Delaware Cooperative Extension

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This is a section from the

2024/2025
Mid-Atlantic Commercial Vegetable Production Recommendations

The recommendations are **NOT** for home gardener use.

The full recommendations are available online at:
https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/commercial-crops/vegetable-crops/midatlantic-vegetable-recommendations/

Printed copies of the recommendations are available for purchase at the New Castle, Kent and Sussex County Extension Offices in Delaware.

This publication will be revised biennially. In January 2025, a Critical Update with important updates for this publication will be communicated through the above website.

These recommendations were prepared and reviewed by individuals from Cornell University, University of Delaware, Delaware State University, University of Maryland, Penn State, Rutgers University, Virginia Tech, and West Virginia University with the purpose of providing up to date information for commercial vegetable growers in the Mid-Atlantic states of **Delaware, Maryland, New Jersey, Pennsylvania, Virginia,** and **West Virginia**.

Disclaimer

- The label is a legally-binding contract between the pesticide user and the manufacturer.
- The user MUST follow all rates and restrictions as per label directions.
- The use of any pesticide inconsistent with the label directions is a violation of Federal law.

F. Commodity Recommendations

Pesticide Use Disclaimer

THE LABEL IS THE LAW

A pesticide applicator is legally bound by the labeling found on and with the pesticide container in their possession. Before using a pesticide, check and always follow the labeling distributed with the product at the point of sale for legally enforceable rates and use restrictions and precautions.
Although labels are available on the Internet from electronic label services such as Proagrica's CDMS (*https://www.cdms.net/*), Greenbook (*https://www.greenbook.net*), or Agworld DBX powered by Agrian (*https://www.agrian.com/labelcenter/results.cfm)* the information contained in these electronic labels may not be identical to the labeling distributed with the product. **Please be advised that these electronic label services provide use disclaimers, and in some cases legally binding *User Agreements* assigning ALL liability to user of service. (**See section D 3.1. Labels and Labeling for more detail.)

Guide to the Recommended Pesticide Tables in the Following Crop Sections:

1. Pesticides are listed by **group number or code based on chemical structure and mechanism of action**, as classified by the Herbicide Resistance Action Committee (**HRAC**, *https://hracglobal.com*) for herbicides, the Insecticide Resistance Action Committee (**IRAC**, *https://irac-online.org*) for insecticides, and the Fungicide Resistance Action Committee (**FRAC,** *https://www.frac.info/*) for fungicides. **In this guide, if the group number or code is in bold font, there are resistance concerns for the product.**
2. **Restricted use pesticides** are marked with a * in the Tables. These products may only be used by certified and/or licensed pesticide applicators, and when stated on the label, those making applications under their direct supervision. Some labels may restrict use solely to certified and/or licensed applicators. (See section D 3.2.1 Restricted Use Classification Statement for more detail).
3. **In addition to the pesticide products listed in the Commodity Recommendations below, other formulations or brands with the same active ingredient(s) may be commercially available. ALWAYS CHECK THE LABELING ON THE PRODUCT CONTAINER ITSELF:**
   a) to ensure a pesticide is labeled for the same intended use,
   b) to ensure the pesticide is labeled for the desired crop,
   c) for differences in application rates and % active ingredient(s), and
   d) additional restrictions.
4. All pesticide recommendations contained in this document are prescribed for spray applications to a **broadcast area of 1 acre** (43,560 square feet). **Adjust the rate accordingly for banded applications** (See section E 1.3. Calibrating Granular Applicators) **or for chemigation** (check labels for amounts per 1,000 feet).
5. Check the physical product label for and do not exceed the maximum amount of pesticide *per application* and the maximum number of applications *per year*.
6. **Bee Toxicity Rating (Bee TR)**: N=nontoxic; L=minimum impact on bees; M=moderately toxic, can be used if dosage, timing, and method of application are correct, but should NOT be applied directly to the crop if bees are present; H=highly toxic, severe losses expected, -- = data not available.
7. In accordance with the USDA National Organic Program, the Organic Materials Research Institute (OMRI) maintains a directory of all products that OMRI has determined are allowed for use in organic production, processing, and handling. These products are catalogued online in the **OMRI Products List** (see *https://www.omri.org/omri-lists*).

