Delaware Cooperative Extension

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This is a section from the

2024/2025
Mid-Atlantic Commercial Vegetable Production Recommendations

The recommendations are **NOT** for home gardener use.

The full recommendations are available online at:
https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/commercial-crops/vegetable-crops/midatlantic-vegetable-recommendations/

Printed copies of the recommendations are available for purchase at the New Castle, Kent and Sussex County Extension Offices in Delaware.

This publication will be revised biennially. In January 2025, a Critical Update with important updates for this publication will be communicated through the above website.

These recommendations were prepared and reviewed by individuals from Cornell University, University of Delaware, Delaware State University, University of Maryland, Penn State, Rutgers University, Virginia Tech, and West Virginia University with the purpose of providing up to date information for commercial vegetable growers in the Mid-Atlantic states of **Delaware, Maryland, New Jersey, Pennsylvania, Virginia,** and **West Virginia**.

Disclaimer

- The label is a legally-binding contract between the pesticide 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.

F. Commodity Recommendations

Pesticide Use Disclaimer

THE LABEL IS THE LAW

A pesticide applicator is legally bound by the labeling found on and with the pesticide container in their possession. Before using a pesticide, check and always follow the labeling distributed with the product at the point of sale for legally enforceable rates and use restrictions and precautions.
Although labels are available on the Internet from electronic label services such as Proagrica's CDMS (*https://www.cdms.net/*), Greenbook (*https://www.greenbook.net*), or Agworld DBX powered by Agrian (*https://www.agrian.com/labelcenter/results.cfm)* the information contained in these electronic labels may not be identical to the labeling distributed with the product. **Please be advised that these electronic label services provide use disclaimers, and in some cases legally binding *User Agreements* assigning ALL liability to user of service. (**See section D 3.1. Labels and Labeling for more detail.)

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

1. Pesticides are listed by **group number or code based on chemical structure and mechanism of action**, as classified by the Herbicide Resistance Action Committee (**HRAC**, *https://hracglobal.com*) for herbicides, the Insecticide Resistance Action Committee (**IRAC**, *https://irac-online.org*) for insecticides, and the Fungicide Resistance Action Committee (**FRAC,** *https://www.frac.info/*) for fungicides. **In this guide, if the group number or code is in bold font, there are resistance concerns for the product.**
2. **Restricted use pesticides** are marked with a * in the Tables. These products may only be used by certified and/or licensed pesticide applicators, and when stated on the label, those making applications under their direct supervision. Some labels may restrict use solely to certified and/or licensed applicators. (See section D 3.2.1 Restricted Use Classification Statement for more detail).
3. **In addition to the pesticide products listed in the Commodity Recommendations below, other formulations or brands with the same active ingredient(s) may be commercially available. ALWAYS CHECK THE LABELING ON THE PRODUCT CONTAINER ITSELF:**
   a) to ensure a pesticide is labeled for the same intended use,
   b) to ensure the pesticide is labeled for the desired crop,
   c) for differences in application rates and % active ingredient(s), and
   d) additional restrictions.
4. All pesticide recommendations contained in this document are prescribed for spray applications to a **broadcast area of 1 acre** (43,560 square feet). **Adjust the rate accordingly for banded applications** (See section E 1.3. Calibrating Granular Applicators) **or for chemigation** (check labels for amounts per 1,000 feet).
5. Check the physical product label for and do not exceed 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 the crop if bees are present; H=highly toxic, severe losses expected, -- = data not available.
7. In accordance with the USDA National Organic Program, the Organic Materials Research Institute (OMRI) maintains a directory of all products that OMRI has determined are allowed for use in organic production, processing, and handling. These products are catalogued online in the **OMRI Products List** (see *https://www.omri.org/omri-lists*).

Summer Squash

Recommended Varieties

Type	Variety[1] (all hybrids)	Reported Disease Resistance[2]					Comments[3]
		CMV	WMV2	ZYMV	PRSV	PM	
Scallop	Flying Saucer						Yellow and Green Fruit
	Jaune et Verte						Light Green Fruit
	Lemon Sun						Bright Yellow
	Peter Pam						Light Green Fruit
	Starship						Dark Green Fruit
	Sunburst						Bright Golden Yellow Fruit
Specialty	Eight Ball		I	I		I	Round Green fruit
	One Ball						Golden Yellow Round Fruit
	Summer Ball						Golden Yellow Round Fruit
Yellow Straightneck	Conqueror III	R	R	R	I	I	Green Stem
	Cougar	I	I	I	I		Precocious Yellow
	Enterprise						Green Stem (pale yellow fruit)
	Fortune						Precocious Yellow
	Grandprize		I	I		I	Green Stem
	Lioness	I	I	I	I		Green Stem
	Multipik						Precocious Yellow
	Smooth Criminal						Green Stem
	Superpik						Precocious Yellow
	Supersonic						Precocious Yellow
	XPT 1832 III	I	I	I			Precocious Yellow
Yellow Crookneck	Destiny III	I	I	I			Yellow
	Gentry						Tolerant to High Temperatures
	Gold Star	I				I	Green Stem
	Prelude II	I	I	I		I	Green Stem
	Superset	I	I				Precocious Yellow
Green Zucchini	Cashflow			I			Medium Green Fruit
	Dunja		I	I	I	I	Medium Green Fruit
	Green Machine	I	I	I		I	Medium Green Fruit
	Payout	I	I	I	I	I	Medium Green Fruit
	Payroll		I	I		I	Medium Green Fruit
	Respect		I	I	I	I	Medium-Dark Green Fruit
	Reward	I	I	I		I	Medium-Dark Green Fruit
	Spineless Beauty						Medium Green fruit, Not for late season
	Spineless Perfection		I	I		I	Medium Green Fruit
	Spineless Supreme	I	I	I	I	I	Medium-Dark Green Fruit
	SV0914YG	R	R	R	I	I	Medium-Dark Green Fruit
	Tigress		I	I	I		Medium Green Fruit
	Tribute		I	I	I	I	Dark Green with Flecks Fruit
	Zucchini Elite						Medium Green Fruit, Not for late season
Golden Zucchini	Golden Dawn III						Green Stem
	Golden Delight		I	I			Green Stem
	Golden Glory		I	I		I	Green Stem
	Golden Rod	I	I				Green Stem
	Gold Rush						Green Stem
	Sebring					I	Green Stem

