# 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) |
| | China Rose (red flesh, white interior, elongated) |
| | White icicle (white flesh, white interior, elongated) |
| | Eastern Egg (multi-color) |
| | Minowase Summer Cross #3 (Daikon) |
| | Bluemoon (blue interior) |
| | French Breakfast (red top, white interior, elongated) |
| | Black Spanish Round (dark flesh, white interior, large globe) |
| | April Cross* (Daikon) |
| **Rutabaga** | Laurentian |
| | Helenor |
| **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. Postemergence**

| Group | Product Name (*=Restricted Use) | Product Rate | Active Ingredient | Active Ingredient Rate | PHI (d) | REI (h) |
|---|---|---|---|---|---|---|
| **1** | Shadow 3EC<br>Select 2EC<br>Select Max 0.97EC | 4 to 5.33 fl oz/A<br>6 to 8 fl oz/A<br>9 to 16 fl oz/A | **clethodim** | 0.07 to 0.125 lb/A | 15/<br>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 0.97EC**: 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.
**Poast 1.5EC**: Apply with COC at 1.0% v/v.
-**General comments:**
-The use of COC may increase the risk of crop injury when hot or humid conditions prevail. To reduce the risk of crop injury, 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. For best results, treat annual grasses when they are actively growing and before tillers are present. -Yellow nutsedge, wild onion, wild garlic, and broadleaf weeds will **not** be controlled with these herbicides. -These herbicides control many annual and certain perennial grasses. Clethodim is best on annual bluegrass; while Poast is preferred for goosegrass control. -Repeated applications may be necessary to control certain perennial grasses. If repeat applications are necessary, allow 14 days between applications.
-Rainfastness is 1 h.

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

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

| | | | | | | |
|---|---|---|---|---|---|---|
| **-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.<br>**-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.<br>**-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.<br>**-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.<br>**-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).<br>-Apply in a single application to control certain annual and perennial broadleaf weeds.<br>-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).<br>-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.<br>-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.<br>-Spray additives are not needed or required by the label and are not recommended.<br>-Rainfastness is 6 h.<br>-Maximum Stinger application per year: 8 fl oz/A; do not apply more than one application per crop per year.<br>-PHI is 15 d for turnip tops and 30 d for turnip roots.<br>-Observe follow-crop restrictions, or injury may occur from herbicide carryover. | | | | | | |

**2. 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 (radish and turnip greens only) | **trifluralin** |
| **14** | Aim (hooded or directed application only) | **carfentrazone** |
| **14** | Aquesta (turnip only) | **sulfentrazone** |

# Insect Control

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

## Recommended Insecticides

**Note**: For **premixes**, the group number (representing the mode of action) and active ingredient that contributes the most to control is generally listed first. In some cases, only one ingredient in a premix provides control.

## 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 3.0 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. Several species of 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. 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*, Brigade eVo | 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 | cyfluthrin + imidacloprid - **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<br>1.0 to 2.0 pt/A | malathion **- radish, rutabaga**<br>malathion **- turnip** | 7<br>1 | 12 | H |
| 4A | Actara 25WDG | 1.5 to 3.0 oz/A | thiamethoxam | 7 | 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** | 21 | 12 | H |
| 4A | Platinum 75SG | 1.70 to 2.17 oz/A<br>1.70 to 4.01 oz/A | thiamethoxam - **radish**<br>thiamethoxam - **rutabaga, turnip** | AP | 12 | H |
| 4A+3A | Leverage 360* | 2.4 to 2.8 fl oz/A | imidacloprid + beta-cyfluthrin - **radish only** | 7 | 12 | H |
| 4D | Sivanto Prime | 7.0 to 14.0 fl oz/A | flupyradifurone - **foliar** | 1 | 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:**<br>**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<br>1.0 to 2.0 pt/A | malathion - **radish and rutabaga**<br>malathion - **turnip** | 7<br>1 | 12 | H |
| **3A[1]** | Asana XL* | 5.8 to 9.6 fl oz/A | esfenvalerate - **turnip: imported cabbageworm only** | 7 | 12 | H |
| **3A[1]** | Brigade 2EC*, Brigade eVo | 5.12 to 6.4 fl oz/A | bifenthrin | 21 | 12 | H |

*Caterpillar "Worm" Pests - continued next page*

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

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | Entrust SC (OMRI) | 3.0 to 6.0 fl oz/A | spinosad | 3 | 4 | H |
| 5 | Blackhawk | 1.7 to 3.3 fl oz/A | spinosad | 3 | 4 | M |
| 5 | Radiant SC, Hemi | 6.0 to 8.0 fl oz/A | spinetoram | 3 | 4 | H |
| 11A | XenTari (OMRI) | 0.5 to 2.0 lb/A | *Bacillus thuringiensis aizawai* | 0 | 4 | N |
| 18 | Intrepid 2F | 4.0 to 16.0 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[1]** | Coragen eVo, Vantacor | 1.2 to 2.5 fl oz/A | chlorantraniliprole - **foliar** | 1 | 4 | L |
| **28[1]** | Exirel | 10.0 to 20.5 fl oz/A | cyantraniliprole | 1 | 12 | H |
| **28[1]+3A[1]** | Elevest* | 5.6 to 9.6 fl oz/A | chlorantraniliprole + bifenthrin | 21 | 12 | H |

**[1]Resistance concerns with DBM and BAW.**

## 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 | beta-cyfluthrin + imidacloprid - **radish only** | 7 | 12 | H |
| 4A | Actara 25WDG | 1.5 to 3.0 oz/A | thiamethoxam | 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 | Platinum 75SG | 1.7 to 2.17 oz/A<br>1.7 to 4.01 oz/A | thiamethoxam - **radish**<br>thiamethoxam - **rutabaga, turnip** | AP | 12 | H |
| 5 | Entrust SC (OMRI) | 3.0 to 6.0 fl oz/A | spinosad | 3 | 4 | H |
| 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 400EC | 0.5 pt/A | dimethoate - **turnip only** | 14 | 48 | H |
| 5 | Entrust SC (OMRI) | 3.0 to 6.0 fl oz/A | spinosad | 3 | 4 | H |
| 5 | Blackhawk | 1.7 to 3.3 fl oz/A | spinosad | 3 | 4 | M |
| 5 | Radiant SC, Hemi | 6.0 to 8.0 fl oz/A | spinetoram | 3 | 4 | H |
| 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 3.72SC[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. *(continued next page)*

***Leaf Spots (caused by Cercospora or Alternaria) and Powdery Mildew** - continued*

| 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 1.67SC | 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 Xemium | 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 |