

Cucurbit Vegetables — Cucumber, Muskmelon, and Watermelon

MUSKMELON Varieties	Season	Quality	Remarks
Aphrodite	early-mid	excellent	Good shipper, 6-9 lbs.
Athena	early-mid	excellent	Medium net, oval very firm flesh
Crescent Moon	early-mid	good	Heavy net, oval, deep sutures
Eclipse	mid-late	excellent	Heavy net, round, very firm flesh
Odyssey	early-mid	excellent	Round to oval, firm, local market only
Saticoy	late	very good	Good eating quality for direct sales
Starfire (HM 2608)	mid-late	very good	Very large fruit, good netting
Starship	early-mid	very good	Excellent size and net, uniform fruit
Superstar	early	good	Very large fruit, excellent netting
Vienna	early-mid	excellent	Oblong, shallow sutures, holds well
Green-fleshed muskmelons: Galileo, Levigal, Passport			
Honeydew melons for trial: Daybreak, Early Dew, Moonshine.			

WATERMELON varieties	Maturity (days)	Ring Color and Pattern	Shape	Approx. wt. (lb.)
Large, Red-Fleshed, Seeded				
Crimson Sweet (open pollinated)	88	green, striped	blocky round	20-30
Fiesta	88	dark green, striped	blocky	22-26
Jamboree	88	dark green, broken light green stripes	long blocky	23-27
Raspa	83	medium green, dark green stripes	blocky	22-24
Regency	82	dark green, striped	blocky oblong	18-22
Royal Majesty	90	green, thin stripes	long oval	30
Royal Sweet	85	light green, striped	blocky oval	20-25
Sangria	85	dark green, striped	long blocky oval	20-26
Stars and Stripes	88	dark green, striped	long, blocky, oval	20-26
Summer Flavor 500	88	medium green, striped	blocky oblong	25-35
Summer Flavor 790	88	dark green, light green stripes	oblong blocky	24-28
Summer Flavor 800	88	dark green, striped	blocky oval	22-26
Top Gun	83	medium green, dark green stripes	globe	21-24
WX 264	88	dark green stripes on light green background	blocky	21-25
Large, Red-Fleshed, Seedless¹				
Afternoon Delight	87	mottled stripe	Round	16-20
Crimson Trio	85	medium green, striped	globe	14-16
Freedom	88	light green, striped	blocky oblong	16-22
Genesis	85	dark green, striped	round	15-18
Gypsy	85	light green, striped	round to globe	13-17
Imagination	80	Solid dark green	round	12-15
Indiana	76	Jubilee stripe/dark background	round-oval	13-15
Millionaire	90	light green, striped	oblong	13-20
Nova	85	dark green, striped	round	14-16
Revolution	84	wide dark stripes on medium background	blocky	18-22
Shadow	90	dark green, striped	round oval	15-18
SummerSweet 5244	90	light green, striped	round oval	16-20
SummerSweet 7167	90	light green, striped	oval	15-17
SW 4502	84	allsweet type	oval	16-20
Sweet Delight	88	light green with dark green stripes	oval	17-19
Trillion	95	light green, striped	oval	16-18
Tri-X-313	90	light green, striped	round oval	16-20
Tri-X-Palomar	86	medium green, striped	round	14-17
Wrigley	90	light green with dark green stripes	oval	16-20
WX 28	88	wide medium green, light green background	elongated	23-28

¹ Pollenizers must be planted with seedless varieties. Use a long watermelon, such as Royal Jubilee, Royal Sweet, Sangria, or SF 500 as the pollinating variety. Crimson Sweet works well as a pollenizer, but its fruit will be seeded and have a similar appearance to most seedless varieties. Fruitless pollenizer varieties are available. Check with Extension specialists or seed company representatives for more information.

WATERMELON varieties	Maturity (days)	Ring Color and Pattern	Shape	Approx. wt. (lb.)
Small (“Ice-Box” Size), Red-Fleshed, Seeded				
Jade Star	72	dark green	round	10-12
Sweet Beauty	77	dark green, striped	oblong	5-7
Tiger Baby	80	light green, striped	round	7-10
Small (‘Personal’ Size), Red-Fleshed, Seedless — For Trial				
Bibo	77	medium green, striped	round	5-7
Miniput	80	dark green	round	6-10
Petite Perfection	77	medium green, striped	round	5-7
Yellow-Fleshed Seeded				
AU-Golden Producer	88	light green, striped	blocky round	20-30
Yellow Baby	68	light green, striped	round	9-12
Yellow-Fleshed, Seedless				
Amarillo	80	medium green, striped	round	12-14
Butterball	90	light green, striped	round	15-18

Watermelon Variety Resistance to Fusarium Wilt¹

Variety	Company	Type	Resistance²
Afternoon Delight	Dwayne Palmer	triploid	+1/2
Black Diamond	OP ³	diploid	+
Calhoun Gray	OP ³	diploid	+++1/2
Crimson Sweet	OP ³	diploid	+
Dixie Lee	OP ³	diploid	++++
Fiesta	Syngenta Seeds	diploid	+++1/2
HSR 3005	Hollar Seeds	triploid	+
Indiana	Seedway	triploid	++
Millionaire	Harris-Moran	triploid	+1/2
Palomar	Syngenta Seeds	triploid	+
Raspa	Willhite Seeds	diploid	+
Regency	Seminis	diploid	++++
Royal Sweet	Seminis	diploid	++
SR 8020	Shamrock Seeds	triploid	+
Summer Flavor 790	Abbott & Cobb	diploid	+++
Summer Sweet 5244	Abbott & Cobb	triploid	++
Summer Sweet 7167	Abbott & Cobb	triploid	+
SW 4502	Seedway	triploid	+1/2
Trillion	Abbott & Cobb	triploid	+1/2
Tri-X-313	Syngenta Seeds	triploid	+1/2
Wrigley	Seminis	triploid	++
WX 28	Willhite Seeds	triploid	+++1/2
WX 264	Willhite Seeds	diploid	+++

¹ Inclusion of these varieties does not imply endorsement or criticism of any variety or company. Refer to company literature for information on host resistance claims.

² The resistance ratings provided here are averages based on two years of greenhouse research (2004 and 2005). In that research, each watermelon variety was observed after receiving an artificial inoculation with a race 1 strain of the disease. +++++ = good resistance; +++ = moderate resistance; ++ = some resistance; + = little or no resistance.

³ OP=open pollinated variety included for comparison.

A. CUCUMBER — Slicing Varieties	Season	Disease Resistance ¹
Dasher II	early	1-2-3-4-5-6
General Lee	main	3-4-5-6
Lightning	very early	3-4-6
Speedway	very early	1-2-3-4-5-6
Thunder	very early	3-4-6-7

Beit alpha type (for trial): Socrates

Burpless (for trial): Tasty Green, Burpless 26. Staking recommended. Tasty Green has tolerance to powdery mildew.

¹Degree of resistance varies according to variety. Disease resistance codes are: 1=angular leaf spot, 2=anthracnose, 3=cucumber mosaic virus, 4=scab, 5=downy mildew, 6=powdery mildew, 7=zucchini yellow mosaic virus.

B. CUCUMBER — Pickling Varieties	Season	Spine Color	Disease Resistance ¹
Calypso	early-mid	white	1-2-3-4-5-6
Carolina	mid	white	1-2-3-4-5-6
Fancipak M	early-mid	white	1-2-3-4-5-6
Green Spear 14	mid	white	1-3-4-5-6
Score ²	early	white	1-2-3-4-5

¹Degree of resistance varies according to variety. Disease resistance codes are: 1=angular leaf spot, 2=anthracnose, 3=cucumber mosaic virus, 4=scab, 5=downy mildew, 6=powdery mildew, 7=zucchini yellow mosaic virus.