Radishes, Rutabagas and Turnips

Radishes are a quick-growing, cool-season crop, that develops its best quality (small tops and well-shaped roots) when grown at 50-65°F in medium to short day lengths. Crops must be grown rapidly (23-28 days) with adequate soil moisture. When growth is checked, the radish becomes hot, tough, and pithy. Long days (15 hours) and warm temperatures induce seed-stalk formation.

Rutabagas and Turnips are cool-season crops that develop their best root growth at 40-60°F. They can be grown in spring or fall. Rutabagas require 90 days to mature so it is not practical to grow a spring crop in Southern New Jersey, Delaware, Maryland, or Virginia. Early maturing turnip varieties can be harvested in 40 days, but late maturing varieties in 75 days. As biennial plants, both rutabagas and turnips will be induced to flower after exposure to cool temperatures in spring planted crops or if fall crops are left to regrow over winter. Seed stalk formation will stop root development rendering them unsalable.

Recommended Varieties[1]

Radish (Red Globe; White Interior)	Cherriette[2]
	Crunchy Royale[2]
	Red Satin[2]
	Cherry Belle
	Fireball[2]
	Champion
Daikon/Specialty Radish	Watermelon (white flesh, red interior, globe)
	Shumkyo Semi Long (red flesh, white interior, elongated)
	White icicle (white flesh, white interior, elongated)
	Eastern Egg (multi-color)
	Minowase Summer Cross #3 (Daikon)
	Redmoon (red interior)
	Bluemoon (blue interior)
	French Breakfast (red top, white interior, elongated)
	Black Spanish Round (dark flesh, white interior, large globe)
	April Cross* (Daikon)
Rutabaga	Laurentian
	American Purple Top
Turnip White	Tokyo Cross[2]
	White Lady[2]
	Tokyo Silky[2]
	Hakurei[2]
	Polar[2]
Turnip Purple	Purple Prince[2]
	Purple Top White Globe (MR[3])
	Royal Crown[2]

[1]**Varieties within type listed earliest to latest according to vendors:**
Radish 18-45 days; Daikon/Specialty Radish 24-80 days; Rutabaga 90-100 days; Turnip 35-75 days.
[2]F1 hybrid variety. [3]MR = Mosaic Resistant (vendor information).

Recommended Nutrients Based on Soil Tests

In addition to using the table below, check the suggestions on rate, timing, and placement of nutrients in your soil test report and Chapter B Soil and Nutrient Management. Your state's soil test report recommendations and/or your farm's nutrient management plan supersede the recommendations found below.

Radishes Rutabagas and Turnips[1,2]		**Soil Phosphorus Level**				**Soil Potassium Level**				
		Low	**Med**	**High (Opt)**	**Very High**	**Low**	**Med**	**High (Opt)**	**Very High**	
	N (lb/A)	**P_2O_5 (lb/A)**				**K_2O (lb/A)**				**Nutrient Timing and Method**
	50	150	100	50	0	150	100	50	0	Total nutrient recommended
	50	150	100	50	0	150	100	50	0	Broadcast and disk-in

[1]Apply 1-2 lb/A of boron (B) with broadcast fertilizer; see also Table B-7. in Chapter B Soil and Nutrient Management.
[2]Apply 20-30 lb/A of sulfur (S) for most soils.

Seed Treatment - See also Disease Control below
Purchase hot water treated seed or request hot water seed treatment, if possible (check with your seed company).

Spacing and Seeding

Radishes: Seed as early in the spring as soil can be worked, then at 8-10 day intervals through September. Seed 10-15 lb/A in rows 8-15 inches apart with 12-15 plants/ft in the row.
Rutabagas: Seed in early spring for the early summer crop and at least 90 days before the fall early freeze date. Seed 1½-2 lb/A, ¼ inch deep, in rows 30-36 inches apart. Thin plants to 4-8 inches apart in the row when plants are 2-3 inches tall.
Turnips: Seed as early in the spring as soil can be worked or at least 70 days before the fall early freeze date. Seed 1-2 lb/A, ⅛-¼ inch deep, in rows 14-18 inches apart. Plants should be 2-3 inches apart in the row. Seed can also be broadcast at the rate of 2.5 lb/A.

