

Chapter 23.

Carrot Production in Florida

G.J. Hochmuth, D.N. Maynard, C.S. Vavrina, W.M. Stall, K.L. Pernezny, S.E. Webb

BOTANY

Nomenclature

Family - Apiaceae (Umbelliferae)

Carrot - *Daucus carota*

Origin

It is believed that the center of origin of carrot was in central Asia, perhaps in the area of present-day Afghanistan.

Related Species

Other common vegetables in the Apiaceae family are celery and parsnip. A great many herbs, including cilantro, fennel, and parsley are also in this family.

VARIETIES

Some carrot varieties used in Florida resistant to Alternaria blight are shown in Table 1.

SEEDING AND PLANTING

Planting dates and seeding information for carrot are given in Table 2.

FERTILIZER AND LIME

For mineral soils, broadcast all P₂O₅, micronutrients, and 25% of N and K₂O prior to forming beds (Fig. 23-1). Sidedress remaining N and K₂O in two or three applications during the early growth period (see Table 3).

For Histosols, broadcast all fertilizer prior to bed forming (Fig. 23-2). Better P efficiency might result on alkaline

mucks from banding. Supplemental N (40 lb/A) might be needed in cool winter weather, or after leaching rains (see Table 4).

Table 1. Carrot hybrids resistant to Alternaria blight.

Apache
Choctaw
Navajo
Top Notch

Table 2. Seeding and planting information for carrot.

Planting dates ¹	
North Florida	Aug - Mar
Central Florida	Aug - Mar
South Florida	Sept - Mar
Seeding information	
Distance between rows (in)	10 - 12
Distance between plants (in) ²	1 - 3
Seeding depth (in)	1/4
Seed per acre (lb)	2 - 4
Days to maturity from seed	70 - 90
Plant population (per acre) ³	630,000
¹ October for best production; high temperatures and heavy rains in late summer, early fall may complicate establishment.	
² Commercial machine harvest spacing.	
³ Population based on closest between and within row spacing.	

Table 3. Soil test and fertilizer recommendations for mineral soils for carrot.¹

Target pH	N lb/A	P ₂ O ₅					K ₂ O				
		VL	L	M	H	VH	VL	L	M	H	VH
(lb/A/crop season)											
6.5	175	150	120	100	0	0	150	120	100	0	0

¹ See Chapter 2 section on supplemental fertilizer application and best management practices, pg. 11.

Table 4. Soil test and fertilizer recommendations for Histosols for carrot, with target pH = 6.5 and N rate = 0 lb/A.

P and K index and fertilizer rate							
P index	3	6	9	12	15	18	21
P ₂ O ₅ (lb/A)	260	200	140	80	20	0	0
K index	50	80	110	140	170		
K ₂ O (lb/A)	200	140	80	20	0		

Table 5. Plant tissue analysis for carrot. Dry wt. basis.

	N	P	K	Ca	Mg	S	Fe	Mn	Zn	B	Cu
Status	Percent						Parts per million				
Deficient	<1.8	0.2	2.0	1.0	0.15	0.2	30	30	20	20	4
Adequate range	1.8-2.5	0.2-0.4	2.0-4.0	1.0-2.0	0.2-0.5	0.2-0.4	30-60	30-60	20-60	20-40	4-10
High	>2.5	0.4	4.0	2.0	0.5	0.4	60	100	60	40	10

PLANT TISSUE ANALYSIS

Plant tissue analysis information for carrot is given in Table 5. The analysis was done 60 days after seeding, using the most recently matured leaf.

DISEASE MANAGEMENT

The chemicals approved for disease management in carrot are listed in Table 7.

IRRIGATION

Carrots have a high demand for water during rapid growth and root development, 105% of ETo (see Chapter 8, *Principles and Practices of Irrigation Management for Vegetables*, Table 4-6). However, rates will decrease to 75% of ETo during the final stages of growth.

INSECT MANAGEMENT

Table 8 outlines the insecticides approved for use on insects attacking carrot.

WEED MANAGEMENT

Herbicides labeled for weed control in carrots are listed in Table 6.

