RUTGERS
New Jersey Agricultural
Experiment Station

This is a section from the

# 2014 Commercial Vegetable Production Recommendations for New Jersey

Publication E001

The manual, which is published annually, is NOT for home gardener use.

The full manual, containing recommendations specific to New Jersey, can be found on the Rutgers NJAES website in the Publications section
njaes.rutgers.edu

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

*Cooperating Agencies:* Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

*Tobacco mosaic virus (TMV)*: TMV is transmitted mechanically. Use resistant varieties to control TMV.

*Aphid-transmitted viruses (PVX, CMV, TEV, PVY, and AMV)*: CMV has caused problems in peppers in the mid-Atlantic region the past few growing seasons. Infected fruit may develop small, irregular brown spots that run parallel on fruit. Young developing leaves may develop mosaic symptoms. The positive identification of pepper viruses with laboratory tests can be difficult. Importantly, these viruses of pepper cannot adequately be controlled with insecticide applications, but symptom expression can be delayed through their use. Since aphids transmit the virus, growers may wish to use yellow trap pans containing water to determine when mass flights of winged aphids occur. Repeated applications of a contact aphicide at those times are most beneficial.

*Thrips-transmitted virus (Tomato Spotted Wilt Virus, TSWV, and Impatiens Necrotic Spot Virus, INSV)*: Resistant varieties should be used, especially in Virginia. TSWV can be severe on peppers during both greenhouse transplant and field production of the crop. INSV causes similar symptoms on peppers as TSWV; however, the virus is not as severe and does not limit production to the same extent as TSWV. Both viruses are transmitted by a number of thrips (Western flower thrips most notably) in a persistent manner (ie. thrips can transmit the virus during their entire life cycle). During transplant production, thrips can transmit the virus from infected ornamental plants (flowers). DO NOT GROW any ornamental bedding plants in the same greenhouse as pepper transplants. **Monitor greenhouses and scout fields regularly for thrips populations.** Begin an insecticide program once thrips are observed. When thrips are observed in the field, treat with an insecticide and rogue out any plant showing TSWV symptoms.

### Skin separation or "silvering" of bell pepper fruit

Skin separation or 'silvering' in bell pepper fruit reduces aesthetic fruit quality. Research in New Jersey has shown that phytophthora-tolerant bell pepper cultivars (such as 'Paladin' and 'Aristotle') are more prone to the development of skin separation or 'silvering' in fruit compared to phytophthora-susceptible varieties such as 'Alliance' or 'Camelot'.

# POTATOES

## Varieties

| Varieties[1] | Table Stock | Chipping | Yield | Spacing |
|---|---|---|---|---|
| **Early** | | | | |
| Andover | +++ | +++ | + | 9-10 |
| Envol | +++ | No | ++ | 8-10 |
| Michigan Purple (purple skin) | ++ | No | ++ | 8-10 |
| Dark Red Norland D | ++ | No | + | 8-10 |
| Superior (SR,VS) | +++ | + | ++ | 8-12 |
| Vivaldi (yellow flesh) | +++ | No | ++ | 8-10 |
| **Midseason** | | | | |
| Atlantic[2] | No | +++ | +++ | 7- 9 |
| Chieftain (red skin) | ++ | No | ++ | 7- 9 |
| Eva | ++ | ++ | ++ | 8-10 |
| Dakota Crisp | ++ | +++ | +++ | 8-10 |
| Harley Blackwell | ++ | +++ | ++ | 9-12 |
| King Harry (for organic production) | ++ | -- | ++ | 8-10 |
| Kueka Gold (pale yellow flesh) | ++ | + | +++ | 9-10 |
| NorDonna (red skin) | ++ | No | ++ | 9-12 |
| Norkotah Russet | ++ | No | + | 9-12 |
| Peter Wilcox (purple skin/yellow flesh) | ++ | No | ++ | 8-10 |
| Reba[3] | +++ | ++ | ++ | 7- 9 |
| Yukon Gold[3] (yellow flesh) | +++ | No | ++ | 8-10 |
| Purple Majesty (purple skin/purple flesh) | ++ | ++ | ++ | 9-12 |
| **Late** | | | | |
| Gold Rush | +++ | No | ++ | 8-10 |
| Katahdin (LR) | ++ | No | +++ | 8-10 |
| Kennebec (VS,LBT)(not for eastern Virginia) | ++ | No | +++ | 7-10 |
| Lehigh (yellow flesh) | +++ | ++ | +++ | 8-10 |
| Marcy | ++ | +++ | +++ | 7- 9 |
| Snowden (for chips only) | No | +++ | ++ | 8-10 |

+ = fair ++ = good +++ = excellent

[1] Varieties are listed alphabetically within maturity group.

[2] Tubers of the chipping variety "Atlantic" are extremely susceptible to internal necrosis and hollow heart.

[3] Tubers of "Reba" and "Yukon Gold" are susceptible to hollow heart during cool growing seasons. Apply one-third of the nitrogen at planting and sidedress the remainder when plants are 4 to 6 inches high to help reduce hollow heart.

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 the Soil and Nutrient Management chapter in Section B and your soil test report. These notes and soil test reports provide additional suggestions to adjust rate, timing, and placement of nutrients. Your state's soil test report recommendations and/or your farm's nutrient management plan supercede recommendations found below.**

| | | Soil Phosphorus Level | | | | Soil Potassium Level | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| White Potatoes | Pounds N per Acre | Low | Med | High (Opt.) | Very High | Low | Med | High (Opt.) | Very High | Nutrient Timing and Method |
| | | Pounds $P_2O_5$ per Acre | | | | Pounds $K_2O$ per Acre | | | | |
| | 150-180[1] | 200 | 150 | 100 | 0[2] | 300 | 200 | 100 | 0[2] | Total nutrient recommended. |
| | 50 | 200 | 150 | 100 | 0[2] | 300 | 200 | 100 | 0[2] | Broadcast and disk-in. |
| | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Sidedress 4-5 weeks after planting. |
| | 0-30[1] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Adjust rate based on petiole nitrate testing at flowering. |

Apply 1.0 pounds of boron (B) per acre with broadcast fertilizer. See Table B-10 for more specific boron recommendations.

[1]For high yielding potato crop systems (>250 cwt. per acre), an extra split N application at flowering may be useful. Consult *Nitrogen management for white potato production* for more information (http://pubs.ext.vt.edu/438/438-012/438-012.html).

[2]In Virginia, crop replacement values of 50 lbs. $P_2O_5$ and 50 lbs. $K_2O$ per acre are recommended on soils testing Very High.

## Plant Tissue Testing

Plant tissue testing can be a valuable tool to assess crop nutrient status during the growing season to aid with in-season fertility programs or to evaluate potential deficiencies or toxicities. The following are critical tissue test values for potatoes.

