Quantifying the Effect of Turf on Pesticide Fate

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Goal:

- *Quantify the ability of the turf organic matter to bind, degrade and slow the movement of a pesticide through the soil.*

This study is designed to quantify the effect of surface organic matter on the fate of pesticides applied to turf. Our goal is to relate the amount of turfgrass leaf tissue and thatch to the distribution of the applied pesticide and the retention and degradation of the pesticide amongst turfgrass leaves, thatch, and soil. Our approach is to remove thatch and leaf tissue from the turf prior to treatment with a pesticide. Using a vertical mower, we remove 0, 1/3, 2/3, and all of the turfgrass leaves and thatch from a bentgrass turf mowed at 1.25 cm.

In 1997, we repeated a study using this approach with the turfgrass fungicide cyproconazole (Sentinel). This study was initiated in July of 1997. Soil cores 20 cm in diameter and 30 cm deep were removed from the various organic matter treatments at 0, 4 8, 16, 32, 64, and 128 days following cyproconazole application. Data from this study is under analysis.

The same study was conducted in 1996. Data from that study shows the attenuating effect of surface organic matter on cyproconazole movement (Figure 13). As the amount of surface organic matter increases, the amount of cyproconazole reaching the 0-1 cm soil layer is dramatically reduced. Turfgrass leaf and thatch provide a barrier to pesticide penetration. The attenuation provided by a dense, actively growing turf is substantial, with less than 2% of the quantity of pesticide initially applied to bare soil reaching the soil of a actively growing bentgrass turf. At 4 days after cyproconazole, the concentration of

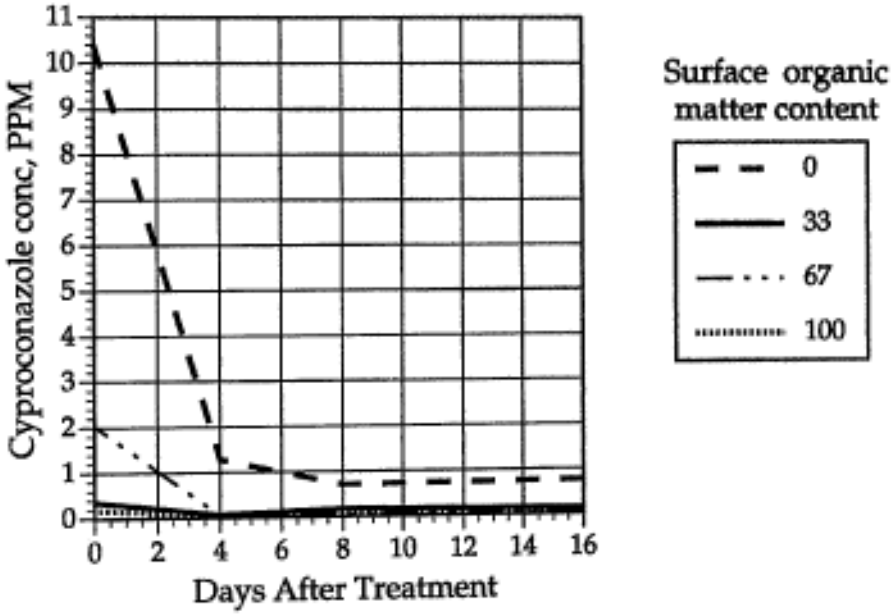

Figure 13. Cyproconazole concentration in the 0-1 cm soil layer.

cyproconazole in the 0-1 cm soil layer under full bentgrass cover was still only 2.3% of the concentration in the 0-1 cm layer of the bare soil plot.

The data on cyproconazole concentrations by soil depth also demonstrate the attenuating power of a turf cover (Figure 14). At each soil depth, the concentration of cyproconazole is higher in the bare soil treatment. However, cyproconazole degrades readily and no residues were detected below 5 cm for any cover treatment. The effect of surface organic matter on more mobile pesticides would be of interest.

The data indicate that turf has a substantial impact on the distribution and soil movement of pesticides applied to turf. As we continue to collect and analyze the samples generated in our studies, we will attempt to model the impact of various levels of surface organic matter on the initial distribution and subsequent dissipation and movement of pesticide residues. Our data will provide a quantitative assessment of the impact of turf on pesticide fate.

In 1997 a second trial was begun to determine the fate of ethofumesate (Prograss) applied to turf. This herbicide is considered likely to be mobile in soils because of its moderate soil sorption and relatively long soil half-life. Our study compares the dissipation rate for ethofumesate applied to bare soil and to a bentgrass turf. This study was initiated on September 21, 1997, the time at which ethofumesate applications are recommended by the manufacturer to begin. Soil samples for 0 to 64 days after treatment have been collected and are stored for future analysis.

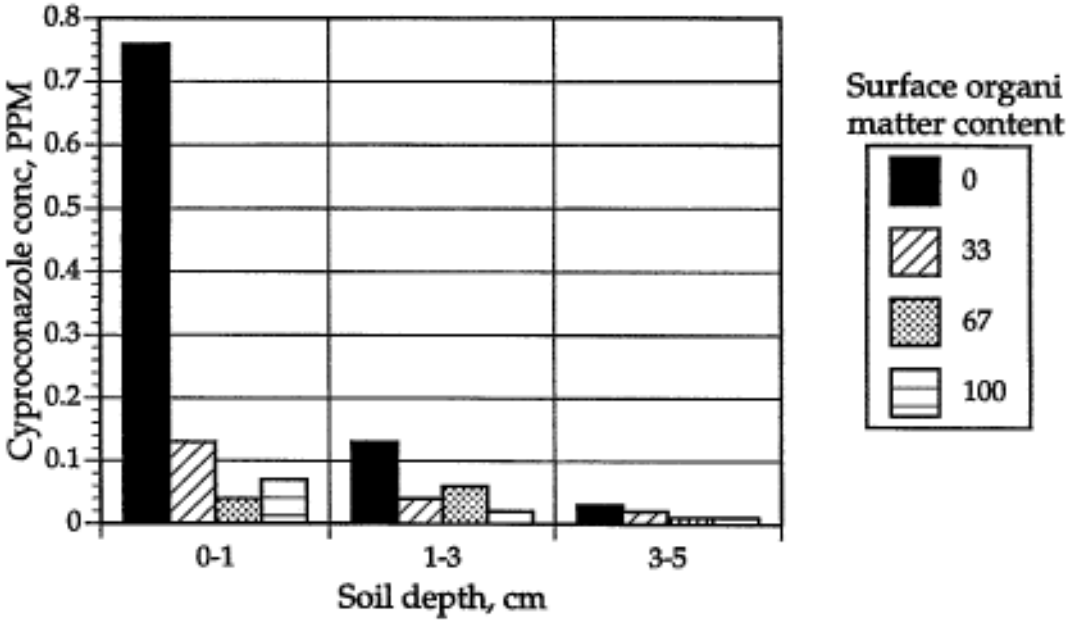

Figure 14. Effect of varying levels of surface organic matter on the cyproconazole concentration by soil depth at 16 DAT.