[1]**Listed alphabetically within type**; recommended for DE, MD, NJ, PA, VA, and WV. Additional information is based on seed manufacturer and/or seed distributor claims; consult seed vendor for maturity/days to harvest. [2]CMV=Cucumber Mosaic Virus, WMV2=Watermelon Mosaic Virus 2, ZYMV=Zucchini Yellow Mosaic Virus, PRSV=Papaya Ring Spot Virus, PM=Powdery Mildew. I=Intermediate and R=High Resistance. Transgenic resistance of specific varieties can be found by consulting the seed manufacturer or distributor. [3]In yellow-fruited summer squash the precocious yellow gene confers tolerance to CMV and WMV2 as compared to the green stem counterpart. Varieties expressing the precocious yellowing gene will mask the greening of fruit caused by WMV and CMV but will become bumpy and/or distorted when infected with either PRSV or ZYMV. **All 4 viruses may be detected at some level in squash fields in our region in any given year, therefore it is best to plant varieties with resistance to more than one virus, especially in later plantings when virus transmission by aphids increases. In some years aphids transmitting viruses may also be a factor in spring plantings. Virus resistance and PM resistance are recommended for fall/late planted varieties.**

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 chapter B Soil and Nutrient Management. Your state's soil test report recommendations and/or your farm's nutrient management plan supersede recommendations found below.

		Soil Phosphorus Level				Soil Potassium Level				
		Low	Med	High (Opt)	Very High	Low	Med	High (Opt)	Very High	
Summer Squash [1,2]	**N (lb/A)**	**P_2O_5 (lb/A)**				**K_2O (lb/A)**				**Nutrient Timing and Method**
	75-100	150	100	50	0[3]	200	150	100	0[3]	Total nutrient recommended
	25-50	150	100	50	0[3]	200	150	100	0[3]	Broadcast and disk-in
	50	0	0	0	0	0	0	0	0	Sidedress and fertigate when vines start to run
	25-30	0	0	0	0	0	0	0	0	Apply through irrigation system

[1]Apply 1-2 lb/A of boron (B) with broadcast fertilizer.; see also Table B-7. in chapter B Soil and Nutrient Management. [2]Apply 20-30 lb/A of sulfur (S) for most soils. [3]In VA, crop replacement values of 25 lb/A of P_2O_5 and 50 lb/A of K_2O are recommended on soils testing Very High.

Seed Treatment

Check the seed container label or consult with the seed manufacturer to confirm if seed has been treated with insecticide and/or fungicide; see also Disease Control below.

Seeding, Transplanting, and Spacing

Seed April 15 through August 15 in warmer, southern regions of the Mid-Atlantic, May 1 to August 10 in Southern NJ, and May 10 to August 1 in PA, Northern NJ, and other cool areas of the region. Use 4-6 lb/A of seed, or 3,500-4,500 seed/A. Transplants plants are planted through plastic mulch when daily mean temperatures have reached 60°F (16°C). Early planting dates vary from April 15 in southern regions to June 1 in northern areas. Early plantings should be protected from winds with low tunnels, hot caps, tents, or floating row covers. Space rows 5-6 ft apart with plants 2-3 ft apart in the row.

Field Preparation

Plastic mulch and fumigant should be applied to well-prepared, moist soil 30 days before field planting. Plastic mulch helps conserve soil moisture, increases soil temperature, and may increase early and total yields. Various widths of plastic are available to accommodate different production systems and equipment.

Fumigation may be necessary when there is a history of soil-borne diseases. The type of fumigant depends on the predominant pest. Several fumigants can be used on summer squash. Fumigation also aids in the control of weeds, though fumigation alone may not be adequate for weed control under plastic mulch (black plastic or paper may be used without additional herbicides, however, may not control yellow nutsedge). Foil mulches can be used to repel aphids that transmit Mosaic Virus in fall planted squash (after July 1). Direct seeding through reflective mulch is recommended for maximum virus protection.

Fertilizer must be applied during bed preparation. At least 50% of the N should be in the nitrate (NO_3^{-1}) form. Consider drip irrigation (more information in chapter C. Irrigation Management).

Pollination (see also sections A 12. Pollination and D 6.3.1. Protection of Pollinators).

Honeybees, squash bees, bumble bees and other wild bees are important for pollination and fruit set. Populations of pollinating insects may be adversely affected by insecticides applied to flowers or weeds in bloom. Apply insecticides only in the evening hours or wait until blooms are closed before application. Read the pesticide label for specific directions to protect pollinators. Check the pesticide tables below for toxicity to bees.

Harvest and Post-Harvest Considerations

Zucchini and summer squash are harvested after fruit reach the desired size but before they form hard seeds or hard rinds. Size is highly dependent on market demands. Crook-neck and straight-neck squash and zucchini should be 1.25-2 inches in diameter. Straight-neck squash and zucchini should be 7-8 inches long. Scallop squash should be 3-4 inches in diameter. For USDA Agricultural Marketing Service grading standards see:
https://www.ams.usda.gov/grades-standards/summer-squash-grades-and-standards

Summer squash and zucchini are delicate and prone to bruising and scratching. Handle with care when harvesting, grading, and packing. Squash should be stored at 41-50°F (5-10°C) and 95% relative humidity. The typical shelf life is 7-14 days. Summer squash is highly sensitive to freezing injury and will show pitting on the skin if exposed to temperatures below 41°F (5°C). Do not store, or transport with, ethylene producing crops.

Weed Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F.

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-3) in Chapter E Pest Management.

2. Minimize herbicide resistance development. Identify the herbicide mode of action group number and follow recommended good management practices; **bolded group numbers in tables below are herbicides at higher risk for selecting resistant weed populations.** Include non-chemical weed control whenever possible.

Labeled Application Sites for Summer Squash

Herbicide (*=Restricted Use)	HRAC group number	Plastic mulch production					Bareground production		
		Soil-Applied		Postemergence					
		Under Plastic	Row Middles	Over Plastic	Row Middles	Post-Harvest	Soil-applied	POST	Post-harvest
Sandea	2		YES		YES				
Curbit	3		YES				YES		
Prefar	8	YES	YES				YES		
Command	13		YES				YES		
Strategy	3 + 13		YES				YES		
Reflex[1]	14	YES	YES		YES		YES		
Selec / Select Max Shadow 3EC	1			YES				YES	
Poast	1			YES				YES	
Gramoxone*[1]	22				YES		YES[2]		YES

[1] Special Local Needs Label 24(c), be sure it is registered for the specific state and for the intended use.
[2] Apply preplant or after seeding but prior to crop emergence.

