Protecting Long Island's Groundwater from Pesticide Contamination

Nursery Crops

Introduction:

The purpose of this factsheet is to provide information that can help Long Island growers select best management practices (BMPs) that will minimize groundwater contamination. BMPs are economically and environmentally sound measures that, when followed, aid the protection of water resources while ensuring the continued availability of pesticides. On the following pages you can find BMPs as well as a reference table of commonly used pesticides and their leaching potential. Applicators should refer to the included table to select pesticides, when feasible, with the lowest leaching potential possible. Note that the leachability rating is merely a general indication of leaching risk. Local environmental conditions, soil characteristics, and application rate, timing, and method all play important roles in leaching. Even products rated 'Low' have the potential to leach, so always be mindful of BMPs.

The Long Island aquifer system provides nearly three million people over 300 million gallons of high-quality water, and has been designated by the US Environmental Protection Agency as a "sole source" aquifer. The characteristics that allow the aquifer to reliably supply this much water also make it vulnerable to contamination from above ground. For these reasons, the agriculture/horticulture industry needs to exercise careful environmental stewardship when using products that have the potential to leach into our groundwater. This is especially important for materials that have widespread use and can move easily through the soil to the underlying groundwater.

Historical Significance:

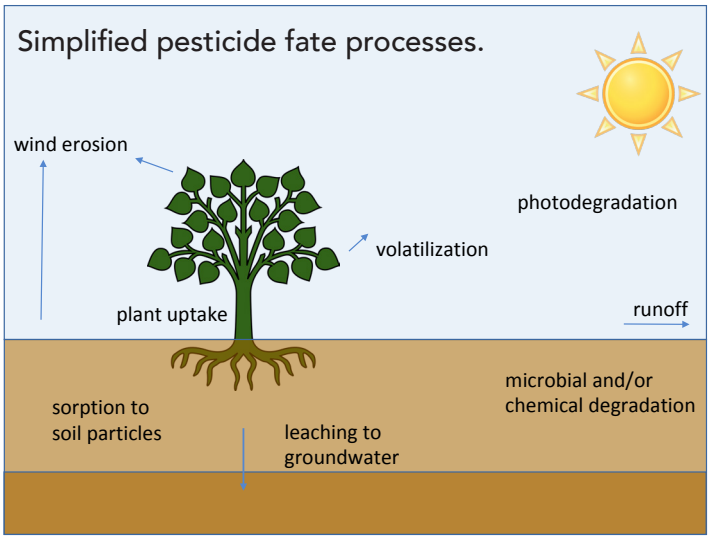
In 1979, the pesticide aldicarb (Temik), was found in wells in Suffolk County. Since that time over 115 pesticide related chemicals have been detected in the groundwater, primarily through groundwater monitoring by the Suffolk County Department of Health Services. Most of these pesticides or their metabolites are highly soluble, and do not adhere strongly to soil particles. Long Island's sandy to loamy soils with low organic matter are permeable, allowing for a high potential for groundwater contamination. A recent study evaluating soil organic matter levels on Long Island found that approximately half of the 1600 soils sampled had less than 2 percent organic matter[1]. About half of the pesticides detected in Long Island groundwater are no longer registered for use. For example, Temik was removed from sale on Long Island in 1980 and it is still found in groundwater today. This lasting presence emphasizes the importance of implementing BMPs that protect our aquifer from pesticide contamination.

Groundwater Movement:

Water that falls on the soil surface may be taken up by plants, evaporated back to the atmosphere, or eventually percolate downward to become groundwater. The percolating water, called recharge, passes down through the root zone and subsoil until it reaches the water table and into the aquifer. Once in the aquifer, the water begins to move horizontally, approximately one foot per day. It will eventually travel into creeks, bays, the sound, or ocean.

Pesticide Fate:

Pesticides in groundwater are the result of two sources, point or non-point. Point sources are those that occur from mixing and loading, spills, or back-siphoning. Careful handling of pesticides can eliminate this avenue of contamination. Another source of groundwater contamination is non-point source. This can occur when certain pesticides leach into the groundwater after application.



[1] Soil samples were collected from Suffolk County during the period of 1995 to 2001, and analyzed by the Cornell Nutrient Analysis Laboratory. Source: Ketterings, Q.M., H. Krol, W.S. Reid, and J.B. Sieczka (2004), Suffolk County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-26: 37 pages.

