

# Root Crops

## Beet, Carrot, Parsnip, Radish, Rutabaga, and Turnip

### Spacing

**Beets:** Rows 18 to 24 inches apart. Seed 8 to 10 pounds per acre for bunching.

**Carrots:** Rows 16 to 30 inches apart. Plant 20 to 30 per foot for slicing/fresh market; 10 to 20 plants per foot for dicing.

**Parsnips:** Rows 18 to 24 inches apart. Seed 2 to 3 pounds per acre.

**Radishes:** Rows 15 inches apart. Plant 12 to 15 per foot of row. Seed 10 to 15 pounds per acre.

**Turnips:** Rows 14 to 18 inches apart. Plant 2 to 3 inches apart in row. Seed 1 to 2 pounds per acre.

### Fertilizing

**Lime:** To maintain a soil pH of 6.0 to 6.8; for beets, 6.5 to 7.0.

**Preplant:** N: 60 pounds per acre. P<sub>2</sub>O<sub>5</sub>: 20 to 160 pounds per acre. K<sub>2</sub>O: 0 to 200 pounds per acre. Adjust according to soil type, previous management, and soil test results for your state. If soil tests indicate that a high amount of K is necessary, plow down at least half the requirement. Beets also respond to boron when grown on sandy soils, light-colored silt and clay loams, and alkaline, dark-colored soils. Boron may be omitted on acid, dark-colored soils. Based on a boron soil test, include boron at 2 1/2 to 5 pounds per acre applied over the row at planting. Do not contact with seed. Boron is toxic to many vegetables, particularly beans, peas, and cucurbits. Thus, rotational plans may have to be adjusted. For carrots grown on muck soil with a soil pH greater than 6.0, add 6 pounds of manganese per acre.

### Sidedress N

**Beets, carrots, parsnips:** for soils with more than 3 percent organic matter and following soybeans, alfalfa or a grass-legume hay crop, apply 30 pounds N per acre 4 to 6 weeks after planting. For soils with less than 3 percent organic matter and the above rotation, apply 45 pounds N per acre. Following corn, rye, oats, wheat, or a vegetable crop, apply 60 pounds N per acre.

**Radish, turnip:** none needed.

### Pesticide Use in Greenhouses

Before using any pesticide, always read the product label for mention of greenhouse restrictions. See Selected Information About Recommended Fungicides (page 79), Selected Information About Recommended Herbicides (page 69), and Selected Information About Recommended Insecticides (page 54).

### Disease Control

#### ***Alternaria Leaf Blight (Late Blight of carrot, parsnip, radish, turnip), Cercospora Leaf Spot (Early Blight of carrot, beet, parsnip, turnip)***

Practice a 3-4 year crop rotation. Scout fields to initiate a spray program when foliar blights are first detected (trace of disease). TOM-CAST with 15 disease severity values (DSVs) can help carrot farmers time their fungicide applications for control of foliar blights. See Disease Forecasting Systems (page 84) for details.

#### ***Recommended Products***

**Bravo**<sup>®</sup>, **Echo**<sup>®</sup>, **Equus**<sup>®</sup>, and **Initiate**<sup>®</sup> are labeled for use at various rates. 0-day PHI for carrot. 10-day PHI for parsnip.

**Cabrio EG**<sup>®</sup> at 8-12 oz. per acre. 0-day PHI.

 Several **copper** products are available at various rates. Not all crops are listed on all copper product labels. *Cercospora* only.

**Endura 70WG**<sup>®</sup> at 4.5 oz. acre. *Alternaria on carrot only.* 0-day PHI.

**Flint**<sup>®</sup> at the following rates:

*Carrot, beet, parsnip, turnip:* 2-3 oz. per acre.

*Alternaria on radish only:* 2-4 oz. per acre.

7-day PHI.

**Fontelis 1.67SC**<sup>®</sup> at 16-30 fl. oz. per acre. 0-day PHI.

**Gem 500SC**<sup>®</sup> at 1.9-2.9 fl. oz. per acre. *Carrot, beet, parsnip, and turnip only.* 7-day PHI.

 May be acceptable for use in certified organic production. Check with your certifier before use.

**Iprodione 4L AG<sup>®</sup>, Rovral 4 Flowable<sup>®</sup>, or Meteor<sup>®</sup>**, at 1-2 pts. per acre. *Alternaria on carrot only*. 0-day PHI.

**Luna Sensation<sup>®</sup>** at the following rates:

*Alternaria on parsnip, radish, turnip*: 5-5.8 fl. oz. per acre. 7-day PHI.

*Carrot only*: 4-7.6 fl. oz. per acre. 7-day PHI.

**Luna Tranquility<sup>®</sup>** at 11.2 fl. oz. per acre. *Alternaria only*. 7-day PHI.

**Merivon<sup>®</sup>** at the following rates:

*Alternaria*: 4-5.5 fl. oz. per acre.

*Cercospora*: 5.5 fl. oz. per acre.

