http://ipm.osu.edu/fruit/index.html

THE OHIO STATE UNIVERSITY Newsletter Extension

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Calendar

March 19: Raspberry School, Rosby's Berry Farm & Greenhouse, 50 E. Schaaf Rd., Brooklyn Hts., OH, 5:30 P.M. Millcreek Row Mulcher demonstration, herbicide application update with Dr. Richard Funt. Receive « hour of ODA pesticide credits. For more information and to RSVP call Charles Behnke at (440) 322-0127. $5.00 registration per family payable at the door.

March 23-24: Kentucky Farmers Direct Marketing Conference, Capital Plaza Holiday Inn, 405 Wilkinson Blvd., Frankfort. The conference will feature workshops on beginning and expanding farmers' markets, value added products, agritourism, business plans, regulations, direct marketing, livestock, and aquaculture. Contact Alason Duncan (606) 233-7845.

Rebuttal: Pesticide Residues in Foods

Source: Dr. Carl K. Winter, Director, FoodSafe Program, and Associate Extension Toxicologist, Department of Food Science and Technology, University of California.

Consumer Reports issued its report "Do You Know What You're Eating? An Analysis of U.S. Government Data on Pesticide Residues in Foods" on Friday, February 19th at a news conference in New York and immediately received national news coverage of its findings (the top story on CNN Headline News and the second story featured on CBS Evening News). You can access the report's summary directly from the internet at.

As for methodology, the authors analyzed results from approximately 27,000 food samples analyzed for pesticide residues that were reported in the USDA's Pesticide Data Program (PDP) from 1994- 1997. These data were used to compile a curious "toxicity index (TI)" for individual food items that could be further subdivided by the origin of the food. The calculation of the TI involved combining pesticide residue data with acute LD50 findings, the chronic reference dose, the cancer potency factor, and, occasionally, endocrine disruption potential. This all looks very impressive and omprehensive on paper, but really has no toxicological validation. At any rate, the TI values for various food items can be compared to yield what the authors term the "relative toxicity loading" for each food.

The major findings of the report were that a few foods had what the authors considered to be "high" TI values, such as domestic and imported fresh peaches, domestic frozen and fresh winter squash, domestic and imported apples, grapes, spinach and pears, and domestic green beans. A few food items were singled out as having low or "clean" TIs, including frozen or canned corn, milk, domestic orange juice, domestic broccoli, bananas, and canned peaches.

While the authors acknowledged that such an approach is not a direct risk assessment, per se, they did urge consumers to consider the relative rankings when making their purchasing decisions. They also concluded that

consumers should continue to eat ample quantities of fruits and vegetables, that consumers wash or peel fresh fruits and vegetables, and that consumers should try to purchase organically grown peaches, apples, grapes, pears, green beans, winter squash, and spinach if such products are available.

Further into the report, however, the authors did engage in some elementary risk assessment practices, and the results of such risk assessments served to drive many of the headlines generated in the news. The authors provided many examples of specific commodity/pesticide combinations that represented potentially harmful exposures. As an example, it was reported that if a 20kg child consumed a single 100- gram peach containing the average methyl parathion residue from U.S. peaches (0.055 ppm), the child's daily exposure would be almost 14 times higher than the chronic reference dose of 0.00002 mg/kg/day established by the U.S. EPA for methyl parathion. It was further reported that even the lowest methyl parathion residue found on peaches in 1996 (0.004 ppm) would deliver the reference dose level of exposure and that, since methyl parathion was found on 41 percent of U.S. peaches analyzed in the PDP program in 1996, it was concluded that roughly two of every five children who eat a U.S. peach will exceed the reference dose for methyl parathion by eating that single food item. Not surprisingly, peaches had, by far, the highest TI calculated in the report, and 90 percent of this TI was represented by methyl parathion residues.

