

plantings. If possible, produce your own transplants under sanitary conditions, since the use of transplants produced in other regions may increase the risk of a late blight infestation. When plants are 6 inches tall, apply one of the following *protectant* fungicides and repeat every 7 days, or follow a locally-verified disease forecasting system such as BLITECAST® to schedule the fungicide applications:

chlorothalonil--1.0 to 3.0 pt 6F/A or OLF, or
Gavel--1.5 to 2.0 lb 75DF/A, or
mancozeb--3.0 lb 75DF/A or OLF.

Once late blight is detected in your area, switch to one of the following translaminar fungicides which can move into and through leaves. Rotate between the following tank mixtures:

Curzate--3.2 to 5.0 oz 60DF/A *plus* a protectant fungicide,
or
Forum--6.0 fl oz 4.18SC/A *plus* a protectant fungicide, or
Presidio--3.0 to 4.0 fl oz 4SC/A *plus* a protectant fungicide,
or
Previcur Flex--1.5 pt 6F/A *plus* a protectant fungicide, or
Ranman--2.10 to 2.75 fl oz 400SC/A *plus* a protectant fungicide, or
Reason--5.5 to 8.2 fl oz 500SC/A *plus* a protectant fungicide, or
Revus Top--5.5 to 7.0 fl oz 4.16SC/A *plus* a protectant fungicide, or
Tanos--8.0 oz 50WG/A *plus* a protectant fungicide.

In greenhouse settings late blight can be particularly damaging. A strong scouting and preventative fungicide program is essential to reduce potential impacts. Microclimate management to reduce levels of free moisture on foliage is essential to reduce disease spread. The following materials permit greenhouse applications. You should consult fungicide labels to ensure greenhouse applications are permitted. The following materials can offer suppression and are labeled for greenhouse applications:

Heritage--1.6 to 2.0 oz 50WG/A or
Catamaran--5.5 to 7.0 pt 5.3F/A

Fruit Rot caused by Pythium and Buckeye Rot caused by Phytophthora

Apply mefenoxam (Ridomil Gold at 1.0 pint 4SL per acre or Ultra Flourish at 1.0 quart 2E per acre) as a soil surface application under the vines 4 to 8 weeks before harvest. Apply broadcast or banded (see Chapter E the section on "Calibrating Granular Application Equipment" for the amount needed per acre). Irrigate after application. An alternative to soil application of mefenoxam is to apply the following as a foliar spray beginning when crown fruit are one-third their final size and repeat every 14 days up to a total of 3 times:

mefenoxam + chlorothalonil (Flouronil, Ridomil Gold Bravo)--2.0 lb 76WP/A, or
Ridomil Gold Copper--2.0 lb 65WP/A

If weather and soil conditions continue to favor disease development apply one of the following between applications of the above listed fungicides:

Gavel--1.5 to 2.0 lb 75DF/A, or
Tanos--8.0 oz 50WG/A

Botrytis Fruit Rot (Gray Mold)

Gray mold is a problem during the fall in fields with dense foliage and poor drainage. For fall production, select fields with good drainage. Shortly before harvest when conditions are wet and cool, apply the following:

chlorothalonil--2.0 to 2.75 pt 6F/A or OLF (also very good for late blight), or
Endura--9.0 to 12.5 oz 70WG/A (also very good for early blight; not for use in greenhouses), or
Switch--11.0 to 14.0 oz 62.5WG/A

Leaf Mold (Fulvia/Cladosporium)

Leaf mold may occur during periods of high moisture particularly within the canopy. The disease is can also cause damage in greenhouse tomato plantings. No fungicides for greenhouse use exist. In both settings, if the disease is present, precautions should be taken to minimize canopy moisture. For field outbreaks, the following fungicide can be used:

Revus Top--5.5 to 7.0 fl oz 4.16SC/A

Tomato Spotted Wilt Virus (TSWV)

TSWV can be serious and result in severely stunted plants. The virus is spread by thrips from ornamental plants (flowers) and weeds to tomatoes. Use resistant varieties when available. Do not grow any ornamental bedding plants in the same greenhouse as tomato transplants. Control weeds in and around greenhouses. Monitor greenhouses and tomato fields for thrips and begin an insecticide control program once thrips are observed. In the field, use of reflective mulch can help repel thrips and can reduce the incidence of spotted wilt.

WATERMELONS

Varieties

Varieties ¹	All varieties are recommended for DE, MD, NJ, PA, VA, WV
Seeded	
Crimson Sweet (AR,FR1,OS)	
Sangria*	
Jamboree*(AT,FT)	
Mardi Gras* (FR 1, AR)	
StarBrite (AR, FR1,OS)	
Top Gun*	
Seedless (all seedless varieties are triploid hybrids)	
Imagination (Sugarbaby Type)	
Gypsy Troubadour	
Crisp N Sweet	
Melody	
Facination	
Sugar Coat	
Sugarheart	
SS5244 (OT)	
Tri-X 212	
Tri-X-313 (OT)	
Tri-X Palomar	
SS7197	
Super Crisp	
Matrix (oblong)	
Revolution (oblong) (OT)	
Amarillo (yellow)	

(table continued next page)

Varieties *(continued)*

Varieties ¹	All varieties are recommended for DE, MD, NJ, PA, VA, WV
Seedless (all seedless varieties are triploid hybrids)	
SugaRed	
Declaration	
Millionaire	
Crunchy Red	
Seedless Personal (3-7 lbs) (all seedless varieties are hybrids)	
Solitaire	
Vanessa	
Pollenizers	
<i>Standard diploid pollenizers</i>	
Stargazer	
Sangria	
SF 800	
Mickylee	
Jade Star	
<i>Special diploid pollenizers</i>	
SP 4	
SP 5	
Polimax	
Accomplice	
Patron	
Sidekick	

¹ Varieties listed by maturity, earliest first.

* 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

Watermelons	Pounds N per Acre	Soil Phosphorus Level			Soil Potassium Level		
		Low	Med	Opt.	Low	Med	Opt.
		Pounds P ₂ O ₅ per Acre			Pounds K ₂ O per Acre		
Nonirrigated	80-100 ¹	150 ¹	100 ¹	50 ¹	200 ¹	150 ¹	100 ¹
	50 ²	150 ²	100 ²	50 ²	200 ²	150 ²	100 ²
	25-50 ³	0	0	0	0	0	0
Irrigated	125-150 ¹	150 ¹	100 ¹	50 ¹	200 ¹	150 ¹	100 ¹
	50 ²	150 ²	100 ²	50 ²	200 ²	150 ²	100 ²
	25-50 ³	0	0	0	0	0	0
	25-50 ⁴	0	0	0	0	0	0

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

²Broadcast and disk-in

³Topdress when vines start to run

⁴Topdress after first harvest

Note: For seedless watermelons, high rates of N may increase the risk of hollow heart in seedless watermelons.

