HortScience 15(2):142–144. 1980.

Influence of Raw and Coated Seed on Production of Carrots in Relation to Seeder Device[1]

L. H. Halsey and J. M. White[2]
Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611

Additional index words. Daucus carota

Abstract. **Raw and coated seed of carrot (*Daucus carota* L. cv Danvers 126) were planted with Stanhay, Earthway and Planet Jr. seeders on October 1, 1976 at Sanford and Zellwood, Florida, and on October 8 and November 16 at Gainesville, Florida. Carrot roots were harvested and graded in February, April, and May, 1977. Differences in weight of marketable carrot roots occurred between planters at 3 of the 4 locations, whereas response to seed coating was independent of locations. The effect of planters on numbers of marketable carrots varied significantly at 2 of the locations, with no effect of seed coating related to location. No difference was found in response to raw or coated seed in number or weight of marketable carrots, whereas carrots from coated seed were slightly larger than from uncoated seed.**

Coating vegetable seed for improving production through uniform plant spacings has been practiced for a long time. Burgessor (1) reported that the first patent relating to seed coating was obtained in 1868. Roos and Moore (7) listed the advantages of seed coating as follows: a) precision planting and spacing of small irregularly shaped seeds; b) reduced thinning costs; c) reduced thinning shock; d) more uniform seed microenvironment; e) potential for inclusion of beneficial chemicals with the seed; and f) use of fewer seeds. Coated seeds were easier to sow by precision drill with the Stanhay seeder than the Planet Jr. seeder (5). Harriott (3) indicated that for precision seeding lettuce a uniform textured seedbed was necessary, and recommended the following for prevision seeding small seeded vegetables: a) accurate spacing of single seeds in-the-row; b) precise control of planting depth; c) uniform germination environment for each seed; and d) non-crusting emergence area for each seedling. Emergence of onion and lettuce from coated seed was slower than from uncoated seed (2), but the slower rate was considered of little consequence over the long-term span of crop development. Others (4, 6, 8) reported that coated seed delayed emergence, but did not mention subsequent crop development.

The objectives of this study were to determine the effects of 3 seeder devices on the number, weight and diameter of marketable carrot roots grown from raw and coated seeds in 4 plantings in Florida.

Raw and coated seed of 'Danvers 126' carrot were planted on October 1, 1976, at Sanford on Myakka fine sand, on October 2 at Zellwood on Lauderhill muck, and October 8 and November 17, 1976 at Gainesville, on Arredondo fine sand (2 trials, Gainesville Sand 1 and Gainesville Sand 2). Coated seed were treated by the Litecoat process. Raw and coated seeds were tested, and found to have 85% germination. Seeders used were Stanhay,[3] Earthway, and Planet Jr. All seeders were adjusted to plant 1 seed (raw or coated) as close as possible to 5 cm apart, using recommended belts, cups or plates for seed drop. At Sanford 3 rows were planted on beds which were on 150 cm centers. Two rows were planted on beds 90 cm on center at Zellwood. Spacing between bed centers at Gainesville was 120 cm with 2 rows per bed. Plots at Sanford

Table 1. Carrot performance in relation to seed coating and method of seeding in 4 trials in Florida, 1976-1977.

