

Chapter 15.

Minor Vegetable Crops: Beets, Carrots, Celery, and Parsley

C.M. Hutchinson, W.M. Stall, S.E. Webb, R.N. Raid, K.L. Pernezny, and S.M. Olson

BEETS BOTANY

Nomenclature

Family - Chenopodiaceae

Beet - *Beta vulgaris*

Origin

Beet is native to the areas of Europe, the Near East, and Africa adjacent to the Mediterranean Sea. Leaves and roots (enlarged hypocotyl) are the plant parts consumed (Fig. 15-1).

Related Species

Spinach and Swiss chard are the only other vegetables of significance in the Chenopodiaceae family. The most important crop plant in this family is sugar beet.

CARROTS, CELERY, PARSLEY BOTANY

Nomenclature

Family - Apiaceae (Umbelliferae)

Carrot - *Daucus carota*

Celery - *Apium graveolens*

Parsley - *Petroselinum crispum*

Origin

The origin of carrot is believed to be in central Asia, perhaps in the area of present-day Afghanistan. Celery is native to marshy sites that may be somewhat saline in areas of southern Europe and North Africa that border the Mediterranean Sea (Fig. 15-2). Parsley is believed to be native to the Mediterranean area as well. Its early use was

medicinal Present day use is as a garnish rather than as a primary component of the diet.

Related Species

Other common vegetables in the Apiaceae family are celeriac and parsnip. This family also contains many important herbs and spices including cilantro and fennel as well as some ornamentals.

VARIETIES

Common Florida Beet, Carrot, Celery, and Parsley varieties are listed in Table 1.

SEEDING AND PLANTING

Seeding and planting information for minor vegetables is listed in Table 2.

FERTILIZER AND LIME

Beet - Broadcast all P₂O₅, micronutrients, and 25 to 50% of N and K₂O before planting. Sidedress remaining N and K₂O four to five weeks after planting when plants are four to six inches tall. Soil test and fertilizer recommendations for beet grown on mineral soil are described in Table 3.

Carrot - For mineral soils, broadcast all P₂O₅, micronutrients, and 25% of N and K₂O prior to forming beds (Fig. 15-3). Sidedress remaining N and K₂O in two or three applications during the early growth period (see Table 3).

Table 1. Common minor vegetable crop varieties.

Beets	Carrots	Celery	Parsley
Asgrow Wonder	Apache	Floribelle - M9	Forest Green (CL)
Bulls Blood (tops)	Choctaw	June Belle	Jade (CL, H)
Golden Beets (yellow)	Navajo	Florida 683	Improved Market Gardeners (CL)
Green Top	Top Notch		Dark Green Italian (PL)
Pacemaker III			
Red Ace			

CL=Curley Leaf; PL=Plain Leaf; H=hybrid

On Histosol soils, broadcast all fertilizer prior to bed forming (Fig. 15-4). Better P₂O₅ 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).

Celery - On mineral soils, broadcast all P₂O₅, micro-nutrients, and 20 to 25% N and K₂O before transplanting. Apply the remaining N and K₂O in 40 to 60 lb side dressings through the early part of the growing season (once at 2 to 3 weeks after planting and the second one at 6 to 8 weeks after planting) (see Table 3).

On Histosol soils, broadcast and incorporate all P₂O₅ and micronutrient fertilizers (Fig. 15-5) prior to planting. On high-pH soil, there might be benefit from banding P₂O₅. Potassium should be applied in three applications (at planting and at 1 and 2 months after planting) to reduce soluble salt burn and minimize leaching losses. For crops harvested before December 1, make two applications of 40 lbs N each at 1 and 2 months after transplanting. For crops harvested between December 1 and March 31, make two applications of 60 lbs each. For crops, harvested after April 1, make two applications of 30 lbs each (see Table 4).

Parsley - For mineral soils with subsurface or sprinkler irrigation, broadcast all P₂O₅, micronutrients, and 20 to 25% of N and K₂O before seeding. Top dress or band remaining N and K₂O at rates up to 30 lbs/A each several times during growing season for single cutting. For multiple cuttings apply 30 lbs/A each of N and K₂O after each cutting. Soil test and fertilizer recommendations for parsley on mineral soils are given in Table 3.

For Histosol soils, broadcast all fertilizer prior to seeding. Supplemental N might be needed during cool, winter periods or after leaching rain. For more than one cutting, apply additional 20 to 30 lbs K₂O/A after each cutting. Soil test and fertilizer recommendations for parsley grown on Histosols are given in Table 4.

PLANT TISSUE ANALYSIS

Plant tissue analysis data for all minor crops are listed in Table 5.

IRRIGATION

Beet - Irrigation is critical if rainfall is low during the rapid growth period of root (hypocotyl) development. Crop water requirements (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Tables 4-6) will equal ETo (see Chapter 3, Table 3) during this stage of growth, and decrease to 90% of ETo during the final stage of production. Overhead (sprinkler) irrigation might be needed to aid seedling emergence, especially on crusting soils in dry periods. Sprinkler irrigation might also be needed at harvest to refresh plants when beets leaves are sold separately or when bunched beets are harvested.

Carrots - Carrots have a high demand for water during rapid growth and root development, 105% of ETo (see Chapter 3, *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.

Table 2. Seeding and planting information for Beet, Carrots, Celery, and Parsley.

	Beets	Carrots	Celery	Parsley
Planting Dates				
North Florida	Aug - Feb	Aug-Mar	Aug - Feb	Sept - Mar
Central Florida	Sept - Feb	Aug-Mar	Sept - Mar	Sept - Mar
South Florida	Oct - Jan	Sept-Mar	Oct - Mar	All year
Planting Information				
Distance between rows (in)	12 - 30	10 - 12	18-40	6 - 12
Distance between plants (in) ²	2 - 4	1 - 3	6-12	drilled ⁴
Seeding depth (in)	0.5 - 1.0	1/4	on surface ²	0.25
Seed per acre (lb)	10 - 15	2 - 4	1 - 2 ³	6 - 8
Days to maturity from seed	50 - 70	70 - 120	75 - 90 ³	70 - 80
Plant population (per acre) ¹	261,360	630,000	58,080	1 million+
¹ Population based on closest between and within row spacing ² Seed pressed in beds, not buried, and kept moist for transplant production. Transplant production takes three months in seedbed. ³ For celery, column one should read "Seed per acre from transplants (lb)" and "Days to maturity from transplant". ⁴ Cut and bunched via ratoon system.				

Celery - Celery water requirements (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Tables 4-6) during rapid growth are similar to carrots (105% of ETo) with a slightly lower demand for water during the final stages of growth and development (95% of ETo). (See also Chapter 3, Table 3)

Parsley - Because parsley is produced for its vegetative growth, initial water requirements (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Table 4 to 6) will increase from 20% to 30% of ETo to 100% of ETo (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Table 3) at complete canopy or foliar coverage through harvest. Water stress will reduce leaf growth and development resulting in reduced yields.

WEED MANAGEMENT

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

Herbicides labeled for weed control in carrots are listed in Table 7.

Herbicides labeled for weed control in celery are listed in Table 8.

Herbicides labeled for weed control in parsley are listed in Table 9.

DISEASE MANAGEMENT

Information on managing diseases affecting beet is given in Table 10.

Information on managing diseases affecting carrots is given in Table 11.

Information on managing diseases affecting celery is given in Table 12.

Information on managing diseases affecting parsley is given in Table 13.

INSECT MANAGEMENT

Table 14 outlines the insecticides approved for use on insects attacking carrot.

Table 15 outlines the insecticides approved for use on insects attacking celery.

Table 16 outlines the insecticides approved for use on insects attacking parsley.

Table 3. Soil test and fertilizer recommendations for mineral soils for minor crops.

Target pH	N						K ₂ O					
	VL	L	M	H	VH	VL	L	M	H	VH		
Beet												
6.5	120	120	100	80	0	0	120	100	80	0	0	
Carrot												
6.5	175	150	120	100	0	0	150	120	100	0	0	
Celery												
6.5	200	200	150	100	0	0	250	150	100	0	0	
Parsley												
6.5	120	150	120	100	0	0	150	120	100	0	0	
See Chapter 2 section on supplemental fertilizer application and best management practices												

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

Crop		P and K indexes and fertilizer rates						
Carrot	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		
Celery	P index	3	6	9	12	15	18	21
	P ₂ O ₅ (lb/A)	260	200	170	100	60	30	0
	K index	50	80	110	140	170	200	
	K ₂ O (lb/A)	300	240	180	120	60	0	
Parsley	P index	3	6	9	12	15	18	
	P ₂ O ₅ (lb/A)	200	140	80	20	0	0	
	K index	50	80	110	140	170	200	
	K ₂ O (lb/A)	200	140	80	50	0	0	

Table 5. Plant tissue analysis for beet, carrot, and celery. Dry weight basis.

