Considerations for Selecting Imported Fire Ant Control Insecticide Products

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Many people have concerns about selecting insecticides to control the red imported fire ant, *Solenopsis invicta* Buren. They want more information about product toxicity and its effects on the environment, other insects, and pets. Risks of having a fire ant infestations and use of insecticides for their control always need to be balanced with the benefits of eliminating the pest with careful insecticide use. Discussed in this fact sheet are several considerations for minimizing and assessing risk when selecting insecticide treatments for imported fire ant control.

Although primarily a nuisance, red imported fire ants can cause medical and occasionally legal problems when they sting, and economic problems when they invade the home and electrical units. Their mounds can be unsightly and damage field working equipment. There are ecological as well as health benefits to controlling fire ants. Some ecologists have come to the conclusion that the best thing they can do to preserve a natural ecology on nature preserves is to control fire ants because of their negative impact on biodiversity. Currently, treatment to suppress these ants relies largely on the judicious use of selected insecticides. Fire ant insecticides can be used with minimal risk.

Lack of knowledge about insecticides, control approaches and perhaps mistrust of information sources (e.g., pesticide manufacturers, government agencies) has resulted in use of ineffective control methods, misuse of insecticides and environmental contamination. For example, higher levels of diazinon, an organophosphate insecticide, have been found in surface run-off water in 15 Texas communities, due to over-use and mis-use of the pesticide. Learning about fire ants, management approaches and toxicology of insecticides is a challenge for anyone. Unfortunately, there is no quick and easy single "best" method for dealing with these challenges. However, knowledge gained may be the largest benefit from considering which pesticide product(s) to use in the battle against imported fire ants.

MINIMIZING RISK:

Follow label directions. The greatest risk associated with use of insecticides is caused by not following directions printed on the product label. The Environmental Protection Agency (EPA) requires all companies developing insecticides to demonstrate that their product poses minimal risks to the user, the environment and to non-target organisms in order to become a registered product (**see FAPFS025**). This process costs millions of dollars and can take years to complete. The EPA registers pesticides if it is satisfied that there will be no unreasonable adverse effects on people or the environment; but this only pertains to pesticides that are used according to directions provided on the label. When using home remedies or concoctions with insecticidal claims, the user has no specific use directions or ability to evaluate the risks involved or has available. Use of petroleum products, like gasoline or diesel fuel, is the most risky and environmentally damaging way to try to control fire ants!

> "***Toxicity*** is the inherent capability of a substance to produce injury or death. ***Hazard*** is a function of *toxicity* and *exposure.* The hazard can be expressed as the probability that injury will result from the use of the pesticide in a given formulation, quantity and manner" (Bohmont, B. L. *1990. The Standard Pesticide User's Guide*, Regents/Prentice Hall, New Jersey 498 pp.)

Exposure. Each pesticide product label describes the appropriate personal protective clothing required when using the product. These items often include use of proper type of clean gloves, long-sleeved shirt, long pants, shoes, eye protection, and occasionally, some type of respirator. Even relatively less-toxic pesticides, can be hazardous to the user when in contact with the skin for prolonged periods. Avoid contact with pesticides, use equipment that is clean, in good working condition, and not used for any other purpose. For example, never use kitchen utensils for measuring pesticides. Clean up after making the application. Discard contaminated or worn articles and wash clothing used during treatment separately and preferably dry on a clothes line in the sun. This avoids contamination of the dryer and helps pesticide residues decompose by ultraviolet light.

Store Unused Pesticides Properly. Storage of unused pesticides presents one of the more substantial risks associated with using pesticides. Only purchase enough product to address the pest situation at hand. This helps avoid having to store products and allows more flexibility for selecting products for future pest problems. If pesticides need to be stored, store them in a secure (locked) location inaccessible to children or animals, and in their original containers accompanied by the product label. Avoid storing pesticides for more than a year or so. Bait-formulated pesticides, in particular, degrade rapidly over time. Bait in unopened containers will remain fresh for about two years when stored in a cool, dry location. When a fire ant bait is exposed to air, the soybean oil spoils and becomes unattractive to foraging ants within weeks. Dispose of unused pesticides properly, following the guidelines of your municipality and by participating in opportunities for hazardous waste chemical disposal offered in your community. DO NOT pour unused pesticides in the sink or toilet or outside in the landscape or drainage system!

