VEGETABLE CROPS HOTLINE

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

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http://www.entm.purdue.edu/entomology/ext/targets/newslett.htm

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BALING PLASTIC MULCH FOR DISPOSAL - *(Liz Maynard)* - The plastic mulch may not even be on the ground yet, but it is not too soon to think about what to do with it at the end of the season. This article describes a method of picking up and compacting the mulch developed last year by Ron Goldy of Michigan State University Extension. Michigan growers who pay for mulch disposal by volume have found it saves them money.

The key piece of equipment is a hay baler that makes round bales. The baler picks up the plastic and rolls and compresses it into a bale of plastic. Four to five acres of plastic mulch can be rolled into one bale. The bale can be moved with a forklift and is more easily transported than loosely piled plastic.

Some balers work better than others. The pick-up mechanism must have tines. Balers with augers or other obstructions will not work. The baling chamber should be designed to produce a soft bale, starting out large and staying large. Goldy has tried balers from Vicon and M & W, which meet these criteria. The M & W seems to work better.

Sound interesting? You can see a video clip of the baler in action by following the link at the lower left of the MSUE Vegetable Area of Expertise Web site: <www.msue.msu.edu/vegetable>. For more information, contact Ron Goldy at 616-944-1477, ext. 207, or <goldyr@msue.msu.edu>.

SEEDCORN MAGGOTS ON EARLY-PLANTED MUSKMELONS - *(Frankie Lam)* - Seedcorn maggots have been found on early-planted muskmelons at the Southwest Purdue Agricultural Center in Vincennes, IN. A muskmelon field was transplanted on April 19 and the field was sampled 3 times during the following week. Out of 600 plants sampled about 150 plants were infested by the maggot (approximately 25% infestation).

If you have already transplanted muskmelons, scout your field daily for leaf flagging and wilting of plants; both are indications of possible seedcorn maggot injury. Dig up the plant that is showing the symptoms and examine the crown and root system carefully for the presence of maggots. Split the crown and the main root with a pocketknife to look for any maggot feeding inside the plant. The maggot is yellowish-white, legless, with a pointing head, and is about 1/4 inch long when fully grown. The maggot feeds on the root and stem tissues, and completes its life cycle in about 3 weeks. The insect prefers soil with an abundance of decaying vegetable matter. In addition, cool and wet periods favor the development of the maggot. Once soil temperatures reach 70°F at 4-inch depth there is seldom an outbreak of seedcorn maggots. The adult is a small fly about 1/5 inch long. There are 3 to 5 generations a year depending on latitude, but mainly the first generation is the most economically important.

Tactics to avoid seedcorn maggot infestations include plowing down cover crops at least 3 to 4 weeks before planting, buying seeds with a commercially applied combination of fungicide-insecticide (Captain-Lindance), and applying soil insecticide (Furadan) at planting. However, no economic threshold has been developed for the seedcorn maggot on early-planted muskmelons. The curative tactic for the management of seedcorn maggots on muskmelons is to replace the transplants. Scout your field and estimate the size of maggots in the plants. On an average, if the maggots are <1/4 inch long, replant the muskmelons after 10 days. If the maggots, which are fully-grown, are ≥1/4 inch long, the muskmelons can be replanted after 5 days.

POLLINATION FROM A BEEKEEPER'S PERSPECTIVE - *(Greg J. Hunt, Department of Entomology)* - Probably at least 95% of beekeepers in Indiana could be called hobbyists. Some beekeepers have 50 to 100 hives and make some income from them and a few earn their livelihood solely from bees. Even though the economics of beekeeping is difficult, honey bees are very important for pollinating some crops and probably are responsible for about a third of our food production nationwide. In fact, the annual value of honey bee pollination was recently estimated at about 15 billion dollars. In Indiana, crops that are highly dependent on bee pollination include blueberries, melons, cucumbers, squash and fruit trees. The 1997 value of Indiana peaches, apples, berries and cucumbers was $26.8 million. Other crops valued at about $67.6 million benefited from honey bee pollination (Indiana Agricultural Statistics Service: 1997 figures).