Status	N	P	K	Ca	Mg	S	Fe	Mn	Zn	Bo	Cu	Mo
	Percent (%)						Parts per million (ppm)					
Beet ¹												
Deficient	<3.0	0.22	2.0	0.7	0.25	0.2	40	30	15	30	5	0.05
Adequate Range	3.0-5.0	0.25-0.4	2.0-6.0	0.7-2.0	0.25-1.0	0.2-0.5	40-200	30-200	15-30	30-80	5-10	0.2-0.6
High	>5.0	0.40	6.0	2.0	1.0	0.5	200	200	30	80	10	0.06
Carrot												
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	-
Celery												
Deficient	<1.5	0.3	6.0	1.3	0.3	-	20	5	20	15	4	-
Adequate Range	1.5-1.7	0.3-0.6	6.0-8.0	1.3-2.0	0.3-0.6	-	20-30	5-10	20-40	15-25	4-6	-
High	>1.7	0.6	8.0	2.0	0.6	-	100	20	60	25	6	-
¹ Boron is toxic to beet at >650 ppm.												
Note: No plant tissue analysis available for Parsley.												

Table 6. Chemical weed control: Beets

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
			Mineral	Muck
Cycloate (Ro-Neet)	Beet	Preplant Incorporate	3-4 lb	
Remarks: Apply to mineral soils only. Use on trial basis.				
Pyrazon (Pyramin)	Beet	Preemergence Early Postemergence	3-3.5	
Remarks: Apply preemergence or early postemergence to beet and weeds for control of many broadleaf weeds. Do not use on muck soils.				
Carfentrazone (Aim)	Beets row middles	Directed-hooded	0.031	0.031
Remarks: Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burndown of emerged broadleaf weeds. May be tank mixed with other registered herbicides. May be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant (nis) at recommended rates.				

Table 7. 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	0.031	0.031
Remarks: Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burndown of emerged broadleaf weeds. May be tank mixed with other registered herbicides. May be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant (nis) at recommended rates.				
Clethodim (Select 2 EC) (Arrow) (Select Max)	Carrot	Postemergence	0.09-0.25	---
Remarks: Postemergence control of actively growing annual grasses. Apply at 6-16 fl oz/acre (Select, Arrow) or 9-16 fl oz/acre (Select Max). Higher rates are listed for perennial grasses. Use a crop oil concentrate for Select and Arrow, but a non-ionic surfactant may be used for Select Max. 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, Durango) Touchdown, Glyphomax)	Carrots	Chemical fallow Preplant Preemergence	0.3 - 1.0	
Remarks: Roundup, Glyphomax and Touchdown have several formulations. Check the label of each for specific labeling directions.				
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 Inteon)	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.				
Pendimethalin (Prowl H2O)	Carrots	Preemergence,	0.95	---
Remarks: Make a post-plant treatment prior to emergence of the crop and before weed emergence at 2.0 pint/A within 2 days of planting.				
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,	Carrots	Preplant incorporate	0.5	--
Remarks: Apply to mineral soils only. Mineral soils with 2-5% organic matter, apply 0.75 lb ai.				

Table 8. Chemical weed controls: Celery.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
			Mineral	Muck
Bensulide (Prefar 4E)	Celery, Chinese celery (transplant only) cardoon, Florence fennel	Preplant incorporated Preemergence	5-6	--
Remarks: Preplant incorporate using power driven rotary cultivations or apply preemergence and incorporate with irrigation. Controls many grass weeds. Provides fair to good control of lambsquarter, purslane, and amaranths. May be applied under polyethylene mulch.				
Carfentrazone (Aim)	Celery	Preplant, Directed-hooded row-middles	0.031	0.031
Remarks: Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burndown of emerged broadleaf weeds. May be tank mixed with other registered herbicides. May be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant (nis) at recommended rates.				
Clethodim (Select) (Select 2 EC) (Arrow) (Select Max)	Celery	Postemergence	0.09-0.25	---
Remarks: Postemergence control of actively growing annual grasses. Apply at 6-16 fl oz/acre (Select, Arrow) or 9-16 fl oz/acre (Select Max). Higher rates are listed for perennial grasses. Use a crop oil concentrate for Select and Arrow, but a non-ionic surfactant may be used for Select Max. Do not apply within 30 days of harvest.				
Glyphosate (Roundup Durango, Touchdown Glyphomax)	Celery	Chemical fallow, Preplant pre emergence, pre transplant	0.3 - 1.0	0.3 - 1.0
Remarks: Roundup, Glyphomax and Touchdown have several formulations. Check the label of each for specific labeling directions.				
Linuron (Lorox DF)	Celery	Posttransplanting	0.75 - 1.5	0.75 - 1.5
Remarks: Controls emerged annuals. Apply following transplanting and establishment of celery, but before crop is 8 inches tall. Annual grasses should not exceed 2 inches and broadleaf weeds 6 inches tall. Avoid application when temperature exceeds 85°F. Do not use a surfactant or mix with other chemicals. Note precautions of planting non-registered crops within 4 months.				
Metolachlor Dual Magnum	Celery	Pre/postransplant	.95-1.26	Dual Magnum
Remarks: Applications must be made prior to/immediately after transplanting. Rates are based on soil texture and percentage of organic matter. On coarse soils apply .95 - 1.26 lbs a.i/A (1.0 -1.33 pints) on medium and fine soils apply 1.25-1.6 lbs a.i. and when organic matter content is greater than 3% apply 1.6-1.9 lbs a.i/A (1.67-2.0 pts/A). This label is a special local need, third party registration. Authorization and waiver agreements must be obtained from T.P.R., Inc. prior to use.				
Pelargonic acid (Scythe)	Celery, fennel, Swiss chard	Preplant, 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 herbicides. Consult label for rates and other information.				
Prometryn (Caparol 4L)	Celery seedbed	Postemergence	0.6 - 0.8	0.6 - 0.8
Remarks: Controls emerged annuals. In seedbed, apply when seedlings have 2 to 5 true leaves after seedbed covers are removed for at least one week.				
Prometryn (Caparol 4L)	Celery field	Posttransplanting	0.8 - 1.6	0.8 - 1.6
Remarks: Controls emerged annuals. Apply one time after celery is established, 2 weeks after transplanting but before 6th week. Weeds should not exceed 2 inches. Note precautions of planting non-registered or sensitive crops within 5 months.				
Sethoxydim (Poast)	Celery	Postemergence	0.188 - 0.28	0.188-0.28
Remarks: Controls actively growing grass weeds. A total of 3 pts. product per acre may be applied in one season. Do not apply within 14 days of harvest. Apply in 5 to 20 gallons of water adding 2 pts. of crop oil concentrate per acre. Unsatisfactory results may occur if applied to grasses under stress. Use 0.188 lb ai (1 pt.) on seedling grasses and up to 0.28 lb ai (1.5 pt.) on perennial grasses emerging from rhizomes, etc. Consult label for grass species and growth stage for best control.				
Trifluralin Treflan EC, Treflen 5 Trifluralin 4 EC	Celery	Preplant Incorporate	0.5	--
Remarks: Apply as a soil incorporated treatment to direct seeded or transplanted celery before planting, at planting or immediately after planting. Apply to mineral soils only. Consult label for application instructions.				

