

Potato

Spacing

Rows 34 to 36 inches apart. Seed pieces 9 to 11 inches apart in row, depending on variety and intended use. Seed 16 to 18 100-pound bags per acre. Seed piece should be 1.5 to 2 ounces. Using B-size certified seed will save cutting labor and reduce tuber-borne diseases.

Fertilizing

Lime: To control common scab, soil pH should be within 5.0 to 5.2. However, low soil pH reduces phosphorus availability and increases availability of toxic elements such as manganese and aluminum. If the field has a history of scab, using scab-resistant varieties is recommended. Then, the soil pH can be 6.5 where phosphorus is most available.

Preplant: N: none — only a small amount such as 24 to 30 pounds with the starter fertilizer. P_2O_5 : none — apply 50 to 150 pounds as a starter depending on the soil test results. K_2O : 50 to 400 pounds per acre. Adjust according to soil type, previous management, and soil test results for your state. For the most efficient phosphate application, apply the fertilizer at planting in a band 2 to 3 inches to the side and below each side of the tuber. Examples would be 500 pounds per acre of 6-24-24 or 8-16-16. Do not apply more than 200 pounds of K_2O per acre in the band at planting. On sandy soils, broadcast 30 pounds or band 15 pounds sulfur per acre.

Sidedress N: For irrigated sandy soils, two split N applications are recommended: half at emergence and half at hilling or tuber initiation. For the early maturing varieties, use 50 to 60 pounds of N per acre at each growth stage. The second application can be adjusted according to rainfall and a petiole nitrate-N analysis. For upland or finer textured soils, all of the required N can be applied preplant or shortly after emergence. For soils with more than 3 percent organic matter and following soybeans, alfalfa, or a grass-legume hay crop, apply 100 pounds N per acre. For soils with less than 3 percent organic matter and the above rotation, apply 135 pounds N per acre. For potatoes following corn, rye, oats, wheat, or a vegetable crop, apply 150 pounds N per acre. Refer to University of Minnesota recommendations for N rates adjusted for yield goal.

Vine Killing

Vine Killing Product	Treatment	Comments
Defol 750*	3.2 qts. per acre in 10-20 gals. water by ground or 5-10 gals. by air.	Apply 10 days before harvest. Do not apply in extreme heat during middle of the day.
paraquat	0.8-1.5 pts. per acre of 2.5L or 0.6-1.0 pt. per acre of 3L in 50-100 gals. of water plus 1 gal. COC or 1-2 pts. nonionic surfactant per 100 gals. spray solution. Not for potatoes to be stored or used for seed.	Begin applications when leaves begin to turn yellow. Immature potato foliage and drought-stressed potato foliage are tolerant to this product. Maximum 3 pts. of 2.5L or 2 pts. of 3L per acre per season. For split applications, use lower rate and wait 5 days between applications. Read label for complete instructions. 3L formulation not for use in Iowa or Missouri. 3-day PHI.
Reglone*	1-2 pts. in 20-100 gals. water plus 8-64 fl. oz. nonionic surfactant.	A second application can be made if necessary. Allow at least 5 days between applications. 7-day PHI.
Rely 280*	21 fl. oz. per acre. Not for potatoes to be used for seed.	Do not make more than 1 application. 9-day PHI.

Chemical Sprout Control

Use maleic hydrazide (MH-30) according to label directions one week after blossoms fall. For varieties and conditions where flowering does not occur, apply four to six weeks before potatoes are mature and ready for harvest. Make only one application. Apply when no rain is expected for 24 hours. Potatoes treated with MH cannot be used for seed because sprouting will be inhibited. Follow label directions.

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

Recommended Controls

Black Dot of Potatoes - Colletotrichum Fungus

azoxystrobin formulations (azoxystrobin) 6-15.5 fl. oz. per acre. Quadris®, Satori® and other azoxystrobin formulations are labeled. REI: 4-hour. PHI: 14-day.

chlorothalonil formulations (chlorothalonil) Bravo®, Echo®, Equus®, and Initiate® are labeled at various rates. REI: 12-hour. PHI: 7-day.

Headline SC® (pyraclostrobin) 6-9 fl. oz. per acre. REI: 12-hour. PHI: 3-day.

Luna Tranquility® (fluopyram, pyrimethanil) 8-11.2 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Miravis Prime® (pydiflumetofen, fludioxonil) 9.2-11.4 fl. oz. per acre. Black dot suppression only. REI: 12-hour. PHI: 14-day.

Revus Top® (mandipropamid, difenoconazole) 5.5-7.0 fl. oz. per acre. REI: 12-hour. PHI: 14-day.

Tanos® (famoxadone, cymoxanil) 6-8 oz. per acre. Disease suppression only. REI: 12-hour. PHI: 14-day.

Zing!® (zoxamide, chlorothalonil) 24-34 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Black Scurf of Potatoes - Rhizoctonia Fungus

Always use a crop rotation of 2-3 years. Plant seed pieces certified to be free of disease. Harvest potatoes as soon after maturity as possible. Use a fungicide when appropriate.

azoxystrobin formulations (azoxystrobin) 0.4-0.8 fl. oz. per 1,000 ft. of row furrow. Formulations include Quadris® and Satori®. REI: 4-hour.

Moncut® (flutolanil) 0.7-1.1 lbs. per acre. REI: 12-hour.

Dry Rot of Potatoes - Fusarium Fungus

Avoid bruising at harvest. Cure potatoes in storage at 60°F before lowering temperature. Provide adequate ventilation.

mancozeb formulations (mancozeb) 1 qt. per 50 gals. of water. Dip whole or cut potatoes in solution. REI: 24-hour.

Mertect 340F® (thiabendazole) 0.42 oz. per 2,000 lbs. of tubers. REI: see label.

Early Blight of Potatoes - *Alternaria Fungus*

Choose a cultivar with partial resistance to early blight.

Avoid droughty, wet, or compacted soils, and other conditions (such as insufficient nitrogen) that might add undue stress to the crop and increase susceptibility to early blight. Rotate fields away from potato production for 2-3 years.

Group 11 Resistance

Strains of the fungus that cause early blight that are resistant to group 11 fungicides have been observed. Group 11 products labeled for potato and early blight include Gem[®], Headline[®], and Quadris[®], and Satori[®]. See Selected Information About Recommended Fungicides (page 79) for more information.

azoxystrobin formulations (azoxystrobin) 6-15.5 fl. oz. per acre. Quadris[®], Satori[®], and other azoxystrobin formulations are labeled. REI: 4-hour. PHI: 14-day.

chlorothalonil formulations (chlorothalonil) Bravo[®], Echo[®], Equus[®], and Initiate[®] are labeled at various rates. REI: 12-hour. PHI: 7-day.

Endura[®] (boscalid) 3.5-4.5 oz. per acre. REI: 12-hour. PHI: 10-day.

