There are about 630 different "active ingredients" in pesticides worldwide. In real-world use, these main ingredients are combined with other chemicals (called "inert ingredients") to make several thousand toxic formulations but the basic active ingredients number about 630.

The purpose of a pesticide is to kill living things by poisoning them, so it is no surprise that these 630 chemicals are all toxic. In many cases -- especially the newer pesticides -- they are very toxic. For example, the most commonly-used insecticide is called chlorpyrifos (trade name: Durshan). Durshan attacks the central nervous system so effectively that one-fifth of an ounce is sufficient to kill an adult human.

To be used legally on fruits and vegetables, pesticides must be registered with U.S. Environmental Protection Agency (EPA). Each use of a pesticide on each crop requires a unique registration. In other words, the pesticide named Captan must be registered for use on onions, and it must be registered a second time if it is to be used on peaches.

Under common law, putting poisons into your neighbor's well, or onto your neighbor's food, is considered very anti-social and is strictly illegal. However, after the manufacturer of a pesticide applies for a pesticide registration, for a fee the government (specifically, Congress) sells them the right to put poisonous residues on our food.

When a pesticide is registered for a use on fruits or vegetables, a "tolerance level" for that pesticide on that crop is set by EPA. The "tolerance level" is the amount of toxic residue that can legally remain on the crop when the consumer eats it. According to the National Academy of Sciences, "Tolerance levels are not based primarily on health considerations.... Their primary purpose is to ensure compliance with good agricultural practice." In other words, the first concern in setting a tolerance is to allow enough of the pesticide to be used to kill the target pests. Health is secondary.

After a tolerance level is set, EPA later (often years later) may set a "reference dose" (called an RfD) that the agency considers safe for consumers to eat. As a result of this peculiar process, EPA has set many "tolerances" at levels far higher than the reference doses that EPA has declared safe. In other words, EPA has set legal pesticide residue limits for many poisons on many fruits and vegetables that are higher -- in some cases much higher -- than the level the EPA considers safe.

For example, EPA's tolerance for Dimethoate is 64 times as high as the "safe dose" (the RfD) for Dimethoate. EPA's tolerance for methyl parathion is 41 times as high as the RfD for methyl parathion. EPA's tolerance for endosulfan is 24 times as high as the "safe" (RfD) dose for endosulfan.[1] Furthermore, RfDs are set to protect adults, not children. The EPA has never set an RfD or a "tolerance level" for that pesticide on that crop is set by EPA. The "tolerance level" is the amount of toxic residue that can legally remain on the crop when the consumer eats it. According to the National Academy of Sciences, "Tolerance levels are not based primarily on health considerations.... Their primary purpose is to ensure compliance with good agricultural practice." In other words, the first concern in setting a tolerance is to allow enough of the pesticide to be used to kill the target pests. Health is secondary.

When the National Academy of Sciences studied pesticides and children's health in 1993, the Academy concluded, "A fundamental maxim of pediatric medicine is that children are not 'little adults'.... In the absence of data to the contrary, there should be a presumption of greater toxicity to infants and children."[2] The Academy specifically recommended that tolerances should be reduced 10-fold to protect children: "The committee recommends that an uncertainty factor up to the ten-fold factor... should be considered when there is evidence of postnatal developmental toxicity and when data from toxicity testing relative to children are incomplete."[2]

Data from toxicity testing relative to children are incomplete in the case of every pesticide currently in use. Researchers who reviewed the pesticide literature in 1995, specifically looking for information about children, wrote in December, "Thus major gaps exist in our knowledge of the health effects of chronic pesticide exposures to children. No published studies have examined the neurotoxic effects of low-level pesticide exposure to children."[3] Thus if the National Academy's recommendations were to be carried out, all pesticide tolerances would have to be reduced by a factor of 10 in an effort to protect children. However, since the release of the Academy's report in 1993, no tolerances -- not one -- for pesticides in food have been adjusted in any way to protect infants and children.

