VEGETABLE CROPS HOTLINE

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

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WELCOME TO A NEW SEASON OF THE HOTLINE - *(Chris Gunter)* - There have been a few changes to the look of the *Hotline* for the 2003 season. The most immediate is the change in page size. We elected to move away from the large format paper, to make it more convenient for subscribers who keep the past issues of the *Hotline* in a binder or folder for future reference. Speaking of future reference, another change for this season will come in the last issue of the *Hotline*. This year we will index all of the articles that appear in the *Hotline*. This should make looking up articles much easier for future reference.

We will continue to update you on emerging problems that occur through the season with our *Hotline-BULLETIN* <www.entm.purdue.edu/entomology/vegisite/commercial/no_bulletins.html>. The *BULLETIN* is the fax or email service that alerts subscribers immediately to pest concerns that occur between the regularly scheduled issues of the *Hotline*. This service is available at no extra charge to regular *Hotline* subscribers.

As always, we welcome your comments and suggestions to make the *Hotline* a better, more useful tool for our subscribers. This is your publication. If you have any questions, concerns or comments, please do not hesitate to contact me, Chris Gunter, by email gunter@hort.purdue.edu or phone (812) 886-0198.

Those of us with Purdue Extension wish all you a prosperous season.

EASTERN MUSKMELON TRIALS FOR SOUTHWESTERN INDIANA, 2002 - *(Christopher C. Gunter, Melborn K. Lang, Dennis Nowaskie, and Angie Thompson)* - Indiana is a leader in the nation for production of eastern muskmelon with Knox county ranking in the top 100 melon producing counties. The evaluation of newly released varieties and advanced experimental breeding lines in this trial is an independent assessment of new melons for growers and seed producers in the commercial melon industry. The objective of this study was to comparatively evaluate and identify potential new cultivars and advanced experimental breeding lines that may be adaptable to the growing conditions in southwestern Indiana. Growers are seeking high yielding, high quality, early maturing types with excellent disease resistance and acceptable keeping quality during shipping and storage. High quality fruit are medium to large and have high uniformity of size and shape. Traditionally, markets have demanded fruit with heavy netting and distinct ridges. Melons that can be stored and held easily for longer periods of time and those that could be harvested at a slightly earlier slip-stage and still retain acceptable quality would also be desirable.

Results: The average yield was 21.7 tons/acre with a range of 17.4 to 27.7 tons/acre. The mean fruit weight was 5.5 lbs/fruit with a range of 4.2 to 7.4 lbs/fruit. This translated to 5896 to 9548 fruit/acre with a mean fruit number of 6985 fruit/acre. PS208096 had the highest yield in this year's trial followed by Vienna, Eclipse, Minerva, and PX12695. The earliest fruit in this trial was from RML 8793, EA 70, EA 60, and Athena at 86 days. Quality ratings of each tested variety or advanced experimental line showed variability in soluble solids, shape, size, uniformity, flavor, netting and the degree of ridges on the fruit surface. Selected comments noted during quality evaluation are mentioned here: ACX 3908, RML 8793, EA 70, Odyssey, E 1009, and Saticoy all had soluble solids measured above 12% (brix). The highest flavor ratings in this trial were Eclipse, EA 60, Odyssey, E 1009, Athena, Saticoy, and E 1007.

Most fruit were medium sized with good uniformity. Heavy netting and a thick rind are also desirable characteristics and PS208096, Eclipse, Vienna, PX12695, and ACX 3908 exhibited both of these characteristics.

Seeded Watermelon Cultivar Trials for Southwestern Indiana, 2002 - *(Christopher C. Gunter, Melborn K. Lang, Dennis Nowaskie, and Angie Thompson)* - Indiana remains a major watermelon producer for the Midwest. With the proliferation of new varieties, the increased competition and the need to maximize profitability per unit area, the identification for new varieties that are of high quality, high yielding, and disease resistant as well as meet market expectations, is of importance to commercial growers. This trial, along with the seedless watermelon variety trial provides an objective and independent comparative assessment of new watermelons for the commercial industry. This year's study included 22 seeded watermelons, with 21 named varieties, and 1 experimental line.

