

a voice
for the natural
landscaping
movement



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For more information, or to join
Wild Ones Natural Landscapers,
here's how to reach us:

Phone

(920) 730-3986
(877) 394-3954 (Toll-Free)

Mail

P.O. Box 1274
Appleton, Wisconsin 54912-1274

E-Mail

ExecDirector@for-wild.org

Web Site

www.for-wild.org

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THE ROUNDUP MYTH

AN OPINION By Maryann Whitman

In the last issue of the *Wild Ones Journal* we spoke at length about the invasive species, garlic mustard (*Alliaria petiolata*). In fact, hardly an issue goes by that we don't have some mention of invasive exotics. In the November/December 2005 issue we reviewed Elizabeth Czarapata's book, *Invasive Plants of the Upper Midwest*. Her lists of invasive plants may be specific to the Midwest but are applicable to anywhere in the continental United States where those plants are capable of growing. She mentions that, according to a recent report from Cornell University, "Every year, the costs associated with non-native weeds approach and exceed \$26 billion in the United States (including Hawaii and Alaska) alone."

It has become abundantly evident that something other than pure manpower and brute pulling force is necessary to control these interlopers. We *do* need to control them for the sake of a large number of natives that are being displaced by these plants, and ecosystems that are being disrupted. In order to gain control of these culprits we *may* need to consider the thoughtful and careful use of herbicides.

Most of our antibiotics (penicillin, tetracycline etc.,) exploit the *differences* among the "illness-producing" and the beneficial biota. For instance, tetracycline interrupts the action of transfer RNA of the target disease organism and not of the rest of the cell wherein it resides. Through this action the illness-producing organism is stopped. A similar strategy may be necessary for the control of unwanted, disruptive plants – exploit the special characteristic of the organism we wish to eliminate. Whether it be garlic mustard or any other of a panoply of exotic invasives that have arrived on our shores.

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Celebrating 25 years
restoring native plants
and natural landscapes.

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These actions are consistent with the mission of the Wild Ones, namely, to promote biodiversity and sustainable practices. We have resolved to support our native biota, and as a result we may need to be prepared to take some drastic action – we must do something to interfere with the off-continent troublesome species, just to give our continental natives a much-needed assist.

The coming of Roundup.

With the acceptance of this premise, let us consider one of our alternatives: glyphosate.

Glyphosate is a broad spectrum, non-selective herbicide that interferes with the production of several amino acids that are vital to the life force of both plants and animals. Its mode of action is through the shikimate pathway. Animals do not use this metabolic pathway – we get these vital amino acids by eating plants. It was with this explanation that glyphosate was approved by the EPA, sold to the American public, and then the rest of the planet, as being safe and non-toxic.

The test results presented to the EPA on this herbicide involved glyphosate alone. When glyphosate was first manufactured by Monsanto in the early 1970s it came on the market in a number of formulations. The most familiar of these is Roundup. It came to the consumer pre-measured, premixed, and ready to be applied. However, in Roundup, glyphosate is combined with surfactants and adjuvants, chemicals that are mixed in to assist in the delivery of the glyphosate into plant cells. This was not pointed out to the consumer. In fact, the consumer, the end user of Roundup, has not been informed of what these additional chemicals were and continue to be. This restriction of information continues, and yet this is the formulation that has been and is being sprayed on agricultural fields around the world.

It is this lack of transparency on the part of Monsanto that has resulted in a great deal of muddled information. Most of the information that is to be had on the deleterious effects of this herbicide on fish, frogs, soil biota, and human beings is based on research using the Roundup formulation. Sometimes it is not clear whether the researcher used only glyphosate or its Roundup formulation. The two are very different products with very different properties.

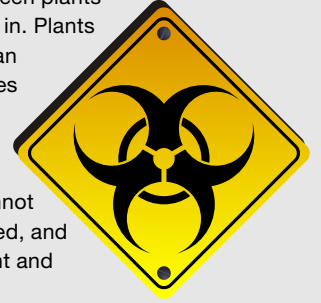
Then came Rodeo and others.