Honey bees are not native to North America and there are about 4,000 native species of bees that feed on nectar and pollen and pollinate plants. These are mostly small insects, sometimes referred to as "sweat bees" because they like to get a little salt from our sweat on a hot day. Almost all of these wild species are solitary – a single female will excavate a hole in the ground or a hollow stem, line it with leaves or other material, and provision the nest with nectar and pollen. Some of these bees are very good pollinators but many specialize on specific types of plants or not be very abundant. The orchard mason bee for example, is useful for pollinating a number of crops and more efficient on a per-bee comparison with honey bees. Since they are active mostly in the spring, these bees are very good for pollinating fruit trees. Straws containing pupae of orchard

mason bees can even be purchased. Providing nesting holes may encourage their numbers to build up over several years.

However, you cannot beat the honey bee as an overall pollinating machine. They can be managed in perennial colonies that get quite large in numbers (up to 60,000 or more in the summer). They can be moved to where you need them, and they have behaviors that make them efficient for pollination. They are very good at finding the sweetest and most abundant source of nectar near the colony and the scouts can communicate information about the source to nest-mates with the "dance language". The direction a bee is dancing in the darkness of the hive can actually be followed by other worker bees and the odor of the nectar that the dancer provides gives the followers another clue as to what kind of flower the dancer has found. Bees will forage on many types of plants that are attractive, but they also show flower fidelity. A forager will concentrate on one type of flower during the day, insuring that pollen is transferred to another flower of the same type.

If you are moving bees for pollination, you need to keep certain things in mind. Since bees are good at finding the sweetest flowers, it is sometimes best to move the bees into the crop after the bloom has already started (maybe 25 to 30% of flowers are open). This way, the first thing they contact is the crop and they do not get in the habit of foraging on the nearby clover. Consider how many hives you will need per acre for best pollination. Blueberries do best with 3 to 4 per acre, canteloupe and cucumber need about 2 per acre and fruit trees only need about 1 per acre. When you move bees, it is also best to move the bees at night so that you do not lose your foragers. You should make sure that you have easy access to your hives with your truck. If it is someone else's crop, you can collect a pollination fee. Talk to other beekeepers and don't sell your services too cheaply. It is more expensive to keep bees now that we have deadly parasitic mites to deal with and growers should expect to pay a fair price. Also, consider having a pollination contract and talk about what pesticides will be used and whether you will be compensated if your colonies die. Keeping bees in a cucumber patch all summer that gets sprayed can be hard on the colonies. Finally, visit the hives and take care of them. The grower should be getting strong hives if he is paying for them and you should let him inspect them if he wishes.

Since parasitic mites entered our state in the late 1980's the number of managed hives has declined to about one third what it was. The mites have killed nearly all of the wild hives in hollow trees so people do not see as many honey bees as they used too. But it is still feasible and fun to keep your own bees. If you are interested in beekeeping, try to find other beekeepers in your area. Consider joining a beekeeping club, at least for a little while and you may want to subscribe to a "bee journal". There are treatments for parasitic mites that you will need to use in your hives for several weeks each year. You can get a lot of information on the internet. If you want more information on pollination and resources for getting started with bees, you can start with my website: <http://www.entm.purdue.edu/entomology/research/bee/index.htm>.

(The following was, in part, sent as a Vegetable Crops Hotline - BULLETIN, No. 2, April 22, 2002.)

Sandea Herbicide Registration Approved - *(Steve Weller)* **-** Sandea herbicide has been approved under a special local need state label (24C) for use in cucumbers, pumpkins, cantaloupes, honeydew melons, crenshaw melons and winter squash but not watermelons in Indiana. Sandea has excellent potential to control a variety of troublesome broadleaf weeds but growers must read and follow all product label recommendations for use to obtain optimum results. It is important for growers to understand that research has shown that preemergence application of Sandea has the potential to delay plant growth after crop emergence and/or to cause some leaf burn after postemergence application. Although this injury is generally temporary, growers must be aware of potential crop injury. The label also specifically states that all hybrids/varieties of labeled crops have not been tested for sensitivity to Sandea, and any crop injury arising from the use of Sandea is the responsibility of the user.