7-day PHI.

**Monsoon<sup>®</sup>, Onset 3.6L<sup>®</sup>, Orius 3.6F, Tebuzol 3.6F<sup>®</sup>, Toledo 3.6F<sup>®</sup>** at the following rates:

*Cercospora on beet only*: 3-7.2 fl. oz. per acre.

*Cercospora on turnip only*: 4-7.2 fl. oz. per acre.

7-day PHI.

**Omega 500F<sup>®</sup>** at 1 pt. per acre. *Alternaria on carrot only*. 7-day PHI.

**Pristine 38WG<sup>®</sup>** at 8-10.5 oz. per acre. *Carrot only*. 0-day PHI.

**Propimax EC<sup>®</sup>, Tilt<sup>®</sup>** at 4 fl. oz. per acre. *Alternaria on carrot only*. 14-day PHI.

**Quadris Flowable<sup>®</sup>** at the following rates:

*Cercospora*: 9-15.5 fl. oz. per acre.

*Alternaria*: 6-15.5 fl. oz. per acre.

0-day PHI.

**Quadris Opti<sup>®</sup>** at 2.4 pts. per acre. *Carrot only*. 0-day PHI.

**Quadris Top<sup>®</sup>** at 12-14 fl. oz. per acre. *Alternaria and Cercospora on carrot only*. 7-day PHI.

**Quilt<sup>®</sup>** at 14 oz. per acre, or **Quilt Xcel<sup>®</sup>** at 14 fl. oz. per acre. *Carrot only*. 14-day PHI.

**Switch<sup>®</sup>** at 11-14 oz. per acre. *Alternaria leaf blight only*. Do not exceed 2 applications to radish. 7-day PHI.

### **Aster Yellows (carrot and parsnip)**

Use an insecticide to control leafhoppers that transmit the disease. Controlling leafhoppers early in the season is essential. You must control leafhoppers before they feed.

### **Bacterial Leaf Blight (carrot)**

Copper sprays labeled for *Cercospora* may be helpful; however, bacteria may become resistant to copper products. Early bacterial leaf blight symptoms may mimic *Alternaria* leaf spot.

Bacteria may occur on seed and can survive on carrot debris in soil. Bacteria spread within a field by rain or overhead irrigation. Under dry conditions, low levels of bacterial leaf blight may not result in significant crop loss. Under hot and wet conditions, high levels of bacterial blight may develop and lead to premature defoliation and an inability to harvest the roots via a mechanical harvester. Work under blighted fields as soon as the crop is harvested so the infected foliage can decompose rapidly, which will reduce the survival of the bacteria in the soil.

### **Recommended Products**

**Copper** products labeled for *Cercospora* may provide some control.

### **Cavity Spot (carrot)**

Cavity spot can affect root quality and yield.

### **Recommended Products**

**Presidio<sup>®</sup>** at 4 fl. oz. per acre in-furrow at 5-10 gals. per acre. 7-day PHI.

**Ranman<sup>®</sup>** at 6 fl. oz. per acre. 14-day PHI.

**Reason 500SC<sup>®</sup>** at 8.2 fl. oz. per acre. 14-day PHI.

**Ridomil Gold SL<sup>®</sup>** at the following rates:

*Preplant incorporation or soil spray*: 0.5-1.3 pts. per acre.

*Postplant chemigation, shanked in, or directed spray*: 0.25-1 pt. per acre.

7-day PHI.

**Ridomil Gold Bravo<sup>®</sup>** at 1.5-2.5 pts. per acre as a foliar spray. 7-day PHI.

**Ridomil Gold Copper<sup>®</sup>** at 1-2 lbs. per acre as a foliar spray. 7-day PHI.

**Ultra Flourish<sup>®</sup>** at the following rates:

*Preplant incorporation or soil spray*: 1-2.6 pts. per acre.

*Postplant chemigation, shanked in, or directed spray*: 0.5-2 pts. per acre.

### **Damping-off (beet, parsnip, radish, turnip)**

Conditions that favor rapid seedling germination may limit damping-off severity. Avoid excessive irrigation and poorly drained soils.

#### **Recommended Products**

**Presidio**® at 3-4 fl. oz. per acre. *Pythium damping-off only*. 0-day PHI.

**Quadris Flowable 2.08SC**® at 0.4-0.8 fl. oz. per 1,000 row-feet. 0-day PHI.

**Reason 500SC**® at 8.2 fl. oz. per acre. *Pythium damping-off only*. 14-day PHI.

**Uniform**® at 0.34 fl. oz. per 1,000 ft. of row. *Beet, parsnip, radish, and turnip only*. Make one application per crop season.

### **Root-knot Nematode**

Sample fields for plant-parasitic nematodes before planting. Avoid fields with high numbers of root-knot nematodes.

### **Septoria Leaf Spot (radish)**

Practice a 3-year crop rotation. Plow crop residue as soon as possible after harvest. Avoid volunteer plants and cruciferous weeds.

