



This is a section from the

2018

Mid-Atlantic

Commercial Vegetable

Production Recommendations

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

The **full manual**, containing recommendations specific to New Jersey, can be found on the Rutgers NJAES website in the Publications section:

<http://njaes.rutgers.edu/pubs/publication.asp?pid=E001>.

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

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

F. Commodity Recommendations

Pesticide Use Disclaimer

THE LABEL IS THE LAW

Before using a pesticide, check the label for up to date rates and restrictions.

Labels can be downloaded from: <http://www.cdms.net/>, <http://www.greenbook.net/> or <http://www.agrian.com/labelcenter/results.cfm>

Guide to the Recommended Pesticide Tables in the Following Crop Chapters:

1. Pesticides are listed by **group or code number based on chemical structure and mode of action**, as classified by the Weed Science Society of America (WSSA) for herbicides, the Insecticide Resistance Action Committee (IRAC) for insecticides, and the Fungicide Resistance Action Committee (FRAC) for fungicides.

If the number is in bold font, the product may have resistance concerns.

2. For **restricted use pesticides**, the restricted active ingredients are labeled with a *. See the Pesticide Safety chapter for more information.

3. **In addition to the pesticides listed below, other formulations or brands with the same active ingredient(s) may be available. ALWAYS CHECK THE LABEL:**

- a) to ensure a pesticide is labeled for the same use,
- b) to ensure the pesticide is labeled for the desired crop, and
- c) for additional restrictions.

4. All pesticide recommendations are made for spraying a **broadcast area of 1 acre** (43,560 square feet). **Adjust the rate for banded applications** (for more information, see the Pest Management chapter, Calibrating Granular Applicators section).

5. Check the label for the maximum amount of pesticide per application and the maximum number of applications per year.

6. **Bee Toxicity Rating (Bee TR):** N=nontoxic; L=minimum impact on bees; M=moderately toxic, can be used if dosage, timing and method of application are correct, but should NOT be applied directly to crop if bees are present; H=highly toxic, severe losses expected, -- = data not available.

Watermelons

Recommended Varieties

	Reported Disease Resistance ¹						Size (lb)	Shape	Flesh Color	Rind Description
	Fon ² Gen	Fon 0	Fon 1	Fon 2	Co ³	Px ⁴				
Seeded (also see seeded pollenizers)										
Crimson Sweet	R				R		16-20	globe	red	medium green with dark green stripes
Jamboree			I		I		24-28	oblong	red	dark green with broken light green stripes
Mardi Gras	I				I		20-24	oblong	red	dark green with broken light green stripes
Sangria	I				I		20-24	oblong	red	dark green with broken light green stripes
Starbrite					R		22-31	oblong	red	medium green with dark green stripes
Top Gun			I		I		21-24	globe	red	medium green with dark green stripes
Seedless Early										
Melody							14-16	globe	red	medium green with dark green stripes
Sweet Gem							13-16	globe	red	dark green
Sweet Eat'n	I				I		15-20	oval	red	light green with broad, medium green stripes
Secretariat							16-20	oval	red	light green with broad, medium green stripes
Amarillo							13-15	globe	yellow	light green with narrow dark green stripes
Vagabond							14-17	oval	red	medium green with dark green stripes
Seedless Mid Season										
Bottle Rocket			I				18-21	oblong	red	medium green with dark mottled stripes
Charismatic							13-16	globe	red	medium green with dark green stripes
Joy Ride	R						18-20	oblong	red	medium green with dark green stripes
Road Trip	R				R		16-18	oblong	red	medium green with mottled green stripe
SS 7167							16-20	oval	red	medium green with dark green stripes
Gypsy					I		13-17	globe	red	medium green with dark green stripes
Fascination			I		I		16-20	oval	red	medium green with dark green stripes
Crisp N Sweet							16-20	oval	red	light green with broad, medium green stripes
Cut Above	I						15-17	round oval	red	medium green with dark green stripes
Sugar Heart							16-20	oval	red	light green with broad, medium green stripes
Traveler							15-20	oval	red	medium green with dark green stripes
Unbridled							13-16	globe	red	medium green with dark green stripes
Kingman							16-20	oval	red	light green with broad, medium green stripes
SV0258WA							15-20	oval	red	light green with broad, medium green stripes
SV0241WA			I		R		12-15	oval	red	light green with medium green stripes
Warrior							17-20	oval	red	medium green with dark green stripes
Wayfarer					R		13-18	globe	red	solid dark green to black
Butterball			I				12-18	globe	yellow	light green with narrow dark green stripes
Seedless Late										
Sugar Fresh							15-18	oval	red	light green with broad, medium green stripes
Traveler					R		12-17	globe	red	medium green with dark green stripes
Troubadour					R		14-17	oval	red	medium green with dark green stripes
SS 7197					I		16-20	oval	red	medium green with dark green stripes
Sweet Polly							15-18	oval	red	medium green with dark green stripes
Captivation			I		I		14-17	oval	red	medium green with dark green stripes
Maxima							19-22	globe	red	medium green with dark green stripes
Talca							17-20	oval	red	green with very dark green stripes
SugaRed							16-18	oval	red	light green with broad, medium green stripes
Exclamation			I		I		17-21	oval	red	medium green with dark green stripes
Crunchy Red					R		16-20	oval	red	light green with broad, medium green stripes
Premont			I		I		15-17	oval to round	red	medium green with green stripes

Continued on next page

F Watermelons

Recommended Varieties - continued

	Reported Disease Resistance ¹						Size (lb)	Shape	Flesh Color	Rind Description
	Fon ² Gen	Fon 0	Fon 1	Fon 2	Co ³	Px ⁴				
Seedless Personal Melon										
Extazy							4-7	globe	red	medium green with dark green stripes
Ladybelle							4-8	globe	red	dark green with thin darker stripes
Solitaire							3-5	globe	red	medium green with dark green stripes
Vanessa							5-7	globe	red	dark green
Edible Pollenizers										
Estrella			I		I		20-24	oblong	red	dark green with broken, light green stripes
Jade Star							13-16	globe	red	dark green
Mickeylee	R				R		8-12	globe	red	light green
Pata Negra							12-15	globe	red	dark green
Premium (micro seeded)							5-7	oval	red	light green with thin dark green strips
Sangria			I		I		20-24	oblong	red	dark green with broken light green stripes
SF 800			I		I		24-28	oblong	red	dark green with broken light green stripes
Stargazer					I		24-26	oblong	red	dark green with broken light green stripes
Inedible Special Pollenizers										
Accomplice		I	I		R					
Ace Plus			I		I					
Pollen Pro	I				I					
Polimax										
Sidekick					R					
SP 6			I	I	I	I				
Wild Card Plus			I		I					

¹Reported disease resistance from source seed companies and University trials. R=Resistance; I=intermediate/partial resistance.

²Fon=Fusarium wilt caused by *Fusarium oxysporum f. sp. niveum* Race 1,2, or 3. Fon Gen=general resistance to Fon; ³Co=Anthracnose caused by *Colletotrichum orbiculare*; ⁴Px=Powery mildew caused by *Podosphaeria xanthii*.

Recommended Nutrients Based on Soil Tests

In addition to using the table below, check the suggestions on rate, timing, and placement of nutrients in your soil test report and the Soil and Nutrient Management chapter. Your state's soil test report recommendations and/or your farm's nutrient management plan supersede recommendations found below.

Watermelons	N (lb/A)	Soil Phosphorus Level				Soil Potassium Level				Nutrient Timing and Method
		Low	Med	High (Opt)	Very High	Low	Med	High (Opt)	Very High	
Non-Irrigated	80-100 ¹	150	100	50	0 ²	200	150	100	0 ²	Total nutrient recommended
	50	150	100	50	0 ²	200	150	100	0 ²	Broadcast and disk-in
	25-50	0	0	0	0	0	0	0	0	Sidedress when vines start to run
Irrigated	125-150 ¹	150	100	50	0 ²	200	150	100	0 ²	Total nutrient recommended
	25-50	150	100	50	0 ²	200	150	100	0 ²	Broadcast and disk-in or follow fertigation schedule for K
	25-50	0	0	0	0	0	0	0	0	Sidedress when vines start to run or follow fertigation schedule
	25-50	0	0	0	0	0	0	0	0	Sidedress after first harvest or follow fertigation schedule

¹For seedless watermelons, high rates of N may increase the risk of hollow heart.

²In VA, crop replacement values of 25 lb/A of P₂O₅ and 50 lb/A of K₂O are recommended on soils testing Very High.

Fertigation Schedule Examples

This table provides examples of fertigation schedules based on two common scenarios – sandy coastal plain soils and heavier upland soils. Modify according to specific soil tests and base fertility.