²Machine harvest only.

Spacing

Muskmelons: Rows 5 to 7 feet apart. Plants 3 to 5 feet apart in row. 1 to 2 plants per hill. Plastic mulch is recommended. Clear mulch is suggested only for earliest plantings in northern areas.

Watermelons: Rows 6 to 12 feet apart. Plants 3 to 6 feet apart in row. One plant per hill.

Mini- or “personal” watermelons: Rows 6 to 10 feet apart. Plants 1.5 to 2 feet apart in row to allow 12 to 15 square feet per plant. Plastic mulch is recommended for all transplanted watermelons.

Cucumbers for fresh market: Rows 4 to 6 feet apart. Plants 15 to 18 inches apart in row.

Pickles (machine harvest): Rows 18 to 20 inches apart. Plants 5 to 7 inches apart in row.

All cucumbers should be planted after the danger of frost is past since they are not frost tolerant. For proper germination, soil temperature must be above 60°F. Planting too early (when the soil is too cold and wet) will result in poor seedling emergence.

Fertilizing

Lime: To maintain a soil pH of 6.0 to 6.5. Muskmelon is particularly sensitive to low soil pH and should be limed to 6.3 to 6.8. If your soil test indicates less than 70 ppm magnesium, use dolomitic limestone, or apply 50 pounds/acre Mg broadcast preplant incorporated.

Preplant: N: 40 to 60 pounds per acre. P₂O₅: 0 to 150 pounds per acre. K₂O: 0 to 200 pounds per acre. Adjust according to soil type, previous management, and soil test results for your state. For transplants, a starter solution at the rate of 1 cup (8 ounces) per plant is

recommended. See page 7 for fertilizer type suggestions. If the transplant flat receives a heavy fertilizer feeding just prior to setting, the starter solution can be eliminated.

Sidedress N: Apply 45 pounds N per acre in a band to either side of the row when plants are rapidly vining. For direct seeded watermelon, the preplant N application can be replaced by an early sidedressing of 40 pounds N per acre when plants show the first set of true leaves followed by the 45 pounds N rate at the rapid vining stage of growth. If heavy rains occur in June, 30 pounds N per acre should be applied through the irrigation system at fruit set (late June to early July).

For muskmelons and cucumbers grown on plastic mulch, the N rate can be reduced because N losses from leaching are greatly reduced. For this culture system, apply 50 pounds N per acre broadcast preplant over the row just prior to laying the plastic. Sidedress 30 pounds N per acre on either side of the plastic at vining when plant roots have reached the edge of the plastic (mid-June). If you are using trickle irrigation, apply the 50 pounds N per acre preplant and apply 0.5 to 1 pound N per acre daily, or 3 to 6 pounds N weekly through the trickle system until fruit are about 2 inches in diameter.

Irrigation

Cucumbers: Maximum yields and fruit quality will result only if plants receive adequate and timely moisture. Depending on your soil type, obtaining high quality cucumbers requires approximately 1 to 2 inches of water per week. An irregular water supply, particularly during blossoming and fruit development,

can affect fruit quality detrimentally and result in increased nubbins or hooked fruit.

Muskmelons: Muskmelons are moderately deep rooted and require adequate soil moisture with good drainage. Natural rainfall may not be adequate, so supplemental irrigation may be required, particularly in the early stages of growth. When irrigating, irrigate the soil in the effective root zone to field capacity. A good, steady moisture supply is critical for good melon production. After melons have attained a good size, it is best to reduce irrigation. Reduced irrigation at this time can, in some cases, increase the mature fruit's sugar content. Excessive moisture during fruit ripening can result in poor quality.

Watermelons: Watermelons are deep-rooted plants, so natural rainfall often is adequate, and irrigation may not be cost effective on heavier soils. Adequate soil moisture in the early growth stages will help ensure vigorous growth. Soil moisture also is critical during blossoming and fruit development.

Harvesting

Cucumbers: Unless a once-over mechanical harvester is being used, cucumbers should be harvested at 2 to 4 day intervals to prevent losses from oversized and over mature fruit. Desired harvest sizes range from 5 to 8 inches long and 1.5 to 2 inches in diameter for fresh market. If growing for processors, be sure to understand the specific terms of their contracts at the beginning of the growing season. Prices received are related to the quantity of fruit within specific size ranges as established by either USDA guidelines or by the processor.

Muskmelons: Harvesting is done manually, and great care must be exercised at picking to harvest only the

physiologically mature plants. Fruits must be in the half or full slip state. Fruit harvested prior to the half slip stage will be too green and will not ripen properly. Shipping under mature fruit has been a problem and should be avoided.

Watermelons: Harvesting watermelons at the correct stage of maturity is critical and difficult. While each cultivar is different, maturity can be determined in several ways, including ground spots changing from white to yellow, browning of tendrils nearest the fruit, ridges appearing on the rind surface, and a hollow or dull sound when "thumped." Melons should be cut from the plant to avoid vine damage and prevent stem-end rot. Leave 1 to 2 inches of stem attached.

Disease Management with the MELCAST System

MELCAST is a disease warning system that can help Indiana farmers schedule their fungicide applications for control of certain diseases of watermelons and muskmelons. The system was developed by researchers in the Purdue University Department of Botany and Plant Pathology.

MELCAST is available throughout the summer at:

<http://btny.agriculture.purdue.edu/melcast>
and
(800) 939-1604

Each winter, Purdue Extension plant pathology specialists conduct educational programs that address the system. For more information about MELCAST, contact Dan Egel (Southwest Purdue Agricultural Research Program) at (812) 886-0198, or Rick Latin (Purdue University) at (765) 494-4639.



Bacterial fruit blotch causes small, water-soaked lesions on muskmelon that may affect fruit quality.

Cucurbit Vegetables — Squash and Pumpkin

Varieties		
Summer Squash	Golden Zucchini	Goldfinger, Gold Rush, Golden Delight
	Middle Eastern	Lita, Bonita
	Yellow Crookneck	Dixie, Prelude 2
	Yellow Straightneck	Lemondrop L, Multipick, General Patton, Monet, Liberator III
	Zucchini	Revenue, Dividend, Spineless Beauty, Jaguar, Puma, Independence III
Winter Squash	Acorn	Table Ace, Seneca Autumn Queen, Taybelle, Table Star (PM*), Mesa Queen
	Butternut	Butternut Supreme, Zenith, Waltham, Early Butternut, Butterboy
	Buttercup	Autumn Cup, BonBon, Buttercup, Burgess, Sweet Mama (Kabocha hybrid)
	Hubbard	Blue Hubbard, Red Kuri (small, red fruits)
	Spaghetti	Vegetable Spaghetti, Tivoli
	Other	Bush Delicata, Sugar Loaf, Carnival, Sweet Dumpling
Pumpkin	Miniature	Apprentice (PM*), Baby Boo (white), Gold Dust (PM*), Gold Speck (PM*), Jack Be Little, Mini-Jack, Munchkin, Sweetie Pie, Wee-B Little
	Small size	Baby Bear, Cannonball (PM*), Hybrid Pam, Iron Man (PM*), Mystic Plus (PM*), Oz, Prankster (PM*), Small Sugar, Spookie, Spooktacular
	For trial	Field Trip (PM*), Gargoyle (PM*)
	Medium size	Gold Fever, Gold Standard, Magician (PM*), Sorcerer, Tom Fox, Wizard
	For trial	New Rocket
	Medium-large and large size	20 Karat Gold (PM*), Aladdin (PM*), Appalachian, Dependable, Gladiator (PM*), Gold Medallion, Harvest Time, Howden Biggie, Magic Lantern (PM*), Merlin (PM*)
	For trial	18 Karat Gold (PM*), Autumn King, Big Rock, Camaro (PM*), Expert (PM*), Gold Challenger, Magic Wand (PM*), Spartan (PM*), Super Herc (PM*), Trojan, Warlock (PM*)
	Very large size	Atlantic Giant, Big Max, Big Moon, Prize Winner
	Specialty types	Buckskin, Fairytale, Jarradale, Rouge Vif D'Etampes (Cinderella)
	Hull-less/naked seed	Trick-or-Treat, Triple Treat, Snack Jack

*PM=powdery mildew resistant.