Methodological Flaw

Pretty scary, eh? Let's break this issue down a bit more. A major methodological flaw here is to consider individual acute exposures (such as the exposure from eating a particular residue of a pesticide on an individual food item) and then relate this exposure to the chronic reference dose, which corresponds to the lifetime average daily level of exposure that is considered to represent a reasonable certainty of no harm. Over the course of a lifetime, in which a few daily exposures exceeding the reference dose would easily be balanced out by many days in which there was little or no exposure to the pesticide (and also realizing that typical people do not maintain the body weight or food consumption patterns of a five- year-old throughout their lifetimes), even such highlighted exposures would NOT result in an average daily dietary exposure approaching the reference dose. Several other examples in the report (chlorpyrifos, dimethoate, and omethoate in Chilean grapes, dieldrin in squash) also rely on this faulty reasoning to express startling percentages of children receiving "unsafe" doses of pesticides. In short, comparisons with chronic reference doses may be suitable when considering average daily exposure to pesticides, but not for considering individual acute exposures.

Organophosphates

Let's also look at methyl parathion in more detail, since it was the greatest contributor to the high TI values for U.S. apples, pears, grapes, frozen/canned green beans and frozen/canned sweet peas and the target of pleas from the authors to the EPA to initiate immediate regulatory action. Methyl parathion is one member of a large class of insecticides known as organophosphates, or OPs. Members of this class of chemicals exert their toxicity in mammals by interfering with an enzyme in the nervous system known as cholinesterase. Significant inhibition of this enzyme can lead to toxic effects, such as increased sweating, vomiting, abdominal discomfort, and pinpointing of the pupils.

Among the OPs, methyl parathion is considered to be a fairly toxic member, but not as potent a cholinesterase inhibitor as several other members of the family such as its ethyl parathion relative. Ethyl parathion is considered to be more toxic because its two ethyl ester groups provide a greater stearic hindrance to a normal metabolic detoxification reaction, hydrolysis, than is provided by the two smaller methyl ester groups of methyl parathion.

Surprisingly, the EPA has reported that the chronic reference dose for methyl parathion (0.00002 mg/kg/day) is slightly lower than that for ethyl parathion (0.000033 mg/kg/day; the authors of the report listed the ethyl parathion chronic reference dose to be 0.00033 mg/kg/day which is in error based upon the most recent EPA risk assessments resulting from the Food Quality Protection Act; see). This curiously low methyl parathion reference dose is based upon identifying the No Observed Effect Level (NOEL) in a chronic toxicology study of 0.021 mg/kg/day, based on systemic toxicity, neuropathology, and red blood cell cholinesterase inhibition in a rat chronic study (see).

No Observed Effect Level (NOEL)

Traditionally, the NOEL is divided by an uncertainty factor of 100 (10-fold to guide animal- human extrapolation x 10-fold to guide human-more sensitive human extrapolation). In the case of methyl parathion, however, the TPA has added an additional10-fold uncertainty factor (leading to a total uncertainty factor of 1,000) because of possible concerns of infant and children susceptibility which must be considered under the Food quality Protection Act. Such an additional uncertainty factor may seem prudent for estimating acute exposures, but I disagree with EPA's philosophy that the additional 10-fold uncertainty factor should apply for the chronic reference dose, since chronic exposures concern an entire lifetime and not just the brief periods of infancy and childhood. Thus, the combination of a curiously low NOEL coupled with an additional 10x uncertainty factor provide methyl parathion with the lowest chronic reference dose of any of the OPs, although conventional logic would suggest otherwise. If the reference dose for methyl parathion were established at levels that would be consistent with the reference doses of other OPs, the findings of the Consumer Reports study would be altered significantly. This illustrates the subjectivity of the risk assessment process and how possible artifacts may indeed drive risk assessments such as those released by Consumer Reports.

So does this report conclusively demonstrate that infants and children are receiving "unsafe" levels of exposure to various pesticides? Certainly not. But what it has done is point the finger at a number of foods. It is critical that emphasis be placed upon the fact that the health benefits of consuming fruits, vegetables, and grains such as decreased risk of heart disease or various types of cancers far outweigh any theoretical risks posed by pesticides. And while Consumer Reports urges consumers to continue eating fruits and vegetables, presenting their data irresponsibly to apply political pressure on the EPA (their major motivation for releasing this study, in my opinion) will unnecessarily scare many consumers and could potentially decrease consumer consumption of many healthy foods such as peaches, apples, grapes, pears, spinach, and squash.