Harvest and Post-Harvest Considerations

Radishes: Bunched with tops or bagged without tops are the two ways radishes are sold. Bunching is most common in this region. Plants are pulled and gathered with rubber bands or twist ties.
Shelf life is 10-14 days. Store at 32°F and 95-100% relative humidity after washing to remove any soil on roots.
Rutabagas: Pull and trim tops in the field. Bruised, damaged, or diseased rutabagas will not store well. Wash rutabagas in clean water, spray-rinse with clean water, then dry as rapidly as possible before waxing for shipping. For short term storage the root does not need to be waxed. Waxed rutabagas can be stored 4-6 months at 32°F and 95-100% relative humidity.
Turnips: The crop is dug mechanically or by hand and either bunched or topped. Turnips can be stored over 4-5 months at 32°F and at 95% relative humidity.

Weed Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F.

Recommended Herbicides

1. Identify the weeds in each field and select recommended herbicides. More information is available in the "Herbicide Effectiveness on Common Weeds in Vegetables" (Table E-3) in Chapter E Pest Management.
2. Minimize herbicide resistance development. Identify the herbicide mode of action group number and follow recommended good management practices; **bolded group numbers in tables below are herbicides at higher risk for selecting resistant weed populations.** Include non-chemical weed control whenever possible.

1. Soil-Applied (Preplant Incorporated or Preemergence)

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
3	Dacthal 6F Dacthal W-75	6 to 14 pt/A 6 to 14 lb/A	**DCPA**	4.5 to 10.5 lb/A	25	12

-**For turnips only**. Turnips: apply preplant incorporated or preemergence in turnips; **do not** incorporate deeper than 2 inches.
-**Do not** apply preplant incorporated for radishes. Emerged weeds should be cultivated or weeded prior to application.
-Primarily controls annual grasses and a few broadleaf weeds, including common purslane.
-Results have been most consistent when used in fields with coarse-textured soils low in organic matter, and when the application is followed by rainfall or irrigation. Maximum application not addressed on label.

2. Postemergence

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
1	Shadow 3EC Select 2EC Select Max 0.97EC	4 to 5.33 fl oz/A 6 to 8 fl oz/A 9 to 16 fl oz/A	**clethodim**	0.07 to 0.125 lb/A	15/ 30	24
	Poast 1.5EC	1 to 2.5 pt/A	**sethoxydim**	0.2 to 0.5 lb/A	14	12

-**Select 2EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution). **Select Max**: use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution). **Shadow 3EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution) for large or stressed grasses; use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution) when crop safety is a concern.

2. Postemergence Shadow, Select, Select Max, Poast - continued next page

2. Postemergence Shadow, Select, Select Max, Poast - continued

Poast: Apply with COC at 1.0% v/v. -**The use of COC 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 NIS when grasses are small and soil moisture is adequate.
-Use lower labeled rates for annual grass control and higher labeled rates for perennial grass control.
-Yellow nutsedge, wild onion, wild garlic, and broadleaf weeds will **not** be controlled.
-Controls many annual and certain perennial grasses, including annual bluegrass, but Poast is preferred for goosegrass control.
-For best results, treat annual grasses when they are actively growing and before tillers are present. Control may be reduced if grasses are large or under hot or dry weather conditions. Repeated applications may be necessary to control certain perennial grasses. If repeat applications are necessary, allow 14 days between applications. Rainfastness is 1 h.
-**Do not** tank mix with or apply within 2 to 3 days of any other pesticide, unless labeled, as this may increase the risk of crop injury or reduce the control of grasses. -**Do not** apply more than 8 fl oz/A of Select 2EC in a single application and **do not** exceed 1 pt/A for the season, **do not** apply more than 16 fl oz/A of Select Max in a single application and **do not** exceed 32 oz/A (radish) or 64 oz/A (rutabagas, turnips) for the season. - **Do not** apply more than 5.33 fl oz/A of Shadow 3EC in a single application and **do not** exceed 10.67 fl oz/A for the season for radish or 21.33 fl oz/A for rutabagas and turnips. -**Do not** apply more than 2.5 pt/A Poast in a single application and **do not** exceed 2.5 pt/A for the season.
-**Do not** harvest radish within 15 days of application and rutabagas and turnips within 30 days of Select or Shadow application.