Rodeo, which is another formulation produced by Monsanto, consists of *only* glyphosate, diluted with water. This product is intended for use in wetlands and even in water. When, in 2000, Monsanto lost the patent on glyphosate products, many other companies started manufacturing similar products. As a result the glyphosate-only formulation is readily available on the open market, for instance under the trade name Accord. A separate surfactant, of known constituents, may be mixed in to assist in the delivery of the glyphosate to the plant cells.

Whether one needs to add the surfactant depends largely on the method of application. With foliar spray the surfactant ensures that the glyphosate stays on the leaf and penetrates past the waxy pro-

How Glyphosate Works

Living things as diverse as plants, animals and some single-cell organisms show remarkable similarity in how they use “food” intake for energy, and in the structure of molecules necessary for their life processes. (It seems that nature seldom “reinvents the wheel.”) There are differences between plants and animals in the “food” they take in. Plants are autotrophic organisms – they can manufacture the nutritive substances (e.g., vitamins) from inorganic molecules (water and minerals) they take in from their environment. Humans are heterotrophic – we cannot manufacture all the vitamins we need, and must therefore find them in the plant and animal matter that we ingest.



Monsanto arrived at glyphosate through hit-and-miss greenhouse experiments. When Roundup was released with the permission of the EPA it was not known exactly *how* the glyphosate worked. It was only known that it interfered with the production of certain amino acids in plants, thereby causing their death. It was also known that animals are not capable of producing these amino acids, so it was assumed that animals were not affected by glyphosate. After the release of glyphosate, curious organic chemists who do basic research (for which funding money is being cut drastically), did some fine work in determining *how* it worked at the molecular level.

Both plants and animals use PEP (phosphoenolpyruvate) in all their cells as a core molecule in their life processes. Research has shown that part of the glyphosate molecule mimics a part of the PEP molecule and thereby blocks its action in a metabolic pathway that is specific to plants (the shikimate pathway). What has not yet been determined is whether this mimicry of the PEP molecule can be accomplished in other metabolic pathways that are common in all animal cells.

tective surface of the plant. But the addition of the surfactant makes the formulation many times more toxic to other biota with which it may come in contact. Premixed formulations of glyphosate with wetland-safe surfactants may also be had, for instance under the trade name Glyphomate 41.

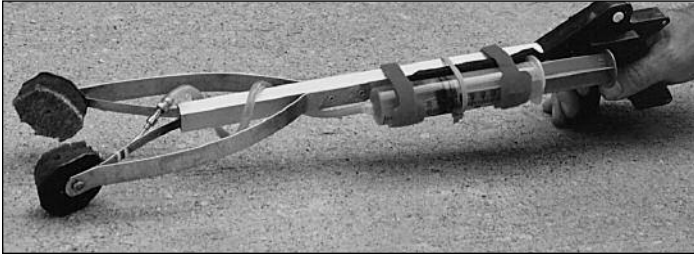
It is possible to use glyphosate “safely.”

Yes. With what we know of the mode of action of glyphosate and its behavior in the environment this chemical may be of use to us with certain methods of application to individual plants:

- *Cut and Daub.* The glyphosate-only product is delivered directly to the freshly cut stump of a buckthorn sapling (for instance), or a fistful of cut stumps of reed canary grass.
- *Drill and Fill.* The glyphosate is squirted into a series of holes drilled into the trunk of a large tree in a forest where it may be left standing to become a snag and eventually fall to the ground and serve as a nurse-log.

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Designed by Wild Ones member Steve Maassen, the easy-to-make Tongs of Death is very effective at applying Roundup (or other herbicide) directly to pesky weeds or invasive aliens, while leaving more desirable plants unharmed.

