PURDUE PESTICIDE PROGRAMS

Purdue University Cooperative Extension Service

PEST CONTROL IN INDIANA CANTALOUPE PRODUCTION

Purdue University Cooperative Extension Service • West Lafayette, IN 47907

Pest Control in Indiana Cantaloupe Production

Fred Whitford, Coordinator, Purdue Pesticide Programs
Dan Egel, Plant Pathologist, Southwest Purdue Agricultural Program
Richard Latin, Plant Pathologist, Purdue University
Rick Foster, Entomologist, Purdue University
Steve Weller, Weed Scientist, Purdue University
Ralph Gann, State Statistician, Indiana Agricultural Statistics

Editing: Cheri Janssen, Arlene Blessing, and Drew Martin, Purdue Pesticide Programs
Layout: Cheri Janssen, Purdue Pesticide Programs

Purdue Pesticide Programs (http://www.btny.purdue.edu) is the State Liaison Representative for the National Agricultural Pesticide Impact Assessment Program (NAPIAP). The mission of NAPIAP (http://ipmwww.ncsu.edu/usdanapiap/) is to promote informed regulatory decisions concerning registered pesticides. NAPIAP pursues this mission through management and coordination of USDA and state activities to develop and analyze information on pesticide use and pest control practices; to determine impacts of pesticide regulations on agricultural productivity, the supply of agricultural products, and product prices; and to address pest control issues related to human health and the environment.

NATIONAL AGRICULTURAL PESTICIDE IMPACT ASSESSMENT PROGRAM
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Pest Control in Indiana Cantaloupe Production

Questions often arise about the use of pesticides in any cropping system. Understanding how crops are raised and the contribution of pesticides allows public policy officials, producers, and environmental groups to knowledgeably discuss the issues surrounding pesticide use. This publication provides information on how cantaloupes are grown in Indiana including how producers control disease, insect, and weed pests.

The top four cantaloupe producing counties are shown above. (Indiana Ag Statistic Service. 1992). Southwestern locations give growers access to markets in Chicago, Louisville, and St. Louis.

Production

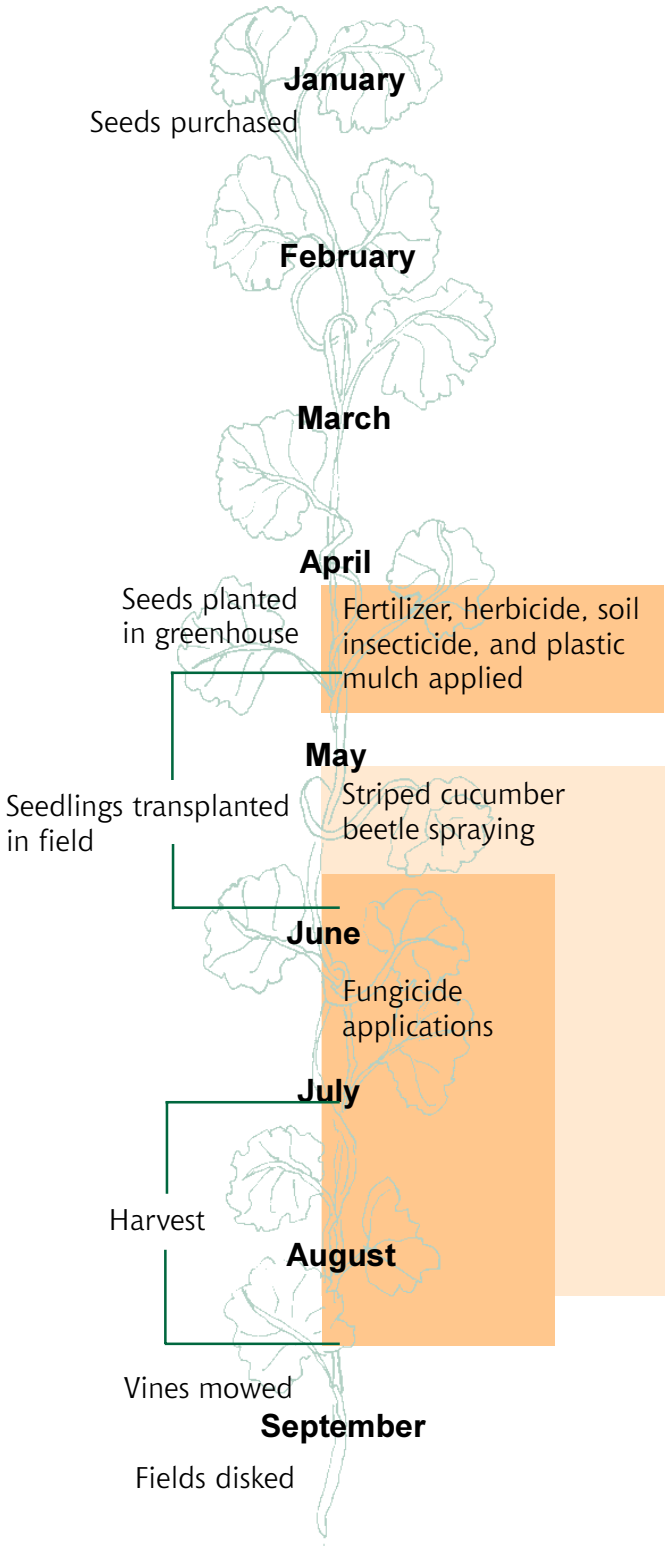
Indiana ranks fifth in the production of cantaloupes or "muskmelons." Although the terms are often used interchangeably, a true cantaloupe has rough, warty skin compared to a muskmelon's netted skin. When many of the southern states are completing their melon harvest and before melons in the north are ripe, Indiana begins to produce melons. This opportunity gives Indiana melon growers a profitable marketing position.