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

Suggested Fertilizer Program Using Trickle Irrigation for Watermelons

Days After Planting	Daily		Cumulative	
	Nitrogen ¹	Potash ^{1,2}	Nitrogen ¹	Potash ^{1,2}
	-----lbs/A-----			
Preplant ³	---	---	25	50
0-14	1.0	1.0	39	64
15-28	1.5	1.5	60	85
29-56	2.0	2.0	116	141
57-78	1.5	1.5	137	166
79-93	1.0	1.0	150	175

¹Adjust rates accordingly if you apply more or less preplant nitrogen and potash.

²Base overall application rate on soil test recommendations.

³Applied under plastic mulch to effective bed area using modified broadcast method. Adjust as needed.

Note: recommendations are based on 8 foot bed centers. If beds are narrower, fertilizer rates per acre should be adjusted proportionally. Drive rows should not be used in acreage calculations.

Plant Tissue Testing and Petiole Sap Analysis

Plant tissue testing and petiole sap analysis are useful tools to monitor watermelon plant nutrient status, especially for nitrogen and potassium. For tissue testing, take the most recent fully expanded leaves at early bloom and send to a laboratory for testing. Sufficiency ranges for nitrogen are between 2.5 to 3.5 percent and for potassium are between 2.7 to 3.5 percent.

Petiole sap testing can be done with portable meters. See section B-6 for sampling details for petiole sap testing. When vines are 6" in length, sap nitrate-N should be between 1200-1500 ppm and potassium 4000-5000 ppm. When fruits 2" in length, nitrate-N should be 1000-1200 ppm and potassium 4000-5000 ppm. When fruits are one-half mature, nitrate-N should be 800-1000 ppm and K should be 3500-4000 ppm and at first harvest, nitrate-N should be 600-800 ppm and potassium 3000-3500 ppm.

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 to prevent disease.

Plant Production

Transplants should be grown in plug trays with cell size at least 1.5 inches in diameter and 2 inches deep for each plant. Smaller pots or cells will restrict root growth and provide less protection to the newly set transplant. Plant one seed per cell.

Triploid (seedless) watermelon seeds require a special regime to germinate well. The seed coat of seedless watermelons tends to adhere to the seedling as it emerges, at times slowing growth or reducing stand and seeds are of lower vigor than standard diploid types.

Seedless watermelon plant production can be broken into 6 phases: sowing, initial germination, emergence, seed leaf stage to first true leaf, first true leaf to second true leaf, and hardening-off.

Seeding

Trays should be evenly filled with a general commercial greenhouse

growing medium like Pro-Mix BX®, Fafard® #2, or Sunshine® #1 (these all have a starter fertilizer). Do not use fine seed starter or plug mix types. Do not compress the growing media. Trays should be watered to capacity and then allowed to drain off excess for 24 hours. During this 24 hour period, trays should be placed in a heated area so that the media reaches a temperature of 85°F. Make planting holes 1” deep and plant seeds with the “pointed” side up. Cover with a small amount of warm moist media just enough to fill over seeds in the holes. Do not water after seeding. Seeding should be done in a way that trays stay at 85° F (do not allow trays to get cold).

Initial Germination

Germination should be done in a room or chamber where temperatures can be maintained at 85-90°F and where there is high humidity. Uniform tray temperature is critical. This phase will last 48 hours. To insure even germination, it may be necessary to move trays around after 24 hours (trays on bottom shelves moved to top shelves and vice versa) to ensure even temperature exposure. In this phase the seed root will emerge but the epicotyl (“crook”) that will carry the seed leaves above the surface should not be visible. If you see crooks, you have left trays in the germination area too long and you may experience plant “stretch” during emergence (if plants have emerged you are too late – stretch has already occurred). Stretching results in poor transplant quality.

Emergence

After initial germination, it is critical to move plants immediately from germination areas to the greenhouse for emergence. If you are having another grower germinate your seeds, it is important to schedule pickup or delivery so that there are no delays. Greenhouses should be set for 72-75°F day temperatures and 65°F night temperatures. Do not water until after you observe crook emergence. Thereafter, water sparingly as needed to keep trays and emerging seedlings from drying out. Excess water and high greenhouse temperatures during the emergence phase will lead to stretch.

Seed Leaf Stage to First True Leaf

Maintain greenhouse temperatures in the 72-75°F day and 65°F night range during this period. Water moderately to keep plants from drying out but do not fertilize during this period if you are growing in a medium that has starter fertilizer. Plants should grow slowly for highest quality.

First True Leaf to Second True Leaf

Continue maintaining greenhouse temperatures in the 72-75°F day and 65°F night range during this period. You can fertilize once the first true leaf emerges. Generally 2 fertilizations of 100 ppm nitrogen concentration one at first true leaf and one at second true leaf will be sufficient. If a constant feed system is used, set for 50 ppm nitrogen each watering once the first true leaf has emerged. These fertilization rates are for the media listed in the seeding section that contain a starter fertilizer charge. Avoid using fertilizers with high amounts of ammonium N as the nitrogen source as this can lead to stretch (use fertilizers with calcium nitrate and potassium nitrate as the main nitrogen sources). Avoid over-watering. Some growers use media with no starter fertilizer charge. If that is the case, a different fertilizer program will be needed. Use fertilizers with calcium nitrate and potassium nitrate as nitrogen sources. Use 50 ppm N

from emergence to first true leaf every 3 days, 200 ppm N every other day from first true leaf to second true leaf.

Hardening Off

It will take 4 to 6 weeks from sowing to finish transplants. Prior to transplanting into the field, harden off plants for one week. This is accomplished by lowering day time temperatures in the greenhouse (if greenhouses have side curtains roll them up during days if temperatures are not too cool). Reduce watering and stop fertilization. Some growers have the ability to place plants on wagons or move benches outside during the day, bringing them in at night. This is advised where possible but make sure the area is sheltered from high winds and avoid days where the temperature is below 60°F.

Pollenizers

The above information is for growing the seedless watermelons. Seeded pollenizers and standard seeded watermelons do not need special germinating conditions and can be grown directly in the greenhouse. It is of crucial importance to time the production so that plants are produced and hardened off at the same time as the seedless types. They also should be grown slowly and attention should be paid to avoid stretch. Follow the same recommendations from seed leaf stage through hardening off.

Planting and Spacing

Transplants: Transplant container-grown plants through plastic mulch 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, row covers, or rye windbreak strips.

Direct-seeded: Seed April 20 to May 15 in Virginia and normally warmer areas, and May 15 to June 10 in Pennsylvania and normally cooler areas. Seed 3 to 5 pounds of seed per acre.

The recommended spacing for watermelons is 6 to 8 feet between rows with 3 to 4 feet between plants in the row.