**Critical potato tissue test values for most recently matured leaves.**

| Timing | Value | N | P | K | Ca | Mg | S | Fe | Mn | Zn | B | Cu | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | % | % | % | % | % | ppm | ppm | ppm | ppm | ppm | ppm |
| Row Closure | Deficient | <3.0 | 0.2 | 3.5 | 0.6 | 0.3 | 0.3 | <40 | 30 | 30 | 20 | 5 | 0.1 |
| | Adequate range | 3 | 0.2 | 3.5 | 0.6 | 0.3 | 0.3 | 40 | 30 | 30 | 20 | 5 | 0.1 |
| | | 6 | 0.8 | 6 | 2 | 0.6 | 0.5 | 150 | 60 | 60 | 60 | 10 | 0.2 |
| | High | >6.0 | 0.8 | 6 | 2 | 0.6 | 0.5 | >150 | 60 | 60 | 30 | 10 | - |
| | Toxic (>) | - | - | - | - | - | - | - | - | - | - | - | - |
| First blossom | Deficient | <3.0 | 0.2 | 3 | 0.6 | 0.25 | 0.2 | <40 | 30 | 30 | 20 | 5 | 0.1 |
| | Adequate range | 3 | 0.2 | 3 | 0.6 | 0.25 | 0.2 | 40 | 30 | 30 | 20 | 5 | 0.1 |
| | | 4 | 0.5 | 5 | 2 | 0.6 | 0.5 | 150 | 100 | 60 | 30 | 10 | 0.2 |
| | High | >4.0 | 0.5 | 5 | 2 | 0.6 | 0.5 | >150 | 100 | 60 | 30 | 10 | - |
| | Toxic (>) | - | - | - | - | - | - | - | - | - | - | - | - |
| Tubers half size | Deficient | <2.0 | 0.2 | 2.5 | 0.6 | 0.25 | 0.2 | <40 | 20 | 30 | 20 | 5 | 0.1 |
| | Adequate range | 2 | 0.2 | 2.5 | 0.6 | 0.25 | 0.2 | 40 | 20 | 30 | 20 | 5 | 0.1 |
| | | 4 | 0.4 | 4 | 2 | 0.6 | 0.5 | 150 | 100 | 60 | 30 | 10 | 0.2 |
| | High | >4.0 | 0.4 | 4 | 2 | 0.6 | 0.5 | >150 | 100 | 60 | 30 | 10 | - |
| | Toxic (>) | <3.0 | 0.2 | 3.5 | 0.6 | 0.3 | 0.3 | - | - | - | - | - | - |

## Planting and Spacing

The recommended planting dates for potatoes are March 10 to April 5 in Maryland and Virginia, March 20 to April 15 in Delaware, and March 20 to April 25 in New Jersey. In Pennsylvania, the recommended planting dates are March 25 to June 5.

Space seed 7 to 12 inches apart in 34- or 36-inch rows. Use close spacing for large, cut seed pieces and wider spacing for whole (B-size) seed. Use close spacing for to be potatoes marketed in 5.0 and 10-pound consumer packs and for 'Katahdin' and 'Kennebec', which tend to set few tubers and produce oversize tubers.

## Seed-Piece Treatment

Use certified seed. See the Disease section for more information on seed-piece treatment to prevent disease.

## Harvest and Storage Considerations

Vine killing is done before harvest using herbicides or mechanical methods (rolling, mowing). See the vine kill section for recommended herbicides. **Vines of potatoes going into storage should be completely dead at least 14 to 21 days before harvest**. Healing of cuts and bruises is most rapid at a tuber temperature of 50° to 60°F (10° to 15.6°C) and a relative humidity of 90 to 95% with no free water. This temperature should be maintained for 2 to 3 weeks

at the beginning of the storage period. The temperature should then be lowered to 40°F (4.44°C) for table stock or seed potatoes. Potatoes for processing are stored at 45°-50°F when a rot-producing agent such as field frost, late blight, or soft rot is present, the curing period should be eliminated, and the temperatures lowered to 45°F (7.22°C) as soon as possible with increased air flow. Monitor the storage daily and, if the rot continues, the crop should be sold immediately.

## Vine Killing

Potato vines are frequently killed prior to harvest. Vine desiccation facilitates ease at harvest by reducing excessive potato foliage or weed growth. In early harvests, vine desiccation can hasten or improve skin set on relatively immature potatoes, thus reducing tuber damage during grading, packing and shipping. Proper skin set of the potato improves shelf life, promotes retention of potato quality during transport, and improves eye appeal. Also, market demand for smaller (B-size) potatoes of some varieties may be greater for mid-size tubers than for large tubers. Tubers stop growing soon after vine dessication. Decisions as to when to apply vine desiccants are based on intended market, demand for a given size and the need for high quality, non-skinned tubers.

Diquat--0.25 to 0.5 lb/A. Apply 1.0 to 2.0 pts/A of Reglone for preharvest vine desiccation in a minimum of 20 gallons of water per acre by ground application. Add a non-ionic surfactant (NIS) containing 75% or greater surface active agent at 0.25 to .05% v/v (1.0 to 2.0 qts/100 gals) of the finished spray volume. Rainfall 30 minutes following application will not affect the activity of Reglone. Do not apply to drought stressed potatoes. A second application may be made if necessary in dense vine growth. Do not exceed a total of 4.0 pts/A of Reglone. If two applications are made, allow at least 5 days between applications.

Glufosinate-ammonium--0.38lb/A. Apply 29.0 fl oz/A Rely 200 at the beginning of natural vine senescence in a single application. Potatoes with heavy or dense vines may require an application of another desiccant (diquat) to complete vine desiccation. Thorough coverage of vines is essential for satisfactory results. Do not harvest potatoes within 9 days of Rely application nor apply to potatoes grown for seed. Do not plant treated areas to wheat, barley, buckwheat, millet, oats, rye, sorghum or triticale until 30 or more days after Rely 200 application.

Paraquat--0.6 lb/A. **A Special Local-Needs 24(c) label has been approved for the use of Gramoxone SL 2.0** or OLF **for postharvest desiccation of the crop in Delaware, New Jersey and Virginia.** Apply 2.4 pints per acre Gramoxone SL 2.0 or OLF as a broadcast spray after the last harvest. Add nonionic surfactant according to the labeled instructions. See the label for additional information and warnings.

## Sprout Inhibitors

Apply the following directly to tubers:

Chloropropham--1% Solution. Apply Sprout Nip 3EC as a 1% solution (1.0 gallon of Sprout Nip per 35.0 gallons of water) after potatoes have been washed. The spray nozzles should be adjusted to applythe growth regulator spray evenly The spray solution should be applied at the rate of 1 quart of the 1% solution per 2000 pounds (20 cwt bags) of potatoes. Conveyer rollers will distribute the spray solution and assure complete coverage of each potato. **Note: Other formulations of Sprout Nip are available,** such as maleic hydrazide (MH-30 SG). Apply to crop 2-3 weeks after full bloom or when harvestable tubers are at least 1.5" in diameter. Do not apply when the temperature is expected to exceed 80°F (26.6°C) that day. Read the label carefully and follow the labeled rate.