Table 9. Chemical Weed controls: Parsley.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
			Mineral	Muck
Carfentrazone (Aim)	Parsley	Preplant Directed-hooded row-middles	0.031	0.031
Remarks: Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burndown of emerged broadleaf weeds. May be tank mixed with other registered herbicides. May be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant (nis) at recommended rates.				
Pelargonic Acid (Scythe)	Parsley	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.				
Prometryne (Caparol 4L)	Parsley Dill (fresh market)	Postemergence	.25 -.5	.25 - .5
Remarks: Caparol 4L may be applied postemergent as a broadcast application at .5 -1 pint/A to direct seeded parsley or dill. Applications may be made no closer than 30 days prior to harvest. Applications must be made in a minimum of 20 gpa. A maximum of 1 lb a.i/A (2 pts/A) of Caparol 4L may be applied per growing season. Crops treated may be sold for fresh market only. This is a third party registration. Authorization and waiver agreements must be obtained from TPR, Inc. prior to use. The use of the product may result in stunting and delayed maturity. Climatic conditions during the growing season will affect efficacy and phytotoxicity.				
Sethoxydim (Poast)	Parsley	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.				
Linuron (Lorox DF)	Parsley	Preemergence Postemergence	0.75 NL	0.75 - 1.5 0.5
Remarks: Apply a single broadcast application in mineral and muck soils after planting but before plant emergence. In muck soils only, an additional application may be made after parsley emergence when weed are in 1 to 3 leaf stage. Do not apply within 30 days of harvest.				
Bensulide (Prefar 4E)	Parsley Cilantro	Preplant, Preemergence	5-6	--
Remarks: May be applied preplant and incorporated with power driven cultivations or may be incorporated with irrigation.				

Table 10. Disease control for beets.

Chemical	Fungicide Group	Maximum Rate Per Acre Per		Min. Days to Harvest	Pertinent Diseases	Remarks
		Application	Season			
Ridomil Gold 4 EC (mefenoxam)	4	2 pt/trtd acre			Pythium seedling blight	Apply in water or liquid fertilizer and incorporate into top 2 inches of soil
Ridomil Gold SL (mefenoxam)	4	2 pts			Pythium root rot	Pre-plant incorporated only
Amistar 80 DF (azoxystrobin)	11	5 oz	2.5 lb	0	Cercospora leaf spot	See label for <i>Rhizoctonia</i> control
Apron XL 3LS (difenoconazole + mefenoxam)	3 + 4	0.64 fl oz/100 lb seed			Pythium damping-off	Seed treatment only
Cabrio 20 EG (pyraclostrobin)	11	16 oz	48 oz	0	Cercospora leaf spot	Limit is 3 appl/crop & alternate chemistry
Various copper compounds (see ind. Labels), including Badge, Basic Copper 53, Basicop, Champ, COC, Copper Count-N, Cuprofix Disperss, Kocide, Nordox, Nu Cop, Stretch, Tenn Cop)	M1	SEE INDIVIDUAL LABELS			Cercospora leaf spot	
Flint 50 WGD (trifloxystrobin)	11	3 oz	12 oz	7	Cercospora leaf spot	No more than 3 sequential appls.
Quadris 2.08FL (azoxystrobin)	11	15.4 oz	3.75 qt	0	Cercospora leaf spot	See label for <i>Rhizoctonia</i> control
Ultra Flourish (mefenoxam)	4	4 pt		0	Pythium and Phytophthora seedling diseases	Soil treatment at planting only
Phosphonics (various derivatives of phosphoric and phosphorous acids including but not limited to Fosphite, Fungi-Phite, Helena Prophyt, Phostrol, Topaz)	SEE INDIVIDUAL LABELS					

Table 11. Disease control for carrot.

Chemical	Fungicide Group	Maximum Rate Per Acre Per		Min. Days to Harvest	Pertinent Diseases	Remarks
		Application	Season			
Ridomil Gold 4 SL (mefenoxam)	4	2 pt/trtd acre			Pythium seedling blight cavity spot	Apply in water or liquid fertilizer & incorporate into top 2 inches of soil
Chlorothalonil (various products, including Bravo, Echo, Applause, Equus)	M5	SEE INDIVIDUAL LABELS			Cercospora blight Alternaria blight	
Ridomil Gold Copper 64.8 W (mefenoxam/copper hydroxide)	4 + M1	2 lb	8 lb	7	Pythium-induced diseases	Limit is 4 appl/crop
Rovral 4 F (iprodione)	2	2 pt	2 qt	0	Alternaria blight black crown rot	Limit is 4 appl/crop
Pristine (pyraclostrobin/boscalid)	11 + 7	10.5 oz	63 oz	0	Alternaria blight Cercospora blight Powdery mildew Southern blight (Suppression only)	Limit is 6 appl/crop & alternate chemistry
Reason 500 SC (Fenamidone)	11	8.5 fl. oz	24.6 fl. oz	14	Pythium spp. (Cavity spot)	Do not make more than 1 appl. of Reason before alternating with a fungicide from a different resistance management group
Amistar 80 DF (azoxystrobin)	11	5 oz	2 lb	0	Cercospora blight Alternaria blight Powdery mildew Pythium disease Rhizoctonia diseases Sclerotium rolfsii	Limit is 4 appl/crop & alternate with different chemistry
Quadris Opti (azoxystrobin + chlorothalonil)	11 + M5	2.4 pt	14.4 pt	0	Early blight	Limit is 6 appl/crop & alternate chemistry
Cabrio 20 EG (pyraclostrobin)	11	12 oz	48 fl oz	0	Alternaria leaf spot Cercospora leaf spot	Limit is 3 appl/crop & alternate chemistry
Endura 70 WDG (boscalid)	7	4.5 oz	22.5 oz	0	Alternaria leaf spot	Limit is 5 appl/crop & alternate chemistry
Flint 50 WGD (trifloxystrobin)	11	3 oz	12 oz	7	Leaf blight (Alternaria dauci) Leaf spot (Cercospora carotae) Powdery mildew Rust	Do not make more than 4 appl. of Flint or other strobilurins/crop or more than 3 sequential appl. of Flint or other strobilurins
Iprodione/Rovral 4F 4L (iprodione)	2	2 pt	8 pt	0	Alternaria blight (A. dauci) Black crown rot (A. radicina)	
Quadris 2.08 FL (azoxystrobin)	11	15.4 oz	3.75 qt	0	Alternaria blight Cercospora blight Rhizoctonia diseases Sclerotium rolfsii	Alternate with other chemistries
Serenade Max (QST 713 strain of Bacillus subtilis)		3 lb		0	Bacterial blight Black crown rot White mold	

Table 11. Continued.

Chemical	Fungicide Group	Maximum Rate Per Acre Per		Min. Days to Harvest	Pertinent Diseases	Remarks
		Application	Season			
Sonata (Bacillus pumilus strain)		4 qt		0	White mold Powdery mildew	Begin appl. soon after emergence or transplant and when conditions are conducive to disease development. Repeat appl. at 7 to 14 day intervals or as needed. Use higher rates and shorter application intervals under heavy disease pressure.
Ultra Flourish (mefenoxam)	4	4 pt			Pythium & Phytophthora seedling diseases	
Switch 62.5 WG (cyprodinil/fludioxanil)	9 + 12	14 oz	56 oz	7	Alternaria blight	After 2 appl. of Switch, a/w another fungicide with a different mode of action for 2 appl.
Various copper compounds (see ind. Labels), including Badge, Basic Copper 53, Basicop, Champ, COC, Copper Count-N, Cuprofix Disperss, Kocide, Nordox, Nu Cop, Stretch, Tenn Cop	M1	SEE INDIVIDUAL LABELS			Alternaria leaf spot Cercospora leaf spot	
Phosphonics (various derivatives of phosphoric and phosphorous acids including but not limited to Fosphite, Fungi-Phite, Helena Prophyt, Phostrol, Topaz)		SEE INDIVIDUAL LABELS				

Table 12. Disease management for celery.

Chemical (a.i.)	Fungicide Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Comments ²
		Application	Season			
Agri-mycin (Streptomycin)	25	200 ppm			Bacterial blight	For transplant production only.
Aliette 80WDG (Fosetyl Al)	33	5 lb	35 lb	3		Do not mix with copper fungicides or apply unbuffered to foliage with copper residues.
Amistar 80DF (Azoxystrobin)	11	5 oz or 0.25 oz/1000 row ft	20 oz	0	Various (see label)	Do not exceed 1 sequential and 4 total applications of Amistar or other QoI fungicides. See label for soil applications.
Apron XL LS (Mefenoxam)	4	0.64 fl. oz./100 lb seed			Pythium seedling blight	Seed treatment only
Bac-master (Streptomycin)	25	200 ppm			Bacterial blight	For transplant production only.
Basic Copper 53 (Tri-basic copper sulfate)	M1	4lb		1	Bacterial blight	
Basicop WP (Tribasic copper sulfate)	M1	4lb		1	Bacterial blight	
Botran 75W (Dichloran)	14	2 lb	5.33 lb	7	Pink rot (Sclerotinia)	Direct spray to base of plant
Bravo Ultrex 82.5 WDG (Chlorothalonil)	M5	2.7 lb	21.8 lb	7	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	
Bravo Weather Stik 6F (Chlorothalonil)	M5	3 pt		7	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	
Bumper 41.8EC (Propiconazole)	3	4 fl oz	16 fl oz	14	Early blight (Cercospora) Late blight (Septoria)	Do not exceed 4 total applications.
Cabrio EG (Pyraclostrobin)	11	16 oz	64 oz	0	Various (see label)	Do not exceed 2 sequential and 4 total applications of Cabrio or other QoI fungicides.
Champ 77 WP (Copper hydroxide)	M1	2 lb		2	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	Do not apply in a solution with a pH of less than 6.5.
Champ DP Dry Prill (Copper hydroxide)	M1	2 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	Do not apply in a solution with a pH of less than 6.5.
Champ Formula 2 F (Copper hydroxide)	M1	2 pt		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	Do not apply in a solution with a pH of less than 6.5.

