

This is a section from the

**2016**

**Mid-Atlantic**

# **Commercial Vegetable Production Recommendations**

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](http://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.

# EGGPLANT

## Suggested Eggplant Varieties<sup>1</sup>

| Variety                     | Days  | F <sub>1</sub> <sup>2</sup> | Color             | Calyx Color | Shape          | Type     | TMV <sup>3</sup> |
|-----------------------------|-------|-----------------------------|-------------------|-------------|----------------|----------|------------------|
| <b>Standard Market Type</b> |       |                             |                   |             |                |          |                  |
| Epic                        | 64    | Yes                         | Purple/black      | Green       | Oval           |          | X                |
| Galine                      | 65    | Yes                         | Black             | Green       | Oval Long      |          |                  |
| Traviata                    | 70    | Yes                         | Black             | Green       | Teardrop       |          |                  |
| Nadia                       | 70    | Yes                         | Black             | Green       | Oval Long      |          | X                |
| Night Shadow                | 68-75 | Yes                         | Black             | Green       | Teardrop       |          |                  |
| Santana                     | 80    | Yes                         | Black/Purple      | Green       | Elongated Oval |          |                  |
| White Lightning             | 75    | Yes                         | White             | Green       | Teardrop       |          |                  |
| White Star                  | 55    | Yes                         | White             | Green       | Teardrop       |          |                  |
| Clara                       | 65    | Yes                         | White             | Green       | Teardrop       |          |                  |
| <b>Specialty Types</b>      |       |                             |                   |             |                |          |                  |
| Fairy Tale                  | 65    | Yes                         | Purple variegated | Green       | Mini Slender   | Japanese |                  |
| Hansel                      | 55    | Yes                         | Purple            | Green       | Mini Slender   | Japanese |                  |
| Megal                       | 60    | Yes                         | Purple/Black      | Green       | Elongated Oval | Italian  | X                |
| Millionaire                 | 55    | Yes                         | Black             | Purple      | Slender        | Japanese |                  |
| Palermo                     | 70    | Yes                         | Purple            | Purple      | Round          | Sicilian |                  |
| Prosperosa                  | 70-78 | Yes                         | Purple            | Purple      | Large Round    | Sicilian |                  |
| Purple Shine                | 70    | Yes                         | Purple            | Purple      | Slender Long   | Chinese  |                  |
| Shooting Stars              | 57    | No                          | Purple variegated | Green       | Elongated Oval |          |                  |
| Shoya Long                  | 55-60 | Yes                         | Purple            | Purple      | Slender Long   | Japanese |                  |
| Purple Fingers              | 65    | No                          | Purple            | Green       | Mini Slender   | Italian  |                  |
| Barbarella                  | 65    | Yes                         | Purple            | Purple      | Round          | Sicilian |                  |
| Mangan                      | 60    | Yes                         | Purple            | Purple      | Elongated Oval | Japanese |                  |
| Orient Express              | 58    | Yes                         | Purple            | Purple      | Slender Long   | Asian    |                  |
| Orient Charm                | 65    | Yes                         | Violet            | Green       | Slender Long   | Asian    |                  |
| Machiaw                     | 65    | Yes                         | Violet            | Green       | Slender Long   | Asian    |                  |
| Kermit                      | 60    | Yes                         | Green and White   | Green       | Mini Round     | Thai     |                  |
| Gretel                      | 55    | Yes                         | White             | Green       | Mini Slender   | Japanese |                  |
| Calliope                    | 64    | Yes                         | Purple variegated | Green       | Oval           | Asian    |                  |

<sup>1</sup>Variety attribute based on Seed Company Information.

<sup>2</sup>F<sub>1</sub> hybrid (yes/no).

<sup>3</sup>Disease resistance: Only those varieties with some resistance or tolerance to tobacco mosaic virus are noted with an X.

### 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.

| Eggplant             | Pounds N per Acre | Soil Phosphorus Level |     |        |           | Soil Potassium Level |     |        |                                     | Nutrient Timing and Method |
|----------------------|-------------------|-----------------------|-----|--------|-----------|----------------------|-----|--------|-------------------------------------|----------------------------|
|                      |                   | Low                   | Med | High   | Very High | Low                  | Med | High   | Very High                           |                            |
|                      |                   |                       |     | (Opt.) | (Opt.)    |                      |     | (Opt.) | (Opt.)                              |                            |
| 125-150 <sup>1</sup> | 250               | 150                   | 100 | 0      | 250       | 150                  | 100 | 0      | Total nutrient recommended.         |                            |
| 50-100               | 250               | 150                   | 100 | 0      | 250       | 150                  | 100 | 0      | Broadcast and disk-in.              |                            |
| 25-50                | 0                 | 0                     | 0   | 0      | 0         | 0                    | 0   | 0      | Sidedress 3-4 weeks after planting. |                            |
| 25-50                | 0                 | 0                     | 0   | 0      | 0         | 0                    | 0   | 0      | Sidedress 6-8 weeks after planting. |                            |

For plasticulture production, fertilization rates are based on a standard row spacing of 6-feet. Apply 1.0 to 2.0 pounds of boron (B) per acre with broadcast fertilizer. See Table B-1 for more specific boron recommendations.

<sup>1</sup>If crop is to be mulched with plastic but not drip/trickle fertilized, broadcast 225 pounds of nitrogen (N) per acre with recommended P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O and disk-in or incorporate prior to laying mulch.