## Potato Physiological Disorders

There are a number of disorders of potatoes that are not caused by disease organisms. These disorders are commonly associated with adverse environmental conditions or cultural practices. The following table lists common potato disorders.

| Disorder | Primary Cause | Occurrence | Market Effect |
|---|---|---|---|
| Brown Center | rapid growth | early to | quality |
| Hollow Heart | after stress | mid bulking | poor processing |
| Blackheart | low oxygen, wet soil | bulking and storage | Quality poor processing |
| Heat Necrosis | heat,acid soil (low Ca) | harvest | Quality poor processing |
| Vascular Discoloration | fast vine death, low moisture | harvest | poor processing |
| Jelly End Glassy End | fast vine death, low moisture | harvest | poor processing |
| Heat Sprouting | hot soil | Late bulking | quality, yield poor processing |
| Internal Sprouting | piling, sprout inhibition | storage | Quality poor seed |
| Chilling Freezing | Low temperature | harvest and storage | Quality yield prone to rots |
| Deformation | heat* | bulking | quality |
| Growth Crack | wet/dry soil* | bulking | quality |
| Chaining | hot soil | mid-bulking | yield (size) |
| Hair Sprout | hot soil | late-bulking | quality and yield |
| Swollen Lenticel | wet soil | bulking-harvest | storage rots |
| Greening | light | bulking-storage | quality |

## Weed Control

Identify the weeds in each field and select recommended herbicides that control those weeds. See Tables E-3 and E-4.

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

Apply postemergence herbicides when crop and weeds are within the recommended size and/or leaf stage.

Find the herbicides you plan to use in the Herbicide Resistance Action Committee's (HRAC) **Herbicide Site of Action Table E-8** and follow the recommended good

management practices to minimize the risk of herbicide resistance development by weeds in your fields.

## Before Planting

Glyphosate--1.5 to 3.75 lb acid equivalent/A. Apply 3.2 to 8.1 pints per acre Roundup Ultra Max 4SC, 4 to 10 pints per acre Touchdown or 4.0 to 10.0 pints per acre Glyphomax Plus in the fall after harvest to control perennial grasses and broadleaf weeds, including quackgrass, field bindweed, Canada thistle, and others. Delay application after harvest to allow for adequate weed regrowth to intercept the spray. Apply before frost to weeds with cold-sensitive foliage. Do not till or mow for 1 week after application. Consult the label for additional details and the rate to use for each weed species.

## Preemergence/Drag-Off

EPTC--3.0 to 4.5 lb/A. Apply 3.4 to 5.1 pints per acre Eptam 7E or 30.0 to 45.0 pounds per acre of Eptam 10G at one of the times listed below.

1. Just before planting and disking. This treatment is best for early season control of nutsedge and other weeds, but on plantings before April 1, it may reduce early vigor and yields slightly.
2. Just after "dragging off." Incorporate into soil in one or two cultivations with a spiketooth harrow or similar piece of equipment.
3. Just before first or second cultivation. This treatment is best for late-season control of nutsedge and other weeds. Do not apply within 45 days of harvest.

Primarily controls annual grasses, yellow nutsedge, and a few broadleaf weeds. Use linuron or metribuzin according to recommendations after planting to increase the spectrum of broadleaf weeds controlled.

Fomesafen--0.188 to 0.25 lb/A. Apply 0.75 to 1.0 pint per acre Reflex) after planting or before potatoes emerge, but after final drag-off. Primarily controls broadleaf weeds. Tank-mix with Dual Magnum or Prowl, or use in addition to Eptam for preemergence annual grass control, and with Metribuzin and/or Matrix to control additional broadleaf weeds. Potato varieties may vary in their response to Reflex, so determine crop tolerance before using. DO NOT preplant incorporate or crop injury may occur. DO NOT apply to emerged potato plants or severe crop injury will occur. Observe a preharvest interval of 70 days. Apply fomesafen only one time in alternate years (once every two years).

Linuron--0.4 to 1.0 lb/A. Apply 0.8 to 2.0 pounds per acre Lorox 50DF (or OLF) after planting or before potatoes emerge, but after final drag-off and before grasses are 2 inches tall and broadleaf weeds are 6 inches tall. Primarily controls broadleaf weeds. Tank-mix with Dual Magnum or Prowl, or use in addition to Eptam for preemergence annual grass control. Use lower rates if tank-mixed. Do not plant to crops not on the label for 4 months after treatment.

S-metolachlor--0.96 to 1.91 lb/A. Apply 1.0 to 2.0 pints per acre Dual Magnum 7.62E or Dual II Magnum 7.64E before potatoes emerge, but after final drag-off. Dual Magnum will primarily control annual grasses. Nutsedge (nutgrass, coffeegrass) control may be adequate if weed pressure is light. Tank-mix Dual Magnum with linuron or metribuzin for broadleaf weed control. A jug-mix of Dual Magnum and Metribuzin that is labeled for use in white potatoes is sold under the trade name Boundary. **Other generic versions of metolachlor and s-metolachlor may be available, and may or may not be labeled for use in the crop.**

Metribuzin--0.38 to 0.5 lb/A. Apply 0.5 to 0.66 pound per acre Metribuzin 75DF (or OLF) (use comparable rates of liquid) just prior to emergence. If drag-off is practiced, then the application should be made after drag-off. Primarily controls broadleaf weeds. Tank-mix with Dual Magnum or Prowl, or use in addition to Eptam for preemergence annual grass control. Read label for rotation crop restrictions. A jug-mix of Dual Magnum and Sencor that is labeled for use in white potatoes is sold under the trade name Boundary. Do not apply within 60 days of harvest.

**Note**. Preemergence application to 'Atlantic' and 'Norland' or to any early maturing, smooth, white- or red-skinned potato varieties, may cause crop injury, especially under adverse weather conditions and when higher labeled rates are used.

Pendimethalin--0.48 to 1.42 lb/A. Apply 1.0 to 3.0 pints per acre Prowl $H_2O$ before potatoes emerge. Prowl primarily controls certain broadleaf weeds, including velvetleaf and early-season annual grasses, but does not control yellow nutsedge. Combine with Lorox to improve velvetleaf control, or with linuron or metribuzin to improve the control of most other broadleaf weeds.

## Postemergence

Rimsulfuron--0.0156 lb/A. Apply 1.0 ounce per acre Matrix 25DF early postemergence to control many weeds including foxtail species, pigweed species, wild mustard, and wild radish. Common lambsquarters, common ragweed, jimsonweed, morningglory species, and yellow nutsedge may only be suppressed. Tank-mix with reduced rates of metribuzin, following label instructions, to increase the spectrum of weeds controlled. Repeat the application 2 to 4 weeks after the initial spray to improve the suppression or control of common purslane and perennial weeds, such as field and hedge bindweed. Results may be most effective when used following a preemergence residual weed control program. Add nonionic surfactant to be 0.25 percent of the spray solution (1.0 quart per 100 gallons of spray solution) to improve weed control. DO NOT exceed 2.0 ounces of Matrix 25DF per acre per year.

Rimsulfuron (Matrix 25DF) is an ALS inhibitor. Herbicides in this class have a single site of action in susceptible plants. Always use in combination with other herbicides with a different site of action in the plant to prevent the development of resistant weed populations. Read and follow label cautions and resistance management recommendations.

S-metolachlor--1.6 lb/A. Apply 1.67 pints Dual Magnum 7.62E as a directed spray after hilling/at lay-by to provide preemergence control of sensitive weeds for the remainder of the growing season. Emerged weeds will not be controlled. This treatment may be applied in addition to a previous (drag-off) application of Dual Magnum or Dual II Magnum, but do not apply more than 3.6 pints Dual Magnum per acre in one season. Maintain a 40-day preharvest interval between the after hilling/at lay-by application of Dual Magnum and harvest. **Other generic versions of metolachlor and s-metolachlor may be available, and may or may not be labeled for use in the crop.**

Metribuzin--0.25 to 0.50 lb/A. Apply 0.33 to 0.66 pound per acre Metribuzin 75DF (or OLF) before weeds are 1 inch tall. Primarily controls broadleaf weeds. Apply only if there have been at least three successive sunny days prior to application. Do not use on red-skinned or early maturing, smooth, white-skinned varieties. Treatment may cause some yellowing or minor burn. Read label for soil texture, crop rotation, and varietal restrictions.

