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Comments from the Coordinator

Here in the Pesticide Education Office, we tend to get a lot of questions from the general public and the media about nuisance pests like mosquitoes. Luckily, this season Ned Walker (medical entomologist at MSU) distributed an informational bulletin on mosquitoes to faculty and staff in the Entomology Department. It came in handy for answering questions over the last few months. We are reprinting the article in its entirety as a reference.

Chris DiFonzo

Pesticide Education Coordinator/Field Crops Entomologist

Mosquitoes: Q&As for the 1998 Season

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The purpose of this article is to provide you with basic facts about biology and control of pest mosquitoes in Michigan, and the significance of mosquitoes as transmitters of disease-causing agents. Knowledge of the different kinds of mosquitoes in Michigan is essential if they are to be controlled using the integrated pest management philosophy. Modern mosquito control involves integration of a variety of methods to achieve the single end of preventing mosquito bites, and can be done in an environmentally acceptable manner through the use of physical methods, personal protection measures, biological controls, and appropriate and judicious application of insecticides.

Mosquitoes are annoying because the female bites in order to acquire a blood meal for development of her eggs. Male mosquitoes do not bite. Mosquito bites may simply cause a short-term itching sensation in the skin, or can lead to inflammation, allergic reactions and possibly to secondary infection with bacteria at the site of the bite. In large numbers, mosquitoes comprise a nuisance and can greatly reduce the quality of life for people and animals. Large populations of mosquitoes can also impact economic activity, including recreation and tourism industries and the golfing industry. Often, proprietors of recreation facilities such as golf courses may suffer economic loss if patrons decide to leave the facility because the mosquitoes are bad, or because they will not patronize the facility for the same reason. The relationship between the abundance or density of mosquitoes, and decisions by patrons regarding their recreational activities, has not been well quantified.

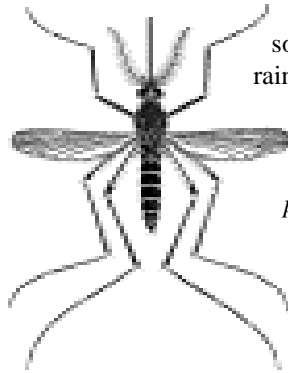
Mosquitoes are true flies and like other insects have a developmental cycle involving metamorphosis from the egg to the adult stage. Mosquito eggs are laid singly or in clusters on water or in mud and debris near water prone areas. Tiny larvae hatch from the eggs and develop in the water. The larvae feed on a variety of microorganisms and organic matter in the water, and develop through four larval stages to the pupal stage. Adult mosquitoes emerge from the pupal stage, and fly away. Male mosquitoes feed on nectar and do not bite for blood; female mosquitoes of most species require a blood meal to develop their eggs, and may bite several times during their lives. Female mosquitoes not only bite people, but also other animals including birds, mammals, frogs, and snakes.

Michigan has four major classes of pest mosquitoes based upon larval habitat and life history: the **spring floodwater mosquitoes**, the **summer floodwater mosquitoes**, the **container mosquitoes**, and the **marsh mosquitoes**. Overall, there are about 60 different species of mosquitoes in Michigan. From a pest point of view, the most important groups of mosquitoes are the spring floodwater mosquitoes and the summer floodwater mosquitoes.

Larvae of spring floodwater mosquitoes hatch from the eggs in March, in pools of water formed by melted snow in the woods. The eggs occur in the leaf litter at the bottom of the pools. These larvae develop slowly because of low water temperatures, and emerge as adults in May, before the pools dry up. The female spring floodwater mosquitoes can be very long-lived, and may bite several times and lay eggs in the woods where they will be flooded the following year. Spring floodwater mosquitoes have only one generation per year, so even if these eggs are flooded by summer rains, they will not hatch until the following spring. The species names of some of the spring floodwater mosquitoes are: *Aedes stimulans*, *Aedes excrucians*, *Aedes provocans*, and *Aedes canadensis*. There are several more species as well, but they all have the same type of life history pattern. In 1998, the crop of spring mosquitoes emerged as usual, and in certain areas they are currently (late May) in great abundance. Their numbers were favored by the mild winter and spring, which reduced overwintering mortality and accelerated the larval development.

Summer floodwater mosquitoes include several of our common pest mosquitoes in Michigan, such as *Aedes vexans*, *Aedes trivittatus*, and *Aedes sticticus*. Larvae of this mosquito hatch from eggs after rainfall in the summer (usually 0.5 inch or greater) in shallow flooded areas such as meadows, roadside ditches, highway right-of-ways, tire tracks, cow hoof prints, and other habitats. The larvae develop very quickly (7-10 days) and several generations may occur each summer depending upon the frequency and intensity of rainfall. For this summer, we cannot predict in advance how bad the summer mosquitoes will be, because we can't predict the rainfall very far in advance.

Mosquito control should involve careful consideration of the biology of the mosquitoes that are forming the nuisance problem or disease threat. In all cases, larval mosquito control should be considered as the first



option for abatement. This involves location of larval habitats, followed by their modification or treatment in such a way that the integrity of the habitat is preserved but the mosquito larvae are reduced in numbers. By dealing with larval mosquitoes, the adults may never become a problem. Adult mosquito control invariably involves the use of insecticides.

