Prioritizing an All-Organic Diet—Paybacks from Safer, Nutrient-Dense Food

Environmental Working Group's Dirty Dozen and Clean 15:
Relatively Clean? Mostly Clean? Clean Enough?

The US population is a walking science experiment — more than 90% have detectable pesticide biomarkers in their blood or urine.[1] Where have these pesticide residues, or their breakdown metabolites, come from? They are most likely on (or in) the food we eat.

The Environmental Protection Agency reports indicate that more than 1.1 billion pounds of pesticides are applied annually in the United States, 90 percent of which are used for agricultural production[2]. About 30 percent of all crops grown are consumed by humans and the remainder is used for animal feed or biofuel production.

So, what is the best way to avoid ingesting pesticides such as herbicides, insecticides, fungicides, and rodenticides when the food we eat is treated with one or more toxins as it is grown?

Every spring the Environmental Working Group (EWG) releases their Shopper's Guide to Pesticides in Produce™. For nearly 20 years, this publication has been used by consumers to avoid the most contaminated produce on grocery shelves. We applaud the work EWG has done producing their Dirty Dozen™ list of most pesticide-contaminated fruits and vegetables.

Because more than 70 percent of conventional (non-organic) fresh produce sold in the U.S. contains residues of potentially harmful pesticides, and often multiple synthetic chemicals, EWG recommends a very simple way to avoid the highest pesticide risk: substitute organic produce for the Dirty Dozen.

But for many members of the organic farming movement, the concept of a Clean 15™ list is a misnomer; we believe it really should be labeled the *Relatively Clean 15.* The EWG list recommends 15 *conventionally grown* fruits and vegetables with the lowest levels of pesticide residues, not crops *grown organically*. Many are far from "clean" and certainly not the safest choices on the market.

Pesticide Residue in Imported Produce

Pesticide sampling, testing, and monitoring programs conducted by the US Department of Agriculture (USDA), the Food and Drug Administration (FDA), and the State of California not only measure pesticide residue on food grown in the US, but also food imported into the US, which

[1] https://pubmed.ncbi.nlm.nih.gov/28930298/
[2] https://www.epa.gov/sites/default/files/2017-01/documents/pesticides-industry-sales-usage-2016_0.pdf

represents a considerable percentage of the foodstuffs consumed in our country and, for certain commodities, and even higher percentage of organic products.

Fresh and processed fruit and vegetables accounted for 94 percent of the total 10,127 samples collected in 2021 through the USDA Pesticide Data Program. Domestic samples accounted for 67.8 percent of the samples, while 30.8 percent were imports. Residues exceeding tolerance levels were detected in 54 samples, 29 were domestic and 24 were imported, 1 was of unknown origin. Residues with no established tolerance were found in 374 samples, 220 were domestic and 150 were imported, 4 were of unknown origin.[3]

The goal of FDA's Pesticide Residue Monitoring Program is to inspect human food and animal feed for consumer protection. Reported in the 2020 Pesticide Report (the most recent published), a total of 316 domestic and 1,762 imported human food samples were collected and analyzed. Residues were found in 59.2 percent of domestic samples and 51.6 percent of import samples. Pesticide residues detected that are not allowed on human food and residues exceeding tolerance levels were found in 3.2 percent of the domestic samples and 11.6 percent of the import samples.[4]

The California Department of Pesticide Regulation (DPR) in 2020, tested 2,892 produce samples and 95 percent of domestically grown and imported samples had either no detectable pesticide residues or had residues within the allowable tolerance. Imported produce accounted for nearly 78 percent of illegal pesticide residue samples—illegal meaning over the tolerance level or including residues of pesticides that are not legal to use in the United States.[5]

Know where your food was grown, harvested, and processed! Clearly imported foods are higher risk than domestic; especially when you consider the low volume of sampling and testing. A growing percentage of both conventional and organic crops are being imported from Mexico, Central America, and other developing countries.