Fertigation recommendations for 125 lb N and 125 lb K ₂ O ^{1,2}										
For soils with organic matter content less than 2% or coarse texture and low to medium or deficient K										
Preplant (lb/A) ³			Nitrogen			Potash				
			25			50				
Stage and Description			Weeks	Days	N	N	N	K ₂ O	K ₂ O	K ₂ O
			lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage		
1 Early vegetative			1-2	1-14	1	7	14	1	7	14
2 Late vegetative			3-4	15-28	1.5	10.5	21	1.5	10.5	21
3 Flowering and fruiting			5-8	29-56	2	14	56	2	14	56
4 Harvest			9-10	57-70	1.5	10.5	21	1.5	10.5	21
5 Repeat harvest ⁴			11-12	71-84	1	7	14	1	7	14

Fertigation recommendations for 100 lb N and 50 lb K ₂ O ^{1,2}										
For soils with organic matter content greater than 2% or fine texture and high or optimum K										
Preplant (lb/A) ³			Nitrogen			Potash				
			50			50				
Stage and Description			Weeks	Days	N	N	N	K ₂ O	K ₂ O	K ₂ O
			lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage		
1 Early vegetative			1-2	1-14	0.4	2.8	5.6	0.3	2.1	4.2
2 Late vegetative			3-4	15-28	0.9	6.3	12.6	0.6	4.2	8.4
3 Flowering and fruiting			5-8	29-56	1.4	9.8	39.2	0.9	6.3	25.2
4 Harvest			9-10	57-70	0.9	6.3	12.6	0.6	4.2	8.4
5 Repeat harvest ⁴			11-12	71-84	0.4	2.8	5.6	0.3	2.1	4.2

¹Rates are based on 6,222 linear bed ft/A (7 ft bed spacing). If beds are closer or wider, fertilizer rates should be adjusted proportionally. Drive rows should not be used in acreage calculations (see the Fertigation section in the Irrigation Management chapter).

²Base overall application rate on soil test recommendations.

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

⁴For extended harvest after 12 weeks continue fertigation at this rate.

Plant Tissue and Petiole Sap Testing

Plant tissue and petiole sap testing are useful tools for monitoring plant nutrient status, especially for N and K.

Petiole sap: Petiole sap can be tested with a portable meter. When vines are 6 inches long, petiole sap nitrate-N should be 1200-1500 ppm and K 4000-5000 ppm. When fruit are 2 inches long, nitrate-N should be 1000-1200 ppm and K 4000-5000 ppm. When fruit are half mature, nitrate-N should be 800-1000 ppm and K 3500-4000 ppm. At first harvest, nitrate-N should be 600-800 ppm and K 3000-3500 ppm.

Tissue testing: Take the most recent fully expanded leaves at early bloom and follow laboratory instructions. The table below lists nutrient concentrations in leaf tissue at various growth stages, ranging from adequate to toxic.

Timing	Value	N	P	K	Ca	Mg	S	Fe	Mn	Zn	B	Cu
		%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm
When Vines Touch	Deficient	<3.0	0.3	3	1	0.25	0.2	<30	20	20	20	5
	Adequate range	3	0.3	3	1	0.25	0.2	30	20	20	20	5
		4	0.5	4	2	0.5	0.4	100	100	40	40	10
	High	>4.0	0.5	4	2	0.5	0.4	>100	100	40	40	10
	Toxic (>)	-	-	-	-	-	-	-	800	-	-	-
At First Flower	Deficient	<2.5	0.3	2.7	1	0.25	0.2	<30	20	20	20	5
	Adequate range	2.5	0.3	2.7	1	0.25	0.2	30	20	20	20	5
		3.5	0.5	3.5	2	0.5	0.4	100	100	40	40	10
	High	>3.5	0.5	3.5	2	0.5	0.4	>100	100	40	40	10
	Toxic (>)	-	-	-	-	-	-	-	-	-	-	-
At First Fruit	Deficient	<2.0	0.3	2.3	1	0.25	0.2	<30	20	20	20	5
	Adequate range	2	0.3	2.3	1	0.25	0.2	30	20	20	20	5
		3	0.5	3.5	2	0.5	0.4	100	100	40	40	10
	High	>3.0	0.5	3.5	2	0.5	0.4	>100	100	40	40	10
	Toxic (>)	-	-	-	-	-	-	-	-	-	-	-

Seed Treatment

Check if seed has been treated with an insecticide and fungicide. See Disease Control below.

Plant Production

Transplants should be grown in plug trays with cells at least 1.5 inches in diameter and 2 inches deep. Smaller pots or cells will restrict root growth and provide less protection to the transplant. Plant 1 seed per cell. Triploid (seedless) watermelon seeds require a special regime to germinate well. The seed coat tends to adhere to the seedling as it emerges, at times slowing growth or reducing stand. Seeds are of lower vigor than standard diploid types.

Seedless watermelon transplant production can be broken into 6 stages:

1) 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 excess water for 24 h in a heated area so that the media can warm up to 85°F (29°C). This temperature should be maintained during seeding. Make 1 inch deep planting holes and plant seeds with the “pointed” side up. Cover with a small amount of warm moist medium. Do not water after seeding.

2) Initial Germination During germination it is critical that trays are kept at a uniform temperature of 85-90°F (29-32°C) and at high humidity. It may be necessary to move trays around after 24 h (trays on bottom shelves moved to top shelves and vice versa) to ensure even temperature exposure. During this 48 h phase, the root will emerge but the epicotyl (“crook”) that will carry the leaves above the media surface should not be visible. If crooks are visible, trays may have been left in the germination area for too long. In that case, plants may “stretch” during emergence which results in poor transplant quality.

3) Emergence After initial germination, move plants immediately to the greenhouse. If another grower germinates your seeds, schedule pickup or delivery without delays. Greenhouses should be set at 72-75°F (22-24°C) during the day and 65°F (18°C) at night. Do not water until after crook emergence. Thereafter, water sparingly as needed to prevent media and emerging seedlings from drying out. Excess water and too high temperatures during the emergence phase will lead to stretch.

4) Seed Leaf Stage to First True Leaf Maintain greenhouse temperatures in the 72-75°F range during the day and at 65°F at night. Water moderately. Do not fertilize if you are using a medium with starter fertilizer. Plants should grow slowly for highest quality.

5) First True Leaf to Second True Leaf Maintain greenhouse temperatures in the 72-75°F range during the day and at 65°F at night. Once the first true leaf emerges, trays can be fertilized. Generally 2 fertilizations of 100 ppm N, one at first true leaf and one at second true leaf appearance will be sufficient. If a constant feed system is used, set for 50 ppm N for each watering once the first true leaf has emerged. Avoid using fertilizers with large amounts of ammonium as the N source as this can lead to stretch; use fertilizers with calcium nitrate and potassium nitrate instead. Avoid over-watering. These rates are for media that contain starter fertilizer, like the ones listed in the seeding section above. If a medium without starter fertilizer is used, use a different fertilizer program. Using fertilizers with calcium nitrate and potassium nitrate as N sources, apply 50 ppm N every 3 days from emergence to first true leaf, and 200 ppm N every other day from first true leaf to second true leaf.

6) Hardening Off It will take 4-6 weeks from sowing to finish transplants. Prior to transplanting into the field, harden off plants for one week. This is accomplished by lowering day temperatures (if greenhouses have side curtains, roll them up during days if temperatures are not too cool). Reduce watering and stop fertilization. If possible, place plants on wagons or move benches outside during the day and bring them in at night, but make sure the area is sheltered from high winds and avoid days where the temperature is below 60°F (16°C).

Seeded pollenizers and standard seeded watermelon transplant production do not need special germinating conditions and can be done directly in the greenhouse. Time the production so that plants are produced and hardened off at the same time as the seedless types. Grow plants slowly to avoid stretch. Follow the same recommendations as for seedless watermelons from seed leaf stage through hardening off, *i.e.*, stages 4 to 6 above.

Planting and Spacing

Transplants: Transplant container-grown plants through plastic mulch when daily mean temperatures have reached 60°F (16°C). Planting dates vary from May 1 in southern areas 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 VA and normally warmer areas, and May 15 to June 10 in PA and normally cooler areas. Seed 3-5 lb/A of seed.

Recommended Spacing: 6-8 ft between rows with 3-4 ft between plants in the row.

Seedless varieties: see the Pollination and Pollenizers section below for planting recommendations.

Mulching

Watermelons are usually grown on black plastic mulch with drip irrigation (see also the Irrigation Management chapter). Weeds under the plastic are controlled by labeled herbicides (see Weed Control below) or by fumigation. Fumigation is also used to control soil borne diseases such as *Fusarium*. Fumigation is necessary when there is a history of soil-borne diseases in the field (recommendations can be found in the Soil Fumigation section in the Pest Management chapter).

