

Viewpoint: The organic food industry is a \$180 billion marketing fraud



s a biomedical scientist, it has never failed to annoy me that the term 'organic' has been co-opted to spread misinformation. Before we get into the topic as it relates to foods (and other consumer products), I just want to emphasize that the term organic in chemistry has a VERY different meaning. And we will talk a lot more about that in the future!



Dr. Andrea Love

But since the [EWG](#) is out there yet again circulating their fear-mongering [“Dirty Dozen”](#) list, it bears explaining what organic actually means.

The [organic foods industry](#) is a \$181.5 BILLION dollar industry as of 2022, with an expected annual growth rate of 11.2% year over year. This industry didn't even exist until 2002, and was borne out of consumer demand and misinformation. For context, it was worth 26.7 billion dollars in 2010. That is a huge amount of growth for a market that has zero science behind it.

Most people have been misled to believe that organic is superior and that's not your fault. Even the American Academy of Pediatrics has figureheads spouting that lie. Of course people wouldn't spend more money for something that's equivalent, so clever messaging is used to insinuate that organic foods are superior. And that is reflected in consumer perception. The number one reason that people opt to purchase organic foods is because they believe that organic foods are healthier, safer, more nutritious, or otherwise superior.

The reality? Organic foods are not superior, just more expensive

The EWG and other organic activists are deliberately trying to spread misinformation in order to drive people to purchase organic produce, which is on average, [around 50% more expensive](#) than conventional

counterparts.

Organic food is only [5-7% more expensive to produce](#), so the difference in price is pure profit, and as a result, organic food is almost synonymous with luxury and privilege. Organic farming is at least 22-35% more profitable than conventional agriculture, especially when factoring in the labeling “markup” that is often default: upwards of 30% more on the price tag and hitting your wallet.

All [organic means](#) in the United States is that produce (or crops) in question are certified to have been grown on soil that had no prohibited substances applied for three years prior to harvest.

So what counts as prohibited substances? Certain synthetic chemicals. Organic farming also prohibits the use of genetically engineered seeds in cultivation. But organic farming uses PLENTY of pesticides – they just have a specific list that they deem appropriate. *(I'll discuss myths about livestock and animal products in a subsequent post)*

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One of the biggest misconceptions about organic products are that they are pesticide-free. This is false

Organic farming uses plenty of pesticides and fungicides. A Soil Association survey demonstrated that [95% of organic food consumers said their top reason was to avoid pesticides](#). Sorry to burst the bubble here, folks.

Organic pesticides are merely pesticides that remain chemically unaltered from the chemical state derived from nature. Before you fall into the [appeal to nature fallacy](#) trap, remember that the suffix ‘-cide’ means “to kill”. It doesn’t matter whether a pesticide is a natural chemical or a synthetic chemical: they all kill certain things at certain exposures. Remember: the dose makes the poison.

Synthetic pesticides are chemicals that are produced from chemical alteration. But the source of a chemical has zero bearing on its potential harm or safety. and In reality, some naturally procured pesticides are deadlier or carry a higher risk than synthetic options. Remember: [plants produce lots of noxious](#) chemicals to deter predators from eating them.

Pesticides and herbicides added to crops reduce exposure to and damage by unwanted insects, bacteria, fungi, and weeds.

If we did not utilize pesticides for agriculture, yields of farm crops would be impacted, cost of food goods would skyrocket, and we would not be able to feed the 8.1 billion people on the planet. Organic farming uses 84% more land for the same yield, but yields are 55% lower by area than conventional.

Just because something is labeled organic or natural does not mean it is safer to the

homeowner or unable to cause harm to the environment. Botanically derived pesticides are not always safer; in fact, some can be more dangerous. — [Chris Enroth](#)

Organic pesticides are not safer than synthetic ones.

[There are over 20 chemicals commonly used in the growing and processing of organic crops that are approved by the US Organic Standards.](#) But the volume of chemicals used in organic farming aren't recorded or monitored, even though pesticides deemed "organic" are generally less effective, so require larger volumes for similar effectiveness.

According to the [National Center for Food and Agricultural Policy](#), the top two organic fungicides, copper and sulfur, were used at a rate of 4 and 34 pounds per acre [in 1971](#). In contrast, the synthetic fungicides only required a rate of 1.6 lbs per acre, from 2.5X to 20X less than the amount of the organic alternatives. More than that, many of these organic pesticides are more toxic (when looking at LD50 values), especially when used at the higher levels required for adequate control.

