It is easier to reduce pesticide risk in food when you know where it lurks.

Our "Dietary Risk Index" confirms that organic foods deliver on a core promise - nearly eliminating pesticide dietary risks.

The Organic Center

DRIVING DOWN PESTICIDE RISKS

TRACKING DIETARY RISKS

Understanding the scope–and location–of a problem is a key step in solving it. There are over 600 pesticides applied routinely to hundreds of different food crops, under widely different circumstances across millions of farm fields. But which applications pose dietary risks worth worrying about?

Are pesticide risks going up or down? What about imported food – riskier or safer? Which foods pose the greatest risks, and which the least? To what extent does organic farming reduce pesticide dietary risks?

Only a few pesticide-food combinations account for 95% of dietary risk.

We field questions like these on almost a daily basis. Avoiding pesticide risk remains the number one reason people switch to organic foods and beverages. It is natural that people want to know if organic foods are actually delivering higher margins of safety. Food companies ask us for help in identifying potential pesticide risk problems in their conventional supply chains. And critics of organic food and farming frequently claim, with essentially no supporting data,

that organic food is as risky as conventional food, because organic farmers occasionally use pesticides approved for use on organic farms.

Fortunately, the nation has invested heavily over the last 20 years in generating the information needed to respond to these sorts of questions and claims. The US Department of Agriculture (USDA) has compiled a massive, high quality pesticide residue data set going back to 1991. It encompasses annual test results for the most important foods accounting for risks to infants and children.

Since passage of the historic Food Quality Protection Act in 1996, the US Environmental Protection Agency (EPA) has completed in-depth dietary risk assessments of nearly all widely used pesticides. We draw on USDA's residue data and EPA's risk assessments in calculating the Center's "Dietary Risk Index" (DRI), a tool designed specifically to answer questions about pesticide dietary risk levels and trends.

QUANTIFYING PESTICIDE RISK

In the simplest of terms, the overall pesticide dietary risk associated with a serving of a given food is equal to the exposure to each pesticide found in food, multiplied by that pesticide's toxicity, added together across all the pesticides present in the food.

Exposure is determined by how frequently pesticide residues appear in food, how many different residues are in a given food, by the distribution of residue levels, and by how much of a food an individual eats in a given day. In general, most pesticide dietary risk is caused by proverbial "hot potatoes"—foods that sometimes contain relatively high residues of relatively toxic compounds.

The second key piece of the risk equation—toxicity to humans—is determined by the innate biological activity of a pesticide, as well as by the timing of exposures and tissue-specific patterns of exposure.

For a given pesticide-food combination, the DRI value is the average residue level in food divided by the maximum amount that can be in the food, based on EPA's current assessment of each pesticide's chronic toxicity. (See www.organic-center.org/DRI for the methodological details).

DRIs can be calculated based on mean residue levels, producing "DRI-Mean" values. It is appropriate to use DRI-Means when comparing, for example, the risk levels for pesticide "x" versus pesticide "y" in a given food. This formulation of the DRI does not take into account how frequently a positive residue is found in a particular food. We also calculate a "Food Supply DRI," or FS-DRI, to overcome this limitation. It is simply the DRI-Mean multiplied by the percent of samples testing positive for each given pesticide.

WHY WORRY?

There are many reasons, and unfortunatley new ones are emerging as science marches on. Farmworkers are exposed regularly to dangerous levels of pesticides, and yet too often are "out of sight, out of mind." Clear evidence now confirms that prenatal exposures to a major class of insecticides have been reducing the IQs of American children by as much as 4 to 7 points. Pre-natal exposures also can lead to smaller brains, reproductive and immune system problems, and elevated risk of asthma and ADHD. New science has identified linkages between pesticides in food and the risk of obesity and type 2 diabetes.

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APPLYING THE DIETARY RISK INDEX (DRI)

WHAT ABOUT ORGANIC VERSUS CONVENTIONAL FOOD RISK LEVELS?

We have calculated DRI-Mean and Food Supply-DRI values for all foods tested by the USDA since 1993 by chemical, by food, over time, in domestically grown food versus imports, and organically grown food.

As a general rule of thumb, aggregate FS-DRIs encompassing all the pesticides found in a given food should not exceed one. Likewise, a pesticide's aggregate FS-DRI should not exceed one, taking into account all the foods in which the pesticide was found.

For single pesticide-food combinations, DRIs should not exceed 0.1. If residues are managed down to this level, aggregate FS-DRIs across all foods are not likely to exceed 1.0.

Relatively few pesticide-food combinations account for the lion's share of risk. In the case of apples in 2009, 3,553 residues of 51 different pesticides were found in 724 samples of domestically grown apples tested by USDA (average of five residues per apple sample). Two individual pesticide-apple combinations had DRIs over one – chlorpyrifos (15.8) and dicofol (12.2). Four have values over 0.1 but below 1.0, and the other 45 residues have FS-DRIs below 0.1.

Solid data now confirms that organic farming virtually eliminates pesticide dietary risks.

A predominantly organic diet for school-age children, after just five days, essentially eliminated evidence of insecticide exposures in two carefully designed studies carried out in Seattle, Washington and Atlanta, Georgia. Our 2009 report *Simplifying the Pesticide Risk Equation: The Organic Option* concluded that if conventional fresh and processed fruit and vegetable products were replaced by organic brands, overall pesticide dietary risk would fall by 97%.

New data from USDA residue testing in 2009 points to even greater benefits. USDA tested 318 domestic samples of organic lettuce – the largest one-time sampling of an organic food ever done. Only 55 residues were found. Of these, 51 were biochemical pesticides approved for use by organic farmers. The average organic sample contained only 0.17 residue (so about 8 in 10 had no residues). The aggregate FS-DRI was 0.001, risk too low to worry about.

Conventional lettuce was last tested in 2005. An average of 3.9 residues were found in ***each*** of 735 samples. The FS-DRI was 0.12—about 120-times higher than in organic lettuce in 2009.

GOOD NEWS AND A GROWING CONCERN

Recent USDA pesticide residue data, in conjunction with the DRI, highlight a growing concern – the shift in residues and risk to imported foods. Domestic fruit and vegetable farmers have made steady progress in reducing pesticide dietary risks, while risks have not come down nearly as much in most imports, and have actually risen in some imported produce items.

Pesticide residues in food and beverages, and associated risks, are bound to continue driving growth and shaping the market for organic foods, especially fresh fruits and vegetables, juices, and fruit and vegetable-based products. Our applications of the DRI confirm that organic food virtually eliminates pesticide dietary risk and provides badly needed guidance to regulators and conventional farmers and food companies wanting to drive down risk levels.

Access more information on the "Dietary Risk Index" at www.organic-center.org/DRI or contact Dr. Benbrook, at cbenbrook@organic-center.org.

DIRT + WATER + SUN

sometimes the greatest ideas are the simplest.

The Organic Center

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