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Mr. Fred Jenkins, DFO
Office of Science Coordination and Policy (7201M)
Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460-0001

Re: Docket ID EPA-HQ-OPP-2010-0761; Public comment on December 7 SAP meeting, "Scientific Issues Related to Pesticide Exposure Models and Climate Change"

Dear Mr. Jenkins:

I presented oral comments to the SAP at the public meeting yesterday. Afterward, Mr. Bailey and two members of the Panel suggested I submit the comments in writing, so that they would be available to the Panel while it writes its report. That is the purpose of this letter.

Runoff Curve Number

The PRZM model, like most runoff models, is very sensitive to the runoff curve number (CN). The CN is used in a semi-empirical relationship, along with precipitation, to predict runoff depth for specified land uses, soil types, and antecedent moisture conditions (e.g., Ward and Elliot, 1995).

My concern is that the CNs were determined for an Ohio watershed in the 1950s-1960s, I believe, for 24 hour time steps, whereas shorter, intense storm events are predicted to become more frequent as climate change progresses. For example, see slide 6 of the EPA presentation, in the part presented by Dr. Scheraga. Runoff estimates using the 24-hour-based CN under-predict runoff for shorter time steps for the same amount of precipitation. We addressed this issue in a paper that compared modeling with field plot results (Durborow et al., 2000). In this study, we were forced to increase the CNs much higher than what one would normally choose for the particular combinations of turf cover and soil type.

My recommendation is that EPA thoroughly evaluate the use and application of the established CNs as part of its climate change strategy, in the context of pesticide runoff risk assessment.

Activation Energies

Currently, most modelers do not have a solid basis for extrapolating critical degradation rates from one temperature (typically the temperature of the study) to a temperature of interest (an ambient condition). Typically, people arbitrarily assume reaction rates increase 2X for every 10° C rise in temperature. In fact, one could use the Arrhenius equation as well as observations to demonstrate that reaction rates can easily vary more than 5X (hydrolysis increases five-fold) at ambient temperatures for a moderately high activation energy (30 kCal/mol) for a 10° temperature change, or less than 2X for low activation energies (microbial and hydrolytic reactions) and a 10° temperature change. Therefore I recommend that a comprehensive compilation of activation energies as a function of hydrolysis and microbial transformation mechanisms be done to aid the OPP risk assessors. (I believe that a compilation of this type was begun many (10??) years ago by a grad student at Stanford, but I have not seen the paper.)

This should be done for two reasons. There is an obvious need to reduce uncertainty in risk assessments whenever possible. Second, even non-scientist regulatory managers will soon begin asking scientists the implications of changing temperatures relative to predicted environmental concentrations.

Thank you for the opportunity to submit these written comments as a followup to my oral comments.

Sincerely,

Stuart Z. Cohen, Ph.D., CGWP
President

References

Durborow, T.E., N.L. Barnes, S.Z. Cohen, G.L. Horst and A.E. Smith. 2000. Calibration and Validation of Runoff and Leaching Models for Turf Pesticides, and Comparison with Monitoring Results. *In*: Fate and Management of Turfgrass Chemicals, ACS Series 743, J.M. Clark and M.P. Kenna (eds.), pp. 195-227, American Chemical Society, Washington, DC, 2000.

Ward, A.D. and W.J. Elliot (eds). 1995. Environmental Hydrology. CRC/Lewis Publishers, New York, NY, pp. 143-149.