#### **Recommended Products**

**Flint**® at 2-4 oz. per acre. 7-day PHI.

### **White Mold**

Practice a 3-4-year crop rotation. Avoid rotating with beans, cucurbits, celery, and late cabbage.

#### **Recommended Products**

**Endura 70WG**® at 7.8 oz. acre. *Carrot only*. 0-day PHI.

**Fontelis 1.67SC**® at 16-30 fl. oz. per acre. *Carrot, beet, radish, and turnip only*. 0-day PHI.

**Luna Sensation**® at the following rates:

*Beet, parsnip, radish, and turnip*: 5.8 fl. oz. per acre.

*Carrot*: 7.6 fl. oz. per acre.

7-day PHI.

**Luna Tranquility**® at 11.2 fl. oz. per acre. 7-day PHI.

**Omega**® at 1 pt. per acre. *Carrot only*. 7-day PHI.

### **White Rust (radish, turnip)**

Practice a 3-year crop rotation. Plow crop residue as soon as possible after harvest. Avoid volunteer plants and cruciferous weeds.

### **Recommended Products**

**Cabrio EG**® at 8-16 oz. per acre. *White rust only*. 0-day PHI.

**Ridomil Gold Copper**® at 1-2 lbs. per acre as a foliar spray. *White rust on radish only*. 7-day PHI.

### **Weed Control**

Cultivation and hand hoeing are usually important components of weed control in root crops. Design bed and row spacing to match equipment that will be used. Use of a stale seedbed is helpful.

Prepare the seedbed several weeks in advance of planting, allow weeds to emerge, and kill weeds without bringing new weed seeds to the surface. This can be done with an herbicide labeled for the crop, flaming, or very shallow cultivation. It may be possible to plant without killing the weeds, and then kill them until just before the crop emerges.

If the time between seedbed preparation and planting is short, weed emergence can be speeded up by putting a row cover over the soil. Weeds that emerge after seeding and before the crop can also be controlled with a labeled herbicide or flaming. For crops like carrots and parsnips that take a long time to emerge, controlling these weeds is especially useful, but it can also pay off for faster-emerging species like radishes or beets.

For specific weeds controlled by each herbicide, check Relative Effectiveness of Herbicides for Vegetable Crops (page 68).

Rates provided in the recommendations below are given for overall coverage. For band treatment, reduce amounts according to the portion of acre treated.

### **Burndown or Directed/Shielded Applications Broadleaves and Grasses**

#### **Recommended Products**

**Glyphosate** products at 0.75-3.75 lbs. acid equivalent (ae) per acre. Use formulations containing 3 lbs. ae per gal. (4 lbs. isopropylamine salt per gal.) at 1-5 qts. per acre, or formulations containing 4.5 lbs. ae per gal. (5 lbs. potassium salt per gal.) at 0.66-3.3 qt. per acre. Broadcast before seeding, or apply between crop rows with wipers or hooded or shielded sprayers. Use lower rate for annuals and higher rates for perennials. See label for suggested application volume and adjuvants. 14-day PHI.

**Gramoxone SL 2.0**® at 2-4 pts. per acre. *Carrots and turnips only. Not for beets, horseradish, parsnips, or radishes.* Use 1 qt. of COC or 4-8 fl. oz. of NIS per 25 gals. of spray solution. Apply before or after seeding but before crop emerges. RUP.

## **Preemergence Broadleaves and Grasses**

### **Recommended Products**

**Dual Magnum**® at the following rates:

*Carrots in Michigan only:* 0.5-1.0 pt. per acre on mineral soils, or 1.33-2.0 pts. per acre on muck soils (more than 20% organic matter) after planting but before carrots emerge. Do not apply both pre- and postemergence. 64-day PHI.

*Carrots in Indiana, Michigan, Minnesota, and Ohio only:* 0.67-1.3 pts. per acre on mineral soils, or 1.3-2 pts. per acre on muck soils (more than 20% organic matter). Apply postemergence after carrots have 3-5 true leaves for residual control of weeds. Do not apply both pre- and postemergence. 64-day PHI.

*Beet, radish, and turnip root in Indiana, Michigan and Ohio only; and parsnip in Michigan only.* 0.67-1 pt. per acre on mineral soils, or up to 1.3 pts. per acre on muck soils. Apply before planting with or without incorporation, or apply after seeding before crop emerges. Risk of crop injury is generally greater with preplant incorporated applications than with preplant or preemergence applications. Risk of crop injury is greater on coarse-textured soils with less than 1.5% organic matter. Do not exceed 1.3 pts. per acre per crop or 1 application per crop.

*Horseradish:* 1.0-1.33 pts. per acre. Apply after planting and before weeds emerge. Do not apply more than once per crop.

**Lorox 50DF**® at the following rates:

*Carrots in Michigan and Minnesota only:* 1-2 lbs. per acre.