Plastic and fumigant should be applied on well-prepared planting beds 30 days before field planting. Plastic should be 3-4 ft wide and laid on 6-8 ft centers immediately over the fumigated soil. The soil must be moist when laying the plastic. Infra-Red Transmitting (IRT) plastic has been used in cooler areas for additional soil heating. Fertilizer must be applied during bed preparation. At least 50% of the N should be in the nitrate form. Direct seeding through the mulch is possible for seeded watermelons but is not generally recommended for seedless varieties

Pollination and Pollenizers

Watermelon fruit set and enlargement is dependent on growth regulators from the pollen grains and from embryos in developing seeds. Inadequate pollination results in triangular-shaped triploid watermelon fruit 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; pollen from a normal or a special diploid pollenizer variety must be present. Field should be **inter-planted** with triploid and pollenizer plants (the pollenizer variety and the seedless variety should **not** be planted in separate but adjacent blocks!). Three methods can be used: 1) Pollenizer plants may be dedicated to every 3rd row, 2) Plant a pollenizer every 3rd or 4th plant in-row with additional spacing for pollenizers, and 3) Plant the pollenizer between every 3rd and 4th plant in-row without changing plant spacing. Co-planted pollenizers are also available and widely used (pollenizer planted in the same cell as seedless in every 3rd or 4th cell). When the latter methods are chosen, the use of a special pollenizer is recommended, as standard diploid varieties planted in-row may decrease yields of closely associated triploid plants. Special pollenizer varieties (see Recommended Varieties table above) 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.

When using pollenizer plants arranged in dedicated rows, it is important to use a marketable pollenizer variety, because up to one-third of the melons produced in the field will be of this variety. The rind pattern and/or shape of the seeded pollenizer fruit should be easily distinguishable from that of the triploid fruit. 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.

Pollen from the diploid pollenizer variety should be available when the female blossoms on the triploid plants are 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 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 the General Production Recommendations chapter. Bee Toxicity ratings are available in the insecticide tables below.

Windbreaks

Use windbreaks as necessary. 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 the earliest plantings for additional protection. Rye is most commonly used, due to its height and rapid growth. Establish windbreaks in the fall, either as a solid planting, or in windbreak 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

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% 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 Post Harvest Considerations

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

Harvested watermelons should be kept at 50-60°F (10-16°C) and a relative humidity of 90% during storage and shipping. Watermelons are not suitable for long storage. At low temperatures, they may develop various chilling injury symptoms and lose quality, and at high temperatures they are susceptible to decay.

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

Commercial melons for distant markets 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, and should not be stored or shipped with fruit that emit substantial amounts of ethylene.

Watermelons are marketed by weight and bin counts: “Large” is 32-35 melons/bin (more than 18 lb/melon), “medium” is 45 melons/bin (14-18 lb/melon) and “small” is 50-60 melons/bin (\leq 14 lb/melon). 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

Hollow heart is an internal crack in the flesh of the melon. Hollow heart is generally more severe in seedless varieties and in crown-set fruit. Inadequate pollen has been shown to be one causal factor. Cold weather during fruit set, poor fruit set and low fruit load, excess nutrients (especially N), and factors producing rapid growth have been reported to impact the severity of hollow heart.

Internal rind necrosis is indicated by the presence of a corky, red-brown layer of tissue on the inside of the rind of affected fruit without extending 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.

Irregular ripening can be a problem in some years and varieties. Watermelons are classified as non-climacteric since they do not ripen significantly after harvest. However, research has shown that watermelon fruit produce a burst of ethylene at the white fruit stage and factors that reduce ethylene at this stage will slow ripening. Watermelon fruit development and ripening also depend 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 K nutrition, or variability in vine health will lead to variability in fruit ripening.

Missshapen 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 the distribution of a minimum of 1,000 pollen over the three lobes of the flower stigma are required to produce a uniformly shaped fruit. In seedless watermelons, poor pollination may lead to undesirable "triangular" fruit.

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

Splitting during handling occurs in fruit under excessive water pressure as a result of excess irrigation or rainfall.

Sunscald occurs when fruit are exposed to direct sunlight, especially on extremely hot days. Under these conditions, rind surfaces can reach temperatures exceeding 140°F (60°C), killing cells and resulting in sunburn spots. Fruit with little or no foliar cover are at most risk. Sunscald 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 sunscald than those with light colored rinds. Sunscald severity is related directly to fertility regime and foliage cover. Proper fertility and soil management promotes adequate vine growth and coverage of fruit. Sunscald 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.

Water soaking 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.

Weed Control

THE LABEL IS THE LAW - See the Pesticide Use Disclaimer on page F 1.

Recommended Herbicides

1. Identify the weeds in each field and select recommended herbicides. More information is available in the "Herbicide Effectiveness on Common Weeds in Vegetables" Table (E-2) in the Pest Management chapter.
2. Minimize herbicide resistance development. Identify the herbicide site mode of action group and follow recommended good management practices. Include non-chemical weed control whenever possible.

Labeled Applications Sites for Watermelon									
Herbicides	WSSA group number	Plastic mulch production					Bare-ground production		
		Soil-Applied		Postemergence			Soil-applied	POST	Post-harvest
		Under Plastic	Row Middles	Over Plastic	Row Middles	Post-Harvest			
Sandea	2	YES	YES		YES		YES		
Curbit	3		YES				YES		
Prowl H2O	3		YES						
Treflan	3		YES						
Sinbar	5	YES	YES				YES		
Prefar	8	YES	YES				YES		
Command	13		YES				YES		
Strategy	3 + 13		YES				YES		
Chateau	14		YES						
Reflex	14	YES	YES		YES		YES		
Dual	15		YES						
Poast	1			YES				YES	
Select	1			YES				YES	
SelectMax	1			YES				YES	
Gramoxone	22				YES	YES			YES