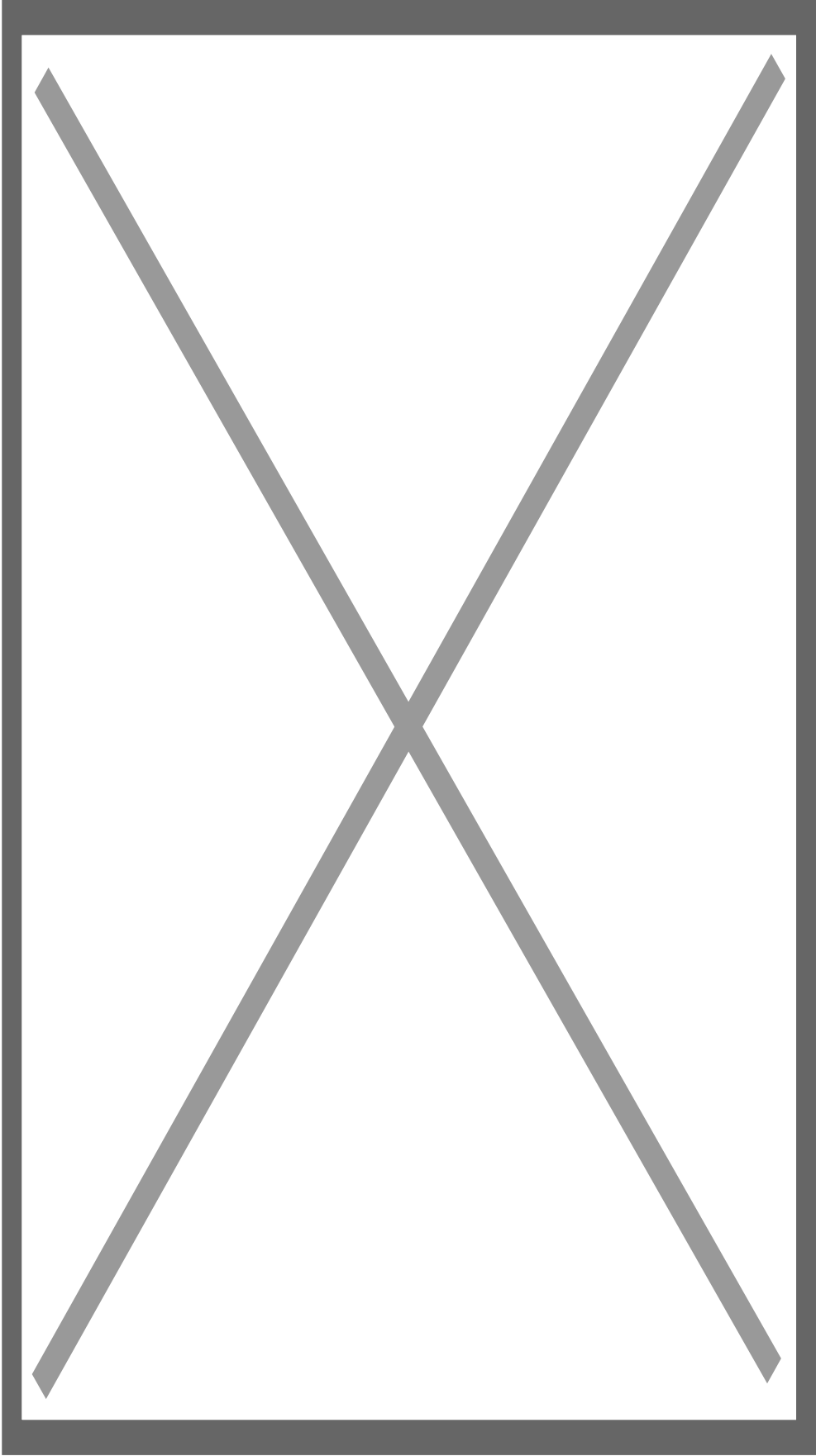
LD50 values are a way we can measure toxicity – it refers to the dose of something at which 50% of the test group dies – the 50% lethal dose. Lower LD50 values means something has greater toxicity. Remember: you can't simply say something is toxic – the dose makes the poison. Toxicity includes dosage, which is often normalized to the size of a given organism too.

Natural pesticides refer to products that are derived strictly from sources in nature with little to no chemical alteration. Synthetic pesticides are products that are produced from chemical alteration. All pesticides are toxic (-cide means to kill) – and the dose makes the poison. In fact, some naturally procured pesticides are deadlier or carry a higher risk than synthetic options. [“Just because something is labeled organic or natural does not mean it is safer to the homeowner or unable to cause harm to the environment. Botanically derived pesticides are not always safer; in fact, some can be more dangerous.”](#)

Lots of things in nature are toxic, so let's cease and desist with the appeal to nature fallacy. Everything is chemicals and the source of a chemical does not dictate its safety. More than that, many have the potential to be more harmful to key pollinator species that we rely on, humans, and other animals.

Examples of organic pesticides include: Nicotine sulfate, Methyl bromide, Copper sulfate, Sodium hypochlorite, Gibberellic acid, Chlorine dioxide, Peracetic acid, Sodium carbonate peroxyhydrate, Lime sulfur, Azadirachtin, Spinosad, Calcium hypochlorite, Veratran D, Lignin sulfonate, Ferric phosphate, Copper oxychloride, Hypochlorous acid, Potassium hypochlorite, Rotenone, and Pyrethrins.