Results: Yields ranged from 19.9 to 26.2 tons/acre with 1881 to 2508 fruit/acre harvested across all the entries. Yields were generally lower in this year's trial, compared to the 2001 trial. The average fruit weight was 20.5 lbs/fruit, with a range of 18.8 to 23.2 lbs/fruit. Highest yielding cultivars were; RWM 8036, Stars and Stripes, Mardi Gras, Regency and Pinata. Most of the fruit in this trial were oblong in shape with medium or thick rinds. All Sweet was noted to have slightly tapered ends. Festival, Gold Strike, and Summer Gold showed slight cracking. The best tasting melons in the trial were: All Sweet and Rojo Grande, which also had the highest percent soluble solids. Seeded watermelon selection should be in large part based upon the size, shape and class of fruit to which your market is focused.

Seedless Watermelon Cultivar Trials for Southwestern Indiana, 2002 - *(Christopher C. Gunter, Melborn K. Lang, Dennis Nowaskie, and Angie Thompson)* - Seedless watermelons continue to generate both grower and consumer excitement, and in many urban markets around the US the percentage of seedless melons has gained considerably. Indiana remains a strong producer of seedless (triploid) watermelons, and since 1994, we have conducted extensive annual variety trials for seedless varieties. This trial, along with the seeded (diploid) watermelon variety trial provides an objective and independent comparative assessment of new watermelons for the commercial industry. This year's study included 22 seedless watermelons, a yellow-fleshed type and three orange-fleshed varieties.

Results and Conclusions: Yields ranged from 21.9 to 34.5 tons/acre with 2046 to 4125 fruit/acre harvested across all entries. The average weight of seedless fruit was down this year to 16.7 lbs/fruit with a range of 14.1 to 22.5 lbs/fruit. Smaller weight per fruit led to the higher number of fruit per acre in general. Highest yielding in this trial were: 7187, 7167, Trillion and Millionaire. Most of the fruit in this year's trial were oval and medium sized. Notable melon varieties exhibiting high soluble solids include 313, Sugar Shack, Millennium and Sweet Slice. This year one yellow-fleshed variety, RWT 8118 (Amarillo), was submitted. Seedless watermelons should be a part of your melon production strategy as long as you have a market that will purchase the fruit at a higher price than the seeded watermelons.

Secondary Insect Pests in Cucurbits - *(Frankie Lam)* - The prominent insect pests of cucurbits in southern Indiana are seed corn maggot, striped and spotted cucumber beetles, squash bug, squash vine borer, aphids, and two-spotted spider mite. The cucumber beetle is the primary or main pest in cucurbits. These beetles can be found in all cucurbit fields and if not managed properly can transmit bacterial wilt, a disease which can cause significant yield loss.

To manage cucumber beetles in melons application of a soil insecticide, such as Furadan or Admire, is recommended at planting, and foliar sprays are justified when the beetle number is above the economic threshold (one beetle per muskmelon plant, five beetles per watermelon or pumpkin plant). However, some melon growers might spray their fields with insecticides on a regular schedule or on a "present and spray" tactic to control the cucumber beetles. These improper spray strategies might be the main reason for the secondary outbreak of spider mites and aphids in their fields.

Secondary pests are pest species that are usually present at low levels and are held in check by the action of natural enemies. These pests can assume full pest status when natural enemies are destroyed by using an improper pest management tactic as described above. Last summer a study conducted by Dan Egel, Chris Gunter, and myself on pumpkin for the management of diseases, insects, and weeds at Southwest Purdue Agricultural Center indicated that weekly foliar spray of insecticide from early through mid-season had significantly greater number of aphids than other treatments with lower insecticide input. There are not many studies of spider mites and aphids in cucurbits, but studies of mites in apples, ornamental plants, corn, and beans had demonstrated that application of insecticides eliminated most of the natural enemies, including predatory mites and minute pirate bugs, in both laboratory and field plot studies. Additionally, studies on corn have indicated that insecticide applications cause a significantly greater percentage of mite dispersal and a study on beans had shown a significant increase in mite reproduction.