"Eat less, move more, eat lots of fruits and vegetables, go easy on junk foods."[6]

The Healthy Eating Plate, introduced in the U.S. Department of Agriculture and U.S. Department of Health and Human Services *Dietary Guidelines for Americans, 2020-2025*[7] does not define a certain number of calories or servings per day from each food group. What it does do is show that we each should eat about half of our daily food intake (by volume) as fruits and vegetables.

The most recent Guidelines eliminate calculating the number of servings or counting calories. Instead, they suggest filling half your plate with produce – raw or cooked – to improve your diet, and likely overall health, compared to the standard American diet. The Dietary Guidelines

[3] https://www.ams.usda.gov/sites/default/files/media/2021PDPAnnualSummary.pdf
[4] https://www.fda.gov/food/pesticides/pesticide-residue-monitoring-report-and-data-fy-2020
[5] https://www.cdpr.ca.gov/docs/pressrls/2022/092822.htm
[6] Marion Nestle, Ph.D., M.P.H., *What to Eat*
[7] https://www.dietaryguidelines.gov/resources/2020-2025-dietary-guidelines-online-materials

recommend eating mostly fruits and vegetables to stay healthy, which—in our opinion—makes avoiding pesticide residue even more critically important. Doing that is easily accomplished by shifting to an all-organic diet.

The primary reason people choose to eat organic[8] is to avoid agrochemicals including pesticides in conventional produce and prepared foods, hormones and antibiotics used to treat livestock, and genetically engineered ingredients. Clearly, organic is considered a cleaner way to grow and process food by consumers.

The Difference in Organic Production—What's Missing?

Consumers consider what organic *doesn't* have to be as important as what it does have. Organic means:

- Most drugs typically administered to livestock, such as antibiotics and growth hormones, are banned
- No toxic, synthetic pesticides
- No synthetic and petroleum-based fertilizers
- No genetically modified organisms (GMOs) in the crops themselves or in ingredients or processing agents

Consumers do not want to feed their families carcinogenic, neurotoxic, or otherwise harmful chemicals. The results of "controlled feeding experiments," where the subjects (children and adults) first ate conventional foods for a limited time, then ate only organic foods, clearly illustrate "…that consumption of organic food resulted in lower urinary concentrations of pesticide metabolites than consumption of conventional alternatives." [9]

Researchers observed that the introduction of an organic diet significantly reduced urinary levels of thirteen pesticide metabolites and parent compounds indicating exposure to organophosphates, neonicotinoid, and pyrethroid insecticides, and the herbicide 2,4-D.[10].

In other words, eating organic means you can avoid pesticide residuals that can be harmful!

The Difference in Organic Production—What Organic Has—Health and Societal Benefits

[8] https://doi.org/10.3390/foods10010105
[9] Organic Food in the Diet: Exposure and Health Implications
https://www.annualreviews.org/doi/pdf/10.1146/annurev-publhealth-031816-044437
[10] Organic diet intervention significantly reduces urinary pesticide levels in U.S. children and adults,
https://www.sciencedirect.com/science/article/pii/S0013935119300246?via%3Dihub

What organic has in every bite, based on published, peer-reviewed studies, is as important as what it avoids and eliminates. Organic farming practices protect the safety, nutritional quality, and flavor of food; the health of farmers, farm workers, and livestock; and the quality of air, soil, and water.

Maintains nutritional density

There is a perception that organic food is healthier than conventionally produced food and, as more research is published, it is becoming more and more clear that perception is actually reality.

While most people who choose to eat organic food do so to avoid agrichemical and drug residues, studies have shown that organic varieties do provide significantly greater levels of vitamin C, iron, magnesium, and phosphorus than non-organic varieties of the same foods.

Organic foods also typically provide greater levels of a number of important antioxidant phytochemicals (anthocyanins, flavonoids, and carotenoids).[11] In addition, with the requirement for outdoor access and grass-based production of organic livestock, tests show enhanced levels of omega-3 fatty acids and conjugated linoleic acids (CLA), both thought to be immunity and health-enhancing compounds.

