NWES) 1986

Treatment	# roots/ foot	Yield (tons/acre)		Mean root wt. (g)	% cracked roots	% rotten roots
		large roots	all roots			
50 lb N, low density	38.3	2.3	41.8	48.0	2.6	2.8
85	56.3	1.4	58.4	43.1	1.8	4.8
120	43.9	1.7	44.2	41.8	2.1	4.0
155	49.5	1.0	51.7	43.5	2.4	13.8
190	44.1	2.2	48.5	45.7	2.9	5.5
50 lb N, high density	85.7	0.6	44.5	22.4	0.8	1.7
85	82.2	0.0	47.5	23.9	0.8	6.5
120	78.1	0.0	48.6	27.0	1.2	9.4
155	68.9	0.4	47.0	28.8	2.4	12.6
190	68.4	0.1	44.6	27.6	2.3	24.7
85 lb N, low density + P	55.3	2.4	38.2	31.8	1.4	2.8
155 lb N, high density + P	40.9	1.6	38.7	40.4	1.0	8.0
LSD(0.05)	21.1	1.1	9.8	10.2	1.3	4.4
<u>Statistical significance:</u>						
N rate	NS ^a	NS	NS	NS	NS	**
Plant density	**	**	NS	**	*	*
N x density	NS	NS	NS	*	*	*
P rate	*	*	*	*	NS	*

^aNS, *, **: no significant differences among means; significant differences at 5% and 1% levels, respectively.