Cantaloupes are a warm season crop. Optimum temperatures range from 65–75°F, with a minimum temperature of 60°F. Melons require ample soil moisture with good drainage. Many growers use drip irrigation to improve crop production. Southwestern Indiana's sandy soils and climate make it well suited for producing cantaloupes.

Growers purchase seeds in January which are planted in the greenhouse in early to mid April. The seedlings grow in the greenhouse four to five weeks before being hardened outside prior to planting. In the greenhouse, insects and weeds are of minimum concern. Of concern are Pythium and Rhizoctonia root and stem diseases. Also of concern are seed-transmitted diseases such as bacterial fruit blotch, anthracnose, and gummy stem blight.

The Midwestern Melon
The ideal melon is round, weighs about seven pounds, and has deep sutures and sweet, orange flesh. Appearance and sweetness are important quality characteristics.

Time Line for Cantaloupe Production



Fertilizers, herbicides, soil insecticides, and plastic mulch are applied to the fields in April before planting. Black plastic mulch blocks sunlight, reducing weed growth. Some growers use photodegradable plastic mulch. The mulch does not always completely break down and the plastic residue is disked under after harvest.

At the two- to five-leaf stage, greenhouse seedlings are transplanted in the fields toward the end of April. Plantings may be staggered until the last of May to supply melons over a longer period. Seedlings are planted 2.5 to 4 feet apart in rows covered by plastic. Rows are spaced 6 to 8 feet apart. Approximately 1800 to 2400 melons are planted per acre.

Spraying begins in May for striped cucumber beetle and continues weekly when beetle populations are high. More information on the treatments used to combat striped cucumber beetles is listed in the Pests and Their Control section.

After vines between rows touch, growers begin fungicide applications. To be effective, most fungicides must be applied before infection occurs. Generally, growers apply fungicides on a regular schedule or based on climatic conditions suitable for infection. Spraying potential lasts from late May or early June to mid August.

Growers apply most of their own pesticides. Pesticide applications that require worker reentry intervals can cause significant financial difficulties for growers. For example, fungicide applications for Alternaria leaf blight begin before and continue through harvest. The reentry requirement can delay harvest and lower prices received.

Melon harvest usually begins during the first week of July and lasts four to six weeks. Melon picking takes place several times a week, often daily. Cantaloupes are picked by hand. Peak ripeness occurs at full slip, when the melon easily detaches from the vine. The last harvest usually occurs in mid August.

Prices received for melons decline as harvest progresses. The first week of harvest prices average $1.00 per melon. By the fourth week, prices drop to $0.60 per melon or less.

After harvest, at the end of August, vines are mowed. If plastic mulch remains it is removed and fields are disked.

Pests and Their Control

Like any crop, cantaloupes compete with weeds and are threatened by insect and disease pests. Melon growers rely on herbicides, insecticides, and fungicides to control pests. Growers rank diseases as their primary concern. Insect and weed pests are significant, but pose less of a threat. Some growers select disease-resistant varieties to reduce pest problems. Adjusting planting dates and using trickle irrigation are also methods to control pest damage.

The following are the primary cantaloupe pests and control measures used against them.