*Parsnips:* 1.5-3 lbs. per acre. Apply after seeding before crop emerges. Plant seed at least 1/2 inch deep.

*Horseradish:* 1-3 lbs. per acre. Apply after planting or before leaves emerge in the spring. After planting, irrigate before applying if it does not rain. Do not apply more than 3 lbs. per acre per year.

*Not for other root crops.* Use low rate on coarse soils and higher rate on heavy soils and muck. Do not use on sand, loamy sand, or soils with less than 1% organic matter.

**Nortron SC**® at the following rates on *beets only:*

*Preemergence:* 60 fl. oz. per acre. Apply at (or soon after) seeding, and before weeds germinate.

*Early postemergence:* 5.25 fl. oz. per acre. Apply when beets have 2-4 true leaves.

*Postemergence:* 10.5 fl. oz. per acre. Apply when beets have 6-8 true leaves.

*Beets only.* May cause temporary leaf fusion. May injure stressed plants. Use on mineral soils only. Do not exceed 96 fl. oz. per acre per season.

**Outlook**® at 12-21 fl. oz. per acre. *Horseradish only.* Apply from 2-leaf stage to 8-leaf stage of horseradish. Cold, wet conditions at application may stunt horseradish. Will not control emerged weeds. 40-day PHI.

**Prowl H2O**® at 2 pts. per acre. *Carrots only.* Apply within 2 days after seeding and before crop and weeds emerge. Or apply at layby as a directed spray between rows. Do not allow spray to contact carrot plants. Will not control emerged weeds. Do not exceed 2 pts. per acre per season. 60-day PHI.

**Trifluralin** products at 0.5-0.75 lb. a.i. per acre. Use 4EC formulations at 1-1.5 pts. per acre. *Carrots and radishes only.* Use lowest rate on coarse soils. Apply and incorporate before planting. Not effective on soils with high organic matter.

## **Preemergence Broadleaves**

### **Recommended Products**

**Caparol 4L**® at the following rates:

*Carrots only:* 1-2 pts. per acre. May stunt carrot. Use lowest rate on sandy soils. Do not apply after carrots have 6 leaves. Do not exceed 8 pts. per acre per year. 30-day PHI.

*Celeriac only:* 1.6-4 pts. per acre. Apply after transplanting after crop has 6-8 leaves. Use low rate on light soils. 60-day PHI.

*Do not use on other root crops.*

**Goal 2XL**® at 2 pts. per acre, or **GoalTender 4SC**® at 1 pt. per acre. *Horseradish only.* Apply after planting prior to crop emergence.

**Spartan 75DF**®, at 1.5-5.3 oz. per acre, or **Spartan 4F**®, at 2.25-8.0 fl. oz. per acre, or **Spartan Charge**® at 2.9-10.2 fl. oz. per acre. *Horseradish only.* Spartan Charge® has postemergence contact activity. Broadcast in the spring before planting or after planting but at least 5 days before crop emergence; or band into row middles after crop emergence. Applications made in the spring shortly before planting may be incorporated, but do not incorporate at other times. Rainfall or irrigation

is required to move herbicide into the soil when not incorporated. Do not broadcast if sprouts are close to soil surface, or over top of emerged crop. Do not use on sand soils with less than 1% organic matter. Do not exceed 5.3 oz. of Spartan 75DF® per 12-month period. Do not exceed 8 fl. oz. of Spartan 4F® per 12-month period. Do not exceed 10.2 fl. oz. of Spartan Charge® per 12-month period.

### Preemergence Grasses

#### Recommended Products

**Ro-Neet 6E®** at 0.5-0.67 gals. per acre. *Beets only.* Apply before planting and incorporate immediately. Mineral soils only.

### Postemergence Broadleaves and Grasses

#### Recommended Products

**Glyphosate** products. See details above for Burndown or Directed/Shielded Applications Broadleaves and Grasses.

**Nortron SC®** See details above for Preemergence Broadleaves.

**Lorox 50DF®** at 1.5-3 lbs. per acre. *Carrot and celeriac only.* Do not use on sand, loamy sand, or soils with less than 1% organic matter. *Carrot:* Apply when crop is at least 3 inches tall. Will provide some residual control of nonemerged weeds. Do not apply if temperature is above 85°F. Do not exceed 4 lbs. per acre per season. 14-day PHI. *Celeriac:* Broadcast after transplanted celeriac is established and before it is 8 inches tall. Do not add surfactants, nitrogen (or other fertilizers), or other pesticides to the spray mix. 60-day PHI.

### Postemergence Broadleaves

#### Recommended Products

**Aim EC®** at 0.5-2 fl. oz. per acre. Apply with hooded sprayers as a directed application between crop rows. Use COC or NIS. Weeds must be actively growing and less than 4 inches tall. Do not allow spray to contact crop. Do not exceed 6.1 fl. oz. per acre per season.

