Slugs
metaldehyde (Metaldehyde 4 Bait or OLF)

Disease Control

Seed Treatment
Use seed that is at least 2 years old. Soak newer seed in hot water at 118°F (47.8°C) for 30 minutes. Use seed treated with Maxim 4F (0.08-0.16 fl oz/100 lb seed) for Rhizoctonia and Fusarium management and Apron XL (0.085-0.64 fl oz/100 lb seed) for Pythium damping off.

Damping-Off (Pythium)
Damping off is favored by excessive soil moisture. Avoid over-saturation of seedbeds and do not transplant diseased plants in the field.

Ridomil Gold--1.0-2.0 pts 4SL/A preplant incorporated broadcast or in a 7-inch band (not for use in a greenhouse)

Crater and Petiole Rot or Basal Stalk Rot (Rhizoctonia)
Rotate out of celery for at least 3 years to insure crop residue is thoroughly decomposed. Avoid planting transplants too deep and in poorly drained soils. Where problems occur regularly apply fungicides.

Quadris--0.4-0.8 fl oz/1,000 row feet applied in a 7" band in–furrow or shortly after emergence directed at the stem.

Pink Rot (Sclerotinia)
Few products are available for pink rot control. Avoid planting in shaded or poorly drained areas and areas with a history of pink rot. Rotate fields for at least 2 or 3 years. Maximize air movement through the plant canopy. Apply 3 to 4 months prior to the onset of disease to allow the active agent to reduce inoculum levels of sclerotia in the soil. Following application, incorporate to a depth of 1 to 2 inches; however, to avoid the chance of infesting the upper soil layer with untreated sclerotia from the lower soil layer, **do not plow** between treatment and planting times.

Contans--2.0-4.0 lb 5.3WG/A

During the season apply:
chlorothalonil--3.0 pts 6F/A, shortly after plants emerge and repeat on a 7-day schedule (suppression only).

Leaf Blights (Cercospora and Septoria)
Use certified, disease-free seed or treat seed with hot water or fungicides. Practice careful sanitation in transplant production or rotate ground seedbeds. Use 3 or 4 year crop rotations.

Alternate:
Quadris--9.2–15.5 oz 2.08SC, or
Quadris Opti--2.4-3.7 pt
5.5SC /A

With one of the following:
chlorothalonil--2.0-3.0 pt 6F/A or OLF, or
copper, fixed--manufacturer's recommendation, or
Tilt--4.0 fl oz 3.6EC/A

Fusarium Yellows
Do not obtain plants from areas of known infestation. There are no means of chemical control. Avoid seeding or transplanting into infested soil or use resistant varieties.

Pesticide	Use Category[1]	Hours to Reentry	Days to Harvest
INSECTICIDE			
abamectin	R	12	7
acephate	G	24	21
acetamiprid	G	12	7
Bacillus thuringiensis	G	4	0
beta-cyfluthrin	R	12	0
carbaryl/carbaryl bait	G	12	14
chlorantraniliprole	G	4	1
cyfluthrin	R	12	0
cyromazine	G	12	7
dinotefuran (soil/foliar)	G	12	21/7
emamectin benzoate	R	48	7
flonicamid	G	12	0
flubendiamide	G	12	1
flubendiamide + buprofezin	G	12	7
imidacloprid	G	12	45
indoxacarb	G	12	3
malathion	G	12	7
methomyl	R	48	7
permethrin	R	12	1
pymetrozine	G	12	7
spinetoram	G	4	1
spinosad	G	4	1
spirotetromat	G	24	3
thiamethoxam	G	12	7
thiodicarb	R	48	14
FUNGICIDE (FRAC code)			
chlorothalonil (Group M5)	G	12	7
Contans WG (biological)	G	4	0
copper, fixed (Group M1)	G	24	0
Quadris (Group 11)	G	4	0
Quadris Opti (Groups 11+M5)	G	12	7
Ridomil Gold (Group 4)	G	48	0
Tilt (Group 3)	G	12	14

See Table D-6.
[1] G = general, R = restricted

CUCUMBERS

For earlier cucumber production and higher, more concentrated yields, use gynoecious varieties. A gynoecious plant produces only female flowers (the ones that produce fruits). To produce pollen, 1 to 15 percent of pollinator must be planted; seedsmen add this seed to the gynoecious variety. Both pickling and slicing gynoecious varieties are available. For machine harvest of pickles, high plant populations concentrate pickle maturity.

Varieties

Varieties[1]	
Slicers (Gynoecious)	
Encore* (ALSR,DMR,PMR,SMR)	
Raider* (SMR)	These varieties are
Speedway* (ALSR,AR,DMR, PMR,SMR)	recommended for DE, MD, NJ, PA, VA, WV
Indy (ALSR,AR,DMR,PMR,SMR)	
Intimidator* (ALSR,AR,CMVR,SR)	
Stonewall* (CMVR,AR,SMR,DMR,ALSR,PMR)	
Dasher II* (ALSR,AR,DMR,PMR,SMR)	
Daytona (ALSR, AR, DMR, PMR)	
Taladaga (AR, ALSR, PMR, ZYMVR, SR)	

(table continued next page)

Varieties *(continued)*

Varieties[1]	
Slicers (Gynoecious)	These varieties are recommended for DE, MD, NJ, PA, VA, WV
Dominator*	
Thunder* (DMR,PMR,SMR, ZYMVR)	
General Lee* (SR)	
Turbo* (ALSR,AR,DMR,PMR, SMR)	
Meteor* (ALSR,DMR,PMR,SMR)	
Striker* (ALSR,AR,DMR, PMR,SMR)	
Slicers (Monoecious)	These varieties are recommended for DE, MD, NJ, PA, VA, WV
Medalist (SMR,DMR,PMR)	
Cyclone* (AR,DMR,PMR,SMR)	
Marketmore 76 (DMR,PMR,SMR,SR)	
Pickles (F_1-Gynoecious)	These varieties are recommended for DE, MD, NJ, PA, VA, WV
Expedition*	
Lafayette* (DMR)	
Vlaspik* (DMR)	
Fanci Pak*	
Jackson Supreme*	
Sassy*	
Pickles (F_1-Gynoecious) Hand Picked	These varieties are recommended for DE, MD, NJ, PA, VA, WV
Fanci Pak*	
Jackson Supreme*	
Eureka*(ALSR,AR,DMR, PMR,PRSV,SMR,WMV,ZYMV)	
Magic* (ALSR,DMR,PMR,SMR)	

[1] Cucumbers and slicers listed by maturity, earliest first. Pickles listed alphabetically. Most pickle varieties have multiple disease resistance.