Seedless Varieties: See Pollination and Pollenizers section for planting recommendations.

Mulching

The majority of watermelons are grown on black plastic mulch with trickle (drip) irrigation (see Chapter C). Weed control under the plastic is performed by using labelled herbicides (see Weed Control section) or by fumigation. Fumigation is also used to control soil borne diseases such as *Fusarium*. See section E6 for fumigation recommendations. Fumigation will be necessary when there is a history of soil-borne diseases in the field.

Plastic and fumigant should be applied on well-prepared planting beds 30 days before field planting. Plastic should be 3-4 feet wide and laid on 6- to 8-foot centers immediately over the fumigated soil. The soil must be moist when laying the plastic. IRT plastic has been used in cooler areas for additional soil heating. Fertilizer must be applied during bed preparation. At least 50% of the nitrogen (N) should be in the nitrate (NO₃⁻¹) form.

Direct seeding through the mulch is possible for seeded types but is not generally recommended for seedless varieties.

Pollination and Pollenizers

Watermelon fruit set and enlargement is dependent upon growth regulators from the pollen grains and from embryos in developing seeds within the fruit. Inadequate pollination results in triploid watermelon fruits that are triangular in shape and of inferior quality. Inadequate pollination may increase the incidence of hollowheart. Triploid watermelon flowers do not produce sufficient viable pollen to induce fruit set and development. Therefore, pollen from a normal or a special diploid pollenizer watermelon variety must be present. Fields should be inter-planted with triploid and pollenizer plants. There are three methods that can be used to incorporate pollenizer plants into the field. Pollenizer plants may be dedicated to every third row. A second alternative is to plant a pollenizer every third or fourth plant in-row with additional spacing for pollenizers. A third alternative is to plant the pollenizer between every third and fourth plant in-row without changing plant spacing. When this method is chosen, the use of a special pollenizer is recommended. The use of standard diploid varieties planted in-row may decrease yields of closely associated triploid plants. Special pollenizer varieties have been developed solely for pollen production and most do not produce marketable fruit. The use of special pollenizers planted in-row allows the field to be 100% seedless. Special pollenizer varieties found to perform well are listed above in the "variety" table. Follow suppliers' instructions. **Under no circumstances should the pollenizer variety and the seedless variety be planted in separate but adjacent blocks!**

When using pollenizer plants arranged in dedicated rows, it is important to use a pollenizer variety that is marketable because up to one-third of all melons produced in the field will be of this variety. The rind pattern and/or shape of the seeded pollenizer fruit should be easily distinguished from that of the triploid fruit to reduce confusion at harvest. Most special pollenizers are distinguishable from triploid fruit by size however, if mini seedless watermelons are planted rind pattern must be used to distinguish pollenizer and seedless fruit. Selection of a pollenizer variety that will be harvested should also take into account the market demand, plant vigor, pollen production, disease resistance, and environmental conditions.

It is important that pollen from the diploid pollenizer variety be available when the female blossoms on the triploid plants are open and ready for pollination. The following recommendations pertain only to pollenizers planted in dedicated rows, special pollenizer plants should be transplanted at the same times as triploid plants. As a general rule, direct field seeding of the pollenizer variety should be done on the same day the triploid seed is planted in the greenhouse. If transplants are used for pollenizers, they can be seeded a few days after triploid transplants are scheduled to be seeded.

Honeybees, squash bees, bumblebees and other wild bees are essential for proper watermelon pollination and fruit set. Honeybee or bumblebee colonies are commonly rented or purchased. 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.

Windbreaks

Use windbreaks as necessary especially in windy areas. Small Grain windbreaks are recommended and may be established between every bed, every 2-3 beds, or in drive row areas (every 6-8 beds). Use windbreaks between every row for earliest plantings for additional protection. Rye is the most common small grain used for windbreaks due to height and rapid growth. Establish windbreaks in the fall, either as a solid planting or spacing windbreak rows at intervals the width of the rows. Plant at high density to insure a good stand. In the spring, for solid plantings, till areas where plastic is to be laid before small grain starts to elongate. Windbreaks may be eliminated with herbicides or mowed out after the crop is well established.

Vine Turning

It is important to move vines in outer rows out of driveways so they are not damaged by vehicle traffic. This reduces disease incidence. Several trips over the field may be necessary.

Irrigation

Watermelons can be grown under dryland conditions, however highest yields are obtained with irrigation. Irrigation is recommended for seedless watermelons. Schedule irrigation so that soil moisture does not drop below 50 percent of field capacity. At peak, during fruit set and full vine cover, watermelons will use up to 0.30 inches of water per day.

Harvest and Handling

Watermelons are hand harvested into bins, trucks, or buses for shed packing. Use every sixth or eighth row as a drive row for field access. Ripeness is indicated by a creamish to slight yellowing of the white background color of the part of the melon that rests on the ground. Drying of the stem tendril nearest the attachment point of the watermelon and green color tone of the rind are also indicators of ripeness but these vary with cultivar. Melons should be cut from the vine rather than pulled, twisted, or broken off.

Harvested watermelons should be stored at 50° to 60°F and a relative humidity of 90% during storage and shipping. Watermelons are not adapted to long storage. At low temperatures they are subject to various symptoms of chilling injury and loss of quality, and at high temperatures they are subject to decay.

Watermelons should be consumed within 2 to 3 weeks after harvest, primarily because of the gradual loss of crispness. Quality in watermelons is determined largely by high sugar content, a deep red flesh color, and a pleasant crisp texture of the edible flesh. These factors are dependent on maturity, cultivar, and handling methods.

Commercial melons for distant market are usually harvested when mature, but before full ripeness, to minimize handling damage and flesh breakdown.

Watermelons are sensitive to high levels of ethylene gas during storage, watermelons should not be stored or shipped with fruits that emit substantial amounts of ethylene.

Rough handling will result in serious losses. Bulk bins with pallets, if used, can speed handling and minimize melon damage.

Watermelons are marketed by weight and bin counts: large, or 32-35 (more than 18 lbs per melon) per bin, medium, or 45 per bin (14-18 lbs) and smaller, or 50-60 per bin (14 lbs or less). The wholesale grower is generally paid by the pound. "Personal" (very small) watermelons are marketed by box counts and weight. The trend in consumer preference has been increased demand for smaller sizes.

Watermelon Disorders

Misshapen Fruits

Poor pollination due to low bee activity, may result in "bottlenecks", or constricted growth at the stem end of the fruit, especially in seeded/elongated watermelons. Research has shown that a minimum of 1,000 grains of pollen are required to be distributed over the three lobes of the stigma of the female flower to produce a uniformly shaped fruit.

In seedless watermelon, poor pollination may lead to undesirable "triangular" fruits.

