

# PESTICIDE REGULATION

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## OVERVIEW

Pesticide residues found on domestic and imported produce pose little, if any, risk to public health, particularly compared to the enormous public health benefits of pesticide use.<sup>1</sup> However, for more than a decade, federal pesticide policies have placed in jeopardy the ability to address the greater risks associated with insects and other pests. Applying federal law, the U.S. Environmental Protection Agency (EPA) may ban numerous pesticides that are both safe and essential for farming, home pest control, and other public health purposes.

### Statutory Scheme

EPA regulates pesticides under three laws:

- **Federal Food Drugs and Cosmetics Act (FFDCA).** The FFDCA is the law under which EPA sets tolerances for pesticides. EPA can essentially ban a pesticide by not setting a tolerance — the amount of pesticide residue that is allowed to legally remain on food. The U.S. Department of Agriculture's (USDA) Agricultural Marketing Service is responsible for monitoring residue levels in or on food. The Health and Human Service's Food and Drug Administration uses this information to enforce tolerances on imported and domestically produced food in interstate commerce. The USDA's Food Safety Inspection Service enforces tolerances for meat, poultry, and some egg products.
- **Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).** To sell a pesticide, a company must also register it with EPA under FIFRA. For pesticides used on food, EPA can only register uses for pesticides that have a tolerance. Pesticide registrants must register and gain EPA approval of their products as well as for each specific use (i.e., use as a bug spray indoors is one registration and use outdoors for a specific crop is another). EPA must review registered pesticides on a 15-year cycle. To gain registration, registrants must submit scientific data and research demonstrating the product's safety. EPA can limit uses by denying registration such uses.
- **Food Quality Protection Act.:** The FQPA amended the first two laws. Details on these changes follow.

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<sup>1</sup>According to one National Research Council report, "The great majority of individual naturally occurring and synthetic chemicals in the diet appears to be present at levels below which any significant adverse biological effect is likely, and so low that they are unlikely to pose any appreciable cancer risk." Committee on Comparative Toxicity of Naturally Occurring Carcinogens, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Research Council, *Carcinogens and Anti-Carcinogens in the Human Diet* (Washington, D.C.: National Academy Press, 1996), 336-37.



## Brief History Of Pesticide Regulation and Legislation

Before 1996, the FFDCA employed two standards for setting tolerances. One standard allowed EPA to regulate pesticide residues on raw produce using a cost-benefit approach. The agency could weigh the risks of using the pesticides versus the risks of not having them to help maintain the food supply. Under that legislative authority, EPA applied what it called a “negligible risk” standard, allowing produce to contain pesticide residues that did not exceed a one-in-a-million cancer risk.

However, the FFDCA set a separate standard for pesticide residues found in processed food. It applied the “Delaney Clause,” which prohibited the addition to food of any substance that caused cancer in laboratory animals. Delaney essentially set a “zero-risk” standard. The Delaney Clause applied to pesticides used directly or indirectly in processed food. It also applied to pesticide residues found on raw agricultural products used in processed food if the pesticide became more concentrated during processing.

As science became able to detect increasingly lower levels of residues, the Delaney Clause essentially demanded that EPA ban many pesticides. In addition, having separate standards for raw produce and processed food created perverse effects, which the National Research Council (NRC)<sup>2</sup> noted could actually reduce safety. In a 1987 report, *Regulating Pesticides in Food: The Delaney Paradox*, the NRC highlighted problems with the existing policy.<sup>3</sup> The NRC raised concerns about alternative pest control practices that could pose greater risks or could prove inadequate to maintain food supplies and control disease-carrying pests. The NRC called on Congress to address this issue, suggesting that it set a single standard for raw and processed foods.

In 1988, the agency began applying the negligible risk standard to processed foods without legislative authorization. But in 1992, environmental groups succeeded in suing the agency for not applying the Delaney Clause. A federal court held that the agency was obligated to apply Delaney to processed food.<sup>4</sup>

Hence, for those who used and produced pesticide products, there was an urgency to reform the law. With numerous bans likely, many crops — and ultimately our food supply — would be placed in jeopardy. In addition, concerns mounted about the increasing difficulty associated with controlling rising infectious diseases, carried by insects and other pests.<sup>5</sup>

Meanwhile, environmental groups worked to make the law more stringent. Their efforts were bolstered by a 1993 NRC report and the media hype that followed. The report, *Pesticides in the Diets of Infants and Children*, noted that children *might* be more susceptible to pesticides, and hence they faced greater risks. Despite media hype suggesting the contrary, the study did *not* conclude that existing exposures were unsafe for children. Specifically, the study noted that “exposures occurring earlier in life can lead to greater or *lower* [emphasis added] risk of chronic toxic effects such as cancer than exposures occurring later in life.”<sup>6</sup> Just to be safe, the report recommended that EPA employ a 10-fold safety factor when setting pesticide regulations.

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<sup>2</sup> The National Research Council is an affiliate of the National Academy of Sciences.

<sup>3</sup> Board on Agriculture, National Research Council, *Regulation Pesticides in Food: The Delaney Paradox* (Washington, D.C.: National Academy Press, 1987).

<sup>4</sup> *Les v. Reilly*, 968 F.2d 985 (9th Cir. 1992), *cert. denied*, 113 U.S. 1361 (1993).

<sup>5</sup> See National Research Council, Institute for Medicine, *Emerging Infections: Microbial Threats to Health in the United States* (Washington, D.C.: National Academy Press, 1992), especially 163-67, <http://www.nap.edu/books/0309047412/html/index.html>.

<sup>6</sup> National Research Council, *Pesticides in the Diets of Infants and Children* (Washington, D.C.: National Academy Press, 1993), 359.



## Food Quality Protection Act Reforms

The FQPA attempts to address the conflicting standards within the first two pesticide laws. The FQPA changed the standard for setting tolerances. It applies a single standard for all pesticide uses that requires EPA to show “reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information.”<sup>7</sup> The FQPA mandated that EPA apply this standard to all pesticide registrations new and old. Accordingly, EPA is working to reregister the thousands of pesticides registered before the passage of the FQPA.