1.Pre-Transplant Over Plastic

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
10	Rely 280 2.34L	29 to 43 fl oz/A	**glufosinate**	0.53 to 0.79 lb/A	14	12

-**Supplemental label expires 12/1/2025 for application over plastic prior to transplanting.**
-Ammonium sulfate (AMS) can be used at 1.5 lb/A to 3 lb/A.
-Control is best when applied to weeds less than 4 inches, temperatures are above 80, high humidity, and bright sunlight.
-Transplants can be injured if they come in contact with herbicide remaining on the plastic. Allow at least 3 days between application and transplanting. At least 0.5 inches of precipitation is needed to wash Rely off the plastic. Do not transplant within 27 days of application if no precipitation occurs.
-DO NOT transplant into or within 6 inches of holes in the plastic mulch that were present at time of application.
-Two applications can be made prior to transplanting. Do not apply more than 64 fl oz/A prior to transplanting; maximum number of applications is three per season. -Rainfastness is 4 h.

22	Gramoxone SL 2.0* Gramoxone SL 3.0*	2 to 4 pt/A 1.3 to 2.7 pt/A	**paraquat**	0.5 to 1.0 lb/A	--	24

-Gramoxone can be used for preplant weed control over the top of plastic mulch. Sufficient rainfall or sprinkler irrigation is needed to wash off the Gramoxone prior to planting to prevent damage to the crop.
-***Restricted-use pesticide***. Only certified applicators, who successfully complete the paraquat-specific training, can mix, load, or apply paraquat. Application of paraquat "under the direct supervision" of a certified applicator is no longer allowed. Required training link (*https://campus.extension.org/enrol/index.php?id=2201*); certified applicators must repeat training every three years.
-Do not exceed 8 pt/A per season. Rainfastness is 30 min.

2. Soil-Applied

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
2	Sandea 75DF	0.5 to 1 oz/A	**halosulfuron**	0.023 to 0.047 lb/A	30	12

-**Plasticulture**: can be applied in a band under the plastic, immediately before laying the mulch; delay seeding or transplanting for 7 days after application. 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.
-**Bareground**: apply broadcast after seeding but before crop emergence or no sooner than 7 days before transplanting.

2. Soil-Applied (Sandea) - continued next page

2. Soil-Applied (Sandea) - continued

-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. -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. -Maximum number of Sandea applications per year is 2 and **do not** exceed 2 oz/A during the crop season.						
3	Curbit 3EC	1 to 3 pt/A	**ethalfluralin**	0.38 to 1.12 lb/A	--	24
-**Plasticulture**: row middles only: apply as a banded spray after crop emergence or transplanting. **Do not** soil incorporate. -**Bareground**: apply broadcast after direct-seeding but prior to crop emergence; **do not** use on transplanted crop. -Controls annual grasses and certain annual broadleaf weeds, including carpetweed and pigweed sp. -Use lower rate for coarse-textured soils or soils with low organic matter. -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. -Available as a pre-mix herbicide Strategy. Strategy at 3 pt/A= Curbit at 26 fl oz/A (0.6 lb ai) and Command at 8 fl oz/A (0.188 lb ai) -Maximum applications per season: not specified						
8	Prefar 4E	5 to 6 qt/A	**bensulide**	5 to 6 lb/A	--	12
-**Plasticulture** under plastic: apply in a band under the plastic, immediately before laying the mulch. Allow 7 days before making transplant holes to allow condensation to incorporate the herbicide. Plasticulture: row middles application is labeled. -**Bareground**: apply preemergence or preplant incorporated. -Preemergence applications should be followed by irrigation within 36 h (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). -Provides control/suppression of some annual grass weeds and some broadleaves including pigweeds, purslane, and lambsquarters. -**Do not** apply more than 6 lb ai/A per season.						
13	Command 3ME	0.67 to 1.33 pt/A	**clomazone**	0.25 to 0.5 lb/A	45	12
-**Plasticulture**: row middles application only. -**Bareground**: apply broadcast just before planting but before crop emergence, or just before transplanting. -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. -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). -**WARNINGS**: Command spray *or* vapor drift may injure sensitive crops and other vegetation up to several hundred yards from the point of application. **Do not** apply adjacent to sensitive crops (see label) or vegetation, or under unfavorable wind or weather conditions. Command may limit subsequent cropping options, see the label. -Available as a pre-mix herbicide Strategy: Strategy at 3 pt/A= Command at 8 fl oz/A (0.188 lb ai) and Curbit at 26 fl oz/A (0.6 lb ai) -Maximum number of Command applications per year: 1						
3 + 13	Strategy 2.1SC	1.5 to 4 pt/A	**ethalfluralin *plus* clomazone**	0.39 to 1.05 lb/A	45	24
-**Plasticulture**: row middles application only. -**Bareground**: apply broadcast just before planting or after planting but before crop emergence. -Strategy is a prepackage mixture of Curbit 3EC and Command 3ME. -Clomazone spray or vapor drift may injure susceptible crops and other vegetation, refer to Command 3ME for comments. -**Do not** apply prior to planting the crop. **Do not** soil incorporate. Refer to individual products for comments. -Certain crop varieties may have the potential for injury or loss with this product. Consult qualified crop advisors for information pertaining to varieties in your area. -Maximum applications per season: not specified.						
14	Reflex 2SL	8 fl oz/A	**fomesafen**	0.13 lb/A	32	24
-Special Local Needs Label 24(c) for the use of Reflex 2SL in DE and NJ, pending in PA (expires 12/31/2025 in DE and 12/31/2027 in NJ). The use of this product is legal ONLY if a waiver of liability has been completed (see: *https://www.syngenta-us.com/labels/indemnified-label-login*). -**Labeled for straight neck yellow, crooked neck yellow, and zucchini types only**. -**Plasticulture** under plastic: apply in a band under the plastic, immediately before laying the mulch. pre-transplant applications over the plastic mulch is labeled; row middles application is labeled. -**Bareground**: apply broadcast within 24 h after direct-seeding and follow with 0.2 to 0.5 inches of overhead irrigation at least 36 h before the crop begins to crack through the soil. For transplants, apply Reflex and then irrigate with 0.2 to 0.5 inches of water and then transplant. **Do not** prepare transplant holes until after Reflex application and irrigation. -Foliar application of Reflex will severely damage or kill squash. The potential of crop injury is greater on lighter textured soils combined with intensive irrigation programs or high amounts of rainfall, therefore, adjust rates accordingly. -Reflex provides both residual and postemergence control of susceptible weed species. Effective postemergence control requires an adjuvant. Summer squash varieties may vary in their response to Reflex; therefore, treat small acreages first to determine crop tolerance, especially when applying to a new variety. -Reflex rates lower than 16 fl oz/A may not provide full-season control and should be used with other herbicides and/or other methods of weed control. The rate for squash is only 8 fl oz/A and will only provide a few weeks of control. -Consider rotational crops when applying fomesafen. If the crop is replanted, **do not** re-apply Reflex. Refer to 24(c) label for specifics on rotational restrictions. Maximum for Reflex application is 24 fl oz/A **IN ALTERNATE YEARS.**						