The larval habitats of spring and summer floodwater mosquitoes can be permanently eliminated through environmental sanitation and civil engineering, and should be the first thing to consider for mosquito control. Because of the temporary nature and small size of mosquito floodwater habitats, they often can be altered to prevent mosquito production. However, there are laws and policies regulating alterations of wetlands, and the Michigan Department of Natural Resources must be consulted before these activities take place. Indeed, professionals responsible for mosquito control are in the unique position of finding a balance between preservation of our wetlands and elimination of mosquito sources, but this balance can often be achieved with careful planning and consultation with authorities. Landscape planners should consider carefully the kinds of mosquito habitats they may be creating when wetlands are integrated into landscape or neighborhood designs. However, it is entirely possible to reduce larval mosquito sources and at the same time preserve wetlands and other desirable habitats.

Source reduction of larval mosquitoes may involve: (1) installation of a catchment; (2) installation of tile leading to a catchment or drain; (3) modification of grade to permit drainage; or (4) conversion of a mosquito-producing area to a non-mosquito-producing body of water such as an ornamental pond, water hazard, or permanent wetland. For tiling purposes, "sock" tile, which allows water entry but prevents roots and debris from clogging the tile, is very useful when dealing with woodland mosquito habitats.

Often, larval mosquitoes must be controlled through the use of insecticides that are applied directly into the water where larvae occur. In such instances, presence of larvae should be confirmed with use of a mosquito dipper and visible inspection. There are many registered larval mosquito insecticides. A bacterial insecticide, *Bacillus thuringiensis israelensis* H-14, is available in both liquid and granular formulations from commercial sources under trade names such as Vectobac and Teknar. Granular formulations are particularly effective against spring mosquitoes when applied during April when the larvae are in the second and third stage. Larvae eat the bacteria, which then disrupt the gut cells of the larvae. Abate (temephos) as a plaster pellet and Altosid (methoprene) as a charcoal pellet are also effective insecticides. Abate is an organophosphate with relatively low toxicity. Altosid is an insect growth regulator.

Both are effective against the spring and summer floodwater mosquitoes.

Application equipment for granular or pelletized formulations of these larvicides includes hand-cranking equipment or motorized backpack sprayers.

Adult mosquito control can also be accomplished through the use of registered insecticides. Essentially, there are three ways to accomplish this. First, adult mosquitoes can be killed on the wing during their normal flight time (dusk) using ultra-low volume (or ULV) equipment (a type of sprayer that is hand-held, mounted on a vehicle, or fixed to aircraft) and an insecticide. This method is sometimes called "cold fogging," although the droplet size of ULV applications comprises a cloud that is technically not a fog. This is an excellent method for controlling mosquitoes, because it allows for use of a small amount of material (generally about 3-5 fl. oz. per acre) in tiny droplets in a narrow band of time and space. In Michigan, malathion (as Fyfanon, an organophosphate) and permethrin (Biomist, also a synthetic pyrethroid) work well as adulticides applied as ULV. None of these insecticides are very toxic when used at the labeled dosages, and each offers very good activity against mosquitoes within the area where they are applied. In general, malathion in a ULV formulation is more effective at warmer evening temperatures, while permethrin (synergized with piperonyl butoxide) is more effective in cooler evening temperatures.

A second approach to killing adult mosquitoes is using thermal fogs. In this technology, an insecticide is heated along with another combustible material such as kerosene or oil, thus creating a fog that moves through the air, around vegetation, and among flying insects. For mosquito control, the best time to make a thermal fog application is in the evening when thermal inversion conditions exist. A thermal inversion occurs when the warm air (heated by the earth during the day) has not yet mixed with cooler air above it. The insecticidal fog remains most stable and near the ground under conditions of thermal inversion. Thermal foggers can be purchased commercially in sizes small enough for backyard use to sizes large enough for widescale application. Currently, formulations of malathion, resmethrin or permethrin are recommended, following the label directions.

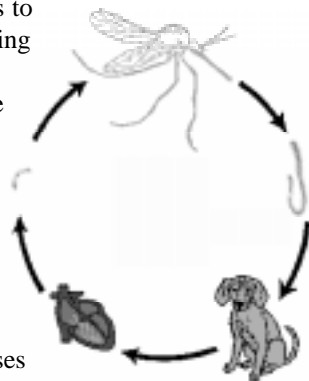
Another way to control mosquitoes is to use "harborage" or "barrier" techniques. This involves spraying a dilution of malathion (3% concentration prepared from a 57% emulsifiable concentrate) or permethrin (3% concentration of a 12% concentrate) onto vegetation surrounding the area to be protected. This area could be a backyard, a cemetery, a park, fairway, etc. The insecticide provides a residual of active ingredient on plant leaf surfaces, and when mosquitoes fly from the harborage areas (the woods) through this zone, they die or are repelled and do not



move into the open to bite. Equipment for a harborage application varies with the size of the area to be protected, but can range from a small hand pump sprayer to a motorized backpack sprayer to a large Buffalo turbine rig.

Aerial predators are often cited in the popular press as a means for controlling mosquitoes by predation. However, scientific studies do not support the contentions that bats, swallows, purple martins, dragonflies, or other aerial predators are effective, even though these methods might sound appealing and the animals themselves have aesthetic and intrinsic value. One has to bear in mind that predation is a natural process that is ongoing, yet we have mosquitoes anyway, often in large numbers. Actually, birds and bats do not include many mosquitoes in their diets, despite some claims to the contrary. The idea that they eat thousands of mosquitoes per night comes from statements in the natural history literature indicating that these predators would have to eat this many to maintain their existence. Outdoor, electronic bug zappers with ultraviolet lights do not control mosquitoes. So-called "mosquito plants" do not effectively repel mosquitoes, and are not recommended for this purpose despite advertisements to this effect. Other devices such as those advertised to repel mosquitoes by high frequency sound do not actually repel mosquitoes.

