Dalusky - Imidacloprid Use & Water Safety

Note: The comments below were provided by Mark Dalusky in response to an inquiry from Dave Teffeteller concerning Imidacloprid use and water safety in April 2012.

Taking a proactive approach to this problem is definitely the way to go if your goal is to preserve some of your hemlocks. Left untreated they will invariably become infested and likely die. I appreciate your concern with the properties of Imidacloprid that suggest a high leaching potential in soil. You have to be aware that most of these studies are conducted on agricultural soils and agricultural applications. Proper application in a forested setting is a horse of a different color entirely.

Agricultural soils have organic matter content in the range of 3-6% or less. It is the organic matter content in soil for which Imidacloprid has such a high binding potential. Consider that we place the injection for hemlock treatment not in the soil but above the soil in what is called the unincorporated organic layer or root mat. This layer is composed of needles, twigs, cones, bark, etc. that is in the initial phase of decomposition by arthropods and micro-organisms. The organic matter (OM) content here is huge and absolutely dwarfs the OM in agricultural soils. We inject the material here because the feeder roots for the hemlock are located here and just below this. The potential for Imidacloprid to bind to OM in the root mat is very high.

Soil column studies by Bayer (yes, I know...vested interest) in which the soil column mimicked the soil profile under forested conditions showed that Imidacloprid moved very little from the point of injection (<20cm). This was after weeks of applying the equivalent of 1" of rain per day to the surface of the columns. The US Forest Service conducted Environmental Analyses for both Imidacloprid and (more recently) Dinotefuran. These studies are exhaustive and subject to critical external review. They supported the Bayer findings regarding leaching potential in forest soils.

Our own study in which we sampled 4 streams on a bi-weekly basis for 2 years for Imidacloprid showed no trace (down to the parts-per-billion level) of the chemical in stream water. We treated 60 hemlocks in each of the drainages where these streams flowed, and we sampled the aquatic insects from these streams for 2 years with no evidence of any negative impact. Aquatic insects are extremely sensitive to Imidacloprid, so they are great indicators of contamination. The only other study involving treating a forested watershed was at Mountain Lake, Va. They did detect small amounts in lake water in only one area of the lake. It turns out that the hemlock forest they treated was planted on top of tons of very rocky fill, and thus was a disaster waiting to happen for any water soluble compounds. I strongly feel that soil injection applied under the proper conditions and restrictions as per the product label is very safe.

Behavior in water

Though Imidacloprid is not intended to be applied directly to water, it nevertheless may enter bodies of water due to spray drift or in extreme situations by runoff from treated fields after rainfall. It has been shown that no unacceptable harmful effects would occur under these circumstances as the substance will undergo complete elimination from water by photolytic reactions and by microbial activity. Though the substance is stable in sterile water in the dark, it decomposes readily under the influence of light. Biotic processes influenced by microbes present in natural waters and their sediments present another mechanism for the elimination of Imidacloprid. All bets are off in the case of a large spill or illegal dump site; collateral damage (aquatic invertebrates, beneficials) may very well occur.

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