It seems safe to say, therefore, that no legal levels of pesticides can be considered safe for children, and many legal levels of pesticides are clearly not safe even for adults.

Furthermore, the pesticide control system in this country was established to maintain pesticide residues on food not at "safe" levels but at or below "tolerance levels." EPA sets tolerance levels, and then the U.S. Food and Drug Administration (FDA) tests samples of food to see if the tolerance levels have been illegally exceeded, or if illegal unregistered pesticides or banned pesticides can be found on fruits and vegetables. How well does this system work?

Researchers with the Environmental Working Group (EWG) in Washington, D.C. looked carefully at the FDA's pesticide residue control system in 1995 and published an excellent report.[4] Here is what they found:

The FDA takes samples of food and tests them in FDA laboratories. The results of those tests are then entered into a computer. However, the legal "tolerances" for those pesticides on those crops have never been entered into a computer, so the computerized test data must be compared to existing tolerances by technicians using pencil and paper. If those technicians find that a tolerance has been exceeded, or an unregistered pesticide has been detected, they are supposed to report it to FDA's enforcement division. Unfortunately, the EWG's analysis revealed that FDA chemists only report 37 percent of the violations that they observe in their labs.[4] Because of careless pencil-and-paper techniques--or perhaps because they simply ignore illegal pesticides--FDA chemists fail to report 43 percent of all the violations they find.

FDA data reveal that some foods are extraordinarily contaminated with illegal pesticides. For example, 24.7 percent of all peaches contain illegal pesticides and 15.7 percent of all pears contain illegal pesticides. Some 12.5 percent of apple juice contains illegal pesticides, 12.4 percent of blackberries, and 11.7 percent of green onions.[5] THESE ILLEGAL PESTICIDES OCCUR IN ADDITION TO THE LEGAL PESTICIDE RESIDUES THAT ROUTINELY CONTAMINATE OUR FOOD SUPPLY.

All together, FDA claims that only 3.1 percent of fruits and vegetables in American grocery stores contain illegal pesticides. However, the FORBIDDEN FRUIT report reveals, based on analysis of FDA's own monitoring data, that 5.6 percent -- or about one pound out of every 18 pounds of food on grocer's shelves--contains illegal pesticides. A person eating 5 fruits and vegetables a day will be eating illegal pesticides 75 times a year.

Unfortunately, even this is probably a gross underestimate of the size of the problem. In 90 percent of cases, FDA laboratories use pesticide-measuring techniques that can only detect half of the pesticides currently in use. Monitoring techniques that can detect the remaining half are very expensive and are not routinely used. For this and other reasons described in the FORBIDDEN FRUIT report, we estimate that about 13 percent of U.S. fruits and vegetables may contain illegal pesticide residues[6] IN ADDITION TO WHATEVER LEGAL PESTICIDE RESIDUES THEY MAY contain. If the 13 percent figure is correct, then someone eating five fruits and vegetables a day would eat illegal pesticides 174 times a year.

What happens to the 3.1 percent of fruits and vegetables that FDA says contain illegal toxic pesticide residues? Government studies
show that 100% of the domestic portion is sold to consumers, and 60% of the foreign portion is sold to consumers.[7] And this describes only the 3.1% that FDA says it has identified as illegally-contaminated; 100% of the illegally-contaminated food that FDA fails to identify is, of course, sold to consumers. The system does not protect consumers even when it identifies illegal pesticides.

It seems clear that the pesticide monitoring and enforcement system in this country is broken. In truth, it has been broken for many years. This is certainly not news to Congress, which (with the advice and consent of the food corporations) created the system to begin with. The General Accounting Office (which provides audits and evaluations at the request of Congress) has published 22 reports since 1980 describing the many ways in which the pesticide control system fails to protect consumers.[8] Congress has consistently refused to make any changes. We can only conclude that Congress prefers the system the way it is. Or, more precisely, the food industry prefers the system the way it is and Congress is not able to break free from the steely grip of moneyed corporations.