Cantaloupe production in Indiana

Indiana's rank in production	5th
Total acres planted	3400 acres[1]
Average acres planted	30 acres
Range of acres planted	10–400 acres
Acres harvested	3200 acres[1]
Yield	2500 melons/acre
Yield (range)	1500–4000 melons/acre
Value of melon production in Indiana	$6,300,000[1]
Price (range)	$.60–$1.00
Average variable costs	$1200/acre[2]
Pesticide expenses as % of variable costs	27%[2]

[1]Five year average, 1992–1996. Indiana Ag Statistics Service.
[2]Study conducted by Dept. of Botany & Plant Pathology, Purdue University, 1996.

Alternaria Leaf Blight

Damaging stage: Spores produced within lesions may be dispersed throughout a field and can produce many new lesions, leading to defoliation.

Occurrence: June 1 to end of season.

Target: Foliage; but, indirectly, fruit which ripens earlier because of the lack of nutrients.

Threshold: Initiate MELCAST *(see page 4)* after initial spray, when vines of adjacent plants within rows touch.

Yield loss: 60% potential loss. Depending on the amount of infection, first picking is 7–10 days late, with the number of melons greatly reduced through the third week of harvest.

Quality loss: Fruit that ripens prematurely is of lower quality. Melons have reduced sugar content and size and color alterations.

Pesticidal control

Percent of total acres treated: 100%*

Pesticide: chlorothalonil
Class: Nitrile
Brand name: Bravo, Terranil, Echo
Percent of acres treated: 80%
Rate (per acre): Liquid at 2 pints. Water dispersible granule at 2 pounds.
Frequency: Nine applications, 7 days apart, or MELCAST *(see page 4)* at 6–7 applications. Often used in conjunction with mancozeb.

photo by Richard Latin

The Alternaria fungus (*Alternaria cucmerina*) only infects leaves. Lesions begin as small, tan or brown spots. Older lesions may be surrounded by a yellow ring. Greatest yield losses occur when the disease is established early in the season.

*Percent of total acres refers to the percent of acres in production treated by a pesticide. Each pesticide listing states the percent of acres treated by that specific pesticide.

Pesticide:	mancozeb
Class:	Carbamate
Brand name:	Dithane, Manzate 200, Penncozeb
Percent of acres treated:	80%
Rates (per acre):	2–3 pounds
Frequency:	Nine applications at 7 days apart or MELCAST at 6–7 applications. Used in conjunction with chlorothalonil.

Nonchemical control

Cultural practice: Crop rotation with nonsusceptible crops (tomato, beans, corn) for a minimum of two years. Almost all producers rotate cantaloupes with another crop. However, some growers rotate from cantaloupe to watermelon, which is not effective in reducing disease pressure.

Cultural practice: Post-harvest tillage buries crop residue which eliminates much of the inoculum that could infect the following year's crop. Many growers use this practice.

IPM practice: MELCAST system.

Genetic alternative: None.

MELCAST
MELCAST is a weather-based disease warning system used to schedule fungicide applications for Alternaria leaf blight, gummy stem blight, and anthracose.

Powdery Mildew

Damaging stage:	Spores are agents of dispersal. They are produced within lesions and wind disseminated through the field, creating numerous new infections.
Occurrence:	June 15 to end of season.
Target:	Foliage.
Threshold:	Systemic fungicide applied two weeks before anticipated harvest.
Yield loss:	20–40% potential loss.
Quality loss:	Melons have reduced sugar content and size and color variances.

photo by Richard Latin

A powdery mildew outbreak is easy to identify. Clusters of infected plants appear throughout the field. The characteristic white mold occurs on both sides of the affected leaves. Severe outbreaks result in rapid defoliation, reduced production, and poor quality fruit.

Pesticidal control

Percent of total acres treated: 95%*

Pesticide:	triadimefon
Class:	Sterol inhibitor
Brand name:	Bayleton
Percent of acres treated:	50%
Rate (per acre):	4 ounces
Frequency:	Every 14–21 days.

Pesticide:	benomyl
Class:	Benzimidazole
Brand name:	Benlate
Percent of acres treated:	40%
Rate (per acre):	8 ounces
Frequency:	Every 14 days.

*Percent of total acres refers to the percent of acres in production treated by a pesticide. Each pesticide listing states the percent of acres treated by that specific pesticide.

Pesticide:	thiophanate methyl
Class:	Benzimidazole
Brand name:	Topsin
Percent of acres treated:	10%
Rate (per acre):	5 ounces
Frequency:	Every 14 days.