* Indicates hybrid varieties

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

Recommended Nutrients Based on Soil Tests

Before using the table below, refer to important notes in Plant Nutrient Recommendations in Section B, Soil And Nutrient Information. These notes provide additional suggestions to adjust rate, timing and placement of nutrients depending on soil type cation exchange capacity and existing fertility levels.

		Soil Phosphorus Level			Soil Potassium Level		
	Pounds N per Acre	Low	Med	Opt.	Low	Med	Opt.
Cucumbers		Pounds P_20_5 per Acre			Pounds K_20 per Acre		
	100-125[1]	150[1]	100[1]	50[1]	200[1]	150[1]	100[1]
	25-50[2]	125[2]	75[2]	25[2]	175[2]	125[2]	75[2]
	25[3]	25[3]	25[3]	25[3]	25[3]	25[3]	25[3]
	25-50[4]	0	0	0	0	0	0

For plasticulture production, fertilization rates are based on a standard row spacing of 6 feet.

[1] Total amount nutrient recommended; growers producing vegetables on soils with high clay contents should reduce the recommended nitrogen and potassium rates by 20% and increase the phosphorus rate by 25%.

[2] Broadcast and disk-in

[3] Band-place with planter

[4] Sidedress when vines begin to run, or apply in irrigation water

Seed Treatment

Check with your seed company to determine if seed has been treated with an insecticide and fungicide. See the Disease Section for more information on treatment to prevent disease.

Planting Dates

Start seeding in mid-April in warmer, southern areas and May 10 in Pennsylvania and other cool areas. Successive plantings can be made through early August.

Container-grown plants are planted through the plastic when daily mean temperatures have reached 60°F (15.6°C). Planting dates vary from May 1 in southern regions to June 20 in northern areas. Early plantings should be protected from winds with hot caps, tents, or row covers.

Spacing

Slicers: Space rows 3 to 4 feet apart with plants 9 to 12 inches apart. Seeding rate: 1.5 pounds per acre. *Machine Harvest Pickles*: Research and field experience has shown that 55,000 to 65,000 plants per acre is the optimum population for yield and quality. To accommodate a harvester width of 84 inches, three rows 26 to 28 inches apart should be planted on each bed. Plants should be 4 to 5 inches apart in the row. If the harvester has a 90-inch head, space rows 30 inches apart and space plants 3 to 4 inches apart in the row. *Hand Harvest Pickles*: Space rows 3 to 4 feet apart with plants 6 to 8 inches apart. Seeding rate: 1.5 to 2 pounds per acre.

Mulching

Fumigated soil aids in the control of weeds and soil-borne diseases. Plastic mulch laid before field planting conserves moisture, increases soil temperature, and increases early and total yield. Several fumigants can be used on cucumber depending on what the predominant pests are. Fumigant and mulch should be applied to well-prepared planting beds 30 days before field planting. Various widths of plastic mulch are available depending on individual production systems and available equipment. Plasic should be laid immediately over the fumigated soil. The soil must be moist when laying the plastic. Fumigation alone may not provide satisfactory weed control under plastic. Black plastic or paper can be used without a herbicide to provide control of most weeds. Fertilizer must be applied during bed preparation. At least 50 percent of the nitrogen (N) should be in the nitrate (NO_3-) form.

Foil and highly reflective mulches can be used to repel aphids that transmit viruses in fall-planted (after July 1) cucurbits. Direct seeding through the mulch is recommended for maximum virus protection. Transplants should not be used with foil mulches. Also, a herbicide is not necessary. Fumigation will be necessary when there is a history of soil-borne diseases in the field.

Growers may wish to consider trickle irrigation. See the section on "Irrigation" in this publication.

Pollination

Honeybees, squash bees, bumblebees and other wild bees are important for proper pollination and fruit set. Populations of pollinating insects may be adversely affected by insecticides applied to flowers or weeds in bloom. Apply insecticides only in the evening hours or wait until bloom is completed before application. See the section on "Pollination" in Chapter A, the General

Production Recommendations, and/or Table D-6 for relative toxicity of various pesticides for hazards to bees.

Weed Control

Section 18 Emergency Label requests may be submitted to supplement weed control recommendations in cucumbers.

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

Match preplant incorporated and preemergence herbicide rates to soil type and percent organic matter in each field. See "Mulching" section above for further information on weed control under clear plastic mulch.

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-7** 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 clear plastic is used. Trickle irrigation tube 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 tube 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.

Bensulide--5-6 lb/A. Apply 5 to 6 quarts per acre Prefar 4E 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 the maximum recommended rate to improve control of annual broadleaf weeds including common lambsquarters, smooth pigweed, and common purslane.