Some entomologists had concluded that the reasons for the outbreaks of secondary pests are: 1) destruction of natural enemies by pesticides, 2) pesticides induced irritation that causes pest dispersal, 3) pesticides induced reproductive stimulation, and 4) altered host-plant quality by agricultural chemicals. For those melon growers who applied foliar sprays on a regular schedule or on a "present and spray" tactic and had the outbreaks of spider mites and/or aphids in past years, I recommend a change in your cucumber beetle management program for the coming season. Sample twice per week and check 5-10 plants at 10 locations in a "Z" pattern for each 20 acre field. Spray the field only if the number of beetles is above the economic threshold. This strategy will not only reduce the insecticides used compared to spraying on a regular schedule, but also avoid the elimination of natural enemies and the outbreak of secondary pests in the field.

Free Worker Protection Standard (WPS) Safety Training - *(Santiago Tijerina)* - Free WPS safety training is available to you and your workers. I am employed by Transition Resources Corporation, a nonprofit organization that receives financial support from Purdue University, Office of the Indiana State Chemist (OISC).

This training takes approximately 45 minutes and presents information required by the EPA since 1992. Here are some important advantages for you:

- -Flexible training determined by you (you pick date & time)
- -On site training at your workplace
- -Workers receive EPA card (valid for 5 years)
- -Free roster of trained workers, signed and provided after training
- -Training in English or Spanish
- -Interactive training and free pamphlets that workers can keep
- -Free EPA Pesticide & Heat Stress Safety Posters

I look forward to working with you. To schedule a training session, please call my office (317) 547-1924 or my cell phone (317) 709-6055. Santiago L. Tijerina Jr., Pesticide & Workplace Safety Trainer, Transition Resources Corporation.

Hand Sprayers in the Greenhouse - *(Dan Egel)* - In the January issue of the *Vegetable Crops Hotline (#415)*, we discussed the legal issues of applying pesticides in the greenhouse. Now, let's say you have found a legal and effective fungicide/insecticide to apply in the greenhouse. Before you dump pesticide in your hand sprayer, let's talk about putting the right amount of pesticide on your plants.

Choosing the sprayer - I like to avoid sprayers that have adjustable nozzles. Such sprayers are difficult to calibrate (see below) since the amount of water that the sprayer puts on is likely to change depending on the sprayer adjustment. Choose a sprayer with a hollow cone or flat fan nozzle. I prefer a sprayer with a pressure gauge built into the wand. Such sprayers are readily available from several catalog supply houses for about $100. It is critical to keep a constant pressure for calibration purposes. Applying pesticide with constant pressure is as important in the greenhouse as it is in the field.

Knowing the area to be sprayed - Some greenhouse labels give instructions in 1,000 sq. ft. Other labels give amounts on a per acre basis. In either case, it is necessary to measure the square feet of the area to be treated. Then it will be possible to calculate the proportion of 1,000 sq. ft. or of an acre that is to be treated. If this step is skipped, the wrong amount of pesticide will be applied, plant damage may result, the pesticide may not work properly, and you will be using the pesticide off label.

Figuring the amount of water necessary - Fill your sprayer with a known amount of water. Be aware that often the graduations marked on the side of sprayer are not accurate. You might want to use a measuring cup. Spray the area to be treated in the same fashion you would were there actually plants present. Just as the speed with which your tractor moves impacts the amount of pesticide you apply in the field, the speed you move while spraying in the greenhouse will affect the amount of pesticide applied. You may choose to overlap the area sprayed with each swipe. Or you may choose to cover each area twice. Either method is fine as long as you are consistent.

Calculating the amount of pesticide - If one knows the area to be treated, it is a straight forward calculation to determine how much pesticide to add to the amount of water you already determined above. Some products specifically labeled for greenhouse use have hints such as the number of tablespoons that are equivalent to 1 pound per acre.

Don't skip steps - It would be easy to skip or at least skimp on some of these steps. However, doing so might result in the wrong amount of pesticide being applied. The misapplication of a pesticide could result in plant damage, an ineffective pesticide application, safety problems, and the very real possibility that you will be using the pesticide off label.