Sunscauld

Sunscauld occurs when fruits are exposed to direct sunlight, especially on extremely hot days. Under these conditions, rind surfaces can reach temperatures exceeding 140° F killing cells and resulting in sunburn spots. Fruits with little or no foliar cover are at most risk. Sunscauld or sunburn first appears as a gray or white area on the exposed upper surface of the fruit. Fruit with dark rinds are more susceptible to sunscauld than those with light colored rinds.

Sunscauld severity is related directly to fertility regime and and foliage cover. Proper fertility and soil management promotes adequate vine growth and coverage of fruit.

Sunscauld severity is also associated with diseases that reduce foliage cover, such as anthracnose, alternaria, gummy stem blight and downy mildew. Recommendations for managing these diseases may be found in the Disease Control section below.

Hollow Heart

Hollow heart is an internal crack in the flesh of the melon. The cause(s) of hollow heart is/are not known. Hollow heart is generally more severe in seedless varieties and in crown-set fruit. Inadequate pollination, cold weather during fruit set, poor fruit set and low fruit load, excess nutrients (especially nitrogen), and factors producing rapid growth have been reported to impact the severity of hollow heart.

Water Soaking

This disorder occurs where excess water accumulates at the bottom of the fruit resulting in a water soaked appearance of internal flesh. Water accumulates during cloudy weather when transpiration from vines is low. Water soaking sometimes appears in fruits where foliage has deteriorated since excess water cannot be transpired.

Splitting

Splitting during handling occurs in fruits under excessive water pressure. Excess irrigation or rainfall are the usual causes.

Irregular Ripening

Irregular ripening can be a problem in some years and varieties. Watermelons are classified as non-climacteric since they do not continue to ripen significantly after harvest.

However, recent research has shown that watermelon fruit produce a burst of ethylene at the white fruit stage and factors that reduce ethylene will slow ripening. Watermelon fruit development and ripening are also dependent on the accumulation of sugars. Loss of foliage or stem tissue due to diseases such as gummy stem blight or insect or mite feeding can reduce the amount of sugars available to the fruit. Different varieties, low potassium nutrition, or variability in vine health will lead to variability in fruit ripening.

Internal Rind Necrosis

Internal rind necrosis is indicated by the presence of a corky, red-brown layer of tissue that occurs on the inside of the rind of affected fruit but that does not extend into the fruit flesh. The disease occurs sporadically and is thought to be caused by bacteria (*Erwinia*) that are naturally present on fruit. Drought stress has been implicated in this disorder.

Weed Control

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

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 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.

- 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.

Note: All herbicide rate recommendations are made for spraying a broadcast acre (43,560 ft²).

Bensulide--5.0 to 6.0 lb/A. Apply 5.0 to 6.0 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 to 0.031 lb/A. Apply 0.5 to 0.75 a 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 0.031 pound per acre, equal to 0.75 dry ounces of Sandea, applied preemergence, per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2.0 dry ounces of Sandea, applied preemergence and postemergence to multiple crops in a single year. Observe a 57 day PHI (PreHarvest Interval).**

Terbacil--0.1 to 0.2 lb/A. Apply 2.0 to 4.0 dry ounces of Sinbar 80WP preemergence in a band under the plastic, immediately before laying the mulch, to control many annual broadleaf weeds under the mulch and around the planting hole. Sinbar will not control pigweed species. Condensation that forms on the underside of the mulch will activate the herbicide. Use the lower rate on fields with coarse-textured soils low in organic matter. Use the higher rates on fields with fine-textured soil and those with high organic matter. Sinbar may be used for direct seeded or transplanted watermelons. **DO NOT apply "over the top" or allow spray to contact crop foliage, or injury may result. Observe a 70 day PHI (PreHarvest Interval).**

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. Complete soil preparation, apply herbicide(s) under the mulch (see above), and lay plastic and trickle irrigation (optional) before herbicide application between the rows.

- 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!**
- Incorporate preemergence herbicide into the soil with ½ to 1 inch of rainfall or overhead irrigation within 48 hours of application.
- 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 ft²).

Preemergence

Bensulide--5.0 to 6.0 lb/A. Apply 5.0 to 6.0 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.

Bensulide *plus* naptalam--5.0 to 6.0 lb/A *plus* 2.0 lb/A. Apply 5.0 to 6.0 quarts Prefar 4EC *plus* 1.0 gallon Alanap 2SC as a banded directed shielded spray preemergence before seeding or transplanting. Tank-mix is approved.

Clomazone--0.094 to 0.188 lb/A. Apply 4.0 to 8.0 fluid ounces per acre Command 3ME as a banded directed shielded spray preemergence to the weeds 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, or use Strategy, the jug-mix that contains clomazone (Command) and ethalfluralin (Curbit).

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.

Ethalfuralin--0.38 to 0.75 lb/A. Apply 1.0 to 2.0 pints per acre Curbit 3E as a banded directed shielded spray 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!

Ethalfuralin plus Clomazone (jug-mix)--0.394 to 1.575 lb/A. Apply 1.5 to 6.0 pints per acre of Strategy 2.1SC as a banded directed shielded spray 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 ethalfuralin (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	Ethalfuralin (Curbit) lb ai/A	Clomazone (Command) lb ai/A
1.5	0.3	0.094
2.0	0.4	0.125
3.0	0.6	0.188
4.0	0.8	0.250
5.0	1.0	0.312
6.0	1.2	0.375

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

Halosulfuron--0.023 to 0.047 lb/A. Apply 0.5 to 1.0 dry ounce Sandea 75WG as a banded directed shielded spray between rows of plastic mulch 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 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, in a 1 year (12 month) period.**

S-metolachlor--0.64 to 1.21 lb/A. A **Special Local-Needs Label 24(c)** has been approved for the use of Dual Magnum 7.62E to control weeds between the rows of plastic mulch in watermelons in Delaware. The use of this product is legal ONLY if a waiver of liability is completed. The waiver of liability can be completed on the Syngenta website, "farmassist.com". Go to the website "farmassist.com" and register (or sign in if previously registered), then under "products" on the toolbar, click on indemnified labels and follow the instructions. Apply 0.67 to 1.27 pints per acre Dual Magnum 7.62E to control annual grasses, galinsoga, and certain other broadleaf weeds, and to suppress or control yellow nutsedge. Use as a surface-applied shielded and directed spray preemergence to the weeds before crop emergence or before transplanting. DO NOT apply Dual Magnum to the plastic mulch, or allow the spray to contact watermelon foliage. DO NOT preplant- incorporate Dual Magnum into the soil. Use the lower rate on fields with coarse-textured soils low in organic matter. Use the higher rates on fields with fine-textured soil and those with high organic matter. **Other generic versions of metolachlor and s-metolachlor may be available, and may or may not be labeled for use in the crop. Observe a minimum preharvest interval of 60 days.**