F Watermelons

1. Soil-Applied						
Group	Product Name	Product Rate	Active Ingredient (*=Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
2	Sandea 75DF	0.5 to 1 oz/A	halosulfuron	0.023 to 0.047 lb/A	57	12
<p>-Plasticulture: can be applied in a band under the plastic, immediately before laying the mulch; delay seeding or transplanting for 7 days after application. Plasticulture row middles: apply before or after weed emergence; apply as a shielded application to avoid contact with the crop. If weeds have emerged, use a non-ionic surfactant at 0.25% v/v or include a non-selective herbicide.</p> <p>-Bareground: apply broadcast after seeding but before crop emergence or no sooner than 7 days before transplanting.</p> <p>-Maximum rate for application in seeded or transplanted row is 0.75 oz/A and up to 1 oz/A for row middle application.</p> <p>-Limit movement of treated soil into transplant hole during transplanting.</p> <p>-Suppresses or controls yellow nutsedge and certain broadleaf weeds. Sandea provides both residual and postemergence control of susceptible weed species. Effective postemergence control requires an adjuvant.</p> <p>-Sandea is an ALS inhibiting herbicide and resistant weed populations are common in the region. Do not use Group 2 herbicides repeatedly in the same field. 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.</p> <p>-Maximum number of Sandea applications per year is 2 and do not exceed 2 oz/A during the crop season.</p>						
3	Curbit 3EC	1 to 3 pt/A	ethalfluralin	0.38 to 1.13 lb/A	--	24
<p>-Plasticulture, row middles only: apply as a banded spray after crop emergence or after transplanting. Do not soil incorporate.</p> <p>-Bareground: apply broadcast after direct-seeding but prior to crop emergence; do not use on transplanted melons.</p> <p>-Controls annual grasses and certain annual broadleaf weeds, including carpetweed and pigweed sp.</p> <p>-Use lower rate for coarse-textured soils or soils with low organic matter.</p> <p>-Where overhead irrigation is available, activate Curbit with 0.5 inch of irrigation within 2 days after application; if no irrigation or rainfall occurs within 5 days of application, activity of Curbit can be reduced.</p> <p>-Available as a pre-mix herbicide Strategy. Strategy at 3 pt/A= Curbit at 26 fl oz (0.6 lb ai) and Command at 8 fl oz (0.188 lb ai)</p> <p>-Maximum applications per season: not specified</p>						
3	Prowl H2O 3.8CS	2.1 pt/A	pendimethalin	1 lb/A	35	24
<p>-Plasticulture: row middles only: apply as a banded spray before seeded crop has emerged or before transplanting.</p> <p>-Bareground: apply with shielded sprayer band between rows, leaving 6 inches of untreated area on both sides of the seeded or transplanted row. Apply before seeded crop emerges or before transplanting.</p> <p>-Where overhead irrigation is available, activate Prowl with 0.5 inch of rainfall or sprinkler irrigation within 48 hr of application; if no irrigation or rainfall occurs within 5 days of application, activity of Prowl can be reduced</p> <p>-A second application at the same rate may be applied to row middles as a banded spray postemergence a minimum of 21 days after the first application, but before the vines begin to run. Do not apply over the top of the crop, or severe injury may occur.</p> <p>-Maximum number of Prowl H2O applications per season is 2 and do not exceed 4.2 pt/A during the crop season.</p>						
3	Treflan 4EC	1 to 2 pt/A	trifluralin	0.5 to 1 lb/A	60	12
<p>-Plasticulture: row middles only: apply as a directed spray after emergence when plants have reached the 3 to 4 true leaf stage.</p> <p>-Not labeled for bareground production. Primarily controls annual grasses with a few broadleaf weeds.</p> <p>-Do not use (or reduce the rate) when cold, wet soil conditions are expected, or crop injury may result.</p> <p>-Maximum applications per season: not specified.</p>						
3 + 13	Strategy 2.1SC	1.5 to 6 pt/A	ethalfluralin plus clomazone	0.39 to 1.58 lb/A	45	24
<p>-Plasticulture: row middles application. Bareground: apply broadcast just before planting or after planting but before crop emergence.</p> <p>-Strategy is a prepackage mixture of Curbit 3EC and Command 3ME. Do not apply prior to planting crop. Do not soil incorporate.</p> <p>-Refer to individual products for comments.Maximum applications per season: not specified.</p>						
5	Sinbar 80WDG	2 to 4 oz/A	terbacil	0.1 to 0.2 lb/A	70	12
<p>-Plasticulture: can be applied in a band under the plastic, immediately before laying the mulch. Sinbar can be broadcast over the plastic before transplanting or before holes are made in the plastic; but must be washed off with a minimum of 0.5 inches for rainfall or irrigation before transplanting. Plasticulture row middles: apply before or after weed emergence; apply as a shielded application to avoid contact with the crop. If weeds have emerged include a non-selective herbicide.</p> <p>-Bareground: apply broadcast after seeding but before crop emergence.</p> <p>-Do not apply over the top of the crop or allow spray to contact crop foliage, or injury may result.</p> <p>-Controls many annual broadleaf weeds, but may be weak on pigweed species. 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.</p> <p>-Maximum number of Sinbar applications per year is 2 and do not exceed 4 oz/A during the crop season</p>						
8	Prefar 4E	5 to 6 qt/A	bensulide	5 to 6 lb/A	--	12
<p>-Plasticulture: under plastic: apply in a band under the plastic, immediately before laying the mulch. Plasticulture: row middles application is labeled. Bareground: apply preemergence or preplant incorporated. Preemergence applications should be followed by irrigation within 36 hrs (apply enough water to wet the soil at least 2 to 4 inches deep). Preplant incorporated applications should be incorporated 1 to 2 inches deep (deeper than 2 inches will result in reduced weed control).</p> <p>-Prefar provides control/suppression of some annual grass weeds and some broadleaves including pigweeds, purslane, and lambsquarters.</p> <p>-Maximum applications per season: not specified.</p>						

Soil Applied continued on next page

Soil Applied - continued.

13	Command 3ME	6,4 to 10.7 fl oz/A	clomazone	0.15 to 0.25 lb/A	--	12
<p>-Plasticulture: row middles application only.</p> <p>-Bareground: apply broadcast just before planting or after planting but before crop emergence.</p> <p>-Use the lower rate when used on coarse-textured soils low in organic matter, when weed pressure is light, or to minimize herbicide carryover that could affect subsequent crops.</p> <p>-Controls annual grasses and many broadleaf weeds including common lambsquarters, velvetleaf, spurred anoda, and jimsonweed. Carpetweed, morningglory sp., pigweed sp., and yellow nutsedge will not be controlled. Higher rates will improve control (or expand number of species controlled) such as common cocklebur, common ragweed, or jimsonweed (refer to label for specific weeds and rates).</p> <p>-WARNING: Command spray or vapor drift may injure sensitive crops and other vegetation up to several hundred yards from the point of application (refer to label for restrictions).</p> <p>-Available as a pre-mix herbicide Strategy: Strategy at 3 pt/A= Command at 8 fl oz (0.188 lb ai) and Curbit at 26 fl oz (0.6 lb ai)</p> <p>-Maximum number of Command applications per year is 1.</p>						
14	Chateau 51WDG	up to 4 oz/A	flumioxazin	0.13 lb/A	--	12
<p>-A Special Local-Needs Label 24(c) has been approved for the use of Chateau SW to control weeds in watermelon in DE only. This label is administered through the DE Fruit/Vegetable Association and requires a signed authorization and waiver of liability.</p> <p>-Plasticulture: apply to row middles only; with raised plastic-mulched beds that are at least 4 inches higher than the treated row middle and the mulched bed must be a minimum of a 24-inch bed width. Spray must remain between raised beds and contact no more than the bottom 1 inch of the side of the raised bed.</p> <p>-Do not apply after crops are transplanted/seeded.</p> <p>-All applications must be made with shielded or hooded equipment.</p> <p>-For control of emerged weeds, a non-selective herbicide may be tank-mixed. Tank-mixtures with labeled residual grass herbicides are allowed.</p> <p>-Maximum use of Chateau during any single application: 4 oz/A.</p>						
14	Reflex 2SL	10 to 16 fl oz/A	fomesafen	0.16 to 0.25 lb/A	35	24
<p>-A Special Local-Needs Label 24(c) has been approved for the use of Reflex 2SL to control weeds in watermelon in DE, MD and VA. The use of this product is legal ONLY if a waiver of liability has been completed (see http://www.farmassist.com/).</p> <p>-Rates vary by state and application method; refer to label to determine correct rates.</p> <p>-Plasticulture: can be applied in a band under the plastic at 10 to 12 fl oz, immediately before laying the mulch.</p> <p>-Plasticulture: Reflex at 10 to 12 fl oz can be broadcast over the plastic before transplanting or before holes are made in the plastic; but must be washed off with a minimum of 0.5 inches for rainfall or irrigation before transplanting.</p> <p>-Plasticulture row middles: before emergence of seeded crop or before transplanting; apply up to 12 fl oz in VA or up to 16 fl oz in DE and MD.</p> <p>-Plasticulture row middles with shielded/hood sprayers after transplanting; apply 16 to 24 fl oz in DE and MD prior to vines "running" off the plastic. Severe crop injury can occur if spray comes in contact with crop foliage.</p> <p>-Bareground direct-seeded: apply broadcast within 24 hrs after seeding followed by 0.2 to 0.5 inch of overhead irrigation at least 36 hrs before watermelon crack the soil surface</p> <p>-Bareground transplants: apply as broadcast spray followed by irrigation of 0.2 to 0.5 inches. Then prepare holes and transplant; avoid moving herbicide-treated soil into transplant holes.</p> <p>-Reflex provides both residual and postemergence control of susceptible weed species. Effective postemergence control requires an adjuvant.</p> <p>-Watermelon varieties may vary in their response to Reflex. Treat small acreages first to determine crop tolerance, especially when applying to a new variety.</p> <p>-Consider rotational crops when applying fomesafen. Rotational restrictions are dependent on whether fomesafen was applied under the plastic, bare ground, or over plastic mulch, refer to 24(c) label for specifics.</p> <p>-Consider rotational crops when applying fomesafen. If crop is replanted do not re-apply Reflex. Rotational restrictions are dependent on whether fomesafen was applied under the plastic, bare ground, or over plastic mulch, refer to 24(c) label for specifics.</p> <p>-Maximum for Reflex application in DE, MD, and VA: 24 fl oz/A IN ALTERNATE YEARS</p>						
15	Dual Magnum 7.62E	0.67 to 1.27 pt/A	s-metolachlor	0.64 to 1.21 lb/A	60	24
<p>-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 watermelon in DE. The use of this product is legal ONLY if a waiver of liability is completed (see http://www.farmassist.com/).</p> <p>-Plasticulture: row middle application only.</p> <p>-Do not apply Dual Magnum to the plastic mulch, or allow the spray to contact watermelon foliage.</p> <p>-Do not soil incorporate.</p> <p>-Suppresses or controls annual grasses, yellow nutsedge, and certain annual broadleaf weeds including nightshade species.</p> <p>-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.</p> <p>-Maximum number of Dual Magnum applications per year is one and do not exceed 1.27 pt/A during the crop season.</p>						