Supported unanimously by both houses of Congress and lauded by members of agricultural states and farm interests themselves, many believed that this bill would dramatically improve pesticide approvals. But rather than solving these problems, those pushing for more stringent regulation gained vital ground. Not surprisingly, environmental groups supported the FQPA because they believed that it would prove even more stringent and would lead to many pesticide bans in the future.<sup>8</sup>

Following the advice of *Pesticides in Infants and Children*, the reform included several new criteria that now apply very strong standards to both processed and raw foods. When setting standards under the new law, EPA must consider (1) the impacts of the pesticide on infants and children, applying a 10-fold safety factor unless information is available to demonstrate safety; (2) the “aggregate exposure” (the total exposure of individuals to various sources of the pesticide); and (3) whether the cumulative effects of a combination of pesticides could increase health risks.<sup>9</sup>

In addition, the law created the Endocrine Disrupter Screening Program, a program under which EPA must study pesticides that are potential endocrine disrupters.<sup>10</sup> The program is designed to simply add to the body of research on endocrine disrupters, but the agency has indicated that it will serve as a guide for regulatory decisions.<sup>11</sup>

The following briefs provide additional information on the Food Quality Protection Act and its implications. The first discusses some of the science and implementation issues in general. The other two address the impacts that federal pesticide policy can have on public health and well-being related to agricultural productivity and control of disease-carrying pests.

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<sup>7</sup> 21 U.S.C. § 346a(b)(2)(A)(ii).

<sup>8</sup> After passage of the Food Quality Protection Act, CEI's Jonathan Tolman noted in the *Wall Street Journal* that the 1996 law is more stringent than the old law and will lead to bans. A response by the Natural Resources Defense Council's Albert Meyerhoff concurs that the law is more stringent and will enable environmental groups to pursue bans. See Jonathan Tolman, “The Real Pests Aren't in the Food,” *Wall Street Journal*, 18 September 1996 and response by Albert H. Meyerhoff, “Law Makes Food Safer For Children,” Letters to the Editor, *Wall Street Journal*, 7 October 1996.

<sup>9</sup> 21 U.S.C. § 346a.

<sup>10</sup> For more information on Endocrine Disrupters, see “Endocrine Disrupters” in *The Environmental Source*.

<sup>11</sup> See *Draft Users Guide for the Endocrine Disrupter Priority Setting Database* (Washington, D.C.: U.S. EPA/Eastern Research Group, 22 May 2000). A contractor produced this publication for EPA. Page 1-1 states that the program will eventually help EPA “determine how best to regulate” chemicals deemed endocrine disrupters under the screening program.



## FOOD QUALITY PROTECTION ACT IMPLEMENTATION

In 1996, the Food Quality Protection Act (FQPA) amended the two federal laws governing pesticides — the Federal Insecticide Fungicide and Rodenticide Act (FIFRA) and the Federal Food Drugs and Cosmetics Act (FFDCA). Congress’s goal was to address disparities between the two laws governing pesticide regulation and to address concerns that federal pesticide regulations were overly stringent. At the time, the onerous pesticide standards were leading the Environmental Protection Agency (EPA) to cancel many vital pesticide uses.<sup>1</sup> The hope was that the new law would ensure a more scientifically sound process that keeps risks low while allowing continued use of many important products.

The FQPA, however, created new and unexpected problems and may in fact prove as onerous as the former law. While many have claimed that the problems emanate from poor EPA implementation, problems have resulted from new onerous standards written into the FQPA. Addressing these issues will likely require congressional action.

### Statutory Scheme

Before entering commerce, pesticides must gain registration for each specific use (e.g., use as indoor bug spray or on a specific crop) under FIFRA. To gain registration, registrants must provide data for each use that demonstrates product safety. Refusing approval will eliminate legal sales (with some emergency exceptions) of that product in the United States. In addition, the FFDCA requires that EPA set “tolerance levels” for pesticides used on foods (as opposed to other uses such as to control insects, rodents, or microbes). “Tolerance levels” specify how much pesticide exposure EPA will allow as residue on foods. For example, EPA sets a level that it believes, on average, will limit individuals’ exposure to pesticide residues found on apples assuming an individual eats a certain number of apples every day for 70 years.

The FQPA added some additional considerations. Under this law, the agency must revise tolerances and apply new standards to 9,700 products by year 2006. The law sets a general standard wherein EPA must show “reasonable certainty” that “aggregate exposure” of a pesticide will “do no harm.”<sup>2</sup> This requirement alone is quite stringent. The language and the legislative history indicate that this standard is equivalent to a risk not greater than one-in-a-million.<sup>3</sup> But that’s just the beginning. The standards must be even more stringent because under the FQPA, EPA must now also consider the following:

- **Aggregate exposure.** The “aggregate exposure” standard requires EPA to consider all exposure pathways of a single pesticide when setting tolerances. For example, they consider whether a person eating an apple containing specific pesticide residue also is exposed to the same pesticide from consumer products, such as bug sprays or household disinfectants. Hence the tolerance level for a pesticide would have to include all conceivable exposures — reducing the amount of allowable residue.
- **Cumulative exposure.** Under the “cumulative exposure” standard, EPA must consider the impact of groups of various pesticides. There are two aspects in particular. First, it must group

<sup>1</sup> For an overview of the history prior to this law, see “Pesticide Regulation Overview” in *The Environmental Source*.

<sup>2</sup> 21 U.S.C. § 346a(b)(2)(A)(ii).

<sup>3</sup> For an analysis, see Frank Cross, “Dangerous Compromises of the Food Quality Protection Act,” *Washington Law Quarterly* 75, no. 1155 (1997): 1163-66.



pesticides that supposedly cause cancer in a similar way — pesticides that have a so-called common mechanism for toxicity. Second, it must add all the exposures — inhalation, oral, dermal — of these pesticides and limit exposure to them as a group. This is a very difficult task because the science is not always clear on the mechanisms for causing cancer for all of these substances, nor do we know whether “cumulative effects” actually increase risk.<sup>4</sup>

- **Safety Factor for Children.** The new law requires EPA to consider risks to children and to apply a 10 fold-safety factor unless the EPA determines that a lower safety factor is safe for children. EPA notes that it will apply this factor in addition to the 100-fold safety factor it currently applies when setting standards. Hence when EPA applies the 10-fold safety factor for children, it will actually apply a 1,000-fold safety factor.