Gavel 75DF[®] (zoxamide, mancozeb) 1.5-2 lbs. per acre. REI: 48-hour. PHI: 14-day.

Headline SC[®] (pyraclostrobin) 6-9 fl. oz. per acre. REI: 12-hour. PHI: 3-day.

iprodione formulations (iprodione) 1-2 pts. per acre. Several formulations of iprodione containing fungicides are available including Rovral[®] and Iprodione 4L[®]. REI: 24-hour. PHI: 14-day.

Luna Tranquility[®] (fluopyram, pyrimethanil) 8-11.2 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

mancozeb formulations (mancozeb) REI: 24-hour. PHI: 14-day.

Miravis Prime[®] (pydiflumetofen, fludioxonil) 9.2-11.4 fl. oz. per acre. Black dot suppression only. REI: 12-hour. PHI: 14-day.

Quadris Opti[®] (azoxystrobin, chlorothalonil) 1.6 pts. per acre. REI: 12-hour. PHI: 14-day.

Revus Top[®] (mandipropamid, difenoconazole) 5.5-7.0 fl. oz. per acre. REI: 12-hour. PHI: 14-day.

Scala SC[®] (pyrimethanil) 7 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Tanos[®] (famoxadone, cymoxanil) 6 oz. per acre. REI: 12-hour. PHI: 14-day.

Velum Prime[®] (fluopyram) 6.5-6.84 fl. oz. per acre. Apply through overhead irrigation. REI: 12-hour. PHI: 7-day.

Zing![®] (zoxamide, chlorothalonil) 24-34 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Late Blight of Potatoes - *Phytophthora Oomycete*

Destroy all potato cull piles.

The fungus that causes late blight does not overwinter in areas where hard freezes occur regularly. The fungus must be re-introduced on winds or plant material each year.

chlorothalonil formulations (chlorothalonil) Bravo[®], Echo[®], Equus[®], and Initiate[®] are labeled at various rates. REI: 12-hour. PHI: 7-day.

Curzate 60DF[®] (cymoxanil) 3.2 oz. per acre. REI: 12-hour. PHI: 14-day.

Gavel 75DF[®] (zoxamide, mancozeb) 1.5-2 lbs. per acre. REI: 48-hour. PHI: 14-day.

mancozeb formulations (mancozeb) REI: 24-hour. PHI: 14-day.

Omega 500F[®] (fluazinam) 5.5 fl. oz. per acre. REI: see label. PHI: 14-day.

Orondis Opti Premix[®] (oxathiapiprolin, chlorothalonil) Follow rates on multipack container. Apply as a tank-mix of both products in multi-pack. REI: 12-hour. PHI: 7-day.

Orondis Ultra Premix[®] (oxathiapiprolin, mandipropamid) Follow rates given on each multi-pack container. Apply as a tank mix of both products in multi-pack. REI: 4-hour. PHI: 14-day.

Previcur Flex[®] (propamocarb) 0.7-1.2 pts. per acre. REI: 12-hour. PHI: 14-day.

Ranman 400SC[®] (cyazofamid) 1.4-2.75 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Revus Top[®] (mandipropamid, difenoconazole) 5.5-7.0 fl. oz. per acre. REI: 12-hour. PHI: 14-day.

Tanos[®] (famoxadone, cymoxanil) 6-8 oz. per acre. Disease suppression only. REI: 12-hour. PHI: 14-day.

Zampro[®] (ametoctradin, dimethomorph) 11-14 fl. oz. per acre. REI: 12-hour. PHI: 4-day.

Zing![®] (zoxamide, chlorothalonil) 30-34 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Root-Knot Nematode

Sample fields during growing season for parasitic nematodes before planting. Avoid fields with high numbers of root-knot and/or lesion nematodes.

Nimitz® (fluensulfone) 3.5-7 pts. per acre. Apply at planting according to label. REI: see label.

Telone II® (1,3-dichloropropene) See label for rates. RUP. Other Telone formulations available. REI: see label. RUP.

Vapam HL® (metam sodium) See label for rates. REI: see label. RUP.

Velum Prime® (fluopyram) 6.5-6.84 fl. oz. per acre. Apply through overhead irrigation. REI: 12-hour. PHI: 7-day.

Vydate L® (oxamyl) 1-2 gals. per acre in 20 gals. of water broadcast. Incorporate 2-4 inches. RUP REI: 48-hour. PHI: 7-day. RUP.

Silver Scurf of Potatoes - Helminthosporium Fungus

Always use a crop rotation of 2-3 years. Plant seed pieces certified to be free of disease. Harvest potatoes as soon after maturity as possible. Use a fungicide when appropriate.

azoxystrobin formulations (azoxystrobin) 0.4-0.8 fl. oz. per 1,000 ft. of row furrow. Formulations include Quadris® and Satori®. REI: 4-hour.

White Mold (Timber Rot) of Multiple Crops - Sclerotinia Fungus

Avoid excess nitrogen. Reduce overhead irrigation if disease is present.

Contans WG® (Coniothyrium minitans) Apply immediately after harvest or 3-4 months before planting. REI: 4-hour. OMRI-listed.

Endura® (boscalid) 5.5-10 oz. per acre. REI: 12-hour. PHI: 10-day.

iprodione formulations (iprodione) 2 pts. per acre. Several formulations are available including Rovral® and Iprodione 4L®. REI: 24-hour. PHI: 14-day.

Luna Tranquility® (fluopyram, pyrimethanil) 11.2 fl. oz. per acre. REI: 12-hour. PHI: 7-day.

Omega 500F® (fluazinam) 5.5-8 fl. oz. per acre. REI: see label. PHI: 14-day.

Topsin 4.5FL® (thiophanate-methyl) 20-30 fl. oz. per acre. REI: see label. PHI: 21-day PHI.

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.

Velum Prime® (fluopyram) 6.5-6.84 fl.oz. per acre. Apply through overhead irrigation. REI: 12-hour. PHI: 7-day.

Weed Control

Potato cultural practices offer several good opportunities to control weeds, beginning with the period between planting and emergence (when early-emerging weeds can be killed with an herbicide or flaming), and continuing through the hilling process (when weeds can be buried or cultivated out). Some organic farmers also use flaming after potatoes emerge because some injury to the potato foliage early in the season can be tolerated. A relatively large number of herbicides are labeled for use on potatoes.

For specific weeds controlled by each herbicide, check Relative Effectiveness of Herbicides for Vegetable Crops table.

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

Recommended Controls**Burndown or Directed/Shielded Applications Broadleaf and Grass Weeds**

glyphosate formulations (glyphosate) 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 qts. per acre. Broadcast before planting, after planting before ground cracks, or apply between crop rows with wipers or hooded or shielded sprayers. Use low rate for annuals and higher rates for perennials. See label for suggested application volume and adjuvants. REI: 4-hour. PHI: 14-day.

