VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

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IN THIS ISSUE

WINTER TEMPERATURES, CORN FLEA BEETLE SURVIVAL, AND POTENTIAL FOR STEWART'S WILT - *(Rick Foster, Dan Egel and John Obermeyer)* - Corn flea beetle is a sporadic pest in Indiana. Winter temperatures in regions where beetles were abundant last season will determine if there is cause to be concerned this season. This is especially important since this insect can transmit the bacteria that cause Stewart's wilt in sweet corn. The severity of the disease correlates well with winter temperatures because the bacterium survives in the gut of the overwintering beetles.

Warmer temperatures result in higher beetle survival, and greater potential for Stewart's wilt. To determine the potential severity of Stewart's disease, add the average daily temperatures for the months of December, January, and February (Table 1). If the sum is below 90, the potential for disease problems to develop is low. If between 90 and 100, moderate disease activity is a possibility. Sums above 100 indicate a high probability that severe problems will develop for susceptible corn. To help you better gauge the potential for corn flea beetle activity in your area, and thus the potential severity of the threat of the disease, we have created the following state map (Figure 1). According to the temperature model, there is low probability of corn flea beetle activity and subsequent disease in northern Indiana, moderate activity in areas south of approximately Interstate-70 to just north of the counties in extreme southwestern Indiana (Table 1). Conditions were very favorable in the extreme southwestern counties for beetle survival, which may result in the appearance of Stewarts's wilt in sensitive sweet corn varieties this spring.

Table 1. Average daily temperatures for selected Indiana cities and the potential threat for Stewart's wilt.

Site	Dec.	Jan.	Feb.	Sum	Disease Threat
Angola	34.8	27.6	15.5	77.9	Low
Wanatah	36.6	27.5	15.6	79.4	Low
Columbia City	38.0	28.9	15.6	82.5	Low
Bluffton	39.5	29.6	16.1	85.2	Low
W. Lafayette	39.1	28.5	16.2	83.8	Low
Tipton	38.8	29.8	16.8	85.4	Low
Farmland	39.3	30.6	16.5	86.4	Low
Greenfield	39.2	30.9	18.1	88.2	Low
Greencastle	39.0	31.1	18.7	88.8	Low
Terre Haute	40.9	32.0	22.0	94.9	Moderate
Brookville	42.8	34.9	20.3	98.0	Moderate
Bloomington	41.3	33.1	21.7	96.1	Moderate
Freelandville	41.1	33.5	24.5	99.1	Moderate
Vincennes	40.2	35.0	25.6	100.8	High

This temperature model for corn flea beetle has been around many years and has been fairly accurate in predicting the activity of this pest the following spring. However one inherent flaw is that the model is based on ambient air temperatures, not temperatures under leaf litter and grass clumps where this pest overwinters. Also, snow cover, which can provide an excellent insulating blanket for the insect, may protect some beetles from winterkill. Even with this "disclaimer" statement, we think the 2006/2007 winter was cold enough to have negatively impacted overwintering beetles in northern Indiana. Also, flea beetle numbers have been low statewide, in general, for the last couple years.

There are two phases of Stewart's wilt: a wilt phase and a leaf blight phase. In the wilt phase, plants wilt rapidly, usually at an early stage of growth. Leaves emerging from the whorl of infected plants are often the first to wilt. Internal tissues at the growing point are discolored or hollowed out. Faint green to yellow streaks containing corn flea beetle feeding marks are visible on one or more leaves. If stalks