## Already Conservative Risk Estimates Become More Stringent

Even before Congress made the law more stringent with the FQPA, EPA used very conservative risk estimates. Given EPA risk metrologies, pesticide safety was already at margins thousands of times above what is safe. For example:

- Bureaucrats set standards to ensure safe exposures even if a farmer applied the full legal limit of all pesticides licensed for use on a given crop. Yet farmers only apply a fraction of the legal limits and don't apply all pesticides licensed for a particular crop. For example, University of Texas Professor Frank Cross notes that one study shows that farmers in California use about 25 percent of their legal limit for tomatoes, and each farmer uses no more than five out of 54 licensed pesticide products.<sup>5</sup>
- Frank Cross highlights a number of studies showing that EPA's conservative risk estimates overstate pesticide exposure by as much as 99,000 to 463,000 times actual exposure levels.<sup>6</sup>
- When researchers recalculated risks by considering actual pesticide exposure levels measured by the Department of Agriculture, they found that risks were “from 4,600 to 100,000 times lower than EPA estimates.”<sup>7</sup>

## Applying the New Standards

The combination “reasonable certainty” of “no harm” along with aggregate risk, cumulative effects, and safety factors for children poses a host of new challenges for EPA when conducting risk assessments for setting of tolerances.

To assess aggregate exposure, the agency must estimate how much exposure the public has to a pesticide from the various pathways — on and in foods, in the home, and in drinking water. Then the agency must limit enough of those exposures to ensure that total exposure does not exceed the level it deems safe. To facilitate understanding of this process, the agency developed a theoretical construct called the “risk cup.” The cup represents the total amount of exposure to the public of a pesticide that the EPA will allow. EPA then only registers the amount of pesticide uses that “fill” the cup. When filling the cup, EPA considers all potential exposure pathways. For example, regulators

<sup>4</sup> See text box “What about Cumulative Effects?” in brief “Endocrine Disrupters” in the *Environmental Source*.

<sup>5</sup> Frank Cross, “Dangerous Compromises,” 1174.

<sup>6</sup> *Ibid.*, 1177.

<sup>7</sup> Sandra O. Archibald and Carl S. Winter, “Pesticides in Our Food,” in *Chemicals in the Human Food Chain* (New York: Van Nostrand Reinhold, 1990), 39.



will estimate that certain agricultural use will “fill” 50 percent of the cup, drinking water exposure will occupy 1 percent, home consumer products will “fill” 29 percent, and they estimate that “other” exposures (which they simply assume but don’t specify) will fill the rest.

Various groups have complained that EPA has grossly exaggerated exposure levels. A key problem is that when the agency either lacks data on actual exposures or when levels are below the agency’s ability to detect them, regulators use “default” numbers that assume a certain amount of exposure. Hence the cup fills with potentially very faulty exposure assumptions, but it does not represent real risks to society. Once the cup is full, the EPA will not register any further uses of the pesticide.

When filling the cup, EPA can consider the impacts of numerous pesticides — placing several in one cup. For example, EPA has placed certain “organophosphate” products into one category and is working on a cumulative risk assessment for these products. Placing them all in one cup could demand dramatic reduction in registered uses. For example, home exterminators may not gain a registered use for many organophosphates, leaving them with fewer options to control cockroaches. Such changes can have serious public health impacts. In addition to carrying diseases, cockroaches are believed to contribute to asthma, a serious health ailment affecting children.<sup>8</sup>

## “Minor” Uses

Ironically, a major problem relates to what people call “minor uses” of pesticides. Minor uses include key public health uses to control pests, ranging from disease carrying-mosquitoes to rodents. In addition, they include uses on many fruits and vegetables. These uses are anything but minor, yet the law has made many of them an unprofitable enterprise for a couple of reasons. First is cost. The law requires that firms spend a considerable amount of resources — submitting data and paying very hefty registration fees — to obtain a registration. Such high costs basically make many markets unprofitable for companies, so they don’t bother to register those uses. The total cost of pesticide registration is estimated to be more than \$50 million, and the process can take from nine to ten years.<sup>9</sup> Second, the new FQPA standards are limiting the number of uses that EPA will register for various products.

These factors both serve as disincentives for the development of new minor use pesticides as well as the reregistration of old ones. In fact, to continue business in more profitable markets, firms are negotiating the elimination of minor uses when they reregister products. Syngenta, for example, came to an agreement with EPA in June 2000 to eliminate many of the minor uses — particularly home-related pest control — for the pesticide diazinon. Syngenta explained that the product was safe when used properly. Agreeing to phase out certain uses was purely a “business decision,” they noted, because the product was no longer profitable for those uses.<sup>10</sup>

The FQPA’s impact on minor uses promises to have serious public health impacts as these products are needed to meet critical needs: to ensure affordable fruits and vegetables and to protect against disease-carrying pests. As one USDA official noted: “Even though the FQPA provisions were intended by Congress to ensure that existing public health pesticide uses are not lost without eco-

<sup>8</sup> Floyd J. Malveaux and Sheryl A. Fletcher-Vincent, “Environmental Factors of Childhood Asthma in Urban Centers,” *Environmental Health Perspectives* 103, Suppl. 6 (September 1995): 59. See also “Pesticides and Public Health” in *The Environmental Source*.

<sup>9</sup> <http://www.ars.usda.gov/is/np/mba/jan97/epa.htm>.