Table 1. Pesticide Leachability Comparison Chart

When choosing your pesticide and management strategies, also consider groundwater protection. Refer to this table for assistance in choosing the pesticide with the lowest leaching potential while meeting your pest management needs. Products listed will vary in efficacy and other attributes, such as worker and environmental safety. Always refer to the label for application rates, restrictions, and recommendations.

Active Ingredient	Examples of Trade Names[1]	Leachability [2]	Group # [3]
Fungicides			
Azoxystrobin⚠	Heritage	Mod	11
Boscalid	Pageant Intrinsic*	Mod	7
Chlorothalonil⚠	Bravo, Daconil	Mod	M5
Copper hydroxide	Kocide, CuPRO	Low	M1
Etridiazole	Terrazole,Truban, Banrot*	Low	14
Fluopicolide	Adorn	High	43
Iprodione⚠	Iprodione, Chipco	Mod	2
Mancozeb	Diathane, Protect DF	Low	M3
Mefenoxam⚠	SubdueMAXX	Mod	4
Mineral oil, Paraffin oil	Sunspray Ultra- fine oil, Purespray	Low	NC
Mono- and Di- Potassium Salts of Phosphorous Acid⚠	Alude, Agri-Fos	High	33
Oxathiapiprolin	Segovis	Low	49
PCNB (Quintozene)	Terraclor	Low	14
Polyoxin D zinc salt	Affrim	Low	19
Potassium bicarbonate	MilStop	Low	NC
Propiconazole	Banner, Spectator	Low	3
Pyraclostrobin	Pageant Intrinsic*	Mod	11
Thiophanate-methyl	3336 Cleary, Banrot*	Low	1
Triadimefon	Bayleton, Strike Plus*, Trigo*	Mod	3
Trifloxystrobin	Compass, Strike Plus*, Trigo*	Mod	11
Triflumizole	Terraguard SC	Low	3
Herbicides			
Clethodim	Envoy Plus	Low	1
2,4-D⚠	2,4-D	Mod	4
Dichlobenil⚠	Casoron, Barrier	High	20
Diquat dibromide	Diquat SPC 2L	Low	22
Dithiopyr	Dimension	Low	3
Fluazifop-P-butyl	Fusilade, Ornamec	Low	1
Flumioxazin	BroadStar, SureGuard	Low	14
Glyphosate	Glyfos, Roundup	Low	9
Halosulfuron-methyl	SedgeHammer	High	2
Oryzalin	Rout*, Surflan*, XL 2G*	Mod	3

Oxadiazon⚠	Ronstar	Mod	14
Oxyfluorfen	GoalTender, Rout*, OH2*, Biathlon*	Low	14
Paraquat dichloride	Gramoxone	Low	22
Pendimethalin	Pendulum, OH2*	Low	3
Prodiamine	Barricade, Biathlon*	Low	2
Simazine⚠	Caliber, Princep	Mod	5
Insecticides & Miticides			
Acephate	Orthene, Acephate	Low	1B
Abamectin	Avid, Minx, Sirocco*	Low	1
Acequinocyl	Shuttle-O	Low	20B
Acetamiprid	Tristar	Mod	4A
Bifenazate	Sirocco*, Floramite	Low	20D
Bifenthrin	OnyxPro, Talstar, Menace	Low	3A
Carbaryl⚠	Sevin, Carbaryl	Mod	1A
Chlorpyrifos	Dursban, Lorsban	Low	1B
Clofentezine	Apollo, Ovation	Low	10A
Cyfluthrin (beta-Cyfluthrin)	Decathlon, Discus*	Low	3A
Etoxazole	TetraSan	Low	10B
Flonicamid	Aria	Mod	9C
Fluvalinate	Mavrik	Low	3A
Hexythiazox	Hexygon, Savey	Low	10A
Imidacloprid⚠	Marathon, Mantra, Discus*	High	4A
Lambda-cyhalothrin	Scimitar, Warrior	Low	3A
Metaldehyde	Durham, Deadline	Low	NC
Paraffinic Oil (Horticultural Oil)	Damoil, SunSpray	Low	NC
Permethrin	Permastar, Perm-Up	Low	3A
Pymetrozine	Endeavor	Low	9B
Pyriproxyfen	Distance, Fulcrum	Low	7C
Spinosad	Conserve, Entrust	Low	5

[1] Trade names used in this publication are for convenience only. No endorsement of products is intended, nor is criticism of unnamed products implied.