Gramoxone SL 2.0® (paraquat) 1-2 pts. per acre. Use 1 qt. of COC, or 4-8 fl. oz. of NIS per 25 gals. of spray solution. Apply before planting, or after planting but before ground cracks. REI: see label. RUP.

Burndown or Directed/Shielded Applications Broadleaf Weeds

Aim EC® (carfentrazone) 0.5-2 fl. oz. per acre. Apply prior to or within 24 hours of planting, or apply between crop rows with hooded sprayer. Do not allow spray to contact crop. Use COC or NIS. Weeds must be actively growing and less than 4 inches tall. Do not exceed 6.1 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day.

Preemergence Broadleaf and Grass Weeds

Dual Magnum® or Dual II Magnum® (s-metolachlor)

1-2 pts. per acre. Use lower rates on coarse soils. Apply and incorporate before planting, or apply after planting before weeds emerge. May also be applied at 1.67 pts. per acre after hilling. Dual Magnum might delay maturity and/or reduce yield of Superior and other early maturing varieties if cold, wet soil conditions occur after treatment. Dual Magnum® can be tank-mixed with Lorox®, Sencor®, Prowl®, or Eptam®. See labels. Do not exceed 3.6 pts. per acre. REI: 24-hour. PHI: 60-day if applied before drag-off, or 40-day if applied at lay-by.

Eptam® (EPTC) Use **Eptam 7E®** at 3.5-7 pts. per acre, or **Eptam 20G®** at 15-20 lbs. per acre. Apply before planting, after drag-off, or as directed spray at lay-by. Incorporate immediately. On muck soils, supplement with linuron or metribuzin products applied before crop emerges and after drag-off. The Superior variety may be sensitive. Suppresses nutsedge. REI: 12-hour. PHI: 45-day.

linuron formulations (linuron) Use **50DF** formulations at 1.5-3 lbs. per acre. Use **4L** formulations at 1.5-4 pts. per acre. Also controls small, emerged weeds. Apply after planting but before crop emergence, when weeds are less than 2 inches tall. Seed pieces must be planted at least 2 inches deep. Do not use on sand, loamy sand, or soils with less than 1 percent organic matter. REI: see label.

Matrix SG® (rimsulfuron) 1-1.5 oz. per acre. Typically combined with full-labeled rates of metribuzin to improve spectrum of broadleaf control. Use 0.5 pt. of NIS per 25 gals. of spray solution if emerged weeds are present. Apply after planting before crop emerges, at hilling, drag-off, or reservoir tillage, to a clean, newly prepared seedbed. Apply post when weeds are less than 1 inch tall. Avoid using adjuvants when potatoes are under heat stress. Do not exceed 2.5 oz. per acre per year. REI: 4-hour. PHI: 30-day.

metribuzin formulations (metribuzin) Use **4F** formulations at 0.5-2 pts. per acre, or **75DF** formulations at 0.33-1.32 lbs. per acre. *Not for early-maturing or red-skinned varieties.* Apply after planting before crop emerges, or apply up to 1 pt. of metribuzin 4F (1.32 lbs. of 75DF formulations) after emergence. Check label for sensitive varieties. Avoid spraying when potatoes are 12-15 inches tall. Do not apply within 3 days of cool, wet, or cloudy weather,

or crop injury may occur. Do not apply within 1 day of other pesticide applications. Do not exceed 2 pts. of 4F formulations or 1.32 lbs. of 75DF formulations per acre per year. REI: 12-hour. PHI: 60-day.

Outlook® (dimethenamid-p) 12-21 fl. oz. per acre. Apply after planting or drag-off and before weeds emerge. In cold and wet conditions potatoes may emerge slowly or be stunted. May be tank-mixed with a number of other potato herbicides. REI: 12-hour. PHI: 40-day.

pendimethalin formulations (pendimethalin) Use **3.8ME** formulations at 1.5-3 pts. per acre. Use **3.3EC formulations** at 1.2-3.6 pts. per acre. Use low rates on coarse soils. Broadcast after planting but before emergence or drag-off, or after potatoes have fully emerged before potatoes are 6 inches tall. May be incorporated. Not effective on muck soils. Do not apply postemergence to stressed potatoes REI: 24-hour.

trifluralin formulations (trifluralin) Use **4EC** formulations at 1-2 pts. per acre. Use **10G** formulations at 5-10 lbs. per acre. Broadcast and incorporate 1-2 inches after planting but before emergence, immediately after drag-off, or after potatoes have fully emerged. Use low rate on coarse soils with less than 2% organic matter. Not effective on muck or high organic matter soils. REI: 12-hour.

Zidua® (pyroxasulfone) Use 2.5-3.25 fl. oz. per acre of SC formulation. Use 1.5-2.0 oz. per acre of WG formulation. Apply after planting and before potatoes emerge. Use with another herbicide. Some varieties may be sensitive to Zidua. REI: 12-hour.

Preemergence Broadleaf Weeds

Chateau SW® (flumioxazin) 1.5 oz. per acre. Minnesota only -- supplemental label. Apply to potatoes after hilling. A minimum of 2 inches of soil must cover vegetative plant parts when applied to avoid injury. Provides suppression of lambsquarters, nightshades, pigweeds, wild mustard, and wild radish. Tank-mixes recommended to improve efficacy. REI: 12-hour.

League® (imazosulfuron) 4.0-6.4 oz. per acre. Apply after planting crop and before crop emerges, or immediately after hilling. Or use 3.2 oz. per acre and after at least 21 days make a second application of 3.2 oz. per acre to control emerged weeds less than 3 inches tall. Or use 3.2-4 oz. per acre after crop emerges and before weeds are 3 inches tall; combine this with other measures to achieve satisfactory

control. When emerged weeds are present use a Valent-recommended surfactant. Use the high rate in fields with a known history of nutsedge. Do not exceed two applications and 6.4 oz. per acre per year. REI: 12-hour. PHI: 45-day.

Reflex® (fomesafen) 1 pt. per acre. Broadcast after planting and before potatoes emerge. When using on any variety for the first time, first determine whether

Herbicides for Potatoes¹

Product (REI/PHI)	Common Name	Timing and Application Location Relative to Crop ²						Timing Relative to Weeds		Weed Groups Controlled			Comments
		Before planting	After planting before grounds cracks	At/after Drag-off	At/after hilling	Between rows, directed/shielded	Postemergence over potato crop	Preemergence	Postemergence	Annual grasses	Small-seeded broadleaves	Broadleaves	
Aim® (12h/-)	carfentrazone	X				X		X		X	X		
Chateau® (12h/-)	flumioxazin				X			X		X	X	Minnesota only.	
Dual (II) Magnum® (12h/40d to 60d)	s-metolachlor	X	X	X	X			X		X	X		
Eptam® (12h/45d)	EPTC	X		X		X		X		X		Incorporate.	
Gramoxone® (12h to 24h/-)	paraquat	X	X						X	X	X	X	
League® (12h/45d)	imazosulfuron		X		X		X	X	X		X	X	
Linuron products (12h/-)	linuron		X					X	X	X	X	X	
Matrix® (4h/60d)	rimsulfuron		X	X	X			X	X	X	X	X	
Metribuzin products (12h/60d)	metribuzin		X				X	X		X	X	X	Not for sensitive varieties.
Outlook® (12h/40d)	dimethenamid-P		X	X				X		X	X		
Pendimethalin products (12h/ -)	pendimethalin		X				X	X		X	X		
Poast® (12h/30d)	sethoxydim	X	X	X	X		X		X	X			
Reflex® (12h/70d)	fomesafen		X					X			X	X	
Roundup®, others (12h/14d)	glyphosate	X	X			X			X	X	X	X	
Select Max®, others (12h/30d)	clethodim	X	X	X	X		X		X	X			
Treflan®, others (12h/-)	trifluralin		X	X				X		X	X		Incorporate.