**Caparol 4L®** at 1.5-2 pts. per acre. *Carrots only.* Do not apply after carrots have 6 leaves. Do not exceed 8 pts. per acre per year. 30-day PHI.

Products containing **metribuzin** at the following rates on *carrot only:*

*4F formulations:* at 0.5 pt. per acre

*75DF formulations:* 0.33 lb. per acre.

Broadcast after carrots have 5-6 true leaves and when weeds are less than 1 inch tall or across. Do not apply within 3 days of cool, cloudy weather, or other pesticide application, or when temperature is

above 85°F. Do not exceed 1 application per season if carrots are rotated with onions; otherwise do not exceed 1 pt. of 4F products per acre per season, or 0.66 lb. of 75DF products per acre per season. 60-day PHI.

**Spin-Aid 1.3E®** at 3-6 pts. per acre in 11-22 gals. of water. *Beets only.* Apply to beets with 4 true leaves to avoid injury. Do not apply if beets are stressed. Does not control pigweed. 60-day PHI.

**Stinger 3L®** at 8 fl. oz. per acre. *Beets and turnips only.* Controls primarily composites and nightshade. Do not exceed 1 application per year for turnip. Do not exceed 2 applications per year for beet. 30-day PHI for beets and turnip roots.

**Upbeet®** at 0.5 oz. per acre. *Beets only.* Apply postemergence when beets have 2-4 true leaves and 4-6 leaves to control velvetleaf and mustards. Suppresses lambsquarters, pigweed, nightshade, ragweed, smartweed, and wild buckwheat. Add 8 fl. oz. NIS per 25 gals. spray solution. Do not exceed 1.5 oz. per acre per season. 30-day PHI.

### Postemergence Grasses

#### Recommended Products

**Clethodim** products at the following rates:

**Select Max®** at 9-16 fl. oz. per acre. Use Select Max® with 8 fl. oz. of NIS per 25 gals. of spray solution (0.25% v/v). Do not exceed 64 fl. oz. of Select Max® per acre per season.

**2EC formulations of clethodim products** at 6-8 fl. oz. per acre. Use 2EC formulations with 1 qt. COC per 25 gals. of spray solution (1% v/v). Do not exceed 32 fl. oz. of 2EC formulations per acre per season.

Spray on actively growing grass. Wait at least 14 days between applications. 15-day PHI for radishes. 30-day PHI for root crops. 14-day PHI for turnip greens.

**Fusilade DX®** at 10-12 fl. oz. per acre. *Carrots only.* Use 1-2 pts. of COC or 0.5-1 pt. of NIS per 25 gals. of spray solution. Spray on actively growing grass. 45-day PHI.

**Poast 1.5E®** at 1-1.5 pts. per acre. *Beets, carrots, celeriac, horseradish, parsnips, radishes, rutabaga, and turnips only.* Not for beet greens. Use 1 qt. of COC per acre. Spray on actively growing grass. Do not exceed 2.5 pts. per acre per season for celeriac, parsnips, radishes, rutabaga, and turnips; or 5 pts. per acre per season for beets, carrots, and horseradish. 14-day PHI for celeriac, parsnips, radishes, rutabaga, and turnips. 30-day PHI for carrots. 60-day PHI for beets and horseradish.

**Herbicides for Root Crops: Beet, Carrot, Horseradish, Radish and Turnip<sup>1</sup>**

Products (REI/PHI)	Common Name	Timing and Application Location Relative to Crop <sup>2</sup>				Incorporated	Timing Relative to Weeds		Weed Groups Controlled			Crops <sup>3</sup>				
		Before seeding/planting	After seeding / planting	Postemergence -between rows only	Postemergence		Premergence	Postemergence	Annual grasses	Small-seeded broadleaves	Broadleaves	Beet	Carrots	Horseradish	Parsnip	Radish
Aim EC <sup>®</sup> (12h)	carfentrazone			X			X		X	X	X	X	X	X	X	
Caparol <sup>®</sup> (12h/30d)	prometryn		X				X		X							
Dual Magnum <sup>®</sup> (24h/variable)	s-metolachlor	X	X				X	X	X					X		X
Goal <sup>®</sup> (12h/-)	oxyfluorfen		X				X		X	X						
Gramoxone <sup>®</sup> (12h to 24h)	paraquat	X	X				X	X	X	X						
Lorox 50DF <sup>®</sup> (24h/14d)	linuron		X				X	X	X				X			
Nortron SC <sup>®</sup> (12h/-)	ethofumesate	X	X				X	X	X							
Outlook <sup>®</sup> (12h/5-)	dimethenamid-P						X	X	X							
Poast <sup>®</sup> (12h/14d to 60d)	sethoxydim						X	X	X					X	X	X
Prowl <sup>®</sup> (12h/60d)	pendimethalin		X				X	X	X							
Ro-Neet <sup>®</sup> (12h/-)	cycloate	X							X							
Roundup <sup>®</sup> , others (12h/14d)	glyphosate	X		X				X	X	X	X	X	X	X	X	X
Select Max <sup>®</sup> , others (12h/15d to 30 d)	clethodim							X	X					X	X	X
Sencor <sup>®</sup> (12h/60d)	metribuzin							X	X					X		
Spartan <sup>®</sup> (12h/-)	sulfentrazone	X	X	X					X	X				X		
Spartan Charge <sup>®</sup> (12h/-)	sulfentrazone + carfentrazone	X	X	X					X	X				X		
Spin-Aid <sup>®</sup> (12h/60d)	phenmedipham								X	X						
Stinger <sup>®</sup> (12h/30d)	clopyralid							X	X							X
Treflan <sup>®</sup> , others (12h/-)	trifluralin	X							X	X						X
Upbeet <sup>®</sup> , (4h/30d)	trisulfuron							X	X					X		