Mosquito-borne diseases occur in Michigan. At one time, malaria (carried by *Anopheles* mosquitoes) was common in Michigan but it has been eradicated. Dog heartworm is common in Michigan and is transmitted by a variety of *Aedes* mosquitoes. Prophylactic drugs are available from veterinarians to prevent dogs from contracting this disease. St. Louis encephalitis, eastern equine encephalitis, and different types of the California group of encephalitis occur in Michigan. The viruses that cause these diseases are transmitted by different species of mosquitoes, and these viruses also infect various kinds of wild birds and mammals. Mosquito-borne encephalitis is not common annually, but because it may occur in epidemics in certain years, it remains a true concern for human and animal health. For example, in 1975 an epidemic of St. Louis encephalitis resulted in 93 human cases and four deaths in Michigan, mainly in the southeastern part of the state. Eastern equine encephalitis has occurred in widespread outbreaks in southern Michigan in 1942-43, 1973-75, 1980-83, 1991, 1993-1994, and 1997 in southern Michigan.



The first Michigan resident to die of eastern equine encephalitis was a 10-year old boy in 1980. In 1991, about 60 horses in 11 southern counties died of this disease, as did hundreds of pheasants on game farms. Two humans were ill from this disease in that year, experiencing coma and other serious conditions. In 1993, about 13 horses and one mule died from eastern equine encephalitis. In that year, two Michigan residents contracted this disease, and one died. In 1994, another outbreak of EEE occurred in southern Michigan, and about 22 horses contracted the disease (all died), and at least two different pheasant flocks were affected. A child who was likely exposed in southwestern Michigan—probably Cass County—died of the disease that year. In August 1997, a man from Saginaw County died of EEE viral infection. There were no documented horse cases in that year.

The status of the California group of encephalitis viruses—another group of mosquito borne viruses—is rather less well known in Michigan compared to other, nearby states. Jamestown Canyon virus is one of these viruses, and it is widespread in distribution and is mainly transmitted by spring *Aedes* mosquitoes and has deer as the vertebrate host of the virus. However, it is not a major cause of human illness and does not affect domestic animals. LaCrosse encephalitis virus, another California group virus, occurs in Michigan and is transmitted by *Aedes triseriatus* mosquitoes. The larvae of this species live in water-filled tree holes and tires. LaCrosse encephalitis is a serious disease of children, but it is rare. The most recent case occurred in a child from the Brighton area in 1994.

There are several sources of information on mosquitoes and their management that are appropriate for Michigan conditions. The Michigan Department of Public Health has produced a manual, the "Michigan Mosquito Manual: Fight the Bite!," which contains material on mosquito control activities, mosquito biology, mosquito-borne diseases such as encephalitis and dog heartworm, and organizational tips. The Michigan Mosquito Control Association is an organization of professionals who conduct mosquito control. This association has an annual meeting, a board of directors, educational materials, and training programs. The address of this association is P.O. Box 366, Bay City, Michigan 48707.

The Michigan Department of Agriculture certifies persons who apply insecticides for mosquito control. The certification process requires taking two examinations, one being a core exam and the other a specialty exam for mosquito control (Category 7F). Interested parties can call their local Michigan Department of Agriculture office to schedule an examination or to get further information. Study booklets for both of these exams are available from the Michigan State University Bulletin Office and from local County Extension Service offices.





Chemical Update

The following information provides registration status of particular pesticides and should not be considered as pesticide recommendations by MSU Extension.



Unless otherwise noted, sources for the Chemical Update are from the June and July 1998 issues of *Agricultural Chemical News*.

Proposed/Established Tolerances:

Insecticides

- Asana (esfenvalerate; DuPont)—residue tolerances established on head lettuce at 5.0 ppm, sugarbeet pulp at 2.5 ppm, sugarbeet root at 0.5 ppm, and sugarbeet tops at 5.0 ppm.
- Chess (pymetrozine; Novartis)—EPA petitioned to establish residue tolerances on cucumbers, fruiting vegetables, and potatoes.
- Naturalis (*Beauvaria bassiana* fungus strain; Troy Biosciences)—proposed to be exempt from establishing a residue tolerance on all crops. Comments were due in July.
- Tracer (spinosad; Dow Agro)—based on work by the IR-4 Program, proposed tolerance on potatoes at 0.32 ppm.

Herbicides

- Affinity (carfentrazone-ethyl; FMC)—tolerance proposed on corn grain, fodder, and forage at 0.15 ppm.
- Axiom (FOE-5043; Bayer)—time-limited residue tolerances established on field corn grain at 0.05 ppm and soybean seed at 0.1 ppm; expires 4/30/03.
- Buctril (bromoxynil; Rhone-Poulenc)—tolerance established at 0.1 ppm on the following crops; alfalfa seedlings, barley, corn, oats, onions (dry bulb), rye, sorghum, and wheat.
- Puma (fenoxaprop-ethyl; AgrEvo)—tolerances established on barley grain at 0.05 ppm and on barley straw at 0.1 ppm.
- Topik (clodinafop-propargyl; Novartis)—tolerance proposed on wheat grain at 0.02 ppm, wheat straw at 0.05 ppm.
- ZA-1296 (mesotrione; Zeneca)—tolerance proposed on corn grain, fodder, and forage at 0.01 ppm.