Nonchemical control

Cultural practice: Some scientific evidence shows that powdery mildew overwinters locally in Midwestern fields. Crop rotation with a nonsuceptible crop (tomato, corn, beans) would be an appropriate method of nonchemical control. Approximately 98% of growers rotate crops.

Cultural practice: Post-harvest tillage to bury crop residue eliminates 50–80% of the pathogens. Fall tillage is done on 98% of the acres.

Genetic alternative: Several resistant varieties are available; nearly 20% of the growers plant resistant varieties. Market prefers the nonresistant varieties, but preference is changing toward resistant varieties.

Striped Cucumber Beetle

Damaging stage:	Adults are vectors for bacterial wilt; some minor larval damage.
Occurrence:	Adults appear mid April to mid June.
Target:	Adults feed on stems, leaves, and cotyledons of young plants.
Threshold:	One beetle per plant (when plants are young).
Yield loss:	Up to about 25% of plants die if no action is taken. Under poor management, 10% of the plants die; 2% die in well-managed fields.
Quality loss:	Melons often look normal, but sugar content is reduced because the wilted vines cannot transport sugars.

Pesticidal control

Percent of total acres treated: 100%*

Pesticide:	carbaryl
Class:	Carbamate
Brand name:	Sevin
Percent acres treated:	50%
Rate (per acre)	1 pound
Frequency:	Weekly for 7 weeks.

photos by Richard Latin

The striped cucumber beetle serves as a vector for bacterial wilt. The disease rapidly attacks the plant. An entire plant can collapse and die within a few days. Losses from bacterial wilt coincide with the spring outbreak of cucumber beetles.

*Percent of total acres refers to the percent of acres in production treated by a pesticide. Each pesticide listing states the percent of acres treated by that specific pesticide.

Pesticide:	permethrin
Class:	Pyrethroid
Brand name:	Pounce, Ambush
Percent of acres treated:	30%
Rate (per acre):	0.1–0.2 lb of active ingredient
Frequency:	Weekly for 7 weeks.

Pesticide:	esfenvalerate
Class:	Pyrethroid
Brand name:	Asana
Percent of acres treated:	10%
Rate (per acre):	5.8–9.6 fluid ounces
Frequency:	Weekly for 7 weeks.

Pesticide:	endosulfan
Class:	Organochlorine
Brand name:	Thiodan
Percent of acres treated:	10%
Rate (per acre):	1 quart
Frequency:	Weekly for 7 weeks.

Nonchemical control

Cultural practice: Plant melons after surge of early season beetles—usually in mid to late May.

IPM practice: Threshold is one beetle per plant. Beetles are active for 3–4 weeks. Growers are advised to scout for beetles. Scouting often reduces pesticide applications to 3 weeks instead of 7 weeks. The goal of scouting is to eliminate sprays before and after the initial surge of beetles. Only 1–3% of the beetles carry the bacterial wilt organism. Beetles transmit bacterial wilt by defecating in holes chewed in stems or leaves. IPM has reduced the use of pesticides to control striped cucumber beetle by 65%.

Genetic alternative: None.

Seed corn maggot

Damaging stage:	Larval
Occurrence:	Many generations, but problem with earlier generations.
Target:	Root feeding and stem tunneling.
Threshold:	None.
Yield loss:	Up to 40% of plants lost. If loss occurs early in season, can replant.
Quality loss:	N/A; plants die.

photo by Dan Egel

Seed corn maggots are larvae of flies that lay eggs in organic matter. The maggots bore into the stems of young seedlings, killing the plant within a few days. Cool, wet conditions in the spring are ideal for seed corn maggot growth.

Pesticidal control
Percent of total acres treated: 50–75%*

Pesticide:	carbofuran
Class:	Carbamate
Brand name:	Furadan
Percent of acres treated:	50–75%
Rate:	2.5 fluid ounces per 1000 linear feet of row
Frequency:	One application placed under the plastic before transplanting seedlings.

Nonchemical control
Cultural practice: Delayed planting; however, delayed planting affects market prices. Some growers use clear plastic, which warms the soil quickly, and stops egg laying by adults.

IPM practice: Growers can delay planting as long as economically feasible. Typically, no damage is expected when soil temperatures (at depth of 4") are above 70°F. Preventive application.

Genetic alternative: None.

Grasses—Barnyard, Foxtail, and Crabgrass

Occurrence:	Early to mid May (South) and late May (North).
Target:	Competition for nutrients, light, and water.
Threshold:	None.
Yield and quality loss:	Reduction of total number of melons and melon size.