<sup>10</sup> Glenn Hess, “EPA Phases Out Pesticide Diazinon; Syngenta Cites Declining Margins,” *Chemical Market Reporter*, 11 December 2000.



nomically effective alternatives, the provisions may not be adequate. If the FQPA results in cancellation of major agricultural uses of a pesticide that is also used in public health, it may become no longer profitable for the manufacturer to produce small quantities for mosquito control, thus ending production of the pesticide. Since adulticides used for mosquito control were registered decades ago, the data supporting their registrations may be insufficient to meet current requirements.”<sup>11</sup>

## Reform Efforts

Soon after EPA began implementing the FQPA, many of those who use minor-use pesticides — farmers and pest control officials — quickly realized that the law posed serious problems. Most expressed concerns that EPA was “implementing” the law incorrectly. However, there are many fundamental flaws with the law itself, and legislative reform is necessary.

In 1999, Rep. Pombo (R-Calif.) offered legislation to begin that process, offering the Regulatory Fairness and Openness Act, H.R. 1592, which has 235 co-sponsors. Sens. Strom Thurmond (R-S.C.) and Rick Santorum (R-Pa.) offered companion legislation in the Senate (S. 1464). The legislation proposed modest reforms to the FQPA to improve the science and data collection. For example, it would require the agency to provide notice when it used assumptions in risk assessments because data was lacking. However, a more serious overhaul of the law is necessary to address not only the serious flaws in the EPA risk-assessment process, but the overly onerous standards set by Congress in the FQPA.

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## Key Experts

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## Recommended Readings

Cross, Frank B. “The Consequences of Consensus: Dangerous Compromises of the Food Quality Protection Act.” *Washington University Law Quarterly* 75 (1997): 1155-1206.

Zambone, Jennifer. “Major Problems Without Minor Uses: Problems with the Food Quality Protection Act.” Washington, D.C.: Competitive Enterprise Institute, forthcoming.

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<sup>11</sup> Robert I. Rose, “Pesticides and Public Health: Integrated Methods of Mosquito Management,” *Emerging Infectious Diseases* 7, no. 1 (January-February 2001): 17-23, <http://www.cdc.gov/ncidod/eid/vol7no1/rose.htm>.



## PESTICIDES AND AGRICULTURE

Environmental activists claimed in 1989 that a growth regulator called, “Alar,” “poisoned” apples, and they conducted a campaign of hysteria to have the substance banned. It turned out that these “poisoned” apples were as much of a fairytale as the apple in *Snow White*. The Alar hysteria was completely debunked.<sup>1</sup> Nevertheless, Alar has never been used again on apples in the United States.<sup>2</sup> Moreover, the crusade against pesticide use on produce continues. Consumers Union, the group that produces *Consumer Reports*, produces a report on the content of pesticides in “Children’s Food” and another report on the pesticide residues in various foods.<sup>3</sup> These reports conclude that certain foods have unacceptably high pesticide residues and may well cause cancer.<sup>4</sup>

### Beyond Safe

In reality, pesticide levels rarely, if ever, approach unsafe levels. Even when activists cry wolf because residues exceed federal limits that does not mean the products are not safe. In fact, residues can be hundreds of times above regulatory levels and still be safe.

- According to one National Research Council (NRC) report, “the great majority of individual naturally occurring and synthetic chemicals in the diet appears to be present at levels below which any significant adverse biological effect is likely, and so low that they are unlikely to pose any appreciable cancer risk.”<sup>5</sup>
- The American Academy of Pediatrics notes: “The risks of pesticides in the diet are remote, long-term and theoretical, and there is no cause for immediate concern by parents. The risks to children over their lifetime of experiencing the major chronic diseases associated with the typical American diet far exceed the theoretical risks associated with pesticide residues.”<sup>6</sup>
- Various government agencies test produce for residues to ensure they meet safety standards. The U.S. Food and Drug Administration and the state of California conduct the most comprehensive and regular testing. Both find that residue levels are not only far lower than any EPA standard, they are most often undetectable (see details in the next section).
- Residue levels decline even further when we wash produce. One study shows that washing fruits and vegetables can reduce exposure by 97 percent for some pesticides.<sup>7</sup>

<sup>1</sup> Fredrick J. Stare and Elizabeth Whelan, *Fad-Free Nutrition* (Alameda, Calif.: Hunter House, 1998), 262. See also “Alar’s Health Risks revised,” *Food Insight*, May/June 1993, <http://ifinfo.health.org/insight/alar-hr.htm>.

<sup>2</sup> Stare and Whelan, *Fad-Free Nutrition*, 262.

<sup>3</sup> Edward Groth III, Charles Benbrook, and Karen Lutz, *Update: Pesticides in Children’s Foods* (Washington, D.C.: Consumers Union, 2000); Edward Groth III, Charles Benbrook, and Karen Lutz, *Do You Know What You’re Eating?* (Washington, D.C.: Consumers Union, February 1999), [http://www.consumersunion.org/food/do\\_you\\_know1.htm](http://www.consumersunion.org/food/do_you_know1.htm).

<sup>4</sup> Groth, Benbrook, and Lutz, *Update*, p. 24.

<sup>5</sup> Committee on Comparative Toxicity of Naturally Occurring Carcinogens, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Research Council, *Carcinogens and Anti-Carcinogens in the Human Diet* (Washington, D.C.: National Academy Press, 1996), 336-37.

<sup>6</sup> International Food Information Council Foundation, *IFIC Review: On Pesticides and Food Safety* (Washington, D.C.: IFIC, January 1995), <http://www.ific.org/relatives/17060.PDF>.

<sup>7</sup> Henry B. Chin, “The Effect of Processing on Residues in Foods,” in *Pesticide Residues and Food Safety: A Harvest of Viewpoints* (Washington, D.C.: American Chemical Society, 1991), 171.



## USDA Residue Survey: Most Residues are Undetectable

In its most recent survey, the USDA<sup>8</sup> has made the following discoveries:

- “The findings for 1999 demonstrate that pesticide residues levels in food are generally well below EPA tolerances, corroborating results presented in earlier reports.”
- There were no pesticide residue tolerance violations on 96.9 percent of all imported fruits and vegetable samples.
- Nearly 39 percent of domestic fruit samples had *no detectable pesticide residues*.
- Only 0.6 percent of domestic fruit samples exceeded standards.
- Nearly 70 percent of domestic vegetable samples had no detectable residues.
- Only 1.2 percent of domestic vegetable samples exceeded federal standards.
- FDA reports similar findings for grains and fish, and it finds even lower residue levels for dairy.