4	Stinger 3SL	5.3 to 8 fl oz/A	**clopyralid**	0.125 to 0.188 lb/A	15/30	12

-**Turnip roots and tops only.** Other clopyralid formulations may not be labeled (read the label). -Apply in a single application to control certain annual and perennial broadleaf weeds. -Common annuals controlled include galinsoga, ragweed species, common cocklebur, groundsel, pineappleweed, clover, and vetch. Perennials controlled include Canada thistle, goldenrod species, aster species, and mugwort (wild chrysanthemum). -Stinger is very effective on small seedling annual and emerging perennial weeds less than 2-4 inches tall but is less effective and takes longer to work when weeds are larger. -Use 5.3 fl oz/A to control annual weeds less than 2 inches tall. Increase the rate to 5.3 to 8 fl oz/A to control larger annual weeds. Apply 8 fl oz/A to suppress or control perennial weeds. -Spray additives are not needed or required by the label and are not recommended. -Rainfastness is 6 h. -Maximum Stinger application per year: 8 fl oz/A; do not apply more than one application per crop per year. -PHI is 15 d for turnip tops and 30 d for turnip roots. -Observe follow-crop restrictions, or injury may occur from herbicide carryover.

3. Other Labeled Herbicides These products are labeled but limited local data are available; and/or are labeled but not recommended in our region due to potential crop injury concerns.

Group	Product Name (*=Restricted Use)	Active Ingredient
3	Treflan	**trifluralin**
14	Aim	**carfentrazone**

Insect Control

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Recommended Insecticides

Soil Pests

Cabbage Maggots

Cabbage maggots overwinter as pupae. Overwintered adults (flies) emerge when yellow rocket (mustard) first blooms, then begin laying eggs on roots or soil near roots. All brassica crops are affected. Eggs hatch within 3-7 days. Young plants may become severely stunted or die. Larvae or tunnels in harvest bulbs may be evident from later infestations. This pest has 3-4 generations per growing season, although the first generation is often the most economically damaging. The last larval generation is in October, particularly in warmer years. Treatments for cabbage maggot must be done preventively, as once damage is evident, loss of plants is unavoidable. Barriers, such as row covers, may be useful in excluding flies from smaller plantings. Prompt and complete destruction of crop residue is helpful. Chemical treatments should be applied preplant, or at planting, depending on the product used.

Apply one of the following formulations:

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s) and Crop Restrictions	PHI (d)	REI (h)	Bee TR
1B	Diazinon AG500*	2.0 to 4.0 qt/A	diazinon - **rutabaga only, preplant broad-cast, incorporate immediately to 4" depth**	AP	96	H
28	Verimark	10.0 to 13.5 fl oz/A	cyantraniliprole - **suppression only**	AP	4	H

Cutworms See also section E 3.1. Soil Pests - Detection and Control.

Cutworms are moth larvae (caterpillars) that feed on roots and stems. Cutworms chew through stems at or near the soil line, causing young plants to topple over. Cutworms may also feed on the subterranean portion of bulb crops like radish, turnips, and rutabagas. Larvae are typically active at night and spend most of this stage belowground.

Cutworms are favored by less disturbed soils and debris covered soil surfaces. Conventional tillage and crop debris incorporation helps reduce populations. Several species in NJ can injure young plants. There are usually two generations per season. If cutworm damage is anticipated, it is best to treat preventively with insecticide.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s) and Crop Restrictions**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Sevin XLR Plus	1.0 to 2.0 qt/A	carbaryl	7	12	H
3A	Baythroid XL*	1.6 to 2.8 fl oz/A	beta-cyfluthrin - **radish only**	0	12	H
3A	Tombstone*	1.6 to 2.8 fl oz/A	cyfluthrin **- radish only**	0	12	H
3A	Brigade 2EC*, others	5.12 to 6.4 fl oz/A	bifenthrin	21	12	H
3A	Hero*	2.6 to 6.1 fl oz/A	zeta-cypermethrin + bifenthrin **- rutabaga and turnip only**	21	12	H
3A + 4A	Leverage 360*	2.4 to 2.8 fl oz/A	imidacloprid + beta-cyfluthrin - **radish only**	7	12	H
28	Exirel	10.0 to 20.5 fl oz/A	cyantraniliprole	1	12	H