Spacing and Seeding

Bush Types: Rows 4-6 feet apart. Plants 18-24 inches apart in row. Seed: 4-6 pounds per acre.

Vining Types: Rows 6-8 feet apart. Plants 2-5 feet apart in row. Seed: 2-3 pounds per acre.

Fertilizing

Lime: To maintain a soil pH of 6.0-6.8.


Preplant: N: 50 pounds per acre; P₂O₅: 0-150 pounds per acre; K₂O: 0-200 pounds per acre. Adjust according to soil type, previous management, and soil test results for your state. For summer squash transplants, a starter solution at a rate of 1 cup (8 ounces) per plant is recommended. See page 7 for fertilizer type suggestions. If the transplant flat receives a heavy fertilizer feeding just prior to setting, the starter solution can be eliminated.


Sidedress N: For soils with more than 3 percent organic matter and following soybeans, alfalfa, or a grass-


legume hay crop, no N is needed. For soils with less than 3 percent organic matter with the same rotation or a rotation of corn, rye, oats, wheat, or a vegetable crop, apply 30-40 pounds N per acre when the vines begin to run. For sandy soils, the preplant N application can be replaced by an early sidedressing of 40 pounds N per acre when the plants show the first set of true leaves. Apply the second sidedressing of 45 pounds N per acre at onset of rapid vining.


For crops grown from transplants on plastic mulch, N losses from leaching are greatly reduced. For this culture system, apply 50 pounds N per acre broadcast preplant over the row just before laying the plastic. If sidedress N is recommended (see above), apply up to 30 pounds N per acre on either side of the plastic at vining when the plant roots have reached the edge of the plastic. If you are using trickle irrigation, apply the 50 pounds N per acre preplant, and apply 0.5-1 pound N per acre daily, or 3-6 pounds N weekly through the trickle system if additional N is needed.


Disease Control


Diseases Controlled	Treatment	Comments
Alternaria Leaf Blight (muskmelon)	3-4 year crop rotation.	Rotation with non-cucurbit crops will significantly reduce the threat of Alternaria in future melon crops.
	Amistar 80WP® at 3.5-5 oz. per acre.	Do not apply more than one time before alternating to a fungicide with a different mode of action. Note: Amistar® has the same active ingredient as Quadris®. See label for tank mix caution. 1-day PHI.
	Cabrio EG® at 12-16 oz. per acre.	Begin applications before disease development. Do not apply Cabrio® more than once before switching to a fungicide with a different mode of action. See label to avoid practices that could result in crop injury. 0-day PHI.
	Several chlorothalonil formulations (e.g., Bravo®, Echo®, Equus®) are labeled for use at various rates. Note that rates vary for different diseases.	Apply protective fungicide beginning when vines touch within rows or when disease threatens. Use a 7-10 day application interval. 0-day PHI.
	Gavel 75DF® at 1.5-2 lbs. per acre.	Some muskmelon varieties are sensitive to Gavel 75DF®. See label for details. 5-day PHI
	Several mancozeb formulations (e.g., Dithane®, Penncozeb®) are available for use at various rates.	5-day PHI.
	Several maneb formulations (e.g., Maneb®, Manex®) are available for use at various rates.	5-day PHI.
	Pristine 38WG® at 12.5-18.5 oz. per acre.	See label concerning the use of Pristine® with additives or adjuvants, particularly with muskmelon. See label for tank mix caution. Do not make more than one application of Pristine® before alternating to a fungicide with a different mode of action. 0-day PHI.
	Quadris 2.08SC® at 11.0-15.5 fl. oz. per acre.	Do not apply Quadris® more than once before alternating to a fungicide with a different mode of action. 7-14 day application interval. See label for tank mix caution. 1-day PHI.
	Quadris Opti® at 3.2 pts. per acre.	Do not apply Quadris Opti® more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
	Reason® at 5.5 fl. oz. per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. You must wait 30 days after last application before planting wheat. You must wait 1 year after last application to plant any crop not on the label (this includes field corn and soybeans). 14-day PHI.
	Tanos 50WG® at 8 oz. per acre.	Tanos® must be mixed with a contact fungicide with a different mode of action, (e.g., chlorothalonil, mancozeb, copper). Do not make more than one application of Tanos® before alternating to a fungicide with a different mode of action. 3-day PHI.
Angular Leaf Spot (cucumber, muskmelon, and watermelon)	Plant resistant varieties. Cucumber only.	Several cucumber varieties have genetic resistance to angular leaf spot.
	 Several copper-based bactericides are effective against angular leaf spot.	Angular leaf spot is a cool weather disease, normally restricted to the spring or early summer.

 May be acceptable for use in certified organic production. Check with your certifier before use.

Diseases Controlled	Treatment	Comments
Anthracnose (cucumber, muskmelon, and watermelon)	Plant resistant varieties. Cucumber only.	Many cucumber varieties have genetic resistance to anthracnose. Some watermelon varieties list resistance to race 1; however, race 2 is the predominant race affecting watermelon in the Midwest.
	3-4 year crop rotation.	Rotation with non-cucurbit crops will decrease the threat of anthracnose in future years.
	Amistar® at 3.5-5 oz. per acre.	See comments for Amistar® under Alternaria leaf blight. See label for tank mix caution. 1-day PHI.
	Cabrio EG® at 12-16 oz. per acre.	See comments for Cabrio® under Alternaria leaf blight. Do not apply Cabrio® more than once before alternating to a fungicide with a different mode of action. 0-day PHI.
	Several chlorothalonil formulations (e.g., Bravo®, Echo®, Equus®) are labeled for use at various rates. Note that rates vary for different diseases.	0-day PHI.
	Several mancozeb formulations (e.g., Dithane®, Penncozeb®) are available for use at various rates.	5-day PHI.
	Pristine 38WG® at 18.5 oz. per acre.	See comments for Pristine® under Alternaria leaf blight. Note higher rate for anthracnose. 0-day PHI.
	Quadris 2.08SC® at 11.0-15.5 fl. oz. per acre.	Do not apply Quadris® more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
	Quadris Opti® at 3.2 pts. per acre.	Do not apply Quadris Opti® more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
	Tanos 50WG® at 8 oz. per acre.	See comments for Tanos® under Alternaria leaf blight. 3-day PHI.
Bacterial Fruit Blotch (Primarily muskmelon and watermelon)	Plant uncontaminated watermelon/muskmelon seed. Sanitize the greenhouse thoroughly after each generation of transplants.	The pathogen is primarily seedborne (introduced with contaminated seed), but may overwinter on infested plant material in greenhouses and in the field.
	Contaminated fields should be fall-plowed and planted to crops other than cucurbits for at least 2 years. Subsequent grain crops are suggested for the rotation so that broadleaf herbicides will kill volunteer seedlings in the spring.	Muskmelons may be infected, but they do not appear as disease-prone as watermelons.
	 In situations where fruit blotch threatens, applying copper products at 10-14-day intervals beginning at fruit set or first observation of leaf lesions may help reduce the rate of the disease's spread. Note: many copper products are listed for suppression only.	Copper applications may be effective in reducing losses only if the disease is diagnosed early, and sprays are applied before widespread infection has occurred. Repeated copper use may reduce yield. Copper will not provide acceptable control of fungal diseases such as anthracnose or gummy stem blight. Transplant facility treatment: copper bactericides that are specifically labeled for use in the greenhouse may help slow the spread of bacterial fruit blotch. Growers should be careful to adapt label rates and practices to greenhouse use.
	Tanos 50WDG® at 8-10 oz. per acre. Disease suppression only.	See comments under Alternaria leaf blight.