Terbacil--0.1 to 0.2 lb/A. Apply 2.0 to 4.0 dry ounces of Sinbar 80WP preemergence as a banded, shielded, directed spray between rows of plastic mulch to control many annual broadleaf weeds. Sinbar will not control pigweed species. Use the lower rate on fields with coarse-textured soils low in organic matter. Use the higher rates on fields with fine-textured soil and those with high organic matter. Sinbar may be used for direct seeded or transplanted watermelons. **Do NOT apply "over the top" or allow spray to contact crop foliage, or injury may result. Observe a 70 day PHI (PreHarvest Interval).**

Postemergence

Halosulfuron--0.023 to 0.031 lb/A. Apply 0.5 to 0.66 dry ounce Sandea 75WG as a banded, shielded, directed spray between rows of plastic mulch 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 0.094 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, in a 1 year (12 month) period.**

Paraquat--0.6 lb/A. A Special Local-Needs 24(c) label has been approved for the use of Gramoxone Inteon 2SC or OLF postemergence as a banded directed shielded spray between the rows of plastic mulch in Delaware, Maryland, New Jersey, Pennsylvania, and Virginia. Apply 2.4 pints per acre Gramoxone Inteon 2SC or OLF as a banded directed shielded 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 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 14 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 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 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. If rainfall does not occur, irrigate 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 ft²).

Preplant Incorporated or Preemergence

Bensulide--5.0 to 6.0 lb/A. Apply 5.0 to 6.0 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.

Bensulide *plus* naptalam--5.0 to 6.0 lb/A *plus* 2.0 lb/A. Apply 5.0 to 6.0 quarts Prefar 4EC *plus* 1.0 gallon Alanap 2SC as a preplant incorporated (2 inches or less) treatment before seeding or transplanting or as a preemergence treatment after seeding. Tank-mix is approved.

Preemergence

Clomazone--0.094 to 0.188 lb/A. Apply 4.0 to 8.0 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.

Ethalfuralin--0.38 to 0.75 lb/A. Apply 1.0 to 2.0 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!

Ethalfuralin *plus* Clomazone (jug-mix)--0.394 to 1.575 lb/A. Apply 1.5 to 6.0 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 ethalfuralin (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 ethalfuralin (Curbit) and clomazone (Command).

Halosulfuron--0.023 to 0.031 lb/A. Apply 0.5 to 0.75 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. 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 0.031 pound per acre, equal to 0.75 dry ounces of Sandea, applied preemergence, per crop-cycle. DO NOT exceed a total of 0.094 pound per acre, equal to 2.0 dry ounces of Sandea, applied preemergence and postemergence to multiple crops in a single year.**

Terbacil--0.1 to 0.2 lb/A. Apply 2.0 to 4.0 dry ounces of Sinbar 80WP preemergence to control many annual broadleaf weeds under the mulch and around the planting hole. Sinbar will not control pigweed species. Use the lower rate on fields with coarse-textured soils low in organic matter. Use the higher rates on fields with fine-textured soil and those with high organic matter. Sinbar may be used for direct seeded or transplanted watermelons. Apply to seeded watermelons after planting, but before emergence. Apply to transplanted watermelons before transplanting (PRE-transplant). **Do NOT apply "over the top" or allow spray to contact crop foliage, or injury may result. Observe a 70 day PHI (PreHarvest Interval).**

Postemergence

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 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 14 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 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 ft²).

Pollinators and Pesticides

Honeybees, squash bees, bumblebees and other wild bees are important for proper set and pollination. 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 section on "Pollination" in the General Production Recommendations and/or Table D-6 for relative toxicity of various pesticides for hazard to bees.

Insect Control

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

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

Seed Corn Maggot

Maggot problems can occur in the field and in transplant bedding trays in the greenhouse. An application of a soil-incorporated insecticide may be needed immediately before planting. Also, see Chapter E "Maggots" section in "Soil Pests--Their Detection and Control". **Note:** The use of

imidacloprid at planting may reduce seed corn maggot populations.

bifenthrin+indole butyric acid--3.5 to 8.0 lbs/A Empower² chlorpyrifos (Lorsban 50W or OLF)--**commercial applied seed treatment only**

Cucumber Beetle

Watermelons are resistant to bacterial wilt; however, control may be needed to prevent feeding damage to seedlings. Treat with one of the following formulations when an average of two beetles per plant is found.

acetamiprid--2.5 to 5.3 oz/A Assail 30SG (or OLF)
beta-cyfluthrin--2.4 to 2.8 fl oz/A Baythroid XL
bifenthrin--2.6 to 6.4 fl oz/A Brigade 2EC (or Sniper or OLF)
carbaryl--1¼ lbs/A Sevin 80S (or OLF)
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
cyfluthrin--3.0 to 3.5 oz/A Renounce 20WP (Tombstone or OLF)
dinotefuron--**foliar** 2.0 to 7.0 fl oz/A, **soil** 9.0 to 10.5 fl oz/A Scorpion 35SL (or OLF)
esfenvalerate--5.8 to 9.6 fl oz/A Asana XL
fenpropathrin--10 2/3 to 16.0 fl oz/A Danitol 2.4EC
imidacloprid--**soil only** 7.0 to 10.5 fl oz/A Admire PRO (or 16.0 to 24.0 fl oz/A imidacloprid 2F or OLF)
lambda-cyhalothrin--1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, Silencer, 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
methomyl--1.5 to 3.0 pts/A Lannate LV (or OLF)
permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or Pounce 3.2EC or OLF)
zeta-cypermethrin--2.8 to 4.0 fl oz/A Mustang MAX (or OLF)
zeta-cypermethrin+bifenthrin--4.0 to 10.3 fl oz/A Hero EC

Cutworms (Also see the "Cutworms" section in Soil Pests--Their Detection and Control.)

Apply one of the following formulations:
beta-cyfluthrin--0.8 to 1.6 oz/A Baythroid XL
bifenthrin--2.6 to 6.4 fl oz/A Brigade 2EC (or Sniper or OLF)
bifenthrin+indole butyric acid--3.5 to 8.7 lbs/A Empower²
esfenvalerate--5.8 to 9.6 fl oz/A Asana XL
flubendiamide--2.0 to 3.0 oz/A Synapse WG
flubendiamide+buprofezin--12.0 to 17.0 fl oz/A Vetica
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
methomyl--1.5 pts/A Lannate LV (**Variegated cutworm only**) (or OLF)
permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or Pounce 3.2EC or OLF)
zeta-cypermethrin--1.28 to 4.00 fl oz/A Mustang MAX (or OLF)
zeta-cypermethrin+bifenthrin--4.0 to 10.3 fl oz/A Hero EC