3. Postemergence

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
1	Shadow 3EC Select 2EC Select Max 0.97EC	4 to 5.33 fl oz/A 6 to 8 fl oz/A 9 to 16 fl oz/A	**clethodim**	0.07 to 0.125 lb/A	14	24
	Poast 1.5EC	1 to 1.5 pt/A	**sethoxydim**	0.19 to 0.28 lb/A	14	12

-**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). **Shadow 3EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution) for large or stressed grasses; use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution) when crop safety is a concern. **Poast**: use 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 NIS when grasses are small and soil moisture is adequate.
-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 Poast is preferred for goosegrass control. For best results, treat annual grasses when they are actively growing and before tillers are present. Control may be reduced if grasses are large or under hot or dry weather conditions. -Repeated applications may be necessary to control certain perennial grasses. If repeat applications are necessary, allow 14 days between applications. Rainfastness is 1 h.
-**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. **Do not** apply more than 8 fl oz/A 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/A of Select Max in a single application and **do not** exceed 64 fl oz/A for the season.
-**Do not** apply more than 5.33 fl oz/A of Shadow 3EC in a single application and **do not** exceed 21.33 fl oz/A for the season
-**Do not** apply more than 1.5 pt/A Poast in a single application and **do not** exceed 3 pt/A for the season.

2	Sandea 75DF	0.5 to 1 oz/A	**halosulfuron**	0.023 to 0.047 lb/A	30	12

-**Plasticulture**: row middles application only.
-**Bareground**: broadcast for bareground. Apply Sandea after the crop has at least 3 to 5 true leaves but before first female flowers appear and no sooner than 14 days after transplanting. If weeds have emerged, use a non-ionic surfactant at 0.25% v/v 1qt/100 gal).
-Suppresses or controls yellow nutsedge and certain broadleaf; control of weeds taller than 3 inches may not be adequate. Sandea will not control common lambsquarters or eastern black nightshade if applied postemergence; for row middle application, tank mix with a non-selective herbicide to increase spectrum of control. Sandea provides both residual and postemergence control of susceptible weed species. Effective postemergence control requires an adjuvant.
-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.
-Rainfastness is 4 h. Maximum number of Sandea applications per year is 2 and **do not** exceed 2 oz/A during the crop season

10	Rely 280 2.34L	29 to 62 fl oz/A	**glufosinate**	0.53 to 1.13 lb/A	14	12

-**Supplemental Label expires 12/1/2025 for hooded spray application between the rows.** If the crop is planted without plastic, do not spray within 6 inches of running vines. -Ammonium sulfate (AMS) can be used at 1.5 lb/A to 3 lb/A.
-Do not allow spray to come in contact with crop foliage or damage will occur.
-Control is best when applied to weeds less than 4 inches, temperatures are above 80, high humidity, and bright sunlight.
-Separate sequential applications by at least 14 days. -Do not apply more than 62 fl oz/A in a single application, do not apply more than 87 fl oz/A per season; maximum number of applications is three per season. -Rainfastness is 4 h.

22	Gramoxone SL 2.0* Gramoxone SL 3.0*	1.95 pt/A 1.3 pt/A	**paraquat**	0.49 lb/A	14	24

-**Supplemental Label for the use of Gramoxone 2SL or 3SL 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 min.
-A maximum of 3 applications per year are allowed.
-***Restricted-use pesticide***. Only certified applicators, who successfully complete the paraquat-specific training, can mix, load, or apply paraquat. Application of paraquat "under the direct supervision" of a certified applicator is no longer allowed. Required training link (*https://campus.extension.org/enrol/index.php?id=2201*); certified applicators must repeat training every three years.

4. Other Labeled Herbicides

These products are labeled but limited local data are available; and/or are labeled but not recommended in our region due to potential crop injury concerns.

Group	Product Name (*=Restricted Use)	Active Ingredient
14	Aim	**carfentrazone**
14	Vida	**pyraflufen**

Insect Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F. Recommended Insecticides

Seed and At-Plant Treatments for Seedcorn Maggot

Farmore DI-400 as a commercially applied seed treatment which contains thiamethoxam (Group 4A).
Verimark (cyantraniprole, Group 28) treatment at planting is also labeled.
Note: The use of neonicotinoid insecticides (Group 4A) at planting may help reduce seedcorn maggot populations.
See also Maggots in section E 3.1. Soil Pests - Detection and Control.

Aphids

Aphids transmit multiple viruses. Cultivars resistant to multiple aphid-transmitted viruses are available.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV*	1.5 to 3.0 pt/A	methomyl - **- melon aphid only**	1-3	48	H
1A	Vydate L	2.0 to 4.0 pt/A	oxamyl - **foliar**	1	48	H
1B	Malathion 57 EC	1.5 pt/A	malathion	1	24	H
4A	Neonicotinoid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
4C	Transform WG	0.75 oz/A	sulfoxaflor	1	24	H
4C + 3A	Ridgeback*	5.5 to 13.8 fl oz/A	sulfoxaflor + bifenthrin	3	24	H
4D	Sivanto Prime or 200SL	21.0 to 28.0 fl oz/A	flupyradifurone - **soil/drip**	21	4	M
4D	Sivanto Prime or 200SL	7.0 to 14.0 fl oz/A	flupyradifurone - **foliar**	1	4	M
9B	Fulfill	2.75 oz/A	pymetrozine	0	12	L
9B	PQZ	2.4 to 3.2 fl oz/A	pyrifluquinazon	1	12	L
9D	Sefina	3.0 fl oz/A	afidopyropen	0	12	L
21A	Torac	17.0 to 21.0 fl oz/A	tolfenpyrad	1	12	H
28	Exirel	7.0 to 20.5 fl oz/A	cyantraniliprole	1	12	H
28	Verimark	Soil, at planting: 10 to 13.5 fl oz/A Drip chemigation: 10 fl oz/A	cyantraniliprole	1	4	H
28	Harvanta 50SL	10.9 to 16.4 fl oz/A	cyclaniliprole	1	4	H
28 + 6	Minecto Pro*	10.0 fl oz/A	cyantraniliprole + abamectin	7	12	H
29	Beleaf 50 SG	Foliar: 2.0 to 2.8 oz/A Drip: 2.8 to 4.28 oz/A	flonicamid	0	12	L

