

With a tank-mix containing:

Pristine--12.5-18.5 oz 38WG/A *plus* chlorothalonil--2.0-3.0 pts 6F/A

If Powdery mildew has become well established in the mid- to late part of the season, only apply protectant fungicides such as chlorothalonil or sulfur.

Downy Mildew

Scout fields for disease incidence early in the growing season. Begin sprays when vines run or if downy mildew is predicted for the region. For current status of the disease, refer to the Cucurbit Downy Mildew forecasting website www.ces.ncsu.edu/depts/pp/cucurbit/. **Preventative applications are much more effective than applications made post infection.** The following are the most effective materials: Tank-mix one of the following products with a protectant such as chlorothalonil--1.5-3 pt 6F/A or maneb (Manex)--1.2-1.6 pt 4F/A, or OLF and alternate between different modes of action (FRAC codes):

Ranman--2.1-2.75 fl. oz 400 SC/A, or
 Presidio--3.0-4.0 fl oz 4SC/A, or
 Previcur Flex--1.2 pt 6F/A, or
 Tanos--8.0 oz 50WDG/A, or
 Curzate--3.2 oz 60DF/A

Materials with different modes of action (FRAC codes) should always be alternated to reduce the chances for fungicide resistance development.

Sprays should be applied on a 7-day schedule. Under severe disease conditions spray interval may be reduced if label allows.

Plectosporium Blight (Microdochium blight)

Research studies have shown that no-till pumpkin production may result in less disease development. Rotate with crops other than cucurbits. It is important to achieve maximum foliage coverage with each fungicide application. Scout fields on a regular basis. Once symptoms appear on petioles or as fruit begins to form, apply the following and repeat every 7-10 days:

chlorothalonil--2.0-3.0 pt 6F/A or OLF, or
 maneb (Manex)--1.2-1.6 pt 4F/A or OLF

A spray schedule that alternates Cabrio or Flint with chlorothalonil will also provide control.

Scab

Use resistant varieties when possible. Scab develops during cool periods. Begin sprays as true leaves form and repeat every 5 to 7 days.

chlorothalonil--2.0-3.0 pt 6F/A or OLF

Gummy Stem Blight (Black Rot) and Anthracnose

Rotate crops to allow at least 2 years between cucurbit plantings. Pumpkin cv. 'Small Sugar' appears to be the least affected by Black rot. Fungicides with a high-risk for resistance development, such as FRAC code 11 fungicides (Cabrio, Pristine and Quadris), should be tank-mixed with a protectant fungicide. When tank-mixing, use at least the minimum labeled rate of each fungicide in the tank-mix. Do not apply FRAC code 11 fungicides more than 4 times total per season. If resistance to FRAC code 11 fungicides exists in the area, do not apply them. Use fungicides from a different FRAC code.

Begin the following fungicide program when fruit start to form:

Alternate:

chlorothalonil--2.0-3.0 pt 6F/A or OLF,
 (use low rate early in season)

With:

Pristine--12.5-18.5 oz 38WG/A *plus* chlorothalonil--2.0-3.0 pt 6F/A

Maintain fungicide schedule until harvest. See the "Harvesting and Storage" section. Fungicide application for black rot control will help maintain "handles" on the fruit. Harvest carefully because wounding can negate benefits from a season-long fungicide program.

Phytophthora Blight

Rotate with crops other than peppers, eggplants, tomatoes, lima and snap beans, and other cucurbits. Fields should be adequately drained to ensure that water does not accumulate around the base of the plant. Mefenoxam (Ridomil Gold or Ultra Flourish) should be applied pre-plant for early season control. Once the canopy closes, subsoil between the rows to allow for faster drainage following rainfall. When conditions favor disease development, apply one of the the following for suppression only, and always tank mix with fixed copper:

Forum--6.0 fl oz 4.18SC/A (must be tank-mixed with another fungicide active against Phytophthora blight on pumpkins and winter squash such as fixed copper), or
 Ranman--2.75 fl oz 400 SC/A (*plus* an adjuvant), or
 Tanos--8.0-10.0 oz 50 WDG/A

Harvesting and Storage

Begin with disease-free fruit by following a regular fungicide program during crop production. Harvest as soon as fruits are mature and prior to frost. Use care in handling fruit to prevent wounds. Wounding can negate benefits from a season-long fungicide program. Cure after harvest at temperatures between 80° to 85°F (26.7° to 29.40°C) with a relative humidity of 75 to 80 percent for 10 days.

Temperatures below 50°F (10°C) cause chilling injury. The hard-shelled varieties, such as Butternut, Delicious, and the Hubbard strains, can be stored. Store at 55°F (12.8°C) and 55 percent relative humidity.

RADISHES, RUTABAGAS, AND TURNIPS

Radishes. Radishes are a quick-growing, cool-season crop developing its best quality and root shape when grown at temperatures of 50° to 65°F (10° to 18.3°C) in moderate to short day lengths. Crop must be grown rapidly (23 to 28 days) and with an adequate moisture supply. When growth is checked, the radish becomes hot, tough, and pithy. Long days (15 hours) and warm temperatures induce seedstalk formation. Under medium to short day lengths, roots are generally well shaped and tops are small.

