ADVANCES IN METHODS OF ANALYSIS FOR PESTICIDES, PROHIBITED MATERIALS AND INDUSTRIAL CHEMICALS IN ENVIRONMENTAL MATRICES

Kevin L. Armbrust, Jose M. Rodriguez
Office of the State Chemist – Mississippi, P.O. Box CR, Mississippi State, MS 39762, USA; armbrust@mscl.msstate.edu

Recent developments in biochemistry and genetics have allowed far superior targeting of crop protection chemicals to control pest species. These improvements allow chemical application rates to be reduced significantly. Furthermore, gene insertion into crops allows plants to produce natural toxins that repel or kill pests. Nevertheless, concerns regarding impacts on non-target organisms must be addressed. Such evaluations require toxicity testing in several species and dissipation studies in several media. Human exposures and allergic responses have emerged with the advent of crops that fall into the category of genetically modified organisms (GMOs). Concurrently new generation "emerging contaminants" such as flame retardants and human health pharmaceuticals in sediment, biosolids and biota present additional challenges as these are found at increasingly higher frequency in environmental samples with unknown toxicological consequences at environmentally relevant concentrations. Food safety concerns prompted by incidences of adulteration with illegal antibiotics in imported seafood and melamine in wheat gluten used in pet food have illustrated the need for rapid screening of large volumes of samples at a country's port of entry. Prions responsible for Bovine Spongiform Encephalopathy (BSE) introduced through prohibited materials in animal feed have resulted in meat import and export restrictions as well. Analytical challenges are significant when addressing exposure to new crop protection chemicals as well as food adulterants in imported products. Improvements in detection limits and analysis of transformation products are required to quantify new synthetic pesticides adequately. Techniques to isolate and quantify toxins from GMOs as well as prohibited materials and contaminants in animal feeds also require more efficient and precise methods. Methods for contaminants at ports of entry must be able to quickly screen for large classes of chemicals in varied and complex matrices in a very short amount of time.