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ESA—Thriving, Threatened, or Extinct?

As you may have read in the popular press and in various newsletters, the U.S. Endangered Species Act (ESA) has received considerable attention lately. Federal agencies have proposed changes in how they exchange information and expertise with one another regarding endangered species and pesticides. More recently, a U.S. District Court judge on the West Coast responded to an ESA-based lawsuit by prohibiting the use of certain pesticides adjacent to salmon-supporting waters. For the pesticide industry and individual applicators, these actions should be viewed as clear signals that the ESA itself is not extinct.

An ESA Primer

When the federal ESA was passed in 1973, it represented America's concern about the decline of many wildlife species around the world. It is regarded as one of the most comprehensive wildlife conservation laws anywhere. The purpose of the ESA is to conserve "the ecosystem upon which endangered and threatened species depend" and to conserve and recover listed species. The ESA is administered by the Interior Department's U.S. Fish and Wildlife Service (FWS) and the Commerce Department's National Marine Fisheries Service (NMFS) (1). Currently, over 1,200 species are listed as endangered or threatened, and critical habitats have been defined for 450 listed species. The list covers mammals, birds, reptiles, amphibians, fishes, snails, clams/mussels, crustaceans, insects (except pests), arachnids, and plants (2).

The state of Illinois also has an Endangered Species Act. As of 1999, 478 species were listed by the Illinois Department of Natural Resources' (IDNR) Illinois Endangered Species Protection Board (ESPB) as either endangered or threatened (3). The ESPB revises the list of protected species every 5 years, and thus the 2004 revision will soon be available online (**http://dnr.state.il.us/espb**). Federally listed species that occur in Illinois are also included on the Illinois list.

A species's ability to survive and thrive may be influenced by a number of direct and indirect factors. Most people recognize that species listed by either federal or state government cannot be harmed, pursued, harassed, hunted, transported, or traded. Although it is perhaps less recognized by many, the greatest threat to wildlife is loss of habitat (4). To ensure that listed species and their critical habitats are not jeopardized by government actions and activities, federal and state agencies and local governments are required to consult with the agencies in charge of the ESA program. At the federal level, the consultation process has received considerable attention, particularly as it relates to the U.S. Environmental Protection Agency (EPA) and pesticide registration.

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Consultation Proposal

On January 24, 2003, the FWS, NMFS, and EPA invited public comment regarding ways to better integrate the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and ESA processes and to improve the efficiency and effectiveness of consultations on pesticide actions. Over 300 groups, organizations, and individuals responded. While most comments expressed support for the goals of the ESA and many recognized the need to better implement the ESA with FIFRA, there were strongly differing perspectives about what course would best achieve those goals (for more details, read source 5, page 4470).

After considering all comments, the FWS, NMFS, and EPA concluded that the goals of the ESA can be fully met using new, more efficient administrative processes that take advantage of EPA's expertise while retaining a strong role for FWS and NMFS throughout the consultation process. Accordingly, on January 30, 2004, the FWS and NMFS published proposed regulatory changes to the consultation process (5). The public is invited to comment on this proposal through March 30, 2004. In short, the proposed regulations are as follow (6):

- Permit EPA determinations that a pesticide is "not likely to adversely affect" a species, without further consultation with the FWS and NMFS, provided the agencies are working in accordance with an interagency agreement for implementing the counterpart regulations.
- Provide for the FWS and NMFS periodic oversight of EPA's "not likely to adversely affect" determinations.
- Provide for advance coordination between EPA the FWS and NMFS in which EPA may request participation in the development of an "effects determination."
- Provide for strict timelines for completion of formal consultation when necessary and provide for "partial" consultation that will start the process for evaluating the impact of pesticides on listed species.