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Diseases Controlled	Treatment	Comments
Bacterial Leaf and Fruit Spot (pumpkin and squash) 	2-year crop rotation. Avoid fields with a history of bacterial leaf and fruit spot. We suggest 3-4 weekly applications of copper applied at 10-day intervals beginning when fruit are approximately 4 inches in diameter.	Use uncontaminated seed. Disease organism may survive on crop residue. All squash and pumpkin varieties appear to be susceptible.
Bacterial Wilt (cucumber and muskmelon)	A systemic insecticide, such as Furadan® or Admire® (see insect section), should be used. Contact insecticides should be applied to seedlings before transplanting and then continued on a regular basis after the systemic insecticide loses effectiveness (2-3 weeks).	Disease control depends on control of striped and spotted cucumber beetles. Regularly scout fields for beetles. Apply insecticides only when beetles are present. When large numbers are present, treatments may be required twice weekly.
Damping-Off	Practice good greenhouse sanitation.	The best way to prevent damping off of seedlings in the greenhouse is to keep the greenhouse area clean. See section on transplant production on page 8.
	Plant in warm field soils.	The fungi responsible for damping off in field soils cause more loss when the seedling is slow to emerge.
	Seed fungicide treatments.	Most seeds come with fungicide treatments.
	Previcur Flex®. See label for rates.	Damping off caused by <i>Pythium</i> species may be managed with Previcur Flex®. See label for details.
Downy Mildew	Plant resistant varieties. Cucumber only.	Several cucumber varieties have genetic resistance to downy mildew. However, during the 2006 season, some varieties that had previously been reported with some resistance were severely affected.
<p>Resistance Possible</p> <p>Some downy mildew fungus strains that blow into the Midwest may be resistant to specific systemic fungicides. Strobilurin fungicides (e.g., Amistar®, Cabrio®, Flint®, Pristine®, Quadris®, Reason®) and fungicides with the active ingredient mefenoxam (e.g., Ridomil®) are particularly susceptible to resistance.</p> <p>If applying systemic fungicides after August 1, tank mixing with a contact fungicide is recommended in case downy mildew threatens.</p> <p>See Table 25, page 47, Fungicide Resistance Management for more information.</p>	Downy mildew does not overwinter in the Midwest. Crop rotation cannot be used to manage this disease.	The North American Disease Forecast Center provides a cucurbit downy mildew forecast Web page showing areas of known outbreaks at www.ces.ncsu.edu/depts/pp/cucurbit .
	Acrobat 50WP® at 6.4 oz. per acre.	Must be applied as a tank mix with a fungicide active against downy mildew. Do not make more than 2 sequential applications before alternating to a fungicide with a different mode of action. Do not make more than 5 applications per season. 0-day PHI.
	Agri-Fos 400® at 1.25 qt. per acre.	Label includes several different crops, PHIs, resistance instructions, and other important information. Some manufacturers recommend tank mixing. 0-day PHI.
	Aliette® at 2-5 lbs. per acre.	Use 2-3-lb. rate when tank mixed with another fungicide registered for use on cucurbits. Use 3-5-lb. rate when used alone. 3-day PHI.
	Amistar 80WP® at 3.5-5 oz. per acre.	See comments for Amistar® under Alternaria leaf blight. See label for tank mix caution. 1-day PHI.
	Cabrio EG® at 8-12 oz. per acre.	Begin applications before disease development. Apply on a 7-14 day interval. Use no more than 4 applications of Cabrio® per season. Do not apply Cabrio® more than once before alternating to a fungicide with a different mode of action. See label to avoid practices that could result in crop injury. 0-day PHI.

 May be acceptable for use in certified organic production. Check with your certifier before use.

Cucurbit Vegetables (continued)

Disease Control (continued)

Diseases Controlled	Treatment	Comments
Downy Mildew (continued)	Several chlorothalonil formulations (e.g., Bravo [®] , Echo [®] , Equus [®]) are labeled for use at various rates. Note that rates vary for different diseases.	It may be useful to tank mix or alternate these products with the systemic products listed here. 0-day PHI.
<p>Resistance Possible Some downy mildew fungus strains that blow into the Midwest may be resistant to specific systemic fungicides. Strobilurin fungicides (e.g., Amistar[®], Cabrio[®], Flint[®], Pristine[®], Quadris[®]) and fungicides with the active ingredient mefenoxam (e.g., Ridomil[®]) are particularly susceptible to resistance.</p> <p>If applying systemic fungicides after August 1, tank mixing with a contact fungicide is recommended in case downy mildew is a threat.</p> <p>See Table 25, page 48, Fungicide Resistance Management for more information.</p>	Curzate 60 DF [®] at 3.2 oz. per acre.	Use only in combination with a labeled rate of a contact fungicide such as copper compounds, mancozeb, or chlorothalonil. 3-day PHI.
	Flint [®] at 4.0 oz. per acre.	Use a 7-14 day interval. Do not apply Flint [®] more than once before alternating to a fungicide with a different mode of action. 0-day PHI.
	Forum 4.18SC [®] at 6 fl. oz. per acre.	Must be applied as a tank mix with a fungicide active against downy mildew. Do not make more than 2 sequential applications before alternating to a fungicide with a different mode of action. Do not make more than 5 applications per season. 0-day PHI.
	Gavel 75DF [®] at 1.5-2 lbs. per acre. Not for use on pumpkins.	Some muskmelon varieties are sensitive to Gavel 75DF [®] . See label for details. 5-day PHI.
	Formulations containing maneb such as Maneb 75 DF [®] or Manex [®] are labeled at various rates. Formulations containing mancozeb such as Dithane [®] , Manzate [®] or Penncozeb [®] are labeled at various rates. Fungicides containing mancozeb may not be used with pumpkins.	5-day PHI.
	Phostrol [®] at 2.5-5 pt. per acre.	Label includes several different crops, PHIs, resistance instructions, and other important information. Some manufacturers recommend tank mixing. 0-day PHI.
	Presidio 4SC [®] at 3-4 fl. oz. per acre.	Must be tank mixed with a product with a different mode of action. 2-day PHI.
	Previcur Flex [®] at 1.2 pts. per acre.	When applying at intervals of longer than 7 days, alternate use with a contact fungicide. 2-day PHI.
	Pristine 38WG [®] at 12.5 to 18.5 oz. per acre.	See comments for Pristine [®] under Alternaria leaf blight. 0-day PHI.
	Prophyt [®] at 2- 4 pt. per acre.	Label includes several different crops, PHIs, resistance instructions, and other important information. Some manufacturers recommend tank mixing. 0-day PHI.
	Quadris 2.08 [®] at 11-15.5 fl. oz. per acre.	Do not apply Quadris [®] more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
	Quadris Opti [®] at 3.2 pts. per acre.	Do not apply Quadris Opti [®] more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
	Ranman 400SC [®] at 2.1-2.75 fl oz per acre.	Alternate each application of Ranman [®] with a fungicide with a different mode of action. 0-day PHI.
	Reason [®] at 5.5 fl. oz. per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. You must wait 30 days after last application before planting wheat. You must wait 1 year after last application to plant any crop not on the label (this includes field corn and soybeans). 14-day PHI.
	Revus 2.09SC [®] at 8 fl. oz. per acre. Suppression only.	Make no more than 1 application before switching to another non-group 40 fungicide. 0-day PHI.
Ridomil Gold Bravo [®] at 2 lbs. per acre. Ridomil Gold MZ [®] at 2 lbs. per acre (dry), or 2.5 pts per acre (flowable). Do not use Ridomil Gold MZ [®] with pumpkins.	Alternate with protective fungicide. 0-day PHI for Ridomil Gold Bravo [®] . 5-day PHI for Ridomil Gold MZ [®] .	
Tanos [®] at 8 oz. per acre.	See comments for Tanos [®] under Alternaria leaf blight. 3-day PHI.	

