TECHNIQUES FOR MINIMIZING TURFGRASS PESTICIDE DRIFT AND VOLATILIZATION

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During the past decade, research concerning the movement of turfgrass pesticides has consistently shown that most turfgrass pesticides do not pose a great risk to move via leaching. In most cases, movement of pesticides in runoff from turfgrass areas is also uncommon. Loss of pesticides into the atmosphere, however, has been shown to be as high as 15 to 20% of the original application for some of the more volatile materials. Movement of pesticides in the atmosphere may occur as volatilization (evaporation) of a pesticide or as drift of a material immediately following application. Both of these avenues of potential movement from treated areas can be minimized by using some common sense as well as proper application methods.

PESTICIDE DRIFT

Movement of droplets of spray solution or particles of dry materials from treated areas due to wind is known as drift. Any application which produces fine spray or dust particles has the potential to drift. Pesticide drift is undesirable because it reduces uniformity of application and, more importantly, may result in non-target plant injury depending upon the material being applied. Drift of post-emergence herbicides such as 2,4-D, dicamba, and glyphosate, for example, may cause significant damage to nearby ornamental or garden plants. Research is lacking regarding pesticide drift following application to turfgrass areas. However, measurement of drift following application to crop fields has indicated that, when properly applied, spray drift onto non-target areas can be expected to be in the area of 1% or less.

Following a few basic guidelines can minimize the potential for chemicals to drift from treated areas. Perhaps the most important precaution is to avoid making spray applications when wind speed exceeds 4 to 5 miles per hour. Because of time constraints and the cost of rescheduling, this may be more of a problem for lawn care companies than for golf courses or parks. You may be tempted to spray anyway. But replacing ornamentals damaged by drift will certainly cost more than a return visit to service the account.

The application equipment you use also affects potential drift through its influence on droplet size. Mist blowers or aerial spray equipment create extremely fine sprays. Fortunately, turf managers seldom use these types of sprayers because fine droplets can travel long distances.

Most sprayers for turfgrass applications operate at low pressure and produce large spray droplets, which are much less likely to drift. Before spraying, you need to ensure that the equipment is operating at the correct pressure. Otherwise, misting may occur. The operating pressure at the nozzle for boom sprayers with standard flat fan nozzles should be 20 to 50 psi. Pressures between 20 and 30 psi will form medium-sized droplets, giving adequate coverage with little drift potential.

Be sure to determine spray pressure at the nozzle rather than at the tank. Pressure is lost by friction as the spray solution travels through hoses, valves and other system components. One way to measure the pressure at the boom is to temporarily replace a nozzle with a pressure gauge.

The boom's height above the turf surface can influence drift potential. The air near the surface is relatively calm but it picks up speed and turbulence as it moves higher above the surface. The closer the boom is to the soil, the less wind there is to blow the spray. Set spray booms no more than 18 to 20 inches above the turf. At this height, the boom should provide proper coverage.

Although we are most concerned about drift from liquid applications, remember that granular applications can drift. Wind can blow fine particles or dust into nearby ornamental beds. Chemicals drift more easily from rotary spreaders than from drop spreaders as rotary spreaders can throw fine particles into non-target areas. A final precaution you can take to minimize the possibility of damage from drift is to maintain a buffer zone between the treated area and sensitive areas and property boundaries.

PESTICIDE VOLATILITY

In addition to movement of spray droplets or granular particles by drift, airborne movement of applied pesticides may also occur by the process of volatilization. Volatilization is the loss of chemicals by evaporation from plant and soil surfaces. Since the process of evaporation is driven by solar radiation, volatilization is greatest on hot days and during early afternoon. Losses on cloudy days, during early morning and at night are generally low.

Volatilization from turf foliage is usually most rapid during the first week following application, followed by a much slower rate of loss over the next two to three weeks. Thus, it is desirable to maximize the time between pesticide applications and use of the area to reduce exposure to pesticide vapors. At a minimum, no one should use the treated area until the spray solution has dried on the foliage.

The following guidelines will help you reduce volatility following pesticide application.

Whenever you have a choice between products or formulations that are equally suitable for a job, choose the less volatile one. Consult your sales representative or refer to the label and the material safety data sheets to learn the differences between the materials. Be aware that different formulations of a particular herbicide can have significantly different volatility potentials. For example, the acid, sodium salt and amine formulations of a 2,4-D have low volatility while ester formulations of this herbicide are extremely volatile.

Weather conditions on the application day greatly influence volatilization. High wind speeds increase the loss rate. So if the weather is calm, chemicals will volatilize less. High air temperatures also increase volatilization. In fact, researchers have reported a three- to four-fold increase in pesticide volatilization for each 18^{o} F increase in temperature. Making applications on cool, cloudy days or in the late afternoon when temperatures are cooling can help reduce initial volatility.

Be sure to water in pesticides immediately after application if the label says to do so. Rainfall and irrigation transport the pesticide into the turf canopy where it can bind to thatch or soil. This will reduce potential volatility. Once certain pesticides have dried on the leaf, they are not easily dislodged. Timely irrigation is critical to moving these materials into the canopy and soil to avoid volatilization.

It is important to recognize that researchers have only recently begun investigations into these forms of turfgrass chemical movement. Until the results are in, act sensibly. Take appropriate precautions to minimize drift and volatilization.