Fungicides

- Abound (azoxystrobin; Zeneca)—time-limited tolerance established on cucurbits at 1.0 ppm to cover a specific exemption.
- Acrobat (dimethomorph; American Cyanamid)—EPA has extended the time-limited tolerance until March 15, 2000 to cover a specific exemption on potato.

- Copper Count-N (copper ammonium complex; Chem Specialties Inc.)—proposed to be exempt from establishing a residue tolerance on all crops.
- Curzate (cymoxanil; DuPont)—tolerance established on potatoes at 0.05 ppm.

Proposed/Established Registrations:

Insecticides

- Eastern Pine Shoot beetle pheromone (3M Canada)—proposed to register this pheromone for use in mating disruption programs.

Herbicides

- Achieve 80dg (tralkoxydim; Zeneca)—proposed to register this new active ingredient for the selective control of wild oats, foxtails, annual ryegrass and Persian dandelion on wheat and barley.
- Axiom (FOE-5043/metribuzin; Bayer)—Received registration for use on corn and soybeans for the preemergence control of grasses and some broadleaf weeds. It will be test marketed this year with full introduction slated for 1999.

Fungicides

- Acrobat MZ (dimethomorph/mancozeb; American Cyanamid)—expected to receive full registration this year for use on potato to control late blight.
- Cygnus (kresoxim-methyl; BASF)—expected to receive registration this year for use on greenhouse grown roses, gerbera daisy, poinsettias and zinnias to control powdery mildew.
- Elite (tebuconazole; Bayer)—Registration expected this year for use on grapes and in 1999 on apples, pears, and almonds.



- Folicur (tebuconazole; Bayer)—Registration is expected on wheat in 1999.
- Quadris (azoxystrobin; Zeneca)—Registration expected this year on cucurbits.
- Sovran (kresoxim-methyl; BASF)—Registration expected in 1999 on apples and grapes to control scab and mildew.

Label/Packaging Changes:

Insecticides

- Asana (esfenvalerate; DuPont)—received new label for use on sugarbeets to control grasshoppers, armyworms, cutworms, saltmarsh caterpillars, looper and beet webworms.
- Baythroid (cyfluthrin; Bayer)—added aerial application on carrots, pepper, radish, and tomato.
- Sammite (pyridaben; BASF)—now labeled for use on ornamentals to control mealybug, mites, and whitefly.

Herbicides

- Authority First/Synchrony STS (FMC/DuPont)—co-pack for postemergence application to soybeans is now being marketed.
- Prefar (bensulide; Gowan)—received supplemental labeling for use on field grown flowers, bulbs and ornamentals to control annual grasses and broadleaf weeds.

Fungicides

- Mancozeb—based on work by the IR-4 Program, gloxinia can be added to the label.

Section 18 and 24c Actions:

- Thiodan 3EC (FMC)—24(c) special local needs registration issued by the Michigan Department of Agriculture for use on canola; expires July 1, 2003.
- Furadan 4F (carbofuran; FMC)—24(c) special local needs registration issued by the Michigan Department of Agriculture for use on cucurbits; expires July 1, 2003
- Aphistar (triazimate; Rhom & Haas)—Section 18 issued by EPA to the Washington Department of Agriculture for use on fir Christmas trees to control root aphids; expires Oct. 31, 1998.
- Confirm (tebufenozide; Rohm & Haas)—a specific exemption granted to the Michigan Department of Agriculture to use on apples to control the obliquebanded leafroller.

Miscellaneous:

- Azadiractin (neem)—Amvac has taken over U.S. marketing rights.
- Dibrom (naled)—Amvac has taken over U.S. marketing rights from Valent.
- Dow AgroSciences plans to purchase the

remaining shares of Mycogen Corp. Dow currently owns 69% of the company.

- Famoxane (famoxadone)—DuPont is developing a new fungicide for use on sugarbeets to control various diseases.
- Gharda, an Indian-based company, plans to introduce its dicamba-based herbicide into the U.S. this fall.
- GMO tomatoes—Zeneca is planning to market two new genetically modified tomatoes, called Vengadura and Vegapeso, in Europe this year.
- Govern (fenbuconazole)—a fungicide being developed by Rohm & Haas for use on wheat and sugarbeets. Sold as Indar on other crops.
- J.P. BioRegulators, Inc. was issued an experimental use permit by the EPA as part of a Rutgers University IR-4 Project. The permit allows the use of 72 kilograms each year of the biochemical phospholipid, Lyse-PE on 520 acres of apples, citrus, cranberries, grapes, peaches, pears, nectarines, strawberries and tomatoes to evaluate pre-harvest and post-harvest ripening and storage shelf-life. The program is authorized only in the states of Arizona, California, Florida, Massachusetts, Michigan, Ohio, Washington, West Virginia and Wisconsin. The program is effective from June 3, 1998 to June 1, 2001 (Federal Register, 7/8/1998).
- Liberty (glufosinate ammonium) will now be produced by AgrEvo at a plant in Muskegon, MI.
- Liberty-Link sugar beet has been granted non-regulated status by the USDA. Expect introduction in 1999.
- Monsanto has acquired two seed companies, DeKalb Genetics and Delta & Pine Land Co.
- Monsanto has merged with American Home Products. The headquarters for the new company (no name as of yet) will be in St. Louis.
- Monsanto also announced it will buy Cargill's international seed operations. This includes research and production facilities in 24 countries, plus sales and distribution rights in 51 countries. Cargill's U.S., Canadian, and U.K. operations are excluded from the deal.
- Ringer—the company plans to change its name to Verdant Brands, Inc.
- Roundup-Ready canola—Monsanto reached an agreement to let Pioneer Hi Bred use the Roundup-Ready gene in canola. Expect introduction in the U.S. and Canada in 2000.
- Roundup-Ready alfalfa—Monsanto will collaborate with Forage genetics in Wisconsin to develop Roundup-Ready alfalfa (expected after 2000).
- Scotts Co. has purchased the U.S. home and garden consumer products division of AgrEvo



