

The Plant Doctor's LANDSCAPE TIPS

By Dr. David L. Roberts, The Plant Doctor LLC a.k.a. The Tree Doctor

ADVANTAGES AND DISADVANTAGES OF HERBICIDES

INTRODUCTION

Ever since Adam and Eve partook of the forbidden fruit in the Garden of Eden, 'Man' has been delegated to a lifetime of toiling and hardship for his sins . . . or so the Biblical story goes. Plants in unwanted places can interfere with our production of food or with other matters such as having that pristine landscape that endows us with bragging rights over the dandelion-ridden landscape of our neighbors, the Jones (Photo 1). When is a weed not a weed? Plants that are unwanted in certain locations are considered to be "weeds". When that 'weed' is in another location, it might be regarded as a beautiful and desirable plant. What's up with our human fickleness?



PHOTO 1

Photo 1: This pristine landscape is largely the product of modern technology that involves chemical inputs such as herbicides. While older, mechanical efforts could potentially yield similar results, modern methods are time saving, less costly, and more efficient.

bicycle became a leisure mode of transportation on weekends and holidays. As costs for production of the bicycle decreased due to mass production, the common person could afford them for daily transportation as the wealthy class graduated to steam and gasoline-powered cars.

But what about weeds? Ever since 'Man' (Humans) left the Hunter/Gatherer lifestyle and began farming, plants in the wrong place could be problematic. They stole nutrients and moisture right out from under the plants we were trying to grow for food. In other words, they were competitive, which is Mother Nature's way, whether we like it or not. In the good ole days, we spent a lot of time hoeing and pulling weeds to eliminate or minimize their competition to crops we were growing for food. In those days, most of us were farmers; we had to devote a lot of time to that agrarian style of labor and life. As time progressed however, more of us moved to urban areas and/or adopted livelihoods other than farming. Farmers became fewer and a smaller and smaller percentage of the population, while needing to increase food production to feed all of those who were no longer farmers (Photo 2). Although this discussion could "branch" into many directions, I just wanted to provide a brief overview, even if inadequate, of the pitfalls and benefits of herbicide use as I have witnessed over many years.

Ever since the dawn of humankind, we have striven to overcome our hardships by adaptation and inventions. When we got tired of walking, we lassoed and tamed horses for riding. If we had lived during the days of the dinosaurs, we probably would have lassoed them for transportation as Fred Flintstone did. And for the wealthy, the invention of the



PHOTO 2

Photo 2: Modern agriculture provides us with a relatively inexpensive and abundant food supply. Herbicides are often considered necessary for these human pursuits. In the United States, some of the major crops such as corn and soybeans are "Roundup Ready", meaning the crop has been engineered to resist the impacts of the herbicide Glyphosate ("Roundup"), which still controls common weeds prone to be a problem in crop production. The widespread use of herbicides is considered controversial by many individuals and groups.

HERBICIDE TYPES

Herbicides are often classified according to their chemical structure and/or their mode of action. For example, Triclopyr, Imazapyr, Aminopyralid, and Imprelis are examples of the carboxylic acid group of herbicides because of their basic chemical structure (Photo 3). Herbicides may also be classified according to their mode of action. Modes of action, for example, may involve the inhibition of an enzyme or synthesis of a protein that are vital to a plant's growth and survival. What that means in real life is that the target "weed" is harmed physiologically . . . and, hence, physically. In the case of carboxylic acid herbicides,

Continued on page 18

Photo 3: The general, beginning basic structure of some herbicides is known as the carboxylic acid molecule. The "R" group is what is added onto the basic carboxylic acid structure to give it its unique properties. Those "R" properties in the case of carboxylic acid include herbicides, polymers, coatings, adhesives, pharmaceutical drugs, solvents, food additives, antimicrobials, flavorings, and chemicals we know . . . and uses like anti-aging and moisturizing cremes, and antioxidants. Carboxylic acid chemicals also occur widely in nature. Isn't chemistry AMAZING?!?!

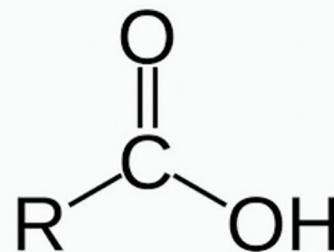


PHOTO 3



The Plant Doctor's LANDSCAPE TIPS

ADVANTAGES AND DISADVANTAGES OF HERBICIDES

Continued from page 17

that manifestation is often exhibited as a cessation of cell division and growth (Photo 4). That cessation of growth often results in plant death (Photo 5A) . . . even though the plant may sometimes outfox the herbicide (Photo 5B).

In general, herbicides may also be classed according to two very basic characteristics: systemic versus contact. Systemic chemicals, (whether insecticides, fungicides, or herbicides, etc.) are absorbed by plants from the point of their contact on the plant and translocated to other portions of the plant. Examples of common systemic herbicides include Glyphosate, Imazapyr, and 2, 4-D. Examples of contact herbicides include Diquat Dibromide and fatty acid herbicides such as Pelargonic Acid and Ammonium Nonanoate.

While we may be familiar with assigned common names of herbicides, we are not likely able to pronounce or even recall an herbicide's true chemical name, which translates to its structure. For example, the common name Glyphosate possesses a chemical name, N-(phosphonomethyl) glycine. And the chemical structure for Imazapyr (isopropylamine salt of Imazapyr) is (2-(4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl)-3-pyridinecarboxylic acid). If you ever need a sleep aid,



PHOTO 4

Photo 4: While herbicides are typically used to suppress weeds and unwanted plants, the death of all these oak trees, initially presumed to be Oak Wilt, resulted when an ill-informed homeowner applied an Imazapyr-containing herbicide to her landscape to suppress weeds along her driveway. Unintended consequences, including BIG mistakes, are not unusual with herbicide use.



