

QuEChERS Method Catches Pesticide Residues

QuEChERS (pronounced *catchers*) is not a cool, new way of spelling the position we usually associate with masked, padded, often grimy players toiling behind home plate during baseball and softball games.

It's actually a catchy name for a new approach to analyzing pesticide residues in fruits and vegetables.

Steven J. Lehotay, an ARS chemist at the Microbial Biophysics and Residue Chemistry Research Unit, Eastern Regional Research Center in Wyndmoor, Pennsylvania, and a visiting scientist, Michelangelo Anastassiades, from a government laboratory in Stuttgart, Germany, developed the QuEChERS method, which stands for quick, easy, cheap, effective, rugged, and safe. It can be used with a wide range of pesticides and food types.

Current methods of extracting pesticide residues from food samples and preparing them for analysis are time consuming, expensive, and labor intensive. The new, streamlined approach makes it easier and less expensive for analytical chemists to examine food.

Routine monitoring serves to enforce laws, protect the consumer, provide data for risk assessment and pesticide reregistration, ease international trade, market residue-free products, and help verify organic food labeling.

The U.S. Department of Agriculture and other organizations started the Pesticide Data Program in May 1991 to test commodities in the U.S. food supply for pesticide residues.

Using QuEChERS, a single chemist can prepare a batch of 10 previously chopped samples in about 30 minutes with \$1 worth of materials per sample. This gives at least fourfold lower material costs and fourfold greater sample throughput per analyst than traditional methods. Lehotay says the method combines different steps, which means there is less chance for error.

A single, easy-to-clean Teflon tube is the only item to be washed and reused, eliminating all the glassware used in conventional methods. Furthermore, less than 10 milliliters of solvent waste is generated—much less than the 75-450 milliliters generated by other methods.

Key to the new approach is the development of a rapid procedure called dispersive solid-phase extraction. This technique quickly removes water and nontarget compounds with magnesium sulfate and a primary-secondary amine sorbent.

More than half the produce samples tested in the United States typically do not have measurable residues, and less than 1 percent of tested samples exceed tolerance levels, according to the U.S. Food and Drug Administration (FDA). Consumers should always wash, peel, or cook produce to help remove residues.

The term "tolerance" is used to describe the maximum amount of a given pesticide or its breakdown products allowed to remain in or on food commodities. The U.S. Environmental Protection Agency sets tolerance levels in the United States, and state and federal monitoring programs enforce these legal limits.

Several monitoring laboratories, including a few in the FDA, are evaluating QuEChERS. Lehotay believes that it will someday substantially increase monitoring rates and lower costs of pesticide residue analysis.—

By **Jim Core**, ARS.

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