

Pesticide Selection for Water Quality Protection

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(Note: The following information is a supplement to the Water Quality Water Management series and replaces the Pesticide Leaching Potential Rating Tables found in publications WQWM-154, 155 and 156.)

While research has shown that pollution of surface and groundwater supplies from turfgrass pesticide application is uncommon, the turf manager should still strive to avoid potential environmental contamination when choosing a pesticide. Unfortunately, there is little information available to aid in choosing a chemical control based upon minimizing potential leaching. Although several computer models exist to evaluate leaching potential, they are difficult to use and require extensive training. In an effort to provide a relatively simple method for identifying pesticides with the least potential for contaminating groundwater, R.L. Warren and J. B. Weber of N C State University have developed a pesticide ranking system known as the Pesticide Leaching Potential (PLP) Index. The index uses several pesticide characteristics to estimate potential leaching to groundwater. These characteristics include the ability to bind to soil organic matter, time required for the pesticide to degrade (persistence), rate of application, and the amount of an application that actually penetrates the turf canopy and reaches the soil.

The PLP index for various turfgrass pesticides labeled for use in North Carolina can be found on the reverse side. The index is based on a scale of 0 - 100 with a higher number indicating an increased likelihood for leaching. For example, a rating of 5 would indicate that a material had a very low potential for leaching while a pesticide with a PLP index of 95 would have a very high probability for leaching and should be avoided, especially in environmentally sensitive areas.

It is important to note that the PLP index is determined primarily based on characteristics of the pesticide and that other factors in the turfgrass ecosystem also influence leaching potential. Potential leaching into groundwater is also affected by soil pH, soil type, photo decomposition (degradation by sunlight), microbial decomposition, volatilization (pesticide evaporation), and other factors.

To minimize leaching potential, it is generally best to choose pesticides which have a low PLP index when possible. If two possible pesticide choices have a similar PLP index (within 5 points of each other) their leaching potential is fairly similar. As a rough guideline, materials having a PLP index less than 40 would have a low leaching potential while a PLP index greater than 70 would indicate that potential leaching was a concern. Also, pesticides are more likely to leach in soils which are sandy, low in organic matter, and which have a pH of 6.0 or greater.

You should also keep in mind that leaching is only one of many considerations in selecting a pesticide. There will be some instances where a pesticide exhibits low leaching potential but because of its high potential toxicity to wildlife, such as fish, extra precautions may be necessary around water. These precautions should be mentioned on the label.

Choosing pesticides with low leaching potential is only one of many techniques available to turfgrass managers to help protect water quality. Contact your local Cooperative Extension Office for free publications regarding water quality protection.

Table 1. Herbicides

Common Name	Trade Name	Rate *	Index **
Fenoxaprop	Acclaim	0.18	0
Prodiamine	Barricade	0.75	1
Diclofop	Illoxan	1.50	10
Pendimethalin	Pre-M	3.00	18
Dithiopyr	Dimension	0.50	20
Metolachlor	Pennant	4.00	22
Sethoxydim	Vantage	0.28	26
MSMA	MSMA	3.00	27
Trifluralin	Treflan	3.00	32
Pronamide	Kerb	1.50	34
Glyphosate	Roundup	4.00	36
Oxadiazon	Ronstar	3.00	36
Benfen	Balan	3.00	36
Bentazon	Basagran	2.00	36
DCPA	Dacthal	10.50	38
Ethofumasate	Prograss	1.00	41
2,4-D	2,4-D	0.75	41
DSMA	Methar	5.00	41
Metsulfuron	DMC	0.10	42
Isoxaben	Gallery	1.00	44
Bensulide	Betasan	10.00	44
Oryzalin	Surflan	3.00	44
Napropamide	Devrinol	3.00	46
Asulam	Asulox	2.00	47
Metribuzin	Sencor	0.50	48
Atrazine	Aatrex	2.00	52
Triclopyr	Turflon	2.00	53
Simazine	Princep	2.00	54

Dicamba	Banvel	0.50	54
Imazaquin	Image	0.50	58
Mecoprop	MCPP	1.75	61
Siduron	Tupersan	10.00	64

* Maximum recommended application rate (lb A.I./Acre)
** Pesticide Leaching Potential Index (0-100) where 0 = very low leaching potential and 100 = very high leaching potential.

Table 2. Fungicides

Common Name	Trade Name	Rate *	Index **
Vinclozolin	Curlan	2.70	20
Fosetyl-Al	Aliette	17.40	25
Thiophanate methyl	Clearys 3336	2.70	31
Anilazine	Dyrene	5.40	31
Iprodione	Chipco	2.50	33
Mancozeb	Fore	8.70	36
Triadimefon	Bayleton	1.30	43
Propiconazole	Banner	1.50	45
Chlorothalonil	Daconil	19.60	46
Metalaxyl	Subdue	1.36	50
Propamocarb	Banol	7.24	51
Fenarimol	Rubigan	2.00	51
Chloroneb	Terraneb	7.00	51
Benomyl	Tersan	2.70	55
Maneb	Manzate	13.00	56
Etridiazole	Koban	6.50	65

* Maximum recommended application rate (lb A.I./Acre)
** Pesticide Leaching Potential Index (0-100) where 0 = very low leaching potential and 100 = very high leaching potential.

Table 3. Insecticides

Common Name	Trade Name	Rate *	Index **
Cyfluthrin	Tempo	0.09	0
Permethrin	Astro	0.90	12

Fenoxycarb	Award	1.50	19
Chlorpyrifos	Dursban	1.00	19
Fenamiphos	Nemacur	10.00	36
Acephate	Orthene	3.00	36
Fonofos	Crusade	3.90	37
Bendiocarb	Turcam	4.10	38
Carbaryl	Sevin	2.10	39
Diazinon	Diazinon	4.30	41
Isofenphos	Oftanol	1.90	44
Isazofos	Triumph	2.00	44
Methomyl	Lannate	1.90	51
Trichlorfon	Proxol	8.16	52
Ethoprop	Mocap	4.90	55
Propoxur	Baygon	8.10	76
<p>* Maximum recommended application rate (lb A.I./Acre) ** Pesticide Leaching Potential Index (0-100) where 0 = very low leaching potential and 100 = very high leaching potential.</p>			