### 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 eggplant.

#### Critical eggplant tissue test values.

| Timing  | Value          | N    | P   | K   | Ca  | Mg   | S   | Fe   | Mn  | Zn  | B   | Cu  | Mo  |
|---|----------------|------|-----|-----|-----|------|-----|------|-----|-----|-----|-----|-----|
|   |                | %    | %   | %   | %   | %    | %   | ppm  | ppm | ppm | ppm | ppm | ppm |
| Most recently matured leaves at early fruit set | Deficient      | <4.2 | 0.3 | 3.5 | 0.8 | 0.25 | 0.4 | <50  | 50  | 20  | 20  | 5   | 0.5 |
|   | Adequate range | 4.2  | 0.3 | 3.5 | 0.8 | 0.25 | 0.4 | 50   | 50  | 20  | 20  | 5   | 0.5 |
|   |                | 6    | 0.6 | 5   | 1.5 | 0.6  | 0.6 | 100  | 100 | 40  | 40  | 10  | 0.8 |
|   | High           | >6.0 | 0.6 | 5   | 1.5 | 0.6  | 0.6 | >100 | 100 | 40  | 40  | 10  | 0.8 |
|   | Toxic (>)      | -    | -   | -   | -   | -    | -   | -    | -   | -   | -   | -   | -   |

### Seed Treatment

Seed should be treated to prevent disease. See the Disease section for more information.

### Transplant Production

Sow seed in the greenhouse 8 to 10 weeks before field planting. Three to 4 ounces of seed are necessary to produce plants for 1 acre. Optimum temperatures for germination and growth are 70° to 75°F (21.1° to 23.9°C). Seedlings should be transplanted to 2-inch or larger pots or containers anytime after the first true leaves appear, or seed can be sown directly into the pots and thinned to a single plant per pot

### Transplanting Dates

Harden plants for a few days at 60° to 65°F (15.6° to 18.3°C) and set in field after danger of frost and when average daily temperatures have reached 65° to 70°F (18.3° to 21.1°C). Usual transplanting dates are May 15 to June 5.

Eggplant is a warm-season crop that makes its best growth at temperatures between 70° to 85°F (21.1° to 29.4°C). Temperatures below 65°F (18.3°C) result in poor growth and fruit set.

### Spacing

Rows: 4 to 5 feet apart; plants: 2 to 3 feet apart in the row. Space plants 18 to 30 inches apart in Pennsylvania.

### Drip/Trickle Fertilization

Before mulching, adjust soil pH to around 6.5 and then apply enough farm-grade fertilizer to supply 60 pounds per acre of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O. Then thoroughly incorporate into the soil. If soil tests medium or less in soil potassium, apply a fertilizer with a ratio of 1-1-2 or 1-1-3 carrying 60 pounds of nitrogen per acre.

After mulching and installing the drip irrigation system, apply completely soluble fertilizers to supply 40 pounds (10 to 20 pounds in Pennsylvania) of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O per acre during each application. On soils testing low and low to medium in boron and that have not received any preplant boron fertilizer, include 0.25 pound of actual boron per acre in each soluble fertilizer application.

The first soluble fertilizer application should be applied through the trickle irrigation system within 1 week after field transplanting the eggplants. The same rate of soluble fertilizer should be applied about every 3 weeks during the growing season for a total of six to seven applications.

### Mulching and Fumigation

Producing eggplant on black plastic mulch can increase yields and promote earliness. Various widths of plastic mulch are available depending on individual production systems and available equipment. At least 50% of the nitrogen (N) should be in nitrate form NO<sub>3</sub><sup>-1</sup> when planting in fumigated soil under plastic mulch. See “For Weed Control

Under Plastic Mulch”, below for more details.

### Staking

High intensity eggplant production can benefit from staking, but materials costs are high due to the heavy fruit load to be supported. Use a staking system similar to that described in the “Tomatoes” section. Pruning is not required for eggplant, but removing the two lowest branches helps with plastic removal at seasons end if the plants are mowed off.

### Harvest and Post Harvest Considerations

Fruits should be harvested when the skin is still a glossy color and the seed and pulp are white. Soft fruit and dark seed indicate over maturity. Fruits must be harvested as they reach maturity to ensure continued fruit set.

Eggplant fruit should be moved from the field to a protected area as soon as possible after harvest. If left in direct sunlight the fruit will sunburn. Cool eggplants in a cold room, forced-air or forced-air and evaporative cooling. Fruit are sensitive to temperature below 50°F, but can be stored for 1-2 weeks at 50-54°F and 90-95% relative humidity.

### 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. See “Mulching” section above for further information on weed control under plastic mulch.

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

Determine the preharvest interval (PHI) for the crop. See Table E-4 and consult the herbicide label.

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.

#### For Weed Control Under Plastic Mulch

Black plastic mulch effectively controls most annual weeds by preventing light from reaching the germinated seedling. Herbicides are used under plastic mulch to control weeds around the planting hole, and under the mulch when plastic mulch is used. Trickle irrigation tubing left on the soil surface may cause weed problems by leaching herbicide away at the emitters. The problem is most serious when clear plastic mulch is used. Bury the trickle tubing several inches deep in the bed to reduce this problem.