<sup>1</sup>For effectiveness against specific weeds, see Relative Effectiveness of Herbicides for Vegetable Crops (page 68), and read label. This table does not include all label information. Be sure to read and follow all instructions and precautions on the herbicide label. Herbicides can cause serious crop injury and yield loss if not used properly.  
<sup>2</sup>X=permitted for at least one crop.  
<sup>3</sup>X=may be used for that crop; check label for application methods permitted.

## Insect Control for Beets

### Aphids

#### Recommended Products

**Actara**® (25WDG) at 1.5-3 oz. per acre. Do not exceed 8 oz. per acre per season. 7-day PHI.

**Admire Pro**® (4.6F) at 4.4-10.5 fl. oz. per acre. Do not exceed 10.5 fl. oz. or 1 application per season. 21-day PHI.

**Beleaf**® (50SG) at 2-2.8 oz. per acre. 3-day PHI.

**Malathion 5EC**® at 1.5-2 pts. per acre. Do not exceed 3 applications per season. 7-day PHI.

 **M-Pede**® at 1-2% by volume. Must contact aphids to be effective. 0-day PHI.

**Platinum**® (2SC) at 5-12 fl. oz. per acre. Do not exceed 12 fl. oz. per acre per season. Apply at planting.

**Sivanto**® (200SL) at 7-10.5 fl. oz. per acre. Do not exceed 28 fl. oz. per acre per season. 7-day PHI.

### Variegated Cutworms

#### Recommended Products

**Lannate LV**® (2.4WSL) at 1.5 pts. per acre. Do not exceed 8 applications or 12 pts. per acre per crop. 0-day PHI for roots. 10-day PHI for tops. *RUP*.

**Mustang Maxx**® (0.8EC) at 1.28-4 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI. *RUP*.

**Sevin XLR PLUS**® (4F) at 1-2 qts. per acre. Do not exceed 6 qts. per acre per season. 7-day PHI.

## Insect Control for Carrots

### Aphids

#### Recommended Products

**Actara**® (25WDG) at 1.5-3 oz. per acre. Do not exceed 8 oz. per acre per season. 7-day PHI.

**Admire Pro**® (4.6F) at 4.4-10.5 fl. oz. per acre. Do not exceed 10.5 fl. oz. or 1 application per season. 21-day PHI.

**Beleaf**® (50SG) at 2-2.8 oz. per acre. 3-day PHI.

 **M-Pede**® at 1-2% by volume. Must contact aphids to be effective. 0-day PHI.

**Platinum**® (2SC) at 5-12 fl. oz. per acre. Do not exceed 12 fl. oz. per acre per season. Apply at planting.

**Sivanto**® (200SL) at 7-10.5 fl. oz. per acre. Do not exceed 28 fl. oz. per acre per season. 7-day PHI.

## Cutworms

### Cutworm Threshold

25% of plants infested

#### Recommended Products

**Asana XL**® (0.66EC) at 5.8-9.6 fl. oz. per acre. Do not exceed 96 fl. oz. per acre per season. 7-day PHI. *RUP*.

**Baythroid XL**® (1EC) at 1.6-2.8 fl. oz. per acre. Do not exceed 14.0 fl. oz. per acre per season. 0-day PHI. *RUP*.

**Brigade**® (2EC) at 5.1-6.4 fl. oz. per acre (do not exceed 32 fl. oz. per acre per season), or **Brigade**® (WSB) at 12.8-16.0 oz. per acre (do not exceed 80 oz. per acre per season). 21-day PHI. *RUP*.

**Diazinon 50W**® at 4-8 lbs. per acre, or **Diazinon AG500**® at 2-4 qts. per acre. Broadcast just before planting and immediately incorporate into the soil. Do not exceed 1 soil application per season. 14-day PHI. *RUP*.

**Lannate LV**® (2.4WSL) at 0.75-1.5 pts. per acre. Do not exceed 10 applications or 21 pts. per acre per crop. 1-day PHI. *RUP*.

