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EDITORIAL

Pesticides and Food

A court ruling mandating that the Delaney Clause be strictly applied has ensured major attention to this legislation. Rigid enforcement would result in banning many herbicides, fungicides, and insecticides (collectively called pesticides). As a result, costs of food would increase, growers and processors would be impacted, and enhanced soil erosion would result (no-till agriculture would decrease). Increased costs of vegetables and fruit would deleteriously affect the health of low-income people. Benefits to public health would be negligible.

The maximum levels of pesticides in unprocessed plant products are established by the Environmental Protection Agency (EPA). The agency relies on tests performed on laboratory rodents using huge doses followed by questionable extrapolation to tiny doses in humans. The regulatory level is then usually set with the objective that individuals consuming the food for 70 years would have, as an upper limit, one extra chance in a million of incurring cancer. (The true risks may be zero according to the EPA.) In contrast, the probability of suffering a cancer-caused death from a bad diet (e.g., excessive fat) is about 70,000 chances in a million.

The Food and Drug Administration (FDA) monitors adherence to the pesticide levels established by the EPA.* Domestic samples of food are collected as closely as possible to the point of production. Fresh produce is analyzed as the unwashed whole raw commodity, with peel or skin intact. If residues above the EPA standards are found, the FDA can seize the produce. Imports may be stopped at the point of entry when illegal residues are found. Residues present at 10 to 100 parts per billion are usually quantitatively measurable. Trace amounts can be detected at lower levels. In 1991, 19,082 samples of food were analyzed by the FDA. No violative residues were found in 99% of all 8281 domestic surveillance samples. Indeed, 64% of these had no detectable residues. No violative residues were found in all 155 baby-food samples tested. When violative residues were found in other samples, few of them exceeded standards by more than a factor of about 4.

In addition to the FDA activities, many states carry out effective monitoring, and there is a "Foodcontam" database which is a compilation of state-collected residue data. The FDA also utilizes the Battelle World Agrochemical Data Bank or the Landell Mills Data Bank, which contain pesticide usage data for about 20 to 25 countries that export food to the United States.

Synthetic pesticides in marketed foods constitute no appreciable threat to human health. What is the problem about the Delaney Clause? Under section 408 of the Federal Food, Drug and Cosmetic Act (FFDCA), the EPA determines appropriate tolerance levels in or on agricultural commodities by considering both potential health effects and the value of pesticide uses. For example, pesticides are beneficial to health by controlling disease and damage to foods caused by bacteria, fungi, and insects. However, section 409 of the FFDCA, which applies only to processed foods, includes the Delaney Clause that prohibits food additives, including pesticides found to induce cancer in humans or animals. The Delaney Clause requires the EPA to consider only a pesticides risk, however insignificant, and not to consider any offsetting benefits. In some instances a ban on a pesticide found in processed foods has been arbitrarily extended by the EPA to revoke its use on the crop in question.

The Delaney Clause was enacted in 1958 at a time of insensitive instrumentation, lack of knowledge about levels of pesticides, and ignorance about causes of human cancer. For instance, it was not recognized how much cancer is caused by smoking, excessive fat in diets, and the production of carcinogens by cooking. It was also a time of ignorance about natural pesticides in food. Ames and Gold[†] have reminded us that the defense mechanisms of plants create an enormous number of endogenous pesticides. Many of these chemicals, when tested by the procedures used on synthetic substances by the EPA, produce cancer in rodents. The natural pesticides are abundant in plants. Ames and Gold have estimated that humans ingest about 10,000 times as much of the natural pesticides as of the synthetic varieties. If the Delaney Clause is sound legislation, why isn't it applied to natural carcinogens?

The long-lasting flap about the Delaney Clause and synthetic pesticides probably had the side effect of increasing cancer by diverting attention from the real factors causing the dreaded disease. Citizens deserve a more judicious source of information affecting their health than has been provided by the federal government.

Philip H. Abelson

*Food and Drug Administration Pesticide Program, *J. Assoc. Off. Anal. Chem.* **75** (1992).
[†]B. N. Ames and L. S. Gold, *Science* **249**, 970 (1990); B. N. Ames *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **87**, 7777 (1990); L. S. Gold *et al.*, *Science* **258**, 261 (1992).

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