¹For 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.

²X=permitted on label.

the variety is tolerant to this herbicide. May be tank-mixed with other preemergence herbicides. May not be used on the same land the following year. Alfalfa and most vegetables should not be planted for 18 months. REI: 24-hour. PHI: 70-day.

Postemergence Broadleaf and Grass Weeds

linuron (linuron) See details above for preemergence broadleaves and grasses.

Matrix SG® (rimsulfuron) See details above for preemergence broadleaves and grasses.

Postemergence Broadleaf Weeds

Aim EC® (carfentrazone) See details above for Burndown or Directed/Shielded Applications Broadleaf Weeds.

League® (imazosulfuron) See details above for Preemergence Broadleaf Weeds.

metribuzin formulations (metribuzin) See details above for Preemergence Broadleaf and Grass Weeds.

Postemergence Grass Weeds

clethodim formulations (clethodim) Use 2EC formulations at 6-16 fl. oz. per acre with 1 qt. of COC per 25 gals. of spray solution (1% v/v). Use Select Max® at 9-32 fl. oz. per acre with 8 fl. oz. of NIS per 25 gals. of spray solution (0.25% v/v). Spray on actively growing grass. Wait at least 14 days between applications. Do not exceed 32 fl. oz. of 2EC formulations or 64 fl. oz. of Select Max® per acre per season. REI: 24-hour. PHI: 30-day.

Poast® (sethoxydim) 1.0-2.5 pts. per acre. Use 1 qt. of COC per acre. Spray on actively growing grass. Use high rate on quackgrass. Do not exceed 5 pts. per acre per season. REI: 12-hour. PHI: 30-day.

Insect Control

Recommended Controls

Aphids

M-Pede® (potassium salts of fatty acids) 1-2% by volume. Must contact aphids to be effective. Combine with another labeled product for best results. REI: 12-hour. PHI: 0-day. *OMRI-listed.*

Actara® (thiamethoxam) 1.5-3.0 oz. per acre. Do not exceed 6 oz. per acre per season. See pollinator precautions. REI: 12-hour. PHI: 14-day.

Admire Pro® (imidacloprid) Seed piece treatment: 0.17-0.35 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 5.7-8.7 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 8.7 fl. oz. per acre per season from seed or soil applications. Foliar application: 1.3 fl. oz. per acre applied to foliage. Do not exceed 5.6 fl. oz. per acre per season from foliar applications. See pollinator precautions. REI: 12-hour. PHI: 7-day for foliar applications.

Ambush® (permethrin) 3.2-12.8 oz. per acre. Do not exceed 51.2 oz. per acre per season. REI: 12-hour. *RUP.*

Asana XL® (esfenvalerate) 5.8-9.6 fl. oz. per acre. Do not exceed 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP.*

Assail 30SG® (acetamiprid) 2.5-4.0 oz. per acre. Do not exceed 4 applications per year, or 16 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Athena® (bifenthrin, abamectin) 7-17 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day. *po RUP.*

Belay® (clothianidin) Seed piece treatment: 0.4-0.6 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 9-12 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 12 fl. oz. per acre per season from seed or soil applications. Foliar application: 2-3 fl. oz. per acre applied to foliage. Do not exceed 12 fl. oz. per acre per season from foliar applications. Allow 7 days between applications. See pollinator precautions. REI: 12-hour. PHI: 14-day.

Beleaf 50SG® (flonicamid) 2.0-2.8 oz. per acre. Do not exceed 8.4 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Dimethoate 4E® (dimethoate) 0.5-1.0 pt. per acre. Do not exceed 2 pts. per acre per season. Allow 7 days between application. REI: 48-hour. PHI: 0-day.

Fulfill® (pymetrozine) 2.75-5.5 oz. per acre. Do not exceed 11 oz. per acre per season. Allow 7-days between applications. REI: 12-hour. PHI: 14-day.

Lannate LV® (methomyl) 1.5-3.0 pts. per acre. Do not exceed 15 pts. per acre per season. REI: 48-hour. PHI: 6-day. *RUP.*

Movento® (spirotetramat) 4-5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. Allow 7 days between applications. REI: 24-hour. PHI: 7-day.

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.

Mustang Maxx® (zeta-cypermethrin) 3.2-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 4 days between applications. REI: 12-hour. PHI: 1-day. *RUP*.

Platinum 2SC® (thiamethoxam) 5-8 fl. oz. per acre. Apply as in-furrow spray during planting, as a directed spray to base of plant at emergence, as a broadcast spray during last hilling operation, or as an overhead chemigation after last hilling. Do not exceed 8 fl. oz. per acre per season. Make only one application per season. REI: 12-hour. PHI: NA

Scorpion 35SL® (dinotefuran) Soil application: 11.5-13.25 fl. oz. per acre applied in-furrow at planting, or side-dressed to both sides of the row at ground crack. Do not exceed 13.25 fl. oz. per acre per season from seed or soil applications. Foliar application: 2.0-2.75 fl. oz. per acre applied to foliage. Do not exceed 8.0 fl. oz. per acre per season from foliar applications. Allow 14 days between applications. See pollinator precautions. REI: 12-hour. PHI: 7-day.

Seed treatments (thiamethoxam, mfenoxam, fludioxonil, azoxystrobin, thiabendazole, spinosad, abamectin) See label. Rates vary by product. Choose seed treatments that include thiamethoxam insecticide (Cruiser 5FS®, Cruiser Maxx®, and Cruiser Maxx Potato®). For best results, plant potatoes immediately after treatment. PHI: See label.

Sivanto 200SL® (flupyradifurone) 7.0-10.5 fl. oz. per acre. Do not exceed 28.0 fl. oz. per acre per season. Allow 7 days between applications. REI: 4-hour. PHI: 7-day.

Thimet 20G® (phorate) Light or sandy soils: 8.5-11.3 oz. per 1,000 ft. of row for any row spacing larger than 32-inches. Use at planting or postemergence. Heavy or clay soils: 13.0-17.3 oz. per 1,000 ft. of row. Do not use post emergence. Apply as a band application on each side of row and beneath soil surfaces, or in the seed furrow. REI: 48-hour. PHI: 90-day. *RUP*.