Table 6. Chemical Weed controls: Carrots.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
			Mineral	Muck
Carfentrazone (Aim)	Carrots	Directed-hooded row middles	0.008-0.025	0.008-0.025
Remarks: Aim may be applied as a post-directed hooded burn-down application to emerged broadleaf weeds in row middles. Aim is not labeled for grassy weeds. May be tank mixed with other herbicides registered for this treatment pattern. May be applied at 0.33 oz (0.008 lb ai) to 1 oz (0.025 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant (nis) at recommended rates.				
Clethodim (Select)	Carrot	Postemergence	0.1-0.125	---
Remarks: Use Select for the control of annual and perennial grasses. Use a crop-oil concentrate at 1% v/v in the finished spray volume. Do not apply more than 8 fl. oz. product/A per application. Do not apply within 30 days of harvest.				
Fluazifop (Fusilade DX)	Carrots	Postemergence	0.188	0.188
Remarks: Controls actively growing emerged annual and perennial grasses. Check the label for specified rates per grass species. Use a crop oil or non-ionic surfactant. Do not apply if rainfall is expected within 1 hour. Do not apply more than 0.75 lb ai/A per crop. Do not harvest carrots within 45 days of application. Withhold field flooding 45 to 60 days following application. In Palm Beach and Hendry counties a 60 day interval must be observed for flooding.				
Glyphosate (Roundup)	Carrots	Preemergence	0.5 - 1.0	0.5 - 1.0
Remarks: Apply as directed for "Cropping Systems" under conditions described on label. Does not provide residual weed control. Use on trial basis.				
Linuron (Lorox DF)	Carrots	Preemergence	0.5	0.5 - 1.5
Remarks: Make a single application after planting but before carrots emerge. Plant seed at least 2 inch deep. Subsequent postemergence treatments may be made provided total does not exceed 4lbs. material per acre per season.				
Linuron (Lorox DF)	Carrots	Postemergence	0.75	0.75 - 1.5
Remarks: Apply after carrots are at least 3 inches tall. Apply before annual grasses exceed 2 inches in height and before broadleaf weeds exceed 6 inches in height. Repeat applications may be made but do not exceed 4 lbs. material per acre. Can be applied following Stoddard's Solvent provided that the applications are at least one day apart. Do not tank mix with Stoddard's Solvent, surfactants, nitrogen or fertilizer solutions. Do not apply when temperatures exceed 85°F as crop injury may result.				
Metribuzin (Sencore DF) (Sencore 4)	Carrots	Postemergence	0.25	0.25
Remarks: Apply as a broadcast spray over the tops of carrot plants. Application should be made after carrots have formed 5 to 6 true leaves but before weeds are 1 inch in height. If needed, a second application may be made after an interval of at least 3 weeks. Application may be made up to 60 days of harvest. Label through I-R-4 program.				
Paraquat (Gramoxone Extra) (Gramoxone Max)	Carrots	Preplant; Preemergence	0.56 - 0.94	0.56 - 0.94
Remarks: Apply as a band treatment over the crop row or as a broadcast treatment before, during or after planting, but before the emergence of the crop. Weeds emerging after the application will not be controlled. Crop plants emerged at the time of application will be killed. Use a non-ionic surfactant in the spray mixture.				
Pelargonic Acid (Scythe)	Carrots	Preplant, Preemergence, Directed-shielded	3-10% v/v	3-10% v/v
Remarks: Product is a contact, non-selective, foliar applied herbicide. There is no residual control. May be tank mixed with soil residual compounds. Consult label for rates and other information.				
Sethoxydim (Poast)	Carrots	Postemergence	0.188-0.28	0.188-0.47
Remarks: Controls actively growing grass weeds. A maximum rate of 2.5 pints product may be made per application. A total of 5 pints product may be applied per season. There is a 30 day PHI (pre harvest interval). Consult label for rates for grass species and growth stages for best control.				
Trifluralin Treflan EC, Treflan HFP, Treflan MTF, Treflan TR-10, TR-4, Trifluralin HEC, Trilin)	Carrots	Preplant incorporate	0.5	--
Remarks: Apply to mineral soils only. Mineral soils with 2-5% organic matter, apply 0.75 lb ai.				

Table 7. Disease management for carrot.

