

Is Roundup Glyphosate?

(Not Always)



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Introduction

Sometime after The Great Flood, when Noah released lions, tigers, bears, spruce trees, insects, bacteria, and fungi, etc., two by two, the great American Corporation Monsanto invented and patented a chemical they assigned the common name, glyphosate. That chemical was sold for years and years under the trade name Roundup, which became one of the most popular herbicides of all time. This herbicide helped to thwart the sins of the first humans in the Garden of Eden by making one of their punishments – weed control – more palatable and efficient for those who like to spend more time watching sports or cable TV.

Roundup possessed some remarkable characteristics: systemic activity, effective at low doses, rapid breakdown and, hence, low residual when coming into contact with soil or organic matter. Even better, after weeds are killed, immediate replanting or reseeding is possible. Wow! Furthermore, the herbicide was believed to be relatively nontoxic to humans, animals and the environment (some individuals now dispute this notion). Over the years,

Roundup has garnered a stellar reputation as a low cost, highly effective, magical herbicide, controlling virtually most unwanted plants (weeds) on Planet Earth.

The goal of this article is not to rain down accolades upon Monsanto as it attempts to end famine around the world with its GMO and Roundup Ready products. Nor is the goal to join the March On Monsanto bandwagon with some individuals who apparently believe that this big, nasty American corporation is destroying this planet while in pursuit of profit. Rather, I wanted to convey some possible lackluster but increasing concerns associated with effects of Roundup products on non-target plants, especially in the nursery and landscape. These non-target plants may include trees, shrubs and herbaceous annuals and perennials. And, because Monsanto's glyphosate patent expired a number of years ago, there has been a plethora of products with similar active ingredients from other competing companies as well. But, why are we seeing more adverse effects on our ornamental plants from these herbicides (Photos 1, 2 & 2A)?

Roundup Active Ingredients Clarification

For decades, Roundup contained glyphosate as the sole (primary) active ingredient. People who utilized the herbicide became accustomed to using it without harm to non-target plants. For example, Roundup was used in nurseries and landscapes as a spray to control weeds around trees, often applying the herbicide right up to the trunk (or even on the trunks) without ill effects. As time ensued, but especially after glyphosate went “off-patent”, the geniuses at Monsanto decided they needed to enhance the efficacy of Roundup while continuing to advance the sterling reputation that the Roundup brand had attained. Subsequently, “Roundup” became a line of herbicide products, and this has undoubtedly become rather confusing to people who were accustomed to the original, plain Jane, glyphosate-containing Roundup. In fact, it is difficult to purchase the original Roundup unless we visit a farm store where it is sold for application over Roundup Ready crops.

Today, Roundup is still sold with the active ingredient glyphosate, but other active



1 Initially, the damage to these oak trees was believed to be due to the lethal disease known as oak wilt. Further investigation disclosed that the damage resulted from an herbicide product containing glyphosate and imazapyr. The herbicide had been applied the year before to the driveway of this horse farm. Many trees did not recover.

2,2A A friend and professional arborist killed this conifer at his property after using Roundup Extended Control. Nearby hickories (2A) were also drastically affected. He had used the original glyphosate-only Roundup for years with no ill effects before switching to the product containing imazapyr.

3A-C Augmenting the original glyphosate active ingredient, various Roundup products now contain a variety of other chemicals to enhance the glyphosate's effectiveness and longevity. Be very cautious of applying products containing imazapyr in the vicinity of trees, shrubs and other desirable plants.



What is Imazapyr?

The real problem for nurseries, landscapes and gardens is the imazapyr component of some Roundup products. Imazapyr has been, or currently is, an active ingredient in **Roundup Extended Control** and **Roundup 365** products. Interestingly, some **Roundup Extended Control** products contain diquat dibromide rather than imazapyr. Confusing enough? Imazapyr (=Imazapic) is a long-lived herbicide (at least a year) that is lethal to most plants. Imazapyr has been used extensively in right-of-way areas (railroads, utilities) for broad spectrum vegetation control; it has been sold under such trade names as Arsenal, Assault and Sahara (Want that area to look like a desert?). Of considerable concern is that imazapyr is a carboxylic acid herbicide (remember DuPont's Imprelis?) that is soluble in water. In other words, imazapyr tends to move with water (irrigation or rain), either laterally across the landscape or by leaching down through the soil to the roots of trees and shrubs, often with deadly consequences (Photo 1, 2 & 4A). Furthermore, because imazapyr persists for a year or more in soil, it is important to understand that planting seeds or transplants into imazapyr-contaminated soil may result in harm to these plants. It is important to point out that many of Monsanto's competitors offer herbicide products that also contain imazapyr (and glyphosate) (Photos 5A & B).