Of interest, FDA could find *no trace of pesticides in domestic infant formula or baby food* out of 38 samples.

## Eating Fruits and Veggies Trumps Pesticide Risks

The main cause of cancer is not pesticide residues, but rather the nutritional value of what you eat.<sup>9</sup>

- In fact, a seminal study by Sir Richard Doll and Richard Peto apportioned 2 percent of cancer cases to causation by *all* environmental pollutants found in the air, water, and food, while dietary factors account for 35 percent of all cancers.<sup>10</sup>
- Accordingly, the World Health Organization (WHO) advocates increased intake of fruits and vegetables to reduce the cancer incidence rate by 30 percent across the board.<sup>11</sup>
- The quarter of the population that consumes the least amount of fruits and vegetables has a cancer rate twice as high as the quarter of the population that consumes the most.<sup>12</sup>

<sup>8</sup> U.S. Food and Drug Administration Pesticide Program, *1999 Residue Reporting* (Washington, D.C.: USDA, 1999), <http://vm.cfsan.fda.gov/percent7Eacrobat/pes99rep.pdf>.

<sup>9</sup> Robert S. Lichter and Stanley Rothman, *Environmental Cancer – A Political Disease?* (New Haven: Yale University Press, 1999).

<sup>10</sup> Richard Doll and Richard Peto, “The Causes of Cancer: Quantitative Estimates of Avoidable Risks of Cancer in the United States Today,” *Journal of the National Cancer Institute* 66, no. 1192 (1981): 1235, 1251. Additionally, Doll and Peto estimate that tobacco use is responsible for 30 percent of the cancer cases in the United States. For more information on cancer risks, see “The True Causes of Cancer” in the *Environmental Source*.

<sup>11</sup> World Health Organization, Programme for Cancer Control, “Developing a Global Strategy for Cancer,” (Geneva: WHO, 2000).

<sup>12</sup> B. N. Ames, and L. S. Gold, “Environmental Pollution, Pesticides, and the Prevention of Cancer: Misconceptions,” *FASEB Journal* 11 (1997): 1041-52.



- Moreover, only 36 percent of Americans older than two consume the USDA-recommended amount of five servings of fruits and vegetables a day.<sup>13</sup> Hence, if we want to reduce cancer risks, we should focus on consuming more produce.

## Pesticides Promote Health Through Affordable Produce

To promote public health, policy should work to ensure that families — particularly lower income families — are able to afford fresh produce. Pesticides play a key role in increasing supply and thereby keeping these products affordable.

- Use of modern agricultural technology and chemicals has reduced the cost of food, improving nutrition, particularly for lower-income families. In fact, at the turn of the 20th century before the use of modern agricultural practices, Americans spent 20 percent of their income on food. Now, the average American family spends approximately 10 percent of its disposable income on food.<sup>14</sup>
- Affordability is a key concern for most Americans. Consumers that say they would pay for residue-free foods are only willing to pay a small increase. In one survey, 46 percent said they would pay more for such products, but only 15 percent of those respondents would pay more than 10 percent extra.<sup>15</sup>
- Without pesticides, the price of raising a crop could increase five to 200 times, and these costs would be transferred to consumers in the price of the goods, according to one estimate.<sup>16</sup>
- Scientist Philip Abelson warned that continued banning of pesticides and fungicides could lead to food scarcities.<sup>17</sup>

## “Carcinogens” in Perspective

Environmentalists have long claimed that we should avoid all pesticides because these chemicals give cancer to rodents and, hence, must be dangerous to us. But even if pesticides weren't used, every time we opened our mouths to eat we would shovel in these “rodent carcinogens.” We consume such natural rodent carcinogens without ill effects, and the same is true for low-level pesticide exposures.

- Bruce Ames and Lois Swirsky Gold of the University of California at Berkeley estimate that the amount of residual carcinogenic pesticides in food is 1,800 times *less than* the amount of carcinogens derived from 54 natural plants chemicals that are found in food.<sup>18</sup>

<sup>13</sup> “Achievements in Public Health, Safer and Healthier Foods — 1900-1999,” *Morbidity and Mortality Weekly Report* 48, no. 40 (15 October 1999): 905-13, <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4840a1.htm>.

<sup>14</sup> *IFIC Review: Pesticides and Food Safety* (Washington, D.C.: International Food Information Council Foundation, January 1995), <http://www.ific.org/relatives/17060.PDF>

<sup>15</sup> National Research Council, Commission on Life Sciences, *The Future Role of Pesticides in U.S. Agriculture* (Washington, DC: National Academy Press, 2000), 85, <http://www.nap.edu/openbook/0309065267/html/69.html>.

<sup>16</sup> Stare and Whelan, *Fad-Free Nutrition*, 92, citing J.G. Edwards, “Antipesticide Ads’ Lies Are Hazardous to Our Health,” *Priorities* 4, no. 4 (1995): 45-46.

<sup>17</sup> Philip Abelson, “Adequate Supplies of Fruits and Vegetables: Fungicide Ban Would Reduce Supply of Healthy Foods,” *Science* 266, no. 5189 (25 November 1994): 1303.

<sup>18</sup> Bruce Ames and Lois Swirsky Gold, “Chemical Carcinogenesis: Too Many Rodent Carcinogens,” *Proceedings of the National Academy of Science* 87, no. 19 (October 1990): 7772-7776.