Table 12. Continued.

Chemical (a.i.)	Fungicide Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Comments ²
		Application	Season			
COC DF (Copper oxychloride)	M1	6 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
COC WP (Copper oxychloride)	M1	6 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Contans WG (Coniothyrium minitans)		6 lbs			Sclerotinia diseases	Apply to soil surface and incorporate prior to, at planting, or at transplanting.
Copper-Count-N (Copper ammonium complex)	M1	3 qt			Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Cuprofix Disperss (Basic copper sulfate)	M1	4 lb			Bacterial blight	
Dusting Sulfur – IAP (Sulfur)	M2	12 lb			Early and late blight	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
Echo 720 (Chlorothalonil)	M5	3 pt		7	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	
Echo 90 DF (Chlorothalonil)	M5	2.4 lb	20 lb	7	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	
Equus 720 SST (Chlorothalonil)	M5	3 pt		7	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	
Equus-DF (Chlorothalonil)	M5	2.4 lb	20 lb	7	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	
Evito 480SC (Fluoxastrobin)	11	5.7 fl oz	22.8 fl oz	3	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	Do not make more than 1 sequential applications without alternation to a fungicide of dissimilar mode of action.

Table 12. Continued.

Chemical (a.i.)	Fungicide Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Comments ²
		Application	Season			
Firewall 17WP (Streptomycin sulfate)	25	200 ppm			Bacterial blight	For transplant production only.
Flint (Trifloxystrobin)	11	3 oz	12 oz	7	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	Do not apply more than 3 sequential or 4 total applications of Flint or another QoI fungicide.
Fosphite (Potassium phosphite)	33	3 qt	18 qt		Pythium, Rhizoctonia, Fusarium	Do not exceed 6 applications per crop. Caution should be used when applying in a management program including copper fungicides. See label for foliar, root dip and irrigation application details.
Kaligreen (Potassium bicarbonate)		3 lb		1	Powdery mildew	Apply in a minimum spray volume of 25 GPA.
Kocide 101 (Copper hydroxide)	M1	2 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	Do not apply in solutions with a pH of less than 6.5.
Kocide 2000 (Copper hydroxide)	M1	1.5 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	Do not apply in solutions with a pH of less than 6.5.
Kocide 4.5 LF (Copper hydroxide)	M1	1.33 pt		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	Do not apply in solutions with a pH of less than 6.5.
Kocide DF (Copper hydroxide)	M1	2 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	Do not apply in solutions with a pH of less than 6.5.
Legion 80WDG (Fosetyl-Al)	33	5 lb	35 lb	3		Do not mix with copper fungicides
Linebacker 80WDG (Fosetyl-Al)	33	5 lb	35 lb	3		Do not mix with copper fungicides
Maxim 4FS (Fludioxonil)	12	0.16 fl oz/ 100 lbs of seed			Various seedling diseases	Seed treatment only.
Micro Sulf (Sulfur)	M2	6 lb			Powdery mildew Rust	
Miconized Gold (Sulfur)	M2	6 lb			Powdery mildew Rust	

Table 12. Continued.

Chemical (a.i.)	Fungicide Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Comments ²
		Application	Season			
Microthiol Disperss	M2	6 lb			Powdery mildew Rust	
Nordox (Cuprous oxide)	M1	4 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Nordox 75WG (Cuprous oxide)	M1	2.5 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Nu-Cop 3L (Copper hydroxide)	M1	2.66 pt		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Nu-Cop 50DF (Copper hydroxide)	M1	2 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Nu-Cop 50WP (Copper hydroxide)	M1	2 lb		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Oxidate (Hydrogen dioxide)		1 gal		0	Bacterial blight	
Phostral (Potassium phosphite)	33	5 pt		35 pt		Do not exceed 7 applications per season. See label regarding cautions regarding conditions during application to avoid possible phytotoxicity.
PlantShield HC (Tricoderma harzianum)		5 oz				Foliar and root fungicide. Use as a drench. (see label for restrictions).
Presidio 4SC (Fluopicolide)	43	4 fl oz	16 fl oz	2	Downy mildew White Rust	A tank mix including a labeled rate of another labeled fungicide with a different mode of action must be used with Presidio for resistance management.
Propimax EC (Propiconazole)	3	4 fl oz	16 fl oz	14	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	Do not apply more than 4 applications per season.

Table 12. Continued.

Chemical (a.i.)	Fungicide Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Comments ²
		Application	Season			
Quadris (Azoxystrobin)	11	15.4 fl oz or 0.8 fl oz/1000 row ft	2.88 qt	0	Various (see label)	Do not exceed 1 sequential and 4 total applications of Quadris or other QoI fungicides. See label for soil applications.
Quilt SC (Azoxystrobin, propiconazole)	11/3	14 fl oz	56 fl oz	14	Early blight (Cercospora) Late blight (Septoria)	Apply in alternation with Tilt or with a fungicide of dissimilar mode of action to group 11.
Reason 500SC (Fenamidone)	11	8.2 fl oz	24.6 fl oz	2	Downy mildew	Do not exceed 1 sequential application before rotating to a fungicide with a different mode of action.
Revus (Mandipropamid)	40	8 fl oz	32 fl oz	1	Downy mildew	Do not exceed 2 sequential applications before rotating to a fungicide with a different mode of action.
Rhapsody (Bacillus subtilis)		6 qt		0	Powdery mildew Sclerotinia drop	For suppression or use as a preventative in a program with other registered fungicides. For Sclerotinia, apply as a banded spray (see label for placement and timings).
Ridomil Gold EC (Mefenoxam)	4	2 pts			Pythium seedling diseases	Apply at seeding in a 7-12" band on soil over seed furrow
Ridomil Gold GR (Mefenoxam)	4	40 lb			Pythium seedling diseases	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.
RootShield Granules (Tricoderma harzianum)		12 lb				Apply in-furrow.
Serenade Max (Bacillus subtilis)		3 lb		0	Pink rot (Sclerotinia)	Begin application approx. 8 wks prior to harvest and repeat on 14 day interval. Direct spray at base of plants and surrounding soil surface.
Sonata (Bacillus pumilus)		4 qt		0	Powdery mildew	For suppression or use as a preventative in a program with other registered fungicides.
Sporan (Clove, Rosemary, and Thyme Oil)		1.5 qt		0	Powdery mildew	Sporan is a concentrated oil-based product. It requires the use of an approved adjuvant to improve spreading and sticking. OMRI listed.
Streptol (Streptomycin)	25	200 ppm			Bacterial blight	For transplant production only.

Table 12. Continued.

Chemical (a.i.)	Fungicide Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Comments ²
		Application	Season			
Stretch (Copper hydroxide)	M1	4 pt		1	Bacterial blight Early blight (Cercospora) Late blight (Septoria)	
Sulfur 90W (Sulfur)	M2	10 lb			Powdery mildew	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
Switch 62.5WG (Cyprodinil, Fludioxonil)	9, 12	14 oz	56 oz	0	Various diseases (see label)	See label for rotational restrictions.
Telone EC (1,3, dichloropro- pene)		18 gal			Nematode and soil- borne diseases	Apply as a soil fumigant. Restricted use pesticide. See label regarding specific application instructions.
Tenn-Cop 5E (Copper tallate)	M1	3 pt		1	Bacterial blight Early blight (Cercospora)	Do not apply in a solution with a pH of less than 6.5.
Tilt 3.6E (Propiconazole)	3	4 fl oz	16 fl oz	14	Early blight (Cercospora) Late blight (Septoria) Stalk rot (Rhizoctonia)	Do not apply more than 4 applications per season.
Topaz (Potassium phos- phite)	33	3 qt	18 qt	0		
Trilogy (Neem Oil)		2 gal				Apply at a rate of 0.5% - 1.0% in 25 to 100 gallons of water per acre or at 2 pt in a minimum of 5 GPA for low volume applications.
Ultra Flourish (Mefenoxam)	4	4 pt			Pythium seedling disease	See label for specifics regarding preplant incorpo- rated applications and sur- face applications at the time of planting.