Furthermore, studies have indicated sperm quality and quantity in humans and other animals have showed disturbing abnormalities in recent years. In the study Organic Food in the Diet: Exposure and Health Implications, the following results were reported:

- Higher sperm density in organic farmers who had a high proportion of organic food in their diets
- Higher sperm quality in organic food consumers
- Lower concentration of morphologically normal spermatozoa in the group with no organic food intake

As increasing fertility problems have been well-documented, and a growing number of would-be parents are investing tens of thousands of dollars in high-technology reproductive options, investing in organic food might be a prudent first alternative.

Organic farming processes protects the health of farm workers

In addition to farmers themselves, more than 2.4 million hard-working migrant, seasonal, and immigrant farm workers are a mostly unseen but critically important workforce in fruit and vegetable production across the country. They are also on the frontline of handling pesticides and other hazardous chemicals since nearly 90 percent of pesticide use is in the agriculture sector.

[11] https://pubmed.ncbi.nlm.nih.gov/20359265/

Occupational exposure in agricultural production primarily comes through contact with the skin and through inhalation. Exposure can also come from aerial drift, accidental spills, leakages, faulty equipment, or difficulties with protective equipment.[12] In some cases, farmworkers are sent into fields that have been freshly sprayed, in violation of pesticide labeling.

Choosing organic directly benefits the people who produce our food!

Organic farming methods reduce the threat of exposure for farmworkers and their children (who often live in housing contiguous to the fields). We can protect the health of farm workers by using our financial power at the supermarket. Not only do we reduce the health threat of agrichemical exposure for farmers and farm workers, we are also improving our own health by avoiding pesticide residue in our food.

Organic farming and ranching protect food animals

Organic standards require that animals on organic farms must have access to the outdoors and, for ruminants, a notable percentage of their feed intake must come from fresh pasture (when weather and ground conditions permit). They are also required to have more space indoors and cages are prohibited for laying hens.

Farmers must always provide enough light, space, and comfort to allow farm animals to move and express their natural behaviors, such as allowing pigs to wallow; chickens to run and flap their wings, dust bathe, and forage; and cows and calves to leap and roll in quality pasture. Grass-based farmers will testify how satisfying it is to see milk cows weighing 1000 to 1500 pounds kick up their heels with the pure joy of entering pasture for the first time each spring.

Organically-raised food animals must consume 100 percent certified organic feed, except for trace minerals and vitamins used to meet the animal's nutritional requirements, and be managed without antibiotics, added growth hormones, mammalian or avian byproducts, or other prohibited feed ingredients, such as urea, manure, or arsenic compounds.

Conventional farming and ranching used nearly 24.5 million pounds of antimicrobial drugs to treat food-producing animals in 2021[13]. Organic farming standards ban the use of all antibiotics and strictly regulate dewormers. [14]

Organic farming protects water, soil, and the environment

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[12] Essential and in Crisis: A Review of the Public Health Threats Facing Farmworkers in the US, https://clf.jhsph.edu/sites/default/files/2021-05/essential-and-in-_crisis-a-review-of-the-public-health-threats-facing-farmworkers-in-the-us.pdf

[13] FDA Antimicrobials Sold or Distributed for Use in Food-Producing Animals, 2021 report, https://www.fda.gov/media/163739/download

[14] USDA Organic Livestock Requirements, https://www.ams.usda.gov/sites/default/files/media/Organic%20Livestock%20Requirements.pdf

Farming systems we would today describe as organic employ practices that have been in use for thousands of years. In fact, all traditional farming methods could be considered "organic" simply because there were no known inorganic methods available. Farmers, shepherds, and goatherds used and experimented with systems that conserved soil, water, energy, and natural resources.

The benefits of organic farming include higher soil organic matter and nitrogen, lower petroleum-based energy use, conservation of soil moisture and water resources, and retention and improvement of biodiversity.[15] On average, organic farms host 34% more biodiversity than conventional ones.[16]

What are the environmental benefits of organic agriculture?