Environmental Health. Scotts will have the marketing rights to the herbicides Final and Weed Warrior, the Vikor line of insecticides, and the Intercept H & G line of insecticides.

Cancellations:

The EPA will cancel the following pesticide registrations at the request of the registrants unless the requests are withdrawn by November 2, 1998. Typically sales of the pesticides may continue for one year, and end-users may apply all pesticide in their possession according to the labeling (*Pest. & Tox. Chem. News*, 5/14/98).

Sureco Inc:

- SMCP Diazinon Insect Spray
- SMCP Diazinon 4S
- SMCP Diazinon RP 12.5E
- SMCP Diazinon RP 25E
- SMCP Diazinon 6-S
- SMCP Diazinon 12.5% Insect Spray
- Insecticide Liquid, Diazinon 1%
- Diazinon 4AG
- Pratt Diazinon 18E Insect Spray
- Pratt Diazinon Ag4E Insect Spray

Cheminova Agro A/S:

- Fyfanon ULV

S.C. Johnson & Son, Inc:

- Raid Aqueous Ant and Roach Killer
- Raid Water-Based Residual Liquid
- Raid Roach & Ant Killer
- Raid Formula 34 Insect Spray
- Raid Formula 33 Insect Spray
- Raid Formula 32 Insect Spray
- Raid Formula 36 Insect Spray

- Insect Spray for Crawling Insects
- Raid Household Roach & Ant Killer
- Raid Formula D147 for Crawling Insects
- Raid Roach & Ant Killer Formula III
- Raid Roach & Ant Killer Formula IV
- Raid Flea Killer VI Plus
- Raid Flea Killer V Plus
- Raid Ant & Roach Killer 5

AgrEvo Environmental Health:

- Flea, Tick & Mange Dip

Unicorn Laboratories:

- Unicorn Dursban Flea Spray for Dogs
- Unicorn Chlorpyrifos Dog Dip
- Unicorn Dursban Flea & Tick Dog Dip
- Unicorn Dursban Room Fogger

Platte Chemical Co., Inc:

- Azinphos Methyl 50 W

Micro-Flo Co.:

- Micro Flo Dyfonate 2-G

Valent U.S.A. Corp.:

- Orthene Specialty Concentrate

Dow AgroSciences LLC:

- Tapp Powdered Pyrethrum
- B&G Tapp 1.3
- B&G SYN-PY-TE-35 Transparent Emulsion Spray
- Dursban 1 D
- B&G Pyrenone General Purpose Spray
- Tapp General Purpose Residual Spray
- Syn-Perm Insecticide for Plants
- B&G Flexi-Dust

Bug Master Products:

- Bug Master Strips



News Extras



EPA Imposes Largest Penalty in its History

In April 1998, a judge fined Dupont \$1.89 million for ignoring EPA's order to stop shipping pesticides with improper labeling. This is the largest fine in EPA history. Nearly 400 shipments of the herbicides Bladex and Extrazine II were shipped by the company with labels that did not state that protective eyewear was required when using the products. Such warnings are required by the Worker Protection Standard.

Public Comment on Organic Standards Force Changes

The USDA received over 200,000 public comments on its proposed national organic standards, the largest number of public comments it has ever received on an issue. Many of the comments were aimed at the controversial inclusion of genetically engineered organisms,

biosolid-based fertilizers, and irradiation as acceptable organic practices. As a result of the comments, Dan Glickman, Secretary of Agriculture, announced in May that USDA would revise the proposed standards so that genetically modified organisms (GMOs), biosolids, and irradiation would not be included in the standards or allowed in organic products.

Unusual *Bt* Serotype Infects Human Wound

A report in May says that microbiologists in France treated a soldier with a serious infection caused by an unusual strain of *Bt*. The soldier had been wounded by shrapnel in Sarajevo, Bosnia, and developed a severe infection. The World Health Organization and the Pasteur Institute in France both identified the causal agent as *Bt* serotype H34. When researchers put the same strain into wounds on mice, a similar infection occurred. The key



element appears to be blood, and scientists speculate that the H34 serotype destroys blood cell membranes. The H34 serotype should not be confused with the other *Bt* strains, H1, H2, and H3, that are used safely in agriculture and forestry to control insect pests.