¹ Fungicide group (FRAC Code): Numbers (1-37) and letters (M, U, P) are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with same number or letter) indicate same active ingredient or similar mode of action. This information must be considered for the fungicide resistance management decisions. M = Multi site inhibitors, fungicide resistance risk is low; U = Recent molecules with unknown mode of action; P = host plant defense inducers. Source: <http://www.frac.info/> (FRAC = Fungicide Resistance Action Committee). Be sure to read a current product label before applying any chemicals,

² Information provided in this table applies only to Florida. Be sure to read a current product label before applying any chemical. The use of brand names and any mention or listing of commercial products or services in the publication does not imply endorsement by the University of Florida Cooperative Extension Service nor discrimination against similar products or services not mentioned.

Table 13. Disease management for parsley.

Chemical (a.i.)	FRAC Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Remarks ²
		Application	Season			
Aliette 80WDG (Fosetyl-Al)	33	5 lb	35 lb	3	Downy mildew	Do not mix with copper fungicides.
Amistar 80DF (Azoxystrobin)	11	5 oz	20 oz	0	Alternaria leaf spot, Powdery mildew, Septoria leaf spot	Do not exceed 1 sequential and 4 total applications of Amistar or other QoI fungicides.
Apron XL LS (Mefenoxam)	4	0.64 fl. oz./100 lb seed			Pythium seedling blight	Seed treatment only
Cabrio EG (Pyraclostrobin)	11	16 oz	64 oz	0	Alternaria leaf spot, Cercospora leaf spot, Downy mildew, Powdery mildew, Septoria leaf spot	Do not exceed 2 sequential and 4 total applications of Cabrio or other QoI fungicides.
Champ 77 WP (Copper hydroxide)	M1	2 lb		2	Bacterial blight	Do not apply in a solution with a pH of less than 6.5.
Champ DP Dry Prill (Copper hydroxide)	M1	2 lb		1	Bacterial blight	Do not apply in a solution with a pH of less than 6.5.
Champ Formula 2 F (Copper hydroxide)	M1	2 pt		1	Bacterial blight	Do not apply in a solution with a pH of less than 6.5.
Contans WG (Coniothyrium minitans)		6 lbs			Sclerotinia diseases	Apply to soil surface and incorporate prior to, at planting, or at transplanting.
Copper-Count-N (Copper ammonium complex)	M1	3 qt			Bacterial blight	
Cuprofix Disperss (Basic copper sulfate)	M1	4 lb			Bacterial blight	
Flint (Trifloxystrobin)	11	3 oz	12 oz	7	Alternaria leaf spot Cercospora leaf spot	Only for turnip-rooted parsley
Fosphite (Potassium phosphite)	33	3 qt	18 qt		Downy mildew, Pythium, Rhizoctonia, Fusarium	Do not exceed 6 applications per crop. Caution should be used when applying in a management program including copper fungicides.
Helena Prophyt (Potassium phosphite)	33	4 pt	18 qt	0	Downy mildew, Pythium	Apply in a minimum spray volume of 30 GPA. Caution should be used when applying in a management program including copper fungicides.
Kaligreen (Potassium bicarbonate)		3 lb		1	Powdery mildew	Apply in a minimum spray volume of 25 GPA.
Kocide 101 (Copper hydroxide)	M1	3 lb			Bacterial blight	Do not apply in solutions with a pH of less than 6.5.
Kocide 2000 (Copper hydroxide)	M1	2.25 lb			Bacterial blight	Do not apply in solutions with a pH of less than 6.5.

Table 13. Continued.

Chemical (a.i.)	FRAC Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Remarks ²
		Application	Season			
Kocide 4.5 LF (Copper hydroxide)	M1	2 lb			Bacterial blight	Do not apply in solutions with a pH of less than 6.5.
Kocide DF (Copper hydroxide)	M1	3 lb			Bacterial blight	Do not apply in solutions with a pH of less than 6.5.
Legion 80WDG (Fosetyl-AI)	33	5 lb	35 lb	3	Downy mildew	Do not mix with copper fungicides
Linebacker 80WDG (Fosetyl-AI)	33	5 lb	35 lb	3	Downy mildew	Do not mix with copper fungicides
Maxim 4FS (Fludioxonil)	12	0.16 fl oz/ 100 lbs of seed			Various seedling diseases	Seed treatment only.
Micronized Gold (Sulfur)	M2	5 lb			Powdery mildew, Rust	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
Nordox (Cuprous oxide)		3 lb			Bacterial blight	
Nordox 75WG (Cuprous oxide)		2 lb			Bacterial blight	
Nu-Cop 3L (Copper hydroxide)	M1	4 pt			Bacterial blight	
Nu-Cop 50DF (Copper hydroxide)	M1	3 lb			Bacterial blight	
Nu-Cop 50WP (Copper hydroxide)	M1	3 lb			Bacterial blight	
Oxidate (Hydrogen dioxide)		128 fl oz		0		
Phostral (Potassium phosphite)	33	5 pt		35 pt	Downy mildew	Do not exceed 7 applications per season. See label regarding cautions regarding conditions during application to avoid possible phytotoxicity.
PlantShield HC (Tricoderma harzianum)		5 oz				Foliar and root fungicide. Use as a drench. (see label for restrictions).
Presidio 4SC (Fluopicolide)	43	4 fl oz	16 fl oz	2	Downy mildew White Rust	A tank mix including a labeled rate of another labeled fungicide with a different mode of action must be used with Presidio for resistance management.
Quadris Flowable (Azoxystrobin)	11	15.4 fl oz	2.88 qt	0	Alternaria leaf spot, Cercospora leaf spot, Powdery mildew, Septoria leaf spot	Do not exceed 1 sequential and 4 total applications of Quadris or other QoI fungicides. See label for cautions regarding tank mixtures to avoid possible phytotoxicity.

Table 13. Continued.

Chemical (a.i.)	FRAC Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Remarks ²
		Application	Season			
Reason 500SC (Fenamidone)	11	8.2 fl oz	24.6 fl oz	2	Downy mildew	Do not exceed 1 sequential application before rotating to a fungicide with a different mode of action.
Revus (Mandipropamid)	40	8 fl oz	32 fl oz	1	Downy mildew	Do not exceed 2 sequential applications before rotating to a fungicide with a different mode of action.
Rhapsody (Bacillus subtilis)		6 qt		0	Powdery mildew Sclerotinia drop	For suppression or use as a preventative in a program with other registered fungicides. For Sclerotinia, apply as a banded spray (see label for placement and timings).
Ridomil Gold EC (Mefenoxam)	4	2 pts			Pythium seedling diseases	Apply at seeding in a 7-12" band on soil over seed furrow
Ridomil Gold GR (Mefenoxam)	4	40 lb			Pythium seedling diseases	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.
RootShield Granules (Tricoderma harzianum)		12 lb				Apply in-furrow.
Serenade Max (Bacillus subtilis)		3 lb		0	Powdery mildew Sclerotinia diseases	For suppression or use as a preventative in a program with other registered fungicides. For Sclerotinia, apply as a banded spray (see label for placement and timings).
Sonata (Bacillus pumilus)		4 qt		0	Powdery mildew	For suppression or use as a preventative in a program with other registered fungicides.
Sporan (Clove, Thyme and Rosemary Oil)		1.5 qt		0	Botrytis gray mold Powdery mildew	Sporan is a concentrated oil-based product. It requires the use of an approved adjuvant to improve spreading and sticking. OMRI listed.
Stretch (Copper hydroxide)	M1	6 pt			Bacterial leaf spot	
Sulfur 90W (Sulfur)	M2	6 lb			Powdery mildew	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
Super-Six (Sulfur)	M2	12 pt			Powdery mildew	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
Switch 62.5WG (Cyprodinil, Fludioxonil)	9, 12	14 oz	56 oz	0	Various diseases (see label)	See label for rotational restrictions.

Table 13. Continued.