**Mustang Maxx**® (0.8EC) at 1.28-4 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI. *RUP*.

**Sevin XLR PLUS**® (4F) at 1-2 qts. per acre. Do not exceed 6 qts. per acre per season. 7-day PHI.

### Leafhoppers

Plant resistant varieties. Use varieties resistant to aster yellows.

### Leafhopper Threshold

For susceptible varieties: 20 leafhoppers per 100 sweeps

#### Recommended Products

**Actara**® (25WDG) at 1.5-3.0 oz. per acre. Do not exceed 8 oz. per acre per season. 7-day PHI.

**Admire Pro**® (4.6F) at 4.4-10.5 fl. oz. per acre. Do not exceed 10.5 fl. oz. or 1 application per season. 21-day PHI.

**Asana XL**® (0.66 EC) at 5.8-9.6 fl. oz. per acre. Do not exceed 96 fl. oz. per acre per season. 7-day PHI. *RUP*.

**Baythroid XL**® (1EC) at 1.6-2.8 fl. oz. per acre. Do not exceed 14.0 fl. oz. per acre per season. 0-day PHI. *RUP*.

**Lannate LV**® (2.4WSL) at 1.5-3 pts. per acre. Do not exceed 21 pts. per acre per crop. 1-day PHI. *RUP*.

**Platinum**® (2SC) at 5-12 fl. oz. per acre. Do not exceed 12 fl. oz. per acre per season. Apply at planting.

**Sevin XLR PLUS**® (4F) at 0.5-1 qt. per acre. Do not exceed 6 qts. per acre per season. 7-day PHI.

**Sivanto**® (200SL) at 7-10.5 fl. oz. per acre. Do not exceed 28 fl. oz. per acre per season. 7-day PHI.

## Insect Control for Radishes

### Aphids, Flea Beetles

#### Recommended Products

**Actara**® (25WDG) at 1.5-3 oz. per acre. Do not exceed 4 oz. per acre per season. 7-day PHI.

**Admire Pro**® (4.6F) at 4.4-10.5 fl. oz. per acre. Do not exceed 0.38 a.i. or 1 application per season. 21-day PHI.


**Asana XL**® (0.66 EC) at 5.8-9.6 oz. per acre. *Flea beetles only*. Do not exceed 19.2 fl. oz. per acre per season. 7-day PHI. RUP.

**Baythroid XL**® (1EC) at 1.6-2.8 fl. oz. per acre. *Flea beetles only*. Do not exceed 14.0 fl. oz. per acre per season. 0-day PHI. RUP.

**Beleaf**® (50SG) at 2-2.8 oz. per acre. *Aphids only*. 3-day PHI.

**Brigade**® (2EC) at 5.1-6.4 fl. oz. per acre (do not exceed 32 fl. oz. per acre per season), or **Brigade**® (WSB) at 12.8-16.0 oz. per acre (do not exceed 80 oz. per acre per season). *Flea beetles only*. 21-day PHI. RUP.

**Malathion 5EC**® at 1.5 pts. per acre. Do not exceed 3 applications per season. 7-day PHI.

 **M-Pede**® at 1-2% by volume. *Aphids only*. Must contact aphids to be effective. 0-day PHI.

**Platinum**® (2SC) at 5-6.5 fl. oz. per acre. Do not exceed 6.5 fl. oz. per acre per season. Apply at planting.

**Sevin XLR PLUS**® (4F) at 0.5-1 qt. per acre. *Flea beetles only*. Do not exceed 6 qts. per acre per season. 7-day PHI.

**Sivanto**® (200SL) at 7-10.5 fl. oz. per acre. *Aphids only*. Do not exceed 28 fl. oz. per acre per season. 7-day PHI.

### Cutworms

#### Recommended Products

**Baythroid XL**® (1EC) at 1.6-2.8 fl. oz. per acre. Do not exceed 14.0 fl. oz. per acre per season. 0-day PHI. RUP.

**Brigade**® (2EC) at 5.1-6.4 fl. oz. per acre (do not exceed 32 fl. oz. per acre per season), or **Brigade**® (WSB) at 12.8-16.0 oz. per acre (do not exceed 80 oz. per acre per season). 21-day PHI.

**Diazinon 50W**® at 4-8 lbs. per acre, or **Diazinon AG500**® at 2-4 qts. per acre. Broadcast just before planting and immediately incorporate into the soil. Do not exceed 1 soil application per acre per season. 14-day PHI. RUP.

**Mustang Maxx**® (0.8EC) at 1.28-4 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI. RUP.

**Sevin XLR PLUS**® (4F) at 1-2 qts. per acre. Do not exceed 6 qts. per acre per season. 7-day PHI.

### Root Maggots

#### Recommended Products

**Diazinon 50W**® at 4-6 lbs. per acre at planting, or **Diazinon AG600**® at 51-102 fl. oz. per acre as an incorporated preplant broadcast. Do not exceed 1 soil application per acre per season.