Sandea Herbicide Registration - *(Liz Maynard)* - Sandea herbicide, marketed by Gowan Co., has received a national label for use on a number of vegetable crops, see Table 1, on page 5. The registration was approved after publication of the *Midwest Vegetable Production Guide for Commercial Growers 2003* (ID-56)

<www.entm.purdue.edu/entomology/ext/targets/ID/index.htm> and so the herbicide is not included in the guide. Last year the 24(c) label allowed use on many cucurbits; additional crops have been added to the national label. The national label is available on the web from CDMS <www.cdms.net/manuf/manuf.asp> (type 'Sandea' into the search box). This article will outline things to consider in deciding whether the material is a good fit in a weed control program: weed control spectrum, replanting restrictions, potential for crop injury, potential for poor weed control due to resistant weed populations, and environmental and human safety considerations.

What weeds does Sandea control? The label indicates the following weeds will be controlled if the material is applied before weed emergence: common cocklebur, galinsoga, common groundsel, jimsonweed, kochia, ladysthumb and Pennsylvania smartweed, common lambsquarters, wild mustard, redroot and smooth pigweed, wild radish, common ragweed, sherpherdspurse, common sunflower, and velvetleaf. If applied after weeds emerge while they are still small, the following weeds should be controlled: common cocklebur, Philadelphia fleabane, galinsoga, ladysthumb and Pennsylvania smartweed, Venice mallow, wild mustard, yellow and purple nutsedge (3 to 5-leaf stage), redroot and smooth pigweed, common pokeweed, wild radish, common ragweed, giant ragweed, common sunflower, and velvetleaf. If current management is not adequately controlling one or more of these weeds, maybe Sandea will be a valuable tool. If these weeds are being controlled with the current system, consider the relative cost of that system versus one including Sandea.

What are the replanting restrictions? Carryover of Sandea residues in the soil can injure certain crops planted in subsequent years. Suggestions for intervals before planting vegetable crops include 24 months for spinach and beets; 18 months for lettuce, broccoli, cauliflower, collards, onions and leeks; 15 months for cabbage, carrots, and mint; and 12 months for radish and eggplant.

Another consideration is the risk of crop injury. Accidental overapplication, misapplication, cool temperatures, too much rainfall at the wrong time, and crop stress caused by a variety of environmental conditions increase the risk of crop injury with this product. Injured crops may have delayed or reduced yield. The label has been written so that only row-middle applications are allowed for crops known to be more sensitive, such as watermelons and summer squash. Still, crops that have been less sensitive in field trials, like cucumbers and cantaloupes, are not immune to injury when material is over- or misapplied, or the crop is stressed. If this material has a fit in a weed control program, it is worth taking the time to learn how to use it to minimize risk to the crop. The label lists precautions that should be followed.

Weed populations that are resistant to a particular herbicide or class of herbicides have not been a major issue in Indiana vegetable production. Sandea raises the issue because the active ingredient, halosulfuron, is in the sulfonylurea family of herbicides. Weeds resistant to this family of herbicides exist in Indiana. Sulfonylurea herbicides kill weeds by interfering with an enzyme called acetolactate synthase (ALS). These herbicides are called ALS inhibitors. Other ALS inhibitors include other sulfonylureas such as Classic, Glean, Accent, Beacon, Harmony and Matrix; imidazolinones such as Pursuit, Scepter, Raptor and Arsenal; and triazolopyrimidines (sulfoanilides) such as First Rate and Broadstrike. In some fields, reliance on an ALS inhibiting herbicide has allowed survival of individual weed plants that happened to carry a gene providing resistance to the herbicide. The resistant plants produced seeds, and continued reliance on an ALS inhibiting herbicide for a number of years allowed that species to establish a population of resistant individuals in the field. If a weed has resistance to one ALS inhibiting herbicide, it might also be resistant to other herbicides with the same site of action. Because of this, if Sandea is used on a field with weeds resistant to another ALS inhibitor, weed control may be poor. Biotypes of giant ragweed, common ragweed and kochia have been found in Indiana that are resistant to at least one ALS inhibiting herbicide. Biotypes of common waterhemp resistant to ALS inhibitors have been found in both Illinois and Ohio and biotypes of common lambsquarters resistant to ALS inhibitors have been reported in both Michigan and Ohio. Before using Sandea on a field, it makes sense to find out whether the field has a history of use of ALS inhibiting herbicides, and if so, whether there was ever any indication that a particular species had developed resistance. For a list of ALS inhibiting herbicides, see the Purdue Publication "*Herbicide Mode-of-Action Categories WS-24-W*", available <www.btny. purdue.edu/Pubs/WS/WS-24-W.pdf>. To reduce the chance that weeds with genetic resistance to ALS inhibitors will survive in a field, use a variety of weed control practices including herbicides with different sites of action.