F Watermelons

2. Postemergence						
Group	Product Name	Product Rate	Active Ingredient (* = Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
1	Select 2EC	6 to 8 fl oz/A	clethodim	0.094 to 0.13 lb/A	14	24
	Select Max 0.97EC	12 to 16 fl oz/A				
	Poast 1.5EC	1 to 1.5 pt/A	sethoxydim	0.19 to 0.28 lb/A	14	12
<p>-Postemergence as broadcast spray with both plasticulture and bareground</p> <p>-Select 2EC: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution). Select Max: use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution). Poast: Apply with COC at 1.0% v/v. The use of COC 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.</p> <p>-Use lower labeled rates for annual grass control and higher labeled rates for perennial grass control. Yellow nutsedge, wild onion, wild garlic, and broadleaf weeds will not be controlled. Controls many annual and certain perennial grasses, including annual bluegrass, but will not consistently control goosegrass. Control may be reduced if grasses are large or under hot or dry weather conditions.</p> <p>-If repeat applications are necessary, allow 14 days between applications.</p> <p>-Do not tank-mix with or apply within 2 to 3 days of any other pesticide - unless labeled - as this may increase the risk of crop injury or reduce the control of grasses. Rainfastness is 1 hr.</p> <p>-Do not apply more than 8 fl oz of Select 2EC in a single application and do not exceed 32 fl oz/A for the season; do not apply more than 16 fl oz of Select Max in a single application and do not exceed 64 fl oz/A for the season.</p> <p>-Do not apply more than 1.5 pt/A Poast in single application and do not exceed 3 pt/A for the season.</p>						
14	Reflex 2SL	10 to 16 fl oz/A	fomesafen	0.16 to 0.25 lb/A	35	24
<p>-A Special Local-Needs Label 24(c) has been approved for the use of Reflex 2SL to control weeds in watermelon in DE, MD and VA. The use of this product is legal ONLY if a waiver of liability has been completed (see http://www.farmassist.com/).</p> <p>-Rates vary by state and application method; refer to label to determine correct rates.</p> <p>-See soil applied section for application prior to planting or transplanting.</p> <p>-Plasticulture row middles: before emergence of seeded crop or before transplanting; apply up to 12 fl oz in VA or up to 16 fl oz in DE and MD. Plasticulture row middles with shielded/hood sprayers after transplanting; apply 16 to 24 fl oz in DE and MD prior to vines "running" off the plastic. Severe crop injury can occur if spray comes in contact with crop foliage.</p> <p>-Foliar application of Reflex will severely damage or kill watermelon.</p> <p>-Watermelon varieties may vary in their response to Reflex. Treat small acreages first to determine crop tolerance, especially when applying to a new variety.</p> <p>-Reflex provides both residual and postemergence control of susceptible weed species. Effective postemergence control requires an adjuvant. Consider rotational crops when applying fomesafen. Rotational restrictions are dependent on whether fomesafen was applied under the plastic, bare ground, or over plastic mulch, refer to 24(c) label for specifics.</p> <p>-Consider rotational crops when applying fomesafen. If crop is replanted do not re-apply Reflex. Rotational restrictions are dependent on whether fomesafen was applied under the plastic, bare ground, or over plastic mulch, refer to 24(c) label for specifics.</p> <p>-Maximum for Reflex application in DE, MD, and VA: 24 fl oz/A IN ALTERNATE YEARS</p>						
22	Gramoxone SL 2.0	1.95 pt/A	paraquat *	0.49 lb/A	14	24
<p>-A Supplemental Label has been approved for the use of Gramoxone 2SL for postemergence weed control in DE, MD, NJ, PA, and VA. Row middles as a shielded application. Apply as a directed spray in a minimum of 20 gal spray mix/A to control emerged weeds between the rows after crop establishment. Include a nonionic surfactant at 0.25% v/v. Use shields or hoods to prevent spray contact with the crop and low spray pressure (maximum of 30 psi) to reduce small droplets that are prone to drift. See the label for additional information and warnings. Rainfastness is 30 minutes. A maximum of 3 applications per year are allowed.</p>						

3. Postharvest						
Group	Product Name	Product Rate	Active Ingredient (* = Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
22	Gramoxone SL 2.0	2.25 to 3 pt/A	paraquat*	0.56 to 0.75 lb/A	--	24
<p>-For postharvest desiccation of vegetable vines. A Special Local-Needs 24(c) label has been approved for the use of Gramoxone SL 2.0 for postharvest desiccation of the crop in DE, NJ and VA.</p> <p>-Apply after the last harvest for bareground or plasticulture. Always include an adjuvant.</p> <p>-Spray coverage is essential for optimum effectiveness. See the label for additional information and warnings.</p> <p>-Rainfastness 30 minutes. A maximum of 2 applications for crop dessication are allowed.</p>						

4. Other Labeled Herbicides These products are labeled but limited local data is available; and/or are labeled but not recommended in our region due to potential crop injury concerns.						
Group	Product Name	Active Ingredient (* = Restricted Use)				
2	League	imazosulfuron				
3	Dacthal	DCPA				
9	Roundup (various)	glyphosate				
14	Aim	carfentrazone				

Insect Control

THE LABEL IS THE LAW - See the Pesticide Use Disclaimer on page F 1.

Recommended Insecticides

Seed Corn Maggots - See also the Pest Management chapter (Insect Management section).

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. The use of neonicotinoid insecticides (Group 4A) at planting may help to reduce seed corn maggot populations.

Aphids **Note: Cultivars that are resistant to multiple aphid-transmitted viruses are available.**

Apply one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*= Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV (melon aphid only)	1.5 to 3.0 pt/A	methomyl*	3	48	H
1A	Vydate 2L	2.0 to 4.0 pt/A	oxamyl*	1	48	H
1B	Dimethoate 400	0.5 to 1.0 pt/A	dimethoate*	3	48	H
3A+4A	Endigo ZC	4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 6	Gladiator	19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
4A	Admire Pro 4.6SC	7.0 to 10.5 fl oz/A	imidacloprid - soil only	21	12	H
4A	Assail 30SG	2.5 to 4.0 oz/A	acetamiprid	0	12	M
4A	Belay 2.13SC	9.0 to 12.0 fl oz/A	clothianidin - soil	21	12	H
4A	Belay 2.13SC	3.0 to 4.0 fl oz/A	clothianidin - foliar	7	12	H
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam - soil/drip	30	12	H
4A	Actara 25WDG	1.5 to 3.0 oz/A	thiamethoxam - foliar	0	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - soil	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - foliar	1	12	H
4A	Venom 70SG	5.0 to 6.0 oz/A	dinotefuran - soil	21	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - foliar	1	12	H
4A +28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - soil	30	12	H
4A +28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - foliar	1	12	H
4D	Sivanto 200SL	21.0 to 28.0 fl oz/A	flupyradifurone	21	4	M
9B	Fulfill 50WP	2.75 oz/A	pymetrozine	0	12	L
9C	Beleaf 50SG	2.0 to 2.8 oz/A	flonicamid	0	12	L
28 + 6	Minecto Pro	10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Beet Armyworms

Apply one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*= Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
3A + 6	Gladiator	19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	1	24	H
5	Radiant 1SC	5.0 to 10.0 fl oz/A	spinetoram	3	4	H
5	Entrust 2SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	3	4	M
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	3	4	L
22A	Avaunt 30WDG	3.5 to 6.0 oz/A	indoxacarb	3	12	H
28	Coragen 1.67SC	3.5 to 5.0 fl oz/A	chlorantraniliprole - soil/drip/foliar	1	4	L
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Cabbage Loopers

Apply one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*= Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
3A	Baythroid XL 1EC	1.6 to 2.4 fl oz/A	beta-cyfluthrin*	0	12	H
3A	Asana XL	5.8 to 9.6 fl oz/A	esfenvalerate*	3	12	H

Cabbage Loopers continued on next page.

F Watermelons

Cabbage Loopers continued

3A	Bifenture 2EC, Sniper	2.6 to 6.4 fl oz/A	bifenthrin*	3	12	H
3A	Danitol 2.4EC	10.67 to 16.00 fl oz/A	fenpropathrin*	7	24	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	3	12	H
3A	Lambda-Cy, LambdaT	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	1	24	H
3A	Mustang Maxx	2.8 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Perm-Up 3.2 EC	4.0 to 8.0 fl oz/A	permethrin*	0	12	H
3A	Tombstone 2EC	1.6 to 2.4 fl oz/A	cyfluthrin*	0	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	1	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 6	Gladiator	14.0 to 19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	1	24	H
4A + 28	Voliam flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - foliar	1	12	H
5	Entrust 2SC	4.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant 1SC	5.0 to 10.0 fl oz/A	spinetoram	3	4	H
11A	Dipel	0.5 to 2.0 lb/A	<i>Bacillus thuringiensis kurstaki</i>	0	4	N
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	3	4	L
22A	Avaunt 30WDG	2.5 to 6.0 oz/A	indoxacarb	3	12	H
28	Coragen 1.67SC	3.5 to 5.0 fl oz/A	chlorantraniliprole - soil/drip/foiar	1	4	L
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Cucumber Beetles

Watermelons are resistant to bacterial wilt; however, control may be needed to prevent feeding damage to seedlings. Seeds pretreated with a neonicotinoid seed treatment such Farmore DI-400 should provide up to 21 days of control of cucumber beetle..Otherwise, treat when an average of 2 beetles per plant is found.

Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
1A	Sevin XLR Plus	1.0 qt/A	carbaryl	3	12	H
3A	Baythroid XL	2.4 to 2.8 fl oz/A	beta-cyfluthrin*	0	12	H
3A	Asana XL	5.8 to 9.6 fl oz/A	esfenvalerate*	3	12	H
3A	Bifenture 2EC, Sniper	2.6 to 6.4 fl oz/A	bifenthrin*	3	12	H
3A	Danitol 2.4EC	10.67 to 16.0 fl oz/A	fenpropathrin*	7	24	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	3	12	H
3A	Lambda-Cy	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	1	24	H
3A	LambdaT	4.0 to 4.5 fl oz/A	lambda-cyhalothrin*	1	24	H
3A	Mustang Maxx	2.8 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Perm-Up 3.2 EC	4.0 to 8.0 fl oz/A	permethrin*	0	12	H
3A	Tombstone	2.4 to 2.8 fl oz/A	cyfluthrin*	0	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	1	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 6	Gladiator	14.0 to 19.0 fl oz/A	zetacypermethrin* + avermectin B1	7	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	1	24	H
4A	Admire PRO	7.0 to 10.5 fl oz/A	imidacloprid - soil	21	12	H
4A	Assail 30SG	2.5 to 5.3 oz/A	acetamiprid	0	12	M
4A	Belay 2.13SC	9.0 to 12.0 fl oz/A	clothianidin - soil	21	12	H
4A	Belay 2.13SC	3.0 to 4.0 fl oz/A	clothianidin - foliar	7	12	H
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam - soil	30	12	H
4A	Actara 25WDG	3.0 to 5.5 oz/A	thiamethoxam - foliar	0	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - soil	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - foliar	1	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - foliar	1	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole - soil	30	12	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - foliar	1	12	H

Cutworms - See also the Pest Management chapter, Insect Management section.

Apply one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV (variegated cutworm)	1.5 pt/A	methomyl*	3	48	H
1A	Lannate LV (granulate cutworm)	1.5 to 3.0 pt/A	methomyl*	3	48	H
3A	Baythroid XL	0.8 to 1.6 fl oz/A	beta-cyfluthrin*	0	12	H
3A	Asana XL	5.8 to 9.6 fl oz/A	esfenvalerate*	3	12	H
3A	Bifenture 2EC, Sniper	2.6 to 6.4 fl oz/A	bifenthrin*	3	12	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	3	12	H
3A	Lambda-Cy, LambdaT	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	1	24	H
3A	Mustang Maxx	1.28 to 4.00 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Perm-Up 3.2 EC	4.0 to 8.0 fl oz/A	permethrin*	0	12	H
3A	Tombstone	0.8 to 1.6 fl oz/A	cyfluthrin*	0	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	1	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 6	Gladiator	19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin*+chlorantraniliprole	1	24	H

Leafminers

Apply one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Vydate 2L	2.0 to 4.0 pt/A	oxamyl*	1	48	H
1B	Dimethoate 400	1.0 pt/A	dimethoate*	3	48	H
3A + 4A	Endigo ZC	4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 6	Gladiator	19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
3A + 28	Voliam Xpress	9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	1	24	H
4A	Belay 2.13SC	9.0 to 12.0 fl oz/A	clothianidin - soil	21	12	H
4A	Platinum 75SG	1.66 to 3.67 oz/A	thiamethoxam- soil/drip	30	12	H
4A	Actara 25 WDG	3.0 to 5.5 oz/A	thiamethoxam - foliar	0	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran- soil	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - foliar	1	12	H
4A	Venom 70S G	5.0 to 6.0 oz/A	dinotefuran- soil	21	12	H
4A	Venom 70S G	1.0 to 4.0 oz/A	dinotefuran - foliar	1	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole- soil	30	12	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - foliar	1	12	H
5	Entrust 2SC (OMRI)	6.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant 1SC	6.0 to 10.0 fl oz/A	spinetoram	3	4	H
6	Agri-Mek 0.7 SC	1.75 to 3.5 fl oz/A	abamectin*	7	12	H
17	Trigard 75WSP	2.66 oz/A	cyromazine	0	12	L
28	Coragen 1.67SC	5.0 to 7.5 fl oz/A	chlorantraniliprole- soil/drip	1	4	L
28	Coragen 1.67SC	5.0 to 7.0 fl oz/A	chlorantraniliprole - foliar	1	4	L
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Mites Mite infestations generally begin around field margins and grassy areas. **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 10-15 % of the crown leaves are infested early in the season, or when 50% of the terminal leaves are infested later in the season. Note: Continuous use of Sevin, or the pyrethroids may result in mite outbreaks.

Apply one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
3A + 6	Gladiator	19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
6	Agri-Mek 0.7 SC	1.75 to 3.5 fl oz/A	abamectin*	7	12	H
10B	Zeal Miticide1	2.0 to 3.0 oz/A	etoxazole	7	12	L
20D	Acramite 50WS	0.75 to 1.00 lb/A	bifenazate	3	12	M
21A	Portal	2.0 pt/A	fenpyroximate	3	12	L
23	Oberon 2SC	7.0 to 8.5 fl oz/A	spiromesifen	7	12	M
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Melonworms, Pickleworms

If foliar materials are used, make one treatment prior to fruit set, and then treat weekly. If soil or drip applications are used, check the label for instructions on treatment frequency.						
Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Lannate LV	1.5 to 3.0 pt/A	methomyl*	3	48	H
1A	Sevin XLR	0.5 to 1.0 qt/A	carbaryl	3	12	H
3A	Baythroid XL 1EC	1.6 to 2.4 fl oz/A	beta-cyfluthrin*	0	12	H
3A	Asana XL (pickleworm)	5.8 to 9.6 fl oz/A	esfenvalerate*	3	12	H
3A	Bifenture 2EC, Sniper	2.6 to 6.4 fl oz/A	bifenthrin*	3	12	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	3	12	H
3A	Lambda-Cy, LambdaT	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	1	24	H
3A	Mustang Maxx	2.8 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Perm-Up 3.2 EC	4.0 to 8.0 fl oz/A	permethrin*	0	12	H
3A	Tombstone 2EC	1.6 to 2.4 fl oz/A	cyfluthrin*	0	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	1	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 6	Gladiator	14.0 to 19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	1	24	H
4A	Assail 30SG	2.5 to 5.3 oz/A	acetamiprid	0	12	M
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam+chlorantraniliprole - soil	30	12	H
4A + 28	Voliam flexi	4.0 to 7.0 oz/A	thiamethoxam+chlorantraniliprole - foliar	1	12	H
5	Entrust 2SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant 1SC	5.0 to 10.0 fl oz/A	spinetoram	3	4	H
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	3	4	L
22A	Avaunt 30WDG	2.5 to 6.0 oz/A	indoxacarb	3	12	H
28	Coragen 1.67SC (melonworm)	2.0 to 3.5 fl oz/A	chlorantraniliprole - drip/foliar	1	4	L
28	Coragen 1.67SC (pickleworm)	3.5 to 7.5 fl oz/A	chlorantraniliprole - foliar	1	4	L
28 + 6	Minecto Pro	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin*	7	12	H

Rindworms

Damage to the rinds may result from a complex of insect pests including cucumber beetle, wireworms, and a number of “worm” species, (beet armyworm, etc). Management of adult cucumber beetles early in the season may help reduce damage. See cucumber beetle section for labeled products.

