



Cornell University Program on Breast Cancer and Environmental Risk Factors in New York State (BCERF)

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FACT SHEET #25

Pesticide Residue Monitoring and Food Safety

This fact sheet presents an overview of the federal regulations on use of pesticides, federal monitoring programs for pesticide residues in food, and outlines some issues being debated nationwide.

Why are pesticides found on food?

Pesticides may be used in a variety of different ways during the production of food. They may be used by farmers to control the growth of weeds, or prevent crop damage by insects, rodents and molds. They may be used on food crops after harvest to prolong their storage life. Pesticides may also be used on animal farms to control insect pests. Sometimes, small amounts of pesticides used in these ways can be found in or on foods. The pesticides found in or on foods are called “residues” (see also BCERF Fact Sheet #24 on *Consumer Concerns About Pesticides in Food*). Some pesticides, even though no longer used, persist and remain in the environment. Residues of these pesticides are sometimes found on food grown on contaminated soil, or in the fish that live in contaminated waters.

How is the use of pesticides regulated?

Before a new pesticide can be sold for use on a farm in the United States (US), it has to be “registered” for agricultural use by the US Environmental Protection Agency (EPA). The registration process involves a careful consideration by EPA of possible health effects from the pesticide. The manufacturer of each new pesticide is required to submit scientific data to EPA that help evaluate the risk of health effects from its use. EPA reviews the submitted data and other available studies to determine if the pesticide is likely to affect human health or the environment. All the uses that have been approved by EPA are mentioned on the pesticide label. Other uses are illegal.

States also regulate the use of pesticides. The New York State Department of Environmental Conservation regulates pesticide use in New York State.

What is the maximum level of a pesticide that is allowed on food?

EPA sets *tolerances* for pesticides. A tolerance is the maximum amount of a specific pesticide or its break down products that is allowed to remain in or on foods. The tolerance is **not** an

estimate of the residue amount that is common or typical for a food. Residue levels found in food are usually below the tolerance levels. Tolerances for a given pesticide may vary for different crops. EPA has set tolerances for about 400 different pesticides. Since a pesticide may be used on many different crops, there are about 9,700 tolerances in effect.

How does EPA decide what level of a pesticide residue is safe?

To estimate the health risk to humans from exposure to pesticides, EPA evaluates tests done in experimental animals, and on plant, human or animal cells growing in the laboratory. EPA determines how much of the pesticide is likely to remain on foods that are grown using the recommended guidelines for pesticide use. It pays extra attention to foods that are eaten by children in large quantities, such as apple juice and milk. All this information is entered into a computer program specially developed to estimate health risks, called the “Dietary Exposure Evaluation Model.” EPA considers the exposure through food, drinking water, and home use of pesticides. EPA will set a tolerance level for food if the combined exposure from different sources is 100 to 1,000 times lower than the maximum level that shows no harmful effects in experimental animals.

Residue levels are usually present in very small amounts that may be expressed as

- parts per million (ppm = 1 inch of a 16 mile-long loaf of bread)
- parts per billion (ppb = 1 inch of a 16,000 mile-long loaf of bread),
- parts per trillion (ppt = 1 inch of a 16,000,000 mile-long loaf of bread).

Are there tolerances for pesticides no longer permitted for use in the US?

Some pesticides are no longer permitted for use because of their toxic effects or cancer-causing potential. Unfortunately, some residues of this description are unavoidable in food.



This is because long lasting pesticides can still be found in the environment many years after their use has been stopped. Small amounts of these residues are sometimes found in food crops grown on contaminated soil, or in fish that live in polluted waters. Under the Food Quality Protection Act of 1996, tolerances are set to enforce the lowest possible levels for such unavoidable pesticide residues. If a food is found to have levels of the pesticide higher than these tolerance levels, federal or local officials can remove the food and destroy it.

A US delegation consisting of US Department of Agriculture (USDA), EPA and Food and Drug Administration (FDA) representatives actively participates in setting international limits that are similar to tolerance levels for pesticide residues in food that is traded globally. If the international limits are not the same as the ones set by the US federal agencies, FDA can enforce US tolerance levels on imported foods.

Why are there pesticide residues with no tolerances?

There are some pesticide residues detected in food for which no tolerances have been set. This could be due to the following reasons: 1) the pesticide may be recognized by EPA as safe and not requiring tolerances, 2) the pesticide may not be registered for agricultural use in the US, or more often, 3) the pesticide residue is on a crop different from the one for which it has been approved. For some residues of this description, FDA may enforce the international action levels. Alternatively, the pesticide residues may be illegal in food in the US and the food can be seized and destroyed.

Who monitors the levels of pesticides in food?

FDA monitors the levels of pesticides in raw agricultural produce, fish, dairy products and processed foods. The Food Safety and Inspection Service (FSIS) of USDA is responsible for monitoring pesticide residues in meat and certain egg and poultry products. The Agricultural Marketing Service of USDA also collects information on pesticide residues in raw agricultural produce through a new program created in 1991, called the Pesticide Data Program. This program, in cooperation with nine participating states (including New York) collects and provides information on pesticide use and residue detection to EPA, FDA and the consumer. EPA uses this information in estimating health risk from a pesticide.