Armyworms (AW) and Cabbage Loopers (CL)

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV*	1.5 to 3.0 pt/A	methomyl	1-3	48	H
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
5	Entrust SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A	spinetoram	3	4	M
6	Proclaim 5SG*	3.0 to 4.8 oz/A	emamectin benzoate	7	12	H
11A	Dipel DF, others (OMRI)	0.5 to 2.0 lb/A	*Bacillus thuringiensis kurstaki*	0	4	N
11A	XenTari (OMRI)	0.5 to 2.0 lb/A	*Bacillus thuringiensis aizawai*	0	4	N
15	Rimon 0.83EC	9.0 to 12.0 fl oz/A	novaluron	1	12	M
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	3	4	L
22	Avaunt 30WDG, Avaunt eVo	2.5 to 6.0 oz/A	indoxacarb	3	12	H
28	Coragen 1.67SC Coragen eVo	3.5 to 7.5 fl oz/A 1.2 to 2.5 fl oz/A	chlorantraniliprole	1	4	L
28	Exirel (AW)	7.0 to 17.0 fl oz/A	cyantraniliprole	1	12	H
28	Verimark	6.75 to 13.5 fl oz/A	cyantraniliprole	1	4	H
28	Harvanta 50SL	10.9 to 16.4 fl oz/A	cyclaniliprole	1	4	H
28 + 4A	Voliam Flexi **(CL only)**	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole	1	12	H
28 + 6	Minecto Pro*	7.5 to 10.0 fl oz/A	cyantraniliprole + abamectin	7	12	H

Cucumber Beetles

Both striped (*Acalymma vittatum*) and spotted (*Diabrotica undecimpuctata howardii*) cucumber beetles are found in the Mid-Atlantic states. Both species can severely defoliate young seedlings and transmit bacterial wilt, though losses from this disease vary greatly between fields and varieties. Young plants need to be protected to manage bacterial wilt. If adult beetles are abundant and there is a disease history, insecticides should be applied before beetles feed extensively on the cotyledons and first true leaves. If foliar insecticides are used, begin spraying shortly after plant emergence and repeat applications at weekly intervals if new beetles continue to invade fields. Treat when an average of 1 beetle per two plants is found. Kaolin clay (Surround WP) does not kill the beetles but acts as a physical deterrent to early season beetle feeding. **Note:** some populations of striped cucumber beetles on Delmarva may exhibit reduced susceptibility to pyrethroids.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV*	1.5 to 3.0 pt/A	methomyl	1-3	48	H
1A	Sevin XLR Plus	1.0 qt/A	carbaryl	3	12	H
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
4A	Neonicotinoid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
28	Verimark	Soil, at planting: 13.5 fl oz/A; Drip chemigation: 10 fl oz/A	cyantraniliprole	1	4	H
28	Harvanta 50SL	10.9 to 16.4 fl oz/A	cyclaniliprole	1	4	H

Cutworms See also section E 3.1. Soil Pests - Detection and Control.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV* (granulate cutworm)	1.5 to 3.0 pt/A	methomyl	1-3	48	H
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					

Leafminers

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
4A	Neonicotinoid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
5	Entrust SC (OMRI)	6.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant SC	6.0 to 10.0 fl oz/A	spinetoram	3	4	M
6	Agri-Mek SC*	1.75 to 3.5 fl oz/A	abamectin	7	12	H
15	Rimon 0.83EC	9.0 to 12.0 fl oz/A	novaluron	1	12	M
17	Trigard 75WSP	2.66 oz/A	cyromazine	0	12	H
28	Coragen 1.67SC Coragen eVo	5.0 to 7.5 fl oz/A 1.7 to 2.5 fl oz/A	chlorantraniliprole	1	4	L
28	Exirel	13.5 to 20.5 fl oz/A	cyantraniliprole	1	12	H
28	Verimark	6.75 to 13.5 fl oz/A	cyantraniliprole	1	4	H
28	Harvanta 50SL	10.9 to 16.4 fl oz/A	cyclaniliprole	1	4	H
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. CAUTION: DO NOT mow or maintain these areas after midsummer to prevent mites from moving into the crop. Localized infestations can be spot treated. Begin treatment when 10 to 15% of the crown leaves are infested early in the season.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
6	Agri-Mek SC*	1.75 to 3.5 fl oz/A	abamectin	7	12	H
10B	Zeal Miticide	2.0 to 3.0 oz/A	etoxazole	7	12	L
20B	Kanemite 15SC	31.0 fl oz/A	acequinocyl	1	12	L
20D	Acramite 50WS	0.75 to 1.0 lb/A	bifenazate	3	12	M
21A	Magister SC	24.0 to 36.0 fl oz/A	fenazaquin	3	12	H
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
N/A	Sulfur 80WG (OMRI)	5 to 25 lb/A	sulfur	0	24	M

Melonworms, Pickleworms

Apply one of the following formulations. 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 application frequency.						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV*	1.5 to 3.0 pt/A	methomyl	1-3	48	H
1A	Sevin XLR Plus	0.5 to 1.0 qt/A	carbaryl	3	12	H
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
5	Entrust SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A	spinetoram	3	4	M
6	Proclaim 5SG*	3.0 to 4.8 oz/A	emamectin benzoate	7	12	H
11A	XenTari (OMRI)	0.5 to 1.0 lb/A	*Bacillus thuringiensis aizawai*	0	4	N
11A	Dipel DF, others (OMRI) **(MW)**	0.5 to 2.0 lb/A	*Bacillus thuringiensis kurstaki*	0	4	N
15	Rimon 0.83EC	12.0 fl oz/A	novaluron	1	12	M
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	3	4	L
22	Avaunt 30WDG, Avaunt eVo	2.5 to 6.0 oz/A	indoxacarb	3	12	H
28	Coragen 1.67SC Coragen eVo	2.0 to 7.5 fl oz/A 0.7 to 2.5 fl oz/A	chlorantraniliprole	1	4	L
28	Exirel	7.0 to 13.5 fl oz/A	cyantraniliprole	1	12	H
28	Verimark	5.0 to 10.0 fl oz/A	cyantraniliprole	1	4	H
28	Harvanta 50SL	10.9 to 16.4 fl oz/A	cyclaniliprole	1	4	H
28 + 4A	Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole	30	12	H
28 + 4A	Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole	1	12	H
28 + 6	Minecto Pro*	5.5 to 10.0 fl oz/A	cyantraniliprole + abamectin	7	12	H

Rindworms

In addition to the above specified Lepidopteran pests, various species may feed on rinds, including, but not limited to corn earworm, leafrollers, webworms, and beet armyworm. Proper pest identification is important because not all species that cause rind feeding damage are susceptible to pyrethroids.