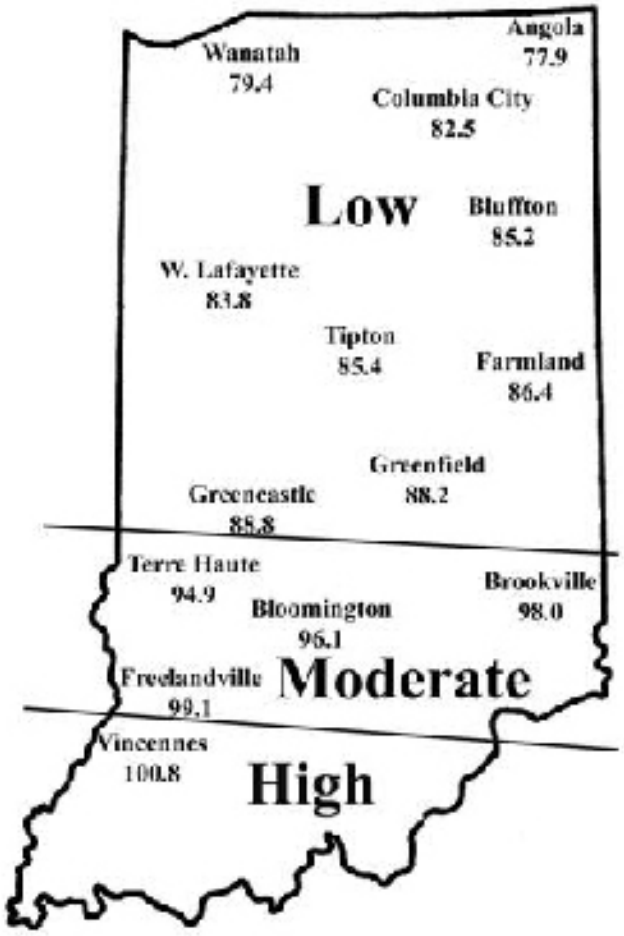

Figure 1. Potential flea beetle activity and thus potential Stewart's will across Indiana.

of wilted plants are cut, it may be possible to see yellow, moist beads of bacterial ooze. The leaf blight phase can occur at any time during the growing season, but often does not appear until after tasseling. Lesions are long and narrow, with pale green to yellow streaks and irregular or wavy-margins. Streaked areas die and become straw-colored. Severely infected leaves may die prematurely. Lesions on leaves of older plants may be confused with northern corn leaf blight. It is usually possible to see beetle feeding tracks in Stewart's wilt lesions.

Sweet corn growers should choose varieties that are resistant if they are growing in high-risk areas. See Table 2 for a list of varieties with high levels of resistance to Stewarts wilt. In areas with a moderate or high risk for flea beetles and Stewart's wilt, growers should consider planting the varieties on this list if they meet the desires of your customers.

In areas where the risk of disease is moderate or low, growers may want to purchase sweet corn seed that has been treated with either Cruiser or Poncho. These systemic insecticides will provide good control of flea beetles and Stewart's wilt in the early growth stages. The low rate can be expected to provide protection up to the 2-leaf stage and the high rate should work until the 5-leaf stage.

If treated seed are not used in moderate or high risk areas, growers should scout fields and treat with an appropriate foliar insecticide if damage and flea beetles are noticed. Recommended products include Ambush, Pounce, Asana, Capture, Lannate, Lorsban, Mustang Max, Penncap-M, Sevin XLR, and Warrior.

Table 2. Seedcorn hybrids with resistant or moderately resistant reaction to Stewart's wilt.

Type[1]	Color[2]	Seed Source[3]	Hybrid	Reaction[4]
su	Y	RG	Bonus	1
	W	CR	CSUWP1-7	1
	Y	CR	Elimator	2
	Y	SM	EX 0830 2424	2
	Y	SM	EX 0873 5807	2
	Y	SM	EX 0875 5780	2
	Y	GG	Green Giant Code 175	2
	Y	HM	HMX 6385	2
	Y	CR	Tamarack	2
se	W	CR	Celestial	2
	Y	CR	Miracle	2
sh2	Y	IFS	179 A	1
	Y	IFS	182 A	2
	Y	BAS	B-234	2
	Y	BAS	B-375	2
	B	CEN	Mirai 334 BC	1
	B	CEN	Mirai X350 BC	2
	Y	RG	Overland	1
	Y	IFS	XTH 1373	2
	B	IFS	XTH 21779	1

[1]Type: su=sugary; se=sugary enhanced; sh2=shrunken-2
[2]Color: Y=Yellow; W=White; B=Bi-color
[3]Seed Source: BAS - Basso, CEN - Centest, CR - Crookham, GG - Green Giant, HM - Harris Moran, IFS - Illinois Foundation Seeds, RG - Rogers (Syngenta), SM - Seminis
[4]Disease reaction ranges from 1-resistant to 9-susceptible. Only hybrids with a 1 or 2 reaction are shown here. (Page 59, Midwest Vegetable Variety Trial Report for 2006.) <www.hort.purdue.edu/fruitveg/rep_pres/2006-7/mvvt_2006_pdf/Hyb%20Dse%20Nrs%202006.pdf>.

