Pesticide	Use Category[1]	Hours to Reentry	Days to Harvest
FUNGICIDE (FRAC code)			
Cabrio (Group 11)	G	12	0
chlorothalonil (Group M5)	G	12	0
Contans WG (biological)	G	4	0
Endura (Group 7)	G	12	0
fixed copper (Group M1)	G	24	2
iprodione (Group 2)	G	24	0
Mertect (Group 1)	G	12	--
Pristine (Groups 11 + 7)	G	12	0
Quadris (Group 11)	G	4	0
Ridomil Gold (Group 4)	G	48	0
Switch (Groups 9 + 12)	G	12	7
Ultra Flourish (Group 4)	G	48	0

See Table D-6. [1] G = general, R = restricted

Nematode Control

Nematode control is essential for successful production. See "Nematodes" section of Soil Pests-Their Detection and Control. Use fumigants listed in the "Soil Fumigation" section or use Vydate L. Heavy rainfall following application and prior to emergence can result in less effective control with Vydate L. Consult label before use

Disease Control

Damping-Off (Pythium and Phytophthora)

Apply the following preplant incorporated or as a soil-surface spray after planting.

mefenoxam--Ridomil Gold 1.0-2.0 pt 4EC/A or Ultra Flourish--2.0-4.0 pt 2E/A

Aster Yellows

Use insecticides to control leafhoppers, and control weed populations (including carrot volunteers) on periphery of fields early in the season to prevent transmission by leafhoppers from the weeds into the crop. The severity of aster yellows and damage to the crop will depend on the age of the crop when the infection occurs. The earlier the infection occurs, the more severe and widespread the symptoms later in the season. See leafhopper management on F22.

Leaf Blights (Alternaria and Cercospora)

Several varieties such as Bolero, Calgary, Carson, Cheyenne, and Choctaw exhibit tolerance to leaf blight and should be grown where adapted. For susceptible varieties, begin applications when disease threatens or early July, and continue every 7 to 10 days until frost. For processing crops or situations when the crop is not being marketed with its foliage, a 25% disease incidence threshold may be used to time the first fungicide application. Scout carrot fields by variety. While walking across the field in a 'V' or 'W' shaped transect, evaluate disease incidence on five leaves from five adjacent plants in a minimum of ten locations. A leaf is infected if one or more fungal leaf blight lesions are observed. When twelve of the fifty leaves scouted show symptoms (~25%) then apply the first fungicide spray. Subsequent sprays can be based on the label recommended spray interval or on increased disease severity. Under severe defoliation, add urea (10.0 lbs/A) to encourage new leaf growth.

Quadris--9.0-15.5 fl oz 2.08SC/A, or
Cabrio--8.0-12.0 oz 20EG/A, or
Pristine--8.0-10.5 oz 38WG/A, or
chlorothalonil--1.5-2.0 pt 6F/A or OLF

Powdery Mildew

For powdery mildew, if symptoms are observed early in the season, initiate a fungicide spray program to protect foliage. Do not make more than one sequential application of Cabrio and/or Pristine before alternating with chlorothalonil. Disease development mid to late in the season rarely results in reduced yield at harvest. Under severe defoliation, add urea (10.0 lbs/A) to encourage new leaf growth.

Cabrio--8.0-12.0 oz 20EG/A, or
Pristine--8.0-10.5 oz 38WG/A

Bacterial Blight (Xanthomonas)

Initiate a fixed copper-based bactericide program as soon as symptoms are first observed. Not all copper-based products are created equal and vary by copper content as well as active ingredient(s) (see Table E-8 for a list of available fixed-copper products and check label for rates). Avoid walking and working in fields when the foliage is wet to reduce bacterial spread.

White Mold

Few products are available for white mold control. Avoid planting in shaded or poorly drained areas and areas with a history of severe white mold, and rotate infested fields to a non-host crop for at least 2 to 3 years. Maximize air movement through the plant canopy by using wider plant spacing. Remove and destroy infected plant material in the field. The following biological fungicide has been tested in some states; however, limited information is available on its effectiveness in the Mid-Atlantic region. Apply 3 to 4 months prior to the onset of disease to allow the active agent to reduce inoculum levels of sclerotia in the soil. Following application, incorporate to a depth of 1 to 2 inches. D**o not plow** before seeding cole crops to avoid untreated sclerotia in lower soil layers from infesting the upper soil layer.

Contans--2.0-4.0 lb 5.3WG/A

Storage Rots (Botrytis and Sclerotinia)

Remove all damaged roots before placing in storage. Remove roots from field and place in storage at 32°F (0°C) and 90 to 95 percent relative humidity immediately after digging. As carrots are placed into storage, dip into the following fungicide solution for 5 to 10 seconds.