Diseases Controlled	Treatment	Comments
Fusarium Fruit Rot	Long rotations of non-cucurbit crops will help to slowly reduce Fusarium populations in the soil. Avoid fields with a history of the problem.	No resistant varieties are available. Fruit with Fusarium fruit rot are often observed from fields where other disease or cultural problems are present. It has been reported that growing pumpkins in cover crops may help avoid Fusarium fruit rot. This disease may be transmitted on seed.
Fusarium Wilt (muskmelon)	Plant resistant muskmelon cultivars.	Several cultivars have good resistance to strains of Fusarium found in Indiana and Illinois.
Fusarium Wilt (watermelon)	Plant watermelon cultivars with partial resistance. Check table on page 67.	Rotation with non-cucurbit crops will decrease wilt incidence.
Gummy Stem Blight/Black Rot	3-4 year crop rotation.	Rotation with other crops will significantly decrease the threat of gummy stem blight in future years.
	Amistar® at 3.5-5 oz. per acre.	See comments for Amistar® under Alternaria leaf blight. See label for tank mix caution. 1-day PHI.
	Cabrio EG® at 12-16 oz. per acre.	Begin applications before disease development. Do not apply Cabrio® more than once before alternating to a fungicide with a different mode of action. See label to avoid practices that could result in crop injury. See label for tank mix caution. 0-day PHI.
	Several chlorothalonil formulations (e.g., Bravo®, Echo®, Equus®) are labeled for use at various rates. Note that rates vary for different diseases.	0-day PHI.
	Folicur 3.6F® at 4-6 fl. oz. per acre.	7-day PHI.
	Several mancozeb formulations (e.g., Dithane®, Penncozeb®) are labeled for use at various rates. Do not apply mancozeb products to pumpkins.	5-day PHI.
	Pristine® at 12.5-18.5 oz. per acre.	See comments for Pristine® under Alternaria leaf blight. Strains of the gummy stem blight fungus have been discovered in Indiana that are resistant to boscalid (one of the active ingredients in Pristine®). Pristine® may fail to control gummy stem blight caused by such resistant strains. 0-day PHI.
	Quadris 2.08SC® at 11.0-15.5 fl. oz. per acre.	Do not apply Quadris® more than once before alternating to a fungicide with a different mode of action. 7-14 day application schedule. See label for tank mix caution. 1-day PHI.
	Quadris Opti® at 3.2 pts. per acre.	Do not apply Quadris Opti® more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
Nematodes (muskmelon and watermelon)	Methyl bromide is the active ingredient under a number of trade names. Generally, it is unavailable. RUP.	Methyl bromide and sodium methyl dithiocarbamate give best results when nematode populations are moderate to high. Vydate® gives adequate control when nematode populations are low to moderate and most of the product is applied under plastic mulch. Apply Vydate® before planting in the spring.
	Telone II® or Telone C-35®. RUP.	
	Vydate L® at 1-2 gallons per acre in 20 gallon water broadcast. Incorporate 2-4 inches. RUP.	
	Vapam®. See label for rates.	
Phytophthora and Pythium Fruit and Root Rot, and Foliar Blight	4 or more year crop rotation.	Turban squash is extremely susceptible. No resistant variety is available.
	Avoid fields with a history of a disease on cucurbits, eggplants, peppers, and tomatoes.	
	Acrobat 50WP® at 6.4 fl. oz. per acre.	See comments for Acrobat® and Forum® under downy mildew. 0-day PHI.
	Apron XL LS® at 6.4 fl. oz. per 100 lbs. seed.	Only for direct seeded plants.
	Forum 4.18SC® at 6 fl. oz. per acre.	See comments for Acrobat® and Forum® under downy mildew. 0-day PHI.
	Presidio 4SC® at 3-4 fl. oz. per acre.	Must be tank mixed with a product with a different mode of action. 2-day PHI.

Diseases Controlled	Treatment	Comments
Phytophthora and Pythium Fruit and Root Rot, and Foliar Blight (continued)	Ranman 400SC® at 2.75 fl oz per acre.	Alternate each application of Ranman® with a fungicide with a different mode of action. 0-day PHI.
	Revus 2.09SC® at 8 fl. oz. per acre. Suppression only.	Make no more than 1 application before switching to another non-group 40 fungicide. 0-day PHI.
Plectosporium Blight (pumpkin and squash)	3-4 year crop rotation.	Rotation with non-cucurbit crops.
	Management activities that control black rot should also control Plectosporium blight.	
	Amistar 80WP® at 3.5-5 oz. per acre.	See comments for Amistar® under Alternaria leaf blight. See label for tank mix caution. 1-day PHI.
	Cabrio EG® at 12-16 oz. per acre.	Do not apply more than once before alternating to a fungicide with a different mode of action. See label to avoid practices that could result in crop injury. 0-day PHI.
	Flint® at 1.5-2.0 oz per acre.	Do not apply more than once before alternating to a fungicide with another mode of action. 0-day PHI.
	Quadris 2.08SC® at 11.0-15.5 fl. oz. per acre.	Do not apply Quadris® more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
Powdery Mildew (watermelon are generally unaffected by powdery mildew)	Plant resistant varieties whenever possible.	Partially resistant cucumber, muskmelon and pumpkin varieties are available.
	Amistar 80WP® at 3.5-5 oz. per acre.	See comments for Amistar® under Alternaria leaf blight. See label for tank mix caution. 1-day PHI.
<p>Alternate Fungicides Unless precautions are taken, the fungi that cause powdery mildew may become resistant to the systemic fungicides listed here.</p> <p>Some labels require alternation between fungicides with different modes of action. Whether required by the label or not, it is a good idea to alternate between fungicides with different modes of action. Refer to the Fungicide Resistance Management Table on page 47 for help in making resistance management decisions.</p>	Cabrio EG® at 12-16 oz. per acre.	See comments for Cabrio® under Alternaria leaf blight. Use no more than 4 applications of Cabrio® per season. Do not apply Cabrio® more than once before alternating to a fungicide with a different mode of action. 0-day PHI.
	Flint® at 1.5-2.0 oz. per acre.	See comments for Flint® under downy mildew. Alternate with fungicides with a different mode of action. 0-day PHI.
	Folicur 3.6F® at 4-6 fl. oz. per acre.	7-day PHI.
	Pristine 39WG® at 12.5-18.5 oz. per acre.	See comments for Pristine® under Alternaria leaf blight. 0-day PHI.
	Procure 50WS® at 4-8 oz. per acre.	0-day PHI.
	Quadris 2.08SC® at 11.0-15.5 fl. oz. per acre	Do not apply Quadris® more than once before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
	Quadris Opti® at 3.2 pts. per acre.	Do not apply Quadris Opti® more than one time before alternating to a fungicide with a different mode of action. See label for tank mix caution. 1-day PHI.
	Quintec® at 4-6 fl. oz. per acre. Muskmelon and watermelon only.	If more than one application is made per crop, at least one application must tank mixed with a product effective against powdery mildew that has a mode of action. 3-day PHI.
	Rally 40WSP® at 2.5-5 oz. per acre.	0-day PHI.
	Topsin M 70WP®SB® at 1/2 lb. per acre or Topsin 4.5 FL® at 10 fl oz. per acre.	For resistance management, tank mix or alternate with a fungicide that has a different mode of action. 1-day PHI