For Lepidopteran Rindworms, apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
5	Entrust SC (OMRI)	4.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A	spinetoram	3	4	M
6	Proclaim 5SG*	3.0 to 4.8 oz/A	emamectin benzoate	7	12	H
11A	XenTari (OMRI)	0.5 to 1.0 lb/A	*Bacillus thuringiensis aizawai*	0	4	N
18	Intrepid 2F	4.0 to 10.0 fl oz/A	methoxyfenozide	3	4	L

Squash Bugs

Treat if more than 1 egg mass per plant is present. Target the nymphal stages. Under leaf spray coverage is essential.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Sevin XLR Plus	1.0 qt/A	carbaryl	3	12	H
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
4A	Neonicotinoid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
4D	Sivanto Prime or 200SL	10.5 to 14.0 fl oz/A	flupyradifurone - **foliar**	1	4	M

Squash Vine Borers

When vines begin to run, apply one of the following formulations to bases of plants 4 times at 7-day intervals. Pheromone traps for squash vine borer are commercially available. These traps can be used to indicate when moth activity begins. **Note:** Use of chlorantraniliprole, spinosad, or spinetoram for looper control will reduce squash vine borer populations.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					

Thrips

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Vydate L	2.0 to 4.0 pt/A	oxamyl - **foliar**	1	48	H
3A[1]	Pyrethroid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
4A[2]	Neonicotinoid insecticides registered for use on Summer Squash: see table at the end of Insect Control.					
4C	Transform WG	2.5 oz/A	sulfoxaflor - s*uppression only*	1	24	H
5	Entrust SC (OMRI)	6.0 to 8.0 fl oz/A	spinosad	3	4	M
5	Radiant SC	6.0 to 10.0 fl oz/A	spinetoram	3	4	M
15	Rimon 0.83EC	12.0 fl oz/A	novaluron	1	12	M
21A	Torac	21.0 fl oz/A	tolfenpyrad	1	12	H
28	Harvanta 50SL	10.9 to 16.4 fl oz/A	cyclaniliprole - s*uppression only*	1	4	H
28 + 6	Minecto Pro*	10.0 fl oz/A	cyantraniliprole + abamectin - s*uppression only*	7	12	H
29	Beleaf 50SG	Drip: 2.8 to 4.28 oz/A	flonicamid	0	12	L

[1]Resistance concerns with western flower thrips [2]Resistance concerns with tobacco thrips

Group 3A Pyrethroid Insecticides Registered for Use on Summer Squash

Apply one of the following formulations (check if the product label lists the insect you intend to spray; the label is the law):					
Product Name (*=Restricted Use)	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
Asana XL*	5.8 to 9.6 fl oz/A	esfenvalerate	3	12	H
Baythroid XL*	0.8 to 2.8 fl oz/A	beta-cyfluthrin	0	12	H
Brigade 2EC*, others	2.6 to 6.4 fl oz/A	bifenthrin	3	12	H
Danitol 2.4EC*	10.67 to 16.0 fl oz/A	fenpropathrin	7	24	H
Declare*	1.02 to 1.54 fl oz/A	gamma-cyhalothrin	1	24	H
Hero*	4.0 to 10.3 fl oz/A	zeta-cypermethrin + bifenthrin	3	12	H
Lambda-Cy 1EC*, others	2.56 to 3.84 fl oz/A	lambda-cyhalothrin	1	24	H
Mustang Maxx*	1.28 to 4.0 fl oz/A	zeta-cypermethrin	1	12	H
Permethrin 3.2EC*, others	4.0 to 8.0 fl oz/A	permethrin	0	12	H
Tombstone*	0.8 to 2.8 fl oz/A	cyfluthrin	0	12	H
Warrior II*	1.28 to 1.92 fl oz/A	lambda-cyhalothrin	1	24	H
Combo products containing a pyrethroid					
Besiege*	6.0 to 9.0 fl oz/A	lambda-cyhalothrin + chlorantraniliprole (Group 28)	1	24	H
Endigo ZC and ZCX*	4.0 to 4.5 fl oz/A	lambda-cyhalothrin + thiamethoxam (Group 4A)	1	24	H
Ridgeback*	5.5 to 13.8 fl oz/A	bifenthrin + sulfoxaflor (Group 4C)	3	24	H
Savoy EC*	6.0 to 12.9 fl oz/A	bifenthrin + acetamiprid	7	12	H

Group 4A Neonicotinoid Insecticides Registered for Use on Summer Squash

Apply one of the following formulations (check if the product label lists the insect you intend to spray; the label is the law)**:**					
Product Name (*=Restricted Use)	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
Admire Pro	7.0 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
Assail 30SG Assail 30SC	2.5 to 5.3 oz/A 2.1 to 4.5 fl oz/A	acetamiprid	0	12	M
Belay 2.13SC	9.0 to 12.0 fl oz/A	clothianidin - **soil/drip**	21	12	H
Belay 2.13SC	3.0 to 4.0 fl oz/A	clothianidin - **foliar** (PHI note: do not make application after 4th true leaf has unfolded)	see note	12	H
Actara 25WDG	1.5 to 5.5 oz/A	thiamethoxam	0	12	H
Platinum 75SG	1.7 to 3.7 oz/A	thiamethoxam	30	12	H
Scorpion 35SL	9.0 to 10.5 fl oz/A	dinotefuran - **soil/drip**	21	12	H
Scorpion 35SL	2.0 to 7.0 fl oz/A	dinotefuran - **foliar**	1	12	H
Venom 70SG	5.0 to 7.5 oz/A	dinotefuran - **soil/drip**	21	12	H
Venom 70SG	1.0 to 4.0 oz/A	dinotefuran - **foliar**	1	12	H
Combo products containing a neonicotinoid					
Durivo	10.0 to 13.0 fl oz/A	thiamethoxam + chlorantraniliprole (Group 28)	30	12	H
Endigo ZC* and ZCX*	4.0 to 4.5 fl oz/A	thiamethoxam + lambda-cyhalothrin (Group 3A)	1	24	H
Savoy EC*	6.0 to 12.9 fl oz/A	acetamiprid + bifenthrin (Group 3A)	7	12	H
Voliam Flexi	4.0 to 7.0 oz/A	thiamethoxam + chlorantraniliprole (Group 28)	1	12	H

Disease Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F. Recommended Fungicides

Nematodes

See also sections E 1.5. Soil Fumigation and E 1.6. Nematode Control. Use fumigants listed in section E 1.5., or nematicides listed below. Consult the label.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
1A	Vydate L*	1.0 to 2.0 gal/A Incorporate into top 2-4 inches of soil, *OR* 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 4.16SC	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 480DP (4.5 fl oz /100 lb seed) and an approved commercially available insecticide.