		Location			
Seeder	Seed treatment	Sanford sand	Zellwood muck	Gainesville sand (1)	Gainesville sand (2)
		Plant stand (no. plants/5 cm)			
Stanhay	Raw	79c[z]	185c	186c	92a
	Coated	66cd	80d	109d	46a
Earthway	Raw	279a	268b	772a	264a
	Coated	197b	420a	404b	141a
Plant Jr.	Raw	45d	86d	169cd	97a
	Coated	38d	86d	138d	97a
		Mkt. yield 72.5cm diam (MT/ha)			
Stanhay	Raw	22.3a	12.1a	18.1a	9.9a
	Coated	17.5a	9.6a	16.4a	6.3a
Earthway	Raw	22.7a	17.1a	8.0c	12.0a
	Coated	28.8a	16.1a	13.3b	11.9a
Planet Jr.	Raw	15.0a	13.2a	17.4b	9.4a
	Coated	13.0a	11.4a	18.3a	8.0a
		Mkt. no. of carrots 72.5cm diam (1000 roots/ha)			
Stanhay	Raw	93a	244b	144a	70a
	Coated	88a	119c	108b	32a
Earthway	Raw	207a	264b	111b	176a
	Coated	184a	353a	153a	106a
Planet Jr.	Raw	57a	126c	138a	64a
	Coated	49a	124c	127ab	64a
		No. carrots <2.5cm diam (1000 roots/ha)			
Stanhay	Raw	17b	36b	159c	13c
	Coated	7b	4c	49d	1d
Earthway	Raw	266a	171b	1253a	188a
	Coated	135a	344a	546b	37b
Planter Jr.	Raw	5b	9c	134c	15c
	Coated	3b	12c	88d	28b
		Diameter of mkt. carrot roots (cm)			
Stanhay	Raw	5.9ab	4.3bc	4.4b	4.2b
	Coated	6.2a	5.0a	5.1a	4.8a
Earthway	Raw	5.0b	4.1c	3.6d	3.3d
	Coated	5.3b	3.8d	3.9c	3.9c
Planet Jr.	Raw	5.8ab	4.6b	4.5b	4.2b
	Coated	6.0ab	4.5bc	4.9ab	4.3b

[z]Mean separation in columns within variable by Duncan's multiple range test, 5% level.

[1]Received for publication January 29, 1979. Florida Agricultural Experiment Station Journal Series No. 1449.
The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper must therefore be hereby marked *advertisement* solely to indicate this fact.
[2]Associate Horticulturist, Vegetable Crops Department, Gainesville, and Associate Horticulturist, AREC – Sanford.
[3]Mention of a trademark name or a proprietary product does not constitute a guarantee or warranty of the product by the Institute of Food and Agricultural Sciences of the University of Florida, and does not imply its approval to the exclusion of the other rproducts that also may be suitable.
[4]Campbell, G. M. 1976. Campbell Institute for Ag ricultural Research. Cairo, Ga.

and Zellwood were 6.1 m long and those at Gainesville were 8.2 m long. A randomized block design was used with 4 replications. Recommended cultural, fertilization and pest control practices were followed in producing the crop.

Number and weight of marketable over 2.5 cm diameter, number of marketable carrots under 2.5 cm diameter were measured at harvest. For this study, no limit was placed on maximum diameter for marketable carrots.

Plant stands obtained varied with seeder. Stand counts (Table 1) show wide variation between seeders, with Stanhay and Planet Jr. seeders more closely approximating the 1 seed per 5 cm spacing (unpublished report[4]) indicated as needed to produce large carrots. Desired stands were approximated with the Stanhay and Planet Jr. seeders, and greatly exceeded by the Earthway seeder.

Marketable weight of carrots (>2.5 cm diameter). Response to planter varied with respect to location, with highest yields obtained in 3 of the 4 plantings when the Earthway seeder was used. Seed treatment was not related to planting and varied only at Gainesville Sand 1 in that there was a depressing effect when raw seeds were planted by the Earthway seeder.

Marketable number of carrots (>2.5 cm diameter). At Zellwood Muck and at Gainesville Sand 1 there was a variable response to seed treatment when Stanhay and Earthway seeders were used, with no interaction evident at the other locations. At Sanford only planters varied significantly and at Gainesville Sand 2 seed treatments and planters differed significantly.

Number of small carrots (<2.5 cm diameter). Significant interactions between seed treatments and planters occurred at all locations, except Earthway and Planet Jr. at Zellwood Muck and Planet Jr. at Gainesville Sand 2. Planting with the Earthway seeder resulted in greater numbers of small carrots at all locations.

Diameter of carrots exceeding 2.5 cm. Carrots grown from coated seed were larger than from uncoated seed when the Stanhay planter was used in 3 of the 4 plantings. With the Earthway seeder carrots from raw seed were larger on Zellwood Muck and smaller on the Gainesville Sands than carrots grown from coated seed, with no difference between seed treatments on the Sanford Sand. No differences between seed treatment were shown at any location when the Planet Jr. seeder was used.