Clethodim--0.094 to 0.125 lb/A. Apply 6.0 to 8.0 fluid ounces per acre Select 2EC with oil concentrate to be 1 percent of the spray solution (1.0 gallon per 100 gallons of spray solution) or 12.0 to 16.0 fluid ounces of Select Max 0.97EC with nonionic surfactant to be 0.25% of the spray solution (1.0 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 30 days.

Sethoxydim--0.2 to 0.4 lb/A. Apply 1.0 to 2.0 pints per acre Poast 1.5EC with oil concentrate to be 1 percent of the spray solution (1.0 gallon per 100 gallons of spray solution) postemergence to control annual grasses and certain perennial grasses. **The use of oil concentrate 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 30 days and apply no more than 5 pints per acre in one season.

### Postharvest

Paraquat--0.6 lb/A. **A Special Local-Needs 24(c) label has been approved for the use of Gramoxone SL 2.0** or OLF **for postharvest desiccation of the crop in Delaware, New Jersey and Virginia.** Apply 2.4 pints per acre Gramoxone SL 2.0 or OLF 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

**THE LABEL IS THE LAW. PLEASE REFER TO THE LABEL FOR UP TO DATE RATES AND RESTRICTIONS**

**NOTE**: Copies of specific insecticide product labels can be downloaded by visiting the websites www.CDMS.net or www.greenbook.net. Also, specific labels can be obtained via web search engines.

**Wireworms** (Also see Chapter E "Wireworms" section in Soil Pests--Their Detection and Control.)

Apply one of the following formulations:

*Preplant Application:* Broadcast and incorporate just before planting.

ethoprop--2/3 to 1.0 gal/A Mocap 6EC (or OLF).

bifenthrin--12.75 to 25.5 fl oz/A Capture LFR (or OLF)

*Planting Application*

bifenthrin--19.2 fl oz/A Bifenture 2EC (Sniper, or OLF) or 12.75 to 25.50 fl oz/A Capture LFR

bifenthrin+imidacloprid--16 to 25.6 fl oz/A Brigadier

ethoprop--2/3 to 1.0 gal/A Mocap 6EC (or OLF)

fipronil--2.9 to 3.2 fl oz/A Regent 4SC (specific rate depends on row spacing; see label.)

phorate--**at planting and post-emergence light or sandy soils** 8.5 to 11.3 oz Thimet 20G/1,000ft, **heavy or clay soils** 13.0 to 17.3 oz Thimet 20G/1,000 ft **do not use post-emergence in heavy soils**

*Lay-by Application*

bifenthrin--3.2 to 9.6 fl oz/A Bifenture 2EC (Sniper, or OLF) or 12.75 to 25.50 fl oz/A Capture LFR

**Cutworms** (Also see Chapter E,"Cutworms" section in Soil Pests--Their Detection and Control.)

Cutworms are present during July and August. They are especially troublesome to tubers where soil cracking occurs. Variegated cutworms feed on lower leaves and petioles, and protective sprays should be applied if numbers exceed six worms per plant or foliar loss is more than 10 percent. Black cutworms are largely underground feeders, but will occasionally feed on leaves. No materials are effective if larvae do not feed above ground (foliar and systemic insecticides are ineffective). Several spray applications may be required for control. Apply one of the following insecticides:

beta-cyfluthrin--0.8 to 1.6 fl oz/A Baythroid XL

bifenthrin--3.2 to 9.6 fl oz/A Bifenture 2EC (Sniper, or OLF) or 12.75 to 25.50 fl oz/A Capture LFR **(soil appl. only)**

carbaryl--1.0 to 2.0 qts/A Sevin XLR Plus (or OLF)

cyfluthrin--0.8 to 1.6 fl oz/A Tombstone (or OLF)

esfenvalerate--5.8 to 9.6 fl oz/A Asana XL

imidacloprid+beta-cyfluthrin--2.8 fl oz/A Leverage 360

lambda-cyhalothrin--0.96 to 1.60 fl oz/A Warrior II or 1.92 to 3.20 fl oz/A Lambda-Cy (LambdaT, or OLF)

lambda-cyhalothrin+chlorantraniliprole--5.0 to 8.0 fl oz/A Besiege

lambda-cyhalothrin+thiamethoxam--3.5 to 4.5 fl oz/A Endigo ZC

methomyl--1.5 pts/A Lannate LV (or OLF) **(variegated cutworm only)**

permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or OLF)

zeta-cypermethrin--1.28 to 4.00 fl oz/A Mustang Maxx (or OLF)

zeta-cypermethrin+bifenthrin--2.6 to 6.1 fl oz/A Hero EC

### Colorado Potato Beetle (CPB)

*Pesticide Resistance Management*

Do not rely exclusively on the neonicotinoid class of

insecticides (Class 4: Actara, Assail, Cruiser, Gaucho, imidacloprid, Leverage 360, Platinum, Scorpion, or Venom) for CPB control. It is important to use all available effective pest management strategies, including crop rotation, pest scouting, treatment thresholds, and alternative (different class) insecticides, such as abamectin (Agri-Mek), Avaunt plus PBO, Blackhawk, Coragen, cryolite, Entrust, Radiant, Rimon, Voliam Xpress, or Vydate.

For rotated fields adjacent to CBP overwintering sites or to previous year's potato fields, most of the colonizing adults can be killed by treating only a strip of rows along the field edge where the invasion front is expected. Fields should still be monitored for beetles and other insect pests throughout the season.

**Note**: DO NOT use foliar applications of any neonicotinoid insecticide (clothianidin, imidacloprid, thiamethoxam, dinotefuron, acetamiprid) in fields previoiusly treated with seed-treatment or at-planting neonicotinoids

Apply one of the following formulations:

*Preplant or Planting Application*

clothianidin--**in-furrow**-9.0 **to** 12.0 fl oz/A, **foliar** 2.0 **to** 3.0 fl oz/A Belay
imidacloprid--s**oil** 5.7 to 8.7 fl oz/A Admire Pro (or 13.0 to 20.0 fl oz/A imidacloprid 2F, or OLF)
dinotefuran--**soil** 11.0 to 13.0 fl oz/A Scorpion 35SL; or 6.5 to 7.5 oz/A Venom 70SG
thiamethoxam--**soil** 1.66 **to** 2.67 oz/A Platinum 75SG (or OLF)

*Postemergence Application*

Rotation to nonsolanaceous crops (crops other than potato, tomato, eggplant, and pepper) is extremely important in reducing CPB problems. Avoid the application of late-season sprays to prevent the buildup of insecticide-resistant beetles.

Beginning at plant emergence, sample fields weekly for CPB to determine the need to spray. Select at least 10 sites per field along a V- or W-shaped path throughout the field. At each site, select one stem from each of five adjacent plants and count and record all adults, large larvae (more than half-grown), and small larvae (less than half-grown). As a general guideline, if more than 50 adults or 75 large larvae or 200 small larvae are counted per 50 stems, a treatment is recommended. The amount of yield loss as a result of CPB feeding depends on the age of the potato plant. 'Superior' variety (short season) cannot compensate for early season defoliation by overwintered beetles, but during the last 30 days of the season, 'Superior' can withstand up to 50 percent defoliation without yield loss.