Judge Orders Interim Buffer Zones

On February 17, 2004, EPA published (7) a notice regarding a January 22, 2004, ruling of the U.S. District Court for the Western District of Washington in the case of Washington Toxics Coalition (WTC) v. EPA. The court is establishing buffer zones around certain water bodies in California, Oregon, and Washington where the court has ordered that specific pesticides cannot be used. The court order establishes buffer zones for applications that are made adjacent to salmon-supporting waters. Generally, the buffer zone is 20 yards for ground applications and 100 yards for aerial applications. Chief Judge Coughenour issued this order in response to the WTC's July 16, 2003, motion for injunctive relief to establish buffer zones as an interim measure to reduce the likelihood of jeopardy to 26 species of salmon and steelhead. This order is in effect until the EPA and, when appropriate, the NMFS complete an evaluation of whether endangered Pacific salmon and steelhead are sensitive to exposure from 55 pesticides. Under the ESA, EPA must ensure that its registration of a pesticide is not likely to jeopardize the continued existence of species listed as endangered and threatened or adversely modify habitat critical to those species' survival. In addition to the obligation to ensure that its actions are not likely to jeopardize listed species, the agency must consult, as appropriate, with the FWS or NMFS if a pesticide's use may affect listed species or designated critical habitat of listed species.

The federal government is currently reviewing the order issued by Chief Judge Coughenour and considering whether to appeal the decision. The government believes that decisions to protect endangered species from potential pesticide risks should be based on the best available scientific information and a thorough scientific evaluation. EPA's risk-assessment process for pesticides provides a level of protection to all nontarget plants and animals, including endangered species. The agency has reviewed over half of the 55 pesticides subject to this litigation. More than a dozen of those reviewed show no effect on salmon and steelhead, others are now undergoing the consultation process, and some pesticide uses are still being evaluated at EPA. The agency is on schedule to complete the review by December 1, 2004.

In the interim, EPA has informed the public about the court order via its Web site. The agency will develop and provide maps that show pesticide users where the buffer zones apply and revise maps to reflect changes to the order that result as EPA completes effects determinations and consultations, where appropriate, with NMFS.

Protecting Species in Illinois

As a pesticide applicator, what can you do to protect endangered and threatened species? As always, read the pesticide label closely. Specifically, look to the "Environmental Hazards" section for general or specific warning statements. Some labels specifically mention the ESA and list protected species or critical habitat. Sometimes, counties may even be listed. The pesticide label may instruct the user to contact the proper local government agency to obtain localized information. In most cases, this information will be in the form of a county bulletin or pesticide product bulletin. This information is considered to be an extension of the actual pesticide label; thus, the user is legally obligated to heed any warnings or application restrictions contained therein.

Many states are included in EPA's Endangered Species Protection Program database and map Web site (**www.epa.gov/espp/usa-map.htm**). However, Illinois is one of 26 states that have not participated in this species-mapping program. To obtain localized information in Illinois, contact the Illinois Department of Natural Resources Endangered Species Protection Board, (217)785-8774; One Natural Resources Way, Springfield, IL 62702-1271; or **http://dnr.state.il.us/espb**).

Sources:

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(Bruce E. Paulsrud)

Control More with More Control: Pulse-Width Modulation

In the January 2004 *Illinois Pesticide Review,* I wrote an article about spray-droplet size measurement and classification. That article provides important background information for the subject of this article. Please refer to that issue if you are unfamiliar with spray-droplet classification.

Pesticides labels will eventually require specific droplet sizes for applications, meaning the applicator will have to control the droplet size category created by the sprayer during applications. When selecting your nozzle size based on the flow rate (in gallons per minute) needed to get the correct gallons per acre (gpa), you will also need to select a nozzle type, size, and operating pressure to create the droplet size category required by the label. The nozzle will then have to be operated within a pressure range that maintains that droplet size category.

What happens to spray-droplet size if pressure increases? Droplet size decreases. The opposite is also true. If pressure decreases, then droplet size increases. During an application, if you increase the pressure too much, your droplet size category will decrease. Decrease the pressure too much, and your droplet size category will increase. In either situation, you will be making an application with the wrong droplet size category, thus, you will be going off label.

This brings us to the subject of spray rate controllers. Spray rate controllers maintain a constant gpa as you change speeds. If we think about the three factors that determine the gpa, which are nozzle flow rate, ground speed, and effective sprayed width (nozzle spacing), we realize that if we change the speed, the rate controller has to adjust one of the other two factors to keep the gpa constant. Because there is no way for the controller to change nozzle spacing, it has to change the nozzle flow rate. There are two ways to change the nozzle flow rate: operating pressure or orifice size. The controller has no way of switching your nozzles for you, so it adjusts the pressure.