All in all, I think Consumer Reports should concentrate its efforts on rating toaster ovens and automobiles rather than pesticide risks.

Food Safety Websites

Source: Carol Ramsey, Extension Pesticide Education Coordinator, Washington State University and William G. Smith, Pesticide Management Education Program, Cornell University

A Consumer's Guide to Microbiological Risks to Food Safety: http://ificinfo.health.org/resource/microbiorisks.htm

Backgrounder - Food Safety & Foodborne Illness: http://ificinfo.health.org/backgrnd/bkgr10.htm

A Consumer's Guide to Pesticides and Food Safety: http://ificinfo.health.org/brochure/cgfs&p.htm

IFIC Review: On Pesticides And Food Safety: http://ificinfo.health.org/review/ir-pest.htm

Questions and Answers about Pesticides and Children's Health: http://ificinfo.health.org/qanda/QAPEST.HTM

A quote from the above web site:

"Should parents limit their children's consumption of produce? Should parents buy organic produce? No. The American Academy of Pediatrics (AAP) states that, "despite the theoretical risk of pesticide residues...a diet rich in fruits and vegetables is the most healthful diet that children can consume." The need for all Americans to increase their consumption of fruits and vegetables has been recommended by the Surgeon General, American Dietetic Association, the American Cancer Society and a wide variety of other helath and medical authorities. It is difficult to imagine children eating too much produce. Produce is a good source of dietary fiber and of many vitamins and minerals that are essential for proper growth and development. There is no evidence that foods labeled "organically grown" are safer or more nutritious than foods grown using conventional agricultural practices. Many organic growers use pesticides found in the environment such as sulfur, nicotine, and copper."

Preliminary Monthly Climatological Data for Selected Ohio Locations, February, 1999

Weather Station Location	Monthly Prec.	Normal Monthly Prec.	Year-to-Date Prec.	Normal Year-to-Date Prec.	Average High	Normal High	Average Low	Normal Low	Mean Temp.	Normal Mean
Akron-Canton	2.78	2.23	6.30	4.39	41.3	35.9	25.6	18.9	33.5	27.4
Cincinnati	3.66	2.69	8.42	5.28	47.3	40.8	28.4	22.7	37.8	31.8
Cleveland	2.07	2.19	6.00	4.23	42.0	35.0	27.4	19.3	34.7	27.1
Columbus	2.76	2.24	5.63	4.42	45.1	38.0	29.0	21.2	37.0	29.6
Dayton	3.97	2.17	7.90	4.30	43.8	38.0	27.5	20.8	35.6	29.4
Elyria	1.89	2.05	5.31	4.09	41.6	37.2	27.0	19.4	34.3	28.3
Fremont	1.97	1.66	4.19	3.45	41.3	35.1	21.4	17.7	31.3	25.7
Mansfield	2.41	2.02	6.14	4.00	40.4	35.0	25.0	18.9	32.7	26.9
Norwalk	1.70	1.73	4.91	3.63	41.7	34.6	25.9	17.1	33.8	25.9
Toledo	1.67	1.73	4.82	3.48	41.5	33.4	25.7	17.0	33.6	25.2
Wooster	2.03	1.97	4.81	3.92	43.2	36.9	26.1	19.1	34.6	28.0
Youngstown	2.82	2.03	7.45	4.16	40.8	34.0	24.3	17.9	32.5	25.9

Temperatures in degrees F, Precipitation in inches

Records set:Highs - 11th; Cincinnati 74, Columbus 74, Dayton 73, Mansfield 68, Toledo 71, Youngstown 70
12th; Cleveland 68, Mansfield 64,

Table Created by Ted W. Gastier, OSU Extension from National Weather Service, OARDC & Local Data

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