**Note:** Several of these insecticides may no longer be effective in certain areas due to CPB resistance. Check with your county Extension agent for most effective control.

Apply one of the following formulations:

abamectin--1.75 to 3.5 fl oz/A Agri-mek 0.7SC (or OLF)
acetamiprid--1.5 to 4.0 oz/A Assail 30SG (or OLF)
azadirachtin--up to 21.0 fl oz/A Azatin XL (AzaDirect, Ecozin, Neemix or OLF)
bifenthrin+imidacloprid--4.80 to 6.14 fl oz/A Brigadier
chlorantraniliprole--3.5 to 5.0 fl oz/A Coragen
clothianidin--**foliar** 2.0 **to** 3.0 fl oz/A
cryolite--10.0 to 12.0 lbs/A Kryocide 96WP (or Prokill Cryolite 96)
cyromazine--2.66 oz/A Trigard
dinotefuran--**foliar** 2.0 to 2.75 fl oz/A Scorpion 35SL or 1.0 to 1.5 oz/A Venom 70SG
imidacloprid--**foliar** 1.3 fl oz/A Admire PRO (or OLF)
imidacloprid+beta-cyfluthrin--2.8 fl oz/A Leverage 360
indoxacarb--3.5 to 6.0 oz/A Avaunt 30WDG **(larvae only**). The addition of the synergist piperonyl butoxide (PBO) is necessary when using indoxacarb.
lambda-cyhalothrin+thiamethoxam--3.5 to 4.5 fl oz/ A Endigo ZC
novoluron--6.0 to 12.0 fl oz/A Rimon 0.83EC
oxamyl--1.0 to 4.0 pt/A Vydate L
phosmet--1 1/3 lbs/A Imidan 70W
spinetoram--4.5 to 8.0 fl oz/A Radiant SC
spinosad--1.7 to 3.3 fl oz/A Blackhawk
thiamethoxam--**foliar** 1.5 to 3.0 fl oz/A Actara 25WDG
thiamethoxam+chlorantraniliprole--4.0 oz/A Voliam Flexi

## Flea Beetles

Apply one of the following formulations:

acetamiprid--1.5 to 2.5 oz/A Assail 30SG (or OLF)
beta-cyfluthrin--1.6 to 2.8 fl oz/A Baythroid XL
bifenthrin **lay-by**--3.2 to 9.6 fl oz/A, **foliar** 2.1 to 6.4 fl oz/A Bifenture 2EC (Sniper, or OLF)
bifenthrin+imidacloprid--4.8 to 6.14 fl oz/A Brigadier
clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 2.0 to 3.0 fl oz/A Belay 2.13SC
cyfluthrin--1.6 to 2.8 fl oz/A Tombstone (or OLF)
dinotefuran--**soil** 11.0 to 13.0 fl oz/A Scorpion 35SL or 6.5 to 7.5 oz/A Venom 70SG; **foliar** 2.0 to 2.75 fl oz/A Scorpion 35SL or 1.0 to 1.5 oz/A Venom 70SG
esfenvalerate--5.8 to 9.6 fl oz/A Asana XL
imidacloprid--**soil** 5.7 to 8.7 fl oz/A Admire Pro (or OLF), **foliar** 1.3 fl oz/A Admire PRO ( or OLF)
imidacloprid+beta-cyfluthrin--2.8 fl oz/A Leverage 360
lambda-cyhalothrin–1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, or OLF)
lambda-cyhalothrin+chlorantraniliprole--6.0 to 9.0 fl oz/A Besiege
lambda-cyhalothrin+thiamethoxam--3.5-4.5 fl oz/A Endigo ZC
methomyl--1.5 pts/A Lannate LV (or OLF)
oxamyl--2.0 to 4.0 pt/A Vydate L
permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or OLF)
phosmet--1 1/3 lbs/A Imidan 70W
thiamethoxam--**soil** 1.66 to 2.67 oz/A Platinum 75SG or **foliar** 1.5 to 3.0 oz/A Actara 25WDG
thiamethoxam+chlorantraniliprole--4.0 oz/A Voliam Flexi
zeta-cypermethrin--1.76 to 4.00 fl oz/A Mustang Maxx (or OLF)
zeta–cypermethrin+bifenthrin--2.6 to 6.1 fl oz/A Hero EC

## Potato Leafhoppers

Monitor fields for the buildup of leafhoppers from early June until early August. Treatment is suggested if leafhopper counts exceed 1 adult per sweep or 1 nymph per 10 leaves. Apply one of the following formulations:

acetamiprid--1.5 to 4.0 oz/A Assail 30SG (or OLF)
beta-cyfluthrin--0.8 to 1.6 fl oz/A Baythroid XL
bifenthrin+imidacloprid--3.8 to 6.14 fl oz/A Brigadier
clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 2.0 to 3.0 fl oz/A Belay 2.13SC
cyfluthrin--0.8 to 1.6 fl oz/A Tombstone (or OLF)
dimethoate--0.5 to 1.0 pt/A Dimethoate 400 4EC (or OLF)

dinotefuran--**soil** 11.0 to 13.0 fl oz/A Scorpion 35SL; or 6.5 to 7.5 oz/A Venom 70SG; **foliar** 2.0 to 2.75 fl oz/A Scorpion 35SL or 1.0 to 1.5 oz/A Venom 70SG
esfenvalerate--5.8 to 9.6 fl oz/A Asana XL
imidacloprid--**soil** 5.7 to 8.7 fl oz/A Admire Pro (or OLF), **foliar** 1.3 fl oz/A Admire PRO (or OLF)
imidacloprid+beta-cyfluthrin--2.8 fl oz/A Leverage 360
lambda-cyhalothrin--0.96 to 1.60 fl oz/A Warrior II or 1.92 to 3.20 fl oz/A Lambda-Cy (LambdaT, or OLF)
lambda-cyhalothrin+chlorantraniliprole--5.0 to 8.0 fl oz/A Besiege
lambda-cyhalothrin+thiamethoxam--3.5 to 4.5 fl oz/A Endigo ZC
methomyl--1.5 to 3.0 pts/A Lannate LV (or OLF)
oxamyl--2.0 to 4.0 pt/A Vydate L
permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or OLF)
phosmet--1 1/3 lbs/A Imidan 70W
sulfoxaflor--1.5 to 2.25 oz/A Transform WG
thiamethoxam--**soil** 1.66 to 2.67 oz/A Platinum 75SG or **foliar** 1.5 to 3.0 oz/A Actara 25WDG
thiamethoxam+chlorantraniliprole--4.0 oz/A Voliam Flexi
zeta-cypermethrin--1.76 to 4.00 fl oz/A Mustang Maxx (or OLF)
zeta–cypermethrin+bifentrhin--4.0 to 10.3 fl oz/A Hero EC

