CLIENT EXPOSURE TO LAWN APPLIED PESTICIDES

Gregory T. Lyman
Enironmental Education Specialist
Crop and Soil Sciences, M.S.U.

There has been a great deal of interest and concern about the presence and risk of pesticides in our daily lives from the food we consume to the chemicals used for turf maintenance. One obvious component in risk calculations is the inherent toxicity of the product. Another component of the risk equation is exposure. For lawn applied pesticides, the exposure is primarily dermal and there have been several interesting studies conducted to evaluate the likelihood of exposure to these products. The person most likely for exposure to lawn products is the applicator. Commercial applicators in Michigan are required to be trained on how to use personal protective equipment to minimize exposure. This discussion however, is directed toward the likelihood and degree of exposure to people using the lawn area after the products have been applied. To investigate this area, we first need to gain an understanding of the fate or destination of these products after they are applied. Once the solution hits the target zone, there are four general places the product can go. It can be absorbed into the plant, adsorbed onto the leaf blade, adsorbed onto the soil/thatch area, or volatilized into the air. There are many factors that influence the amount of pesticide product that can be accumulated in any of these areas. They include the product formulation (dry, liquid, EC, WP), temperature, moisture, humidity, turf density, and time after application to name a few. What we are concerned about is the dislodgeable fraction, or the amount left on the leaf blade that is able to be removed or rubbed off by a person.

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 and clippings collected to evaluate the effect of additional water on dislodgeability. The clippings were washed with a detergent to dislodge the chemical and then analyzed. 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 by nearly 50% for all formulations except for the emulsifiable concentrates which 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. Sears however included a few more treatments. They compared granular versus liquid formulations of diazinon, and erected shade cloth on portions of the test area to investigate the influence of the sun on dislodgeability. The overall amounts detected were lower than the Hurto study, but the trends were similar. The overall dislodgability may be explained by the difference between the washing method versus the cheesecloth wipe method. Nearly 10% of the diazinon amount applied was 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 levels 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 interesting studies were conducted by a group of researchers at the University of Guelf in Ontario, Canada (Harris 1,2). They used human volunteers to determine the amount of exposure by having them 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 on campus. 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 shorts/shirt group. The highest amount 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 calculated that approximately 24 milligrams of 2,4-D is the acceptable daily intake according to the World Health Association. This was based on the average weight of the subjects and the acceptable intake of 0.3 mg/kg/day. Clearly the amount of exposure is well 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 also 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 until it is dry.

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