Above-ground Pests

Aphids

To prevent flare-ups, avoid overuse of synthetic pyrethroid (3A) insecticides for control of other pests.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s) and Crop Restrictions**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Malathion 57 EC	1.0 to 1.6 pt/A - radish, rutabaga 1.0 to 2.0 pt/A - turnip	malathion	7 1	12	H
3A+4A	Leverage 360*	2.4 to 2.8 fl oz/A	imidacloprid + beta-cyfluthrin-**radish only**	7	12	H
4A	Actara 25WDG	1.5 to 3.0 oz/A	thiamethoxam	7	12	H
4A	Platinum 75SG	1.70 to 2.17 oz/A- radish 1.70 to 4.01 oz/A- rutabaga, turnip	thiamethoxam	AP	12	H
4A	Admire Pro	1.2 fl oz/A	imidacloprid - **foliar**	7	12	H
4A	Admire Pro	4.4 to 10.5 fl oz/A	imidacloprid - **soil**			
4D	Sivanto Prime	7.0 to 14.0 fl oz/A	flupyradifurone - **foliar**	7	4	M
28	Exirel	13.5 to 20.5 fl oz/A	cyantraniliprole	1	12	H
29	Beleaf	2.0 to 2.8 fl oz/A	flonicamid	3	12	L

Caterpillar "Worm" Pests Including Cabbage Loopers, Diamondback Moths, Imported Cabbageworms, Cross-striped Cabbageworms, Cabbage Webworms, and Armyworms

Due to resistance development, pyrethroid insecticides are not recommended for control of Diamondback Moth or Beet Armyworm. Other insecticides may no longer be effective in certain areas due to Diamondback Moth resistance; consult your Extension Office. Rotation of insecticides with different modes of action is recommended to reduce resistance development. Under-leaf spray coverage is essential for effective control particularly with *Bacillus thuringiensis* and contact materials. With boom-type rigs, apply spray with at least 3 nozzles per row, one directed downward, and one directed toward each side. Evaluate effectiveness when considering further treatment.

Apply one of the following formulations: **Note: not all materials are labeled for all crops, insects or application methods, check the label for directions!**						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s) and Crop Restrictions**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Malathion 57 EC	1.0 to 1.6 pt/A (radish and rutabaga) 1.0 to 2.0 pt/A (turnip)	malathion	see label	12	H
3A	Asana XL*	5.8 to 9.6 fl oz/A	esfenvalerate - **turnip: imported cabbageworm only**	7	12	H
3A	Brigade 2EC*, others	5.12 to 6.4 fl oz/A	bifenthrin	21	12	H
5	Entrust SC (OMRI)	3.0 to 6.0 fl oz/A	spinosad	3	4	M
5	Blackhawk	1.7 to 3.3 fl oz/A	spinosad	3	4	M
5	Radiant SC	6.0 to 8.0 fl oz/A	spinetoram	3	4	M
11A	XenTari (OMRI)	0.5 to 2.0 lb/A	*Bacillus thuringiensis aizawai*	0	4	N
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	1	4	L
18 + 5	Intrepid Edge	4.5 to 12.0 fl oz/A	methoxyfenozide + spinetoram	7	4	M
28	Vantacor	1.2 to 2.5 fl oz/A	chlorantraniliprole - **foliar**	1	4	L
28	Exirel	10.0 to 20.5 fl oz/A	cyantraniliprole	1	12	H
28 + 3A	Elevest*	7.7 to 9.6 fl oz/A	chlorantraniliprole + bifenthrin	21	12	H