Rutabagas. A cool-season crop developing best at temperatures of 60° to 65°F (15.6° to 18.3°C). Usually considered a fall crop; it can be grown in the spring.

Varieties

Varieties ¹	DE	MD	NJ	PA	VA	WV
Radishes: spring to fall						
Cherriette*				P		
Improved Red Prince	D	M	N	P	V	WV
Champion	D	M	N	P	V	WV
Radishes: winter						
China Rose				P		WV
Round Black Spanish				P		
Rutabagas						
Laurentian	D	M	N			
Improved American Purple Top	D	M	N	P	V	WV
Purple Top Yellow Globe				P		
Turnips: white						
White Lady*				P		WV
Hakeuri			N			
Turnips: purple top						
Royal Globe II*			N			
Royal Crown*			N	P		
Purple Top White Globe (MR)	D	M	N	P	V	WV
Just Right*				P		

¹ Varieties listed by maturity, earliest first.

* Indicates hybrid varieties.

Letters in parentheses indicate disease resistance possessed by varieties. See the "Abbreviations" section in front portion of this publication.

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.

Radishes, Rutabagas, & Turnips	Nitrogen (N) Pounds per Acre	Soil Phosphorus Level			Soil Potassium Level		
		Low	Med	Opt.	Low	Med	Opt.
		Pounds P ₂ O ₅ per Acre	Pounds P ₂ O ₅ per Acre	Pounds P ₂ O ₅ per Acre	Pounds K ₂ O per Acre	Pounds K ₂ O per Acre	Pounds K ₂ O per Acre
	50 ¹	150 ¹	100 ¹	50 ¹	150 ¹	100 ¹	50 ¹

¹ Broadcast and disk-in before seeding.

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

Seed Treatment

Soak seed in hot water at 122°F (50°C). Soak rutabagas for 20 minutes and turnips for 25 minutes. Dry, then dust with captan 50WP or thiram 75WP at 1 level teaspoon per pound of seed.

Spacing and Seeding

Radishes. Seed as early in the spring as soil can be worked, then at 8 to 10 day intervals through September. Seed 10 to 15 pounds per acre. Space rows 8 to 15 inches apart with 12 to 15 plants per foot in the row.

Rutabagas. Seed in early spring for the early summer crop and at least 90 days before the early freeze date in the fall. Sow 1½ to 2 pounds of seed per acre at a depth of ¼ inch in rows 30 to 36 inches apart. Thin to 4 to 8 inches in the row when plants are 2 to 3 inches tall.

Turnips. Seed as early in the spring as soil can be worked or at least 70 days before the early freeze date in the fall. Seed in rows 1 to 2 pounds per acre, 1/8 to 1/4 inch deep, in rows 14 to 18 inches apart. Plants should be 2 to 3 inches apart in the row. Seed can also be broadcast at the rate of 2.5 pounds per acre.

Harvesting and Storage

Rutabagas. Pull and trim tops in 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 or shipping. Rutabagas can be stored 2 to 4 months at 32°F (0°C) and at a relative humidity of 90 to 95 percent.

Turnips. The crop is dug mechanically and either bunched or topped. Turnips can be stored over winter at 32° to 35°F (0° to 1.67°C) and at a relative humidity of 90 to 95 percent.

Weed Control

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

Match preplant incorporated and preemergence herbicide rates to soil type and percent organic matter in each field.

Use shallow cultivation as necessary to control seedling weeds.

Preemergence

Turnips. DCPA--6-10.5 lb/A. Apply 8 to 14 pints per acre Dacthal 6F immediately after seeding.

Postemergence

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 15 days for radish and 30 days for rutabagas and turnips.

Clopyralid—0.047-0.188 lb/A. Turnips ONLY! (roots and tops) Apply 2 to 8 fluid ounces of Stinger 3A per acre in a single application to control certain annual and perennial broadleaf weeds. Stinger controls weeds in the Composite and Legume plant families. 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 to 4 inches tall, but is less effective and takes longer to work when weeds are larger. Use 2 to 4 fluid ounces to control annual weeds less than 2 inches tall. Increase the rate to 4 to 8 fluid ounces to control larger annual weeds. Apply the maximum rate of 8 fluid ounces to suppress or control perennial weeds. Spray additives are not needed or required by the label, and are not recommended. Observe a minimum preharvest interval (PHI) of 30 days for turnip roots and 15 days for turnip tops. Stinger is a postemergence herbicide with residual soil activity. Observe follow-crop restrictions, or injury may occur from herbicide carryover.

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 websites www.CDMS.org or www.Greenbook.org. Also, specific labels can be obtained via web search engines.

Cabbage Maggot

chlorpyrifos (Lorsban 4EC) Apply in a 4-inch band across the seed row behind the planter shoe and ahead of the press wheel, or apply as a water based spray directed to the base of plants immediately after setting. Do NOT apply as a foliar application.

diazinon (**radish, rutabaga only**) (Diazinon 4E or OLF) Apply as preplant broadcast or as a transplant solution.

