

## Herbicide Alphabet Soup

Many land managers find themselves contemplating herbicides. After the initial decision to include chemicals in their repertoire of management tools (see below) the wide array of names and formulations quickly becomes frustratingly complex. It seems every year I re-research the more common herbicides, then re-forget the information, so I've finally compiled chemical and other pertinent information of some of the more commonly encountered herbicides.

I'm sharing this information but please keep in mind it is not meant to be comprehensive, or the final word: before any chemical is used the "specimen label" should be consulted. This is a document regulated by the US Environmental Protection Agency which contains important content and usage information about each particular formulation and is a sort of partner document to the more detailed "Material Safety Data Sheet" that also exists for each product. A specimen label is included on each herbicide container but is also available online, so any herbicide may be studied prior to purchase.

**Thoughtful perspective on herbicides** see Schwegman, J.E. *Suggestions for the use of herbicides in natural areas.*

Natural Areas Journal. 8(4):277-278. 1988:

1. Never use herbicides when an alternative is feasible.
2. Use herbicides when it is most effective.
3. Use herbicides prudently. Time application and choose the herbicide so as to be as selective as possible for the target species.
4. Use the lowest dose, least toxic, and least persistent herbicide consistent with effective, selective control.
5. Be safe in application and record actions taken.

**Herbicide specificity:** There are three general types of post-emergence herbicides. One kills what most people would call flowering plants, but does not kill grasses. The susceptible plants have leaves that are broad when compared to grass, so these herbicides are called "broadleaf specific". This is in contrast to another group of herbicides, those that kill grass species but not broad-leaved plants ("grass-specific"). Using one or the other of these herbicides offers some useful management flexibility within a prairie that contains both broadleaf and grass species. The third general type of herbicide is non-specific, killing or at least stunting any green plant regardless of whether it is broadleaf or grass. The most common chemical in this category is glyphosate, originally marketed as Round-Up but now sold under many other trade names.

**A word about Tordon (picloram):** This chemical has a well-deserved reputation for causing extensive collateral damage due to the "circle of death" that often forms around treated plants and sometimes extends downslope from a treated area. This is due to the high toxicity of this chemical, its ability to move out of treated plant roots and through the soil, and to a very long "half life" (the time it takes for half of a given chemical to decompose). Historically it was often used to treat tree stumps in grassy areas, with no side effects observed. This was misleading because it is not toxic to grass, so often no susceptible vegetation was available to be killed; when similar stump treatments are done in a mixed prairie the nearby broadleaf species are often lost.

Some alternative chemicals (triclopyr, glyphosate) bond more strongly to soil particles so do not move thru the soil as easily AND have shorter half-lives, so are considered safer to use than Tordon/picloram. However, there are some land managers that use Tordon/picloram under some conditions. They feel it requires fewer second-round treatments, and that very cautious application (generally with a small sponge applicator rather than a sprayer) avoids damage to nearby vegetation. However, even slight over-application leads to a halo of dead vegetation around treated plants Anyone

choosing to use Tordon/picloram needs to research and thoroughly understand the risk of potential damage to nearby vegetation should over-application occur.

**Volatility concerns:** Many herbicides are available in different chemical forms (in addition to different concentrations and combinations with other herbicides). In many cases the same herbicide is available as either an “amine” or “ester” (this can be found in the first column of the specimen label). The chemical form can dramatically affect the volatility of the herbicide, and therefore its tendency to damage nearby vegetation by drifting away from the target area. In general, the ester form will be more volatile than the amine, and is usually taken up more readily by the target plants. Unfortunately, the volatility can cause problems with herbicide drift onto non-target species. Volatility is also greatly affected by temperature, with a potential for volatilization during warm weather remaining for more than a month after application of many herbicides. This means applications done a month or more before the arrival of warm-season temperatures still have the potential for significant volatilization, and lower risk formulations should be used.