Chemical (a.i.)	FRAC Group ¹	Maximum Rate/Acre		Min. Days to Harvest	Pertinent Diseases	Select Remarks ²
		Application	Season			
Telone EC (1,3, dichloropropene)		18 gal			Nematode and soil-borne diseases	Apply as a soil fumigant. Restricted use pesticide. See label regarding specific application instructions.
Topaz (Potassium phosphite)	33	3 qt	18 qt	0		
Trilogy (Neem Oil)		2 gal				Apply at a rate of 0.5% - 1.0% in 25 to 100 gallons of water per acre or at 2 pt in a minimum of 5 GPA for low volume applications.
Ultra Flourish (Mefenoxam)	4	4 pt			Pythium seedling disease	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.

¹ Fungicide group (FRAC Code): Numbers (1-37) and letters (M, U, P) are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with same number or letter) indicate same active ingredient or similar mode of action. This information must be considered for the fungicide resistance management decisions. M = Multi site inhibitors, fungicide resistance risk is low; U = Recent molecules with unknown mode of action; P = host plant defense inducers. Source: <http://www.frac.info/> (FRAC = Fungicide Resistance Action Committee). Be sure to read a current product label before applying any chemicals,

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Table 14. Selected insecticides approved for use on insects attacking carrots.

Chemical	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Actara (thiamethoxam)	1.5-4.0 oz	12	7	aphids, flea beetles, leafhoppers	4A	Do not exceed 8 oz product/acre/season.
Admire Pro (imidacloprid)	4.4-10.5 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)	11	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	un	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
Azatin XL (azadirachtin)	5-21 fl oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, thrips, weevils, whiteflies	un	Antifeedant, repellent, insect growth regulator.
*Bathroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	aster leafhopper, cutworms, carrot weevil	3	Do not exceed 14 oz/acre 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)	11	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.
*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21	aphids, beet armyworm, celery leafminer, corn earworm, cutworms, fall armyworm, fire ants, flea beetles, loopers, southern armyworm, yellowstriped armyworm	3	Do not apply more than 0.5 lb ai/acre per season.
Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11	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	11	Use higher rates for armyworms. OMRI-listed ² .
*Diazinon 4E, AG500, 50W (diazinon)	AG500, 4E: 1-4 qt 50W: 2-8 lb	72	preplant	cutworms, mole crickets, wireworms	1B	
*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	11	Treat when larvae are young. Good coverage is essential. OMRI-listed ² .

Table 14. Continued.

Chemical	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
*Thionex 3EC *Thionex 50W (endosulfan)	0.66-1.33 qt 1-2 lb	24	7	armyworms, flea beetles, green peach aphid, leafhoppers, whiteflies	2	Do not make more than 1 application per year. Do not use tops for food or feed.
Entrust (spinosad)	1-2 oz	4	3	armyworms, dipteran leafminers, flea beetle, loopers, thrips	5	Do not apply more than a total of 7 oz/acre per crop or apply more than 4 times. OMRI-listed ² .
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)	11	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	Do not apply more than 21 pt (LV) or 7 lb (SP) per acre per crop.
Lepinox WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	1.0-2.0 lb	12	0	most caterpillars, including beet armyworm (see label)	11	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	--	OMRI-listed ² .
*Mustang Max (zeta-cypermethrin)	1.28-4.0 oz	12	1	cabbage looper, cucumber beetles, cutworms, flea beetles, grasshoppers, leafhoppers, tarnished plant bug, vegetable weevil, whitefringed beetle (adult), yellowstriped armyworm; aids in control of aphids and beet armyworm	3	A maximum of 0.15 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, cabbage looper, cutworms, leafminers, whiteflies	un	Acts as IGR and feeding repellent. OMRI-listed ² .
Platinum 75SG (thiamethoxam)	5-8 fl oz 1.7-4.0 oz	12	at planting	aphids, flea beetles, leafhoppers, whiteflies	4A	Do not exceed 8 oz/acre or use less than 5 oz/acre during each growing season.
Provado 1.6F (imidacloprid)	3.5 oz	12	7	aphids, flea beetles, leafhoppers, whiteflies	4A	Maximum of 3 applications or 10.5 fl oz/acre per season.
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	
Radiant (spinetoran)	6-8 fl oz	4	3	armyworms, dipterous leafminers, loopers, thrips	5	Maximum of 4 applications per year.
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.

Table 14. Continued.

Chemical	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
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.
*Telone II (dichloropropene)						
Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	un	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	11	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.

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. 6.1 August 2008.

- 1A. Acetylcholinesterase inhibitors, Carbamates (nerve action)
- 1B. Acetylcholinesterase inhibitors, Organophosphates (nerve action)
- 2A. GABA-gated chloride channel antagonists (nerve action)
- 3. Sodium channel modulators (nerve action)
- 4A. Nicotinic acetylcholine receptor agonists (nerve action)
- 5. Nicotinic acetylcholine receptor allosteric activators (nerve action)
- 6. Chloride channel activators (nerve and muscle action)
- 7A. Juvenile hormone mimics (growth regulation)
- 7C. Juvenile hormone mimics (growth regulation)
- 9B and 9C. Selective homopteran feeding blockers
- 10. Mite growth inhibitors (growth regulation)
- 11. Microbial disruptors of insect midgut membranes
- 12B. Inhibitors of mitochondrial ATP synthase (energy metabolism)
- 15. Inhibitors of chitin biosynthesis, type 0, lepidopteran (growth regulation)
- 16. Inhibitors of chitin biosynthesis, type 1, homopteran (growth regulation)
- 17. Molting disruptor, dipteran (growth regulation)
- 18. Ecdysone receptor agonists (growth regulation)
- 22. Voltage-dependent sodium channel blockers (nerve action)
- 23. Inhibitors of acetyl Co-A carboxylase (lipid synthesis, growth regulation)
- 28. Ryanodine receptor modulators (nerve and muscle action)
- un. Compounds of unknown or uncertain mode of action

² OMRI-listed: Listed by the Organic Materials Review Institute for use in organic production.

* **Restricted Use Pesticide**

Table 15. Insecticides approved for use on insects attacking celery.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Actara (thiamethoxam)	1.5-5.5 oz	12	7	aphids, flea beetles, leafhoppers, whiteflies	4A	Do not use if other 4A insecticides have been or will be used.
Admire Pro (imidacloprid)	4.4-10.5 fl oz	12	45	aphids, leafhoppers, whiteflies, foliage feeding thrips	4A	Do not apply more than 0.38 lb ai per acre per year.
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 .
*Agri-Mek 0.15 EC (abamectin)	8-16 fl oz	12	7	<i>Liriomyza</i> leafminers, spider mites	6	Do not make more than 2 sequential applications after transplanting.
*Ambush 25W (permethrin)	6.4-12.8 oz	12	1	beet armyworm, cabbage looper, corn earworm, cutworms, fall armyworm, leafminers	3	Do not apply more than 128 oz/acre per season.
Assail 70WP (acetamiprid)	0.8-1.7 oz	12	7	aphids, whiteflies	4A	Begin applications for whiteflies when first adults are noticed. Do not apply more than 5 times per season or apply more often than every 7 days.
Assail 30 SG	2.0-4.0 oz					
Avaunt (indoxacarb)	2.5-6.0 oz	12	3	beet armyworm, cabbage looper,	22	Do not apply more than 14 ounces of product per acre per crop.
Aza-Direct (azadirachtin)	1-2 pts, up to 3.5 pts	4	0	un	un	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
Azatin XL (azadirachtin)	5-21 fl oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, thrips, weevils, whiteflies	un	Antifeedant, repellent, insect growth regulator.
*Baythroid XL (beta-cyfluthrin)	0.8-3.2 fl oz	12	0	beet armyworm (1 st and 2 nd instars), cabbage looper, corn earworm, cutworms, flea beetles, grasshoppers, potato leafhopper, saltmarsh caterpillar, thrips, vegetable weevil, yellowstriped armyworm	3	Maximum of 12.8 fl oz per acre per season.
Beleaf 50 SG (flonicamid)	2.0-2.8 oz	12	0	aphids, plant bugs	9C	Do not apply more than 8.4 oz/acre per season. Begin applications before pests reach damaging levels.
Biobit HP (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars (will not control large armyworms)	11	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.
Confirm 2F (tebufenozide)	6.0-8.0 fl oz	4	7	armyworms, cabbage looper, garden webworm	18	Do not exceed 56 ounces of product per acre per season.
Coragen (rynaxypyr)	3.5-7.5 fl oz	4	1	beet armyworm, cabbage looper, corn earworm, leafminers, suppression of whitefly nymphs	28	May be applied via drip chemigation.
Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11	Use high rate for armyworms. Treat when larvae are young.