PHOTO 5A



PHOTO 5B

Photos 5A & 5B: Although I have often used this landscape example of misapplication of an herbicide, this BIG mistake was done by a professional applicator licensed by the State of Michigan. Application of an Imazapyr-containing herbicide to mulch rings of these maple trees resulted in their apparent death (5A). Because this situation was tied up in litigation for several years, many of the maple trees metabolized the herbicide and magically re-leafed and resumed growth 2-3 years after application of the herbicide. In many cases of herbicide misapplication, irreversible harm occurs.

forget all those prescribed medications and over the counter drugs and just try to remember the chemical formula of Imazapyr. Guaranteed! So, where am I going with all this? Not sure.

ADVANTAGES OF HERBICIDES

There is no question herbicides have benefited humanity. They have helped to make food production less expensive and more plentiful. And even though there are many people who are "anti-chemical" in our society, I think we often take for granted the abundance and relatively low expense of food, not that we couldn't do a much better job of offering "organic" or "free range"



PHOTO 6

Photo 6: Herbicides are often the Go-To and most practical means of invasive plant management. Phragmites (here), Purple Loosestrife, Autumn Olive, Norway Maple, Oriental Bittersweet, and Buckthorn are among the most common invasive species targeted by herbicides.



PHOTO 8

Photo 8: The author's Glyphosate/Stump Cup 'Chaser' procedure to stop Oak Wilt can be used anywhere in Michigan but is especially valuable in the fragile dune areas in western Michigan along Lake Michigan. The technique only involves treating infected trees with no sacrifice of healthy trees. Permits to sever root grafts via trenching is generally not permissible, and, even if granted, would likely result in serious harm to the dunes. Furthermore, the sacrifice of so many healthy trees by implementation of other destructive techniques would likely destroy the local habitat and destabilize the dunes.

food products. In our plant industry, herbicides have enabled us to create weed-free nursery crops, and beautiful landscapes (Photo 1). Also associated with our industry is the restoration of natural landscapes, woodlands, forests, and wetlands with the installation of native plants while concentrating on the elimination of "Invasive Species" (Photo 6).

In my research, I have developed a Glyphosate/Stump Cup technique for the management of Oak Wilt, a clear advantage over the more traditional destructive and invasive trenching methods used to contain and stop Oak Wilt. Some of my variations of this technique have enabled us to minimize the loss of oak trees to this dreaded disease (Photo 7). However, some entities and people cause far more serious losses and sacrifice of healthy oak trees due their inexplicable promotion of very destructive techniques. While

my herbicide management of Oak Wilt may be used anywhere for the preservation of our Michigan woodlands, forests, and landscapes, it is especially efficacious in fragile environments such as critical dunes where mechanical trenching would destabilize and destroy the ecosystem (Photo 8).

Continued on page 20



PHOTO 7

Photo 7: The implementation of the author's Glyphosate/Stump Cup 'Chaser' technique at this Oak Wilt site stopped root-graft transmission cold. The fungus had already killed 7 or 8 trees to the left and threatened all the trees visible in this photo and many more not visible to the right. Without the 'Chaser', all trees to the right and many others out of sight would need to be sacrificed according to "Experts" in government and an arboriculture society. In this photo, the last Oak Wilt-infected tree has been felled by the property owner; the deadly fungus had not transferred the short distance (~10 feet) in three years after the implementation of 'Chaser'. The unique systemic and rapid death properties of Glyphosate herbicide made this remediation procedure possible.



The Plant Doctor's LANDSCAPE TIPS

ADVANTAGES AND DISADVANTAGES OF HERBICIDES

Continued from page 19

DISADVANTAGES OF HERBICIDES

Herbicides are also unwelcome by many humans who would prefer to live in a "Chemical"-free environment. Unfortunately, we as humans make mistakes with chemicals, which complicate the "organic" path many people would like to pursue. We can readily understand why powerful chemical tools such as herbicides might be dangerous in the hands of homeowners. But about half of the toxicity problems on desirable plants I encounter are caused by professional applicators (Photo 9). There are a multitude of reasons for these mistakes. We may fail to follow herbicide directions or read the fine print. In other instances, chemical labels are poorly worded and even misguided. Among chemical application issues or other landscape/nursery kerfuffles, herbicide mistakes are likely contributors to be among the most disastrous and BIG problems. Conversely, herbicide toxicities to nontarget plants are surprisingly common in landscapes and nurseries (Photo 10). Luckily, most of these issues pose no serious problems to landscape plants or human endeavors. 🌱

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PHOTO 9

Photo 9: Near the location where Photo 6 was taken, application of Imazapyr herbicide to control phragmites was commissioned by a government agency and applied by a professional aerial application (helicopter) company. The resulting drift of the herbicide damaged/killed many trees, shrubs, and other plants along this lake shoreline.



PHOTO 10

Photo 10: Herbicide toxicity to non-target plants is surprisingly common in landscapes. Thankfully, no serious damage or death to plants results in most of these cases. In this photo, red oak leaves exhibit dark green coloration and cupped foliage typical of a phenoxy-growth regulator type herbicide such as 2,4-D, which is often applied to lawns for broadleaf weed control. The oak will recover just fine.