1. Complete soil tillage, and form raised beds, if desired, prior to applying herbicide(s). Do not apply residual herbicides before forming beds, or herbicide rate and depth of incorporation may be increased, raising the risk of crop injury. When beds are formed and plastic mulch laid in a single pass, the herbicide should be applied after the bed is formed, as a part of the same operation.
2. Apply herbicide(s) recommended for use under plastic mulch in a band as wide as the mulch. Condensation that forms on the underside of the mulch will activate the herbicide. Use the trickle irrigation to provide moisture if

the soil is too dry for condensation to form on the underside of the mulch.

3. Complete by laying the plastic mulch and trickle irrigation tubing, if used, immediately after the herbicide application. Delay punching the planting holes until seeding or transplanting.

Napropamide--1.0 to 2.0 lb/A. Apply 2.0 to 4.0 quarts per acre Devrinol 2-XT preemergence in a band under the plastic, immediately before laying the mulch. Condensation that forms on the underside of the mulch will activate the herbicide. Annual grasses and certain annual broadleaf weeds will be suppressed or controlled under the mulch and around the plant hole. Use lower rate on coarse-textured or sandy soil. Devrinol may reduce stand and yield of fall grains. Moldboard plowing will reduce the risk of injury to a small grain follow crop.

#### For Soil Strips Between Rows of Plastic Mulch (Directed and Shielded Band Applications)

Use the following land preparation, treatment, planting sequences, and herbicides labeled for the crop to treat **Soil Strips Between Rows of Plastic Mulch**, or crop injury and/or poor weed control may result.

1. Complete soil preparation, apply herbicide(s) under the mulch (see above), and lay plastic and trickle irrigation (optional) before herbicide application between the rows.
2. Spray preemergence herbicide(s), registered and recommended for use on the crop in bands onto the soil and the shoulders of the plastic mulch before planting and weeds germinate, **OR** apply after planting as a shielded spray combined with a postemergence herbicide to control emerged weeds. **DO NOT broadcast spray over the plastic mulch at any time!**
3. Incorporate preemergence herbicide into the soil with ½ to 1 inch of rainfall or overhead irrigation within 48 hours of application
4. Apply Gramoxone in bands to the soil strips between the plastic mulch before the crop emerges or is transplanted, **AND/OR** as a shielded spray postemergence to control emerged weeds. Use in combination with residual herbicides that are registered for use.

**Note.** All herbicide rate recommendations are made for spraying a broadcast acre (43,560 ft<sup>2</sup>).

#### Preemergence

Napropamide--1.0 to 2.0 lb/A. Apply 2.0 to 4.0 quarts per acre Devrinol 2-XT as a banded directed shielded spray and activate with one-half inch of rainfall or sprinkler irrigation within 48 hours of application to control most annual grasses and certain broadleaf weeds. Use lower rate on coarse-textured or sandy soil. Devrinol may reduce stand and yield of fall grains. Moldboard plowing will reduce the risk of injury to a small grain follow crop.

#### Postemergence

DCPA--6.0 to 10.5 lb/A. Apply 8.0 to 14.0 pints per acre Dacthal 6F as a banded directed shielded spray 4 to 6 weeks after transplanting for preemergence weed control. Emerged weeds will not be controlled. Dacthal will not injure crop foliage. Spray broadcast when eggplants are grown without plastic mulch, or band between the rows when plastic mulch

is used. Controls late season annual grasses, common purslane, and certain other broadleaf weeds.

Halosulfuron--0.023 to 0.047 lb/A. Apply 0.5 to 1.0 dry ounce Sandea 75WG as a **banded directed shielded spray to the soil strips between rows of plastic mulch ONLY**, to suppress or control yellow nutsedge and broadleaf weeds including common cocklebur, redroot pigweed, smooth pigweed, ragweed species, and galinsoga. Sandea applied postemergence will not control common lambsquarters or eastern black nightshade. Add nonionic surfactant to be 0.25 percent of the spray solution (1.0 quart per 100 gallons of spray solution). **DO NOT** use oil concentrate. Susceptible broadleaf weeds usually exhibit injury symptoms within 1 to 2 weeks of treatment. Typical symptoms begin as yellowing in the growing point that spreads to the entire plant and is followed by death of the weed. Injury symptoms are similar when yellow nutsedge is treated but may require 2 to 3 weeks to become evident and up to a month for the weed to die. Sandea is an ALS inhibitor. Herbicides with this mode of action have a single site of activity in susceptible weeds. The risk of the development of resistant weed populations is high when herbicides with this mode of action are used continuously and exclusively to control a weed species for several years or in consecutive crops in a rotation. Integrate mechanical methods of control and use herbicides with a different mode of action to control the target broadleaf weeds when growing other crops in the rotation. **DO NOT** apply Sandea to crops treated with a soil applied organophosphate (OP) insecticide, or use a foliar applied organophosphate (OP) insecticide within 21 days before or 7 days after a Sandea application. **DO NOT exceed total of 0.094 pounds per acre, equal to 2.0 dry ounces of Sandea per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2.0 dry ounces of Sandea applied in one year.**

Paraquat--0.6 lb/A. Apply 2.4 pints per acre Gramoxone SL 2.0 or OLF as a **banded directed shielded spray between the rows ONLY**, to control emerged grass and broadleaf weed seedlings. **DO NOT** allow the spray to contact plants as injury or residues may result. Use shields to prevent spray contact with crop plants. **DO NOT** exceed a spray pressure of 30 psi. Add a wetting agent as per label.