Here is a scenario to consider, keeping in mind the calibration equations (I'm sure you have these memorized). Let's say you're making an application for which the primary speed is 8 mph with nozzles spaced 20 inches apart. The label requires a spray application rate of 10 gpa and a very coarse or coarse droplet size category. You are using TT11003 nozzles, which at a pressure of 32 pounds per square inch (psi) give the required flow rate of 0.27 gallons per minute (gpm). You are using a spray rate controller. At times during the application, the speed is increased to 10 mph. At this speed, the flow rate needs to be increased to 0.34 gpm to maintain 10 gpa. To increase the flow rate from the TT11003 nozzle, pressure must be increased to 51 psi. This pressure changes the droplet size category from coarse to medium. You are now off label because the droplet size is too small. Is there any way to maintain a constant gpa while changing speeds without changing the droplet size category? Technology called pulse-width modulation (PWM) can provide this control.

PWM works by rapidly starting and stopping the flow of spray from the nozzle. Thus, the pulse is the rapid on–off action of the nozzle. A computer-controlled solenoid valve located at the inlet of the nozzle controls the flow. The valve can open and close very rapidly, 10 times a second. The length of time the valve is held open during a pulse is called the duty cycle and is given as a percentage. A duty cycle of 100% means the nozzle is constantly open; a duty cycle of 50% indicates the nozzle is open only 50% (half) the time. The longer the duty cycle, the longer the nozzle is open, and the greater amount of spray that is released. Thus, nozzle flow rate can be controlled by the length of the duty cycle. Need an increase in flow rate? Increase the duty cycle, which opens the nozzle for a longer time. If a lower flow rate is needed, then the duty cycle can be decreased.

Using PWM, nozzle flow rate can be varied over an 8-to-1 range. If pressure is used to change flow rate, most nozzles can be varied only over a 2-to-1 range before the upper or lower limit of their pressure range is reached. Because the length of the duty cycle is controlling the flow rate instead of pressure, pressure can now be set independently. What can pressure control be used for? Droplet size! While the duty cycle adjusts nozzle flow rate, pressure can be adjusted to control the droplet size category created by the nozzle. If you need larger droplets, reduce pressure. The PWM duty cycle will adjust the nozzle flow to maintain the gpa required for the application.

PWM allows you to have independent control of nozzle flow rate and droplet size. You can adjust one without altering the other. An applicator can adjust nozzle flow rate to maintain a constant gpa, while changing speed without changing the droplet size category. An operator can also adjust droplet size by changing the

pressure without affecting nozzle flow rate and gpa.

What about uniformity? Certainly starting and stopping the flow of spray from a nozzle, even rapidly, would have an effect on the uniformity of the spray pattern, right? You would expect skips in the coverage during those periods when the nozzles are turned off. However, this problem does not occur. The pulses from individual nozzles are blended together to create a continuous, uniform pattern along the length of the boom that provides consistent coverage of the target. This blended pattern is accomplished in several ways. First, the pulses are alternated along the boom so that adjacent nozzles are opposite one another. When a nozzle is open, the nozzle next to it is closed. Second, nozzles with 110° fan angles are recommended instead of 80° angles, so each individual nozzle creates a wide pattern. Third, boom height is set to provide 100% nozzle overlap. Finally, it is recommended to avoid duty cycles below 33%. PWM works with most commercially available nozzles, with the exception of venturi-style nozzles. The pulsing prohibits the venturi action from working properly.

Let's reexamine our previous scenario, assuming that you recently purchased a PWM system. Now when the speed is increased to 10 mph, the gpa is held constant by increasing the nozzle flow rate to 0.34 gpm, as before. This time, however, the rate controller increases flow rate by increasing the pwm duty cycle. Pressure remains constant at 32 psi, and the droplet size category remains coarse. You are able to increase speed while maintaining the gpa and droplet size category.

Sometimes the change required during an application might be the droplet size category. For example, you might be applying a pesticide that requires a droplet size category of medium, coarse, or very coarse. Along one side of the field to be sprayed is an area containing trees that are sensitive to the pesticide being applied. For the majority of the application, the pressure can be set to provide a medium droplet size category to maximize coverage. When working close to the sensitive trees, you can reduce pressure to increase the droplet size category to very coarse. This means larger spray droplets and a decreased chance of drift occurring. Because nozzle flow rate is being independently controlled by the PMW duty cycle, the correct gpa is maintained during the pressure changes.