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Farm Sustainability Tours Focus on Opportunities in Horticulture - *(Jerry Nelson)* - The 2007 Indiana Farm Sustainability Tour Series will feature "Opportunities in Horticulture" at three innovative farms in Southwest Indiana on April 19th. Registration will begin at 9:30am (local time) with coffee and donuts at the Halter Farm located South of Vincennes.

Hoosier farmers are leading the way in a variety of innovative practices that add value to their farms and their

communities. This tour and seven others will give educators, farmers and other rural residents the opportunity to investigate ways to diversify their operations and to learn from other successful diversified Hoosier farmers.

The Indiana Farm Sustainability Tours will be conducted monthly through November, and hosted around the State of Indiana. The featured farms have led the way in a variety of innovative practices that have added to the sustainability of their farms and their communities.

The focus of the April 19th tour will be "Opportunities in Horticulture," one of a number of ways in which farmers are considering to enhance their profitability and sustainability. Each stop will highlight how farm families have worked together to make their Horticultural Farm a viable economic opportunity, not only for their families, but also to add value to the economic well being of the community.

The tour will begin at the Halter Farm, which owns and operates Halters Market in Vincennes, Indiana. Currently, the Halters have three generations (10 family members), working on the farm, where they grow the plants and hanging baskets in 15 greenhouses. The 240 acres in the Halter farm support all three generations. Participants who attend the tour will be able to see and learn why the Halters' customers return year after year to buy their quality products. The market is open from April through Labor Day. Participants will travel from the greenhouses on the farm which is located south of Vincennes, through Vincennes where they will pass by the market to the second stop on the tour where a barbecue lunch and homemade pies will be served.

Apple Hill Orchard, located 5 miles North of Vincennes, will be the second stop. During lunch, Dr. Chris Gunter, Purdue Horticulturalist located at the Southwest Purdue Ag Center, will speak on "opportunities in Horticulture". After lunch, the Joe and Brad Black families who own and operate Apple Hill Orchard will be introduced. Apple Hill Orchard consists of 95 total acres. Apples and peaches are located on 15 of those acres. The Blacks have been innovative in several areas on their family farm. These include trellising the apples, trickle irrigating all fruit trees, raising and selling 42 varieties of apples and 14 varieties of peaches, and operating a certified kitchen in their retail outlet on the farm. A walking tour will take place through the orchard following lunch, where participants will be able to view all of these innovative practices. Following the walking tour, participants will move on to the final stop of the day at Melon Acres located in Oaktown, Indiana.

Asparagus production, processing and selling will be featured at Melon Acres. Participants will meet the Mike and Abner Horrall families who own and operate the farm. Melon Acres, well known for their innovations in melon production in southwest Indiana, began in 1976. In order to diversify crops on their farm, they started raising asparagus in 2000 with 80 acres, growing to a total of 124 acres today. Keeping innovation at the forefront of their farm operation, they purchased a machine that processes asparagus that is harvested and brought to the packing shed. The asparagus is sold wholesale and retail and is also available on line at <www.getfreshasparagus.com>. Asparagus will be harvested and process on April 19th, so come and see this unique operation.

The Indiana Farm Sustainability tours will be held from 10 a.m. to 3 p.m. the third Thursday of each month with the exception of August. Due to the Indiana State Fair, the tour will be the fourth Thursday of August.

Future tour dates are listed below:

* May 17; "Farm Business Structures"; Cook's Bison Ranch of Wolcottville and Gunthorps' Pastured Pork and Poultry of LaGrange.
* June 21; "Urban Fringe Marketing: Meeting the Needs of the Urban Consumer"; Tuttle's Orchard and Farm Market of Greenfield.
* July 19; "Organic Production and Marketing" Bloomingfoods, Stranger's Hill Organic Farm and Bloomington Farmers' Market, all of Bloomington.
* Aug. 23; "Agritourism: Enhancing the Visitor's Experience"; Traders Point Creamery of Zionsville.
* Sept. 20; "Family Farming: Keeping the Family in the Family Farm"; Swiss Connection Cheese of Clay City and Moody Meats of Ladoga.
* Oct. 18; "Specialty-Marketing Partnerships"; Birky Family Farms, Valparaiso Farmers' Market and Crème de la Crop CSA, all of Valparaiso.
* Nov. 15; "Food Trends, a Look at Consumer Food Expectations and How We Can Meet Them"; Purdue Food Science facilities of West Lafayette.