Halosulfuron--0.023-0.047 lb/A. Apply 0.5 to 1.0 dry ounce Sandea 75WG to suppress or control yellow nutsedge and broadleaf weeds including common cocklebur, redroot, pigweed, smooth pigweed, ragweed species, and galinsoga. Use the lower rate on coarse-textured soils low in organic matter and higher rates on fine-textured soils and on soils with high organic matter. Condensation that forms on the underside of the mulch will activate the herbicide. Delay seeding or transplanting the crop for 7 days after the application of Sandea under plastic mulch. Occasionally, slight stunting may be observed following Sandea use early in the season. When observed, recovery is rapid with no effect on yield or maturity. 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 insecticide, or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application. **DO NOT exceed a total of 0.047 pound per acre, equal to 1 dry ounce of Sandea, applied preemergence. DO NOT exceed a total of 0.078 pounds per acre, equal to 1.66 dry ounces of Sandea, applied preemergence and postemergence, per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2 dry ounces of Sandea, applied preemergence and postemergence to multiple crops in a single year.**

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 cucumbers 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^2). Recalibrate and reduce herbicide rates for banded applications.

Preemergence

Bensulide--5-6 lb/A. Apply 5 to 6 quarts per acre Prefar 4E as a banded directed shielded spray preemergence to the

weeds and activate with one-half inch of sprinkler irrigation within 36 hours to control most annual grasses. Use the maximum recommended rate preemergence followed by irrigation to suppress certain annual broadleaf weeds including common lambsquarters, smooth pigweed, and common purslane.

Clomazone--0.094-0.188 lb/A. Apply 4 to 8 fluid ounces per acre Command 3ME preemergence to direct-seeded cucumbers to control annual grasses and many broadleaf weeds including common lambsquarters, velvetleaf, spurred anoda, and jimsonweed. Mustards, morningglory species, and pigweed species will not be controlled. Use lowest recommended rate on coarse-textured, sandy soils low in organic matter. Higher rates should only be used on medium- and fine-textured soils and sites that have been heavily manured. Combine with Curbit 3EC to control pigweed species where Curbit is registered for use. Some temporary crop injury (partial whitening of leaf or stem tissue) may be apparent after crop emergence. Complete recovery will occur from minor early injury without affecting yield or earliness. Banding the herbicide reduces the risk of crop injury and offsite movement due to vapor drift.

WARNING: Command spray *or* vapor drift may injure sensitive crops and other vegetation up to several hundred yards from the point of application. Do not apply when wind or weather conditions favor herbicide drift. Do not apply to fields adjacent to horticultural, fruit, vegetable, or other sensitive crops (see label). Drift injury from offsite Command movement is extremely apparent; therefore, do not use Command on fields near sensitive locations.

Herbicide residues may limit subsequent cropping options when Command is used for weed control in cucumbers. See planting restrictions on the label or consult your local Cooperative Extension office for information regarding subsequent cropping options when Command is used.

Ethalfluralin--0.38-0.75 lb/A. Apply 1 to 2 pints per acre Curbit 3E preemergence to control annual grasses and certain annual broadleaf weeds, including carpetweed and pigweed sp. Control of many other broadleaf weeds, including common lambsquarters, jimsonweed, morningglory sp., ragweed sp., mustard sp., and others may not be acceptable. Dry weather following application may reduce weed control. Cultivate to control emerged weeds if rainfall or irrigation does not occur prior to weed emergence. DO NOT preplant incorporate. DO NOT apply under plastic mulch or tunnels. DO NOT use when soils are cold or wet. Crop injury may result!

Ethalfluralin *plus* Clomazone (jug-mix)--0.394-1.575 lb/A. Apply 1.5 to 6 pints per acre of Strategy 2.1SC preemergence to control annual grasses and many annual broadleaf weeds. Use the lowest recommended rates on coarse-textured sandy soils low in organic matter. Higher rates should only be used on medium- and fine-textured soils and sites that have been heavily manured.

Strategy is a **jug-mix** of ethalfluralin (Curbit 3E) and clomazone (Command 3ME). Refer to the chart below to determine the amount of each herbicide at commonly used rates:

Curbit and Command Active Ingredients (ai) in Commonly Used Strategy Rates

Strategy pints/A	Ethalfluralin (Curbit) lb ai/A	Clomazone (Command) lb ai/A
1.5	0.3	0.094
2	0.4	0.125
3	0.6	0.188
4	0.8	0.25
5	1.0	0.312
6	1.2	0.375

Labeled for use in all the mid-Atlantic states. Read and follow all the recommendations and warnings (above) for ethalfluralin (Curbit) and clomazone (Command).

Halosulfuron--0.023-0.047 lb/A. Apply 0.5 to 1.0 dry ounce Sandea 75WG to suppress or control broadleaf weeds including common cocklebur, redroot, pigweed, smooth pigweed, ragweed species, and galinsoga. Use the lower rate on coarse-textured soils low in organic matter and higher rates on fine-textured soils and on soils with high organic matter. Rainfall or irrigation after application is necessary before weeds emerge to obtain good control. Occasionally, slight stunting may be observed following Sandea use early in the season before the vines begin to run. When observed, recovery is rapid with no effect on yield or maturity. 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 insecticide, or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application. **DO NOT exceed a total of 0.047** pound per acre, equal to 1 dry ounce of Sandea, applied preemergence. DO NOT exceed total of 0.078 pounds per acre, equal to 1.66 dry ounces of Sandea, applied preemergence and postemergence, per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2 dry ounces of Sandea, applied preemergence and postemergence to multiple crops in a single year.

Postemergence

Halosulfuron--0.023-0.047 lb/A. Apply 0.5 to 1.0 dry ounce Sandea 75WG to suppress or control yellow nutsedge and broadleaf weeds including common cocklebur, redroot pigweed, smooth pigweed, ragweed species, and galinsoga when the crop has 2 to 5 true leaves but has not yet begun to to bloom or run. 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 quart per 100 gallons of spray solution). 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. Occasionally, slight yellowing of the crop may be observed within a week of Sandea application. When observed, recovery is rapid with no effect on yield or maturity. 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 a total of 0.031 pound per acre, equal to 0.66 dry ounces of Sandea, applied postemergence. DO NOT exceed a total of 0.078 pounds per acre, equal to 1.66 dry ounces of Sandea, applied preemergence and postemergence, per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2 dry ounces of Sandea applied preemergence and postemergence to multiple crops in one year.**

Paraquat--0.6 lb/A. **A Special Local-Needs 24(c) label has been approved for the use of Gramoxone Max 3SC or Gramoxone Inteon 2SC** or OLF **postemergence as a directed shielded spray in Delaware, Maryland, New Jersey, Pennsylvania, and Virginia.** Apply 1.5 pints per acre Gramoxone Max 3SC or 2.4 pints per acre Gramoxone Inteon 2SC as or OLF a directed spray to control emerged weeds between the rows after crop establishment. Add nonionic surfactant according to the labeled instructions. Do not allow spray or spray drift to contact the crop or injury may result. Use shields to prevent spray contact with the crop plants. Do not exceed a spray pressure of 30 psi. See the label for additional information and warnings.