Pickleworm, Melonworm

Make one treatment prior to fruit set, and then treat weekly. Use one of the following formulations:

acetamiprid--5.3 oz/A Assail 30SG (or OLF)
 beta-cyfluthrin--1.6 to 2.4 fl oz/A Baythroid XL
 bifenthrin--2.6 to 6.4 fl oz/A Brigade 2EC (or Sniper or OLF)
 carbaryl--5/8 to 1¼ lbs/A Sevin 80S (or OLF)
 chlorantraniprole--**soil/drip/foliar** 2.0 to 5.0 fl oz/A Coragen
 cyfluthrin--1.6 to 2.4 fl oz/A Tombstone (or OLF)
 esfenvalerate--5.8 to 9.6 fl oz/A Asana XL (**pickleworm only**)
 flubendiamide--2.0 to 3.0 oz/A Synapse WG
 flubendiamide+buprofezin--12.0 to 17.0 fl oz/A Vetica
 indoxacarb--2.5 to 6.0 oz/A Avaunt 30WDG
 lambda-cyhalothrin--1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, Silencer, 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
 methomyl--1.5 to 3.0 pts/A Lannate LV (or OLF)
 methoxyfenozide--4.0 to 10.0 fl oz/A Intrepid 2F
 permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or Pounce 3.2EC or OLF)
 spinetoram--5.0 to 10.0 fl oz/A Radiant SC
 spinosad--1.25 to 2.50 oz/A Entrust 80W (or OLF)
 zeta-cypermethrin--2.8 to 4.0 fl oz/A Mustang MAX (or OLF)
 zeta-cypermethrin+bifenthrin--4.0 to 10.3 fl oz/A Hero EC

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 with one of the following formulations:

acetamiprid--2.5 to 4.0 oz/A Assail 30G (or OLF)
 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 2.9 oz/A Beleaf 50 SG
 imidacloprid--**soil only** 7.0 to 10.5 fl oz/A Admire PRO (or 16.0 to 24.0 fl oz/A imidacloprid 2F or OLF)
 lambda cyhalothrin+thiamethoxam--4.0 to 4.5 fl oz/A Endigo ZC
 methomyl--1.5 to 3.0 pts/A Lannate LV (or OLF) (**Melon Aphid only**)
 pymetrozine--2.75 oz/A Fulfill 50WP
 thiamethoxam--**soil** 1.66 to 3.67 oz/A Platinum 75SG (or OLF); **foliar** 1.5 to 3.0 oz/A Actara 25WDG

Leafminers

Apply one of the following formulations:

abamectin--8.0 to 16.0 fl oz/A Agri-Mek 0.15EC (or Abba EC, Temprano or OLF)
 chlorantraniprole--**soil** 5.0 to 7.5 fl oz/A, **drip** 5.0 to 7.5 fl oz/A, **foliar** 5.0 to 7.0 fl oz/A Coragen
 cyromazine--2.66 oz/A Trigard 75WSP
 dimethoate--0.5 to 1.0 pt/A Dimate 4EC (or OLF)
 dinotefuran--**foliar** 2.0 to 7.0 fl oz/A, **soil** 9.0 to 10.5 fl oz/A Scorpion 35SL (or OLF)
 oxamyl--2.0 to 4.0 pts/A Vydate L
 permethrin--8.0 fl oz/A Perm-Up 3.2EC (or Pounce 3.2EC or OLF)

spinetoram--6.0 to 10.0 fl oz/A Radiant SC
 spinosad--2.0 to 2.5 oz/A Entrust 80W (or OLF)
 thiamethoxam--**soil** 1.66 to 3.67 oz/A Platinum 75SG (or OLF)

Rindworms (Cucumber Beetle Larvae.)

Damage to the rinds may result from a complex of insects including cucumber beetle, wireworms, and a number of "worm" species, (beet army worm, etc). Control of adult cucumber beetles early in the season may help reduce rindworm damage. For Lepidopteran rindworms, use one of the following formulations:

flubendiamide--2.0 to 3.0 oz/A Synapse WG
 flubendiamide+buprofezin--12.0 to 17.0 fl oz/A Vetica
 lambda-cyhalothrin+chlorantraniliprole--6.0 to 9.0 fl oz/A Voliam xpress

Beet Armyworm

chlorantraniprole--**soil/drip/foliar** 3.5 to 5.0 fl oz/A Coragen
 indoxacarb--3.5 to 6.0 oz/A Avaunt 30WDG
 methoxyfenozide--4.0 to 10.0 fl oz/A Intrepid 2F
 spinosad--1.25 to 2.5 oz/A Entrust 80W (or OLF)
 spinetoram--5.0 to 10.0 fl oz/A Radiant SC

Cabbage Looper

Apply one of the following formulations:

Bacillus thuringiensis--0.5 to 1.0 lb/A Biobit (or Dipel, Dipel 2X, Javelin, XenTari or OLF)
 beta-cyfluthrin--1.6 to 2.4 fl oz/A Baythroid XL
 bifenthrin--2.6 to 6.4 fl oz/A Brigade 2EC (or Sniper or OLF)
 chlorantraniprole--**soil/drip/foliar** 3.5 to 5.0 fl oz/A Coragen
 cyfluthrin--1.6 to 2.4 fl oz/A Tombstone (or OLF)
 esfenvalerate--5.8 to 9.6 to fl oz/A Asana XL
 flubendiamide--2.0 to 3.0 oz/A Synapse WG
 flubendiamide+buprofezin--12.0 to 17.0 fl oz/A Vetica
 indoxacarb--2.5 to 6.0 oz/A Avaunt 30WDG
 lambda-cyhalothrin--1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, Silencer, 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
 methoxyfenozide--4.0 to 10.0 fl oz/A Intrepid 2F
 permethrin--4.0 to 8.0 fl oz/A Perm-Up 3.2EC (or Pounce 3.2EC or OLF)
 spinetoram--5.0 to 10.0 fl oz/A Radiant SC
 spinosad--1.25 to 2.50 oz/A Entrust 80W(or OLF)
 thiamethoxam+chlorantraniliprole--4.0 to 7.0 oz/A Voliam flexi
 zeta-cypermethrin--2.8 to 4.0 fl oz/A Mustang MAX (or OLF)
 zeta-cypermethrin+bifenthrin--4.0 to 10.3 fl oz/A 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. Apply one of the following formulations:

Note: Continuous use of Sevin, or the pyrethroids may result in mite outbreaks.

abamectin--8.0 to 16.0 fl oz/A Agri-Mek 0.15EC (or Abba EC, Temprano, or OLF)
 bifenthrin--5.12 to 6.4 fl oz/A Brigade EC (or Sniper, or OLF)
 bifenazate--0.75 to 1.00 lbs/A Acramite 50WS
 etoxazole--2.0 to 3.0 oz/A Zeal Miticide¹
 fenpropathrin--10 2/3 to 16.0 fl oz/A Danitol 2.4EC
 fenpyroximate--2.0 pts/A Portal
 spiromesifen--7.0 to 8.5 fl oz/A Oberon 2SC
 zeta-cypermethrin+bifenthrin--10.3 fl oz/A Hero EC