The production of marketable size carrots (>2.5 cm diameter) was partially related to the number of marketable size roots. Greater numbers of carrots resulting from the Earthway planter yielded more weight of marketable carrots at all locations except Gainesville Sand 1, when compared with the yield obtained from Stanhay and Planet Jr. seeders. Marketable yields at Gainesville Sand 1 were depressed by the high plant population resulting from plantings made with the Earthway seeder.

Carrot root diameter decreased as carrot numbers increased, with the correlation higher for marketable numbers of Zellwood and Gainesville Sand 2 than the other 2 plantings (Fig. 1). Correlation of diameter of marketable carrots with total numbers was relatively consistent for all trials (Fig. 2).

Although more marketable carrots were obtained when the Earthway seeder was used at Sanford, Zellwood and Gainesville Sand 2, the size was smaller than those obtained when the Stanhay and Planet Jr. seeders were used.

Many carrots were produced which were free of defects but which were too small (<2.5 cm diameter, Table 1) to be considered marketable for regular fresh market or processing use. They could, however, meet the requirements as carrettes and thus be considered marketable in that form.

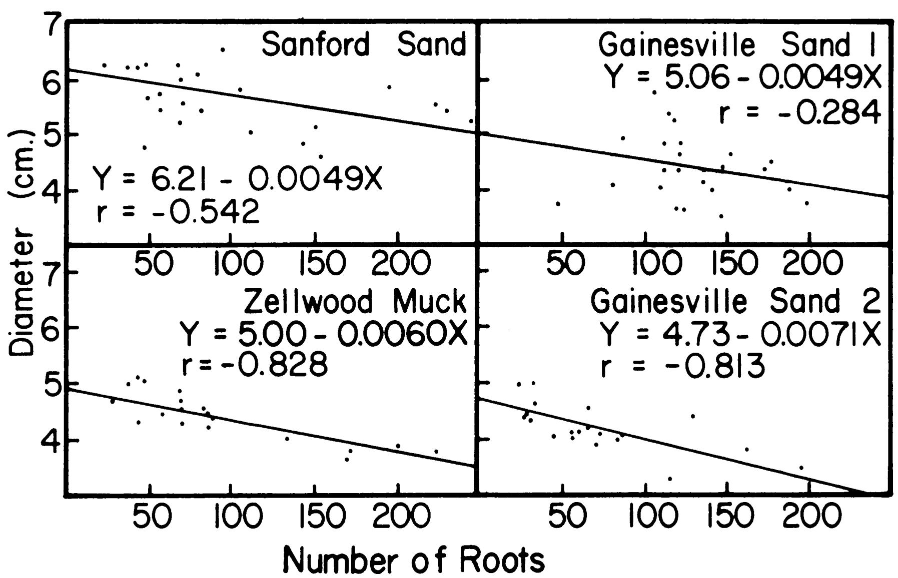

Fig. 1. Effect of number of marketable carrots (>2.5 cm. diameter) on average diameter of marketable roots from three locations in Florida, 1976-77.