The Synchro spraying system is fully automatic PWM equipment that can be retrofitted to existing spray equipment. The diaphragm check valve on the nozzle body is replaced with the solenoid valve, and wires connect these valves to a flow-control unit. The flow-control unit works with conventional rate controllers to determine and set the nozzle flow rate. A separate pressure-control system with its own control unit and pressure-regulating valve is also part of the equipment. The Sharpshooter is a manually controlled PWM system that does not include pressure-control equipment. Both the Synchro and Sharpshooter systems are available from Capstan Ag Systems, Inc. For more information, visit **http://www.capstanag.com.** PWM is also available as the AIM Command Spray System on new Case IH sprayers; visit **http://www.caseih.com/products/series.asp?reg=NA&RL=ENNA&id=2000&mod=true.**

In summary, pulse-width modulation allows independent control of nozzle flow rate and operating pressure during an application. This means flow rate can be adjusted to maintain a set gpa without significantly changing droplet size. Alternatively, droplet size can be changed to reduce drift while not affecting gpa. When droplet size–category requirements become part of the label, the ability to control these factors will be critical to making an accurate and safe application.

(Scott Bretthauer)

Unified Biotechnology Website Launched by U.S. Regulators

As stated in a previous article ("Regulatory Oversight in Biotechnology," *Illinois Pesticide Review*, March 2003), "Whether you advocate or oppose the use of biotechnology in crop production, it is important to understand what biotechnology provides and how it is regulated." However, keeping yourself informed of this rapidly changing field has been difficult, largely because up to three different federal agencies may be involved in the regulatory process. And then, along came a Web site (**http://usbiotechreg.nbii.gov**).

The Unified Biotechnology Website provides information about the U.S. oversight system for products of modern biotechnology. It includes information on the roles of the regulatory agencies and links to relevant statutes and regulations. The centerpiece of the Web site is a searchable database containing information on all genetically engineered crop plants intended for food or feed that have completed the recommended or required reviews for food, feed, or planting use in the United States.

Statements within this Web site indicate that the content and scope of the database may change to meet user needs. Perhaps we can expect to see nonfood crops included in the future? Construction of the Web site and database has been a joint effort by the Department of State (DOS), the U.S. Department of Agriculture (USDA), the U.S. Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the U.S. Geological Survey (USGS). *(Bruce E. Paulsrud; source: Eddie G. Gouge, associate director, Federal Relations–Food and Agricultural Sciences/CARET, e-mail message, dated 2/17/04.)*

What Are Biopesticides?

The U.S. Environmental Protection Agency (EPA) recognizes four types of pesticides—chemical pesticides, biopesticides, antimicrobials, and pest-control devices. The following is information about biopesticides according to EPA. It can be found on their Web site at **http://www.epa.gov/pesticides/biopesticides/whatarebiopesticides.htm.**

Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides. At the end of 2001, there were about 195 registered biopesticide active ingredients and 780 products. Biopesticides fall into three major classes:

1. **Microbial pesticides** consist of a microorganism (for example, a bacterium, fungus, virus, or protozoan) as the active ingredient. Microbial pesticides can control many different kinds of pests although each separate active ingredient is relatively specific for its target pest(s). For example, there are fungi that control certain weeds, and other fungi that kill specific insects.

The most widely used microbial pesticides are subspecies and strains of *Bacillus thuringiensis*, or Bt. Each strain of this bacterium produces a different mix of proteins and specifically kills one or a few related species of insect larvae. While some kinds of Bt control moth larvae found on plants, others are specific for larvae of flies and mosquitoes. The target insect species are determined by whether the particular Bt produces a protein that can bind to a larval gut receptor, thereby causing the insect larvae to starve.

2. **Plant-incorporated protectants** (PIPs) are pesticidal substances that plants produce from genetic material that has been added to the plant. For example, scientists can take the gene for the Bt pesticidal protein and introduce the gene into the plant's own genetic material. Then the plant, instead of the Bt bacterium, manufactures the substance that destroys the pest. The protein and its genetic material, but not the plant itself, are regulated by EPA.

3. **Biochemical pesticides** are naturally occurring substances that control pests by nontoxic mechanisms. Conventional pesticides, by contrast, are generally synthetic materials that directly kill or inactivate the pest. Biochemical pesticides include substances, such as insect sex pheromones, that interfere with mating, as well as various scented plant extracts that attract insect pests to traps. Because it is sometimes difficult to determine whether a substance meets the criteria for classification as a biochemical pesticide, EPA has established a special committee to make such decisions.