Clethodim--0.094 to 0.125 lb/A. Apply 6 to 8 fluid ounces per acre Select 2EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) or 12.0 to 16.0 fluid ounces of Select Max 0.97EC with nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of spray solution) postemergence to control many annual and certain perennial grasses, including annual bluegrass. Select will not consistently control goosegrass. The use of oil concentrate with Select 2EC may increase the risk of crop injury when hot or humid conditions prevail. To reduce the risk of crop injury, omit additives or switch to nonionic surfactant when grasses are small and soil moisture is adequate. Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe

a minimum preharvest interval of 20 days.

Sethoxydim--0.2 to 0.3 lb/A. Apply 1.0 to 1.5 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 as a banded directed shielded spray 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 20 days and apply no more than 4.5 pints per acre in one season.

#### **For Transplanting Into Soil Without Plastic Mulch (Broadcast Applications)**

Use the following land preparation, treatment, planting sequences, and herbicides labeled for the crop when **planting into soil without plastic mulch**, or crop injury and/or poor weed control may result.

1. Complete soil tillage, apply preplant incorporated herbicide(s), and incorporate. Use a finishing disk or field cultivator that sweeps at least 100% of the soil surface twice, at right angles, operated at a minimum of 7 miles per hour (mph), OR a PTO driven implement once, operated at less than 2 miles per hour (mph).
2. Seed and apply preemergence herbicide(s) immediately after completing soil tillage, and mechanical incorporation of preplant herbicides. Irrigate if rainfall does not occur, to move the herbicide into the soil and improve availability to germinating weed seeds within 2 days of when the field was last tilled, or plan to control escaped weeds by other methods.

#### **Preplant Incorporated**

Napropamide--1.0 to 2.0 lb/A. Apply 2.0 to 4.0 quarts per acre Devrinol 2-XT before planting and incorporate 1 to 2 inches deep with power-driven rotary cultivators, or activate with one-half inch of sprinkler irrigation within 48 hours of application to control most annual grasses and certain broadleaf weeds. Use lower rate on coarse-textured or sandy soil. Devrinol may reduce stand and yield of fall grains. Moldboard plowing will reduce the risk of injury to a small grain follow crop.

Trifluralin--0.5 to 1.0 lb/A. **A Special Local-Needs Label 24(c) has been approved for the use of Trilin in Maryland.** Apply 1.0 to 2.0 pints per acre Trilin prior to transplanting. Incorporate to a depth of 3 inches. Use the lower rate on coarse-textured soils low in organic matter, and the higher rate on fine-textured soils with high organic matter. Avoid planting during periods of cold, wet weather to reduce the risk of temporary stunting.

#### **Postemergence**

DCPA--6.0 to 10.5 lb/A. Apply 8.0 to 14.0 pints per acre Dacthal 6F 4 to 6 weeks after transplanting for preemergence

weed control. Emerged weeds will not be controlled. Dacthal will not injure crop foliage. Broadcast spray when eggplants are grown without plastic mulch, or band between the rows when plastic mulch is used. Controls late season annual grasses, common purslane, and certain other broadleaf weed.

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 20 days.

Sethoxydim--0.2 to 0.3 lb/A. Apply 1.0 to 1.5 pints per acre Poast 1.5EC with oil concentrate to be 1 percent of the spray solution (1 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 20 days and apply no more than 4.5 pints per acre in one season.

### Postharvest With or Without Plastic Mulch

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. Use to prepare plastic mulch for replanting, or to aid in the removal of the mulch. See the label for additional information and warnings.

**Note.** All herbicide rate recommendations are made for spraying a broadcast acre (43,560 ft<sup>2</sup>).

## 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](http://www.CDMS.net) or [www.greenbook.net](http://www.greenbook.net). Also, specific labels can be obtained via web search engines.

### Aphids

Apply one of the following formulations:

acetamiprid--2.0 to 4.0 oz/A Assail 30SG (or OLF)

bifenthrin + imidacloprid--3.80 to 9.85 fl oz/A Brigadier (or OLF)

*Chenopodium* extract--2.0 to 3.0 qts/A Requiem EC

clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 3.0 to 4.0 fl oz/A Belay 2.13SC

flonicamid--2.0 to 2.8 oz/A Beleaf 50 SG

flupyradifuzone--7.0 to 12.0 fl. oz/A Sivanto 200SL

imidacloprid--**soil** 7.0 to 10.5 fl oz/A Admire Pro (or OLF),

**foliar** 1.3 to 2.2 fl oz/A Admire PRO (or OLF)

imidacloprid+beta-cyfluthrin--3.8 to 4.1 fl oz/A Leverage 360

malathion--1.0 to 1.5 pts/A Malathion 57EC (or OLF)

methomyl (**green peach aphid only**)--0.75 to 3.0 pts/A Lannate LV

oxamyl--**foliar** 2.0 to 4.0 pts/A Vydate 2L

pymetrozine--2.75 oz/A Fulfill 50WDG

spirotetramat--4.0 to 5.0 fl oz/A Movento

thiamethoxam--**soil** 1.66 to 3.67 oz/A Platinum 75SG; **foliar**

2.0 to 3.0 oz/A Actara 25WDG (or other labeled mixtures

containing thiamethoxam like Durivo and Voliam flexi)