Both the FDA and USDA work with state agencies to collect and test for pesticide residues in food from different parts of the country. For imported foods, food samples are collected

at the port of entry. If a food is found to have any pesticide residue at, or greater than the tolerance level, federal or state officials can remove the food and destroy it. Any pesticide residue that exceeds tolerance levels, or does not meet EPA regulations is reported as “violative.”

What are the foods that are monitored?

FDA reviews the recent findings on pesticide residues in foods, and state and regional intelligence reports on how much pesticide is being used on crops or animals in a region. Similarly, FDA obtains information on pesticide usage from countries that export foods to the US. All this information helps FDA plan on the types of foods to monitor and how many samples to analyze. It prioritizes foods to be tested according to how much of it is typically eaten. The food is also monitored for pesticides that are no longer used in the US but are long lasting in the environment, such as the insecticides DDT, chlordane, dieldrin and toxaphene. In recent surveys, FDA has used methods that monitor food samples for 397 different pesticides and break down products.

A second type of monitoring is called “Incidence or Level Monitoring.” Under this program, FDA tries to determine how often a certain pesticide is found on a particular crop. For example, in 1996, FDA analyzed different foods for the presence of 19 triazine herbicides (pesticides used to control weeds) or their breakdown products. Few of these residues were found and none were at levels above the set tolerances.

What levels of pesticide residues remain in prepared meals?

FDA conducts a third kind of food monitoring called the “Total Diet Studies” to analyze pesticide residues that remain in a “typical meal.” Information on what people eat or what is a “typical meal” is collected by the USDA’s Nationwide Food Consumption Surveys. A list of 265 food items was compiled for 1990. Some examples are: chocolate milk, boiled eggs, chicken nuggets, pork and beans, bread, banana, french fries, macaroni and cheese, ice cream, popcorn, honey, butter, lemonade, and 35 infant and children’s foods. Food monitored in the Total Diet Studies may be analyzed for nearly 200 different pesticides.

How can food be analyzed for so many pesticide residues?

Most food testing laboratories use methods that test for almost 200 residues at one time. These multi-residue methods make it possible to test many foods for several hundred residues at the same time.



Were violations common in recent surveys?

More than half of the 9,843 food samples collected by FDA for monitoring in 1997 were of imported foods. Violations were detected in 85 of the 5,342 imported foods that were tested. No violative residues were found in imported milk, dairy products, eggs, seafood, bananas and apple juice. Violations were reported for 54 of 4,501 domestically produced foods that were monitored in 1997. No violative residues were found in domestic milk, dairy products, eggs, bananas, apple juice, grains and grain products, and seafood.

Is the current pesticide monitoring system ensuring a safe food supply?

Consumers often voice the presence of pesticide residues in food as a concern. We have outlined below some issues on food safety that are being debated nationwide.

- Should we spend more on increased monitoring of our food supply? Due to limited resources, of all the food produced or imported into the US, only 9,843 food samples were analyzed for residues by FDA in 1997. As mentioned earlier, a very small percentage of these domestic and imported food samples were found to have violative pesticide residues. Ideally, no food should have any violative residues.

- What else can be done? Some people argue that a more effective way to increase food safety in the long run is to strengthen programs that guide farmers on good farm practices and proper use of pesticides, to further decrease the incidence of violative residues in food. For example, the Integrated Pest Management Program recommends a variety of strategies to reduce pesticide use for the control of pests in agriculture. Some crops are naturally more resistant to pests and lend themselves well to organic production methods without the use of any synthetic chemicals. A greater reliance on seasonal and varied local produce through local farmer's markets may be another way to reduce the need for pesticides, which would be required if the food was to be shipped over great distances.
- Is more information needed on health effects of pesticide residues? While the tolerances set by EPA are based on available research, there are gaps in our knowledge on the health effects of pesticides. The National Academy of Sciences published a report in 1993 recommending that more attention be paid to the estimation of risk of health effects from pesticides for infants and children. The Food Quality Protection Act passed in 1996, has special features included to assure adequate protection of children when estimates are being made for acceptable levels of a pesticide residue in food.

*Where can I find more food safety related information?

- USDA, Food Safety and Inspection Services: 1-800-535-4555
- USEPA, Office of Pesticide Programs: 703 305-5017 or www.epa.gov/pesticides
- National Pesticide Telecommunications Network: 1-800-858-7378 or <http://ace.orst.edu/info/nptn>
- FDA: 202 205-5275
- FDA, Food Information and Seafood hotline: 1-800-332-4010
- FDA's Residue Monitoring Report: <http://vm.cfsan.fda.gov/~dms/pes97rep.html>, or request a reprint: Bernadette M. McMahon, Food and Drug Administration, Division of Pesticides and Industrial Chemicals, HFS-337, 200 C St., SW, Washington, DC 20204
- The NAS Report "Pesticides in the Diet of Infants and Children": <http://www.nap.edu/bookstore/isbn/0309048753.html>
- IPM in New York State: <http://www.nysaes.cornell.edu/ipmnet/ny/>, or by mail: IPM Program Office, New York State Agricultural Experimental Station, Cornell University, Geneva, NY 14456
- Cornell Cooperative Extension: <http://www.cce.cornell.edu/food/index.html>, or call your local or county Cooperative Extension office

*Reproduced from the BCERF Fact Sheet #24 on *Consumer Concerns About Pesticides in Food*.



An extensive bibliography on *Pesticide Residue Monitoring and Food Safety* is available on the BCERF web site: <http://www.cfe.cornell.edu/bcerf/>

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