- Cooking food produces 2,000 milligrams of burnt material per person per day. Burnt material contains many rodent carcinogens and mutagens.
- On the other hand, a person consumes only 0.09 milligrams per day of the residues of 200 synthetic chemicals that the FDA measures.<sup>19</sup>
- As Ames and Gold point out, 99.99 percent of the chemicals that we eat are natural. Plants produce chemicals to defend themselves against insects, fungi, and other predators. Ames and Gold estimate that “on average Americans ingest roughly 5,000 to 10,000 different natural pesticides and their breakdown products.”<sup>20</sup> Ames and Gold argue that these natural pesticides aren’t necessarily dangerous, but then neither are pesticide residues on produce.

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### Recommended Readings

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<sup>19</sup> Ames and Gold, “Environmental Pollution, Pesticides, and the Prevention of Cancer,” 5.

<sup>20</sup> *Ibid.*, 4.



## PESTICIDES AND PUBLIC HEALTH

In recent years, public health authorities have expressed serious concerns regarding what they call the trend of “emerging infections.” They fear that many diseases transmitted by various pests — collectively called “vectors” — are on the rise. Even diseases eradicated from the United States are reemerging as increased travel and trade create more opportunities for diseases to cross international boundaries. Even diseases that have never been seen in the United States have emerged, such as the appearance of the West Nile virus in 1999.

In the past, we have been able to keep these diseases at bay with the use of pesticides and other measures. But government regulations limit access to much-needed pesticides. In addition, environmental activists have waged public attack campaigns on pesticide use, scaring the public about the risks of pesticides and failing to inform them of the far more serious risks associated with vectors. As a result, individuals and public health agencies have fewer options to control serious and expanding risks associated with vector-borne diseases.

### Background

Many emerging diseases are transmitted to humans by vectors. Vectors include any organism that carries pathogens that can then be transferred to humans. Most commonly we think of mosquitoes and other insects, but rodents and other animals can transmit disease as well.

To control vector-borne diseases, we can control the vector population, reduce human contact with vectors, and/or treat the disease. Environmentalists often claim that we don’t need vector control because it makes more sense to develop medical solutions such as vaccines, eliminating the need for pesticides. In reality, the control method depends upon the nature of the organism causing the disease and the methods available for control. In the case of bacterial diseases such as Lyme disease, antibiotics are an effective medical treatment. However, the infection is often discovered too late, and, hence, treatment does not always eliminate the disease. The Food and Drug Administration (FDA) approved a vaccine for Lyme disease, but it is not widely used nor is it recommended for everyone.<sup>1</sup>

Vaccines can be developed for some viral diseases, but not for all. To eliminate the protozoa that cause malaria, both drugs and vaccinations may help. Unfortunately, it may take decades to find a vaccine for malaria. In addition, anti-malarial drugs are only safe for use for a limited period of time and are unaffordable to many people who live in the developing world. Drugs are also toxic and present their own risks to human health.

In the case of mosquito-borne disease, vector control is a particularly effective method of curbing the spread of the disease. Unfortunately, in the past few years, even with the appearance of the West Nile virus in New York, vector control, particularly the application of pesticides, has come under attack from environmentalists.<sup>2</sup> Vector control takes place at two levels: the private and the public. Private individuals can apply insect repellent to themselves, spray their houses, set up physi-

<sup>1</sup> The Lyme disease vaccine is only approved for people ages 15 to 70, leaving children and the elderly at risk. This is of particular concern since the highest incidences occur among two groups, one of which is children ages 2 to 15 (the other is adults 30-55). The vaccine is also expensive and may be cost-prohibitive. See Kathleen A. Orloski et al., “Surveillance for Lyme Disease — United States, 1992-1998,” *Morbidity and Mortality Weekly Report* 49, no. SS03 (28 April 2000): 1-11, <http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/ss4903a1.htm>; and Neal A. Halsey et al., “Prevention of Lyme Disease,” *Pediatrics* 105, (January 2000): 142-147.

<sup>2</sup> Timothy Williams, “Health Chief: City Not Spraying Until EPA Gives Okay,” *Associated Press*, 14 April 2000, <http://more.abcnews.go.com/sections/living/DailyNews/westnile000414.html>.



cal barriers to mosquito entry (screens, etc.) and reduce mosquito breeding areas around their homes.<sup>3</sup> At the public level, many states have mosquito control boards and districts that work at the local level to reduce mosquito populations through a variety of methods that include pesticides.

Source reduction (reducing breeding grounds for vectors) and larviciding (the application of pesticides to water to kill larvae) play long-term roles in mosquito reduction. Mosquito control boards view these techniques as essential. Yet in some states, even the use of larvicides has been greatly reduced because of environmentalist demands.<sup>4</sup> During an outbreak of a disease, the only effective measure for reducing the mosquito population, and thus the mosquitoes already infected with the pathogen, is the application of adulticides, pesticides that kill adult mosquitoes.<sup>5</sup>

## Lessons From History

We should learn from history that vector-borne risks are not isolated to tropical areas and that they can reemerge in the United States. Consider a few historical anecdotes.

- In the summer of 1793, an epidemic of yellow fever, a disease carried by mosquitoes, struck Philadelphia. Yellow fever killed 5,500 people that summer and plagued the city for seven years.<sup>6</sup>
- Malaria was endemic in most of the United States and remained so in many states until right after the end of World War II.<sup>7</sup> Dengue fever plagued the Gulf Coast states. Tick-borne diseases affected the population as well.<sup>8</sup>
- The research of Paul Reiter, chief of the entomology section of the Dengue Branch of the Centers for Disease Control and Prevention (CDC), demonstrates that, contrary to popular wisdom, most mosquito-borne diseases are not tropical. For example, he notes that until modern times, malaria was endemic in nearly all states east of the Rockies as well as in Canada, Norway, Sweden, and northern Russia.<sup>9</sup>

## Adverse Impacts of Vector-borne Disease Today

Vector-borne diseases continue to plague the world. The developing world suffers the greatest toll because many nations cannot afford pesticides and other control methods.

- According to the World Health Organization (WHO), malaria alone infects 300 million to 400 million people a year and kills more than 1 million.<sup>10</sup> Most of its victims are children.

<sup>3</sup> Tom Floore, "Mosquito Information" (New Brunswick, N.J.: American Mosquito Control Association, 2000), <http://www.mosquito.org/mosquito.html>.