Soil: Organic practices such as crop rotation, inter-cropping, cover crops, minimum tillage, and organic fertilizers encourage the soil microbiome, improve soil development and structure, and sequester carbon. As a result, water retention is improved, and soil erosion is reduced.

Water: Well-managed organic systems retain more nutrients , and the use of compost, animal manure, and green manure prevents water pollution from chemical and fossil-fuel based fertilizer—which often results in contaminated ground and surface waters, algae blooms on lakes, and has contributed to the expanding dead zone past the mouth of the Mississippi River in the Gulf of Mexico.

Biodiversity: Organic farmers are both custodians and users of a diverse ecosystem. Traditional and adapted seeds and breeds have more resistance to disease, reducing the dependence on agrichemicals and drug treatments for livestock, and are more resilient to climate stress. Diverse combinations of plants and animals optimize nutrient and energy cycling. At the ecosystem level, the location of natural areas in and around organic fields, coupled with the absence of chemical inputs, improves wildlife habitat. Wild flora and fauna and pollinators and pest predators are attracted to organic systems and increase biodiversity.

Climate impacts: Organic agriculture decreases non-renewable energy use by reducing the use of petroleum-based agrochemical. Organic farming practices increase the return of carbon to the soil, raising productivity and sequestering carbon.[17]

Because organic farmers carefully steward the farmland and are mandated to practice a more humane standard of animal husbandry, consumers who want to influence the production of organic food should encourage organic farming by directing their financial strength differently. The first choice should always be to buy organic.

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[15] Environmental, Energetic, and Economic Comparisons of Organic and Conventional Farming Systems, https://academic.oup.com/bioscience/article/55/7/573/306755

[16] Landscape context affects the sustainability of organic farming systems, https://www.pnas.org/doi/10.1073/pnas.1906909117

[17] Organic Agriculture FAQ, fao.org/organicag/oa-faq/oa-faq6/en

What about produce that EWG rates somewhere between the dirtiest and cleanest?

Over the last 30 years, the USDA has tested 126 different commodities from apples to zucchini, however the same products are not necessarily reviewed every year. The EWG lists focus on two distinct groups, the "dirtiest" and the "cleanest." Therefore it should be noted that 78 percent the fruits and vegetables tested by the USDA fall between the cracks of the EWG scrutiny and publicity.

Obviously, this critique of their work, and of the published literature available, focuses on the many advantages of consuming an organic diet. Please allow us to give[18] just one example of why we recommend choosing organic produce, regardless of where an item falls on EWG's Shopper's Guide—certified organic potatoes.

Historically, **potatoes** have been the number one vegetable crop consumed in the US. In 2021, each American consumed 29.3 pounds of fresh potatoes[19]; they also ate 54.6 pounds of potatoes processed into French fries and potato chips[20].

It's a **dirty little secret** that conventional potato farmers use **toxic herbicides to desiccate—kill and dry down**—potato crops to even out the harvest and to regulate tuber size prior to mechanical harvesting. Herbicides such as carfentrazone-ethyl, diquat, glufosinate-ammonium, paraquat, pyraflufen-ethyl, and sulfuric acid can be applied between 5 and 9 days before harvest, depending on the product.[21] And that's in addition to other chemicals that are sprayed on the crop post-harvest.

Potatoes do not consistently appear on EWG's Dirty Dozen list. They are #13 on the EWG 2022 Shopper's Guide list[22] but consumers would only be aware of that if they accessed the full list on the website. As of this writing, the last year potatoes appeared on the Dirty Dozen list was 2020. The only way to avoid these highly toxic chemicals is to buy organic.

Not only are there a myriad of agrichemicals sprayed on conventional potatoes during the growing season, but after they reach the packing shed and are washed, they are commonly sprayed with a fungicide and sprout inhibitor—directly on the skins (the part of the plant that adds flavor, fiber, increased nutrition, and mitigates the high glycemic effects that can have deleterious health impacts).