- *The Glove (and Tongs) of Death.* The glyphosate is stroked onto individual plants, by hand, in a glove soaked in the chemical. The hand is actually in a latex or rubber glove within the soaked cotton glove. The glove may also be replaced by a sponge applicator. (See *Journal* article, "Tongs of Death" at www.for-wild.org/native.html.)

- *Coarse Spray.* The glyphosate product, in combination with a surfactant of known constituents, may also be applied as a coarse foliar spray in a relatively safe manner, during that period of time when native plants are dormant but the invasive plant in question is growing. These so-called "wetland-safe" surfactants may be used on upland plants as readily as on those near water.

Other things to think about.

Consider this: because garlic mustard comes from a different continent (middle Europe) and a different growing environment, it has a different growing season. In fact, it continues growing during a period of time that our natives are dormant. This is the "difference" that we need to exploit. We may apply the glyphosate plus water-safe surfactant while natives are dormant and amphibians are not out and about. It would be well to remember that not all natives go dormant during the winter. For instance, some sedges continue to be green throughout the winter. Because glyphosate is a general herbicide the sedges would be affected.

Another important factor in the premeditated, careful use of glyphosate products is concentration of the applied product when diluted with water. *When a little is good, a lot is not better.*

When using a product that is not premixed, it is important to know the percent by volume of the active ingredient in the concentrated product. For instance, Accord comes in a concentration of 53%. That means that there are 53 parts per hundred of glyphosate and 47 parts per hundred of water in the container that comes from the store. For treatment of woody plants ("Cut and Daub" or "Drill and Fill"), a concentration of 14% by volume of active glyphosate is recommended – and for herbaceous treatment (foliar spray), a concentration of 5%. To achieve these concentrations when starting with 53%, one would need to do the following: mix 1 part Accord concentrate with 3 parts water to get approximately 14%. Mix 1 part Accord concentrate with 10 parts water to get an approximately 5% solution of glyphosate. It's important not to ex-

ceed suggested concentrations for application. This is especially true if a surfactant has been mixed with the glyphosate as one might do for an early-winter spray application. It's been found that it's possible to chemically burn the plants before the glyphosate has been delivered into the plant body. Plants treated in this way are able to resprout from their roots.

The Nature Conservancy and many foresters have discontinued using the Roundup formulation when they use herbicides, and use instead the glyphosate-only products, or with wetland-safe surfactants, (both on uplands and wetlands).

Moderation, balance, and tradeoffs.

Many things that we use every day are dangerous, or even life-threatening in some circumstances: fire, boiling water, concentrated salt solutions. But they are familiar to us – we use them with care



and avoid peril. It seems that with modern technology there is available to us an ever increasing variety of things that are useful but may be dangerous if not used with awareness. We need to make ourselves aware of dangers as well as of beneficial applications.

The beneficial applications of some herbicides are evident and necessary if we are to deal with invasive plant species. We look upon infestations of non-natives and recog- *Continued on page 4.*

Roundup and Amphibians

When the fatal effects of Roundup on amphibians are pointed out, one of the defenses that Monsanto uses is that, "Roundup is not intended for use near wetlands." It has finally occurred to someone to point out that most of our amphibian species actually reproduce in big puddles. These temporary water bodies lie in shallow indentations in agricultural fields. The water lasts just long enough for most amphibians to complete their life cycles. Scientists suggest that Roundup may be implicated in the decrease in population numbers of amphibians around the world.

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nize their disruption of native ecosystems – systems on which our clean water and the survival of our continental native species depend. It is the pledge of Wild Ones members to do what we can to further the related causes of biodiversity, ecologically sound gardening practices, and conservation of native plant species. But we need to engage invasives with cautious, clear-headed premeditation. If you don't need to use glyphosate but can accomplish your goals by other means, do so. If you need to use glyphosate do so with awareness and care. ♦

Maryann Whitman is the editor of the Wild Ones Journal. She is a member of the Oakland (MI) Chapter.