Stink bug

Apply one of the following formulations:
 beta-cyfluthrin--2.4 to 2.8 fl oz/A Baythroid XL
 bifenthrin--2.6 to 6.4 fl oz/A Bifenture EC (or Brigade EC, Sniper, or OLF)
 cyfluthrin--2.4 to 2.8 fl oz/A Tombstone (or OLF)
 dinotefuran--**soil** 9.0 to 10.5 fl oz/A, **foliar** 2.0 to 7.0 fl oz/A Scorpion 35SL (or OLF)
 lambda-cyhalothrin--1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, Silencer, 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
 methomyl--1.5 to 3.0 pts/A Lannate LV (or OLF)
 permethrin--8.0 oz/A Permethrin 3.2 EC (or Perm-Up, or OLF)
 zeta-cypermethrin--2.8 to 4.0 oz/A Mustang MAX (or OLF)
 zeta-cypermethrin+bifenthrin--4.0 to 10.3 oz/A Hero EC

Thrips

Apply one of the following formulations:
 dinotefuran--**foliar** 2.0 to 7.0 fl oz/A, **soil** 9.0 to 10.5 fl oz/A Scorpion 35SL (or OLF)
 lambda-cyhalothrin--1.28 to 1.92 fl oz/A Warrior II or 2.56 to 3.84 fl oz/A Lambda-Cy (LambdaT, Silencer, or OLF)
 oxamyl--2.0 to 4.0 pts/A Vydate L
 spinetoram--6.0 to 10.0 fl oz/A Radiant SC
 spinosad--2.0 to 2.5 oz/A Entrust 80W (or OLF)

Pesticide	Use Category ¹	Hours to Reentry ²	Days to Harvest ³
INSECTICIDE			
abamectin	R	12	7
acetamiprid	G	12	0
<i>Bacillus thuringiensis</i>	G	4	0
beta-cyfluthrin	R	12	0
bifenthrin	R	12	3
bifenthrin + indole butyric acid	R	12	3
bifenazate	G	12	3
carbaryl	G	12	3
chlorantranilprole (soil/foliar)	G	4	1
clothianidin (soil/foliar)	G	12	AP/21
cyfluthrin	R	12	0
cyromazine	G	12	0
dimethoate	R	48	3
dinotefuran (soil/foliar)	G	12	21/1
esfenvalerate	R	12	3
etoxazole	G	12	7
fenpropathrin	R	24	7
fenpyroximate	G	12	3
fonicamid	G	12	0
flubendiamide	G	12	1
flubendiamide+buprofezin	G	12	7

(table continued next column)

Pesticide (continued)	Use Category ¹	Hours to Reentry ²	Days to Harvest ³
INSECTICIDE (continued)			
imidacloprid (soil)	G	12	21
indoxacarb	G	12	3
lambda-cyhalothrin	R	24	1
lambda-cyhalothrin + chlorantraniliprole	R	24	1
lambda-cyhalothrin + thiamethoxam	R	24	1
methomyl	R	48	3
methoxyfenozide	G	4	3
oxamyl	R	48	1
oxydemeton-methyl	R	48	7
permethrin	R	12	0
pymetrozine	G	12	0
spinetoram	G	4	3
spinosad	G	4	3
spiromesifen	G	12	7
thiamethoxam (soil/foliar)	G	12	30/0
thiamethoxam+chlorantraniliprole	G	12	1
zeta-cypermethrin	R	12	1
zeta-cypermethrin+bifenthrin	R	12	3
FUNGICIDE (FRAC code)			
Actigard (Group P1)	G	12	7
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
Flouronil (Groups 4 + M5)	G	48	0
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	24	5
MetaStar (Group 4)	G	48	AP
Presidio (Group 43)	G	12	2
Previcur Flex (Group 28)	G	12	2
Pristine (Groups 11 + 7)	G	48	0
Procure (Group 3)	G	12	0
Quadris (Group 11)	G	4	1
Quadris Top (Groups 11 + 3)	G	12	1
Quintec (Group 13)	G	12	3
Rally (Group 3)	G	24	0
Ranman (Group 21)	G	12	0
Reason (Group 11)	G	12	14
Revus (Group 40)	G	4	0
Ridomil Gold (Group 4)	G	48	0
Ridomil Gold Bravo (Groups 4 + M5)	G	48	0
Ridomil Gold Copper (Groups 4 + M1)	G	48	5
Switch (Groups 9 + 12)	G	12	1
Tanos (Groups 11 + 7)	G	12	3
thiophanate-methyl (Group 1)	G	12	0
Ultra Flourish (Group 4)	G	48	5

See Table D-6.

¹ G = general, R = restricted

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

³ AP = At plant

Nematode Control

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

Apply Vydate L--1.0 to 2.0 gal 2L/A. Incorporate into the 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 3.0 ounces per 100 pounds) and an approved commercially available insecticide.

Damping-Off

Apply the following in a 7-inch band at planting. Use formula 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 to 2.0 pt 4SL/A or 2.0 to 4.0 pt Ultra Flourish 2E/A), or
metalaxyl (MetaStar)--4.0 to 8.0 pt 2E/A

Bacterial Fruit Blotch

Obtain disease-free seed or seedlings. Practice good sanitation during transplant production. Segregate different seed lots in the transplant house to reduce the chance of cross contamination. Do not use infected transplants. Use only transplants from houses in which there were no seedling symptoms of the fruit blotch disease. Rotate to allow 2 years between watermelon plantings and control volunteers during those years. Apply one of the following fungicide schedules beginning before the first flower is open and continuing until three weeks after flowering (Actigard applications must begin one or two weeks prior to flowering to be effective):

copper, fixed--at labeled rates, or copper plus Actigard--0.5 to 1.0 oz/A

Viruses (WMV2, PRSV, ZYMV, and CMV)

Plant fields as far away from existing cucurbit plantings as possible to help reduce the chances of aphid transmission of viruses from existing fields to new fields.

Ozone Injury

Ozone is a common pollutant of air. When present in high concentrations in the atmosphere, ozone will cause chlorosis and upper surface bronzing and scorching on the older leaves, which leads to defoliation. 'Sugar Baby' is one of the more sensitive varieties.

Fusarium Wilt

Use a long rotation of at least 5 years and resistant varieties when possible. Several newly released seedless varieties have resistance to Fusarium wilt caused by race 1. However, their level of resistance is lower than in resistant seeded varieties and race 2 also occurs in our region. Pollinizers SP-4 and SP-5 also are resistant to Fusarium wilt caused by race 1.

Anthracnose

Excellent resistance is available in some varieties. Use resistant varieties when possible. Begin fungicide applications when vines run or earlier if symptoms are detected.