Use recommendations: Apply Sandea uniformly in a minimum of 15 gallons of water per acre.

Labeled Crops:

Cucumbers - Direct seeded

Preemergence: Use Rate of 1/2 to 1 oz product/acre. Apply uniformly in a minimum of 15 gallons of water per acre preemergence to direct seeded crop prior to cracking. Use lower rate on lighter textured soils with low organic matter. Heavy rainfall and/or cool/wet weather following an application during the germination and early growth period may result in severe crop injury and/or reduced stands.

Postemergence: Use Rate: 1/2 to 2/3 oz product/acre. Direct Seeded: apply after the crop has reached the 2-5 true leaf stage, but before flowering. Irrigation or rainfall occurring within 4 hours after a Sandea application may reduce effectiveness. Temporary yellowing or stunting may occur following post-emergence application.

- Do not apply Sandea Herbicide within 30 days of harvest.
- A maximum of 2 applications may be made per crop.
- Do not apply more than 1 2/3 oz. Sandea per acre per year.

Pumpkins and Winter Squash - Direct seeded

Preemeregence: Use rate: 1/2 -2/3 oz product/acre. Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre to direct seeded crop prior to cracking. Use the lower rate on lighter textured soils with low organic matter.

Heavy rainfall and/or cool/wet weather following an application during the germination and early growth period may result in severe crop injury and/or reduced stands.

Postemergence: Use Rate: 1/2 to 2/3 oz product/acre. After the crop has reached the 2-5 true leaf stage, but before flowering. Irrigation or rainfall occurring within 4 hours after a Sandea application may reduce effectiveness. Temporary yellowing or stunting may occur following post-emergence application.

- Do not apply Sandea Herbicide within 30 days of harvest.
- A maximum of 2 applications may be made per crop.
- Do not apply more than 1 oz. Sandea per acre per year.

Cantaloupes, Honeydew Melons, and Crenshaw Melons - Direct seeded

Preemeregence: Use rate: 1/2 - 1 oz product/acre. Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre to direct seeded crop prior to cracking. Use the lower rate on lighter textured soils with low organic matter.

Pre-Plant Under Plastic Mulch: Sandea Herbicide may be applied as a pre-plant application under plastic mulch. Apply Sandea Herbicide after final bed shaping and just prior to installation of the plastic mulch. The crop may be transplanted into the treated area 7 days after the application and installation of the plastic mulch. Use lower rates on lighter textured soils with low organic matter. Heavy rainfall and/or cool/wet weather following an application during the germination and early growth period may result in severe crop injury and/or reduced stands.

Postemergence: Use Rate: 1/2 to 2/3 oz product/acre. After the crop has reached the 2-5 true leaf stage, but before flowering. Irrigation or rainfall occurring within 4 hours after a Sandea application may reduce effectiveness. Temporary yellowing or stunting may occur following post-emergence application.

Post-transplant: Sandea Herbicide may be used on transplants grown on bare ground. Transplants must be established and actively growing prior to a Sandea Herbicide application. Delay application for at least 14 days after transplanting to allow for plant establishment. Do not apply if transplants are under stress, weak, and/or not actively growing.

- Do not apply Sandea Herbicide within 57 days of harvest.
- A maximum of 2 applications may be made per crop.
- Do not apply more than 1 2/3 oz. Sandea per acre per year.

Weeds Controlled:

Preemergence application - 1/2 to 1 oz/A. Common cocklebur, galinsoga, jimsonweed, kochia, common lambsquarters, wild mustard, yellow nutsedge, redroot and smooth pigweed, wild radish, common ragweed, Pennsylvania smartweed, common sunflower and velvetleaf.

Postemergence application - 1/2 to 1 oz/A. common cocklebur, galinsoga, nutsedge, redroot pigweed, common and giant ragweed, Pennsylvania smartweed, venice mallow, wild mustard, common pokeweed, wild radish and common sunflower. The label specifies rate and weed size susceptibility. A nonionoc surfactant at 0.25% (1 QUART PER 100 GALLONS OF WATER). is the only adjuvant required for postemergence application. Do not use crop oil concentrate or silicone-based adjuvants. Other weeds that might be suppressed by Sandea are listed on the label.