### Colorado Potato Beetle (CPB)

CPB has the ability to rapidly develop resistance to insecticides; thus, see the section on "How to Improve Pest Control" for information on resistance management practices. The use of the egg parasitoid, *Edovum putleri*, has been shown to control CPB effectively in eggplant, or apply one of the following insecticides:

abamectin--1.75 to 3.5 fl oz/A Agri-Mek 0.7SC (or OLF)

acetamiprid--1.5 to 2.5 oz/A Assail 30SG (or OLF)

*Bacillus thuringiensis tenebrionis* (**small CPB larvae only**) (Novodor, Raven)

**Note.** Larval reduction may not be noticeable for 48 to 72 hours after application.

Make first application when eggs begin to hatch and repeat applications at 5- to 7-day intervals if small larvae are present. NOT effective against medium larvae and adults.

If rainfall occurs within 24 hours post-treatment,

reapplication may be necessary.

bifenthrin+imidacloprid--5.10 to 9.85 fl oz/A Brigadier (or OLF)

chlorantraniliprole--drip/foliar 3.5 to 5.0 fl oz/A Coragen 1.67SC

clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 3.0 to 4.0 fl oz/A Belay 2.13SC

cyantraniliprole--**soil** (drip or injection) 5.0 to 10.0 fl. Oz/A Verimark; **foliar** 7.0 to 13.5 fl. Oz/A Exirel

dinotefuran--**soil** 9.0 to 10.5 fl oz/A Scorpion 35SL; or 5.0 to 6.0 oz/A Venom 70SG; **foliar** 2.0 to 7.0 fl oz/A

Scorpion 35SL or 1.0 to 4.0 oz/A Venom 70SG

flupyradifuzone--10.5 to 14.0 fl. oz/A Sivanto 200SL

imidacloprid--**soil** 7.0 to 10.5 fl oz/A Admire Pro (or OLF)  
**foliar** 1.3 to 2.2 fl oz/A Admire PRO (or OLF)  
 imidacloprid + beta-cyfluthrin--3.8 to 4.1 fl oz/A Leverage 360  
 novaluron--9.0 to 12.0 fl oz Rimon 0.83EC  
 oxamyl--2.0 to 4.0 pts/A Vydate L  
 spinetoram--5.0 to 10.0 fl oz/A Radiant SC  
 spinosad--3.0 to 6.0 fl oz/A Entrust SC **OMRI-listed**  
 thiamethoxam--**soil** 1.66 to 3.67 oz/A Platinum 75SG; **foliar** 2.0 to 3.0 oz/A Actara 25WDG  
 thiamethoxam + chlorantraniliprole--**soil** 10.0 to 13.0 fl oz/A Durivo; **foliar** 4.0 to 7.0 oz/A Voliam Flexi)

**Eggplant Lacebug**

Apply one of the following formulations:  
 abamectin--1.75 to 3.5 fl oz/A Agri-Mek 0.7SC (or OLF)  
 dinotefuran--**soil** 9.0 to 10.5 fl oz/A Scorpion 35SL; or 5.0 to 6.0 oz/A Venom 70SG; **foliar** 2.0 to 7.0 fl oz/A Scorpion 35SL or 1.0 to 4.0 oz/A Venom 70SG  
 emamectin benzoate--3.2 to 4.8 oz/A Proclaim 5SG  
 lambda-cyhalothrin + chlorantraniliprole--6.0 to 9.0 fl oz/A Voliam Xpress  
 malathion--2.5 pts/A Malathion 57EC (or OLF)  
 oxamyl--2.0 to 4.0 pts/A Vydate L  
 permethrin--4.0 to 8.0 fl oz/A Perm-up 3.2, Permethrin 3.2 (or OLF)

**Flea Beetles (FB)**

Apply one of the following formulations:  
 beta-cyfluthrin--2.8 fl oz/A Baythroid XL  
 bifenthrin--2.1 to 6.4 fl oz/A Bifenture EC (or OLF)  
 bifenthrin + imidacloprid--5.10 to 9.85 fl oz/A Brigadier (or OLF)  
 clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 3.0 cyantraniliprole – **soil** (at-planting) 6.75 to 13.5 fl. Oz/A Verimark to 4.0 fl oz/A Belay 2.13SC  
 cyfluthrin--2.8 fl oz/A Tombstone (or OLF)  
 dinotefuran--**soil** 9.0 to 10.5 fl oz/A Scorpion 35SL; or 5.0 to 6.0 oz/A Venom 70SG; **foliar** 2.0 to 7.0 fl oz/A Scorpion 35SL or 1.0 to 4.0 oz/A Venom 70SG  
 esfenvalerate--5.8 to 9.6 fl oz/A Asana XL  
 gamma-cyhalothrin--2.56 to 3.84 fl oz/A Proaxis  
 imidacloprid--**soil only** 7.0 to 10.5 fl oz/A Admire Pro (or OLF)  
 imidacloprid + beta-cyfluthrin--4.1 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 Voliam Xpress  
 lambda-cyhalothrin + thiamethoxam--4.0 to 4.5 fl oz/A Endigo ZC  
 permethrin--4.0 to 8.0 fl oz/A Perm-up 3.2, Permethrin 3.2 (or OLF)  
 thiamethoxam--**soil** 1.66 to 3.67 oz/A Platinum 75SG; **foliar** 2.0 to 3.0 oz/A Actara 25WDG (or other labeled mixtures containing thiamethoxam like Durivo and Voliam flexi)  
 zeta-cypermethrin--2.24 to 4.00 fl oz/A Mustang Maxx (or OLF)  
 zeta-cypermethrin+bifenthrin--4.0 to 10.3 fl oz/A Hero EC