Mertect 340F--41.0 fl oz/100 gal

CELERY

Celery is a cool-season crop with high moisture requirement. Muck soils or well-drained, medium-textured mineral soils with irrigation are best suited for celery. The crop will withstand light freezes, but it is damaged by several moderate freezes. Seedstalk development, rather than normal growth, will occur if young plants are exposed to temperatures below 55°F (12.8°C) for 10 days or more.

Varieties

Varieties[1]	
Florida 683	These varieties are recommended for PA and other areas where climatic conditions are favorable for celery production.
Utah 52-70 strains	
Penncrisp (trenching)	

[1] Varieties listed by maturity, earliest first.

Recommended Nutrients Based on Soil Tests

Before using the table below, refer to important notes in Plant Nutrient Recommendations in Section B, Soil And Nutrient Information. These notes provide additional suggestions to adjust rate, timing and placement of nutrients depending on soil type cation exchange capacity and existing fertility levels.

Celery	Nitrogen (N) Pounds per Acre	Soil Phosphorus Level			Soil Potassium Level		
		Low	Med	Opt.	Low	Med	Opt.
		Pounds $P_2 0_5$ per Acre			Pounds $K_2 0$ per Acre		
	150-175[1]	250[1]	150[1]	100[1]	250[1]	150[1]	100[1]
	50-75[2]	250[2]	150[2]	100[2]	250[2]	150[2]	100[2]
	25-50[3]	0	0	0	0	0	0
	25-50[4]	0	0	0	0	0	0

[1] Total amount nutrient recommended
[2] Broadcast and disk-in
[3] Sidedress 2-3 weeks after planting
[4] Sidedress 6-8 weeks after planting

Apply 1 1/2 -3 pounds of boron (B) per acre with broadcast fertilizer.
See Table B-10 for more specific boron recommendations.

Seed Treatment

Use seed at least 2 years old. Soak newer seed in hot water at 118°F (47.8°C) for 30 minutes.

Soil Fertility and pH (for Pennsylvania)

Lime to a pH of 6.2 to 6.8. Apply a total of 200 pounds per acre nitrogen to the crop. Apply phosphate, potash, magnesium, boron, and lime as directed by soil test results. Apply 1 to 2 pounds of boron per acre.

Transplant Production

Because of the long growing season required, celery is usually treated as a transplant crop. Sow seed in the greenhouse 10 to 12 weeks before field planting. About 35,000 plants can be produced from 2½ ounces of seed. Temperatures between 70° to 75°F (21.1° to 23.9°C) should be maintained until the plants emerge, then 65° to 70°F (18.3° to 21.1°C) for steady growth. To reduce the production of "seeders," night temperatures should not drop below 55°F (12.8°C). Plants for the early crop should not be set in the field until danger of a prolonged cold period or actual freeze is over.

If plants become too tall or spindly before field setting, they can be clipped back to a 5- or 6-inch height. Plants can be hardened by withholding water 7 to 10 days after setting in field. Never harden celery plants by lowering temperatures.

Planting

Celery is a cool-season crop that grows most rapidly, yields best, and develops top quality at moderately cool temperatures (55° to 75°F [12.8° to 23.9°C]), good soil moisture, and relatively high humidity. It will withstand light freezes, but both young and old plants are damaged by moderate freezes. Celery, a biennial, initiates seed stalk (bolts) after being exposed to temperatures below 55°F (12.8°C) for a number of days.

Satisfactory crops can be produced on fertile, medium-textured mineral soils with irrigation. Since celery is expensive to grow, experience in both production and marketing is desirable before large-scale operations are attempted.

The usual planting period is May 1 to June 30. Transplants are grown in greenhouses or imported from Florida. Under satisfactory growing conditions, celery reaches usable size 85 to 100 days from transplanting. Special blanching practices can improve color and eating quality.

Field Spacing

Rows: 16 to 32 inches apart; *plants*: 8 inches apart in row. Set from 30,000 to 45,000 plants per acre.

Special Precautions

Celery should be cooled quickly to temperatures below 45°F (7.2°C) by hydrocooling, vacuum-cooling, icing, or other means of refrigeration. It can be held a few weeks if storage is near 32°F (0°C) with high humidity.

A physiological disorder called "brown check," is characterized by russeting and cracking on the inner side of the petiole. There is evidence that brown check may be caused by excessive amounts of potassium in the soil, although boron nutrition may also be involved. Plant resistant varieties, particularly Utah 52-70. Brown check may appear if varieties other than Utah 52-70 or related lines are planted on soils with high potassium levels and if a heavy rate of potassium fertilizer is used.