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

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	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	1.0 to 2.0 pt/A	mefenoxam	5	48	N
4	Ultra Flourish 2E	2.0 to 4.0 pt/A	mefenoxam	5	48	N
4	MetaStar 2E AG	4.0 to 8.0 pt/A	metalaxyl	AP	48	N
49 + **4**	Orondis Gold[1]	28.0 to 55.0 fl oz/A	oxathiapiprolin + mefenoxam	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						
11	azoxystrobin 2.08F	0.40 to 0.80 fl oz/1000 ft row	azoxystrobin	1	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 hydrochloride	2	12	N

[1] May cause some yellowing in leaves

Bacterial and Fungal Diseases

Bacterial Wilt

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

Choanophora Fruit Rot

This disease occurs during warm wet weather and develops predominantly on flowers or fruit near the ground. Management is difficult because disease development is rapid, and weather dependent. Fungicide sprays are not effective because flowers, which open daily, must be protected immediately. Practices that reduce soil moisture or reduce soil contact, such as raised beds and plastic mulch, may be beneficial.

Downy Mildew

Scout fields early in the growing season. Begin sprays when plants meet in the row or if disease occurrence is predicted for the region (check the Cucurbit Downy Mildew Forecasting website at *https://cdm.ipmpipe.org/*. Strains of the Downy Mildew pathogen that infect one cucurbit crop may not affect summer squash. Unnecessary

fungicide application can be avoided by not spraying until disease is predicted in the region on watermelon. Preventative applications are much more effective than applications made after detection.

Materials with different FRAC codes should be alternated to reduce the chances for fungicide resistance development.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	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 spray interval may be reduced IF the label allows.						
TANK-MIX one of the following products with a protectant such as chlorothalonil 6F 1.5 to 2.0 pt/A:						
49 + 40	Orondis Ultra 2.33SC	5.5 to 8.0 fl oz/A	oxathiapiprolin + mandipropamid	0	4	--
49+M05	Orondis Opti	1.75 to 2.5 pt/A **contains protectant**	oxathiapiprolin + chlorothalonil	0	12	--
21	Ranman 400SC	2.10 to 2.75 fl oz/A (**do not apply with copper**; see label for details)[1]	cyazofamid	0	12	L
Other materials for use in rotation as tank mix partners with a protectant:						
28	Previcur Flex 6F	1.2 pt/A	propamocarb hydrochloride	2	12	N
43	Presidio 4SC	4.0 fl oz/A (**caution**: pathogen is now less sensitive to Presidio)	fluopicolide	2	12	L
40 + 45	Zampro 525SC	14.0 fl oz/A	dimethomorph + ametoctradin	0	12	--
22	Elumin 4SC	8.0 fl oz/A	ethaboxam	2	12	--
M03+22	Gavel 75DF	1.5 to 2.0 lb/A **contains protectant**	mancozeb + zoxamide	5	48	--
M05+22	Zing! 4.9SC	36 fl oz/A **contains protectant**	chlorothalonil + zoxamide	0	12	N
M05+27	Ariston 42SC	1.9 to 3.0 pt/A **contains protectant**	chlorothalonil + cymoxanil	3	12	--
11 + 27	Tanos 50DF	8.0 oz/A	famoxadone + cymoxanil	3	12	--
27	Curzate 60DF	3.2 to 5.0 oz/A	cymoxanil	3	12	N
29	Omega 500F	12.0 to 24.0 fl oz/A	fluazinam	7	12	N
40	Forum 4.17SC	6.0 fl oz/A	dimethomorph	0	12	N

[1]Ranman should be tank mixed with an organosilicone surfactant when disease is severe, or a non-ionic surfactant or blend of organosilicone and non-ionic surfactant disease is moderate or light.

Phytophthora Crown and Fruit Rot

Multiple practices should be used to minimize the occurrence of this disease. Rotate away from susceptible crops (such as peppers, eggplants, tomatoes, lima and snap beans, and other cucurbits) for as long as possible. Pre-plant fumigants will also suppress disease. Fields should be adequately drained to ensure that water does not accumulate around the base of the plant. Once the canopy closes, subsoil between the rows to allow for faster drainage following rainfall. **Materials with different modes of action (FRAC codes) should always be alternated to reduce the chances for fungicide resistance development.** Apply fungicides when conditions are favorable for disease development. Fruit are susceptible at all growth stages and must be protected season-long.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
Apply one of the following formulations pre-plant for early season control:						
4	MetaStar 2E AG	4.0 to 8.0 pt/A	metalaxyl	AP	48	N
4	Ridomil Gold 4SL	1.0 to 2.0 pt/A	mefenoxam	5	48	N
4	Ultra Flourish 2E	2.0 to 4.0 pt/A	mefenoxam	5	48	N
4 + 11	Uniform 3.66SE	0.34 fl oz/1000 ft row	mefenoxam + azoxystrobin	AP	0	N
28	Previcur Flex 6F	1.2 pt/A in transplant water, drip irrigation, or spray directed to the base of the plants and soil.	propamocarb hydrochloride	2	12	N
49 + **4**	Orondis Gold 1.67SC[1]	28.0 to 55.0 fl oz/A in furrow or by drip	oxathiapiprolin + mefenoxam	5	48	--
When conditions favor disease development, apply one of the following WITH FIXED COPPER at labeled rates (for suppression only):						
49 + 40	Orondis Ultra 2.33SC	5.5 to 8.0 fl oz/A	oxathiapiprolin + mandipropamid	0	4	--
49+M05	Orondis Opti	1.75 to 2.5 pt/A	oxathiapiprolin + chlorothalonil	0	12	--
40	Revus 2.08F	8.0 fl oz/A	mandipropamid	0	4	--
40 + 45	Zampro 525SC	14.0 fl oz/A	dimethomorph + ametoctradin	0	12	--
22	Elumin 4SC	8 fl oz/A	ethaboxam	2	12	--