Table 15. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Deliver (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-1.5 lb	4	0	caterpillars	11	Use higher rates for armyworms. OMRI-listed ² .
Dimethoate 4EC (dimethoate)	1 pt	48	7	leafminers, mites	1B	Use ground equipment.
Dimethoate 267	1.5 pt					
DiPel DF (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11	Treat when larvae are young. Good coverage is essential. OMRI-listed ² .
Durivo (thiamethoxam, chlorantraniliprole)	1-1.5 pt	48	1	aphids, armyworms, leaf- miners, loopers, salt marsh caterpillars	4A, 28	Do not apply more than 5 times per season.
Entrust (spinosad)	0.5-3 oz	4	1	armyworms, cabbage looper, leafminers, thrips	5	See label for resistance management recommendations. Apply no more than 9 oz per acre per year. OMRI- listed ² .
Extinguish (S)-methoprene)	1-1.5 lb	4	0	fire ants	7A	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
Fulfill (pymetrozine)	2.75 oz	12	7	aphids, suppression of whiteflies	9B	Apply when aphids first appear, before populations build to damag- ing levels. Two applications may be needed to control persistent aphid populations.
Intrepid 2F (metoxyfenozide)	4-16 fl oz	4	1	armyworms, cabbage looper, webworms	18	Do not apply more than 64 fl oz per acre per season.
Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.5 lb	4	0	most caterpillars, but not Spodoptera species (army- worms)	11	Treat when larvae are young. Thorough coverage is essential. OMRI-listed ² .
*Lannate LV, *SP (methomyl)	LV: 0.75-3 pt SP: 0.25-1.0 lb	48	7	armyworms, aster leafhop- per, beet armyworm, loop- ers, variegated cutworm	1A	Do not apply more than 24 pt of LV or 8 lb SP per acre per season.
*Larvin 3.2 (thiodicarb)	16-30 fl oz	48	14	armyworms, beet army- worm, cabbage looper, corn earworm, fall army- worm, southern armyworm	1A	Do not exceed 60 fluid ounces of Larvin per acre per season.
Lepinox WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	1.0-2.0 lb	12	0	most caterpillars, including beet armyworm (see label)	11	Treat when larvae are small. Thorough coverage is essential.
Malathion 8F (malathion)	1-1.5 pt	12	7	aphids, mites	1B	
Movento (spirotetramat)	4.0-5.0 fl oz	24	3	aphids, whiteflies	23	Do not apply more than 10 fl oz/acre/ crop.
M-Pede 49% EC (Soap, insecticidal)	1-2% V/V	12	0	whiteflies	--	OMRI-listed ² .

Table 15. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
*Mustang Max EC (zeta-cypermethrin)	2.24-4.0 oz	12	1	corn earworm, cucumber beetles, cutworms, flea beetles, leafhoppers, salt-marsh caterpillar, tobacco budworm, aphids, whiteflies, armyworms, ground beetles, crickets, loopers, <i>Lygus</i> bugs, stink bugs, wireworm adults	3	A maximum of 0.15 lb ai/acre per season may be applied. Do not make applications less than 7 days apart.
Neemix 4.5 EC (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, cabbage looper, cutworms, leafminers, webworms, whiteflies	un	IGR and feeding repellent. OMRI-listed ² .
Orthene 75S, 97 (acephate)	75S: 0.67-1.33 lb 97: 0.5-1.0 lb	24	21	cabbage looper, fall armyworm, green peach aphid	1B	Do not use more than 2 lb active ingredient per acre per season.
Platinum 75SG (thiamethoxam)	5.0-11 fl oz 1.55-3.67 oz	12	30	aphids, flea beetles, leafhoppers, leafminers (suppression), whiteflies	4A	Maximum = 11 oz/acre or 3.67 oz/acre (75SG) per season. Do not use in conjunction with other 4A insecticides.
*Pounce 25 W (permethrin)	6.4-12.8 oz	12	1	aphids, beet armyworm, cabbage looper, corn earworm, cutworms, fall armyworm, leafhoppers, leafminers, loopers, southern armyworm, tobacco budworm	3	Do not apply more than 1.0 lb active ingredient per acre per season.
*Proclaim (emamectin benzoate)	2.4-4.8 oz	12	7	beet armyworm, corn earworm, fall armyworm, <i>Liriomyza</i> leafminers, loopers, tobacco budworm	6	Provides suppression of leafminers. Rotate with other products with different modes of action.
Pyrellin EC (pyrethrins + rotenone)	1-2 pt	12	12 hours	aphids, leafhoppers, leafminers, leaf tiers, loopers, lygus bug, mites, plant bugs, stink bugs, whiteflies	3, 21	
Pyronyl Crop Spray (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	ants, aphids, armyworms, cabbage looper, corn earworm, flea beetles, leafhoppers, leaf tiers, webworms, whiteflies	3	
Radiant (spinetoram)	5-10 fl oz	4	1	armyworms (not yellow-striped), cabbage looper, corn earworm, <i>Liriomyza</i> leafminer, thrips	5	Maximum of 6 applications, no more than 2 consecutive applications before rotating to another MOA.
Sevin XLR; 4F; 80S (carbaryl)	XLR; 4F: 0.5-2 qt 80S: 0.03-2.5	12	14	armyworms, aster leafhopper, corn earworm, fall armyworm, flea beetles, leafhoppers, lygus bug, spittlebugs, stink bugs, tarnished plant bug	1A	Repeat, as needed, up to 5 times, with at least 7 days between applications.
SpinTor 2 SC (spinosad)	1.5-10 fl oz	4	1	armyworms, cabbage looper, leafminers (<i>Liriomyza</i> spp.), thrips	5	Control of leafminers and thrips may be improved by use of an adjuvant.
SunSpray 98.8%, JMS Stylet-Oil, Saf-T-side, others (Oils, insecticidal)	3-6 qt/100 gal (JMS) 1-2 gal/100 gal	4	0	aphids, beetle larvae, leafhoppers, leafminers, mites, thrips, whiteflies (pests controlled vary by product)	--	See label for cautions on tank mixes. Organic Stylet-Oil and Saf-T-Side are OMRI-listed ² .

Table 15. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Synapse WG (flubendiamide)	2.0-3.0 oz	12	1	armyworms, loopers	28	Do not apply more than 9.0 oz/acre per season.
*Telone C-35 (dichloropropene + chloropicrin)	See label	5 days - See label	preplant	symphylans, wireworms	--	See supplemental label for use restrictions in south or central Florida.
*Telone II (dichloropropene)						
*Thionex 3EC *Thionex 50W (endosulfan)	0.66-1.33 qt1-2 lb	24	4 or 7, depend- ing on rate used	armyworms, cabbage looper, flea beetles, green peach aphid, leafhoppers, whiteflies	2	Do not exceed 1.33 qt per year.
Trigard (cyromazine)	2.66 oz	12	7	leafminers	17	Do not make more than six applications per crop.
Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	un	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .
Venom Insecticide (dinotefuran)	foliar: 1-3 ozsoil: 5-6 oz	12	7	leafhoppers, leafminers, whiteflies	4A	Do not apply more than 6 oz per acre per season (foliar) or 12 oz per acre per season (soil). Do not use both methods of application.
*Vydate L (oxamyl)	2-4 pt	48	21	leafminers (except <i>Liriomyza trifolii</i>)	1A	

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. 6.1 August 2008.

- 1A. Acetylcholinesterase inhibitors, Carbamates (nerve action)
- 1B. Acetylcholinesterase inhibitors, Organophosphates (nerve action)
- 2A. GABA-gated chloride channel antagonists (nerve action)
- 3. Sodium channel modulators (nerve action)
- 4A. Nicotinic acetylcholine receptor agonists (nerve action)
- 5. Nicotinic acetylcholine receptor allosteric activators (nerve action)
- 6. Chloride channel activators (nerve and muscle action)
- 7A. Juvenile hormone mimics (growth regulation)
- 7C. Juvenile hormone mimics (growth regulation)
- 9B and 9C. Selective homopteran feeding blockers
- 10. Mite growth inhibitors (growth regulation)
- 11. Microbial disruptors of insect midgut membranes
- 12B. Inhibitors of mitochondrial ATP synthase (energy metabolism)
- 15. Inhibitors of chitin biosynthesis, type 0, lepidopteran (growth regulation)
- 16. Inhibitors of chitin biosynthesis, type 1, homopteran (growth regulation)
- 17. Molting disruptor, dipteran (growth regulation)
- 18. Ecdysone receptor agonists (growth regulation)
- 22. Voltage-dependent sodium channel blockers (nerve action)
- 23. Inhibitors of acetyl Co-A carboxylase (lipid synthesis, growth regulation)
- 28. Ryanodine receptor modulators (nerve and muscle action)
- un. Compounds of unknown or uncertain mode of action

² OMRI-listed: Listed by the Organic Materials Review Institute for use in organic production.