**Lorsban 15G**® at 3.3 oz. per 1,000 linear ft. of row in-furrow at planting, or **Lorsban 4E/Advanced**® at 1 fl. oz. per 1,000 linear ft. of row as water-based drench in seed furrows at planting.

## Insect Control for Rutabagas

### Root Maggots

#### Recommended Products

**Diazinon 50W**® at 4-6 lbs. per acre, or **Diazinon AG600**® at 51-102 fl. oz. per acre as an incorporated preplant broadcast. Do not exceed 1 soil application per acre per season.

**Lorsban 15G**® at 4.6-9.2 oz. per 1,000 linear ft. of row at planting, or **Lorsban 4E/Advanced**® at 1.6-3.3 fl. oz. per 1,000 linear ft. of row at planting.

### Aphids, Flea Beetles

#### Recommended Products

**Actara**® (25WDG) at 1.5-3 oz. per acre. Do not exceed 8 oz. per acre per season. 7-day PHI.


**Admire Pro**® (4.6F) at 4.4-10.5 fl. oz. per acre. Do not exceed 0.38 lb. a.i. or 1 application per season. 21-day PHI.

**Beleaf**® (50SG) at 2-2.8 oz. per acre. *Aphids only*. 3-day PHI.

**Malathion 5EC**® at 1.5 pts. per acre. Do not exceed 3 applications per season. 7-day PHI.

 May be acceptable for use in certified organic production. Check with your certifier before use.




 **M-Pede**® at 1-2% by volume. *Aphids only*. Must contact aphids to be effective. 0-day PHI.

**Platinum**® (2SC) at 5-12 fl. oz. per acre. Apply at planting. Do not exceed 12 fl. oz. per acre per season.

**Sivanto**® (200SL) at 7-10.5 fl. oz. per acre. *Aphids only*. Do not exceed 28 fl. oz. per acre per season. 7-day PHI.

## **Imported Cabbageworms, Armyworms**

### **Recommended Products**

 Several *Bacillus thuringiensis* products (Agree®, Bio-bit®, Dipel®, Javelin®, Xentari®) are available. Follow label directions. Begin applications when worms are small. Using *Bt* products will help conserve beneficial insects. 0-day PHI.

**Brigade**® (2EC) at 5.1-6.4 fl. oz. per acre (Do not exceed 32 fl. oz. per acre per season), or **Brigade**® (WSB) at 12.8-16.0 oz. per acre (do not exceed 80 oz. per acre per season). 21-day PHI.

**Coragen**® (1.67SC) at 3.5-7.5 fl. oz. per acre. Do not exceed 15.4 fl. oz. per acre per season. 1-day PHI.

**Mustang Maxx**® (0.8EC) at 3.2-4 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI. *RUP*.

**Radiant SC**® (1SC) at 6-8 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 3-day PHI.

**Sevin XLR PLUS**® (4F) at 1-2 qts. per acre. Do not exceed 6 qts. per acre per season. 7-day PHI.

## **Insect Control for Turnips**

### **Aphids, Flea Beetles**

#### **Recommended Products**

**Actara**® (25WDG) at 1.5-3 oz. per acre. Do not exceed 8 oz. per acre per season. 7-day PHI.

**Admire Pro**® (4.6F) at 4.4-10.5 fl. oz. per acre. Do not exceed 0.38 lb. a.i. or 1 application per season. 21-day PHI.

**Ambush 25W**® at 3.2-6.4 fl. oz. per acre. *Aphids in Illinois and Indiana only*. Do not exceed 8 applications per season. 1-day PHI. *RUP*.

**Asana XL**® (0.66 EC) at 5.8-9.6 oz. per acre. *Flea beetles only*. Do not exceed 76.8 fl. oz. per acre. 7-day PHI. *RUP*.

**Beleaf**® (2EC) at 2-2.8 fl. oz. per acre. *Aphids only*. 3-day PHI.

**Brigade**® (2EC) at 5.1-6.4 fl. oz. per acre (do not exceed 32 fl. oz. per acre per season.), or **Brigade**® (WSB) at 12.8-16.0 oz. per acre (do not exceed 80 oz. per acre per season). 21-day PHI. *RUP*.

**Malathion 5EC**® at 1-2 pts. per acre. Do not exceed 3 applications per season. 1-day PHI.

 **Neemix**® according to label directions. 0-day PHI.


**Platinum**® (2SC) at 5-12 fl. oz. per acre. Apply at planting. Do not exceed 12 fl. oz. per acre per season.

**Sivanto**® (200SL) at 7-10.5 fl. oz. per acre. Do not exceed 28 fl. oz. per acre per season. 7-day PHI.

## **Root Maggots**

### **Recommended Products**

**Lorsban 15G**® at 4.6-9.2 oz. per 1,000 linear ft. of row at planting, or **Lorsban 4E/Advanced**® at 1.6-3.3 fl. oz. per 1,000 linear ft. of row at planting.

 This is a biopesticide. See page 37 for details.

 May be acceptable for use in certified organic production. Check with your certifier before use.