Under light or moderate disease pressure:

Alternate:

chlorothalonil--2.0 to 3.0 pt 6F/A or OLF (Use low rate early in season),

With:

chlorothalonil--2.0 to 3.0 pt/A *plus* thiophanate-methyl--0.5 lb 70WP/A

Under high disease pressure, tank-mix:

chlorothalonil--2.0 to 3.0 pt 6F/A

with one of the following FRAC code 11 fungicides:

Pristine--18.5 oz 38WG/A, or

Quadris--11.0 to 15.5 fl oz 2.08SC/A, or

Cabrio--12.0 to 16.0 oz 20EG/A, or

Tanos--8.0 oz 50DF/A, or

Inspire Super 16.0 to 20.0 oz 2.8 F/A, or

Quadris Top 10.0 to 14.0 fl oz 2.7 F/A

And rotate every 7 days with:

chlorothalonil--2.0 to 3.0 pt/A *plus* thiophanate-methyl--0.5 lb 70WP/A

If resistance to FRAC code 11 (strobilurin) fungicides has been detected in the area, do not use Quadris, Quadris Top, Tanos or Cabrio.

Downy Mildew

Scout fields for disease incidence on a regular basis. Begin targeted sprays when disease occurrence is predicted for the region. Refer to the Cucurbit Downy Mildew Forecasting website (<http://cdm.ipmpipe.org/>) for current status of the disease. Preventative applications are much more effective than applications made after disease is detected. The following are the most effective materials (tank-mix these products with a protectant fungicide such as chlorothalonil--1.52 to 2.00 pt 6F/A or OLF):

Ranman--2.10 to 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 to 4.0 fl oz 4SC//A, or

Previcur Flex--1.2 pt 6F/A,

Other materials for use in tank mix or alternation:

Tanos--8.0 oz 50DF/A, or

Gavel--1.5 to 2.0 lb 75DF/A (Gavel contains mancozeb, which is a protectant, and does not need a tank-mix partner), or

Curzate--3.2 oz 60DF/A

Materials with different Modes of Action (FRAC groups) should be alternated.

Sprays should be applied on a 7-day schedule when disease is forecast or present in region. Under severe disease conditions and conducive weather, spray interval may be reduced if label allows.

Alternatively Presidio may be applied through drip irrigation. See label for additional details and application information.

Alternaria Leaf Blight.

Begin sprays when vines begin to run.

Alternate one of the following:

chlorothalonil--2.0 to 3.0 pt 6F/A, or OLF (Use low rate early in season), or

mancozeb--2.0 to 3.0 lb 75 DF/A

With:

Pristine--12.5 to 18.5 oz 38W/A, or

a tank-mix of chlorothalonil *plus* one of the following every 14 days:

Quadris--11.0 to 15.5 fl oz 2.08SC/A (do not apply near apples, see label for details), or

Cabrio--12.0 to 16.0 oz 20EG/A, or
Reason--5.5 fl oz 500SC/A, or
Inspire Super 16.0 to 20.0 fl oz 2.8 F/A, or
Quadris Top 10.0 to 14.0 fl oz 2.7 F/A

If resistance to FRAC code 11 fungicides exist in the area, do not use Cabrio, Pristine or Quadris or Quadris Top. Use a fungicide with a different FRAC code.

Gummy Stem Blight

Fungicide solo products within the FRAC code 11 (Cabrio, Quadris and Flint) are not recommended in the mid-Atlantic region. Pristine, which contains both FRAC code 11 and 7 components should always 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. Begin sprays when vines begin to run, apply the following:

Under low disease pressure:

chlorothalonil--2.0 to 3.0 pt 6F/A every 7 days

Under high disease pressure:

Alternate:

chlorothalonil--2.0 to 3.0 pt 6F/A

With:

Pristine--12.5 to 18.5 oz 38W/A *plus* chlorothalonil--2.0 to 3.0 pt 6F/A, or

Switch--11.0 to 14.0 oz 62.5WG/A, or
tebuconazole (Folicur--8.0 fl oz 3.6 F/A or OLF), or
Inspire Super 16.0 to 20.0 fl oz 2.8 F/A

Phytophthora Crown and Fruit Rot

Multiple practices should be used to minimize the occurrence of this disease. Watermelon should be grown on raised beds and fields should be adequately drained to ensure that water does not accumulate around the base of the plants. Rotate away from susceptible crops (such as cucurbits, peppers, lima and snap beans, eggplants and tomatoes) for as long as possible. Preplant fumigants also will suppress disease. In addition, when the vines begin to run, subsoil between rows to allow for faster drainage following rainfall. Apply one of the following and always tank mix with fixed copper at labeled rates when conditions favor disease development (for suppression only):

Revus--8.0 fl oz 2.08 F/A (rotate with another effective, registered fungicide), 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 to 4.0 fl oz 4F/A, or

Forum--6.0 fl oz 4.18SC/A or

Gavel--1.5 to 2.0 lb 75DF/A, or

Tanos--8.0 to 10.0 oz 50DF/A *plus* mancozeb

Materials with different modes of action (FRAC codes) should always be alternated to reduce the chances for fungicide resistance development.

Alternatively Presidio may be applied through drip irrigation. See label for additional details and application information.

Powdery mildew

This disease was observed for the past few seasons in

Delaware and Maryland and could occur in other States. Detection of powdery mildew is more difficult in watermelons than in other cucurbits because sporulation is sparse and masked by leaf color. Look for chlorotic spots on upper leaf surface of young, fully expanded leaves, and then inspect the corresponding lower leaf surface with a hand lens to confirm presence of the fungus.

The fungus that causes cucurbit powdery mildew can develop resistance to high risk fungicides. Resistance to strobilurin (FRAC code 11) and DMI (FRAC code 3) fungicides have been reported in the Eastern U.S. Proper fungicide resistance management should be followed.

Powdery mildew generally occurs from mid-July until the end of the season. 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:

Quintec--6.0 fl oz 2.08SC/A *plus* chlorothalonil

With:

Procure--4.0 to 8.0 oz 50WS/A *plus* chlorothalonil 2.0 to 3.0 pt 6 F/A, or

Rally--5.0 oz 40WSP/A *plus* chlorothalonil 2.0 to 3.0 pt 6 F/A, or

tebuconazole (Folicur--4.0 to 6.0 fl oz 3.6F/A or OLF) *plus* chlorothalonil 2.0 to 3.0 pt 6 F/A

Or with one of the following tank mixes:

Inspire Super 16.0 to 20.0 fl oz 2.8F/A *plus* chlorothalonil 2.0-3.0 pt 6F/A, or

Pristine--12.5 to 18.5 oz 38WG/A *plus* chlorothalonil 2.0-3.0 pt 6 F/A

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