Clethodim--0.094-0.125 lb/A. Apply 6 to 8 fluid ounces per acre Select 2EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) or 12 to 16 fluid ounces of Select Max 0.97EC with nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of spray solution) postemergence to control many annual and certain perennial grasses, including annual bluegrass. Select will not consistently control goosegrass. The use of oil concentrate with Select 2EC may increase the risk of crop injury when hot or humid conditions prevail. To reduce the risk of crop injury, omit additives or switch to nonionic surfactant when grasses are small and soil moisture is adequate. Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, 0wild 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 14 days.

Sethoxydim--0.2-0.3 lb/A. Apply 1 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 14 days and apply no more than 3 pints per acre in one season.

For Seeding Into Soil Without Plastic Mulch (Broadcast Applications)

Use the following land preparation, treatment, planting sequences, and herbicides labeled for the crop when **Seeding into Soil Without Plastic Mulch**, or crop injury and/or poor weed control may result.

1. Complete soil tillage, apply preplant 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.

Note. All herbicide rate recommendations are made for spraying a broadcast acre (43,560 ft^2).

Preplant Incorporated

Bensulide *plus* naptalam--4-6 lb/A *plus* 2 lb/A. Apply 1 to 1.5 gallons of Prefar 4EC *plus* 1 gallon Alanap 2SC as a preplant incorporated (2 inches or less) treatment before seeding or transplanting. Tank mix is approved.

Preplant Incorporated or Preemergence

Bensulide--5-6 lb/A. Apply 5 to 6 quarts per acre Prefar 4E before planting and incorporate 1 to 2 inches deep with power-driven rotary cultivators, or apply preemergence and activate with one-half inch of sprinkler irrigation within 36 hours to control most annual grasses. Use the maximum recommended rate preemergence followed by irrigation to suppress certain annual broadleaf weeds including common lambsquarters, smooth pigweed, and common purslane.

Preemergence

Clomazone--0.094-0.188 lb/A. Apply 4 to 8 fluid ounces per acre Command 3ME preemergence to a direct-seeded crop to control annual grasses and many broadleaf weeds including common lambsquarters, velvetleaf, spurred anoda, and jimsonweed. Mustards, morningglory species, and pigweed species will not be controlled. Use lowest recommended rate on coarse-textured, sandy

soils low in organic matter. Higher rates should only be used on medium and fine-textured soils and sites that have been heavily manured. Combine with Curbit 3EC to control pigweed species where Curbit is registered for use. Some temporary crop injury (partial whitening of leaf or stem tissue) may be apparent after crop emergence. Complete recovery will occur from minor early injury without affecting yield or earliness. Banding the herbicide reduces the risk of crop injury and offsite movement due to vapor drift.

WARNING: Command spray *or* vapor drift may injure sensitive crops and other vegetation up to several hundred yards from the point of application. Do not apply when wind or weather conditions favor herbicide drift. Do not apply to fields adjacent to horticultural, fruit, vegetable, or other sensitive crops (see label). Drift injury from offsite Command movement is extremely apparent; therefore, do not use Command on fields near sensitive locations.

Herbicide residues may limit subsequent cropping options when Command is used for weed control in cucumbers. See planting restrictions on the label or consult your local Cooperative Extension office for information regarding subsequent cropping options when Command is used.

Ethalfluralin--0.38-0.75 lb/A. Apply 1 to 2 pints per acre Curbit 3E preemergence to control annual grasses and certain annual broadleaf weeds, including carpetweed and pigweed sp. Control of many other broadleaf weeds, including common lambsquarters, jimsonweed, morningglory sp., ragweed sp., mustard sp., and others may not be acceptable. Dry weather following application may reduce weed control. Cultivate to control emerged weeds if rainfall or irrigation does not occur prior to weed emergence. DO NOT preplant incorporate. DO NOT apply under plastic mulch or tunnels. DO NOT use when soils are cold or wet. Crop injury may result!

Ethalfluralin *plus* Clomazone (jug-mix)--0.394-1.575 lb/A. Apply 1.5 to 6 pints per acre of Strategy 2.1SC preemergence to control annual grasses and many annual broadleaf weeds. Use the lowest recommended rates on coarse-textured sandy soils low in organic matter. Higher rates should only be used on medium and fine textured soils and sites that have been heavily manured.

Strategy is a **jug-mix** of ethalfluralin (Curbit 3E) and clomazone (Command 3ME). Refer to the chart under Ethalfuralin *plus* clomazone (jug-mix) in the section **For soil strips between rows of plastic mulch** to determine the amount of each herbicide at commonly used rates.

Read and follow all the recommendations and warnings (above) for ethalfluralin (Curbit) and clomazone (Command).