For Lepidopteran rindworms, use one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
3A	Baythroid XL 1EC	1.6 to 2.4 fl oz/A	beta-cyfluthrin*	0	12	H
3A	Asana XL	5.8 to 9.6 fl oz/A	esfenvalerate*	3	12	H
3A	Bifenture 2EC, Sniper	2.6 to 6.4 fl oz/A	bifenthrin*	3	12	H
3A	Hero EC	4.0 to 10.3 fl oz/A	zeta-cypermethrin* + bifenthrin*	3	12	H
3A	Lambda-Cy, LambdaT	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	1	24	H
3A	Mustang Maxx	2.8 to 4.0 fl oz/A	zeta-cypermethrin*	1	12	H
3A	Perm-Up 3.2EC	4.0 to 8.0 fl oz/A	permethrin*	0	12	H
3A	Tombstone 2EC	1.6 to 2.4 fl oz/A	cyfluthrin*	0	12	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	1	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 6	Gladiator	14.0 to 19.0 fl oz/A	zeta-cypermethrin* + avermectin B1	7	12	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	1	24	H
4A + 28	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole - foliar	1	12	H
5	Entrust 2SC	4.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant 1SC	5.0 to 10.0 fl oz/A	spinetoram	3	4	H
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	3	4	L

Thrips

Apply one of the following formulations:						
Group	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Vydate2 L	2.0 to 4.0 pt/A	oxamyl*	1	48	H
3A	Lambda-Cy, LambdaT	2.56 to 3.84 fl oz/A	lambda-cyhalothrin*	1	24	H
3A	Warrior II	1.28 to 1.92 fl oz/A	lambda-cyhalothrin*	1	24	H
3A + 4A	Endigo ZC	4.0 to 4.5 fl oz/A	lambda-cyhalothrin* + thiamethoxam	1	24	H
3A + 28	Voliam Xpress	6.0 to 9.0 fl oz/A	lambda-cyhalothrin* + chlorantraniliprole	1	24	H
4A	Admire PRO 4.6SC	7.0 to 10.5 fl oz/A	imidacloprid- soil	21	12	H
4A	Belay 2.13SC	9.0 to 12.0 fl oz/A	clothianidin- soil	21	12	H
4A	Platinum 75SG	1.66 to 3.67 oz/	thiamethoxam- soil/drip	30	12	H
4A	Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran- soil	21	12	H
4A	Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran- foliar	7	12	H
4A	Venom 70SG	5.0 to 6.0 oz/A	dinotefuran- soil	21	12	H
4A	Venom 70SG	1.0 to 4.0 oz/A	dinotefuran- foliar	7	12	H
4A + 28	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole- soil	30	12	H
5	Entrust 2SC (OMRI)	6.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant 1SC	6.0 to 10.0 fl oz/A	spinetoram	3	4	H

Disease Control

THE LABEL IS THE LAW - See the Pesticide Use Disclaimer on page F 1.

Recommended Fungicides

Nematodes - See also the Nematodes and Soil Fumigation sections in the Pest Management chapter.

Use fumigants listed under Soil Fumigation in the Pest Management chapter, or apply one of the following:

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
1A	Vydate L	0.5 to 1.0 gal/A Incorporate into top 2-4 inches of soil, <i>OR</i> .2.0 to 4.0 pt/A apply 2 w after planting and repeat 2-3 w later.	oxamyl*	1	48	H
7	Velum Prime	6.5 to 6.84 fl oz/A	fluopyram	0	12	--
--	Nimitz 4EC	3.5 to 5.0 pt/A Incorporate or drip-apply 7 d before planting.	fluensulfone	n/a	12	N

Seed Treatment

Check with your seed company if seed has been treated with an insecticide and fungicide. For untreated seed, use a mixture of thiram (4.5 fl oz 480DP/100 lb) and an approved commercially available insecticide.

Damping-off caused by *Phytophthora*, *Pythium*, and *Rhizoctonia*

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply one of the following at-planting (see label for application timing, methods, and restrictions):						
Phytophthora and Pythium root rot:						
4	Ridomil Gold 4SL	0.5 to 1.0 pt/A	mefenoxam	AP	48	N
4	Ultra Flourish 2E	2.0 to 4.0 pt/A	mefenoxam	AP	48	N
4	MetaStar 2EAG	4.0 to 8.0 pt/A	metalaxyl	AP	48	N
Phytophthora, Pythium, and Rhizoctonia root rot:						
4 + 11	Uniform 3.66SE	0.34 fl oz/1000 ft row. Avoid direct seed contact, which may cause delayed emergence.	mefenoxam + azoxystrobin	AP	0	N
Rhizoctonia root rot only:						
11	azoxystrobin 2.08F	0.40 to 0.80 fl oz/1000 ft row	azoxystrobin	AP	4	N
Pythium root rot only:						
28	Previcur Flex 6F	1.2 pt/A in transplant water, drip irrigation, or direct spray at base of plant and soil	Propamocarb HCL	2	12	N

Bacterial and Fungal Diseases**Alternaria Leaf Blight**

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Begin sprays when vines begin to run. ALTERNATE one of the following:						
M3	mancozeb 75DF	2.0 to 3.0 lb/A	mancozeb	5	12,24	N
M5	chlorothalonil 6F	2.0 to 3.0 pt/A ¹	chlorothalonil	0	12	L
WITH A TANK MIX of one of the following fungicides PLUS chlorothalonil 6F 2.0 to 3.0 pt/A every 14 days						
3 + 9	Inspire Super 2.8F	16.0 to 20.0 fl oz/A	difenoconazole + cyprodonil	0	12	--
3 + 11	TopGuard EQ ²	5.0 to 8.0 fl oz/A	azoxystrobin + flutriafol	1	12	--
3 + 11	Quadris Top 2.7F ²	12.0 to 14.0 fl oz/A	difenoconazole + azoxystrobin	0	12	--
7 + 3	Aprovia Top	10.5 to 13.5 fl oz/A	benzovindiflupyr + difenoconazole	0	12	N
7 + 11	Luna Sensation 4.25SC ²	7.6 fl oz/A	fluopyram + trifloxystrobin	0	12	--
7 + 11	Pristine 38W ²	12.5 to 18.5 oz/A (no tank mix)	pyraclostrobin + boscalid	0	12	--
7 + 11	Merivon ²	4 to 5.5 fl oz/A	fluxapyroxad + pyraclostrobin	0	12	N
11	azoxystrobin 2.08F ²	11.0 to 15.5 fl oz/A ³	azoxystrobin	0	4	N
11	Cabrio 20EG ²	12.0 to 16.0 oz/A	pyraclostrobin	0	12	N
11	Reason 500SC ²	5.5 fl oz/A	fenamidone	14	12	--

¹Low rate early in the season. ²Do not use if resistance to FRAC code 11 fungicides exists in the area. ³Do not apply near apples, see label.

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

Anthracnose Excellent resistance is available in some varieties and those should be used when possible. Begin fungicide applications when vines run or earlier if symptoms are detected. **If resistance to FRAC code 11 (strobilurin) fungicides has been detected in the area, do not use Quadris, Quadris Top, Tanos or Cabrio.**

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Under LIGHT or MODERATE disease pressure, ALTERNATE:						
M5	chlorothalonil 6F	2.0 to 3.0 pt/A (low rate early in the season)	chlorothalonil	0	12	L
WITH a TANK MIX the following fungicide PLUS mancozeb 80 DF 2.0 to 3.0 lb/A OR chlorothalonil 6F 2.0 to 3.0 pt/A:						
1	thiophanate-methyl 70WP	0.5 lb/A	thiophanate-methyl	1	12	N
Under HIGH disease pressure, TANK-MIX one of the following fungicides WITH chlorothalonil 6F 2.0 to 3.0 pt/A:						
3 + 11	Quadris Top 2.7F	12.0 to 14.0 fl oz/A	difenoconazole + azoxystrobin	0	12	--
3 + 11	TopGuard EQ	10.0 to 14.0 fl oz/A	Azoxystrobin + flutriafol	1	12	--
7 + 11	Merivon	5.5 fl oz/A	fluxapyroxad + pyraclostrobin	0	12	N
7 + 11	Pristine 38WG	18.5 oz/A	pyraclostrobin + boscalid	0	12	--
11	azoxystrobin 2.08F	11.0 to 15.5 fl oz/A	azoxystrobin	0	4	N
11	Cabrio 20EG	12.0 to 16.0 fl oz/A	pyraclostrobin	0	12	N
AND ROTATE with a TANK MIX of the following fungicide PLUS mancozeb 75DF 2.0 to 3.0 lb/A OR chlorothalonil 6F 2.0 to 3.0 pt/A every 7 days:						
1	thiophanate-methyl 70WP	0.5 lb/A	thiophanate-methyl	1	12	N

Bacterial Fruit Blotch (BFB)

Obtain seed or seedlings that were tested and found to have “no evidence” of the pathogen, which will reduce the risk of BFB development. Practice good sanitation during transplant production. Segregate different seed lots in the transplant house to reduce the chance of cross contamination. Scout seedlings daily, have suspect plants tested and destroy all diseased plants. Use only transplants from houses in which there were no seedling symptoms of BFB. If BFB is detected after transplanting, always work infested fields at the end of the day. Rotate to allow 2 yrs between watermelon plantings and control volunteers during those years.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply one of the following fungicide schedules beginning before the first flower is open and continuing until 3 weeks after flowering. Subsequent fruit sets must also be protected.						
M1	copper, fixed	At labeled rates	copper, fixed	0	see label	N
P1	Actigard 50WG (must apply 1 or 2 weeks prior to flowering to be effective)	0.5 to 1.0 oz/A	acibenzolar-S-methyl	0	12	N