Torac 15EC® (tolfenpyrad) 17-21 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season, or 2 applications. Allow 14 days between applications. See pollination precautions. REI: 12-hour. PHI: 14-day.

Transform WG® (sulfoxaflor) 0.75-1.5 oz. per acre. Do not exceed 8.5 oz. per acre per season. Allow 14 days between applications. REI: 24-hour. PHI: 7-day.

Voliam Flexi® (thiamethoxam, chlorantraniliprole) 4 oz. per acre. Do not exceed 8 oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 14-day.

Vydate C-LV® (oxamyl) 17-34 fl. oz. per acre. Do not exceed 306 fl. oz. per acre per season, or 8 applications per crop. Allow 14 days between applications. In Kansas do not exceed 204 fl. oz. per acre per season, or 4 applications per crop. Allow 14 days between applications. REI: 48-hour. PHI: 7-day. *RUP*.

Warrior II® (lambda-cyhalothrin) 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. REI: 24-hour. PHI: 7-day. *RUP*.

Colorado Potato Beetle

Actara® (thiamethoxam) 1.5-3.0 oz. per acre. Do not exceed 6 oz. per acre per season. See pollinator precautions. REI: 12-hour. PHI: 14-day.

Admire Pro® (imidacloprid) Seed piece treatment: 0.17-0.35 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 5.7-8.7 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 8.7 fl. oz. per acre per season from seed or soil applications. Foliar application: 1.3 fl. oz. per acre applied to foliage. Do not exceed 5.6 fl. oz. per acre per season from foliar applications. See pollinator precautions. REI: 12-hour. PHI: 7-day for foliar applications.

Agri-Mek SC® (abamectin) 1.7-3.5 fl. oz. per acre. Do not exceed 10.25 fl. oz. per acre per season. REI: 12-hour. PHI: 14-day. *RUP*.

Ambush® (permethrin) 3.2-12.8 oz. per acre. Do not exceed 51.2 oz. per acre per season. REI: 12-hour. *RUP*.

Asana XL® (esfenvalerate) 5.8-9.6 fl. oz. per acre. Do not exceed 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP*.

Assail 30SG® (acetamiprid) 1.5-4.0 oz. per acre. Do not exceed 4 applications per year, or 16 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Athena® (bifenthrin, abamectin) 7-17 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day. *RUP*.

Avaunt® 30WDG (indoxacarb) 3.5-6.0 oz. per acre. Do not exceed 24 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Baythroid XL® (beta-cyfluthrin) 1.6-2.8 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. REI: 12-hour. PHI: 0-day. *RUP*.

Colorado Potato Beetle Resistance Management

In some areas of the Midwest, Colorado potato beetle populations are resistant to many insecticides. If a previously effective insecticide is no longer effective, consider switching to another chemical class. If insecticides are still effective, alternating between classes will help prolong their effective lives. If planting time applications of neonirotinoids (Admire Pro®, Gaucho®, Genesis®, Platinum®) are used, foliar neonirotinoids (Actara®, Leverage®) should not be used.

The following table shows the active ingredients and chemical classes of Colorado potato beetle insecticides, and should be used to make resistant management decisions. To avoid promoting insect resistance, make sure to rotate between products that have different Insecticide Resistance Action Committee (IRAC) Group Numbers.

Insecticide	Active Ingredient	Chemical Class	IRAC Group Number
Actara®	thiamethoxam	neonicotinoid	4A
Platinum®	thiamethoxam	neonicotinoid	4A
Admire Pro®	imidacloprid	neonicotinoid	4A
Assail®	acetamiprid	neonicotinoid	4A
Belay®	clothianidin	neonicotinoid	4A
Genesis®	imidacloprid	neonicotinoid	4A
Gaucho®	imidacloprid	neonicotinoid	4A
Leverage®	imidacloprid + cyfluthrin	neonicotinoid + pyrethroid	4A + 3
Endigo ZC®	thiamethoxam = lambda cyhalothrin	neonicotinoid + pyrethroid	4A + 3
Baythroid XL®	cyfluthrin	pyrethroid	3
Ambush®	permethrin	pyrethroid	3
Pounce®	permethrin	pyrethroid	3
Warrior II®	lambda cyhalothrin	pyrethroid	3
Agri-Mek®	abamectin	GABA agonist	6
Epi-Mek®	abamectin	GABA agonist	6
Monitor®	methomidaphos	organophosphate	1B
Kryocide®, Cryolite®	sodium aluminofluoride	mineral	9A
M-Trak®, Novodor®, Raven®	<i>Bacillus thuringiensis</i>	bacterium	11C
Entrust®	spinosad	spinosyn	5
Radiant®	spinetoram	spinosyn	5
Rimon®	novaluron	chitin biosynthesis inhibitor	15
Torac®	tolfenpyrad	mitochondrial complex I electron transport inhibitors	21A
Coragen®	chlorantraniliprole	anthanilic diamide	28
Voliam Flexi®	chlorantraniliprole + thiamethoxam	anthanilic diamide + neonicotinoid	28 + 4A
Voliam Xpress®	chlorantraniliprole + lambda cyhalothrin	anthanilic diamide = pyrethroid	28 + 3