Flea Beetles Crop rotation, management of wild hosts (wild mustard, rocket etc.) and prompt destruction of crop residue are helpful in population suppression. Sequential plantings of host crops can result in population build-up.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s) and Crop Restrictions**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Sevin XLR Plus	0.5 to 1.0 qt/A	carbaryl	7	12	H
3A	Asana XL*	5.8 to 9.6 fl oz/A	esfenvalerate - **radish and turnip only**	7	12	H
3A	Baythroid XL*	1.6 to 2.8 fl oz/A	beta-cyfluthrin	0	12	H
3A	Tombstone*	1.6 to 2.8 fl oz/A	cyfluthrin	0	12	H
3A	Hero*	2.6 to 6.1 fl oz/A	zeta-cypermethrin + bifenthrin - **rutabaga and turnip only**	21	12	H
3A + 4A	Leverage 360*	2.4 to 2.8 fl oz/A	imidacloprid + beta-cyfluthrin - **radish only**	7	12	H
4A	Admire Pro	4.4 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Admire Pro	1.2 fl oz/A	imidacloprid - **foliar**	7	12	H
4A	Actara 25WDG	1.5 to 3.0 oz/A	thiamethoxam	7	12	H
4A	Platinum 75SG	1.7 to 2.17 oz/A 1.7 to 4.01 oz/A	thiamethoxam - **radish** thiamethoxam - **rutabaga, turnip**	AP	12	H
5	Entrust SC (OMRI)	3 to 6 fl oz/A	spinosad	3	4	M
5	Blackhawk	1.7 to 3.3 fl oz/A	spinosad	3	4	M
28	Exirel	13.5 to 20.5 fl oz/A	cyantraniliprole	1	12	H
28 + 3A	Elevest*	7.7 to 9.6 fl oz/A	chlorantraniliprole + bifenthrin	21	12	H

Leafminers

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s) and Crop Restrictions**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Dimethoate 400	0.5 pt/A	dimethoate - **turnip only**	14	48	H
5	Entrust SC (OMRI)	3 to 6 fl oz/A	spinosad	3	4	M
5	Blackhawk	1.7 to 3.3 fl oz/A	spinosad	3	4	M
5	Radiant SC	6.0 to 8.0 fl oz/A	spinetoram	3	4	M
28	Exirel	13.5 to 20.5 fl oz/A	cyantraniliprole	1	12	H

Disease Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F. Recommended Fungicides

Seed Treatment Options

Heat treatment is a non-chemical alternative to conventional chlorine treatments that only kill pathogens on the surface of the seed coat. Heat treatment has the additional benefit of killing pathogens within the seed coat and is particularly useful for crops that are prone to seed-borne bacterial infections. Seed heat treatment follows a strict time and temperature protocol and is best done with thermostatically controlled water baths. Two baths are required: one for pre-heating, and a second for the effective (pathogen killing) temperature. The initial pre-heating is at 100ºF (37ºC) for 10 minutes. In the second bath, soak radish seed at 122°F (50°C) for 15 minutes. Immediately after removal from the second bath, rinse seeds with cool water. Dry seeds on a screen or paper. Pelleted seed is not recommended for heat treatment. Only treat seed that will be used during the current production season.

An alternative to hot water is to use 1 part Alcide (sodium chlorite), 1 part lactic acid, and 18 parts water as a seed soak. Treat seed for 1-2 minutes with constant agitation and rinse for 5 minutes in running water. Following either treatment above, dust dried seed with Captan 50WP or Thiram 480DP at 1 level tsp/lb of seed (3 oz/100 lb).

Seed Treatment Prior to Seeding

Code	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
For Pythium and Phytophthora Root Rot control use a seed treatment such as:						
4	Apron XL	0.085 to 0.64 fl oz/100 lb seed	mefenoxam	--	--	N
For control of other root rots apply:						
12	Maxim 4FS	0.08 to 0.16 fl oz/100 lb seed	fludioxonil	--	--	L
Note: Apron XL and Maxim 4FS can be combined.						