Diseases Controlled	Treatment	Comments
Scab (cucumber)	Plant resistant varieties.	0-day PHI.
	3-4 year crop rotation.	Rotation will significantly reduce the threat of scab infection in subsequent cucumber crops.
	Bravo 500® at 2.75-4.25 pts. per acre, or Bravo Ultrex® at 1.8-2.7 lbs. per acre, or Bravo WS® at 2-3 pts. per acre.	0-day PHI.
	Dithane M45® or Dithane DF® at 2-3 lbs. per acre, or Dithane F45® at 1.2-2.4 qts. per acre.	Apply on a 7-14 day schedule. 5-day PHI.
	Echo®. See label for rates.	0-day PHI.
	Maneb 75DF® or Maneb 80WP® at 1-2 lbs. per acre.	Apply on a 7-14 day schedule. 5-day PHI.
	Manex® at 1.2-1.6 qts. per acre.	Apply on a 7-14 day schedule. 5-day PHI.
	Penncozeb 75DF® at 2-3 lbs. per acre.	Apply on a 7-14 day schedule. 5-day PHI.
	Terranil®. See label for rates.	0-day PHI.
Virus Diseases	Control insects responsible for the virus (see Common Cucurbit Viruses and Transmission Sources table below). For squash mosaic virus, plant virus free seed.	Most viruses that occur in the Midwest are transmitted by aphids (see Common Cucurbit Viruses and Transmission Sources table below). However, insect control will not effectively reduce virus incidence in late-season cucurbits. Early planting will best control pumpkin viruses so fruit can set before virus diseases become apparent. For example, southern Indiana growers should plant by June 20. Proper virus diagnosis is critical. Chemical drift sometimes mimics virus symptoms.

Common Cucurbit Viruses and Transmission Sources

Virus	Host Range	Transmission Source
Cucumber Mosaic Virus	wide	aphids ¹
Papaya Ring Spot Virus	<i>Cucurbitaceae</i>	aphids ¹
Squash Mosaic Virus	<i>Cucurbitaceae</i> , <i>Chenopodiaceae</i>	seeds, cucumber beetles
Watermelon Mosaic Virus	<i>Cucurbitaceae</i> , weeds	aphids ¹
Zucchini Yellow Mosaic Virus	<i>Cucurbitaceae</i>	aphids ¹

¹Aphidborne viruses are non-persistent, thus aphids can begin transmitting the virus after seconds of feeding, and may transmit the virus for only a few hours.

Weed Control

Weeds Controlled ¹	Treatment ²	Comments
Annuals (emerged) — treatment applied before crop emergence or transplanting	Gramoxone Inteon 2L [®] at 2-4 pts per acre, or Gramoxone Max 3L [®] at 1.3-2.7 pts. per acre.	Include 1 qt. of COC or 4-8 fl. oz. of nonionic surfactant per 25 gallons of spray solution. Apply before seeding or transplanting, or after seeding but before crop emergence. RUP.
Annuals and Perennials (emerged) — crop not present or protected from spray	Glyphosate products at 0.75-3.75 lbs. acid equivalent (ae) per acre. Use formulations containing 3 lbs. ae/gal. (4 lbs. isopropylamine salt/gal.) at 1-5 qts. per acre, or formulations containing 4.5 lbs. ae/gal. (5 lbs. potassium salt/gal.) at 0.66-3.3 qts. per acre.	Broadcast at least 3 days before seeding or transplanting, or apply between crop rows with hooded or shielded sprayer. Use low rate for annuals and higher rates for perennials. See label for suggested application volume and adjuvants. Remove herbicide residue from plastic mulch prior to transplanting. 14-day PHI.
Broadleaves (emerged) — crop not present or protected from spray	Aim EC [®] at 0.5-2 fl. oz. per acre.	Apply prior to transplanting or apply between crop rows with hooded sprayer. Do not apply before direct seeding. Do not allow spray to contact crop. Use COC or nonionic surfactant. Weeds must be actively growing and less than 4 inches tall. Do not exceed 6.1 fl. oz. per acre per season.
Broadleaves and Grasses (not emerged)	Command 3ME [®] at the following rates: Muskmelon and watermelon: 0.4-0.67 pt. per acre. Cucumbers: 0.4-1.0 pt. per acre. Summer squash: 0.67-1.33 pts. per acre. Winter squash and processing pumpkins: 0.67-2 pts. per acre. Not for jack-o-lantern pumpkins.	See label for sensitive varieties. Apply prior to seeding or transplanting, or after seeding before crop emergence. Does not control pigweed and related species. Rates below 1 pt. will only suppress weeds. May cause temporary bleaching of crop leaves. 45-day PHI for cucumbers and squash.
	Curbit 3EC [®] at 3-4 pts. per acre.	Use lower rates on coarse soils. Direct-seeded crops: apply to soil surface within 2 days after seeding. Do not incorporate. Transplants: apply as a banded spray between rows. Does not control large-seeded broadleaves. Needs 0.5 in. water within 5 days of application to be effective. If no rain occurs, cultivate shallowly. Do not apply over or under hot caps, row covers, or plastic mulch. Do not broadcast over top of plants. Under cool temperatures may cause crop injury or failure.
	Strategy [®] at 2-6 pts. per acre.	Strategy [®] is a premix containing the active ingredients of Command [®] and Curbit [®] . Direct-seeded crops: apply to soil surface within 2 days after seeding. Do not incorporate. Transplants: apply as a banded spray between rows. Does not control large-seeded broadleaves. Needs 0.5 in. water within 5 days of application to be effective. If no rain occurs, cultivate shallowly. Do not apply over or under hot caps, row covers, or plastic mulch. Do not broadcast over top of plants. Under cool temperatures may cause crop injury or failure. 45-day PHI for cucumbers and squash.
	Trifluralin products at 0.5-1 lb. a.i. per acre. Use 4EC formulations at 1-2 pts. per acre.	Use lowest rate on coarse soils. Apply as a directed spray between rows after plants have 3-4 leaves and incorporate. 60-day PHI for watermelons. 30-day PHI for other cucurbits.
Broadleaves (not emerged)	Sinbar [®] at 2-4 oz. per acre. Watermelons only.	Do not use on sand or gravel soils. Not recommended on soils with less than 1% organic matter due to crop injury potential. Apply pre-transplant to bare ground, or pre-transplant under plastic mulch, or to row middles. For direct-seeded crops on bare ground apply after planting before crop emerges. Do not allow spray to contact crop. 70-day PHI. Do not plant other crops within 2 years of application.