Wild Ones Ecoscaper

Somewhere between a prairie and a formal planting lies the fertile potential of native plants in an ornamental design, the domain of the Ecoscaper – which is a brilliant synthesis in language of the two concepts, landscaper and ecologist. Getting the name right is the first step in defining and shaping an understanding of what you want to accomplish.

The term "Ecoscaper" was coined to refer to the concept and practice of ecological landscaping. We have developed the Ecoscaper Certification Program which will allow Wild Ones members to both enhance their knowledge and receive credit for their accomplishments. For more information or to enroll go to www.for-wild.org/land/ecoscaper/ or contact the National Office.

Herbicide Myths Vs. the Facts

MYTH: The Government tests pesticides for safety before they are sold. **FACT:** The EPA (Environmental Protection Agency) does not test pesticides for safety. It relies on the manufacturers' test data to make judgments. Recent probes have found that the experiments on which these data have been based, have been designed to show only what the manufacturer would like them to show. This criticism of self-serving misrepresentation can be aimed equally validly at irresponsible experimenters bent on demonstrating toxicity of a given pesticide.

It seems that however this problem is approached, the EPA needs to take more affirmative action and responsibility. This is not likely to happen, as the EPA's research program increasingly relies on corporate joint venture, according to agency documents obtained by Public Employees for Environmental Responsibility (PEER). Indeed, a study by the Government Accountability Office (the investigative arm of Congress – the same people who first told us of the \$640 toilet seats and \$1,000 hammers purchased with Department of Defense money), in April 2005, concluded that the EPA lacks safeguards to "evaluate or manage potential conflicts of interest" in corporate research agreements, as they are taking money from corporations that they are supposed to be regulating.

MYTH: What you need to know is on the packaging label.

FACT: Not by a long shot. Read the list of ingredients of any pesticide and you will find them divided into "Active Ingredients" and "Inert Ingredients." The active ingredients listed are those chemicals that will affect the target pest – these *must* be listed. They usually consist of a long chemical name and the percent it represents of total volume. The so-called inert ingredients are everything else that is not the active ingredient. They may be solvents, carriers, preservatives, and/or adjuvants intended to make the active ingredient work better. They do *not* need to be listed on the label, though they may represent 99.9 % of the volume. The so-called inert ingredients in a pesticide may be hundreds of times more toxic than the so-called active ingredient.

Most consumers assume that the inert ingredients are somehow "inactive" and therefore not harmful to health or environment. Nothing could be further from the truth. The chemicals used as inerts

include some of the most dangerous substances known. A chemical may be identified as an active ingredient in one pesticide, while being included under inert ingredients in another product, and not identified. The designation reflects the purpose the chemical serves in a given formulation, and is at the discretion of the manufacturer. Consequently, some chemicals that are "controlled substances" in one formulation, may be used as "inert ingredients" and not listed in another.

MYTH: There are laws... **FACT:** The primary focus of the Federal Insecticide, Fungicide, and Rodenticide Act, originally enacted in 1947, was to provide federal control of pesticide distribution, sale, and use. The act has been amended many times over the years. One of these amendments permitted manufacturers protection of trade secrets. It is under these provisions that manufacturers circumvent a law that originally intended all information to be known – at least by the EPA. The fact that today, with mass spectrometers, chemistry can determine the makeup of the inert ingredients, leaves only the end consumer in the dark.

In 1990 the Office of the Attorney General of New York filed a request that all inert ingredients in pesticides be made public. The request was repeated a number of times through the decade, to no avail. Sixteen years later, in August of 2006, the attorneys general of 14 states have filed a similar petition to the EPA. This time the EPA is obliged to respond within a given time period.

MYTH: There are safe pesticides. **FACT:** Any chemical may be

misused and misapplied. Precautionary measures to consider when using glyphosate (without adjuvants):

- Wear gloves,
- Don't breathe in the fumes.
- Avoid ingesting the product.
- Don't use the product if you are pregnant.
- Use a coarse broadcast spray when most native plant species are dormant and amphibians are not out and about.