Halosulfuron--0.023-0.047 lb/A. Apply 0.5 to 1.0 dry ounce Sandea 75WG to suppress or control broadleaf weeds including common cocklebur, redroot, pigweed, smooth pigweed, ragweed species, and galinsoga. Use the lower rate on coarse-textured soils low in organic matter and higher rates on fine-textured soils and on soils with high organic matter. Rainfall or irrigation after application is necessary before weeds emerge to obtain good control. Occasionally, slight stunting may be observed following Sandea use early in the season. When observed, recovery is rapid with no effect on yield or maturity. 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 insecticide, or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application.. **DO NOT exceed a total of 0.047 pound per acre, equal to 1 dry ounce of Sandea, applied preemergence. DO NOT exceed a total of 0.078 pounds per acre, equal to 1.66 dry ounces of Sandea, applied preemergence and postemergence, per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2 dry ounces of Sandea, applied preemergence and postemergence to multiple crops in a single year.**

Postemergence

Halosulfuron--0.023-0.031 lb/A. Apply 0.5 to 0.66 dry ounce Sandea 75WG to suppress or control yellow nutsedge and broadleaf weeds including common cocklebur, redroot pigweed, smooth pigweed, ragweed species, and galinsoga when the crop has 2 to 5 true leaves but has not yet begun to bloom or run. 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 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. Occasionally, slight yellowing of the crop may be observed within a week of Sandea application. When observed, recovery is rapid with no effect on yield or maturity. 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 a total of 0.031 pound per acre, equal to 0.66 dry ounces of Sandea, applied postemergence. DO NOT exceed total of 0.078 pounds per acre, equal to 1.66 dry ounces of Sandea, applied preemergence and postemergence, per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2 dry ounces of Sandea applied preemergence and postemergence to multiple crops in one year.**

Paraquat--0.6 lb/A. A Special Local-Needs 24(c) label has been approved for the use of Gramoxone Max 3SC or **Gramoxone Inteon 2SC or OLF postemergence as a**

directed shielded spray in Delaware, Maryland, New Jersey, Pennsylvania, and Virginia. Apply 1.5 pints per acre Gramoxone Max 3SC or 2.4 pints per acre Gramoxone Inteon 2SC **or OLF** as a directed spray to control emerged weeds between the rows after crop establishment. Add nonionic surfactant according to the labeled instructions. Do not allow spray or spray drift to contact the crop or injury may result. Use shields to prevent spray contact with the crop plants. Do not exceed a spray pressure of 30 psi. See the label for additional information and warnings.

Clethodim--0.094-0.125 lb/A. Apply 6 to 8 fluid ounces per acre Select 2EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) or 12 to 16 fluid ounces of SelectMax 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 2EC 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 14 days.

Sethoxydim--0.2-0.3 lb/A. Apply 1 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 14 days and apply no more than 3 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 Inteon 2SC** or OLF **for postharvest desiccation of the crop in Delaware, New Jersey and Virginia.** Apply 2.4 pints per acre Gramoxone Inteon 2SC 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^2).

Insect Control

NOTE: Copies of specific insecticide product labels can be downloaded by visiting www.CDMS.net or www.Greenbook.org. Also, specific labels can be obtained via Google or other web search engines.

Seed Corn Maggot

See Chapter E "Maggots" section in "Soil Pests--Their Detection and Control".)

chlorpyrifos (seed treatment-Lorsban 50W or OLF)

Note: The use of imidacloprid at planting may reduce seed corn maggot populations.

Cucumber Beetle

Cucumber beetles can transmit bacterial wilt; however, losses from this disease vary greatly from field to field and among different varieties. Pickling cucumbers grown in high-density rows for once-over harvesting can compensate for at least 10 percent stand losses. On farms with a history of bacterial wilt infections and where susceptible varieties are used, insecticides should be used to control adult beetles before they feed extensively on the cotyledons and first true leaves. If foliar insecticides are used, begin spraying shortly after plant emergence and repeat applications at weekly intervals if new beetles continue to invade fields. Treatments may be required until vines begin to run (usually about 3 weeks after plant emergence).

acetamiprid (Assail 30SG or OLF)
esfenvalerate (Asana XL)
beta-cyfluthrin (Baythroid XL)
bifenthrin (Brigade EC, Sniper, or OLF)
clothianidin (soil/foliar - Belay 2.13SC)
cyfluthrin (Renounce 20WP, Tombstone or OLF)
dinotefuran (soil/foliar – Scorpion 35SL)
endosulfan (Thionex 3EC/A or OLF)
fenpropathrin (Danitol 2.4EC or OLF)
imidacloprid (at plant/drip/in-furrow/hill drench/ postseeding-Admire PRO or OLF)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
lambda-cyhalothrin + chlorantraniliprole (Voliam xpress)
methomyl (Lannate LV or OLF)
permethrin (Perm-Up, Pounce 3.2EC or OLF)
zeta-cypermethrin (Mustang MAX)
zeta-cypermethrin+bifenthrin (Hero EC)

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

beta-cyfluthrin (Baythroid XL)
bifenthrin (Brigade EC, Sniper or OLF)
esfenvalerate (Asana XL)
flubendiamide (Synapse)
flubendiamide + buprofezin (Vetica)
lambda-cyhalothrin + chlorantraniliprole (Voliam xpress)
methomyl (Lannate LV or OLF)
permethrin (Perm-Up, Pounce 3.2EC or OLF)
zeta-cypermethrin (Mustang MAX)
zeta-cypermethrin+bifenthrin (Hero EC)

Pickleworm, Melonworm

Make one treatment prior to fruit set, and then treat weekly.

beta-cyfluthrin (Baythroid XL)
bifenthrin (Brigade EC, Sniper, or OLF)
carbaryl (Sevin 80S or OLF)
chlorantraniliprole (drip/foliar–Coragen 1.67SC)
cyfluthrin (Renounce 20WP, Tombstone or OLF)
endosulfan (Thionex 3EC)
esfenvalerate (**PW only**) (Asana XL)
flubendiamide (Synapse WG)
flubendiamide + buprofezin (Vetica)
indoxacarb (Avaunt 30WDG)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
lambda-cyhalothrin + chlorantraniliprole (Voliam xpress)
methomyl (Lannate LV or OLF)
methoxyfenozide (Intrepid 2F)
permethrin (Perm-Up, Pounce 3.2EC or OLF)
spinetoram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)
thiamethoxam + chlorantraniliprole (soil/drip–Durivo; foliar–Voliam flexi)
zeta-cypermethrin (Mustang MAX)
zeta-cypermethrin+bifenthrin (Hero EC)