Emergency Regulation of Guthion Proposed in California

In late May, California announced proposed restrictions on the use of azinphos-methyl (Guthion) to begin June 1 and remain in effect throughout the summer season. The California Department of Pesticide Regulation (the DPR, similar to the Michigan Department of Agriculture) claims that current label use patterns of Guthion, a popular foliar insecticide, present an "unacceptable occupational exposure." The restrictions are being put in place to protect workers, based on a recently completed risk assessment by the DPR, which calculated aggregate exposure of field workers to Guthion. The new restrictions include a longer reentry interval for crops like apples, citrus, corn, grapes, nectarines, peaches, pome fruit, and stone fruit, based on DPR's assessment that Guthion residues on foliage dissipate slowly. The former 14- to 30-day reentry interval (REI) will be increased to 45 days for these crops. For pears, the REI will increase from 3 up to 14 days. However, workers with proper protective clothing will be allowed to enter the field to do hand labor 14 days after application. A second restriction is a limit of 1 pound active ingredient per acre. The final restriction includes changes in requirements for personal protective equipment for air-blast application. EPA agreed with DPR's risk assessment, which sets the stage for potential changes in Guthion labeling nationwide (*Pest. & Tox. Chem. News*, 5-28-98).

EPA Denies Emergency Request for Use of Unregistered Aphicide

The EPA denied a request by the state of Wisconsin for the emergency application of an unregistered aphicide, "Fulfill." It is believed that Fulfill presents fewer risks than those associated with methamidophos, the most widely used aphicide. The active ingredient in Fulfill is pymetrozine, which operates as a neuroregulator of feeding activity. Pymetrozine has been granted reduced-risk status by the Agency.

Dean Zuleger, executive director of the Wisconsin Potato and Vegetable Grower's Association (WPVGA) argued that pymetrozine "is the safest aphicide EPA will ever see." Despite its reduced-risk status, the EPA denied



the request to use Fulfill on the basis that registered alternatives exist (*Pest. & Tox. Chem. News*, 5/14/98).

FDA Sued Over Genetically Engineered Food Policy

A coalition of scientists, consumer groups, health professionals, religious leaders and chefs filed suit on May 27, 1998 against the Food and Drug Administration's current policy for genetically engineered food. The lawsuit is being coordinated by two groups, the Alliance for Bio-Integrity and the International Center for Technology Assessment. The suit claims that current FDA policy, which allows genetically modified food to be marketed without testing or labeling, does not protect public health, does not provide consumers with necessary information about their food, and violates religious freedom. The lawsuit challenges the marketing of at least 36 genetically engineered foods that are currently being sold, including herbicide resistant corn, canola, cotton, potato, and soybean marketed by AgrEvo, Monsanto, and Novartis; *Bt* corn marketed by many companies; *Bt* and virus-resistant potato marketed by Monsanto; virus-resistant vegetables and fruit; and tomatoes modified to ripen slower. Some of these foods are marketed fresh, and also as ingredients in processed foods, such as soy-based baby formula and corn chips.

Coalition members have different motivations for filing the lawsuit. Consumer groups have raised the issue of consumer right-to-know. Currently, since labeling is not required, consumers would have no way of knowing if they are consuming genetically engineered foods. Health professionals are worried that as plants are genetically engineered, there is a possibility that a nontoxic element in the food could become toxic. This is what apparently happened with L-tryptophan several years ago. Other concerns include food allergies, and the inability of consumers to tell which foods to avoid. For example, many people are allergic to nuts; soybean experimentally engineered with a nut gene caused an allergic reaction in such people. Vegetarians voiced a concern that they will not be able to avoid animal substances. Religious groups, specifically Jews and Muslims, are worried that they will be unable to observe dietary restrictions, for example, avoiding substances from certain animals, if food is engineered but not labeled. Other religious groups see genetic engineering as "irreverent" or "playing god", and thus wish to avoid engineered foods. The religious coalition members allege that FDA is infringing on their right to exercise their religion as guaranteed by the Religious Freedom Restoration Act.

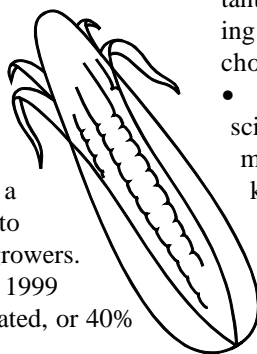
Spokespeople for the Grocery Manufacturers and National Food Processors countered that genetically modified plants and food are sufficiently regulated by FDA, EPA, and USDA, and that labeling is required of genetically engineered foods that differ significantly in composition or nutrition, or contain a common allergen.



They added that labeling would be impractical and mislead consumers into thinking that biotech products are not as safe as traditional foods (news release, AAPSE listserv).