- Belay® (clothianidin)** Seed piece treatment: 0.4-0.6 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 9-12 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 12 fl. oz. per acre per season from seed or soil applications. Foliar application: 2-3 fl. oz. per acre applied to foliage. Do not exceed 12 fl. oz. per acre per season from foliar applications. Allow 7 days between applications. See pollinator precautions. REI: 12-hour. PHI: 14-day.
- Blackhawk® (spinosad)** 1.7-3.3 oz. per acre. Do not exceed 14.4 oz. per acre per season. Allow 7 days between applications. REI: 4-hour. PHI: 7-day.
- Coragen® (chlorantraniliprole)** 3.5-7.5 fl. oz. per acre. Do not exceed 15.4 fl. oz. per acre per season. Allow 5 days between applications. REI: 4-hour. PHI: 14-day.
- Endigo ZC® (thiamethoxam, lambda-cyhalothrin)** 3.5-4.5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. Allow 7 days between applications. REI: 24-hour. PHI: 14-day. *RUP.*
- Entrust® (spinosad)** 3-10 fl. oz. per acre. Do not exceed 21 fl. oz. per acre per season. Allow 7 days between applications. Tolerance/resistance has been observed in Minnesota. Follow resistance management restrictions. REI: 4-hour. PHI: 7-day. *OMRI-listed.*
- Mustang Maxx® (zeta-cypermethrin)** 3.2-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 4 days between applications. REI: 12-hour. PHI: 1-day. *RUP.*
- Novodor FC® (*Bacillus thuringiensis tenebrionis* strain NB-176)** 1-4 qts. per acre. Effective on small (up to 1/4 inch) larvae only. Use higher rate for mixed sizes or heavier infestations. REI: 4-hour. PHI: 0-day.
- Platinum 2SC® (thiamethoxam)** 5-8 fl. oz. per acre. Apply as in-furrow spray during planting, as a directed spray to base of plant at emergence, as a broadcast spray during last hilling operation, or as an overhead chemigation after last hilling. Do not exceed 8 fl. oz. per acre per season. Make only one application per season. REI: 12-hour. PHI: NA
- Pounce 25WP® (permethrin)** 6.4-12.8 oz. per acre. Do not exceed 6.4 lbs. per acre per season. Allow 10 days between applications REI: 12-hour. PHI: 14-day. *RUP.*
- Radiant 1SC® (spinetoram)** 4.5-8 fl. oz. per acre. Do not exceed 32 fl. oz. per acre. Allow 7 days between applications. REI: 4-hour. PHI: 7-day.
- Rimon 0.83EC® (novaluron)** 6-12 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 14-day.
- Scorpion 35SL® (dinotefuran)** Soil application: 11.5-13.25 fl. oz. per acre applied in-furrow at planting, or side-dressed to both sides of the row at ground crack. Do not exceed 13.25 fl. oz. per acre per season from seed or soil applications. Foliar application: 2.0-2.75 fl. oz. per acre applied to foliage. Do not exceed 8.0 fl. oz. per acre per season from foliar applications. Allow 14 days between applications. See pollinator precautions. REI: 12-hour. PHI: 7-day.
- Seed treatments (thiamethoxam, mfenoxam, fludioxonil, azoxystrobin, thiabendazole, spinosad, abamectin)** See label. Rates vary by product. Choose seed treatments that include thiamethoxam insecticide (Cruiser 5FS®, Cruiser Maxx®, and Cruiser Maxx Potato®). For best results, plant potatoes immediately after treatment. PHI: See label.
- Sevin XLR Plus® (carbaryl)** 1.0-2.0 qts. per acre. Some Colorado Potato Beetle populations are resistant to carbaryl, so results may vary. Do not exceed 6 qts. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 7-day.
- Sivanto 200SL (flupyradifurone)** 10.5-14.0 fl. oz. per acre. Do not exceed 28.0 fl. oz. per acre per season. Allow 7 days between applications. REI: 4-hour. PHI: 7-day.
- Thimet 20G® (phorate)** Light or sandy soils: 8.5-11.3 oz. per 1,000 ft. of row for any row spacing larger than 32-inches. Use at planting or postemergence. Heavy or clay soils: 13.0-17.3 oz. per 1,000 ft. of row. Do not use post emergence. Apply as a band application on each side of row and beneath soil surfaces, or in the seed furrow. REI: 48-hour. PHI: 90-day. *RUP.*
- Torac 15EC® (tolfenpyrad)** 14-21 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season, or 2 applications. Allow 14 days between applications. See pollination precautions. REI: 12-hour. PHI: 14-day.
- Voliam Flexi® (thiamethoxam, chlorantraniliprole)** 4 oz. per acre. Do not exceed 8 oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 14-day.
- Warrior II® (lambda-cyhalothrin)** 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. REI: 24-hour. PHI: 7-day. *RUP.*

OMRI-listed indicates that the product is listed by the Organic Materials Review Institute (OMRI.org) and therefore may be acceptable for use in organic production. Check with your certifier before use.

Cutworm Caterpillars

Ambush® (permethrin) 3.2-12.8 oz. per acre. Do not exceed 51.2 oz. per acre per season. REI: 12-hour. *RUP.*

Asana XL® (esfenvalerate) 5.8-9.6 fl. oz. per acre. Do not exceed 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP.*

Baythroid XL® (beta-cyfluthrin) 0.8-1.6 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. REI: 12-hour. PHI: 0-day. *RUP.*

Endigo ZC® (thiamethoxam, lambda-cyhalothrin) 3.5-4.5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. Allow 7 days between applications. REI: 24-hour. PHI: 14-day. *RUP.*

Lannate LV® (methomyl) 1.5 pts. per acre. Do not exceed 15 pts. per acre per season. REI: 48-hour. PHI: 6-day. *RUP.*

Mustang Maxx® (zeta-cypermethrin) 1.28-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 4 days between applications. REI: 12-hour. PHI: 1-day. *RUP.*

Pounce 25WP® (permethrin) 6.4-12.8 oz. per acre. Do not exceed 6.4 lbs. per acre per season. Allow 10 days between applications REI: 12-hour. PHI: 14-day. *RUP.*

Sevin XLR Plus® (carbaryl) 1.0-2.0 qts. per acre. Some Colorado Potato Beetle populations are resistant to carbaryl, so results may vary. Do not exceed 6 qts. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 7-day.

Warrior II® (lambda-cyhalothrin) 0.96-1.60 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. REI: 24-hour. PHI: 7-day. *RUP.*

European Corn Borer Caterpillar

Ambush® (permethrin) 3.2-12.8 oz. per acre. Do not exceed 51.2 oz. per acre per season. REI: 12-hour. *RUP.*

Asana XL® (esfenvalerate) 5.8-9.6 fl. oz. per acre. Do not exceed 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP.*

Assail 30SG® (acetamiprid) 2.5-4.0 oz. per acre. Do not exceed 4 applications per year, or 16 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Athena® (bifenthrin, abamectin) 7-17 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day. *po RUP.*

Avaunt 30WDG® (indoxacarb) 3.5-6.0 oz. per acre. Do not exceed 24 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Baythroid XL® (beta-cyfluthrin) 1.6-2.8 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. REI: 12-hour. PHI: 0-day. *RUP.*

Blackhawk® (spinosad) 1.7-3.3 oz. per acre. Do not exceed 14.4 oz. per acre per season. Allow 7 days between applications. REI: 4-hour. PHI: 7-day.

Coragen® (chlorantraniliprole) 3.5-7.5 fl. oz. per acre. Do not exceed 15.4 fl. oz. per acre per season. Allow 5 days between applications. REI: 4-hour. PHI: 14-day.

Endigo ZC® (thiamethoxam, lambda-cyhalothrin) 4-4.5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. Allow 7 days between applications. REI: 24-hour. PHI: 14-day. *RUP.*

Entrust® (spinosad) 3-10 fl. oz. per acre. Do not exceed 21 fl. oz. per acre per season. Allow 7 days between applications. Tolerance/resistance has been observed in Minnesota. Follow resistance management restrictions. REI: 4-hour. PHI: 7-day. *OMRI-listed.*

Mustang Maxx® (zeta-cypermethrin) 1.76-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 4 days between applications. REI: 12-hour. PHI: 1-day. *RUP.*

Pounce 25WP® (permethrin) 6.4-12.8 oz. per acre. Do not exceed 6.4 lbs. per acre per season. Allow 10 days between applications REI: 12-hour. PHI: 14-day. *RUP.*

Radiant 1SC® (spinetoram) 6-8 fl. oz. per acre. Do not exceed 32 fl. oz. per acre. Allow 7 days between applications. REI: 4-hour. PHI: 7-day.