**Leafminers**

Apply one of the following formulations:  
 abamectin--1.75 to 3.5 fl oz/A Agri-Mek 0.7SC (or OLF)  
 bifenthrin + imidacloprid (**LM adults only**)--5.10 to 9.85 fl oz/A Brigadier (or OLF)  
 cyantraniliprole--**soil** 6.75 to 10.0 fl. Oz (drip or injection),

6.75 to 13.5 fl. Oz (at-planting) Verimark, **foliar** 13.5 to 20.5 fl. Oz/A Exirel  
 dinotefuran--**soil** 9.0 to 10.5 fl oz/A Scorpion 35SL; or 5.0 to 6.0 oz/A Venom 70SG; **foliar** 2.0 to 7.0 fl oz/A Scorpion 35SL or 1.0 to 4.0 oz/A Venom 70SG  
 emamectin benzoate--3.2 to 4.8 oz/A Proclaim 5SG  
 lambda-cyhalothrin + chlorantraniliprole--6.0 to 9.0 fl oz/A Voliam Xpress  
 novaluron--12 fl oz/A Rimon 0.83EC  
 oxamyl--2.0 to 4.0 pts/A Vydate L  
 permethrin--4.0 to 8.0 fl oz/A Perm-up 3.2, Permethrin 3.2 (or OLF)  
 spinetoram--6.0 to 10.0 fl oz/A Radiant SC  
 spinosad--6.0 to 10.0 fl oz/A Entrust SC **OMRI-listed**  
 thiamethoxam + chlorantraniliprole--soil 10.0 to 13.0 fl oz/A Durivo

**Mites**

Apply one of the following formulations:  
 abamectin--1.75 to 3.5 fl oz/A Agri-Mek 0.7SC (or OLF)  
 bifenazate--0.75 to 1.00 lb/A Acramite 50WS  
 etoxazole--2.0 to 3.0 oz/A Zeal Miticide<sup>1</sup>  
 fenpyroximate--2.0 pts/A Portal; 2.0 pts/A Portal XLO  
 hexakis--2.0 to 3.0 lbs/A Vendex 50WP (or OLF)  
 spiromesifen--7.0 to 8.5 fl oz/A Oberon 2SC

**Thrips**

beta-cyfluthrin--2.1 to 2.8 fl oz/A Baythroid XL  
 bifenthrin+imidacloprid--5.10 to 9.85 fl oz/A Brigadier (or OLF)  
 clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC  
 cyfluthrin--2.1 to 2.8 fl oz/A Tombstone (or OLF)  
 dinotefuran--**soil** 9.0 to 10.5 fl oz/A Scorpion 35SL; or 5.0 to 6.0 oz/A Venom 70SG; **foliar** 2.0 to 7.0 fl oz/A Scorpion 35SL or 1.0 to 4.0 oz/A Venom 70SG  
 imidacloprid--**soil only** 7.0 to 10.5 fl oz/A Admire Pro (foliage feeding thrips only)  
 imidacloprid+beta-cyfluthrin--3.8 to 4.1 fl oz/A Leverage 360(foliage feeding thrips only)  
 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 + thiamethoxam--4.5 fl oz/A Endigo ZC  
 spinetoram--6.0 to 10.0 fl oz/A Radiant SC  
 spinosad--4.0 to 8.0 fl oz/A Entrust SC **OMRI-listed**  
 thiamethoxam--**soil** 1.66 to 3.67 fl oz/A Platinum 75SG  
 zeta-cypermethrin + bifenthrin--10.3 fl oz/A Hero EC

| Pesticide                      | Use Category <sup>1</sup> | Hours to Reentry | Days to Harvest |
|--------------------------------|---------------------------|------------------|-----------------|
| <b>INSECTICIDE</b>             |                           |                  |                 |
| abamectin                      | R                         | 12               | 7               |
| acetamiprid                    | G                         | 12               | 7               |
| <i>Bacillus thuringiensis</i>  | G                         | 4                | 0               |
| beta-cyfluthrin                | R                         | 12               | 7               |
| bifenthrin                     | R                         | 12               | 7               |
| bifenthrin + imidacloprid      | R                         | 12               | 7               |
| bifenazate                     | G                         | 12               | 3               |
| <i>Chenopodium</i> extract     | G                         | 4                | 0               |
| chlorantraniliprole            | G                         | 4                | 1               |
| clothianidin (soil/foliar)     | G                         | 12               | 21/7            |
| cyantraniliprole (soil/foliar) | G                         | 4/12             | 1               |
| cyfluthrin                     | R                         | 12               | 7               |
| dinotefuran (soil/foliar)      | G                         | 12               | 21/1            |