Weeds Controlled ¹	Treatment ²	Comments
Broadleaves and Nutsedge (not emerged or emerged)	Sandea® at the following rates:	Use lower rates on coarse soils with low organic matter. Add 0.5-1 pt. nonionic surfactant per 25 gallons of spray solution if emerged weeds are present. Not recommended for use under cool temperatures due to potential for crop injury. May delay crop maturity. Avoid contact with surface of plastic mulch if present. Preemergence and pretransplant applications are allowed on watermelons in Indiana, Illinois, Kansas, and Missouri. Do not exceed 2 applications per crop cycle. Check label for maximum quantity Sandea® permitted per crop cycle and year. 30-day PHI for cucumbers, squash and pumpkins. 57-day PHI for cantaloupes and watermelons. Not for use before planting summer squash or over the top of summer squash or watermelons.
	Row-middle applications: 0.5-1.0 oz. per acre.	Apply between rows of crop, avoiding contact with crop.
	Preemergence: <i>Direct-seeded pumpkins and winter squash on bare ground:</i> 0.5-0.75 oz. per acre. <i>Direct-seeded cucumbers, cantaloupes, and processing pumpkins on bare ground:</i> 0.5-1 oz. per acre.	Apply after seeding but prior to cracking.
	Pre-transplant: <i>Cucumbers, cantaloupes, pumpkins, and winter squash:</i> 0.5-0.75 oz. per acre. <i>Cucumbers and cantaloupes:</i> up to 1 oz. per acre.	Apply to soil surface after final soil preparation or bed shaping and just before applying plastic mulch. Wait 7 days after application and lay mulch before transplanting.
	Postemergence: <i>Pumpkins and winter squash on bare ground:</i> 0.5-0.67 oz. per acre. <i>Cucumbers, cantaloupes, and processing pumpkins on bare ground:</i> 0.5-1 oz. per acre.	Apply after the crop has 3-5 true leaves but before female flowers open.
Grasses (not emerged)	Dacthal W-75® at 6-14 lbs. per acre, or Dacthal Flowable® at 6-14 pts. per acre. Direct-seeded melons, cucumbers, and squash only.	Apply when plants have 4-5 true leaves and growing conditions favor good plant growth. Crop injury may occur if applied under unfavorable growing conditions or earlier than recommended.
	Prefar 4E® at 5-6 qts. per acre.	Use low rate on soils with less than 1% organic matter. Apply before planting and incorporate 1-2 in. or apply after seeding before crop emerges and irrigate within 24 hours.
Grasses (emerged)	Poast 1.5E® at 1-1.5 pts. per acre.	Use with 1 qt. of COC per acre. Spray on actively growing grass. Do not exceed 3 pts. per acre per season. 14-day PHI.
	Select Max® at 12-16 fl. oz. per acre, or Select 2EC® at 6-8 fl. oz. per acre for annual grasses. Use high rate for perennial grasses.	Use with 1 qt. of COC per 25 gallons of spray solution (1%v/v). Spray on actively growing grass. Wait at least 14 days between applications. Do not exceed 64 fl. oz. Select MAX® or 32 fl. oz. Select 2EC® per acre per season. 14-day PHI.

¹ For specific weeds controlled by each herbicide, check Table 19 on page 37.

² Rates given are for overall coverage. For band treatment, reduce amounts according to the portion of acre treated.

Insect Control

Insects Controlled	Treatment	Comments
Aphids and Leafhoppers	Conserve natural enemies.	Limiting insecticide use will conserve predators and parasites that help control aphid populations.
	Monitoring.	Look for the presence of predators or parasitized aphids. Several predators per aphid colony will probably bring the aphid population under control without insecticide. Killing aphids with insecticides cannot prevent the virus diseases they carry.
	Actara® at 1.5-3 oz. per acre. Aphids only.	Do not exceed 11 oz. per acre per season. 0-day PHI.
	Admire PRO® at 7.0-10.5 fl. oz. per acre.	Apply pre-plant in a band 2 inches or less, as an in-furrow spray at planting, as a post-plant drench, as a sidedress application, or through trickle irrigation water. Do not exceed 10.5 fl. oz. per acre per season. 21-day PHI.
	Asana XL® at 5.8-9.6 fl. oz. per acre. Leafhoppers only.	Do not exceed 0.25 lb. a.i. per acre per season. 3-day PHI. RUP.
	Assail 70WP at 1.1-1.7 oz. per acre.	Do not exceed 5 applications per season. 0-day PHI.
	Baythroid® at 0.8-1.6 fl. oz. per acre. Potato leafhoppers only.	Do not exceed 11.2 fl. oz. or 4 applications per acre per season. Allow 7 days between applications. 0-day PHI. RUP.
	Brigade 2EC® at 2.6-6.4 fl. oz. per acre, or Brigade WSB® at 8-16 oz. per acre. Leafhoppers only.	Do not exceed 19.2 fl. oz. per acre per season. 3-day PHI. RUP.
	Danitol 2.4EC® at 10.67-16 fl. oz. per acre. Leafhoppers only.	Do not exceed 42.67 fl. oz. per acre per season. 7-day PHI. RUP.
	Diazinon AG500® at 0.5-1.5 pts. per acre, or Diazinon 50W® at 1-1.5 lbs. per acre. Muskmelon and watermelon only.	Do not exceed 5 applications per season. 3-day PHI. RUP.
	Dimethoate 400® or Dimethoate 4E® at 0.5-1 pt. per acre, or Dimethoate 2.67EC® at 0.75-1.5 pts. per acre. Muskmelons and watermelons only.	3-day PHI.
	Endosulfan 3EC® at 0.67-1.33 qts. per acre.	Do not exceed 4 applications per acre per season. 2-day PHI.
	Fulfill® at 2.75 oz. per acre. Aphids only.	Do not exceed 5.5 oz. per acre per season. 0-day PHI.
	Lannate SP® at 0.5-1 lb. per acre. Aphids only.	1-day PHI for applications of 0.5 lb. 3-day PHI for applications of more than 0.5 lb. RUP.
	Malathion 5EC® at 1.5-2.0 pts. per acre. Aphids only. Not for use on melons.	Ground application only. 1-day PHI for cucumber and squash. 3-day PHI for pumpkin.
	M-Pede® at 1-2% by volume. Aphids only.	Must contact aphids to be effective. 0-day PHI.
Platinum® at 5-11 fl. oz. per acre. Aphids only.	30-day PHI.	
Pounce 25WP® or Ambush 25W® at 6.4-12.8 oz. per acre. Leafhoppers only.	Apply a minimum of 4 gallons finished spray per acre by air, or 20 gallons finished spray per acre with ground equipment. Do not exceed 1.6 lbs. a.i. per acre. 0-day PHI. RUP.	
Cucumber Beetles only (preplant)	Admire PRO® at 7.0-10.5 fl. oz. per acre.	Apply pre-plant in a band 2 inches or smaller, as an in-furrow spray at planting, as a post-plant drench, as a sidedress application, or through trickle irrigation water. Do not exceed 24 fl. oz. per acre per season. 21-day PHI.