The active ingredient in Sandea, halosulfuron, has a low mammalian acute toxicity and was not found to be carcinogenic in mouse and rat studies. The potential for leaching is moderate to low.

References:

Heap, I. The International Survey of Herbicide Resistant Weeds. Online. Internet. March 18, 2003. <www.weedscience.com>.

Pollock, C. Another ALS Resistant Weed Identified. Ohioline March 11, 2003. <http://fusion.ag. ohio-state.edu/news/story.asp?storyid=814>.

WSSA. 2002. Herbicide Handbook 8th Ed.

Table 1. Vegetable crops, planting method, and application timings for which Sandea herbicide is labeled in Indiana, 2003. X indicates that use is allowed under those conditions. Refer to label for specific recommendations and precautions.[1]

Planting Method	Direct-seeded			Transplanted on bare ground			Transplanted on plastic mulch		
Time of herbicide application	After planting before cracking	After emergence over the top	After emergence between rows	Before transplanting	After transplanting over the top	After transplanting between rows	Before transplanting under mulch	After transplanting over the top	After transplanting between rows
Asparagus					X transplanted crowns and established beds during or after harvest season				
Cucumber	X	X	X		X	X	X		X
Cantaloupe	X	X	X		X	X	X		X
Bean: Dry, Lima & Snap	X								
Eggplant			X			X			X
Gourd			X			X			X
Pepper			X			X			X
Pumpkin	X	X	X			X			X
Squash, summer			X			X			X
Squash, winter	X	X	X			X			X
Tomatillo			X			X			X
Tomato			X		X	X	X		X
Watermelon			X			X			X

[1]Read and follow all pesticide label instructions. The pesticide label is the law.

Corn Flea Beetles and Stewart's Wilt - *(Rick Foster, John Obermeyer and Dan Egel)* - One of the few good things about a winter as cold as the one we have just gone through is that survival of corn flea beetles should be considerably lower than in recent years. In general, the colder the winter, the fewer beetles we expect to survive. Corn flea beetles are particularly important to sweet corn growers, because the beetles carry a bacterium that causes the disease, Stewart's bacterial wilt. Lower flea beetle survival means a decreased threat of Stewart's wilt.

You can figure the potential for Stewart's wilt on your farm by adding the average monthly temperature (in degrees Fahrenheit) for December, January, and February. If the sum of these averages is less than 90, the disease is not expected to be serious. If the sum is between 90 and 100, then epidemics of moderate severity are expected. Sums greater than 100 indicate that the disease is expected to be severe and destructive.

The table below summarizes the disease potential for several locations in the state.

Site	Dec.	Jan.	Feb.	Sum	Disease Threat
Wanatah	28.3	18.3	23.1	69.7	Low
Columbia City	27.3	18.1	22.8	68.2	Low
Bluffton	29.3	17.9	21.4	68.6	Low
W. Lafayette	30.2	18.8	23.4	72.4	Low
Tipton	71.5	18.7	22.8	71.5	Low
Farmland	29.8	19.6	22.8	72.2	Low
Greenfield	30.3	19.7	24.0	74.0	Low
Terre Haute	34.1	24.1	27.9	86.1	Low
Bloomington	33.0	22.8	26.4	82.2	Low
Freelandville	33.4	24.3	26.7	84.4	Low
Dubois	35.5	25.5	27.5	88.5	Low
Boonville	36.6	27.5	32.1	96.2	Moderate

These data indicate that, except for extreme southern Indiana, there should be few problems caused by corn flea beetles and Stewart's bacterial wilt this year.

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