(table continued next page)

| Pesticide                                       | Use Category <sup>1</sup> | Hours to Reentry | Days to Harvest |
|---|---------------------------|------------------|-----------------|
| <b>INSECTICIDE (continued)</b>                  |                           |                  |                 |
| emamectin benzoate                              | G                         | 12               | 7               |
| esfenvalerate                                   | R                         | 12               | 7               |
| etoxazole                                       | G                         | 12               | 7               |
| fenpropathrin                                   | R                         | 24               | 3               |
| fenpyroximate                                   | R                         | 12               | 1               |
| flonicamid                                      | G                         | 12               | 0               |
| flupyradifuzone                                 | G                         | 4                | 1               |
| gamma-cyhalothrin                               | R                         | 24               | 5               |
| hexakis   | R                         | 48               | 3               |
| imidacloprid (soil/foliar)                      | G                         | 12               | 21/0            |
| imidacloprid + cyfluthrin                       | R                         | 12               | 7               |
| lambda-cyhalothrin                              | R                         | 24               | 5               |
| lambda-cyhalothrin + chlorantranilprole         | R                         | 24               | 5               |
| lambda-cyhalothrin + thiamethoxam               | R                         | 24               | 5               |
| malathion                                       | G                         | 12               | 3               |
| methomyl  | R                         | 48               | 5               |
| novaluron                                       | G                         | 12               | 1               |
| oxamyl (foliar)                                 | R                         | 48               | 7/1             |
| permethrin                                      | R                         | 12               | 3               |
| pymetrozine                                     | G                         | 12               | 0               |
| pyriproxyfen                                    | G                         | 12               | 14              |
| spinetoram                                      | G                         | 4                | 1               |
| spinosad  | G                         | 4                | 1               |
| spiromesifen                                    | G                         | 12               | 1               |
| spirotriamat                                    | G                         | 24               | 1               |
| thiamethoxam (soil/foliar)                      | G                         | 12               | 30/0            |
| thiamethoxam + chlorantranilprole (soil/foliar) | G                         | 12               | 30/1            |
| zeta-cypermethrin                               | R                         | 12               | 1               |
| zeta-cypermethrin+bifenthrin                    | R                         | 12               | 7               |
| <b>FUNGICIDE (FRAC code)</b>                    |                           |                  |                 |
| azoxystrobin (Group 11)                         | G                         | 4                | 0               |
| Cabrio (Group 11)                               | G                         | 12               | 0               |
| chlorothalonil (Group M5)                       | G                         | 12               | 3               |
| copper, fixed (Group M1)                        | G                         | see label        | 0               |
| Forum (Group 40)                                | G                         | 12               | 0               |
| Presidio (Group 43)                             | G                         | 12               | 2               |
| Priaxor (Groups 7 + 11)                         | G                         | 12               | 7               |
| Quadris Top (Groups 3+11)                       | G                         | 12               | 0               |
| Ranman (Group 21)                               | G                         | 12               | 0               |
| Ridomil Gold (Group 4)                          | G                         | 12               | 7               |
| Ultra Flourish (Group 4)                        | G                         | 12               | 7               |

See Table D-6.

1 G = general, R = restricted

### Nematode Control

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

### Disease Control

#### Seed Treatment

Soak seed in hot water at 122°F (50°C) for 25 minutes. Dry seed then slurry or dust with thiram 480DP at the rate of 2/3 teaspoon per/lb seed (4 oz/100 lb).

#### Damping-Off

The best control is obtained by using a seed treatment (see Table E-13) or seed treatment method (see above), sowing

into a clean mix, and preventative measures during transplant production. Consideration should be given to using soilless mixes containing microorganisms that help suppress damping-off fungi. See Table E-14 for materials listed for use in controlling damping-off caused by *Pythium*, *Rhizoctonia*, *Phytophthora* and other pathogens in greenhouses.

#### Rhizoctonia root rot

For suppression, at transplanting via drip apply azoxystrobin (Quadris at 0.40-0.80 fl oz 2.08F /1000 ft row) or OLF, or Priaxor--4 .0 to 8.0 fl oz 4.17SC/A (will also help suppress white mold and southern blight)

#### Phytophthora Blight (*Phytophthora capsici*) – Root and Crown rot

To minimize the occurrence of this disease, rotate fields away from susceptible crops (such as cucurbits, peppers, eggplants, and tomatoes) for as many years as possible. Transplant onto raised beds apply the following via drip application:

mefenoxam--Apply 1.0 pt (Ridomil Gold) 4SL/A or 1.0 qt (Ultra Flourish) 2E/A at transplanting and 30 days later

Apply drip applications of 3.0 to 4.0 fl. Oz Presidio 4SC/A between mefenoxam applications when conditions favor disease development

mefenoxam--broadcast prior to planting or in a 12 to 16-inch band over the row before or after transplanting. Make two supplemental post-directed applications at 1.0 pt/A Ridomil Gold or 1.0 qt/A Ultra Flourish to 6 to 10 inches of soil on either side of the plants at 30-day intervals. Use formula in the "Calibration for Changing from Broadcast to Band Application" section of Calibrating Granular Application Equipment to determine amount of Ridomil Gold or Ultra Flourish needed per acre when band applications are made.

#### Phytophthora Blight (*Phytophthora capsici*) – Fruit and stem rot

For suppression of the aerial stem and fruit rot phase of Phytophthora blight, apply the following on a 7 to 10 day schedule when environmental conditions are conducive for disease development.