For more information and to register, visit <www.conf.purdue.edu/farmtours>. Each tour is $15 per person, which includes lunch, refreshments and materials. Individuals have the option to register for all of the tours or to select one or two at a time. Registration is due seven days prior to a tour.

The 2007 Indiana Farm Sustainability Tours are sponsored by the Purdue Small Farms Team, the Purdue New Ventures Team, Indiana State Department of Agriculture (ISDA) and the North Central Region Sustainable Agriculture Research and Education (NCRSARE).

For questions and more information, please contact Jerry Nelson, New Ventures Extension educator and tour coordinator, at (812) 886-9582 or jnelson@purdue.edu or Roy Ballard at (317) 462-1113 or rballard@purdue.edu.

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April 19 IP Video - Tri-State Organic IP Video Program: Insect and Disease Control in Organic Vegetables. April 19, 2007, 6:00 - 8:30 p.m. Eastern/5:00 - 7:30 Central. Offered at 19 sites around Indiana and additional sites in neighboring states. Topics to be covered: Preventing Insect Problems in Organic Vegetable Systems - Rick Foster, Purdue University; Biological Control and Organic Pesticides in Organic Vegetable Production - Rick Weinzierl, University of Illinois; Diagnosis and Prevention of Vegetable Diseases in Organic Systems - Dan Egel, Purdue University; and Specific Approaches to Disease Management in Organic Systems - Sally Miller, Ohio State University.

Registration is $10 per person/farm and includes workshop materials and refreshments. To register, please contact Lynn Stocksick at (800) 359-2968, or you may register online at: <www.conf.purdue.edu/VIDEO>. For more information about the program or assistance with registration, contact Liz Maynard at (219) 785-5673 or (800) 872-1231 ext 5673 (IN only).

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Cucurbit Seedling Diseases - *(Dan Egel)* - Muskmelon and watermelon growers who produce their own transplants or those individuals who order seedlings should be familiar with seedlings diseases. Inspect seedlings often and be certain to inspect any purchased seedlings before accepting a shipment. Except for Fusarium wilt and damping off, these diseases will spread quickly from plant to plant often leaving a cluster of diseased plants.

Gummy stem blight - The stems of infected seedlings are often dark brown and look water soaked at the point where the seed leaves (cotyledons) are attached to the stem. Stems of such seedlings remain green at the soil line. Gummy stem blight may be brought into a greenhouse on contaminated transplants or seeds. This disease may also occur in a greenhouse that was not properly cleaned up from a previous occurrence of the disease.

Anthracnose - This disease causes sunken lesions to occur on the stem. Lesions on true leaves often have sharp or angular margins. Anthracnose may occur in a transplant facility in the same manner as gummy stem blight (See above).

Bacterial Fruit Blotch - The first symptom observed in this disease is likely to be a water-soaked lesion on the underside of the seed leaves. This lesion will quickly spread to the entire seed leaf and to the true leaf. On true leaves lesions are small, dark brown, and often surrounded by a band of yellow tissue. Bacterial Fruit blotch, like gummy stem blight and anthracnose, may be brought into a transplant facility on transplants or seeds.

Damping-Off - Seedlings affected with damping-off fungi look brown and water-soaked at the soil line. Such seedlings quickly wilt and collapse. The roots may appear brown. This type of disease may be caused by one of several soil fungi. These fungi are not seed borne and may survive in soil or plant debris on transplant trays or greenhouse floors.

Fusarium wilt of watermelon - Although this disease is often observed in the field as a result of soil borne inoculum, in the last few years, this disease has been seed in greenhouses. Look for scattered seedlings in which the true leaves have wilted and died. The roots and stem should remain in intact at least initially - this is in contrast with seedlings with damping-off.