*** Restricted Use Pesticide**

Table 16. Selected insecticides approved for use on insects attacking parsley.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Admire 2F (imidacloprid)	10-24 fl oz	12	21	aphids, leafhoppers, thrips (foliage feeders), whiteflies	4A	Limited to 0.38 lb ai per acre per season.
Admire Pro	4.4-10.5 fl oz					
Agree WG (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	lepidopteran larvae (caterpil- lar pests)	11B1	Apply when larvae are small for best control. OMRI- listed ² .
*Agri-mek 0.15 EC (abamectin)	8-16 fl oz	12	7	<i>Liriomyza</i> leafminers, spider mites	6	No more than 2 sequential applications. Maximum of 48 oz per acre per season.
*Ambush 25W (per- methrin)	6.4-12.8 oz	12	1	aphids, beet armyworm, cabbage looper, corn earworm, cutworms, fall armyworm, leafhoppers, vegetable leafminer	3	Do not apply more than 2 lb ai/acre per season.
Assail 70WP (acetamiprid)	0.8-1.7 oz	12	7	aphids, whiteflies	4A	Begin applications for white- flies when first adults are noticed. Do not apply more than 5 times per season or apply more often than every 7 days.
Assail 30 SG	2.0-4.0 oz					
Aza-Direct (azadirachtin)	1-2 pts, to 3.5 pts if needed	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	18B	Antifeedant, repellent, insect growth regulator. OMRI- listed ² .
Azatin XL (azadirachtin)	5-21 fl oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, thrips, weevils, whiteflies	18B	Antifeedant, repellent, insect growth regulator.
*Baythroid 2 (cyfluthrin)	0.8-3.2 fl oz	12	0	beet armyworm (1 st and 2 nd instars), cabbage looper, corn earworm, cutworms, flea beetles, grasshoppers, potato leafhopper, saltmarsh caterpillar, thrips, vegetable weevil, yellowstriped army- worm	3	Apply no more than 4 times per season, or a maximum of 12.8 fl oz per acre per season.
*Baythroid XL (beta-cyfluthrin)						
Beleaf 50 SG (flonicamid)	2.0-2.8 oz	12	0	aphids, plant bugs	9C	Do not apply more than 8.4 oz/acre per season. Begin applications before pests reach damaging levels.
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 green- house. 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 recom- mendations if an adjuvant must be used. Not compat- ible in tank mix with fungi- cides.
Confirm 2F (tebufenozide)	6-8 fl oz	4	7	armyworms, cabbage looper, garden webworm	18A	Do not exceed 56 ounces of product per acre per season.
Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11B2	Use high rate for army- worms. Treat when larvae are young.

Table 16. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
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 .
DiPel DF (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11B2	Treat when larvae are young. Good coverage is essential.
Entrust (spinosad)	0.5-3 oz	4	1	armyworms, cabbage looper, leafminers, thrips	5	Use no more than 9 oz per acre per crop. OMRI-listed ² .
Extinguish ((S)-methoprene)	1.0-1.5 lb	4	0	fire ants	7A	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
Fulfill (pymetrozine)	2.75 oz	12	7	aphids, suppression of whiteflies	9B	Apply when aphids first appear, before populations build to damaging levels. Two applications may be needed to control persistent aphid populations.
Intrepid 2F (methoxyfenozide)	4-16 fl oz	4	1	armyworms, cabbage looper, webworms	18A	Do not apply more than 64 fl oz acre per season.
Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.5 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: 1.5-3.0 pts SP: 0.5-1.0 lb	48	10	beet armyworm, cabbage looper, diamondback moth, imported cabbageworm	1A	Do not use more than 4 lb of SP, or 12 pt of LV per acre/season.
*Larvin 3.2 (thiodicarb)	16-30 fl oz	48	14	armyworms, beet armyworm, cabbage looper, corn earworm, fall armyworm, southern armyworm	1A	Do not exceed 60 fl oz per acre per season.
Lepinox WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	1.0-2.0 lb	12	0	for most caterpillars, including beet armyworm (see label)	11B2	Treat when larvae are small. Thorough coverage is essential.
Malathion 8 F (malathion)	1-2 pt	12	21	aphids	1B	
M-Pede 49% EC Soap, insecticidal	1-2% V/V	12	0	aphids, leafhoppers, mites, plant bugs, whiteflies	--	OMRI-listed ² .
*Mustang Max (zeta-cypermethrin)	2.24-4.0 oz	12	1	aphids, armyworms, corn earworm, crickets, cucumber beetles, cutworms, flea beetles, ground beetles, leafhoppers, loopers, <i>Lygus</i> bugs, saltmarsh caterpillar, stink bugs, tobacco budworm, whiteflies, wireworm adults	3	A maximum of 0.15 lb ai/acre per season may be applied. Do not make applications less than 7 days apart.
Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, leafhoppers, leafminers, loopers, whiteflies	18B	IGR and feeding repellent. OMRI-listed ² .

Table 16. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Oberon 2SC (spiromesifen)	7.0-8.5 fl oz	12	7	whiteflies	23	Maximum amount per crop: 25.5 fl oz/acre. No more than three applications.
*Pounce 25 W (permethrin)	6.4-12.8 oz	12	1	aphids, armyworms, beet armyworm, cabbage looper, corn earworm, cutworms, fall armyworm, leafhoppers, loopers, southern armyworm, tobacco budworm, vegetable leafminer	3	
*Proclaim (emamectin benzoate)	2.4-4.8 oz	48	7	beet armyworm, corn earworm, fall armyworm, loopers, tobacco budworm, suppression of leafminers	6	Do not apply more than 28.8 oz/A per season.
Provado 1.6 F (imidacloprid)	3.8 oz	12	7	aphids, flea beetles, leafhoppers, whiteflies	4A	Maximum of 19.0 fl oz per acre per season.
Pyrellin EC (pyrethrin + rotenone)	1-2 pt	12	0	aphids, cabbage looper, <i>Lygus</i> bug, mites, plant bugs, whiteflies	3, 21	
Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb XLR; 4F: 0.5-2.0 qt	12	14	armyworms, aster leafhopper, corn earworm, fall armyworm, flea beetles, leafhoppers, <i>Lygus</i> bug, spittlebugs, stink bug, tarnished plant bug	1A	Do not apply more than a total of 7.5 lb or 6 qt per acre per crop.
SpinTor 2 SC (spinosad)	1.5-10 fl oz	4	1	armyworms, cabbage looper, leafminers (<i>Liriomyza</i> spp.)	5	Do not apply more than 29 fl oz per acre per season.
*Telone C-35 (dichloropropene + chlorpicrin)	See label	5 days - See label	preplant	symphylans, wireworms	--	See supplemental label for use restrictions in south and central Florida.
*Telone II (dichloropropene)						
Trigard (cyromazine)	2.66 oz	12	7	leafminers	17	No more than 5 applications per crop.
Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	18B	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .
Venom Insecticide (dinotefuran)	foliar: 1-3 oz soil: 5-6 oz	12	foliar: 7 soil: 21	leafhoppers, leafminers, whiteflies	4A	Use only one application method (soil or foliar, not both). Do not apply more than 6 oz/acre (foliar) or 12 oz/acre (soil) per season.
Xentari DF (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2 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.

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.

Table 16. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
¹ Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v.5.2 September 2006.						
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-selective mode of action (selective feeding blockers), Cryolite						
9B. Compounds of unknown or non-selective mode of action (selective feeding blockers), Pymetrozine						
9C. Compounds of unknown or non-selective mode of action (flonicamid)						
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. Molting disrupter, Dipteran						
18A. Ecdysone agonist/disruptor (methoxyfenozide, tebufenozide)						
18B. Ecdysone agonist/disruptor (azadirachtin)						
20. Site II electron transport inhibitors						
21. Site I electron transport inhibitors						
22. Voltage-dependent sodium channel blocker						
23. Inhibitors of lipid biosynthesis						
25. Neuronal inhibitors						
² OMRI listed: Listed by the Organic Materials Review Institute for use in organic production.						
* Restricted Use Only.						