Thrips

dinotefuran (soil/foliar, Scorpion 35SL, Venom 70SG or OLF)
fenpropathrin (Danitol 2.4EC)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
spinetroram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)
thiamethoxam (soil–Platinum 2SG or OLF; foliar–Actara 25WDG)
thiamethoxam + chlorantraniliprole (soil or drip-Durivo)
oxamyl (Vydate L)

Aphids

Note. Aphids transmit mosaic virus. Thorough spray coverage beneath leaves is important. For further information on aphid controls, see the preceding "Mulching" section. Treat seedlings every 5 to 7 days or as needed.

endosulfan (Thionex 3EC or OLF)
Chenopodium ambrosioides extract (Requiem)
clothianidin (soi/foliar – Belay 2.13SC)
flonicamid (Beleaf 50SG)
imidacloprid (at plant/ chemigation/ in-furrow/ hill drench/ postseeding–Admire PRO or OLF)
methomyl **(melon aphid only**) (Lannate LV or OLF)
pymetrozine (Fulfill 50WP)
thiamethoxam (soil–Platinum 75SG or OLF; foliar–Actara 25WDG)
thiamethoxam + chlorantraniliprole (soil or drip–Durivo; foliar–Voliam flexi)

Leafminers

abamectin (Agri-Mek EC, Abba EC, Temprano or OLF)
cyromazine (Trigard 75WSP)
dinotefuran (soil/foliar-Scorpion 35SL, Venom 70SG or OLF)
oxamyl (Vydate L)
spinosad (Entrust 80W, SpinTor 2SC or OLF)
spinetroram (Radiant 2SC)

Cabbage Looper

esfenvalerate (Asana XL)
Bacillus thuringiensis (Biobit, Dipel, Dipel 2X, Javelin, XenTari or OLF)
beta-cyfluthrin (Baythroid XL)
bifenthrin (Brigade EC, Sniper, or OLF)
chlorantraniliprole (soil/drip/foliar–Coragen 1.67SC)
flubendiamide (Synapse WG)
flubendiamide + buprofezin (Vetica)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
lambda-cyhalothrin + chlorantraniliprole (Voliam xpress)
methomyl (Lannate LV or OLF)
methoxyfenozide (Intrepid 2F)
permethrin (Perm-Up, Pounce 3.2EC or OLF)
spinetoram (Radiant 2EC)
spinosad (Entrust 80WP, SpinTor 2SC or OLF)
thiamethoxam + chlorantraniliprole (Voliam flexi)
zeta-cypermethrin (Mustang MAX)
zeta-cypermethrin+bifenthrin (Hero EC)

Mites

Mite infestations generally begin around field margins and grassy areas. CAUTION: DO NOT mow or maintain these areas after midsummer since this forces mites into the crop. Localized infestations can be spot-treated. Begin treatment when 10 to 15 percent of the crown leaves are infested early in the season, or when 50 percent of the terminal leaves are infested later in the season.

Note. Continuous use of carbaryl, or a pyrethroid may result in mite outbreaks.

abamectin (Agri-Mek EC, Abba EC, Temprano or OLF)
bifenthrin (Brigade EC, Sniper or OLF)
bifenazate (Acramite 50WS)
fenpropathrin (Danitol 2.4 EC)
spiromesifen (Oberon 2SC)
zeta-cypermethrin+bifenthrin (Hero EC)

Nematode Control

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

Vydate L--1.0-2.0 gal 2L/A. Incorporate into top 2 to 4 inches of soil or 2.0 to 4.0 pints 2L per acre applied 2 weeks after planting and repeat 2 to 3 weeks later.

Disease Control

Seed Treatment

Check with your seed company to determine if seed has been treated with an insecticide and fungicide. If it has not been treated, use a mixture of thiram 75WP (½ teaspoon per pound or 3 ounces per 100 pounds) and an approved commercially available insecticide.

Damping-Off

Apply the following in a 7-inch band after seeding. Use formula given in the "Calibration for Changing from Broadcast to Band Application" section of Calibrating Granular Application Equipment to determine amount of

Ridomil Gold, Ultra Flourish or MetaStar needed per acre.
mefenoxam (Ridomil Gold--1.0-2.0 pt 4SL/A or Ultra Flourish--2.0-4.0 pt 2E/A), or
metalaxyl (MetaStar)--4.0-8.0 pt 2E/A

Viruses (CMV, WMV2, PRSV, ZYMV)

Use resistant varieties when possible. Plant fields as far away from existing cucurbit plantings as possible to help reduce aphid transmission of viruses from existing fields into new fields.

Bacterial Wilt

Controlling striped and spotted cucumber beetles is essential for preventing bacterial wilt. See preceding "Cucumber Beetle" section under Insect Control for specific recommendations. Insecticide applications made at seeding may not prevent beetle damage season long, therefore, additional foliar insecticide applications may be neccessary.

Angular Leaf Spot

At first sign of disease, apply the labeled rates of fixed copper *plus* mancozeb. Repeat every 7 days. To minimize the spread of disease, avoid working in field while foliage is wet.