Certified organic potatoes are never treated with mold and sprout inhibitors. That means they will need to be stored in a dark, cool spot and might require a little more effort to remove the

[18] https://www.nature.com/articles/s41370-022-00482-1
[19] https://www.statista.com/statistics/381907/per-capita-consumption-of-fresh-potatoes-in-the-us/
[20] https://www.statista.com/statistics/788866/us-volume-sales-potatoes-by-product-type/
[21] https://pnwhandbooks.org/weed/agronomic/potato/chemical-potato-vine-kill-desiccation
[22] https://www.ewg.org/foodnews/full-list.php

sprouts. They also may not last as long as conventionally grown potatoes so it would be best to buy fewer for long term storage. But the payback is in gaining all the flavor and nutrition from the skin and not worrying about any of the chemicals that might systemically exist throughout the tuber.

The solution to the problem: Buy Organic, Grow Organic, Eat Organic

Reprioritize your spending. In these days of high inflationary pressures, this should not be a case of organic versus conventional — even a "cleaner-but-not-all-that-clean" conventional choice — but rather the decision to prioritize investing in quality food over other more discretionary budgetary items such as the latest technology and consumer goods. It is a long-term investment in the health and well-being of your family, and for children, it can yield a lifetime of benefits.

Given the prevalence and expense of chronic disease in the United States, far eclipsing that in other developed countries, the investment in safer and more nutritious organic food, and fresh whole foods rather than processed, has the potential to have a profoundly positive fiscal impact, both individually and collectively.

The United States has the highest cost healthcare in the world, as a percentage of our gross national product, and the cheapest food. For families, the cost of healthcare eclipses, in many cases, their food budget. Investing more upfront, in organic food, can have a long-term budgetary impact.

Grow your own organic produce at home. If you live in an apartment or condo, grow something on your porch or patio. Tomatoes in patio pots, herbs in window boxes – there are lots of ways to take the first step. If you have a traditional yard, you can turn the lawn, which in many cases burns up time and fossil fuels, into a lush, bountiful garden.

Grow your own organic produce in a community garden plot. If you lack the space, nearly every community of any size offers plots that include water, shared tools, and are generally fenced against intruders. And every community garden plot comes with built-in advisors in neighboring plots.

Shop at one or more farmers markets. Almost every city, town, or village has a farmers market, some have more than one. At a farmers market you get produce that is fresher than anything you'll find on a grocery shelf, where it takes days–or even weeks–to arrive. Encourage more local and regional production by encouraging others to visit the market. You will be keeping your food dollars in your own local community.

Join a member-owned food-coop. Food co-ops reflect the values and principles of their owners and members and fit comfortably into small towns and unique neighborhoods. The independence of today's food co-ops makes each one different and contributes to the diversity of the business landscape and the success of a wide network of local suppliers. Cooperatives

and many locally owned independent natural food stores offer sales and case discounts. It pays to stock up on staples.

Join a CSA farm (Community Supported Agriculture). With a CSA subscription you are helping a farmer plan for the growing season and helping prepay for seed, labor, and materials that are needed for the upcoming season. Being a member of a CSA is being a part of a community that supports a very hardworking farmer and his family. Farms deliver a box weekly, or biweekly, to a drop off point in your neighborhood. Produce was probably picked 10 hours ago rather than 10 days ago as far away as California or Mexico.

Add more meaning and a spiritual connection to your food. It's not that long ago that everyone, regardless of religious orientation, said grace. Food was a lot more expensive, and it took a lot more effort to secure. We guarantee you that if you make the choice to seek out, or grow, the very best food, you will find enjoyment, a learning opportunity for all family members, and meaning from your efforts. If for no other reason, there is a parallel between nutritional density and flavor profile in food. Buying organic is just not about health, it's about enjoyment and quality of life.

These inflationary times are hard, and many families are reconsidering their financial priorities. But, as illustrated by the studies cited above, choosing organic food can have a profound and lasting impact on health and well-being and is a worthwhile investment of our hard-earned dollars.