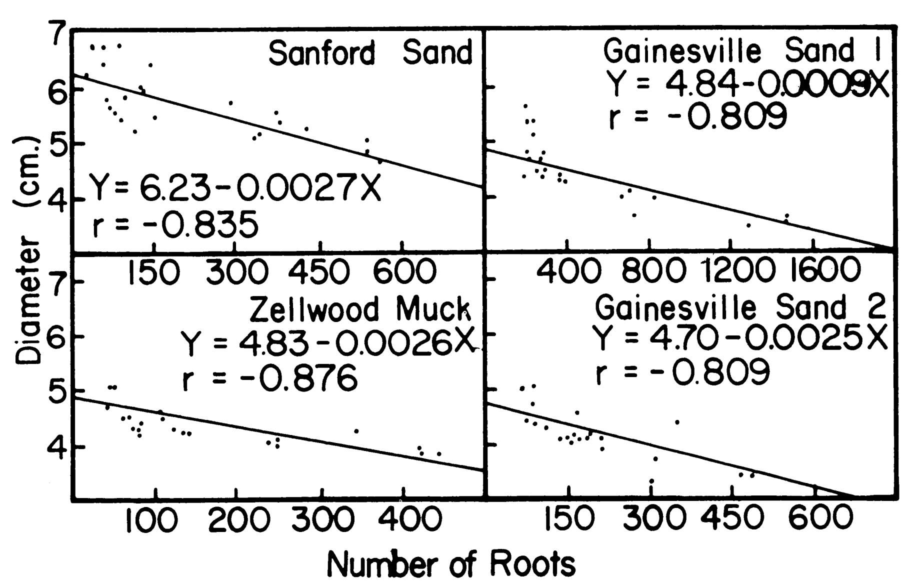

Fig. 2. Effect of total number of carrots (including culls) on average diameter of marketable roots from three locations in Florida, 1976-77.

Literature Cited

1. Burgesser, F. W. 1950. The use of coated seed in modern agriculture. *Proc. Amer. Soc. Sugar Beet Tech.* 6:79-84.
2. Bishop, J. C. 1948. Pelleting vegetable seeds effect on germination and rate of emergence on some seeds. *Calif. Agr.* 2(8):6, 16.

3. Harriott, B. L. 1970. A packaged environment system for precision planting. *Trans. Amer. Soc. Agr. Eng.* 13:550-553.

4. May, D. M. and R. Corley. 1967. Precision planting for cannery tomatoes. *Calif Agr.* 21(3):6-7.

5. Millier, W. F. and R. F. Bensin. 1974. Tailoring pelleted seed coatings to soil moisture conditions. *N.Y. Food & Life Sciences* 7(1):20-23.

6. ________and C. Sooter. 1967. Improving emergence of pelleted vegetable seed. *Trans. Amer. Soc. Agr. Eng.* 10:658-666.

7. Roos, E. E. and F. D. Moore, III. 1975. Effect of seed coating on performance of lettuce seeds in greenhouse soil tests. *J. Amer. Soc. Hort. Sci.* 100:573-576.

8. Zink, F. W. 1967. Coated celery seed aids mechanization efforts. *Calif. Agr.* 21(8): 4-5.

HortScience 15(2):144–145. 1980.

Effect of Row Spacings on Processing Carrot Root Yields[1]

H. J. Mack

Department of Horticulture, Oregon State University, Corvallis, OR 97331

Additional index words. plant populations, seeding rates, *Daucus carota*

Abstract. **Total root yields as well as roots <25 and 25-38 mm diameter, were increased in carrot (*Daucus carota* cv Red Cored Chantenay), as row spacings were decreased from 60 to 15 cm in 2 field experiments. Different within-row seeding rates did not have a significant impact on total yields, but affected yields of various size grades.**

Most U.S. carrot processors accept a range of root sizes from about 20 to 65 mm in diameter, but the range of acceptable sizes for fresh market sale is not as great. Webster (15) determined that maximum yields of salable roots were obtained from carrots spaced 4 to 6 cm apart in 30 cm rows (55-83 plants/m^2). Warne (12, 13) found that yield of roots was highest in 45 cm rows at 2.5 cm within-row spacing (89 plants/m^2). When 30 cm rows were used, Warne (14) showed a total yield increase of 48% as populations were increased from 60 to 305 plants/m^2. Robinson (9) obtained highest root yields at a square grid spacing of 5.1 × 5.1 cm (384 plants/m^2); densities of 1359, 5439, and 22,305 plants/m^2 produced greater dry matter yields, but the roots did not reach marketable size in 150 days. The lowest yield of dry matter was at 10 cm square grid but this spacing produced the earliest roots of marketable size. Kepka et al. (7) reported the largest increase in carrot yield when plant density increased from 37 to 167 plants/m^2. Bleasdale (2) showed that root size can be controlled by varying inter- and intra-row spacings. Highest yields of 19-32 mm diameter roots were produced in 9 to 13 cm rows at populations of about 400 to 500 plants/m^2. Bussell (6) produced small finger carrots (roots 13 to 18 mm diameter, 7.5 to 11.5 cm long) using row spacings of 2.5 to 7.5 cm, and he showed that yield increased as the sowing density was increased from 533 to 2500 seeds/m^2.