Weed Control

Identify the weeds in each field and select recommended herbicides that control those weeds. See Tables E-2 and E-3.

Apply postemergence herbicides when crop and weeds are within the recommended size and/or leaf stage.

Preplant Incorporated or Preemergence

Bensulide--5-6 lb/A. Apply 5 to 6 quarts per acre Prefar 4E before planting and incorporate 1 to 2 inches deep with power-driven rotary cultivators, or apply preemergence and activate with one-half inch of sprinkler irrigation within 36 hours to control most annual grasses. Use the maximum recommended rate preemergence followed by irrigation to suppress certain annual broadleaf weeds including common lambsquarter, smooth pigweed, and common purslane.

Postemergence

Linuron--0.75-1.5 lb/A. Apply 1.5 to 3 pounds per acre Lorox 50DF. Make a single application after celery transplants are established, but before celery is 8 inches tall to control most broadleaf weeds. Spray before target weeds reach 6 inches in height. DO NOT exceed 40 psi or apply when temperatures exceed 85°F. DO NOT add surfactants, oil concentrate, or liquid fertilizer. Use only the Lorox 50DF formulation of linuron. **For use on celery grown on muck soils only!**

Clethodim--0.094-0.125 lb/A. Apply 6 to 8 fluid ounces per acre Select 2EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) or

12 to 16 fluid ounces of Select Max 0.97EC with nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of spray solution) postemergence to control many annual and certain perennial grasses, including annual bluegrass. Select will not consistently control goosegrass. The use of oil concentrate with Select 2EC may increase the risk of crop injury when hot or humid conditions prevail. To reduce the risk of crop injury, omit additives or switch to nonionic surfactant when grasses are small and soil moisture is adequate. Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 30 days.

Sethoxydim--0.2-0.3 lb/A. Apply 1 to 1.5 pints per acre Poast 1.5EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) postemergence to control annual grasses and certain perennial grasses. **The use of oil concentrate may increase the risk of crop injury when hot or humid conditions prevail**. To reduce the risk of crop injury, omit additives or switch to nonionic surfactant when grasses are small and soil moisture is adequate. Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 30 days and apply no more than 3 pints per acre in one season.

Postharvest

Paraquat--0.6 lb/A. **A Special Local-Needs 24(c) label has been approved for the use of Gramoxone Inteon 2SC for postharvest desiccation of the crop in Delaware, New Jersey and Virginia.** Apply 2.4 pints per acre Gramoxone Inteon 2SC as a broadcast spray after the last harvest. Add nonionic surfactant according to the labeled instructions. See the label for additional information and warnings.

Insect Control

NOTE: Copies of specific insecticide product labels can be downloaded by visiting the websites www.CDMS.org or www.Greenbook.org. Also, specific labels can be obtained via web search engines.

Cutworms

beta-cyfluthrin (Baythroid XL)
carbaryl (Sevin 80S, Sevin 5% Bait)
methomyl (Lannate LV or OLF)
permethrin (Pounce 3.2EC or OLF)

Leafhopper

beta-cyfluthrin (Baythroid XL)
carbaryl (Sevin 80S or OLF)
dinotefuran (soil or foliar-Venom 70SG or OLF)
imidacloprid (soil only–Admire 2F, Admire PRO or OLF)
methomyl (Lannate LV or OLF)
thiamethoxam (Actara 25WDG)

Leafminer

abamectin (Agri-Mek EC, Abba EC, Temprano, or OLF)
chlorantraniliprole (Coragen 1.67SC)
cyromazine (Trigard 75WP)
dinotefuran (soil/foliar-Venom 70SG or OLF)
spinosad (Entrust 80W, SpinTor 2SC or OLF
spinetoram (Radiant 2SC)

Cabbage Looper

acephate (Orthene 97S or OLF)
Bacillus thuringiensis (Biobit, Dipel, Dipel 2X, Javelin, XenTari or OLF)
beta-cyfluthrin (Baythroid XL)
chlorantraniliprole (Coragen 1.67SC)
emamectin (Proclaim 5SG)
flubendiamide (Synapse WG)
indoxacarb (Avaunt 30WDG)
methomyl (Lannate LV or OLF)
permethrin (Pounce 3.2EC or OLF)
pymetrozine (Fulfill 50WDG)
spinetoram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)
thiodicarb (Larvin 3.2F)

Tarnished Plant Bug (*Lygus*)

Look for bugs on leaves shortly after transplanting and when nearby alfalfa or grain is cut.

beta-cyfluthrin (Baythroid XL)
carbaryl (Sevin 80S or OLF)
floniamid (Beleaf 50SG)