Damping-off caused by *Pythium* and *Rhizoctonia*

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
For Pythium root rot control apply as banded spray:						
4	MetaStar 2E AG[1]	2.0 to 4.0 pt/A	metalaxyl	AP	48	N
4	Ridomil Gold 4SL[1]	0.5 to 1.0 pt/A	mefenoxam	AP	48	N
43	Presidio 4SC[1]	3.0 to 4.0 fl oz/A	fluopicolide	AP	48	L
For Rhizoctonia root rot control apply as in-furrow application:						
11	azoxystrobin 2.08F	0.40 to 0.80 fl oz/A (see label)	azoxystrobin	0	4	N
For Pythium and Rhizoctonia root rot control apply as banded spray:						
4 + 11	Uniform 3.66SE[1]	0.34 fl oz/1000 ft. row[2]	mefenoxam + azoxystrobin	AP	0	N

[1]Applications at seeding will also help control Downy Mildew. [2] See label for restrictions

Bacterial and Fungal Diseases

Alternaria, Blackleg and Black Rot Alternaria, Blackleg and Black Rot can survive on infested debris and seed. Purchase certified or treated seed. Use hot water seed treatment to help reduce seed-borne infections (see above). Thoroughly disc or plow under plant debris after harvest. Eliminate cruciferous weeds which can act as hosts and rotate with non-cruciferous crops.

Clubroot Radishes are susceptible, whereas turnips are resistant. Use of irrigation water containing fungus spores is the principal way of spreading the pathogen. If clubroot occurs, clean and disinfest any equipment to be used in other fields. Adjust soil pH with hydrated lime to as close to 7.0 as possible. Improve drainage and use raised beds.

Downy Mildew

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
Apply the following when weather conditions favor disease development and/or disease is first noticed:[1,2]						
M01	copper (OMRI)[1]	at labeled rates	copper	0	48	N
21	Ranman 400SC	2.75 fl oz/A (turnip greens only)	cyazofamid	0	12	L

[1]Some copper -based products are OMRI listed for organic production and may help suppress some fungal pathogens in these crops.
[2]Uniform, Presidio, mefenoxam, or metalaxyl applications for root rot control at seeding will also help control Downy Mildew.

Leaf Spots (caused by *Cercospora* or *Alternaria)* and Powdery Mildew Long periods of wet weather and driving rains which promote soil splashing are conducive for development. Thoroughly disc or plow under plant debris after harvest. Eliminate cruciferous weeds which can act as hosts and rotate with non-cruciferous crops.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
Apply and rotate the following preventatively and/or when conditions favor development:						
3	Tilt 3.6EC[1]	3.0 to 4.0 fl oz/A	propiconazole	14	12	N
7	Fontelis	16.0 to 30.0 fl oz/A	penthiopyrad	0	12	L
7 + 9	Luna Tranquility 4.16SC	8.0 to 11.2 fl oz/A	fluopyram + pyrimethanil	7	12	--
7 + 11	Merivon 2.09SC	4.0 to 5.5 fl oz/A	fluxapyroxad + pyraclostrobin	0	12	N
7 + 12	Miravis Prime	6.8 fl oz/A	pydiflumetofen + fludioxonil	7	12	--
Rotate with one of the following FRAC code 11 fungicides:						
11	azoxystrobin 2.08F	6.0 to 15.5 fl oz/A plus fixed copper at labeled rates	azoxystrobin	0	4	N
11	Cabrio 20EG	8.0 to 12.0 oz/A plus fixed copper at labeled rates	pyraclostrobin	0	12	N

[1]For Cercospora leaf spot only.

Scab Scab is more severe under dry soil conditions, high soil pH, and low level of Mg. Heavy irrigation in the first two weeks after emergence and the application of S to reduce soil pH will assist in disease control.

White Rust

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
When weather conditions favor disease development or at the first sign of disease in field, apply one of the following:						
11	azoxystrobin 2.08F	6.0 to 15.5 fl oz/A	azoxystrobin	0	4	N
11	Cabrio 20EG	8.0 to 16.0 oz/A	pyraclostrobin	0	12	N

If you are having a medical emergency after using pesticides, always call 911 immediately.

POISON Help®
1-800-222-1222

In Case of an Accident

- Remove the person from exposure
- Get away from the treated or contaminated area immediately
- Remove contaminated clothing
- Wash with soap and clean water
- Call a physician and/or the National Poison Control Center (1-800-222-1222). Your call will be routed to your State Poison Control Center.
- Have the pesticide label with you!
- Be prepared to give the EPA registration number to the responding center/agency