Powdery Mildew

The fungus that causes cucurbit powdery mildew has developed resistance to high-risk fungicides. Resistance to strobilurin (FRAC code 11) and DMI (FRAC code 3) fungicides has been reported in the Eastern US. Proper fungicide resistance management should be followed. Pristine, which is a combination of two fungicides a group 7 and 11, continues to perform well in our region. However, strict resistance management should be followed to prolong the efficacy of Pristine, including rotation with fungicides in other FRAC code groups and tank mix with FRAC code M fungicides. Powdery mildew generally occurs from mid-July until the end of the season. Excellent resistance is available in all recommended cucumber varieties. Observe fields for the presence of powdery mildew. If one lesion is found on the underside of 45 old leaves, begin the following fungicide program:

Alternate one of the following tank mixes:

Procure--4.0-8.0 oz 50WS/A *plus* chlorothalonil--2.0-3.0 pt
Rally--5.0 oz 40WSP/A *plus* chlorothalonil--2.0-3.0 pt 6F/A or OLF, or
6F/A or OLF, or
Folicur--4.0-6.0 fl oz 3.6 F/A *plus* chlorothalonil--2.0-3.0 pt 6F/A
Inspire Super--16-20 fl oz 2.8F/A plus chlorothalonil 2.0-3.0 pt 6F/A

With:

a tank-mix containing Pristine--12.5-18.5 oz 38WG/A *plus* chlorothalonil--2.0-3.0 pt 6F/A or OLF#

Downy Mildew

Cultivars that were resistant in the past are no longer resistant because of recent shifts in the pathogen population. Scout fields for disease incidence beginning in early summer. Begin sprays when vines run or earlier if disease occurrence is predicted for the region. Once the disease has become established in an area, new plantings should receive an application of Ranman, Presidio, or Previcur Flex at the 1-3 leaf stage. Under severe pressure sequential applications (no more than 2 applications in a row) of the most effective materials (Presidio and Ranman) can be made or the most effective products (Presidio, Ranman and Previcur Flex) can be alternated. Follow all label precautions for preventing development of resistance to these fungicides. Preventative applications are much more effective than applications made after disease is detected. Refer to the Cucurbit Downy Mildew Forecasting website (http://cdm.ipmpipe.org) for current status of the disease.

The following are the most effective materials (always tank-mix these products with a protectant such as chlorothalonil--1.5-3 pt 6F/A or OLF, or mancozeb--3.0 lb 75DF/A or Gavel--1.5-2.0 lb 75DF/A):

Presidio--3.0-4.0 fl oz 4SC/A, or
Ranman--2.1-2.75 fl. oz. 400SC/A *plus* an organosilicone or non-ionic surfactant, see label for details, do not apply with copper, or
Previcur Flex--1.2 pt 6F/A
Other materials for use in tank mix or alternation:
Curzate--3.2 oz 60DF/A

Materials with different modes of action (FRAC codes) should always be alternated.

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

Anthracnose

Excellent resistance is available in some varieties and should be used when possible. Begin fungicide applications when vines begin to run, or earlier if symptoms are detected. Alternate chlorothalonil or mancozeb with Cabrio, Tanos or Quadris every 7 days. This is especially important to delay the development of resistant strains of the pathogen to FRAC code 11 fungicides.

Alternate:

chlorothalonil--1.5-3.0 pt 6F/A or OLF (use low rate early in season), or
mancozeb--2.0-3.0 lb 75DF/A or OLF,

With:

a tank-mix containing chlorothalonil or mancozeb *plus*
Quadris--11.0-15.5 fl oz 2.08SC/A, or
Cabrio--12.0-16.0 oz 20EG/A, or
Pristine--18.5 oz 38WG/A, or
Tanos--8.0 oz 50DF/A
Inspire Super 16.0-20.0 fl oz 2.8 F/A
Quadris Top 10.0-14.0 fl oz 2.7 F/A

To improve the performance of chlorothalonil, combine it with:

thiophanate-methyl--0.5 lb 70WP/A or OLF

Gummy Stem Blight

Gummy stem blight occurs primarily in the late summer. Fungicides with a high-risk for resistance development such as Pristine (a FRAC code 11 fungicide) should be tank-mixed with a protectant fungicide to reduce the chances for resistance development (see Table E-12). When tank-mixing, use at least the minimum labeled rate of each fungicide in the tank mix. Do not apply FRAC code 11 fungicides more than 4 times total per season. If resistance to FRAC code 11 fungicides exists in the area, do not use. Apply fungicides from a different FRAC code.

Begin sprays when vines begin to run.

Alternate:
chlorothalonil--2.0 pt 6F/A, or
mancozeb--2.0-3.0 lb 75DF/A

With:
a tank-mix containing either chlorothalonil or mancozeb plus one of the following fungicides:

Folicur--8.0 fl oz 3.6 F/A
Inpsire Super--16 to 20 fl oz 2.8F/A
Switch--11-14 oz 62.5 WG/A, or

or a tank-mix containing either chlorothalonil or mancozeb plus one of the following FRAC code 11 fungicides:
Pristine--12.5-18.5 oz 38WG/A, or
Quadris--11.0-15.5 fl oz 2.08SC/A (not recommended in Maryland , Delaware and Virginia due to resistance), or
Cabrio--12.0-16.0 oz 20EG/A (not recommended in Maryland, Delaware and Virginia due to resistance)

Belly Rot

Apply the following at the 1- to 3-leaf stage. Make a second application 10 to 14 days later or just prior to vine tip–over or whichever occurs first.

Quadris--11.0-15.5 fl oz 2.08SC/A

Scab

Scab typically occurs during cool periods. Excellent resistance is available in some varieties and should be used when possible. Apply one of the following as true leaves form and repeat every 5 to 7 days.

chlorothalonil--2.0-3.0 pt 6F/A or OLF, or
mancozeb--2.0-3.0 lb 75DF/A

Cottony Leak (*Pythium*)

At planting apply:
mefenoxam--1.0-2.0 pt Ridomil Gold 4SL/A or 2.0-4.0 pt Ultra Flourish 2E/A. Apply in a 7-inch band after seeding. 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.

Phytophthora Fruit Rot

Multiple practices should be used to minimize the occurrence of this disease. Rotate away from susceptible crops (such as cucurbits, peppers, lima and snap beans, eggplants, and tomatoes) for as long as possible and improve drainage in the field, apply preplant fumigants to suppress disease. When conditions favor disease development fungicides should be applied under excellent resistance management practices. Apply the following fungicides for suppression only. Rotate with fungicides in different FRAC groups and always tank mix with a fixed copper.