Chemical	Maximum Rate/Acre/		Minimum Days to Harvest	Pertinent Diseases	Select Remarks
	Application	Crop			
Rovral 4F	2 pts	8 pts	0	Alternaria blight	Limit is 4 appl./crop
Equus 6 FL , Chlorogold or Echo 720	2 pts	20 pts	7	Alternaria blight Cercospora blight	
Echo 90DF	1.5 lbs	-	7	Alternaria blight Cercospora blight	
Ridomil Gold 4 EC	2 pts/trtd acre			Pythium seedling blight	Apply at seeding in a 7-12" band on soil over seed furrow.
Bravo Ultrex 82.5 WDG	1.8 lb		7	Alternaria blight Cercospora blight	
Bravo Weather Stik 6F	2.0 pts	20 pts	7	Alternaria blight Cercospora blight	
Amistar 80DF	5.0 oz.	20 oz	0	Cercospora blight Alternaria blight	Limit is 1 sequential appl. Limit is 4 appl./ crop/season
Cabrio 2.09F	16 fl oz	48 fl oz	0	Cercospora blight Alternaria blight	Limit is 2 sequential appl. and 3 appl./crop
Pristine 38 WG	10.5 ozs	63 ozs	0	Cercospora blight Alternaria blight	Limit is 2 sequential appl. Limit is 6 appl./ crop/season
Various copper compounds (see ind. Labels), including Basic Copper 53, Basicop, Champ, COC, Copper Count-N, Cuprofix Disperss, Kocide, Nordox, Nu Cop, Stretch, Tenn Cop				Alternaria leaf spot, Bacterial blight	
Flint	3oz		7	Leaf blight (<i>Alternaria dauci</i>), Leaf spot (<i>Cercospora carotae</i>), Powdery mildew, Rust	
Iprodione	2pt	8pt	0	Alternaria blight (<i>A. dauci</i>), Black crown rot (<i>A. radicina</i>)	
Quadris 2.08 FL	15.4oz	3.75qt	0	Alternaria blight, Cercospora blight, Rhizoctonia diseases, <i>Sclerotium rolfsii</i>	Alternate with other chemistries
Quadris Opti	2.4pts	14.4pts	0		
Endura 70WDG	4.5oz	22.5oz	0	Alternaria leaf spot	Alternate with other chemistries
Serenade Max	3lb		0	Bacterial blight, Black crown rot, White mold	
Ultra Flourish	4pt			Pythium and Phytophthora seedling diseases	Soil treatment at planting only

Table 8. Selected insecticides approved for use on insects attacking carrots.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Actara (thiamethoxam)	1.5-3.0 oz	12	7	aphids, flea beetles, leafhoppers	4A	Do not exceed 8 oz product/acre/season.
Admire 2F (imidacloprid)	10-24 fl oz	12	21	aphids, flea beetles, leafhoppers, whiteflies	4A	Limited to one soil application.
Agree WG (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	lepidopteran larvae (caterpillar pests)	11B1	Apply when larvae are small for best control. OMRI-listed ² .
*Asana XL(0.66EC) (esfenvalerate)	5.8-9.6 fl oz	12	7	aster leafhopper, cutworms, leafhoppers, carrot weevil	3	Do not apply more than 0.5 lb ai/acre per season.
Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, miters, stink bugs, thrips, weevils, whiteflies	26	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
Azatin XL (azadirachtin)	5-21 fl oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, miters, stink bugs, thrips, weevils, whiteflies	26	Antifeedant, repellent, insect growth regulator.
*Baythroid 2 (cyfluthrin)	1.6-2.8 fl oz	12	0	aster leafhopper, cutworms, carrot weevil	3	Do not exceed 5 applications per season.
Biobit HP (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars (will not control large armyworms)	11B2	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse. OMRI-listed ² .
BotaniGard 22 WP, ES (<i>Beauveria bassiana</i>)	WP: 0.5-2 lb/100 gal ES: 0.5-2 qts/100 gal	4	0	aphids, thrips, whiteflies	--	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Not compatible in tank mix with fungicides.
Condor (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.67-1.67 qts	4	0	caterpillars	11B2	Do not use in combination with any chlorothalonil-based fungicides. Use caution when mixing with other oil-based products or surfactants. Treat when larvae are young. Good coverage is essential.
Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11B2	Use high rate for armyworms. Treat when larvae are young.
Deliver (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-1.5 lb	4	0	caterpillars	11B2	Use higher rates for armyworms. OMRI-listed ² .
*Diazinon 4E, AG500, 50W (diazinon)	AG500, 4E: 1-4 qt 50W: 2-8 lb	24	preplant	cutworms, mole crickets, wireworms	1B	
*Diazinon 4E, AG500, 50W (diazinon)	Foliar: AG500, 4E: 1 pt 50W: 1 lb	24	14	aphids	1B	Do not make more than 5 foliar applications per year.
*Diazinon 4E, AG500, 50W (diazinon)	Preplant: AG500, 4E: 1-4 qt 50W: 2-8 lb	24	pre- or at planting	carrot rust fly, cutworms, mole crickets, wireworms	1B	
DiPel DF (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)		4	0	caterpillars	11B2	Treat when larvae are young. Good coverage is essential. OMRI-listed ² .