## European Corn Borer (ECB)

Proper timing of ECB sprays is critical. Apply first spray when 10% of the stems have entry holes in fresh market varieties or 25% in processing varieties. Make two to three applications on a 5- to 10-day schedule. Consult your county Extension agent and/or area pest management newsletter. **Apply one of the following formulations:**

beta-cyfluthrin--1.6 to 2.8 fl oz/A Baythroid XL
chlorantraniliprole--3.5 to 5.0 fl oz/A Coragen
cyfluthrin--1.6 to 2.8 fl oz/A Tombstone (or OLF)
esfenvalerate--5.8 to 9.6 fl oz/A Asana XL
imidacloprid+beta-cyfluthrin--2.8 fl oz/A Leverage 360
indoxacarb--3.5 to 6.0 oz/A Avaunt 30WDG
lambda-cyhalothrin--1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, or OLF)
lambda-cyhalothrin+chlorantraniliprole--6.0 to 9.0 fl oz/A Besiege
lambda-cyhalothrin+thiamethoxam--4.0 to 4.5 fl oz/A Endigo ZC
novaluron--6.0 to 12.0 fl oz/A Rimon 0.83EC
permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or OLF)
spinetoram--6.0 to 8.0 fl oz/A Radiant SC
spinosad--1.7 to 3.3 fl oz/A Blackhawk
thiamethoxam+chlorantraniliprole--4.0 oz/A Voliam Flexi
zeta-cypermethrin--1.76 to 4.00 fl oz/A Mustang Maxx (or OLF)
zeta-cypermethrin+bifenthrin--4.0 to 10.3 fl oz/A Hero EC

## Aphids

Insecticide treatments are recommended when aphid counts exceed 2 per leaf prior to bloom, 4 aphids per leaf during bloom, and 10 aphids per leaf within 2 weeks of vine kill. Apply one of the following formulations:

acetamiprid--2.5 to 4.0 oz/A Assail 30SG (or OLF)
bifenthrin+imidacloprid--3.80 to 6.14 fl oz/A Brigadier
*Chenopodium* extract--2.0 to 3.0 qts/A Requiem
clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 2.0 to 3.0 fl oz/A Belay 2.13SC
dimethoate--0.5 to 1.0 pt/A Dimethoate 400 4EC (or OLF)
flonicamid--2.0 to 2.8 oz/A Beleaf 50SG
imidacloprid--**soil** 5.7 to 8.7 fl oz/A Admire Pro (or OLF), **foliar** 1.3 fl oz/A Admire PRO (or OLF)
imidacloprid+beta-cyfluthrin--2.8 fl oz/A Leverage 360
methomyl--1.5 to 3.0 pts/A Lannate LV (or OLF)
oxamyl--2.0 to 4.0 pts/A Vydate L
pymetrozine--2.75 to 5.50 oz/A Fulfill 50WDG
spirotetramat--4.0 to 5.0 fl oz/A Movento
thiamethoxam--**foliar** 3.0 oz/A Actara 25WDG or **soil** 1.66 to 2.67 oz/A Platinum 75SG
sulfoxaflor--0.75 to 1.5 oz/A Transform WG
thiamethoxam+chlorantraniliprole--4.0 oz/A Voliam Flexi
zeta-cypermethrin+bifenthrin--4.0 to 10.3 fl oz/A Hero EC

## Potato Tuberworm

**Note:** Treat when foliage injury is first noted. Four to five applications at 7- to 14-day intervals may be needed. Tuberworms are primarily a problem on the fall crop.

Because moths are actively flying at dusk, sprays are most effective when applied early evening. Apply one of the following formulations:

beta-cyfluthrin--1.6 to 2.8 fl oz/A Baythroid XL
cyfluthrin--1.6 to 2.8 fl oz/A Tombstone (or OLF)
esfenvalerate--2.9 to 9.6 fl oz/A Asana XL
imidacloprid+beta-cyfluthrin--2.8 fl oz/A Leverage 360
lambda-cyhalothrin--1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, or OLF)
lambda-cyhalothrin+chlorantraniliprole--6.0 to 9.0 fl oz/A Besiege
lambda-cyhalothrin+thiamethoxam--4.0 to 4.5 fl oz/A Endigo ZC
methomyl--1.5 to 3.0 pts/A Lannate LV (or OLF)
novaluron--6.0 to 12.0 fl oz/A Rimon 0.83EC
permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or OLF)

| Pesticide | Use Category[1] | Hours to Reentry[2] | Days to Harvest[3,4,5] |
|---|---|---|---|
| **INSECTICIDE** | | | |
| abamectin | R | 12 | 14 |
| acetamiprid | G | 12 | 7 |
| azadirachtin | G | 4 | 0 |
| beta-cyfluthrin | R | 12 | 0 |
| bifenthrin | R | 12 | 21 |
| bifenthrin + imidacloprid | R | 12 | 21 |
| carbaryl | G | 12 | 7 |
| *Chenopodium* extract | G | 4 | 0 |
| chlorantraniliprole (any method) | G | 4 | 14 |
| chlothianidin (soil/foliar) | G | 12 | AP/14 |
| cryolite | G | 12 | 0 |
| cyfluthrin | R | 12 | 0 |
| cyromazine | G | 12 | 7 |
| dimethoate | R(NJ),G | 48 | 7 |
| dinotefuran (soil) | G | 12 | PP[5] |
| (foliar) | | | 7 |
| esfenvalerate | R | 12 | 7 |
| ethoprop | R | 48 | AP[4] |
| fipronil | R | 0 | 90 |
| flonicamid | G | 12 | 7 |
| imidacloprid (seed treatment) | G | 12 | AP[4] |
| (soil/foliar) | G | 12 | AP/7 |
| imidacloprid +cyfluthrin | R | 12 | 7 |
| indoxacarb | G | 12 | 7 |
| lambda-cyhalothrin | R | 24 | 7 |

*(table continuednext page)*

| Pesticide | Use Category[1] | Hours to Reentry[2] | Days to Harvest[3,4,5] |
|---|---|---|---|
| **INSECTICIDE** | | | |
| lambda-cyhalothrin + chlorantraniliprole | R | 24 | 14 |
| lambda-cyhalothrin + thiamethoxam | R | 24 | 14 |
| methamidaphos | R | 48 | 14 |
| methomyl | R | 48 | 6 |
| novaluron | G | 12 | 14 |
| oxamyl | R | 48 | 7 |
| permethrin | R | 12 | 14 |
| phorate | R | 48 | 90 |
| phosmet | G | 24 | 7 |
| pymetrozine | G | 12 | 14 |
| spinetoram | G | 4 | 7 |
| spinosad | G | 4 | 7 |
| spirotetremat | G | 24 | 7 |
| sulfoxaflor | R | 24 | 7 |
| thiamethoxam (seed treatment) | G | 12 | AP[4] |
| thiamethoxam (soil/foliar) | G | 12 | 30/14 |
| thiamethoxam+chlorantraniliprole | G | 12 | 14 |
| zeta-cypermethrin | R | 12 | 1 |
| zeta-cypermethrin+bifenthrin | R | 12 | 21 |
| **FUNGICIDE (FRAC code)** | | | |
| Blocker (Group 14) | G | 12 | AP[4] |
| chlorothalonil (Group M5) | G | 12 | 0 |
| Curzate (Group 27) | G | 12 | 14 |
| Endura (Group 7) | G | 12 | 30 |
| Forum (Group 40) | G | 12 | 4 |
| Gavel (Groups 22 + M3) | G | 48 | 14/3[3] |
| Gem (Group 11) | G | 12 | 7 |
| Headline (Group 11) | G | 12 | 3 |
| iprodione (Group 2) | G | 12 | 14 |
| Luna Tranquility (Groups 7+9) | G | 12 | 7 |
| mancozeb (Group M3) | G | 12,24 | 14/3[3] |
| Moncut (Group 7) | G | 12 | AP[4] |
| Omega (Group 29) | G | 48 | 14 |
| Polyram (Group M3) | G | 24 | 14/3[3] |
| Presidio (Group 43) | G | 12 | 7 |
| Previcur Flex (Group 28) | G | 12 | 14 |
| Priaxor (Groups 7 + 11) | G | 12 | 7 |
| Quadris (Group 11) | G | 4 | 14 |
| Quadris Opti (Groups 11 + M5) | G | 12 | 14 |
| Quadris Top (Groups 3 + 11) | G | 12 | 14 |
| Quash (Group 3) | G | 12 | 1 |
| Ranman (Group 21) | G | 12 | 7 |
| Reason (Group 11) | G | 12 | 14 |
| Revus (Group 40) | G | 12 | 14 |
| Revus Top ( Groups 40 + 3) | G | 12 | 14 |
| Ridomil Gold Bravo (Groups 4 + M5) | G | 48 | 7 |
| Ridomil Gold Copper (Groups 4 + M1) | G | 48 | 7 |
| Ridomil Gold MZ (Groups 4 + M3) | G | 24 | 14/3[3] |
| Super Tin (Group 30) | R | 48 | 7 |
| Tanos (Groups 11 + 27) | G | 12 | 14 |
| thiophanate-methyl (Group 1) | G | 12 | 14 |
| Ultra Flourish (Group 4) | G | 48 | 0 |