<sup>4</sup> Maryland Department of Agriculture, "Mosquito Control in Maryland" (Annapolis, Md.: MDA, January 2000), <http://www.mda.state.md.us/mosquito/progdesc.html>.

<sup>5</sup> Joshua Lederberg, Robert E. Shope, and Stanley C. Oaks, Jr. ed., *Emerging Infections: Microbial Threats to Health in the United States* (Washington, D.C.: National Academy Press, 1992), 166.

<sup>6</sup> Andrew A. Spielman and Michael D'Antonio, *Mosquito: A Natural History of Our Most Persistent and Deadly Foe* (New York: Hyperion, 2001), 61.

<sup>7</sup> In fact, one of the fundamental reasons for the establishment of the Centers for Disease Control and Prevention (CDC) in 1945 was the eradication of endemic malaria in the United States. Happily, that goal was achieved.

<sup>8</sup> Researchers believe that although Lyme disease was only recently identified (1975) the disease has been around for about 100 years. National Institutes of Health, Department of Health and Human Services, *Lyme Disease: The Facts, the Challenge*, NIH Pub. 98-3193 (Washington, D.C.: NIH, April 1998), <http://www.niaid.nih.gov/publications/lyme>.

<sup>9</sup> Paul Reiter, "Global Warming and Vector-Borne Disease: Is Warmer Sicker?" Cooler Heads Briefing (Washington, D.C.: Competitive Enterprise Institute, 28 July 1998), <http://www.cei.org/CHBReader.asp?ID=539>.

<sup>10</sup> World Health Organization, "Malaria: Fact Sheet" (Geneva: WHO, 1998), <http://www.who.int/inf-fs/en/fact094.html>.



- In the United States, Lyme disease is the number one vector-borne disease. According to the CDC, "During 1992-1998, a total of 88,967 cases of Lyme disease were reported by 49 states, the District of Columbia, and Guam (2 cases), for a crude mean annual incidence of 5.1 reported cases/100,000 persons/year. The number of reported cases increased 70%, from 9,909 in 1992 to 16,802 in 1998. Ninety-two percent of cases were reported by 10 states. Over the 7-year period, crude annual incidence per 100,000 persons increased from 4.0 to 6.7."<sup>11</sup> The CDC notes that reported Lyme disease cases have increased probably because of both better surveillance and true increases of incidence. Still, the CDC believes overall incidence is under-reported, noting that more intensive studies in both Maryland and Connecticut find that there are 7 to 17 cases of unreported case for each reported case.
- In 1999, the West Nile virus appeared in the United States for the first time in history, killing seven people in 1999 and one in 2000.<sup>12</sup> The CDC estimated that potentially thousands of individuals became ill from the virus, but few cases were reported.
- Vectors also promote serious problems related to allergies and asthma. According to one study: "Allergens associated with dust mites (DM) and cockroaches (CR) are probably important in both onset and worsening of asthma symptoms for children who are chronically exposed to these agents. Young children spend a great deal of time on or near the floor where these allergens are concentrated in dust. Of children (2-10 years of age) living in metropolitan Washington, DC, 60% were found to be sensitive to CR and 72% were allergic to DM."<sup>13</sup>
- Other mosquito-borne diseases currently endemic in the United States are Western equine encephalitis, Eastern equine encephalitis, St. Louis encephalitis, and LaCrosse virus. As noted, malaria, yellow fever, and dengue have been endemic in the past. Additionally, mosquitoes transmit canine heartworms.<sup>14</sup>

## Role of Pesticides in Promoting Health Throughout History

Pesticides have proven critical in protecting public health:

- In 1966, St. Louis encephalitis (SLE), a mosquito-transmitted form of viral encephalitis, broke out in Dallas. In the space of a few weeks, mosquitoes infected up to 690 people. Dallas then aerielly sprayed 475,000 acres with the pesticide malathion. The mosquito populations and the number of new SLE cases dropped dramatically. As the NAS committee stated: "The economic and public health consequences would certainly have been greater had pesticides not been available."<sup>15</sup>
- In 1914, when few pesticides were available, there were 600,000 cases of malaria in the United States. By 1995, after pesticides had long been a staple of public health control, the number of annual cases had shrunk to 1,167.<sup>16</sup>

<sup>11</sup> Kathleen A. Orloski et al., "Surveillance for Lyme Disease — United States, 1992-1998," *Morbidity and Mortality Weekly Report* 49, no. SS03 (28 April 2000): 1-11, <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss4903a1.htm>.

<sup>12</sup> Centers for Disease Control and Prevention, Division of Vector-Borne Infectious Diseases, West Nile Virus web page, *Questions and Answers* (Washington, D.C.: CDC, accessed 9 July 2001), <http://www.cdc.gov/ncidod/dvbid/westnile/q&a.htm>.

<sup>13</sup> Floyd J. Malveaux and Sheryl A. Fletcher-Vincent, "Environmental Factors of Childhood Asthma in Urban Centers," *Environmental Health Perspectives* 103, Suppl. 6 (September 1995): 59.

<sup>14</sup> P. G. Koehler, "Mosquitoes and Other Biting Flies" (Gainesville, Fla.: Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, revised 1999), <http://edis.ifas.ufl.edu/lg081>.

<sup>15</sup> Lederberg et al, *Emerging Infections*, 166.

<sup>16</sup> Holly Ann Williams et al., "Malaria Surveillance — United States, 1995," *Morbidity and Mortality Weekly Report* 48, no. SS-1 (26 February 1999): 1-21, <http://www.cdc.gov/mmwr/preview/mmwrhtml/00056518.htm>.