Avoiding/Managing "Roundup" Damage to Trees and Landscape Plants

There are probably at least two rather confusing aspects about the Roundup line of products and other competitors' analogous products. First, individuals who have used the original Roundup (glyphosate) in the past may believe that the "**Roundup Extended Control**" or "**Roundup 365**" formulations simply represent stronger doses of glyphosate, without comprehending that other very lethal and/or long-lasting herbicides have been added to the formulations. People switched to the high "steroidal" Roundup products because they would only have to spray weed-infested areas once a year rather than several times. It is evident that the general public and even some professional applicators do not understand the unintended impacts of these additional herbicides in the Roundup product line. Second, according to the labels and directions on packages, recommended use of most Roundup products includes locations such as driveways, patios, sidewalks/paths, tree rings, mulched areas, etc. – exactly where the roots of many trees and shrubs exist. The imazapic ingredient of certain Roundup products may leach vertically or laterally into the root zones of trees and shrubs



ingredients have been added: predominantly the contact herbicides pelargonic acid and diquat dibromide, and the systemic herbicide imazapyr (Photos 3 A-C). I recall when growing up on the family farm that it might take 1-2 weeks before weeds turned yellow and began to die after the original Roundup was applied. The Roundup folks with all of their infinite wisdom in a burgeoning market understood the average impatient consumer's desires – "We want that weed to die *NOW!*, not next month". So pelargonic acid, a fatty acid herbicide, was added to the formulation to ensure a rather fast "melt-down" of the weed. To the consumer's immense gratification, the sprayed weed often withered the same day of application while glyphosate advanced systemically to eventually kill the roots. Diquat dibromide largely does the same thing as pelargonic acid, but somewhat slower. These extra ingredients cannot be added to the original Roundup for application on Roundup Ready crops because they would destroy the crops!

and be taken up systemically, causing severe harm to these plants (Photo 1, 2 and 4A). It must be emphasized that there are many products marketed under different manufacturers' labels that contain active ingredients similar to those in Roundup products and that are just as deadly (Photos 5A and 5B). While the percentages of these active ingredients in these different products may vary slightly, imazapyr and other potentially long lasting chemicals can do serious harm to our desirable plants.

Following are some simple steps that may help us avoid or correct herbicide issues:

Step 1 – Read and Follow the Label: It is important to have knowledge of the active ingredient(s) and where/under what conditions the herbicide is to be applied before application (Photo 6). Make sure the label is followed in regards to precautionary measures and so forth. **Avoidance** of herbicide damage is key!

Step 2 – Don't Follow the Label: For any products that contain imazapyr or similar acting broad spectrum, water-soluble herbicide, it is best to not use these products anywhere in the vicinity of desirable plants (Photos 7A & 7B). It is important to understand that roots of trees often extend horizontally 1-2X the height of the tree. In my opinion, the labeling on some of these herbicide products is way too lax, resulting in serious risks and misunderstandings regarding non-target effects on plants whether in the nursery or landscape.

Step 3 – Ameliorating Herbicide Damage: If mistakes do happen, which according to my experience is happening in greater frequency, do not remove trees or shrubs immediately. Affected plants sometimes recover with time depending on the dose they receive (Photos 4A, 4B, 6 & 7A). For plants that are damaged by herbicides, it is important to know the herbicide's chemistry and determine what remedial steps we might take to prevent plant death and aid in the plant's recovery. For example, imazapyr (like Imprelis) can be leached from root zones by frequent irrigation.

Lastly, when nurserypersons, arborists, landscapers and other individuals in the plant industry encounter problems with plants, it is prudent in our diagnostic efforts to always investigate the potential that herbicides may be involved, whether in a primary or secondary manner.

If anyone has any questions or comments about this article, please feel free to contact the author at robertsd@msu.edu or (248) 320-7124.



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7A



7B

The author and MSU do not endorse any particular products. If using pesticides, be sure to read and follow label directions.

ABOUT THE AUTHOR

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4A The mulch rings of these trees were treated the previous year with a product containing imazapyr, with "apparent" lethal consequences. Note that the topically applied imazapyr not only leached into the root zones of the trees, but also into the adjacent turf, inhibiting reseeding and weed growth for two years.

4B This photo was taken three years after the initial application of imazapyr (same location as 4A). Of the apparent damage to trees in Photo 4A, two apparently died and had to be replaced. Astoundingly, many of the other trees eventually recovered! Believe it or not (One for Ripley's!), most of the affected trees survived two years without foliage and then re-foliated! Provided there is green cambium tissue beneath the bark, never give up!!

5A&B Competing with the ever popular Roundup line of products, a plethora of other manufacturers' products contain the same active ingredients, glyphosate and imazapyr, albeit at slightly different percentages. Barrier and Ortho's Ground Clear are shown here.

6 This serviceberry contains sparse, straggled foliage as the result of a glyphosate application to the mulched area adjacent to the tree. The reason for the damage from glyphosate is that the applicator applied the herbicide to epicormic shoots (suckers) emerging from the lower trunk and roots. Luckily, the tree eventually recovered.

7A&B Dogwood is very sensitive to herbicides. A dogwood (7A) at the same property in Photo 1 suffers from imazapyr application to the driveway while another dogwood (7B) farther from the driveway was unaffected.