Remember that diseases such as gummy stem blight, anthracnose and bacterial fruit blotch will occur in one or a few clusters in the greenhouse. Damping off will likely occur on trays that are less well drained. Problems that occur on most of the seedlings in the greenhouse or along a wall or walk way are likely due to environmental conditions such as cold or wind.

Growers who have confirmed serious seed borne problems in their transplants face a decision about whether to set such seedlings in the field or not. Growers who choose to plant such seedlings should remove all trays with infected seedlings and all the surrounding trays. The remaining seedlings may be sprayed the appropriate fungicide or bactericide. Be certain to check the label for proper rates and usage.

If apparently healthy seedlings from a greenhouse with gummy stem blight are set in the field, do not wait until vine touch to spray the plants. For the first 20-30 days in the field, spray every 7-10 days with a mancozeb (e.g., Dithane, Manzate. Penncozeb), chlorothalonil (e.g., Bravo, Equus, Echo) or stoblurin (e.g., Quadris) product. If after 20-30 days the plants look healthy, use the MELCAST system of spraying. For bacterial problems use copper hydroxide applications, perhaps in combination with a mancozeb product.

Descriptions of watermelon and muskmelon diseases are well described in the Purdue CES publication Diseases and Pests of Muskmelon and Watermelon (BP-44). It is available through the Media Distribution Center by calling 1-888-EXT-INFO.

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Trends in Indiana: Most Productive Fresh Fruits and Vegetables - *(Quintrell Hollis and Jennifer Dennis)* - The Packer is one of the leading sources of news, information and analysis for the fresh produce industry and has been publishing information every week since 1893. Fresh Trends is an annual report that is used as a tool for readers to make improvements to their marketing strategies by understanding the dynamics of the marketplace. Information listed below is from a special publication entitled The Packer Fresh Trends 2007. Information provided is obtained from a survey that was sent to 62,000 U.S. households via email. This study was conducted by The Packer and Vance Research. Results report demographic information and consumption patterns for produce. This information includes characteristics such as age, gender, income, ethnicity, and marital status and allows producers and retailers to gather data about potential and current customers. The information provided below helps to examine consumption patterns of fruits and vegetables.

Bananas and potatoes remain the favorite fruits and vegetables chosen by consumers, followed by staples like apples, grapes, onions and tomatoes. Pomegranates and papayas were the item least likely to be purchased by consumers at 6% each respectively. In the past, survey respondents for this study had been 75% female and 25% male. In 2007, consumer demographics changed and respondents were 54% female and 46% male which represents the trend that has been increasing in the last twenty years of men doing more of the grocery shop-

ping. More men are identifying themselves as the primary shopper than in the past, which will be evident in the results of the survey. Another emerging trend is the likelihood of purchase to increase according to household income. In many cases, consumers earning $75,000 or more annually were some of the most likely to buy fresh produce. Below are the trends for each of the most productive fruits in Indiana.

Apples

- 94% of apples are used as a snack.
- Red Delicious is the most preferred variety at 23%.
- 80% of consumers purchased apples within the past 12 months.
- Married consumers are the most likely to purchase apples at 85%.

Asparagus

- 37% of consumers purchased asparagus within the past 12 months.
- Males are more likely to purchase asparagus.
- 13% of those who buy asparagus said they purchased organic product at least some of the time, with 3% reporting that they buy organic asparagus exclusively.

Blackberries

- 43% of consumers purchased blackberries within the past 12 months.
- 16% of those buying blackberries bought organic product at least part of the time and 5% bought organic blackberries exclusively.

Cantaloupe

- 65% of consumers purchased cantaloupe within the past 12 months.
- Married shoppers were also very likely to buy, with 72% of married respondents reporting that they have purchased in the past year.
- Single shoppers and those earning less than $30,000 annually were the least likely groups to buy cantaloupe.
- Slightly more than half of all consumers prefer to buy cantaloupe already ripe, and 37% said they prefer to buy it ripe but occasionally buy unripe fruit.

Cabbage

- 49% of consumers purchased cabbage within the past 12 months.
- Shoppers without kids in the household were more likely to buy cabbage, at 50%, than those consumers with kids in the home, at 44%.
- Female shoppers were slightly more likely to buy cabbage than their male counterparts.