Downy Mildew

Scout fields for disease incidence regularly. Begin targeted sprays when disease occurrence is predicted for the region (check the Cucurbit Downy Mildew Forecasting website at <http://cdm.ipmpipe.org>). **Preventative applications are much more effective than applications made after detection. Materials with different Modes of Action (FRAC codes) should be alternated.** The following are the most effective products.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Sprays should be applied on a 7-day schedule when disease is forecast or present in the region. Under severe disease conditions and conducive weather, spray interval may be reduced IF the label allows.						
TANK-MIX one of these products WITH a protectant fungicide such as chlorothalonil 1.5 to 2.0 pt 6F/A:						
U15+40	Orondis Ultra	5.5 to 8 fl oz/A	oxathiapiprolin + mandipropamid	0	4	--
21	Ranman 400SC (Do not apply with copper; see label for details)	2.10 to 2.75 fl oz/A	cyazofamid	0	12	L
Other materials for use in rotation as tank mix partners with a protectant:						
43	Presidio 4SC	4.0 fl oz/A	fluopicolide	2	12	L
28	Previcur Flex 6F	1.2 pt/A	propamocarb	2	12	N
40 + 45	Zampro 525SC	14.0 fl oz/A	acetochradin + dimethomorph	0	12	--
M3 + 22	Gavel 75DF contains protectant	1.5 to 2.0 lb/A	mancozeb + zoxamide	5	48	--
M5 + 22	Zing! 4.9SC contains protectant	36.0 fl oz/A	chlorothalonil + zoxamide	0	12	N
M5 + 27	Ariston 42SC contains protectant	3.0 pt/A	chlorothalonil + cymoxanil	3	12	--
11 + 27	Tanos 50DF	8.0 oz/A	famoxadone + cymoxanil	3	12	--
27	Curzate 60DF	3.2 oz/A	cymoxanil	3	12	N
40	Forum 4.17SC	6.0 fl oz/A	dimethomorph	0	12	N

Fusarium Wilt

Use a 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 that of resistant *seeded* varieties and race 2 also occurs in our region. Some *pollinizers* have good resistance to Fusarium wilt caused by race 1.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Application of Proline through drip irrigation or as a post-plant drench, may reduce Fusarium wilt early season:						
3	Proline 480 SC	5.7 fl oz /A	prothioconazole	7	12	--

Gummy Stem Blight

Fungicide solo products within the FRAC code 11 (Cabrio, Quadris and Flint) are not recommended in the mid-Atlantic region. Pristine or Luna Sensation, which contain 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-8 in the Pest Management chapter). **When tank-mixing use at least the minimum labeled rate of each fungicide. Do not apply FRAC code 11 fungicides more than 4 times total per season.**

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Begin sprays when vines begin to run. Apply the following under LOW disease pressure:						
M5	chlorothalonil 6F	2.0 to 3.0 pt/A every 7 days	chlorothalonil	0	12	L
Under HIGH disease pressure, ALTERNATE:						
M5	chlorothalonil 6F	2.0 to 3.0 pt/A	chlorothalonil	0	12	L
WITH a TANK-MIX containing chlorothalonil or mancozeb PLUS one of the following fungicides:						
3	Proline 480SC	5.7 fl oz/A	prothioconazole	7	12	--
3	tebuconazole 3.6F ¹	8.0 fl oz/A ¹	tebuconazole	7	12	N
3 + 7	Luna Experience 3.34SC	10.0 to 17.0 fl oz/A	fluopyram + tebuconazole	7	12	--
3 + 9	Inspire Super 2.8F	16.0 to 20.0 fl oz/A	difenoconazole + cyprodonil	0	12	--
3 + 11	Aprovia Top 1.62EC	10.5 to 13.5 fl oz/A	difenoconazole + benzovindiflupyr	0	12	N
7	Fontelis 1.67SC	12.0 to 16.0 fl oz/A	penthiopyrad	1	12	L
7 + 11	Merivon 500SC	5.5 fl oz/A	fluxapyroxad + pyraclostrobin	7	12	N
7 + 11	Pristine 38WG	12.5 to 18.5 oz/A	pyraclostrobin + boscalid	0	12	--
9 + 12	Switch 62.5WG	11.0 to 14.0 oz/A	cyprodonil + fludioxonil	1	12	N

¹Note: reduced sensitivity of the pathogen to tebuconazole 3.6 F has occurred in the Southern U.S.

F Watermelons

Phytophthora Crown and Fruit Rot

Multiple practices should be used to minimize the occurrence of this disease. Grow muskmelons on raised beds and drain fields adequately so that water will not accumulate around the base of the plants. Rotate away from susceptible crops (cucurbits, peppers, lima beans and beans, eggplants and tomatoes) for as long as possible. Apply preplant fumigants to suppress disease. Watermelon should be grown on raised beds and fields should be adequately drained to ensure water does not accumulate around the base of the plants. When the vines begin to run, subsoil between rows to allow for faster drainage following rainfall.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply one of the following fungicides and tank mix with fixed copper at labeled rates when conditions favor disease development (for suppression only). Materials with different modes of action (FRAC codes) should always be alternated to reduce the chances for fungicide resistance development:						
U15+40	Orondis Ultra	5.5 tp 8.0 fl oz/A	oxathiapiprolin + mandipropamid	0	4	--
40	Revus 2.08F	8.0 fl oz/A	mandipropamid	0	4	--
40 + 45	Zampro 525SC	14.0 fl oz/A	acetoxtradin + dimethomorph	0	12	--
43	Presidio 4SC ¹	4.0 fl oz/A	fluopicolide	2	12	L
M3 + 22	Gavel 75DF	1.5 to 2.0 lb/A	macozeb + zoxamide (note: some cultivars are sensitive to mancozeb)	5	48	--
11 + 27	Tanos 50DF	8.0 to 10.0 oz/A	famoxadone + cymoxanil	3	12	--
21	Ranman 400SC	2.75 fl oz/A (Do not apply with copper, see label for additional precautions)	cyazofamid	0	12	L
40	Forum 4.17SC	6.0 fl oz/A	dimethomorph	0	12	N

¹Presidio may also be applied through the drip irrigation (see supplemental label). Soil drench followed by drip application has given good results in some trials on crown rot caused by *Phytophthora capsici*.

Powdery mildew

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 the upper surface of young, fully expanded leaves, and then inspect the corresponding lower 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. **Materials with different modes of action (FRAC codes) should always be alternated.**

Powdery mildew generally occurs from mid-July until the end of the season. Observe fields for its presence. If 1 lesion is found on the underside of 45 old leaves per acre, begin the following fungicide program:

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
TANK MIX one of these products with a protectant such as chlorothalonil 6F 2.0 to 3.0 pt/A:						
U6	Torino 0.85SC	3.4 fl oz/A	cyflufenamid	0	4	--
U8	Vivando 2.5SC	15.4 fl oz/A	metrafenone	0	12	--
13	Quintec 2.08SC	6.0 fl oz/A	quinoxifen	3	12	--
3 + 7	Luna Experience 3.34SC	10.0 to 17.0 fl oz/A	fluopyram + tebuconazole	7	12	--
7 + 11	Luna Sensation 4.25SC	7.6 fl oz/A	fluopyram + trifloxystrobin	0	12	--
AND ALTERNATE with a TANK MIX of one of the following and a protectant such as chlorothalonil 6F 2.0 to 3.0 pt/A:						
3	Proline 480SC	5.7 fl oz/A	prothioconazole	7	12	--
3	Procare 480SC	4.0 to 8.0 fl oz/A	triflumizole	0	12	N
3	Rally 40WSP	5.0 oz/A	myclobutanil	0	24	N
3	tebuconazole 3.6F	4.0 to 6.0 fl oz/A	tebuconazole	7	12	N
7	Fontelis 1.67 SC	12.0 to 16.0 fl oz/A	penthiopyrad	1	12	L
3 + 11	Aprovia Top 1.62EC	10.5 to 13.5 fl oz/A	difenoconazole + benzovindiflupyr	0	12	N

Viruses (WMV2, PRSV, ZYMV, and CMV)

The most prevalent virus in the mid-Atlantic region is WMV2 followed by 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.

For Immediate Medical Attention

Call 911

**For a Pesticide Exposure Poisoning
Emergency Call**



For All States

This number will automatically connect you to the poison center nearest you.

Anyone with a poisoning emergency can call the toll-free telephone number for help. Personnel at the Center will give you first-aid information and direct you to local treatment centers if necessary.

For Pesticide Spills

Small Spills: See the product label for cleanup advice.

Large spills: Call the National Response Center at 1-800-424-8802 or CHEMTREC at 800-424-9300 (24 hours) - Industry assistance with emergency response cleanup procedures for large, dangerous spills.

Be aware of your responsibility to report spills to the proper state agency.