Aphids

acephate (Orthene 97S or OLF) (**green peach aphid only**)
acetamiprid (Assail 30SG or OLF)
flonicamid (Beleaf 50SG)
imidacloprid (soil only) (Admire 2F, Admire PRO or OLF)
malathion (Malathion 57EC or OLF)
pymetrozine (Fulfill 50WDG)
spirotetromat (Movento)
thiamethoxam (Actara 25WDG)

Mites

abamectin (Agri-Mek EC, Abba EC, Temprano, or OLF)

Beet Armyworm (BAW), Fall Armyworm (FAW)

acephate (Orthene 97S) (**FAW only)**
carbaryl (Sevin 80S or OLF)
chlorantraniliprole (Coragen 1.67SC) (**BAW only)**
emamectin (Proclaim 5SG)
flubendiamide (Synapse WG)
indoxacarb (Avaunt 30WDG) (**BAW only**)
methomyl (Lannate LV or OLF)
spinetoram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)
thiodicarb (Larvin 3.2F)

Slugs

metaldehyde (Metaldehyde 4 Bait or OLF)

Disease Control

Damping-Off

Use multipurpose soil fumigants listed in Chapter E, the "Nematodes" section of Soil Pests--Their Detection and Control, or steam sterilize the plant bed. If soil is not sterilized, apply Thiram 75WP at 1.3 pounds in 15 to 25 gallons of water per 1,200 square feet at 3-day intervals (plant beds only).

Crater and Petiole Rot or Basal Stalk Rot (Rhizoctonia)

Apply Quadris 0.4-0.8 fl oz/1,000 row feet in a 7" band in–furrow or shortly after emergence.

At weekly intervals, alternate:

Quadris--9.2-15.5 oz 2.08SC/A *plus* chlorothalonil at 2.0-3.0 pt 6F/A or OLF, or
Quadris Opti--2.4-3.7 pt 5.5SC/A

Pink Rot (Sclerotinia)

Apply chlorothalonil at 2.0 to 3.0 pts 6F/A, shortly after plants emerge and repeat on a 7-day schedule.

Preplant: The following biological fungicide has been tested in some states; however, limited information is available on effectiveness in the Mid-Atlantic region. Apply 3 to 4 months prior to the onset of disease to allow the active agent to reduce inoculum levels of sclerotia in the soil. Following application, incorporate to a depth of 1 to 2 inches; however, to avoid the chance of infesting the upper soil layer with untreated sclerotia from the lower soil layer, **do not plow** between treatment and planting times.

Contans--2.0-4.0 lb 5.3WG/A

Leaf Blights (Cercospora and Septoria)

Use certified, disease-free seed or treat seed with hot water or fungicides. Practice careful sanitation in transplant production or rotate ground seedbeds.

Alternate:

Quadris--9.2–15.5 oz 2.08SC, or
Quadris Opti (azoxystrobin+chlorothalonil)--2.4-3.7 pt 5.5SC /A

With one of the following:

chlorothalonil--2.0-3.0 pt 6F/A or OLF, or
copper, fixed--manufacturer's recommendation, or
Tilt--4.0 fl oz 3.6EC/A

Fusarium Yellows

Do not obtain plants from areas of known infestation. There are no means of chemical control. Avoid seeding or transplanting into infested soil or use resistant varieties.

Pesticide	Use Category[1]	Hours to Reentry	Days to Harvest
INSECTICIDE			
abamectin	R	12	7
acephate	G	24	21
acetamiprid	G	12	7
Bacillus thuringiensis	G	4	0
beta-cyfluthrin	R	12	0
carbaryl/carbaryl bait	G	12	14
chlorantraniliprole	G	4	1
cyfluthrin	R	12	0
cyromazine	G	12	7
dinotefuran (soil/foliar)	G	12	21/7
INSECTICIDE *(continued)*			
emamectin	R	48	7
flonicamid	G	12	0
flubendiamide	G	12	1
imidacloprid	G	12	45
indoxacarb	G	12	3
malathion	G	12	7
methomyl	R	48	7
permethrin	R	12	1
pymetrozine	G	12	7
spinetoram	G	4	1
spinosad	G	4	1
spirotetromat	G	24	3
thiamethoxam	G	12	7
thiodicarb	R	48	14
FUNGICIDE (FRAC code)			
chlorothalonil (Group M5)	G	12	7
Contans WG (biological)	G	4	0
copper, fixed (Group M1)	G	24	0
Quadris (Group 11)	G	4	0
Quadris Opti (Groups 11+M5)	G	12	7
Thiram (Group M3)	G	24	3
Tilt (Group 3)	G	12	14

See Table D-6.

[1] G = general, R = restricted