Biotechnology Extravaganza

- EPA approved a *Bt* corn hybrid with a new strain of *Bt*, the *tolworthi* strain. "Starlink," developed by AgrEvo, produces Cry9C protein to kill European corn borer, rather than CryA the proteins currently used in DEKALBt, YieldGard, Maxi-mizer, and NatureGard hybrids. The Cry9C protein binds to a different location in the corn borer than the CryA proteins, and thus may be useful in resistance management. An additional benefit is that *Bt tolworthi* is not used as a foliar spray, and thus will not contribute to resistance to *Bt* sprays used by organic growers. The Starlink registration is for 1998 and 1999 only, and requires a refuge of 25% untreated, or 40% treated, non-*Bt* corn.
- An ILSI (International Life Sciences Institute) panel is working on a report that will make recommendations on managing insect resistance to transgenic crops. The panel will make recommendations on 1) assessing development of resistance in insect pests to transgenic corn; 2) standards and practices to manage resistance; and 3) priorities for future research. Up to now, EPA has not had a consistent policy of risk management when registering transgenic crops resistant to insects. EPA requires registrants to have a resistance management plan, and to monitor commercial fields for resistance. A refuge of 20% non-*Bt* crop is required for cotton, but crop refuges were not required for registration of *Bt* potato and *Bt* corn. The ILSI insect resistance panel report is due to be released in early August.
- Certain European countries are strongly against genetically modified organisms (GMOs). Several major supermarkets in England banned GMOs in their products starting in May. Finland and Sweden are actively seeking non-transgenic crops for animal feed. Austria and Luxembourg want a complete ban on GMOs.
- The European Union now has regulations in place requiring **labeling** of foods containing GMOs, specifically transgenic corn and soybean. The regulation is set to take effect in September. European consumer groups pushed for the labeling, saying "consumers are not geese," and should not be forced GMOs without their knowledge.
- Monsanto has changed its position on labeling genetically modified food for the European market. Previously the company was opposed to labeling on the grounds that it was scientifically unjustified and



gave consumers the impression food was unsafe or nutritionally inferior. Opposition to genetically modified food is increasing in Europe, and Monsanto now supports labeling of genetically modified food in the European Union as a means to show openness and trust. The labeling will particularly effect Monsanto's Round-Up Ready soybean.

- The American Soybean Association still does not think that labeling of Round-Up Ready beans is necessary. However, the European market is important to U.S. growers, and the Association is negotiating with EU nations to allow Europeans to have a choice.
 - With the new label requirements ready to go, scientists in Europe are discussing ways to test for modified DNA in food. Buyers in Europe want to know if corn and soybean shipments contain the amount of GMO claimed by the supplier. One suggestion is to use polymerase chain reaction, PCR, a sensitive test that amplifies very small amounts of DNA so it can be more easily detected. However, with any testing program, sampling becomes a big issue (imagine how you would accurately sample a ship carrying corn). The solution according to some: develop separate chains of production for transgenic versus unmodified crops.
 - And even as we speak, demand for "identity preserved soybeans," i.e., beans grown, harvested, handled, shipped, and processed separately from genetically modified beans is increasing. Segregating beans in the channels of trade will cost more, but some European countries and companies are apparently willing to pay the premium.

Gypsy Moth Program Update

The Michigan Department of Agriculture contracted with 19 counties this summer for gypsy moth suppression (up from 9 counties in 1997). Spraying by fixed-wing aircraft began on May 9th and continued until May 22nd. Over 79,000 acres were treated, versus 23,899 acres in 1997. A *Bacillus thuringiensis* (*Bt*) product, Foray 48F, was used in all counties with one exception. A small area in Wayne County was sprayed with Gypchek, a viral pathogen specific to gypsy moth, to avoid harming an endangered butterfly—the Dukes Skipper. MDA reports a "serious expansion" in gypsy moth complaints this summer. A defoliation fly-over by the Michigan DNR on July 13 showed significant defoliation in 25 counties in the Lower Peninsula (MDA Report to Pesticide Advisory Committee, July 1998).



EDSTAC Recommendations Close to Being Formalized

For those of you following the endocrine disruptor screening committee, EDSTAC is due to release its recommendations in the Federal Register sometime in August. The committee's latest definition of an endocrine disruptor is the following: "an exogenous chemical substance or mixture that alters the structure or function(s) of the endocrine system and causes adverse effects—at the level of the organism, its progeny, populations, or subpopulations of organisms—based on scientific principles, data, weight-of-evidence, and the precautionary principle." Whew! The screening program that eventually is put into place must prioritize 86,000 chemicals for testing (based on *Pest. & Tox. Chem. News*, 6/18/98).

EPA Postpones 6(a)(2) Reporting

EPA announced it is postponing implementing the new FIFRA reporting rule, 6(a)(2), for 60 days. This rule requires pesticide registrants and their "agents" to report all "unreasonable adverse effects" associated with their products. The rule was scheduled to go into effect on June 16. Before that date, the rule raised many questions, and a coalition of industry groups asked for the delay so that EPA could clarify and amend the rule. The rule is confusing, raising questions about the kinds of effects that must be reported, and who is considered an "agent" of a registrant. For example, an adverse effect has been interpreted by some as meaning all incidents of crop injury, reduced efficacy, or any other complaint that company representatives might deal with in the course of the field season. The term "agent" has been interpreted to mean even university researchers and extension agents conducting field trials or answering grower questions. EPA has made conflicting interpretations of the rule, and

the 60-day delay should allow the agency to publish written guidance to address industry concerns (based on *Pest. & Tox. Chem. News*, 6/18/98).

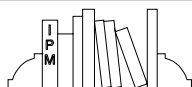
Lake Michigan Fish Eaters Part of Contamination Study

A 1993 study of charter boat operators and others involved in sport fishing in Wisconsin, Michigan, and Ohio shows that those who ate fish from Lake Erie consistently had lower blood and urine concentrations of PCBs and pesticides than those who ate fish from Lakes Michigan and Huron. Body levels of most organochlorine compounds were similar in people who ate fish from Lake Michigan and Lake Huron. However, Lake Huron fish eaters had higher levels of dioxins, while Lake Michigan fish eaters had higher PCB and chlorinated pesticide burdens (*Pest. & Tox. Chem. News*, 7/2/98).