Preplant pesticidal control
Percent of total acres treated: 95%*

Pesticide:	Tank mix of bensulid and naptalam
Class:	Bensulid is a "phosphorodithioate" and naptalam is a "benzoic acid."
Brand name:	Prefar and Alanap
Percent of acres treated:	60%
Rate (per acre):	Prefar at 4–6 quarts; Alanap at 6–8 quarts, under plastic
Frequency:	Single application.

Pesticide:	ethalfluralin
Class:	Dinitroaniline
Brand name:	Curbit
Percent of acres treated:	40%
Rate (per acre):	3–4 pints under plastic
Frequency:	Single application.

Foxtail

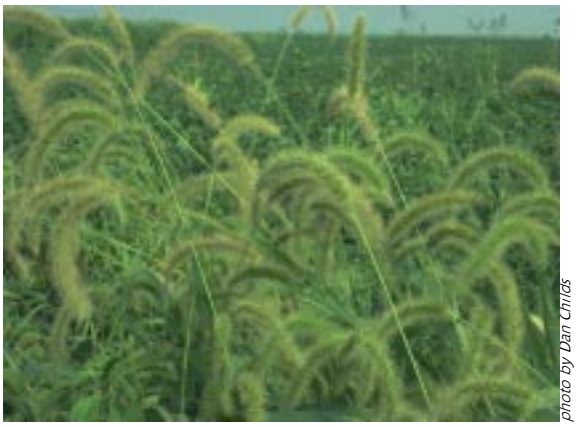


photo by Dan Childs

Grasses are most often a problem in early spring. Rotating crops to avoid fields with high grass populations helps to reduce the problem.

*Percent of total acres refers to the percent of acres in production treated by a pesticide. Each pesticide listing states the percent of acres treated by that specific pesticide.

Postemergent pesticidal control
Percent of total acres treated: 50–60%*

Pesticide:	sethoxydim
Class:	Cyclohexanedione
Brand name:	Poast
Percent of acres treated:	50–60%
Rate (per acre):	1 pint
Frequency:	Single application 4–6 weeks after planting.

Pesticide:	ethalfluralin
Class:	Dinitroaniline
Brand name:	Curbit
Percent acres treated:	40%
Rate (per acre):	3–4 pints
Frequency:	Single application.

Broadleaves—Pigweed, Lambsquarter, Morningglory, Velvetleaf, Ragweed

Occurrence:	Early to mid May (South) and late May (North).
Target:	Competition for nutrients, light, and water.
Threshold:	None.
Yield and quality loss:	Reduction of total number of melons and melon size.

Preplant pesticidal control
Percent of total acres treated: 95%*

Pesticide:	Tank mix of bensulid and naptalam
Class:	Bensulid is a "phosphorodithioate." Naptalam is a "benzoic acid."
Brand name:	Prefar and Alanap
Rate (per acre):	3–4 pints under plastic
Frequency:	Single application.

Postemergent pesticidal control
Percent of total acres treated: 0

Nonchemical control of grasses and broadleaves
Cultural practice: All growers use early cultivation between rows.

Cultural practice: Black plastic in rows to control weeds is used by 50% of the growers.

Cultural practice: Cover crops are planted between rows for early season weed control. Less than 5% of growers plant cover crops.

IPM practice: Rotate crops to avoid heavily weed-infested fields to reduce the spread of weeds.

Ragweed

photo by Bob Nielsen

Velvetleaf

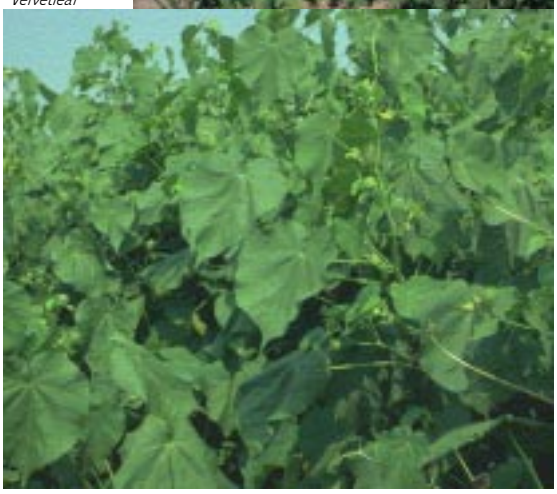


photo by Dan Childs

Late season broadleaf weeds are difficult to control because most herbicides don't provide residual control. Early, shallow cultivation, when weeds are less than 6" minimizes weed competition.

*Percent of total acres refers to the percent of acres in production treated by a pesticide. Each pesticide listing states the percent of acres treated by that specific pesticide.

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