See Table D-6.

[1] G = general, R = restricted

[2] Chemicals with multiple designations are based on product and/or formulation differences. CONSULT LABEL.

[3] 14 days = NJ, MD, VA; 3 days = DE, PA

[4] AP = At Plant

[5] PP = Preplant

## Nematode Control

See Chapter E, "Nematodes" section in Soil Pests--Their Detection and Control. Use fumigants listed in the "Soil Fumigation" section, or use one of the following:

Vydate--1.0 to 2.0 gal 2L/A applied in at least 20 gal/A preplant in-furrow treatment. Foliar applications at 2.0 to 4.0 pt 2L/A can be utilized to offer further suppression of nematodes. See labels for more details.

Mocap--4.4 fl oz per 1,000 row ft 6F or OLF. Apply in a 12-inch band over the row at planting (avoid contact with seed piece), or 1.0 to 1.5 gal/A broadcast.

Certain mustard green cover crops planted in the fall and incorporated prior to planting may offer nematode suppression. (see Disease Management sub-section Non-chemical management of nematodes in E section)

## Disease Control

### Seed-Piece Treatment

Use certified seed. Give seed potatoes a warming-up (65° to 70°F [18.3° to 21.1°C]) period of 2 to 3 weeks before planting to encourage rapid emergence. Plant seed pieces immediately after cutting or store under conditions suitable for rapid healing of the cut surfaces (60° to 70°F [15.6° to 21.1°C] plus high humidity). Dust seed pieces with fungicides immediately after cutting. Some fungicide seed-piece treatments are formulated with fir or alder bark. Bark formulations have been effective treatments. Use one of the following:

For *Fusarium spp*.:

Captan--1.0 lb 7.5D/cwt or OLF
mancozeb*--1.0 lb 8D/cwt or OLF
Polyram--1.0 lb 7D/cwt or OLF

For *Fusarium* spp*. and Rhizoctonia* spp.:

Maxim--0.5 lb 0.5D/cwt
Maxim MZ*--0.5 lb/cwt
MonCoat MZ*--0.75 to 1.00 lb 7.5D/cwt
Tops--1.0 lb 2.5D/cwt
Tops MZ*--0.75 to 1.00 lb 8.5 D/cwt
Evolve* (thiophante-methyl, mancozeb and cymoxanil)--0.75 lb/cwt

Additionally for aphid, Colorado potato beetle, flea beetle and potato leafhopper control, apply one of the following:

Cruiser 5FS--see label for application directions and rates,
Belay 2.13SC--see label for application directions and rate
Tops MZ Gaucho--12.0 oz/cwt

*Seed-piece fungicides that contain EBDC fungicides or cymoxanil also provide protection against seedborne late blight infections.

### Air Pollution

Symptoms appear as tiny spots of brown tissue on the upper surface of leaves and a bronzing of the lower surfaces. Some varieties such as Kanona, Red Norland, and Snowden are particularly sensitive.

### Early Blight

Begin preventative sprays and continue every 7 to 10 days according to a disease forecasting system where available. If late blight is a threat, then begin sprays when plants are 8 inches tall.

***Alternate or tank-mix one of the following preventative fungicides:***

chlorothalonil--1.0 to 1.5 pt 6F/A or OLF
mancozeb--1.5 to 2.0 lb 75DF/A or OLF (**Note: DO NOT apply more than a combined total of 15.0 pounds of mancozeb or Polyram per acre per crop**)
Polyram--2.0 lb 80DF/A or OLF (**Note: DO NOT apply more than a combined total of 15.0 pounds of mancozeb or Polyram per acre per crop**)
Super Tin--3.0 to 6.0 fl oz 4L/A or OLF *plus* mancozeb--2.0 lb 75DF/A or OLF

***With one of the following pre-mix fungicides:***

Luna Tranquility--8.0 to 11.2 fl oz 4.16SC/A (only use 11.2 fl oz/A rate in Delaware)
Priaxor--4.0 to 8.0 fl oz 4.17SC/A
Quadris Opti--1.6 pt 5.5 SC/A
Quadris Top--8.0 to 14.0 fl oz 2.72SC/A
Revus Top--5.5 to 7.0 fl oz 4.16 SC/A
Tanos--6.0 oz 50W/A *plus* a protectant fungicide (i.e., chlorothalonil or mancozeb)

***Or with one of the following single-active ingredient fungicides:***

Endura--2.5 to 4.5 oz 70WG/A
Quash--2.5 to 4.0 oz 50WDG/A (do not use an adjuvant with Quash on potato)
Quadris--6.0 to 15.5 fl oz 2.08F/A
Gem--6.0 to 8.0 oz 25WDG/A
Headline--6.0 to 9.0 fl oz 2.1F/A
Reason--5.5 to 8.2 fl oz 500SC/A

## Late Blight

Begin fungicide applications when plants are 6 inches tall and repeat every 7 days or apply fungicides according to a disease forecasting system such as BLITECAST or WISDOM. One of the following protective fungicides should be applied early in the season prior to the occurrence of any disease in the region:

chlorothalonil--1.0 to 1.5 pt 6F/A or OLF,
mancozeb--1.5 to 2.0 lb 75DF/A or OLF. (**Note. DO NOT apply more than a total of 15.0 pounds per acre per crop**),
Polyram--2.0 lb 80DF/A or OLF. (**Note. DO NOT apply more than a total of 15.0 pounds per acre per crop**).