**Forms of Tordon (picloram) commercially available:**

- Tordon 101: picloram (0.54 lb/gal) (5.7%)  
2,4-D 240 g/L (2lb/gal) (21.2%)  
Restricted use – applicators license required
- Tordon 22K: picloram 2lb/gal (21.1%)  
Restricted use – applicators license required
- Same formulation as Tordon K but registered for CRP etc.
- Tordon K: picloram 2lb/gal (21.1%)  
Restricted use – applicators license required  
Same formulation as Tordon 22K but NOT registered for CRP etc.
- Tordon RTU: picloram 3%  
2, 4 D 11.2%  
RTU = Ready To Use, no applicator’s license required  
Same formulation as Pathway, Grazon
- Pathway: picloram 3%  
2, 4 D 11.2%  
RTU = Ready To Use  
Same formulation as Tordon RTU

**Alternative stump treatment herbicides:**

- Garlon 3A: triclopyr 31.8% (3lb/gal) as amine salt (less volatile)  
30- 45 day half-life, little movement thru soil, broadleaf selective
- Garlon 4E: triclopyr 44.3% (4lb/gal)(ester formulation more volatile than amine)  
Contains petroleum distillates  
30- 45 day half-life, little movement thru soil, broadleaf selective
- Garlon 4 Ultra: triclopyr (43.5% = 4lb/gal), ester formulation, more volatile than amine salt compound  
No petroleum distillates  
30- 45 day half-life, little movement thru soil, broadleaf selective
- Pathfinder II: triclopyr 9.8% (0.75lb/gal) (ester formulation = more volatile than amine salt)  
Same active chemical as in Garlon 4E  
30- 45 day half-life, little movement thru soil, broadleaf selective

- Crossbow: 2,4D (23.7% = 2lb/gal)  
Triclopyr (11.9% = 1 lb/gal)(ester form)  
Contains petroleum distillates  
short half life but moves in soil, broadleaf selective
- Round-up: Glyphosate, many concentrations, formulations  
Not always as effective as Tordon, 2,4D or triclopyr – but numerous formulations cloud results data  
Use non-detergent formula if near water (Rodeo, AquaNeat, Aquamaster, Aquapro, Accord Concentrate, and Touchdown Pro)  
Breaks down quickly, little soil movement  
Not selective – kills all green vegetation, can safely be sprayed on mature(not green) bark of live trees

**Miscellaneous other herbicides (not necessarily for stump treating):**

- Stinger: clopyralid, 31% (3lb/gal)  
broadleaf selective  
10-170 day half-life, some issues w/compost contamination, moves thru soil  
Effective on legumes, composites, solanaceous species  
Also sold as Transline, other names

- Milestone: aminopyralid 1.15% (0.1lb/gal)  
Triclopyr 11.6% (1lb/gal)  
Broadleaf selective, useful on thistles  
avg 100 day half life, maybe much longer, moves thru soil

- 2,4 D: 2,4-Dichlorophenoxyacetic acid  
A broad-leaf herbicide found in over 1000 combination herbicide products, see below

- Weed B Gon: same as Killex, Par III, Premium 3-Way Turf Herbicide, Tri-Kil, Trillion, Weedaway  
Contains Dicamba, 2,4D and Mecoprop (MCP)  
broadleaf selective  
often used on grass lawns

- Sethoxydim Poast = Arrest = Vantage = Poast Plus = Torpedo = Prestige (18% = 1.5 lb/gal)  
Cyclohexanedione chemical family  
Grass-selective herbicide (graminicide), both annual and perennial grasses  
Water soluble (could move in soil) but degrades rapidly

**Herbicide chemical families and related products:**

- Anilides/Anilines: acetochlor · alachlor · asulam · butachlor · diethatyl · diflufenican · dimethenamid · flamprop · metazachlor · metolachlor · pendimethalin · pretilachlor · propachlor · propanil · trifluralin
- Aromatic acids: **aminopyralid** · chloramben · **clopyralid** · **dicamba** · **picloram** · pyriithiobac · quinclorac · quinmerac
- Arsenicals: cacodylic acid · copper arsenate · DSMA · MSMA
- Organophosphorus: bilanafos · ethephon · fosamine · glufosinate · **glyphosate** · piperophos
- Phenoxy: **2,4-D** · 2,4-DB · dichlorprop · fenoprop · MCPA · MCPB · 2,4,5-T
- Pyridines: dithiopyr · fluroxypyr · imazapyr · thiazopyr · triclopyr
- Quaternary: diquat · MPP · paraquat
- Triazines: ametryn · atrazine · cyanazine · hexazinone · prometon · prometryn · propazine · simazine · simetryn · terbutylazine · terbutryn
- Ureas: chlortoluron · DCMU · metsulfuron-methyl · monolinuron
- Others: 3-AT · bromoxynil · clomazone · DCBN · dinoseb · juglone · methazole · metham sodium · sulfentrazone