IS IT SAFE TO GO IN THERE ? EXPOSURE TO TURF APPLIED PESTICIDES

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There is a great deal of concern about the presence and risk of pesticides in our daily lives. Exposure to pesticides can range from the food and water we consume to the air we breathe and can also include chemicals used for turf maintenance. Many of you are routinely asked questions regarding the "safety" of turf applied pesticides. In my opinion, "safe" is a four letter word and assurances about the relative safety of any product can be a slippery slope to defend. It is more reasonable to offer guidance in this area through an understanding of risk and the factors involved in raising and lowering the risk. Once a few basic concepts of risk are understood, a person can make informed choices on the relative risk............ and therefore the level of safety involved.

For lawn applied pesticides, understanding the risk begins with evaluating the inherent toxicity of the product. Toxicity is measured using a variety of tests and it is important to consider a number of organisms in addition to human toxicity. I will address the area of toxicity in an upcoming article. The other component that is important in measuring risk is to evaluate the likelihood for exposure. That is - how much of the stuff is likely to get into your system. In today's article, I will concentrate on this part of the equation - exposure.

The exposure to lawn applied pesticides is quite interesting and a few important studies have been conducted in this arena. The major avenues for exposure to pesticides are through breathing the vapors (inhalation), eating the material (oral), and absorbtion through the skin (dermal). Since turf is not often a major staple of your diet, oral consumption is not considered a mechanism of major exposure. The vaporization of turf pesticides is quite variable and I will feature this area in another future article. That leaves dermal exposure which seems to be the primary avenue for exposure to lawn applied pesticides. Let's investigate some of the research conducted in this area.

Which Way Did It Go ??

Once the pesticide solution hit the turf zone, there are four general destinations. It can be absorbed into the plant, adsorbed onto the leaf blade, adsorbed onto the soil/thatch area, or volatilized into the air. The main area of concern for dermal exposure is the *dislodgeable* fraction, or the amount that is left on the leaf blade and is avaialble for removal by a person frolicing in the area. As you might imagine, there are many factors that influence the amount which can be dislodged. They include the product formulation, air temperature, moisture, humidity, and turf density to name a few. The most important factor however, is the time after application in which you are exposed.

Several experiments have been conducted to evaluate amount of dislodgeable residue. Hurto (1990) applied several insecticides and pre-emergence herbicides to Kentucky bluegrass by using wettable powder, dispersible granule, flowable, and emulsifiable concentrate formulations of these products. Clippings were collected by mowing the area immediately after application and at 1,2,3,7, and 14 days after treatment (DAT). In addition, half of the plots were irrigated two hours after treatment to evaluate the effect of additional water on dislodgeability. The clippings were washed with a detergent to dislodge the chemical and then analyzed. They reported approximately 13-30% of the amount applied could be dislodged within one hour after treatment from the non-irrigated plots. The amount collected from the irrigated plots fell off by nearly 50% for all formulations except for the emulsifiable concentrates. Since these are oil-based materials, they were not as affected by the irrigation. The average amount collected decreased rapidly over time to 3.3% 1 DAT, 2.7% 2 DAT, 1.9% 3 DAT, and 0.3% 14 DAT.

In a similar study, Sears (1992) applied diazinon, Dursban, and Oftanol to Kentucky bluegrass. This group of researchers included a few more treatments in their work. They compared granular versus liquid formulations, and the effect of shade versus sun grown turf. The trends in dislodgeability were the same when compared to the Hurto study, yet the overall amounts detected were lower. This is likely explained by the difference in collection methods. Hurto used a detergent wash as mentioned above whil the Sears group used a cheescloth wipe method to simulate a person brushing over the turf. Nearly 10% of the liquid diazinon applied could be dislodged immediately after treatment. That fell to 0.3% by 1 DAT. There was 20 times more liquid diazinon detected compared to the granular formulation immediately after treatment. By 1 DAT the amount of liquid and granular dislodged were similar. Irrigation reduced the amount for all timings, while sunlight did not affect the dislodgeability of any of the treatments.

Some of the more revealing studies in this quest was conducted by a group of researchers at the University of Guelf in Ontario, Canada (Harris 1,2). They used human volunteers and measured the level of exposure after they were allowed to walk and sit in treated areas. They chose the herbicide 2,4-D because it is excreted in the urine quickly after exposure. The product was applied at label rates to a large lawn area. After application, they released 10 volunteers into the area 1 hour after treatment. Five of the people wore a short sleeve shirt, long pants, shoes and socks. The other five wore a short sleeve shirt, shorts, and no shoes or socks. They remained in the treated area for 60 minutes and walked, sat, or lied down in the area for five minute intervals. Another group of ten people were released into the treated area 24 hours after treatment and instructed to perform the same tasks. Urine was collected from all subjects for four consecutive days after the exposure period.

No detectable residues were collected from the group that was in the area 24 hours after treatment. This included the people that were clothed in only shorts and shirts. Only three people had detectable residues in the group that entered the area 1 hour after treatment. All three were in the group that wore shorts rather than long pants, shoes and socks. The highest amount collected was from a subject who removed his shirt during the test. The amount accumulated for this subject was 0.426 milligrams of 2,4-D. The other two detection's were between 0.10-0.15 milligrams of 2,4-D. The authors go on to offer a perspective on the amount of exposure for the volunteers who had detectable amounts. They reported the World Health Organization acceptable daily intake for 2,4-D is 24 milligrams. The amounts collected in this experiment were clearly below this limit.

Part of the importance of these studies are the recommendations that we can offer to people concerned about exposure. Certainly, we should strive to reduce the potential for exposure to pesticide products applied to lawn areas. Once liquid products are dried on the leaf, the potential for exposure is greatly reduced, and the potential for exposure continues to decrease over time. The largest reduction is within the first 24 hours. The addition of irrigation also reduces the potential for exposure. These conclusions are particularly important for reducing the exposure of these products on the more sensitive portions of or population such as children.

These conclusions coincide with our current posting and notification procedures in Michigan. Specific signs are required to be placed on lawns that have been treated by commercial applicators and suggest that you stay off the area for 24 hours.

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