Rimon 0.83EC® (novaluron) 6-12 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 14-day.

Sevin XLR Plus® (carbaryl) 1.0-2.0 qts. per acre. Some Colorado Potato Beetle populations are resistant to carbaryl, so results may vary. Do not exceed 6 qts. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 7-day.

Voliam Flexi® (thiamethoxam, chlorantraniliprole) 4 oz. per acre. Do not exceed 8 oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 14-day.

Warrior II® (lambda-cyhalothrin) 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. REI: 24-hour. PHI: 7-day. *RUP.*

Flea Beetles

Actara® (thiamethoxam) 1.5-3.0 oz. per acre. Do not exceed 6 oz. per acre per season. See pollinator precautions. REI: 12-hour. PHI: 14-day.

Admire Pro® (imidacloprid) Seed piece treatment: 0.17-0.35 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 5.7-8.7 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 8.7 fl. oz. per acre per season from seed or soil applications. Foliar application: 1.3 fl. oz. per acre applied to foliage. Do not exceed 5.6 fl. oz. per acre per season from foliar applications. See pollinator precautions. REI: 12-hour. PHI: 7-day for foliar applications.

Asana XL® (esfenvalerate) 5.8-9.6 fl. oz. per acre. Do not exceed 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP.*

Assail 30SG® (acetamiprid) 1.5-2.5 oz. per acre. Do not exceed 4 applications per year, or 16 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Athena® (bifenthrin, abamectin) 7-17 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day. *po RUP.*

Baythroid XL® (beta-cyfluthrin) 1.6-2.8 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. REI: 12-hour. PHI: 0-day. *RUP.*

Belay® (clothianidin) Seed piece treatment: 0.4-0.6 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 9-12 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 12 fl. oz. per acre per season from seed or soil applications. Foliar application: 2-3 fl. oz. per acre applied to foliage. Do not exceed 12 fl. oz. per acre per season from foliar applications. Allow 7 days between applications. See pollinator precautions. REI: 12-hour. PHI: 14-day.

Endigo ZC® (thiamethoxam, lambda-cyhalothrin) 3.5-4.5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. Allow 7 days between applications. REI: 24-hour. PHI: 14-day. *RUP.*

Lannate LV® (methomyl) 1.5 pts. per acre. Do not exceed 15 pts. per acre per season. REI: 48-hour. PHI: 6-day. *RUP.*

Platinum 2SC® (thiamethoxam) 5-8 fl. oz. per acre. Apply as in-furrow spray during planting, as a directed spray to base of plant at emergence, as a broadcast spray during last hilling operation, or as an overhead chemigation after last hilling. Do not

exceed 8 fl. oz. per acre per season. Make only one application per season. REI: 12-hour. PHI: NA

Pounce 25WP® (permethrin) 6.4-12.8 oz. per acre. Do not exceed 6.4 lbs. per acre per season. Allow 10 days between applications REI: 12-hour. PHI: 14-day. *RUP.*

Scorpion 35SL® (dinotefuran) Soil application: 11.5-13.25 fl. oz. per acre applied in-furrow at planting, or side-dressed to both sides of the row at ground crack. Do not exceed 13.25 fl. oz. per acre per season from seed or soil applications. Foliar application: 2.0-2.75 fl. oz. per acre applied to foliage. Do not exceed 8.0 fl. oz. per acre per season from foliar applications. Allow 14 days between applications. See pollinator precautions. REI: 12-hour. PHI: 7-day.

Seed treatments (thiamethoxam, mefenoxam, fludioxonil, azoxystrobin, thiabendazole, spinosad, abamectin) See label. Rates vary by product. Choose seed treatments that include thiamethoxam insecticide (Cruiser 5FS®, Cruiser Maxx®, and Cruiser Maxx Potato®). For best results, plant potatoes immediately after treatment. PHI: See label.

Sevin XLR Plus® (carbaryl) 0.5-1.0 qts. per acre. Do not exceed 6 qts. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 7-day.

Thimet 20G® (phorate) Light or sandy soils: 8.5-11.3 oz. per 1,000 ft. of row for any row spacing larger than 32-inches. Use at planting or postemergence. Heavy or clay soils: 13.0-17.3 oz. per 1,000 ft. of row. Do not use post emergence. Apply as a band application on each side of row and beneath soil surfaces, or in the seed furrow. REI: 48-hour. PHI: 90-day. *RUP.*

Voliam Flexi® (thiamethoxam, chlorantraniliprole) 4 oz. per acre. Do not exceed 8 oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 14-day.

Warrior II® (lambda-cyhalothrin) 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. REI: 24-hour. PHI: 7-day. *RUP.*

Leafhoppers

Actara® (thiamethoxam) 1.5-3.0 oz. per acre. Do not exceed 6 oz. per acre per season. See pollinator precautions. REI: 12-hour. PHI: 14-day.

Admire Pro® (imidacloprid) Seed piece treatment: 0.17-0.35 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 5.7-8.7 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 8.7 fl. oz. per acre per season

from seed or soil applications. Foliar application: 1.3 fl. oz. per acre applied to foliage. Do not exceed 5.6 fl. oz. per acre per season from foliar applications. See pollinator precautions. REI: 12-hour. PHI: 7-day for foliar applications.

Ambush® (permethrin) 3.2-12.8 oz. per acre. Do not exceed 51.2 oz. per acre per season. REI: 12-hour. *RUP.*

Asana XL® (esfenvalerate) 5.8-9.6 fl. oz. per acre. Do not exceed 67.2 fl. oz. per acre per season. REI: 12-hour. PHI: 7-day. *RUP.*

Assail 30SG® (acetamiprid) 1.5-4.0 oz. per acre. Do not exceed 4 applications per year, or 16 oz. per acre per season. REI: 12-hour. PHI: 7-day.

Athena® (bifenthrin, abamectin) 7-17 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day. *po RUP.*

Baythroid XL® (beta-cyfluthrin) 0.8-1.6 fl. oz. per acre. Do not exceed 16.8 fl. oz. per acre per season. REI: 12-hour. PHI: 0-day. *RUP.*

Belay® (clothianidin) Seed piece treatment: 0.4-0.6 fl. oz. per 100 lbs. of seed applied directly to seed pieces. Soil application: 9-12 fl. oz. per acre applied in-furrow, side-dressed, or below seed piece at planting. Do not exceed 12 fl. oz. per acre per season from seed or soil applications. Foliar application: 2-3 fl. oz. per acre applied to foliage. Do not exceed 12 fl. oz. per acre per season from foliar applications. Allow 7 days between applications. See pollinator precautions. REI: 12-hour. PHI: 14-day.