What are the advantages of using biopesticides? Biopesticides are usually inherently less toxic than conventional pesticides. Biopesticides generally affect only the target pest and closely related organisms, in contrast to broad-spectrum conventional pesticides that may affect organisms as different as birds, insects, and mammals. Biopesticides often are effective in very small quantities and often decompose quickly, thereby resulting in lower exposures and largely avoiding the pollution problems caused by conventional pesticides.

When used as a component of integrated pest management (IPM) programs, biopesticides can greatly decrease the use of conventional pesticides, while crop yields remain high. To use biopesticides effectively, however, users need to know a great deal about managing pests.

How does EPA encourage the development and use of biopesticides? In 1994, the Biopesticides and Pollution Prevention Division was established in the Office of Pesticide Programs to facilitate the registration of biopesticides. This division promotes the use of safer pesticides, including biopesticides, as components of IPM programs. The division also coordinates the Pesticide Environmental Stewardship Program (PESP).

Because biopesticides tend to pose fewer risks than conventional pesticides, EPA generally requires much less data to register a biopesticide than to register a conventional pesticide. In fact, new biopesticides are often registered in less than a year, compared with an average of more than 3 years for conventional pesticides.

Although biopesticides require less data and are registered in less time than conventional pesticides, EPA always conducts rigorous reviews to ensure that pesticides have no adverse effects on human health or the environment. For EPA to be sure that a pesticide is safe, the agency requires registrants to submit a variety of data about the composition, toxicity, degradation, and other characteristics of the pesticide.

For More Information

Microbial pesticides and plant-incorporated protectants: Dennis Szuhay, Chief, Microbial Pesticides Branch, Biopesticides and Pollution Prevention Division, (703)305-6098; e-mail: szuhay.dennis@epa.gov

Biochemical pesticides: Sheryl Reilly, Chief, Biochemical Pesticides Branch, Biopesticides and Pollution Prevention Division, (703)308-8269; email: reilly.sheryl@epa.gov *(Phil Nixon)*

Pesticide Update

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

Agronomic

DEFINE SC (flufenacet)—Bayer Crop Science—This new formulation will be available this season. Currently, it is available as a DF formulation. [herbicide]

INTRRO (alachlor)—Monsanto—A new formulation being made available to soybean growers this season. [herbicide]

MESOMAXX/FALCON (mesosulfuron-methyl)—Bayer Crop Science—Registration is expected by the middle of next year for use on wheat. [herbicide]

STAMPEDE/STAM (propanil)—Dow AgroSciences—Due to costs, the company will cancel uses on wheat and barley, and sales from the manufacturers will not be lawful after 6-28-04. Resellers may continue to sell until existing stocks are used up. *(FR,* vol. 68, 12-10-03) [herbicide]

STARANE (fluroxypyr)—Dow AgroSciences—This postemergence herbicide is expected to be available this season for use on corn and grain sorghum.

Fruit/Vegetable

AMDRO PRO FIRE ANT BAIT (hydramethylnon)—BASF—Added to their label the control of bigheaded ants and the use in tropical fruit and nut orchards.

BENTHIAVALICARB-ISOPROPYL—Kumai Chemical—A new fungicide being developed in combination with other products for use on vegetables, grapes, and potatoes.

ELEVATE (fenhexamid)—Arvesta—Added to their label the use on greenhouse and transplant tomatoes. [fungicide]

INTREPID (methoxyfenozide)—Dow AgroSciences—Added to their label the use on turnip greens and okra. [insecticide]

OBERON (spiromesifen)—Bayer Crop Science—Registration is expected late next year for this insecticide/acaricide on vegetables, tomatoes, cole crops and strawberries.

PREFAR (bensulide)—Gowan—Added to their label the use on cilantro. [herbicide]

SEIZE (pyriproxyfen)—Valent—Added to their label the use on pome fruits, stone fruits, and tree nuts. [insecticide]

SONALAN (ethalfuralin)—Dow AgroSciences—Registration for use on potatoes is expected in the near future. [herbicide]

SONATA (fenamidone/mancozeb)—Bayer Crop Science—A new combination fungicide being developed for use on tomatoes and potatoes to control early and late blight.