Use Pesticides Judiciously. There is no risk-free pesticide - natural, "organic" or synthetic. To be a pesticide chemical, it must affect some biological system or at least be poisonous to the target organism. Selecting an approach which uses the lowest effective amount of the least toxic materials available should be everyone's goal. Over-use of any product can be costly, labor intensive, and environmentally undesirable. For instance, treating each fire ant mound using a liquid, granular, dust or bait formulation will cost $0.10 to $1.50 (or more) per ant mound, not counting labor. Some areas of Texas are infested with 200 to 1,000 ant mounds per acre! Even at 10 cents per mound, treating each ant hill in these areas is unquestionably too expensive, labor intensive and uses too much insecticide. In areas with 20 or fewer ant mounds per acre (about 5 per yard), use of mound treatments only is encouraged. However, in areas with more ant mounds, a broadcast application of a bait can be more economical and provide longer-lasting 80 to 90 percent control. This is the basis of the "Two-Step Method of Fire Ant Control" (**see L-5070 and B-6043, B-6076 and B-6099**).

EVALUATING PESTICIDE TOXICITY

Signal Word. Each registered insecticide label boldly displays a "signal word," DANGER, WARNING OR CAUTION. This descriptor applies to the material as formulated in the product container and indicates the relative toxic level of the product, with "Danger" being the most toxic and "Caution" being the least-toxic. Mixing the product from the container is usually the most hazardous aspect of using a pesticide. Once diluted for use, the toxicity of most products is reduced. Always follow the directions provided on the product label carefully and read other precautionary statements, for instance those describing hazards to bees and other pollinators. Regardless of the signal word, always treat an insecticide as a poison. Also consider that label direction on a less-toxic insecticide may require application at a higher concentration or volume, or the product may need to be applied more frequently, relative to a more potent or "stronger" insecticide -- which could off-set any initially reduced risks associate with selecting these materials.

LD_{50} Values. The LD_{50}, or "Lethal Dose of 50 percent of a population," is a measure of toxicity and indicates the amount of pesticide that would kill 50 percent of the animals tested. These data are found

in many reference describing pesticide toxicity profile (**see Sources below**). Occasionally, however, this information is used incorrectly. The LD_{50} value is expressed as the amount (milligrams or mg) of pesticide per kilogram (kg) body weight of test animals (usually rabbits or rats). The pesticide is generally administered orally or dermally and, provides an indication of the toxicity level of a pesticide's active ingredient. Lower LD_{50} values indicate that the pesticide is relatively more toxic. Extrapolation of this information to other organisms, like humans, is questionable. Furthermore, most published values refer to the toxicity of the active ingredient (a.i.) rather than to the product as formulated for sale (i.e., diluted). If the product has a low percent a.i., the toxicity of the formulation is much lower than the toxicity of the technical material (99 to 100 percent concentrate used to prepare the commercial formulations). For example, most bait-formulated fire ant products contain less than one percent a.i., so one pound of product only contains 1/100th pound insecticide. Another consideration, particularly for liquid pesticide formulations, is that occasionally they contain some other ingredients (active ingredients or inert materials) in the formulation that can affect the toxicity of the product (**see B-6099**).

Material Safety Data Sheet (MSDS). Each pesticide is required to have, in addition to the product label, a Material Safety Data Sheet (MSDS). This document provides specific toxicological information about the pesticide in the product, including risks to the user and the environment. These documents are available from pesticide manufacturers and distributors, but may also be found in some publications and internet sites (**see Sources below**).