Cucumbers

- 65% of consumers purchased cucumbers within the past 12 months.
- Shoppers in the Northeast region were most likely to buy this vegetable.
- Consumers earning $50,000 to $74,999 made up the income group most likely to buy.
- Single shoppers, male consumers and those earning less than $30,000 annually were the least likely groups to purchase cucumbers.

Green Beans

- 42% of consumers purchased green beans within the past 12 months.
- Shoppers in the Northeast region are most likely to buy green beans.
- 15% of those buying greens beans said they buy organic at least some of the time.
- Those most likely to buy organic exclusively are those earning more than $75,000 annually and those living in the Western part of the country.

Honey Dew

- 30% of consumers purchased honeydew within the past 12 months.
- Shoppers in the West comprised the region most likely to buy honeydew, followed by those in the Northeast.
- Consumers least likely to buy honeydew were single shoppers, those earning less than $30,000 annually and those who are separated, divorced or widowed.
- The majority of shoppers purchased conventionally grown honeydew, while 8% of honeydew consumers reported that they buy organic product at least part of the time.

Lettuce

- 66% of consumers purchased lettuce within the past 12 months.
- While the majority of shoppers bought conventionally grown lettuce, 13% of those who bought lettuce said they purchased organic product at least some of the time.
- Consumers earning more than $75,000 annually and those with three or more children at home were the most likely groups to buy organic product exclusively.

Specialty Mushrooms

- 22% of consumers purchased specialty mushrooms within the past 12 months.
- 20% of those who bought mushrooms said they purchased organic specialty mushrooms at least some of the time.
- 4% of consumers said they bought organic varieties exclusively.
- Groups that were least likely to buy specialty mushrooms included those earning $30,000 to $75,000 annually, single shoppers and those living in the South.

Peppers

- 68% of consumers purchased peppers in the past 12 months.
- Shoppers who shared the shopping responsibility equally with others in their household were the group least likely to buy peppers.
- Single shoppers were also among the least likely to buy the vegetable.
- While most consumers bought conventionally grown peppers, 11% of those who bought peppers said they bought organic product at least part of the time.

Salad Mix

- 69% of consumers purchased salad mix within the past 12 months.
- Male shoppers comprised the group least likely to buy salad mix, while female shoppers made up one of the most likely groups to buy bagged salad.
- The likelihood of purchases increased according to household income, with consumers earning more than $75,000 annually being the most likely group to buy salad mixes.
- 13% reported buying organic salad mix at least some of the time.

Squash

- 34% of consumers purchased squash within the past 12 months.
- Consumers earning more than $75,000 annually were the most likely group to purchase squash, at 44%.
- Married shoppers are almost twice as likely to buy squash, at 38%, than single shoppers, of which only 20% said they buy the vegetable.
- For those buying squash, 14% said they bought organic product at least part of the time.

Tomatoes

- 81% of consumers purchased tomatoes within the past 12 months.
- Married consumers, those earning more than $75,000 annually and those with one child in the household were the most likely groups to buy tomatoes.
- Single shoppers and those earning less than $30,000 annually were the least likely to buy.
- While most consumers purchased conventionally grown tomatoes, 15% of those buying tomatoes reported that they bought organic product at least some of the time.
- 60% of consumers said they knew how to ripen tomatoes once they got them home.

Watermelon

- The majority of consumers prefer to buy watermelon ripe.
- Only 19% of those surveyed said they felt comfortable ripening the fruit once they got it home.
- Married consumers, female shoppers and those earning more than $75,000 buy watermelon.
- Single shoppers and those earning $30,000 to $49,999 annually were the least likely to buy.
- Among consumers buying watermelon, about 8% said they purchased organic product at least some of the time.

Sweet Corn

- The likelihood of sweet corn purchases increased according to household income, with consumers earning more than $75,000 annually being the most likely group to buy sweet corn.
- Shoppers in the West comprised the region most likely to buy this vegetable.
- Consumers living in the South and those earning less than $30,000 annually were the least likely to buy sweet corn.
- Consumers who are considered primary shoppers for their household are less likely to buy sweet corn than those shoppers who share buying responsibilities equally with someone else.
- While most shoppers buy conventionally grown corn, 10% of corn purchasers reported buying organic corn at least some of the time.

Vegetable Crops Hotline
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