SWITCH (cyprodinil/fludioxonil)—Syngenta—Added to their label the use on berries, pistachios, watercress, carrots, broccoli, and kale. [fungicide]

VANGARD (cyprodinil)—Syngenta—In conjunction with the IR-4 Project, EPA extended time-limited residue tolerances on onions and strawberries. They expire 12-31-04. *(FR,* vol. 68, 12-31-03) [fungicide]

Turf/Ornamental

AKARI (fenproximate)—Sepro—Currently registered to control mites in greenhouses; an outdoor nursery label is expected by early next year.

ARENA (clothianidin)—Arvesta—A new insecticide being introduced for use on ornamentals in the near future.

ARIA (flonicamid)—FMC—A new insecticide being developed for use on ornamentals to control aphids, whiteflies, thrips, and mealybugs.

DISPAR VIRUS—Terra Nostra—A new viral insecticide being developed in Canada to control the gypsy moth.

FLONICAMID 50 WG—FMC—A new insecticide being developed for greenhouse use on ornamentals.

FORBID 4F (spiromesifen)—Bayer Crop Science—A new miticide being developed for use on greenhouse and outdoor ornamentals. It also controls whiteflies.

GALLERY (isoxaben)—Dow AgroSciences—Added to their label the uses on the ornamentals agapanthus and ligustrom. [herbicide]

HURRICANE (mefenoxam/fludioxonil)—Syngenta—A new fungicide combination being developed for use on ornamentals to control Pythium, Rhizoctonia, and other diseases.

INSIGNIA (pyraclostrobin)—BASF—Recently received registration for use on golf courses and other turf areas to control 15 different diseases.

MILSTOP (potassium-bicarbonate)—Bio Works—A new formulation available for use on ornamentals. [fungicide]

MONUMENT (trifloxysulfuron-sodium)—Syngenta—A new herbicide for use on commercial warm-season turf to control nutsedge, green kyllinga, and other weeds.

PITON 15SC (acequinocyl)—Arvesta—A new miticide expected to be registered in the near future on greenhouse and outdoor ornamentals.

SPOTLIGHT (fluroxypyr)—Dow AgroSciences—A new postemergence herbicide recently registered for use on turf to control various broadleaf weeds.

TALUS (buprofezin)—Sepro—Registration on ornamentals is expected early next year. [insecticide]

TETRA SAN (etoxazole)—Valent—This miticide is registered for greenhouse use, as well as outdoor and landscape applications.

TRISTAR (acetamiprid)—Cleary—Registration is expected in the near future on ornamentals. [insecticide]

ULTIFLORA (milbemectin)—Gowan—A new miticide being developed for use on ornamentals.

Structural

CUNI NPV—Terra Nostra—This Canadian company is in the process of developing this new viral insecticide to control mosquitoes that carry the West Nile virus.

Many

ACARATOUCH (propyleneglycol monolurate)—Toagossi & Co.—A new miticide being made available in the United States for use on fruits, vegetables, and ornamentals.

ARCHER PLUS (gamma-cyhalothrin)—Pytech—Registration in the United States for this new insecticide is expected in 2004. It is being developed as a joint venture of Dow AgroSciences and Cheminova.

EMINENT (tetraconazole)—Sipcam Agro—Registration is expected late next year for use on peanuts, sugar beets, and turf. [fungicide]

FLUCETOSULFURON—LG Life Sciences—A new sulfonylurea compound being developed for use on rice, cereals, and turf. It is highly effective against barnyardgrass as both a foliar and soil application.

NEMACUR (fenamiphos)—Bayer Crop Science—Due to high costs of reregistration, use of this soil fumigant will be phased out prior to cancellation of registration. Production was capped at 500,000 pounds as of 5-31-03. A phaseout of 20% of each year's previous production will be allowed for a 5-year period. Bayer intends to support import tolerances on bananas, citrus, garlic, grapes, and pineapple. Sales by Bayer will stop on 5-31-07, and existing stock can be sold until 5-31-08. *(FR,* vol. 68, 12-10-03) [insecticide]

ONAGER (hexythiazox)—Gowan—A new formulation for the control of mites in various crops.