Optimum Result Recommendations:

- Follow mixing instructions regarding adjuvants.
- For pre-emergence applications, if weeds are present prior to crop emergence, use a surfactant as directed below.
- Pre-emergent activity of Sandea Herbicide may be enhanced by incorporating the product with 0.25 – 0.5 inch of water via overhead irrigation following application. Sandea Herbicide should not be mechanically incorporated.
- For post-emergence applications, treat young, actively growing weeds after the crop has reached at least the 2 true leaf stage. Best results will be obtained by waiting to irrigate 5 to 7 days after a post-emergence Sandea Herbicide application. Wait to cultivate treated soil area for 7 to 10 days. A timely cultivation may be necessary to control suppressed weeds, weeds that were bigger than the maximum recommended size at application, weeds that emerge after an application or weed species not on the Sandea label.
- Annual weeds at times may have multiple flushes of seedlings, or treated perennials may sometimes regrow from underground stems or roots, depending upon rainfall and other environmental conditions. To maximize control of such weeds, it may be necessary to use sequential applications of Sandea Herbicide.

Sandea Herbicide can be applied as a banded application. Use proportionally less spray mixture based on the soil area actually sprayed. See the "APPLICATION RATES AND TIMING" section for additional details on the use of Sandea Herbicide.

Use Precautions:

- Do not apply Sandea by air.
- Do not apply Sandea using air assisted (air blast) field crop sprayers.
- Do not apply this product through any type of irrigation system.
- Heavy rainfall and/or excessive irrigation soon after application may cause crop injury. This potential injury can be enhanced if seeding depth is too shallow.
- Under cool temperature conditions that can delay early seedling emergence or growth, Sandea can cause injury or crop failure. Be especially cautious during first planting of season when this condition is likely to occur.
- Sandea may delay maturity of treated crops.
- Follow all recommended crop rotation intervals as listed in this label.
- Sandea should not be applied if the crop or target weeds are under stress due to drought, water saturated soils, low fertility (especially low nitrogen levels) or other poor growing conditions.
- Do not apply Sandea to crops treated with soil applied organophosphate insecticides.
- Do not apply an organophosphate insecticide within 7 days before or 3 days after any Sandea application.
- This label must be in the possession of the user at the time of pesticide application.
- Follow all other applicable directions, restrictions, and precautions on the EPA-registered label. It is a violation of federal law to use this product in a manner inconsistent with its labeling.
- Other crops on this label may be replanted following applications of Sandea without restriction. All other crops should follow the intervals in the table below.
- Other crops on this label may be replanted following applications of Sandea without restriction. All other crops should follow the intervals in the table below.
- In the event of crop failure, the crop may be planted back into the treated area at the user's risk for potential phytotoxicity to the subsequent crop.
- Avoid spray drift outside of targeted area.

Sandea Herbicide may be applied to cucumbers, winter squash, pumpkins, cantaloupes, honeydew melons and crenshaw melons, however the user assumes responsibility for such use. All hybrids/varieties have not been tested for sensitivity to Sandea Herbicide. Any plant injury arising from the use of Sandea is the responsibility of the user. A copy of the full label can be obtained at the following website <www.hort.purdue.edu/hort/ext/veg/pesticides.html>.

Editor's note: If you have access to e-mail service or a fax machine and would like to receive notification of any future *Vegetable Crops Hotline – BULLETIN*, please notify the Southwest Purdue Agricultural Program, 4369 N. Purdue Road, Vincennes, IN 47591 Phone: (812) 886-0198; Fax: (812) 886-6693 or you may e-mail Chris Gunter, Editor at <gunter@hort.purdue.edu>.