Revus--8.0 fl oz 2.08 F/A or
Ranman--2.75 fl oz 400SC/A (*plus* an organosilicone or non-ionic surfactant, see label for details, do not apply with copper), or
Presidio--3.0-4.0 fl oz 4 F/A, or
Forum--6.0 fl oz 4.18SC/A, or
Gavel--1.5-2.0 lb 75DF/A, or
Tanos--8.0-10.0 oz 50DF/A

Pesticide	Use Category[1]	Hours to Reentry[2]	Days to Harvest[3]
INSECTICIDE			
abamectin	R	12	7
Bacillus thuringiensis	G	4	0
beta-cyfluthrin	R	12	0
bifenthrin	R	12	3
bifenazate	G	12	3
carbaryl	G	12	3
chlorantraniliprole	G	4	1
clothianidin (soil/foliar)	G	12	AP/ 21
cyromazine	G	12	0
dinotefuran (soil/foliar)	G	12	21/1
endosulfan	R	48	2
esfenvalerate	R	12	3
Chenopodium extract	G	4	0
fenpropathrin	R	24	7
flonicamid	G	12	0
flubendiamide	G	12	1
flubendiamide + buprofezin	G	12	7
imidacloprid (soil)	G	12	21
indoxacarb	G	12	3
lambda-cyhalothrin	R	24	1
lambda-cyhalothrin + chlorantraniliprole	R	24	1
methomyl	R	48	3
methoxyfenozide	G	4	3
oxamyl	R	48	1
oxydemeton-methyl	R	48	3
permethrin	R	12	0
pymetrozine	G	12	0
spinetoram	G	4	1
spinosad	G	4	1
spiromesifen	G	12	7
thiamethoxam (soil/foliar)	G	12	30/0
thiamethoxam+chlorantraniliprole (soil/foliar)	G	12	30/1
zeta-cypermethrin	R	12	1
zeta-cypermethrin+bifenthrin	R	12	3
FUNGICIDE (FRAC code)			
Cabrio (Group 11)	G	12	0
chlorothalonil (Group M5)	G	12	0
copper, fixed (Group M1)	G	24	0
Curzate (Group 27)	G	12	3
Folicur (Group 3)	G	12	7
Forum (Group 40)	G	12	0
Gavel (Groups 22+ M3)	G	48	5
Inspire Super (Groups 3 + 9)	G	12	7
mancozeb (Group M3)	G	12,24	5
MetaStar (Group 4)	G	48	0
Presidio (Group 43)	G	12	2
Previcur Flex (Group 28)	G	12	2
Pristine (Groups 11 + 7)	G	12	0
Procure (Group 3)	G	12	0
Quadris (Group 11)	G	4	1
Quadris Top (Groups 11 + 3)	G	12	1
Rally (Group 3)	G	24	0

(table continued next page)

Pesticide	Use Category[1]	Hours to Reentry[2]	Days to Harvest[3]
FUNGICIDE (FRAC code) ***(continued)***			
Ranman (Group 21)	G	12	0
Revus (Group 40)	G	4	0
Ridomil Gold (Group 4)	G	48	0
Switch (Groups 9 + 12)	G	12	1
Tanos (Groups 11 + 27)	G	12	3
thiophanate-methyl (Group 1)	G	12	0
Ultra Flourish (Group 4)	G	48	5

See Table 3.

[1] G = general, R = restricted

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

[3] AP=at planting

EGGPLANTS

Varieties

Varieties[1]	
Specialty	
Orient Express* (early oriental type)	
Ichiban* (oriental type)	
Machiaw (oriental type)	
Orient Charm (light purple)	
Ghostbuster (white)	These varieties are
Cloud Nine (white)	recommended for DE,
Millionaire* (oriental type)	MD, NJ, PA, VA, WV
Viserba*	
Bharta (Indian type)	
Pushpa (Indian type)	
Rosita (lavender)	
Zebra* (lavender/ purple,white stripes)	
Standard	
Classic*	These varieties are
Nadia*	recommended for DE,
Night Shadow*	MD, NJ, PA, VA, WV
Classy Chassis*	
Santana*	
Local Hibush Selections	

[1] Varieties listed by maturity, earliest first.

*Indicates hybrid varieties

Recommended Nutrients Based on Soil Tests

Before using the table below, refer to important notes in Plant Nutrient Recommendations in Section B, Soil And Nutrient Information. These notes provide additional suggestions to adjust rate, timing and placement of nutrients depending on soil type cation exchange capacity and existing fertility levels.

Eggplants	Pounds N per Acre	Soil Phosphorus Level Low	Med	Opt.	Soil Potassium Level Low	Med	Opt.
		Pounds P_2O_5 per Acre			Pounds K_2O per Acre		
	125-150[1]	250[1]	150[1]	100[1]	250[1]	150[1]	100[1]
	50-100[2]	250[2]	150[2]	100[2]	250[2]	150[2]	100[2]
	25-50[3]	0	0	0	0	0	0
	25-50[4]	0	0	0	0	0	0

For crops grown on platic muclh, fertilization rates are based on a standard row spacing of 6 feet

[1] Total amount nutrient recommended; growers producing vegetables on soils with high clay contents should reduce the recommended nitrogen and potassium rates by 20% and increase the phosphorus rate by 25%.

[2] Broadcast and disk-in

[3] Sidedress 3-4 weeks after planting

[4] Sidedress 6-8 weeks after planting

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

Note: If crop is to be mulched with plastic but not drip/trickle fertilized, broadcast 225 pounds of nitrogen (N) per acre with recommended P_20_5 and K_20 and disk-in or incorporate prior to laying mulch.

Drip/Trickle Fertilization: see below for drip/trickle fertilization guides.

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. Control aphids on seedlings in greenhouse with a Thionex aerosol bomb before transplanting to field.

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 and for late plantings in other areas.

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_2O_5 and K_2O. Then thoroughly incorporate into