[2] Leachability ratings were determined based on Environmental Hazards as listed on the EPA label, the active ingredient Groundwater Ubiquity Score (GUS; for more information visit: *http://npic.orst.edu/envir/gus.html*), and information provided by the NYSDEC.

[3] Group # corresponds to the mode of action (MOA) group designated by the resistance action committees for fungicides (FRAC) and insecticides (IRAC); NC = not classified. Follow label directions for resistance management and rotate between products with different MOAs.

⚠ Active ingredients (and/or their degradates) found in Long Island's groundwater from historical monitoring. For more information on pesticides detected in Long Island's groundwater, refer to the Long Island Pesticide Pollution Prevention Strategy at *www.dec.ny.gov/chemical/87125.html*.

* Products that contain more than one active ingredient

While every effort has been made to provide correct and up-to-date information, changes in pesticide registrations and labels occur frequently. Find product labels and registration information at *http://www.dec.ny.gov/nyspad/*.

Pest Management BMPs/Cultural Practices

- Choose insect and disease resistant cultivars.
- Adjust irrigation to avoid excess, and apply the minimum amount that supports plant health.
- If using overhead, apply early to allow foliage to dry before nightfall.
- Group containers of like size together, so that irrigation amount will be appropriate for the whole area.
- Use a mix with sufficient porosity and water holding capacity.
- Store container mix ingredients on a concrete pad to avoid field soil contamination, and cover piles if stored outdoors.
- Use woven plastic landscape fabric, and inspect annually for holes and weed emergence.
- On slopes where irrigation runoff will concentrate herbicides keep gravel and grass walkways intact so gullies don't form.
- Perform irrigation tests to ensure adequate cover and output.
- Maintain a layer of gravel in highly-used areas to deter the formation of gullies.
- Incorporate cover crops/buffers whenever possible to reduce erosion/leaching, and improve soil health.
- Seed cover crops between planting rows and in fields out of production to improve soil structure and capture excess nutrients.
- Apply irrigation efficiency measures such as updating poorly performing systems, monitoring schedules, and practicing precision application—don't over irrigate!
- Convert overhead irrigation to drip systems.
- Apply conservative fertilizer rates.
- Properly dispose of plastics used in production, and for tunnel covers.
- Develop a weed management program before planting.
- Implement an integrated pest management protocol that includes scouting, & tolerance thresholds.

Pesticide Applicator BMPs

- Mix and load on a properly maintained containment pad. Containment pads should be located on a level surface, and far away from wellheads.
- Calibrate equipment to ensure reduced waste of product and efficient application.
- Calibrate during weather conditions similar to conditions during application.
- Always read and follow the pesticide label.
- Avoid using pesticides with high leachability.
- Promptly clean up spills, and store and handle pesticides properly. For spills and to report a spill, contact CHEMTREC at 800-424-9300, and the NYS Department of Environmental Conservation at 800-457-7362.
- Apply pesticide when target species is most susceptible.
- Apply lower application rate when range is given on the label.
- Rotate like pesticides with those having varying modes of action, and as directed on the label.
- Avoid heavy irrigation before and after application.
- For insecticides and herbicides prone to leaching, avoid drench treatments, and use spray application instead.
- Consider using mating disruption rather than drench insecticide applications, where appropriate.
- Apply drenches to individual pots rather than in overhead irrigation lines as a chemigation.
- If applying granular insecticide or herbicide, apply to individual pots or target area rather than broadcast.
- In containers, apply spray herbicide to newly planted pots before they are placed on the ground.
- Dispose of unusable or unwanted pesticides properly. The NYS Clean Sweep Program organized by NYSDEC with the collaboration of NYSDOT provides opportunities for the disposal of unusable and unwanted pesticides. For more information call 1-877-793-3769 or visit *www.cleansweepny.org*.

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Contact us! We're here to help!

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Find this factsheet, a Spanish language version, and many other resources on the Cornell Cooperative Extension of Suffolk County's BMP's to Protect Groundwater webpage:
http://ccesuffolk.org/agriculture/bmps-to-protect-groundwater

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Cornell Cooperative Extension is funded in part by Suffolk County through the office of the County Executive and the County Legislature.