- It is possible that malaria could return to the United States, but high standards of living and effective vector control keep it in check. For example, two Boy Scouts contracted malaria on Long Island in 1999. Vector control found the nesting ground of these pests and destroyed it by applying pesticides.<sup>17</sup>
- In 1995, dengue spread to the Mexico-Texas border. On the Mexican side of the border where pesticides were largely not available, approximately 4,700 individuals contracted dengue. On the Texas side, where public health officials applied pesticides (and where more people have screened homes), there were only 29 cases. Only seven of the Texas cases occurred among individuals who had no history of travel outside the state.<sup>18</sup>

## The Freedom to Develop and Use Pesticides is Key to Disease Control

Numerous experts in the field of vector control fear that government regulation jeopardizes public health by reducing the development of, and access to, much needed pesticides. Consider some observations from the scientific community and vector control experts:

- In 1992, a National Academy of Sciences (NAS) report warned: “A growing problem in controlling vector-borne diseases is the diminishing supply of effective pesticides.” Because all pesticides must go through an onerous registration process at the federal Environmental Protection Agency (EPA), “some manufacturers have chosen not to reregister their products because of the expenses of gathering safety data. Partly as a result, many effective pesticides over the past 40 years to control agricultural pests and vectors of human disease are no longer available.”<sup>19</sup>
- The NAS report continued, “The potential for vector-borne disease to emerge in the United States still exists ... any reduction in vector control efforts is likely to be followed by a resurgence of the vector population. For a disease agent that is known or suspected to be transmitted by an arthropod vector, efforts to control the vector can be crucial in containing or halting an outbreak.”<sup>20</sup>
- “The primary goal at the onset of mosquito-borne disease epidemics is to eliminate the infective mosquitoes as quickly as possible. Transmission can only be stopped by the effective application of a pesticide that kills adult mosquitoes.”<sup>21</sup>
- “We as a nation, recognize the need to reduce both vector borne diseases and the public health and economic impacts of pest arthropods. Without organophosphates, these objectives cannot be assured.”<sup>22</sup>

<sup>17</sup> Suffolk County Vector Control, “Why We Control Mosquitoes” (Yaphank, N.Y.: Suffolk County Vector Control, 14 August 2001), <http://www.co.suffolk.ny.us/vector/whywecontrol.html>.

<sup>18</sup> J Rawlings, et al. “Dengue Fever at the U.S.-Mexico Border, 1995-1996,” *Morbidity and Mortality Weekly Report* 45, no. 39 (4 October 1996): 841-44, <http://www.cdc.gov/mmwr/preview/mmwrhtml/00043962.htm>.

<sup>19</sup> Lederberg et al., *Emerging Infections*, 160.

<sup>20</sup> *Ibid.*, 160, 161.

<sup>21</sup> *Ibid.*, 166.

<sup>22</sup> Dr. David Dame, *American Mosquito Control Association Newsletter* 25, no. 6 (November/December 1999): 3, <http://www.mosquito.org/newsletter/novdec99.pdf>.



## Issues of Safety: Pesticides Versus Alternatives

Environmental activists suggest that pesticide risks are too high and that there are “more natural” means to control pests. However, risks of disease are far greater than risks of pesticides, and “alternative” controls are not nearly as effective.

- Despite activist complaints, they provide no scientifically validated information documenting deaths or illnesses related to proper application of pesticides. In contrast, there are millions of documented deaths and illnesses related to vector-borne diseases (see the preceding section for the statistics).
- Despite what activists tell you about the risks associated with pesticides, the EPA has studied these chemicals extensively and determined them to be safe even under the most severe exposure assumptions. Of particular interest in recent times are the chemicals used to control West Nile — malathion, resmethrin, and sumithrin.<sup>23</sup>
- Environmentalists claim that pesticides are so toxic that they lead to wide-scale killing of wildlife, particularly birds. Accordingly, they think that pesticides should be eliminated. While we should continue to study and find ways to reduce impacts of pesticides on wildlife, we should not neglect the fact that wildlife is also at considerable risk from the vector-borne disease that the pesticides control. For example, the CDC reports that of all the birds collected for study in the Northeast in year 2000, 4,139 had died from the West Nile virus alone.<sup>24</sup>
- It appears that wildlife may be at greater risk from the vector-borne diseases than from pesticides. Steve Milloy points out that in a New York state study of 3,216 dead birds, natural diseases and toxins caused the majority of the birds' deaths (1,263 from West Nile virus and 1,100 from botulism). Meanwhile, the report identified 219 pesticide-related bird deaths, 30 of those from intentional poisonings of pest birds and 100 from illegal use pesticides intended to kill birds. Twenty-seven bird deaths resulted from lawn care products.<sup>25</sup>
- Electronic repellers, citrosa plants, bug zappers, bats and purple martins are not effective in controlling or repelling mosquitoes. Wayne J. Crans, research professor of entomology at Rutgers University, notes that these items have limited value in actually controlling the targeted pests, and many simply take advantage of consumers.<sup>26</sup>

— Angela Logomasini and Jennifer Zambone

<sup>23</sup> Environmental Protection Agency, *Malathion Revised Risk Assessment* (Washington, D.C.: U.S. EPA, 9 November 2000), <http://www.epa.gov/pesticides/op/malathion.htm>. For information on resmethrin and sumithrin see U.S. Environmental Protection Agency, “For Your Information: Synthetic Pyrethroids for Mosquito Control,” (Washington, D.C.: USEPA, May 2000), <http://www.epa.gov/pesticides/citizens/synpyfs.pdf>.

<sup>24</sup> A. Novello et al., “Update: West Nile Virus Activity — Eastern United States, 2000,” *Morbidity and Mortality Weekly Report* 49, no. 46 (24 November 2000): 1044-1047, <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4946a2.htm>.

<sup>25</sup> Steve Milloy, “Audubon’s Fly-by-night Pesticide Campaign,” *FOX News Online* (8 July 2001), <http://www.foxnews.com/story/0,2933,28870,00.html>.

<sup>26</sup> Wayne Crans, “Products and Promotions that Have Limited Value for Mosquito Control” (New Brunswick, N.J.: Department of Entomology, Rutgers University, accessed online July 2001), <http://www-rci.rutgers.edu/~insects/proprom.htm>.



### Key Experts

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### Recommended Readings

For information on malaria, see [www.fightingmalaria.org](http://www.fightingmalaria.org).

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