Toxicity Profiles. A greater understanding of toxicological properties of pesticides can help when choosing the most appropriate product to use. Each pesticide has certain properties to consider for selection and use, and each has a distinct toxic effect on different organisms. The combined information on the effects is known as the toxicological profile. For instance, although the insecticides containing ingredients called, pyrethrins (extracted from a plant), as well as pyrethroids (synthetically-produced class of insecticides), have low toxicity to man, mammals and birds, they are all highly toxic to fish and aquatic organisms. Conversely, acephate (e.g., the ingredient found in products like Orthene®), an organophosphate insecticide, is usually formulated at relatively high concentrations and can be toxic to the user and pets if exposure (through prolonged skin contact or inhalation) is excessive. However, this ingredient decomposes rapidly in the environment and is much less toxic to fish. *Persistence* in the environment varies greatly between pesticides and can be a desired benefit or a risk, depending on the degree for pest control desired. *Water solubility* can become a problem if the product is leached away from its intended use site and contaminates ground or surface run-off water. Most pesticide manufacturers employ technical representatives that can help find answers to questions about the toxicity profiles of their products.

EVALUATING ENVIRONMENTAL RISKS

Effects on Non-target Arthropods and Other Soil Organisms. The MSDS will provide information about hazards to the user (human toxicity) and environment, but information about the effects of a pesticide on other organisms (e.g., insects and other arthropods) is lacking. Frequently, technical support brochures developed by manufacturers will describe whether the product has a broad-spectrum effect on a wide variety of insects, or whether it is target-specific or toxic only to certain arthropod groups. Beyond that, a search of scientific literature might be necessary to obtain data on specific effects of products on beneficial organisms like earthworms, soil microorganisms ("microbes") or biological control agents like insect diseases, parasites and predators. Bait-formulated fire ant products, for instance, contain active ingredients that could kill a wide range of other insects and arthropods. However, as formulated and applied, they are primarily consumed by red imported fire ants and perhaps other ants that eat soybean oil, the attractant in most of these products. Consequently, there is some concern about using broadcast applications of these bait products in areas where the preservation of native, competitor ant species is desired. On the other hand, dust, granular or liquid insecticide

treatments applied only to imported fire ant mounds will not affect other ant species nesting elsewhere (or other non-target organisms) unless they are contacted by the treatment.

Secondary Pest Outbreaks. Although imported fire ants are largely considered to be a pest, they are effective predators of other insects and arthropods considered to be pests as well. Should imported fire ants be eliminated on a large scale, the probability of increased populations of the organisms on which they feed should be anticipated. These groups would include tick and chigger species and many species of caterpillars and beetles. Particularly in agriculture, the decision to eliminate fire ants should carefully be made after evaluating the collective impact of the ant on the ecosystem and the production system. In cotton and sugarcane, the impact of the imported fire ants is generally thought of as beneficial.

SOURCES OF ADDITIONAL INFORMATION:

- EXTONET, The Extension Toxicology Network, Pesticide Information Profiles, http://ace.ace.orst.edu/info/extoxnet
- Oregon State University Extension Pesticide Properties Databaser, http://ace.orst.edu/info/nptn/ppdmove.htm
- Agricultural Research Service, US Department of Agriculture Pesticide Properties Database, http://www.arsusda.gov/rsml/ppdb2.html
- Hazardous Substance Databank, Toxnet, National Library of Medicine, http://toxnet.nln.nih.gov/servlets/si,ple-search

Pesticide labels and information references: C&P Press, 888 Seventh Ave., 28th floor, New York, NY 10106; 212/621-4600, FAX 212/399-1122 1/800-544-7377

Farm Chemicals Handbook, Meister Publishing Company, 37733 Euclid Ave., Willoughby, OH 44094; 440/942-2000; 800/572-7740; FAX 440/942-0662

A World Compendium, The Pesticide Manual (10th ed.). C. Tomlin (ed.) 1994. Crop Protection Publications, British Crop Protection Council, 49 Downing St., Farnham, Surrey GU9 7PH, United Kingdom and The Royal Soc. Chemistry, Cambridge, UK. 1341 pp.

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For more information regarding fire ant management, see Extension publications B-6043, *Managing Red Imported Fire Ants in Urban Areas*; B-6076, *Managing Red Imported Fire Ants in Agriculture*; B-6099, *Broadcast Baits for Fire Ant Control*; or L-5070 *The Texas Two-Step Method Do-It-Yourself Fire Ant Control for Homes and Neighborhoods*. Also visit our web site at http://fireant.tamu.edu.