What is the solution? Given the power of corporations over Congress, only a grassroots from the American people can change the system. Therefore anti-pesticide campaigners must devise a solution that will actually protect public health; a solution that everyone can understand; a solution that can appeal to Americans as something worth fighting for and worth sacrificing for.

We believe there is only one such solution: stop trying to "manage" persistent toxic pesticides and ban them all. To join such a campaign, phone Food & Water, Inc., toll-free: 1-800-EAT SAFE.

--Peter Montague


[4] Susan Elderkin, Richard Wiles, and Christopher Campbell, FORBIDDEN FRUIT: ILLEGAL PESTICIDES IN THE U.S. FOOD SUPPLY (Washington, D.C.: Environmental Working Group [1718 Connecticut Ave., N.W., Washington, D.C. 20009; phone: (202) 667-6982; E-mail: ewg@igc.apc.org]), February, 1995. See pg. 15. This report examined 14,923 computerized records from the FDA’s routine pesticide monitoring program for fiscal years 1992 and 1993. FDA chemists reported finding 470 illegal uses of pesticides among the 14,923 records; however, the authors of the report found 826 violations in the same data. The authors conclude that FDA laboratory personnel measured, but failed to report to FDA enforcement personnel, 826-470=356 illegal uses of pesticides.


[6] To keep the arithmetic simple, let's assume that in a particular period of time, there are in actuality 1200 violations (illegal pesticides used on fruit and vegetables) that the FDA is seeking to discover.

We know that the FDA uses multi-residue detection methods (MRMs) in 90% of its work, so it would use MRMs on 0.9*1200=1080 of these cases. We also know that MRMs miss half of what is being looked for [FORBIDDEN FRUIT, pg. 11], so 540 events out of the 1080 will be discovered and another 540 will be missed. Half of these 540 will be searched for by East Coast FDA labs and half by West Coast FDA labs. Eastern FDA labs only do about half of the full six screens required in an MRM analysis [FORBIDDEN FRUIT, pg. 12], so the Eastern lab will search for 270 of the 540 but will miss half, or 135, because of failure to use all six screens. Therefore of the 540 being found by MRM, the West Coast labs will find 270 but the East Coast labs will find only 135. Thus of the original 1080 violations being sought by MRM analysis, 540+135=675 are missed, and the remainder, 405, are discovered.

We also know that 10% of the original 1200 are sought by single-residue methods (SRMs) [FORBIDDEN FRUIT, pg. 11] so 120 events are being sought by SRMs. These methods cost the same as the MRMs but each SRM only detects one or 2 pesticides, so full searches using SRMs are very expensive and are used sparingly. Therefore, let us assume, generously, that 75% of these 120 are found, or 90 of 120 are found, meaning 30 of 120 are not found. Thus the total illegal events found = 405+90, or 495 events.

We know from EWG’s analysis that FDA enforcement learns about only 470 out of every 826 illegal events that FDA labs find, so we must multiply the 495 events by this fraction to find the actual number of events that will be reported to FDA enforcement officials: 495*470/826=282 events. Therefore, we can say that FDA is likely to actually catch 282 out of 1200 illegal pesticide events, or 24% of the illegal events that are waiting to be discovered.

In the real world, FDA reports that 3.1% of the food it tests contains illegal residues [FORBIDDEN FRUIT, pg. 15]. If this 3.1% represents 24% of the actual illegal use of pesticides on U.S. fruits and vegetables, then the proportion of fruits and vegetables that FDA should be reporting with illegal pesticide residues is 3.1/0.24=13 percent.


[8] All 22 GAO reports are listed in FORBIDDEN FRUIT'S bibliography.

Descriptor terms: pesticides; fda; children; tolerance levels; reference dose; five a day; epa; environmental working group; food & water; dimethoate; methyl parathion; endosulfan; national academy of sciences; chlorpyrifos; dursban; regulation; enforcement;