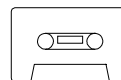


Inert Lists Available

EPA has issued lists of inert ingredients *no longer used*, and *currently used*, in pesticides. The lists are too long to include here, but are available on the web at: www.epa.gov/fedrgstr/EPA-PEST/1998/June/Day-24/p16571.htm. Incidentally, any federal register document can be accessed through the EPA web site at www.epa.gov/fedrgstr. The catch is that you must know the exact date that the item was published in the Federal Register. Once you access the site, simply click on the appropriate date on the calendar. If you don't know the date, there is an option to search the Federal Register.



Resources

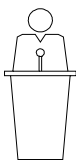


Minimizing Spray Drift, a set of 20 slides plus script and *Spray Drift Management*, a detailed set of 49 slides plus script. Both sets can be downloaded from the following site:

<http://www.age.uiuc.edu/faculty/rew/index.html>. Developed by Robert Wolf, University of Illinois.

Physicians Guide to Pesticide Poisoning—distributed by Texas Agricultural Extension Service @ \$11 per copy. Mail check or money order to Texas Agricultural Extension Service, PO Drawer FS, College Station, TX 77841. Purchase orders from universities and government agencies can also be accepted.

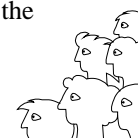




Pesticide Applicator Recertification Seminars

This partial listing of recertification seminars was provided by MDA. Certified applicators and registered technicians may earn recertification credits by attending these programs. For additional information, call the MDA Lansing office at (517) 373-1087.

NOTE: Renewal of pesticide applicator certification credentials can be done by taking the appropriate exam(s) or by obtaining the necessary number of recertification credits by attending approved seminars.



Date	Seminar	Location	Credit	Category	Phone #
8/3	Fruit Spray Updates	Coloma, MI	1	Priv,1C	(616)657-7745
8/4	IPM Breakfast Update Session	Centreville, MI	1	Priv, 1A, 1B	(616)467-5511
8/7	Vegetable Crop Issue Meeting	Walker, MI	1	Priv, 1B	(616)846-8250
8/7	Potato Pest Management Mtng	Six Lakes, MI	1	Priv, 1B	(517)831-7500
8/10	Fruit Spray Update	Coloma, MI	1	Priv, 1C	(616)657-7745
8/11	Fruit Grower IPM Update	Old Mission, MI	1	Priv	(616)922-4620
8/11	IPM Breakfast Update Session	Centreville, MI	1	Priv, 1A,1B	(616)467-5511
8/13	Potato Pest Management Mtng	Six Lakes, MI	1	Priv, 1B	(517)831-7500
8/14	Vegetable Crop Issue Meeting	Walker, MI	1	Priv, 1B	(616)846-8250
8/17	Fruit Spray Updates	Coloma, MI	1	Priv, 1C	(616)657-7745
8/18	IPM Breakfast Update Session	Centreville, MI	1	Priv,1A,1B	(616)467-5511
8/18-19	IFC/FSA Two Day Seminar	Baltimore,MD	6	Com Core, 7A,7C,8,ST	(913)782-7600
8/21	Vegetable Crop Issue Meeting	Walker, MI	1	Priv, 1B	(616)846-8250
8/24	Fruit Spray Update	Coloma, MI	1	Priv, 1C	(616)657-7745
8/25	Fruit Grower IPM Update	Old Mission, MI	1	Priv	(616)922-4620
8/25	IPM Breakfast Update Session	Centreville, MI	1	Priv, 1A,1B	(616)467-5511
8/28	Vegetable Crop Issue Meeting	Walker, MI	1	Priv, 1B	(616)846-8250
8/31	Fruit Spray Updates	Coloma, MI	1	Priv, 1C	(616)657-7745
9/8	Fruit Grower IPM Update	Old Mission, MI	1	Priv	(616)922-4620
9/8	Purdue Univ. Diagnostic Training	W. Lafayette, IN	4	Priv, Com Core,1A	(765)494-7731
9/9	Purdue Univ. Diagnostic Training	W. Lafayette, IN	4	Priv, Com Core,1A	(765)494-7731
9/10	Purdue Univ. Diagnostic Training	W. Lafayette, IN	4	Priv, Com Core,1A	(765)494-7731
9/15-16	AIB Food Plant Sanitation Wkshp	Chicago, IL	8	Com Core, 7A, 7D	(800)633-5137
9/29-30	AIB Food Plant Sanitation Wkshp	Chicago, IL	8	Com Core, 7A, 7D	(800)633-5137
10/6-7	IFC/FSA Two Day Seminar	Atlanta, GA	6	Com Core, 7A,7C,8,ST	(913)782-7600
10/15	1998 PAASS Program	Mt. Pleasant, MI	2	Com Core, AE	(202)546-5722
10/20-21	IFC/FSA Two Day Seminar	Pleasanton,CA	6	Com Core, 7A,7C,8,ST	(913)782-7600
11/14	PLCAA 19th Annual Conf.	Nashville, TN	2	Com Core, 3A	(700)977-5222
11/17-18	AIB Food Plant Sanitation Wkshp	Ontario,CN	8	Com Core, 7A,7D	(800)633-5137

Instructions for recertification training seminar attendance and training seminar dates are posted at the MDA website: <http://www.mda.state.mi.us/industry/semsked.html>

