

## APPENDIX B

## A CALL FOR UNIFORMITY IN REPORTING TRACE ELEMENT CONCENTRATIONS

S. J. Fleischer<sup>1</sup>, J. L. Hayes<sup>2</sup>, and D. H. Akey<sup>3</sup>Department of Entomology  
VPI & SU  
Blacksburg, VA 24061

Anyone who has explored the elemental marking literature has likely suffered frustration due to differences in the manner of reporting trace element concentrations. This confounds comparative studies and may impede the initiation of new studies. We would like to see this problem resolved, so please make very clear on what basis concentrations are reported. To state parts-per-million (ppm) is not enough; the reader needs to know parts-per-million of what? Is it parts per million parts of volume of liquid diet, or per million parts of dry weight?

When mixing diet, it is customary to add a weight of trace element, measured in milligrams (mg), to a volume of diet, in liters (L), and report mg/L as ppm. This is a weight/volume measure (diet has a density different than that of water). But when measuring concentrations in biological materials (e.g., plant tissue), it is customary to dry the biological material, and report concentration as micrograms ( $\mu\text{g}$ ) trace element per gram (g) dry weight of biological material. This is also a ppm measure, but on a weight/dry weight basis. These two ppm measures (mg/L and  $\mu\text{g/g}$ ) are not convertible. The  $\mu\text{g/g}$  dry weight in diet greatly exceeds the mg/L in diet (Knight et al. 1989)<sup>4</sup>.

Dry weights act as a standard in many field studies. It would be helpful if dry weight concentrations of trace elements in diet are reported (i.e., dry the diet and measure the ppm in  $\mu\text{g/g}$ ). Reporting the weight per unit volume of liquid diet may also help, as well as reporting the wet weight concentrations of trace elements in biological samples. Our point here is not to compare the merits of different bases for reporting concentrations, but to argue for clear reporting of the basis (weight or volume), and to ask that an estimate on a dry weight basis be included in all studies.

Difference in the way concentrations have been reported (mg/L and  $\mu\text{g/g}$  dry weight both being called ppm) makes comparisons among past studies difficult. Let's insure that future work is more comparable among studies, preferably by reporting the dry weight concentration, and by clearly stating the unit basis for the term ppm.

<sup>1</sup> Current address: Dept. Entomology, The Pennsylvania State University, University Park, PA 16802

<sup>2</sup> Forest Insect Research, USDA Forest Service, 2500 Shreveport Hwy., Pineville, LA 71360

<sup>3</sup> Western Cotton Research Laboratory, USDA, ARS, 4135 E. Broadway, Phoenix, AZ 85040

<sup>4</sup> Knight, A. L., L. A. Hull, E. G. Rajotte, and S. J. Fleischer. 1989. Labelling tufted apple budmoth (Lepidoptera: Tortricidae) with rubidium: effect on development, longevity, and fecundity. *Ann. Entomol. Soc. Am.* 82: 481-485.