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Endosulfan 3EC (endo-sulfan)	0.66-1.33 qt	24	7	aphids, armyworms, flea beetles, leafhoppers, whiteflies	2	Do not make more than 1 application per year. Do not use tops for food or feed.
Intrepid 2F (methoxyfenozide)	6-16 fl oz	4	14	armyworms, loopers, saltmarsh caterpillar, webworms	18	Do not apply more than 64 fl oz per acre per season.
Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.50 lb	4	0	most caterpillars, but not <i>Spodoptera</i> species (armyworms)	11B2	Treat when larvae are young. Thorough coverage is essential. OMRI-listed ² .
*Lannate LV, *SP (methomyl)	LV: 0.75-3.0 pts SP: 0.25-1.0 lb	48	1	armyworms, aster leafhopper, beet armyworm, variegated cutworm	1A	
Lepinox WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	1.0-2.0 lb	12	0	most caterpillars, including beet armyworm (see label)	11B2	Treat when larvae are small. Thorough coverage is essential.
M-Pede (potassium salts of fatty acids)	1-2% V/V	12	0	leafminers, aphids, thrips, whiteflies	--	
Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, cabbage looper, cutworms, leafminers, whiteflies	26	Acts as IGR and feeding repellent. OMRI-listed ² .
Provado 1.6F (imidacloprid)	3.5 oz	12	7	aphids, flea beetles, leafhoppers, whiteflies	4A	Maximum of 3 applications.
Pyrellin EC (pyrethrins + rotenone)	1-2 pt	12	12 hours	aphids, flea beetles, leafhoppers, leafminers, lygus bug, mites, plant bugs, stink bugs, thrips, vegetable weevil, whiteflies	3, 21	
Pyronyl Crop Spray (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	ants, aphids, armyworms, cabbage looper, corn earworm, crickets, flea beetles, leafhoppers, thrips, whiteflies	3	
Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb XLR, 4F: 0.5-2 qt	12	7	armyworms, aster leafhopper, corn earworm, cutworms, fall armyworm, flea beetles, leafhoppers, lygus bug, spittlebugs, stink bugs, tarnished plant bug	1A	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
Spintor (spinosad)	3-6 oz	4	3	armyworms, flea beetles, leafminers, loopers, thrips	5	Do not apply more than 21 oz per acre per crop. Limited to 4 applications per year.
*Telone C-35 (dichloropropene + chloropicrin)	See label	5 days - See label	preplant	symphylans, wireworms	--	See supplemental label for use restriction in south and central Florida.
Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	26	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .
Xentari DF (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	caterpillars	11B1	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
The pesticide information presented in this table was current with federal and state regulations at the time of revision. The user is responsible for determining the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label instructions.						
¹ Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v.3.3 October 2003. 1A. Acetylcholine esterase inhibitors, Carbamates 1B. Acetylcholine esterase inhibitors, Organophosphates						
2A. GABA-gated chloride channel antagonists						
3. Sodium channel modulators						
4A. Nicotinic Acetylcholine receptor agonists/antagonists, Neonicotinoids						
5. Nicotinic Acetylcholine receptor agonists (not group 4)						
6. Chloride channel activators						
7A. Juvenile hormone mimics, Juvenile hormone analogues						
7C. Juvenile hormone mimics, Pyriproxifen						
9A. Compounds of unknown or non-specific mode of action (selective feeding blockers), Cryolite						
9B. Compounds of unknown or non-specific mode of action (selective feeding blockers), Pymetrozine						
11B1. Microbial disruptors of insect midgut membranes, <i>B.t. var aizawai</i>						
11B2. Microbial disruptors of insect midgut membranes, <i>B.t. var kurstaki</i>						
12B. Inhibitors of oxidative phosphorylation, disruptors of ATP formation, Organotin miticide						
15. Inhibitors of chitin biosynthesis, type 0, Lepidopteran						
16. Inhibitors of chitin biosynthesis, type 1, Homopteran						
17. Inhibitors of chitin biosynthesis, type 2, Dipteran						
18. Ecdysone agonist/disruptor						
20. Site II electron transport inhibitors						
21. Site I electron transport inhibitors						
22. Voltage-dependent sodium channel blocker						
23. Inhibitors of lipid biosynthesis						
25. Neuroactive (unknown mode of action)						
26. Unknown mode of action, Azadirachtin						
² OMRI-listed: Listed by the Organic Materials Review Institute for use in organic production.						
* Restricted Use Pesticide						