The present study was conducted to determine the effect of row spacings on yield of various size grades of roots of 'Red Cored Chantenay', a processing cultivar. Two field experiments were conducted in separate years on a loam soil at the Oregon State University Vegetable Research Farm, Corvallis. Row spacings of 15, 30, 45, and 60 cm were used. Broadcast fertilizer rates of 56 kg N, 74 kg P, 47 kg K/ha and 112 kg N, 148 kg P, 94 kg K/ha were used in Experiment 1, but only the former rate was used in Experiment 2. The fertilizer treatments in Experiment 1 did not have a significant effect on yield, and the yields reported for this experiment are averages of the 2 treatments. Plots were irrigated by overhead sprinklers at 12 to 20 day intervals. Roots were harvested from the center row of multi-row plots and at least 2 border rows remained on each side of the test row for the 15 cm row treatment and at least 1 border row remained on each side of the test row for the 30, 45,. and 60 cm row treatments. Roots were separated into the following size grades (mm shoulder diameter): <25, 25-38, 39-51, 52-64, and >64 mm. In Experiment 1 plots were planted with a Planet Jr. hand seeder (plate hole 6) on May 19. Early stand counts were not made, but root counts made about 10 days before harvest indicated the following average populations/m^2 for each of the 4 row spacings: 15 cm, 238; 30 cm, 129; 45 cm, 86; and 60 cm, 76. Treatments were replicated 3 times. Plots were harvested on October 4. In Experiment 2, 3 seeding rates (low, medium, and high) were used at each of the 4 row spacings. Planting was on May 25 and harvest was on September 27-28. The 3 seeding rates were accomplished by using Planet Jr. plant holes 6, 9, and 12. Treatments were replicated 3 times. Average number of roots/m^2 before harvest for the low, medium, and high seeding rates were as follows for the 4 row spacings: 15 cm – 212, 316, 534; 30 cm – 107, 209, 323; 45 cm – 82, 163, 262; and 60 cm – 72, 129, 221.

Decreasing the row spacing from the conventional 60 cm to 15 cm increased total yields 32 and 27% respectively, in Experiments 1 and 2 (Table 1 and Fig. 1), and also increased yields of smaller sized roots, <25 and 25-38 mm in diameter. Highest yield of larger sized roots, 52-64 mm, was produced at 60 cm row spacing. No significant effect of row spacings on yield of 39-51 mm diameter roots was found in either experiment. Main effects of within-row seeding rates in Experiment 2 indicate that total yields were found not to be significantly different at the 3 seeding rates, but yields of various sizes of roots were affected. The high seeding rate produced higher yields of small roots and lower yields of large roots than the low seeding rate. The individual effects of the 4 row spacings and 3 seeding rates on yields of various size grades of roots are shown in Fig. 1. No significant row spacing × seeding rate interactions were found.

Population density at harvest on an area basis (about 210 to 220 roots/m^2) in Experiment 2 was similar for 60 cm rows at the high seeding rate, 20 cm rows at the medium seeding rate and 15 cm rows at the low seeding rate and the respective total yields were 73.1, 81.9, and 95.1 MT/ha. This 30% increase in total yield indicates that an arrangement in which plants are more evenly distributed in a given area is advantageous. The major yield increase of the 15 cm rows with a low seeding rate over the 60 cm rows with a high seeding rate was in the production of 113% higher yield of 39-51 mm diameter roots (Fig. 1).

[1]Received for publication May 29, 1979. Oregon Agricultural Experiment Station Technical Paper No. 5193.

The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper must therefore be hereby marked *advertisement* solely to indicate this fact.