Insects Controlled	Treatment	Comments
Cucumber Beetles only (preplant) (continued)	Furadan 4F® at 2.4 fl. oz. per 1,000 linear ft. of row. Indiana, Illinois, Iowa, and Missouri only.	Apply directly into seed furrow or as a 7-inch band over the row. This application is for seedling protection and beetle control after seedlings emerge or as transplants become established. RUP.
Cucumber Beetles, Squash Bugs, and Squash Vine Borers	Monitoring.	Fields should be monitored frequently (2-3 times per week) to detect mass emergence of beetles in the spring. Focus insecticide applications on periods of heavy beetle activity. Evening sprays will reduce bee kill.
	Apply throughout the season when beetles exceed threshold.	If Furadan 4F® was applied just before or during transplanting, plants will need one spray to protect plants until plant uptake of Furadan® has occurred.
Traps for Sampling Muskmelon growers may consider using unbaited AM Yellow Sticky Traps for sampling cucumber beetles.	Ambush 25W® at 6.4-12.8 oz. per acre.	Apply a minimum of 4 gallons finished spray per acre by air or 20 gallons finished spray per acre with ground equipment. Do not exceed 1.6 lbs. a.i. per acre. 0-day PHI. RUP.
	Asana XL® at 5.8-9.6 fl. oz. per acre.	Do not exceed 0.25 lb. a.i. per acre per season. 3-day PHI. RUP.
	Baythroid® at 2.4-2.8 fl. oz. per acre. Cucumber beetles only.	Do not exceed 11.2 fl. oz. or 4 applications per acre per season. Allow 7 days between applications. 0-day PHI. RUP.
	Brigade 2EC® at 2.6-6.4 fl. oz. per acre, or Brigade WSB® at 8-16 oz. per acre.	Do not exceed 19.2 fl. oz. per acre per season. 3-day PHI. RUP.
	Danitol 2.4EC® at 10.67-16 fl. oz. per acre. Cucumber beetles only.	Do not exceed 42.67 fl. oz. per acre per season. 7-day PHI. RUP.
	Diazinon AG500® at 0.5-1.5 pts. per acre, or Diazinon 50W® at 0.5-1.5 lbs. per acre. Muskmelon and watermelon only.	Do not exceed 5 applications per season. 3-day PHI. RUP.
	Endosulfan 3EC® at 0.67-1.33 qts. per acre.	Do not exceed 4 applications per season. 2-day PHI.
	Kryocide® at 8-16 lbs. per acre.	Do not exceed 64 lbs. per acre per season. 7-day PHI for summer squash. 14-day PHI for other cucurbits.
	Mustang Max® at 2.8-4 fl. oz. per acre.	Do not exceed 24 fl. oz. per acre per season. 1-day PHI.
	Pounce 25WP® at 6.4-12.8 oz. per acre.	Apply a minimum of 4 gallons finished spray per acre by air or 20 gallons finished spray per acre with ground equipment. Do not exceed 1.6 lbs. a.i. per acre. 0-day PHI. RUP.
	Prokil Cryolite 50D® at 15-30.5 lbs. per acre.	Do not exceed 153 lbs. per acre per season. 7-day PHI for summer squash. 14-day PHI for other cucurbits.
	Sevin XLR PLUS® at 1 qt. per acre. Not for squash vine borer.	When applied during hot, humid conditions, carbaryl may cause some phytotoxicity, especially on seedlings and newly set plants. Carbaryl may be highly toxic to bees visiting plants during bloom. Do not exceed 6 qts. per acre per season. 3-day PHI.
Warrior at 2.56-3.84 fl. oz. per acre.	Do not exceed 23 fl. oz. per acre per season. 1-day PHI.	
Mites	Acramite 50WS® at 0.75-1 lb. per acre.	One application per season only. Do not apply less than 50 gallons of water per acre. 3-day PHI.
	Agri-Mek 0.15 EC® at 8-16 fl. oz. per acre.	Do not exceed 48 fl. oz. per acre per season. Allow at least 7 days between applications. Do not make more than 2 sequential applications. Do not apply less than 20 gallons of water per acre. 7-day PHI.
	Danitol 2.4EC® at 10.67-16 fl. oz. per acre.	Do not exceed 42.67 fl. oz. per acre per season. 7-day PHI. RUP.

Cucurbit Vegetables (continued)
 Insect Control (continued)

Insects Controlled	Treatment	Comments
Mites (continued)	Diazinon AG500® at 0.5-1.5 pts. per acre, or Diazinon 50W® at 1-1.5 lbs. per acre. Muskmelons and watermelons only.	Do not exceed 5 applications per season. 3-day PHI. RUP.
	Epi-mek 0.15EC® at 8-16 fl. oz. per acre.	Do not exceed 48 fl. oz. per acre per season. Allow at least 7 days between applications. Do not make more than 2 sequential applications. Do not apply less than 20 gallons of water per acre. 7-day PHI.
	Kelthane 50WSP® at 1.25 lbs. per acre.	Do not exceed 2 applications per season. 2-day PHI.
	Malathion 5EC® at 1.5 pts. per acre. Not for melons.	Ground application only. 1-day PHI for cucumber and squash. 3-day PHI for pumpkin.
	Oberon 2SC® at 7.0-8.5 fl. oz. per acre.	Do not exceed 25.5 fl. oz. per acre per season. 7-day PHI.
Seed Corn Maggots and Cucumber Beetles (in seed beds)	Treat seeds with a combination fungicide/insecticide, such as captan-lindane, at 1 oz. per 25 lbs. of seed.	Early clean plowing of cover crops will generally result in less damage to seedling plants in the field.
Thrips	Admire PRO® at 7-10.5 fl. oz. per acre.	Apply preplant in a band 2 inches or less, as an in-furrow spray at planting, as a post-plant drench, as a sidedress application, or through trickle irrigation water. Do not exceed 10.5 fl. oz. per acre per season. 21-day PHI.
	Danitol 2.4EC® at 10.67-16 fl. oz. per acre.	Do not exceed 42.67 fl. oz. per acre per season. 7-day PHI. RUP.
	Diazinon AG500® at 0.5-1.5 pts. per acre, or Diazinon 50W® at 1-1.5 lbs. per acre. Muskmelon and watermelon only.	Do not exceed 5 applications per season. 3-day PHI. RUP.
	Dimethoate 400® or Dimethoate 4E® at 1 pt. per acre, or Dimethoate 2.67EC® at 1.5 pts per acre. Melons only.	3-day PHI.
	Entrust® at 1.25-3 oz. per acre.	Do not exceed 9 oz. per acre per season. 1-day PHI.
	Platinum® at 5-11 fl. oz. per acre.	30-day PHI.
	SpinTor 2SC® at 6-8 fl. oz. per acre.	Do not exceed 29 fl. oz. per acre per season. 1-day PHI for cucumbers. 3-day PHI for other cucurbits.
Whiteflies	Actara® at 3-5.5 oz. per acre.	Do not exceed 11 oz. per acre per season. 0-day PHI.
	Admire PRO® at 7-10.5 fl. oz. per acre.	Apply pre-plant in a band 2 inches or less, as an in-furrow spray at planting, as a post-plant drench, as a sidedress application, or through trickle irrigation water. Do not exceed 10.5 fl. oz. per acre per season. 21-day PHI.
	Align® according to label directions.	0-day PHI.
	Assail 70WP® at 1.1-2.3 oz. per acre.	Do not exceed 5 applications per season. 0-day PHI.
	Brigade 2EC® at 5.2-6.4 fl. oz. per acre, or Brigade WSB® at 12.8-16.0 oz. per acre.	Do not exceed 19.2 fl. oz. per acre per season. 3-day PHI. RUP.
	Danitol 2.4EC® at 10.67-16 fl. oz. per acre.	Do not exceed 42.67 fl. oz. per acre per season. 7-day PHI. RUP.
	Fulfill® at 2.75 oz. per acre.	Do not exceed 5.5 oz. per acre per season. 0-day PHI.
	M-Pede® at 1-2% by volume.	Must contact whiteflies to be effective. 0-day PHI.
	Neemix® according to label directions.	0-day PHI.
	Oberon 2SC® at 7-8.5 fl. oz. per acre	Do not exceed 25.5 fl. oz. per acre per season. 7-day PHI.
	Platinum® at 5-11 fl. oz. per acre.	30-day PHI.