Irrigation Water and Food Safety – *(Liz Maynard)* - People can get sick from eating vegetables that are contaminated with disease-causing organisms. Even though products from animals are more likely to be contaminated, vegetables and fruits eaten raw are of concern because it's not possible to completely disinfect them by washing, and since they are not cooked, pathogens aren't killed by heat. From 1990 to 1998, 57 outbreaks of bacterial disease were traced back to fruits or vegetables according to the Federal Centers for Disease Control. (In an outbreak, two or more people get sick.) Three quarters of these outbreaks were traced to produce grown in the United States. Vegetables involved included lettuce, cabbage, carrots, tomatoes, sprouts and salad bar items.

Responsibility for keeping vegetables safe to eat begins on the farm and continues through the food distribution chain to the final consumer. On the farm, soil, manure, irrigation and wash water, equipment, and people can be sources of pathogens. In previous issues (July 22, 1999, No. 365 and March 23, 2000, No. 371),

practices related to manure use; post harvest operations and personal hygiene were reviewed. This article will cover considerations related to irrigation water: water sources, testing recommendations, and application methods. There is still a lot we don't know about pathogens in irrigation water and how long they survive on vegetables: these recommendations are based on what we know today.

Source of irrigation water is an important consideration. Municipal drinking water rarely contains significant levels of pathogens. It is also not widely used for irrigating commercial vegetable fields. Well water that is potable also rarely contains pathogens. Even though these two sources are usually clean, there have been documented cases of pathogens in both municipal drinking water and well water, so the use of common sense and periodic testing is recommended. Municipal water is routinely tested by the local water authority. Once a year the grower should request a copy of the test results for fecal coliforms. High levels of fecal coliforms indicate that the water may have been contaminated with fecal material and may contain pathogenic bacteria. Well water should be tested twice a year for fecal coliforms. If they are present, the well should be treated, and an inspection of the well recharge and pumping area conducted to identify and remove the source of the contamination.

Surface water, including lakes, ponds and streams, are more likely to be contaminated. The source of contamination may be livestock in or near streams, runoff from manure storage or livestock operations, wildlife, or improperly treated sewage. In many communities with combined storm and sanitary sewers, the sewage treatment plants cannot handle the volume of water coming through after a heavy rainfall, and lakes or streams downstream of the treatment plant become contaminated with sewage. Growers who use surface water can help to reduce food-borne illness by becoming familiar with the source of the water in the stream or pond, knowing what is going on upstream or in the drainage area that may influence water quality, and working with local water conservation districts to protect water from contamination. Surface waters used for irrigation should be tested three times during the growing season; once at planting, once at peak use, and a final time at or near harvest. If high levels of fecal coliforms are found, it may be possible to filter the water or to use settling ponds to reduce the coliform level in water that is applied to the field. Results of all water tests should be filed for future reference.

Irrigation methods that minimize contact of water with the edible portion are considered the least risky. For this reason, drip irrigation is more desirable than overhead irrigation for crops with harvested portions growing above ground. When overhead irrigation is used, morning application is desirable so that water droplets on the plant dry quickly and are exposed to UV rays, which reduce survival of pathogens in the water.

Some of the information here has been adapted from the booklet "Food Safety Begins on the Farm: A Grower's Guide" by A. Rangarajan et al. A summary of the booklet is available at: <www.hort.cornell.edu/commercialvegetables/issues/foodsafe/index.html>. Federal guidelines are published in the "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables", available at <http://vm.cfsan.fda.gov/~dms/prodguid.html>.

Gummy Stem Blight - *(Dan Egel)* - In the last week, this disease was observed in a greenhouse in southwest Indiana. Seedlings with gummy stem blight may have large, black watersoaked lesions on true leaves and seed leaves (cotyledons). The stems of infected seedlings are often dark brown and look watersoaked at the point where the seed leaves 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. Remember that diseases such as gummy stem blight, anthracnose and bacterial fruit blotch will occur in one or a few clusters in the greenhouse.

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. An appropriate fungicide may be applied to the remaining seedlings. 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 product (e.g., Dithane, Manzate. Penncozeb), chlorothalonil product (e.g., Bravo, Equus, Echo) or a stoblurin product (e.g, Quadris). If after 20-30 days the plants look healthy, use the MELCAST system of spraying. For bacterial problems use copper sulfate applications, perhaps in combination with a mancozeb product.

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