XVII[th] World Congress of the International Commission of Agricultural and Biosystems Engineering (CIGR)

Hosted by the Canadian Society for Bioengineering (CSBE/SCGAB)
Québec City, Canada June 13-17, 2010

EVALUATION OF TOXICITY METRICS AND THE TOXICITY OF DIFFERENT PRODUCTION METHODS IN THE US

Z. CLAYTON-NIEDERMAN[1], L. LANIER NALLEY[1], M.D. MATLOCK[1]

[1] Z. CLAYTON-NIEDERMAN, University of Arkansas, United States, Center for Agricultural and Rural Sustainability, zclayton@uark.edu.
[1] L.L. NALLEY, Agricultural Economics and Agribusiness, llnalley@uark.edu.
[1] M.D. MATLOCK, Ecological Engineering, mmatlock@uark.edu.

CSBE101610 – Presented at the 10th American Ecological Engineering Society Annual Meeting (AEES) Symposium

ABSTRACT The objective of this study was to evaluate different index methods used for assessing toxicity and to assess the toxicity of different US cotton production practices, using these toxicity methods. These methods include CML 2001, TRACI, Impact2002+, ReCiPe and EIQ. We have found that none of the methods have values for every pesticide in the study, although Impact2002+, EIQ and ReCiPe have most of the pesticides. Each method provides index values for both ecological toxicity and human toxicity; however each method breaks these down into more refined categories that differ across each study. Impact2002+, EIQ and ReCiPe also provide a weighting system that combines the human and ecological toxicity values into a single score value. Each toxicity index uses different calculation and weighting methodology which causes the methods to produce fairly different results for both pesticide ranking and production method ranking. Due to these differences in results, one must have a clear understanding of how the different methods work in order to determine when it may be more appropriate to use one method over another. In particular, when making claims comparing one product or production method, there must be clear justification for using one method over another. These index methods appear to generally provide good first approximation rankings for pesticides and production methods, but because toxicity really depends upon the exposure to the substance, timing and method of application, as well as environmental factors such as soil type and rainfall will play a much greater role in the risk to humans and animals. Therefore more specific models that take into account these details may be more appropriate for a field level study.

Keywords: Cotton, Toxicity, Impact Assessment, LCA.