Note. When yellow-rocket (mustard family) first blooms, cabbage maggot adults (flies) begin laying eggs on roots or soil near roots.

Cutworms

beta-cyfluthrin (Baythroid XL)
 carbaryl (Sevin 80S or OLF)
 cyfluthrin (Renounce 20WP, Tombstone or OLF)

Flea Beetles

beta-cyfluthrin (Baythroid XL)
 carbaryl (Sevin or OLF)
 cyfluthrin (Renounce 20WP, Tombstone or OLF)
 esfenvalerate (Asana XL)
 imidacloprid (soil-Admire 2F, Admire PRO; foliar-Nuprid 1.6F, Provado 1.6F or OLF)
 spinosad (Entrust 80W, SpinTor 2SC or OLF)
 thiamethoxam (Actara 25WDG)

Aphids

dimethoate (Dimate 4EC or OLF)
 imidacloprid (soil-Admire 2F, Admire PRO; foliar-Nuprid 1.6F, Provado 1.6F or OLF)
 malathion (Malathion 57EC or OLF)

thiamethoxam (Actara 25WDG)

Leafminers

spinetoram (Radiant 2SC)
 spinosad (Entrust 80W, SpinTor 2SC or OLF)

Cabbage Looper (CL), Imported Cabbageworm (ICW), Diamondback Larvae

Note: For best worm control, underleaf spray coverage is essential.

Bacillus thuringiensis (Biobit, Dipel, Dipel 2X, Javelin, XenTari or OLF)
 esfenvalerate (Asana XL) (**CL and ICW only**)
 methoxyfenozide (Intrepid) (**CL and ICW only**)
 spinetoram (Radiant SC) (**CL only**)
 spinosad (Entrust, SpinTor or OLF) (**CL only**)

The following chart gives minimum days wait between last application of pesticide and harvest of root crucifers.

Pesticide	Use Category ¹	Hours to Reentry	Days to Harvest ²		
			Radish	Rutabagas	Turnip
INSECTICIDE					
<i>Bacillus thuringiensis</i>					
beta-cyfluthrin	R	12	0	0	0
carbaryl	G	12	7	7	7
chlorpyrifos 15G, 4E 75WG	R	24	AP	AP	AP
cyfluthrin	R	12	0	0	0
diazinon	R	96	AP	AP	-
esfenvalerate	R	12	7	-	7
imidacloprid (soil/foliar)	G	12	21/7	21/7	21/7
malathion	G	12	7	3	7
methoxyfenozide	G	4	-	-	1
spinetoram	G	4	3	3	3
spinosad	G	4	3	3	3
thiamethoxam	G	12	7	7	7
FUNGICIDE (FRAC code)					
Cabrio (Group 11)	G	12	0	0	0
copper, fixed (Group M1)	G	24	0	-	0
Quadris (Group 11)	G	4	0	0	0
Ridomil Gold (Group 4)	G	48	AP	AP	AP
Ridomil Gold Copper (Groups 4 + M1)	G	48	7	-	-
Ultra Flourish (Group 4)	G	48	AP	AP	AP

See Table D-6.

Dash (-) in table indicates pesticide is **not** labeled for that crop.

¹ G=general, R=restricted

² AP=At planting application only

Disease Control

Damping-off (caused by Pythium and Basal stem rot caused by Phytophthora)

Apply the following as a pre-plant 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)

Black Rot, Blackleg, Alternaria

Use hot water seed treatment. See the preceding "Seed Treatment" section.

Clubroot

Radishes are susceptible to clubroot, whereas turnips are resistant. Use of irrigation water containing spores of the fungus is the principal way that disease is spread to new fields. If clubroot occurs, take time to clean and disinfest any equipment to be used in other fields to prevent spread. Adjust soil pH with hydrated lime to as close to 7.0 as possible. Improve drainage in the field as much as possible and grow on raised beds.

Downy Mildew

Apply the following when weather conditions favor disease development and/or disease is first noticed:

copper, fixed-- at labeled rates every 7 to 10 days

Leaf Spots

Apply preventatively or when initial symptoms first appear:

Alternate one of the following FRAC code 11 fungicides:

Quadris--6.0-15.5 oz 2.08SC/A, or

Cabrio--8.0-12.0 oz 20WG/A

With:

copper, fixed--at labeled rates every 7 to 10 days.

Scab

This disease is more severe under dry soil conditions, high soil pH, and low level of magnesium. Heavy irrigation in the first 2 weeks after emergence and the application of sulfur to reduce soil pH will assist in disease control.

White Rust

When weather conditions favor disease development or at the first sign of disease in field:

Alternate one of the following FRAC code 11 fungicides:

Quadris--6.0 to 15.5 fl oz 2.08SC/A, or

Cabrio--8.0-16.0 oz 20 WG/A

With

Ridomil Gold Copper--2.0 lb 65WP/A every 7 days.