PROWL H2O (pendimethalin)—BASF—A new formulation that reduces the odor and the ability to stain will be available this season. Also, due to reduced volatility, it does not have the incorporation requirement. [herbicide]

QUINTEC (quinoxyfen)—Dow AgroSciences—Introduction into the U.S. market is expected this spring for use on grapes, hops, and cherries to control powdery mildew. It is a protective fungicide with no curative ability.

TURBINE (flonicamid)—ISK Bio Sciences—A new insecticide under development for use on numerous crops. Marketing will be done by FMC.

ZEEL (etoxazole)—Valent—This new miticide should be available this spring for use on cotton, pome fruits, and strawberries. All stages of mites are controlled except the adults.

Other

ACETO/NUFARM—A newly formed joint venture will produce and market the herbicide Butoxone (2,4-DB), which they acquired from Makhteshim-Agan. Nufarm will formulate the product. The new company will be called SRFA LLC.

AGRO KANESKO—This Japanese company has acquired from BASF its soil-fumigant products, which include Basamid (dazomet), 1,3-DP, and Metam sodium. BASF will continue to manufacture the products.

AMVAC—The company has signed an agreement with Novartis Animal Health to acquire assets of their business related to the insecticide DDVP, which Novartis sells under the trade name Nuvan.

BASF—The company has agreed to sell its global phenoxy herbicide business to Nufarm of Australia. This includes the active ingredients 2,4-D, MCPA, mecoprop-p, mecoprop, dichlorprop-p, and dichloroprop.

BIOTECH CROPS—It is estimated that 167 million acres of biotech crops were planted worldwide in 2003, up from 142 million acres in 2002.

NEOGEN—The company has purchased from United Agri Products, a Con Agra Foods subsidiary, the assets of Hess and Clark, an Ohio-based company that produces disinfectants for animals, and Hacco, a Wisconsin-based rodenticide company.

RIVERDALE CHEMICAL—The company previously purchased by Nufarm will change its name to Nufarm Turf and Specialty Division of Nufarm America Inc.

SEPRO—The company has acquired Dow AgroSciences tree-growth regulator business, which is primarily based on the product Profile (paclobutazol).

SUMITOMO CHEMICAL—The company has purchased Kubota's line of Bt insecticide products.

WEEVIL-CIDE (aluminum phosphide)—United Phosphorus—A new formulation of this fumigant will be marketed by this company as tablets and pellets.

(*Michelle Wiesbrook, unless otherwise noted, adapted from* Agricultural Chemical News, *January and February 2004.)*

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Active Ingredient or Acid Equivalent?

Most pesticide applicators are familiar with the term *active ingredient* (a.i.); but if you are confused by the term *acid equivalent* (a.e.), you are not alone. This term spurs many questions, such as: When would I encounter this term? What does it mean? Can't I just calculate a.e. the same way I would for a.i.? I can answer the first and last questions quickly with: "when applying 2,4-D or glyphosate" and "unfortunately, no."

"What does it mean?" can be best explained in an article by Aaron Hager, U of I assistant professor and weed science Extension specialist. He has thoroughly explained this difficult subject matter in a fairly concise and easy-to-read manner at **http://weeds.cropsci.uiuc.edu/newsletter/2000/Issue%202/Herbicide%20Formulations%20and%20Calculations%20%20Active%20Ingredient%20or%20Acid%20Equivalent.htm.**

Differences in the amount of acid equivalent applied between two formulations could potentially result in weed-control differences. Dr. Hager's article can help you learn how to calculate differences in formulations based on either active ingredient or acid equivalent. His detailed article can also answer many other questions you may have about acid equivalence. *(Michelle Wiesbrook)*

Upcoming Pesticide Meetings

What do the Pesticide Safety Education Program specialists do when they are not on the road training applicators? Naturally, they hit the road again! (Willie Nelson would be proud!) Here are a few of the upcoming conferences that the specialists plan to attend in order to keep up-to-date with pesticide regulatory and industry happenings:

North Central Region Pesticide Education and Certification Workshop, June 6 to 9, 2004, St. Louis, Missouri

International Conference on Pesticide Application for Drift Management, October 27 to 29, 2004, Waikoloa Hilton, Kona, Hawaii, **http://pep.wsu.edu/drift04/**

National Pesticide Stewardship Alliance (NPSA) Annual Conference, November 7 to 10, 2004, Orlando, Florida, **http://www.npsalliance.org/**

(Michelle Wiesbrook)

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