Presidio--3.0 to 4.0 fl. Oz 4SC/A plus fixed copper at labeled rates

Ranman--2.75 fl. Oz 400SC/A plus a non-ionic or organosilicone surfactant (see label for specifics)(do not apply Ranman with copper)

Forum--6.0 fl oz 4.18SC/A plus fixed copper at labeled rates

#### Verticillium Wilt

Best control can be accomplished by a 4- to 5-year rotation with crops other than tomato, potato, pepper, strawberry, or any of the brambles. Varieties which appear to maintain yield in infested fields include Classic, and Epic.

Soil fumigation will provide some control by delaying symptom expression. Refer to the "Soil Fumigation" section for details on application. Use metam-sodium (Vapam HL at 56 to 75 gallons per acre) with a plastic seal. Broadcast treatments are superior to row treatments.

Grafting Verticillium resistant tomato rootstocks to susceptible eggplant varieties is a viable strategy to reduce the impact of disease.



Before grafting: 1) expose the scion and rootstock to sunshine for two to three days, 2) withhold water from the plants to avoid spindly growth and 3) make sure that the scions and rootstock have stems of a similar diameter. Grafted plants are usually healed and acclimated in a plastic tunnel. The healing and acclimatization are very important for grafted plants to survive. The tunnel is covered with materials that provide shade and maintain a high relative humidity inside the tunnel.

### Leaf Spots

Scout on a regular basis and begin preventative sprays when weather conditions favor disease development or when symptoms of disease first appears and repeat every 7 to 10 days.

Tank mix chlorothalonil--1.5 pt 6F/A or fixed copper at labeled rates with one of the following FRAC code 11 fungicides:

azoxystrobin--6.0 to 15.5 fl oz 2.08F/A or OLF  
Cabrio--8.0 to 12.0 oz 20EG/A (leaf spots only)  
Fontelis--10.0-24.0 fl oz 1.67SC/A  
Quadris Top--8.0 to 14.0 fl oz 2.72SC/A

**and rotate with one of the following:**

chlorothalonil--1.5 pt 6F/A or OLF  
fixed copper at labeled rate

Do not make more than 4 total applications of fungicides from the FRAC code 11 group in a single year. Tank mix FRAC code 11 fungicides with a protectant fungicide such as copper or chlorothalonil to help reduce resistance development.

### Fruit Rot

Scout on a regular basis and begin preventative sprays when weather conditions favor disease development and repeat every 7 to 10 days.

Tank mix chlorothalonil--1.5 pt 6F/A or fixed copper at labeled rates with one of the following FRAC code 11 fungicides:

azoxystrobin--6.0 to 15.5 fl oz 2.08F/A or OLF  
Priaxor--4.0-8.0 fl oz 4.17SC/A

Quadris Top--8.0 to 14.0 fl oz 2.72SC/A

**and rotate with one of the following:**

chlorothalonil--1.5 pt 6F/A or OLF  
fixed copper at labeled rate

Do not make more than 4 total applications of fungicides from the FRAC code 11 group in a single year. Tank mix FRAC code 11 fungicides with a protectant fungicide such as copper or chlorothalonil to help reduce resistance development.

### Tomato Spotted Wilt Virus (TSWV)

TSWV is spread by thrips from flowering ornamental plants to eggplant. Do not grow any ornamental bedding plants in the same greenhouse as eggplant transplants. Monitor and scout greenhouses for thrips and begin an insecticide control program once observed.

### Fruit Disorders

#### Liver Spot and Pitting

'Liver spot' and 'pitting' are late season physiological disorders that appears on fruit at post-harvest as a result of chilling injury. Light-tan to coppery colored spots appear on fruit after washing often with the appearance of scratching on the fruit surface. The scratching of fruit is most likely cause by rough handling or where fruit were in contact with the ground. Small slightly sunken brown pits can also develop on fruit. Liver spot and/or pitting are thought to occur because of a thinner waxy fruit cuticle as a result of cooler temperatures. Temperatures at or below 50°F are often associated with both disorders.

#### Internal Seed Cavity Browning (ISCB)

Symptoms of ISCB include the discoloration, or browning of the fruit tissue directly surrounding the seed cavities of the fruit. Internal seed cavity browning can be caused by low temperatures, as well as, bruising and compression injury during harvest and postharvest handling.

## GARLIC

### Varieties

Obtain the best strains of Italian or German (late or pink-skinned type) "Rocambole" garlic, Polish softneck (no hard seed stalk) types that will braid, or elephant types from a local grower who has had success with fall-planted garlic or reputable agriculture products vendors. Unlike many strains sold commercially, such a strain will be hardy and, therefore, will overwinter very well. Avoid the Creole types (also called Early, Louisiana, White Mexican, etc.), since they are not very winter-hardy and do not keep well. Both the Italian and Creole types have a white outer skin covering the bulb, but the Italian type has a pink skin around each clove. Elephant garlic (*Allium ampeloprasum* -- is a type of leek that produces bulbils; it is milder than regular garlic and up to four times larger) may not yield very well when fall-planted in areas with severe cold or extensive freezing and thawing cycles, which cause heaving. The Italian and Elephant types take about 220 days to mature.

Many of the most productive Italian garlic strains will produce seed stalks prior to harvest. Snap these seed stalks just as they begin to coil for best yields. "Rocambole" types have coiled seedstalks that are perfectly normal and not the result of any poor cultural practice or herbicide contamination.