Dimethoate 4E® (dimethoate) 0.5-1.0 pt. per acre. Do not exceed 2 pts. per acre per season. Allow 7 days between application. REI: 48-hour. PHI: 0-day.

Endigo ZC® (thiamethoxam, lambda-cyhalothrin) 3.5-4.5 fl. oz. per acre. Do not exceed 10 fl. oz. per acre per season. Allow 7 days between applications. REI: 24-hour. PHI: 14-day. *RUP.*

Lannate LV® (methomyl) 1.5-3.0 pts. per acre. Do not exceed 15 pts. per acre per season. REI: 48-hour. PHI: 6-day. *RUP.*

malathion formulations (malathion) Use the following rates for different formulations. 5 formulations: 1 pt. per acre. 5E formulations: 2 pts. per acre. 57EC formulations: 1-1.5 pts. per acre. PHI: 0-day.

Mustang Maxx® (zeta-cypermethrin) 3.2-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. Allow 4 days between applications. REI: 12-hour. PHI: 1-day. *RUP.*

Platinum 2SC® (thiamethoxam) 5-8 fl. oz. per acre. Apply as in-furrow spray during planting, as a directed spray to base of plant at emergence, as a broadcast spray during last hilling operation, or as an overhead chemigation after last hilling. Do not exceed 8 fl. oz. per acre per season. Make only one application per season. REI: 12-hour. PHI: NA

Pounce 25WP® (permethrin) 6.4-12.8 oz. per acre. Do not exceed 6.4 lbs. per acre per season. Allow 10 days between applications REI: 12-hour. PHI: 14-day. *RUP.*

Scorpion 35SL® (dinotefuran) Soil application: 11.5-13.25 fl. oz. per acre applied in-furrow at planting, or side-dressed to both sides of the row at ground crack. Do not exceed 13.25 fl. oz. per acre per season from seed or soil applications. Foliar application: 2.0-2.75 fl. oz. per acre applied to foliage. Do not exceed 8.0 fl. oz. per acre per season from foliar applications. Allow 14 days between applications. See pollinator precautions. REI: 12-hour. PHI: 7-day.

Seed treatments (thiamethoxam, mefenoxam, fludioxonil, azoxystrobin, thiabendazole, spinosad, abamectin) See label. Rates vary by product. Choose seed treatments that include thiamethoxam insecticide (Cruiser 5FS®, Cruiser Maxx®, and Cruiser Maxx Potato®). For best results, plant potatoes immediately after treatment. PHI: See label.

Sevin XLR Plus® (carbaryl) 0.5-1.0 qts. per acre. Do not exceed 6 qts. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 7-day.

Sivanto 200SL® (flupyradifurone) 7.0-10.5 fl. oz. per acre. Do not exceed 28.0 fl. oz. per acre per season. Allow 7 days between applications. REI: 4-hour. PHI: 7-day.

Thimet 20G® (phorate) Light or sandy soils: 8.5-11.3 oz. per 1,000 ft. of row for any row spacing larger than 32-inches. Use at planting or postemergence. Heavy or clay soils: 13.0-17.3 oz. per 1,000 ft. of row. Do not use post emergence. Apply as a band application on each side of row and beneath soil surfaces, or in the seed furrow. REI: 48-hour. PHI: 90-day. *RUP.*

Torac 15EC® (tolfenpyrad) 14-21 fl. oz. per acre. Do not exceed 42 fl. oz. per acre per season, or 2 applications. Allow 14 days between applications. See pollination precautions. REI: 12-hour. PHI: 14-day.

Transform WG® (sulfoxaflor) 1.5-2.25 oz. per acre. Do not exceed 8.5 oz. per acre per season. Allow 14 days between applications. REI: 24-hour. PHI: 7-day.

Voliam Flexi® (thiamethoxam, chlorantraniliprole) 4 oz. per acre. Do not exceed 8 oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 14-day.

Vydate C-LV® (oxamyl) 17-34 fl. oz. per acre. Do not exceed 306 fl. oz. per acre per season, or 8 applications per crop. Allow 14 days between applications. In Kansas do not exceed 204 fl. oz. per acre per season, or 4 applications per crop. Allow 14 days between applications. REI: 48-hour. PHI: 7-day. *RUP.*

Warrior II® (lambda-cyhalothrin) 0.96-1.60 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. REI: 24-hour. PHI: 7-day. *RUP.*

Wireworms

Admire Pro® (imidacloprid) 0.17-0.35 fl. oz. per 100 lbs. of seed Apply directly to seed pieces. Do not exceed 8.7 fl. oz. per acre per season. See pollinator precautions. REI: 12-hour. PHI: NA

Brigade 2EC® (bifenthrin) 9.6-19.2 fl. oz. per acre. Apply as preplant broadcast and incorporate, at planting as a banded spray into furrow, or at lay-by as a soil-directed and incorporated spray through cultivation. Do not exceed 32 fl. oz. per acre per season. REI: 12-hour. PHI: 21-day. *RUP.*

Capture LFR® (bifenthrin) 12.75-25.5 fl. oz. per acre. Apply as preplant broadcast and incorporate, at planting as a banded spray into furrow, or at lay-by as a soil-directed and incorporated spray through cultivation. REI: 12-hour. PHI: 21-day. *RUP.*

Diazinon AG500® (diazinon) 3-4 qts. per acre. Ohio only - applicators must have a 24(c) label. Preplant broadcast and incorporate into top 4-8 inches of soil. PHI: 3-day. *RUP.*

Platinum 2SC® (thiamethoxam) 5-8 fl. oz. per acre. Apply as in-furrow spray during planting, as a directed spray to base of plant at emergence, as a broadcast spray during last hilling operation, or as an overhead chemigation after last hilling. Do not exceed 8 fl. oz. per acre per season. Make only one application per season. REI: 12-hour. PHI: NA

Regent 4SC® (fipronil) 0.184-0.220 fl. oz. per 1,000 ft. of row. Do not apply in row spacing less than 30 inches. On any row spacing greater than 36 inches, apply no more than 0.220 fl. oz. REI: 0-hour. PHI: 90-day. *RUP.*

Seed treatments (thiamethoxam, mefenoxam, fludioxonil, azoxystrobin, thiabendazole, spinosad, abamectin) See label. Rates vary by product. Choose seed treatments that include thiamethoxam insecticide (Cruiser 5FS®, Cruiser Maxx®, and Cruiser Maxx Potato®). For best results, plant potatoes immediately after treatment. PHI: See label.

Thimet 20G® (phorate) Light or sandy soils: 8.5-11.3 oz. per 1,000 ft. of row for any row spacing larger than 32-inches. Use at planting or postemergence. Heavy or clay soils: 13.0-17.3 oz. per 1,000 ft. of row. Do not use post emergence. Apply as a band application on each side of row and beneath soil surfaces, or in the seed furrow. REI: 48-hour. PHI: 90-day. *RUP.*