Monitor for movement of the disease by contacting your local extension professional or visiting the following website to receive updates on where the disease is currently located (www.usablight.org). Once late blight is detected in your area, tank mix one of the following translaminar fungicides which can move into and through leaves with a protectant fungicide:

Curzate--3.33 oz 60DF/A plus a protectant fungicide (ie, chlorothalonil or mancozeb),
Forum--4.0 to 6.0 fl oz 4.18SC/A plus a protectant fungicide,
Gavel--1.5 to 2.0 lb 75DF/A
Omega--5.5 fl oz. 500F/A
Presidio--4.0 fl. oz 4SC/A
Previcur Flex--1.2 pt 6F/A plus a protectant fungicide (ie, chlorothalonil or mancozeb)
Ranman--1.40 to 2.75 fl oz 400SC/A
Revus--5.5 to 8.0 fl oz 2.08SC/A
Revus Top--5.5 to 7.0 fl oz 4.16SC/A
Super Tin--3.0 to 6.0 fl oz 4L/A or OLF *plus* mancozeb--2.0 lb 75DF/A or OLF,
Tanos--6.0 to 8.0 oz 50W/A *plus* a protectant fungicide (ie, chlorothalonil or mancozeb)

When a field contains new late blight infections and harvest is near, vines should be destroyed immediately to help prevent tuber infection.

## Rhizoctonia stem canker and black scurf

Apply one of the following as an in-furrow spray at planting:

Quadris--0.4 to 0.6 fl oz 2.08F/1000 row ft
Moncut--0.79 to 1.18 oz 70DF/1000 row ft

## Verticillium Wilt

Select fields with a low incidence of wilt. Use resistant varieties where possible. Do not use tomato, eggplant, or pepper in rotation with potato. The use of sudangrass in rotation with potato may reduce nematode levels. The use of Mocap (see "Nematode Control" section) will reduce lesion nematode levels in the soil, resulting in less Verticillium wilt.

Apply one of the following through center pivot irrigation in the fall to fallow fields for suppression of Verticillium and lesion nematode:

K-Pam HL--30.0 to 60.0 gal/A,
metam-sodium (Vapam HL)--37.5 to 70.0 gal/A

## White Mold

Apply one of the following immediately prior to row closing and repeat 28 days later:

Endura--5.5 to 10.0 oz 70WG/A
Omega--5.5 to 8.0 fl oz 500F/A
iprodione--2.0 pt 4F/A or OLF
thiophanate-methyl--1.0 to 1.5 lb 70WP/A

## Common Scab

Potato scab is caused by a soil-inhabiting fungus (*Streptomyces scabies*). The disease is suppressed in acid soils (pH <5.2), so increase of soil pH with lime favors development of scab. When lime is needed, therefore, it is best to apply after potato harvest and before subsequent crops grown in rotation. The optimum soil pH for growing scab susceptible potato varieties is about 5.0 to 5.2. Scab resistant potato varieties may be grown at pH 5.5 to 6.2. Plant scab-free seed potatoes. Use resistant varieties and rotate with small grains, corn, or alfalfa. Avoid rotations using red clover. Maintain adequate soil moisture during and after tuber set. Avoid heavy application of manures.

## Bacterial Soft Rot

Prevent wounding and make certain tubers are dry before packing. Free chlorine wash maintained at 25 ppm chlorine or use of a fresh chlorine rinse maintained at 50 ppm chlorine may help reduce soft rot.

## Leak (*Pythium*) and Pink Rot (*Phytophthora*)

Leak is a disease that usually enters the tubers through bruises occurring in conjunction with the harvesting of immature tubers during hot weather. Pink rot generally occurs in poorly drained areas. Be sure to rotate out of potatoes for at least 2 years. Apply one of the following fungicides in a 6- to 8-inch band directly over the seed-piece prior to row closure:

Platinum Ridomil Gold--2.2 fl oz 1.6E/1000 ft of row
Presidio--4.0 fl oz 4SC/A (**Pink rot only**), followed by a side-dressing application between hilling and tuber initation (see label for more information)
Ridomil Gold--0.42 fl oz 4SL/1000 ft of row
Ultra Flourish--0.84 fl oz 2E/1000 ft of row
Ranman--0.42 fl. oz/1000 ft row.

An alternative application technique is to apply one of the following fungicides with as much gallonage as possible for ground applications and a minimum of 5 gal/A for aerial applications. Make the first application at flowering and the second 14 days later. If the field has a history of pink rot or leak a third application might be warranted 14 days after the second application. Be sure to get some coverage of the soil surrounding plants for root uptake to occur.

Ridomil Gold Bravo--2.0 lb 76WP/A
Ridomil Gold Copper--2.0 lb 65WP/A
Ridomil Gold MZ--2.5 lb 68WP/A

### Virus Diseases

Numerous seed borne viruses can occur in potato including potato leafroll, potato virus S (PVS), potato virus M (PVM), and several strains of potato virus Y PVY). There has been an increase in occurrence of PVYN strain in the region. Control these seed borne viruses by obtaining virus-free certified or foundation seed.

# PUMPKINS AND WINTER SQUASH

## Varieties[1]

**Pumpkins (less than 1 pound)**
Apprentice* (FR,PR)
Munchkin
Wee-B-Little*
Baby Boo

**Pumpkins (1 to 3 pounds)**
Baby Pam
Baby Bear*
Touch of Autumn* (PMT)
Rockafellow* (PMT)

**Pumpkins (2 to 6 pounds)**
Prankster* (PMT)
Cannonball* (hard shell)
Iron Man * (FR, PR, PMT) (hard shell)
Field Trip*(PMT)
Orange Smoothie* (hard shell)
Hybrid Pam*
Fall Splendor*(PMT)
Mystic Plus* (PMT)
(5-6 pounds, plant at closer spacing to reduce size)
Small Sugar (BRT)
Kakai (edible seeds)

**Pumpkins (10 to 20 pounds)**
Magic Lantern* (PMT)
Apollo* (PMT)
Sorcerer*
Charisma* (PMR)
Capt. Jack
Magician* (PMR, ZYMV)

**Pumpkins (more than 20 pounds)**
Pro Gold 510*
Howden Biggie
Gladiator* (PMT)
Aladdin (PMT)
Gold Medal*
Apogee*
Solid Gold*

**Exhibition Pumpkins (more than 50 pounds)**
Atlantic Giant
Prize Winner

**Ornamental Pumpkins**
Knuckle Head*
Rascal* (PMR; PR; WMV)

**Winter Squash (Acorn Type)**
Table Ace*
Taybelle* (semi bush, PMT)
Table Gold
Table Queen
Table Star * (PMT)
Autumn Delight * (PMT)
Royal Ace (bush PMT)

**Winter Squash (Butternut Type)**
Butterboy* (restricted vine)
Puritan Butternut
Metro* (restricted vine, PMR)
Quantum *
Waltham Butternut

**Winter Squash (Buttercup Type)**
Sunshine*
Buttercup
Sweet Mama
Bon Bon (green)

**Winter Squash (Delicious Type)**
Golden Delicious

**Winter Squash (Hubbard Type)**
Hubbard Types
Boston Marrow

**Spaghetti Squash**
Tivoli*
Stripetti*
Vegetable Spaghetti

**Processing**
Golden Delicious
Neck Pumpkin Types
Atlas* & Other Butternut Types

[1] Varieties are listed by maturity within each type, earliest first.
* Indicates hybrid varieties
Letters in parentheses indicate disease resistance possessed by varieties. See the "Abbreviations" section in front portion of this publication.