Phytophthora Crown and Fruit Rot - continued next page

Phytophthora Crown and Fruit Rot - continued

43	Presidio 4SC[2]	4.0 fl oz/A	fluopicolide	2	12	L
M03+22	Gavel 75DF	1.5 to 2.0 lb/A	mancozeb + zoxamide	5	48	--
21	Ranman 400SC	2.75 fl oz/A (**do not apply with copper**; see label for details)[3]	cyazofamid	0	12	L
40	Forum 4.17SC	6.0 fl oz/A	dimethomorph	0	12	N
M05+22	Zing! 4.9SC	36 fl oz/A	chlorothalonil + zoxamide	0	12	N

[1]Do not follow soil applications of Orondis Gold 1.67SC with foliar applications of oxathiapiprolin-containing products. [2]Presidio may also be applied through the drip irrigation (see label). Soil drench followed by drip application has given good results in some trials on crown rot caused by *Phytophthora capsici*. [3]Ranman should be tank mixed with an organosilicone surfactant when disease is severe, or a non-ionic surfactant or blend of organosilicone and non-ionic surfactant disease is moderate or light.

Plectosporium Blight (Microdochium blight)

A 3-year rotation with crops other than cucurbits is advised. It is important to achieve maximum foliage coverage with the fungicide application.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
Once symptoms appear on petioles or after fruit form, apply one of the following and repeat every 7 to 10 d (a spray schedule that rotates Cabrio 20EG or Flint Extra 500SC with chlorothalonil will also provide control (note: do not apply Flint Extra 500SC near Concord grapes, see label):						
M03	mancozeb 75DF	2.0 to 3.0 lb/A	mancozeb	5	24	N
M05	chlorothalonil 6F	2.0 to 3.0 pt/A	chlorothalonil	0	12	N
3 + 11	Quadris Top 1.67SC[1]	12.0 to 14.0 fl oz/A	difenoconazole + azoxystrobin	1	12	--
7 + 11	Pristine 38WG[2]	18.5 oz/A	boscalid + pyraclostrobin	0	12	--
7 + 11	Merivon 2.09SC[2]	5.5 fl oz/A	fluxapyroxad + pyraclostrobin	0	12	N

[1]**Do not apply near apples**, see label. [2]Tank mixes of additives, adjuvants, and/or other products may result in crop injury.

Powdery Mildew

Some varieties have intermediate resistance; they should be used if possible (see Recommended Varieties above). The fungus that causes cucurbit Powdery mildew has developed resistance to high-risk fungicides. Resistance to strobilurin (FRAC code 11) and DMI (FRAC code 3) fungicides have been reported in the Eastern U.S. Proper fungicide management should be followed to help delay the development of resistance and minimize control failures. Powdery Mildew generally occurs from mid-July until the end of the season. Once observed in the area or detected by scouting (1 lesion on the underside of 45 old leaves per acre), begin the following fungicide program:

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	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:						
50	Vivando 2.5SC[1]	15.4 fl oz/A	metrafenone	0	12	--
3 + 7	Luna Experience 3.34SC[2]	6.0 to 17.0 fl oz/A	tebuconazole + fluopyram	7	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	Procure 480SC	4.0 to 8.0 fl oz/A	triflumizole	0	12	N
3	Proline 480SC	5.7 fl oz/A	prothioconazole	7	12	--
3	Rally 40WSP	2.5 to 5.0 oz/A	myclobutanil	0	24	N
3	tebuconazole 3.6F	4.0 to 6.0 fl oz/A	tebuconazole	7	12	N
3	Rhyme 2.08SC	5.0 to 7.0 fl oz/A	flutriafol	0	12	--
3 + 7	Aprovia Top 1.62EC	10.5 to 13.5 fl oz/A	difenoconazole + benzovindiflupyr	0	12	--
39	Magister 1.6SC[3]	24.0 to 36.0 fl oz/A	fenazaquin	3	12	H
7 + 12	Miravis Prime	9.2 to 11.4 fl oz/A	pydiflumetofen + fludioxonil	1	12	--
U13	Gatten 5EC	6.0 to 8.0 fl oz/A	flutianil	0	12	--
OR with one of the following:						
3 + 9	Inspire Super 2.82EW	16.0 to 20.0 fl oz/A	difenoconazole + cyprodinil	7	12	--
7	Fontelis 1.67SC	12.0 to 16.0 fl oz/A	penthiopyrad	1	12	L
7 + **11**	Pristine 38WG[4]	12.5 to 18.5 oz/A	boscalid + pyraclostrobin	0	12	--
P05	Regalia (OMRI)	4.0 qt/A	Extract of *Reynoutria sachalinensis*	0	4	--
U06	Torino 0.85SC	3.4 fl oz/A	cyflufenamid	0	4	--

[1]Do not mix Vivando with horticultural oils. [2]A mild yellowing on leaf margins is sometimes seen following application of Luna Experience in cucurbits. [3]Do not make more than one application per year of Magister. [4]Tank mixes of additives, adjuvants, and/or other products may result in crop injury.

Scab

Select scab-resistant varieties. The fungus that causes scab typically occurs during periods of cool, wet weather when temperatures are below normal. Rotate away from fields with a history of scab for at least 2 years.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
Begin sprays as true leaves form and repeat every 5 to 7 days:						
M05	chlorothalonil 6F	2.0 to 3.0 pt/A	chlorothalonil	0	12	N

Viruses (WMV, PRSV, ZYMV, and CMV)

The most prevalent virus in the Mid-Atlantic region is WMV, followed by PRSV, ZYMV, and CMV. Varieties with multiple resistance packages are available (see table Recommended Varieties). Varieties expressing the precocious yellowing gene such as “Multipik” will mask the greening of fruit caused by WMV and CMV but will become distorted when infected with either PRSV or ZYMV. All 4 viruses may be detected at some level in squash fields in the region in any given year, therefore plant varieties with resistance to more than one virus. The following control measures should also be used. Plant fields as far apart as possible from existing cucurbit plantings to reduce the chances for aphid transmission. Using reflective mulch may help to prevent aphid transmission of viruses.

If you are having a medical emergency after using pesticides, always call 911 immediately.

POISON Help®

1-800-222-1222

In Case of an Accident

- Remove the person from exposure
- Get away from the treated or contaminated area immediately
- Remove contaminated clothing
- Wash with soap and clean water
- Call a physician and/or the National Poison Control Center (1-800-222-1222). Your call will be routed to your State Poison Control Center.
- Have the pesticide label with you!
- Be prepared to give the EPA registration number to the responding center/agency