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Nicotine sulfate: Nicotine is natural, and thus approved for organic farming to control aphids, thrips, mites and other insects. It is amusing to have seen so many pro-organic campaigners arguing against the use of neonicotinoids by saying that these synthetic pesticides were using nicotine. Yes BUT so were organic farmers. But how toxic is this natural, organic-approved neurotoxin? Very (LD50: 50-60 mg/kg). In the US, nicotine sulphate carries a Danger warning. It is an organic neurotoxin that [interferes with the transmitter substance between nerves and muscles](#). Tests have shown that nicotine sulphate has caused abnormalities in the offspring of laboratory animals and a [New Jersey State study](#) revealed that nicotine sulphate poisoning of organic gardeners can lead to increased blood pressure levels, irregular heart-rate, and, in certain cases, death.

Rotenone: occurs naturally in the seeds and stems of several plants, such as the jicama vine plant, and has been used copiously for decades. Touted as being 'natural', is [extremely toxic at relatively low doses](#). Was temporarily discontinued as pesticide from 2005 to 2010 in US, but was re-approved in 2010. It is also routinely used as a piscicide in fishery waters.

Pyrethrins are derived from chrysanthemum flowers. They act as neurotoxins in all organisms, but are [particularly neurotoxic to bees and other insects](#), many of which are key pollinator species. They can also be neurotoxic to mammals (including humans).

Copper sulfate: [used as "organic" fungicide](#). Copper sulfate has significantly higher toxicity than synthetic alternatives. The LD50 (50% lethal dose) of copper sulfate is 300 mg/kg versus the synthetic alternative Mancozeb (4500-11,200 mg/kg) — which means that copper sulfate is at LEAST 15X more toxic, and needs to be used in LARGER quantities compared to synthetic alternatives. Not only is copper sulfate toxic to fish, humans, and other species, but it also persists in groundwater and the environment long-term.

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Regulation and safety monitoring is more stringent for synthetic pesticides

The U.S. Environmental Protection Agency (U.S. EPA) regulates pesticides, and has a rigorous process that requires the product demonstrate no risk to human health if used correctly. All pesticides must go through a registration process requiring a review of data on the safety of the product which include many pesticides used in organic agriculture. These data are used to construct pesticide labels which anyone who uses them must legally follow.

However, most natural pesticides haven't been tested for their toxic potential, as the [Reduced Risk Program of the US Environmental Protection Agency](#) (EPA) applies to synthetic pesticides only. Many natural pesticides have been found to pose potential – or serious – health risks, including those used commonly in organic farming. This is also why the EWG conveniently "omits" all of the organic pesticide residues: because they are not monitored or regulated as stringently.

Safety data for conventional pesticides include:

Evaluating if the product can cause harm to humans and under what circumstances (i.e. is it toxic to humans after inhalation, ingestion, physical contact, etc).

Evaluating dose that can cause harm at both acute and chronic exposures.

Evaluating exposure (timing and frequency) that may cause harm (i.e. how often a produce item is eaten for example would determine exposure).

Evaluating overall risk, combined information about the dose, exposure and conditions under which harm may occur.

The EPA sets tolerance levels of residues for synthetic pesticides on food ([I discussed this more in depth in my piece on chlormequat](#)). For some organically-approved pesticides, no tolerance level is set.

Organic foods are not healthier or more nutritious

There is very little scientific evidence to support any health benefits for organic products. In fact, the growing body of evidence supports the statement that a diet rich in organic products isn't actually better for you.

A [2009 meta-analysis](#) found no nutrient differences between organic and conventional foods. More recent studies came to the same conclusion. While a [2012 study](#) found slightly higher phosphorus levels in organic produce, and a [2014 study](#) found higher antioxidant levels and lower cadmium levels in organic food, the differences weren't significant, and the levels don't translate to clinical or health relevance. The 2012 study concluded there was a "[lack of] strong evidence that organic foods are significantly more nutritious than conventional foods."

In [2012, another meta-analysis](#) analyzed 240 studies: 17 comparing populations consuming organic and conventional diets, and 223 studies that compared either nutrient levels or the bacterial, fungal or pesticide contamination of various products (fruits, vegetables, grains, meats, milk, poultry, and eggs) grown organically and conventionally.

They report little difference in health benefits between organic and conventional foods, as well as no consistent differences in vitamin content of organic products. In fact, only one nutrient (phosphorous) was significantly higher in organic versus conventionally grown produce. Protein and fat content were also similar, and no differences reported (some of which is due to methodological disparities) were clinically relevant.

Trace levels of pesticides found in urine are frequently used as "evidence", but have no biological relevance

[Finding micro-trace levels](#) of any chemical in urine is meaningless in and of itself. More than 3,000 chemicals can be detected in human urine; almost none poses any harm. Trace chemicals in urine are the residue of the kidneys doing its filtering job. EWG routinely assesses 'urine levels' of chemicals, either because they do not understand basic chemistry, or they are deliberately exploiting the widespread misunderstanding people have about how chemicals are processed by our bodies in order to spread fear.

A [study](#) claimed that people who switched to organic foods primarily had a decrease in urine output of pesticides: but they only looked at pesticides used in conventional farming, not organic pesticides. Of course it stands to reason you're not going to detect things you're not testing for! [Another study making claims about glyphosate](#) in urine, that the median glyphosate levels in organic food consumers and individuals with known exposure are essentially identical (390 vs 400 parts per trillion, respectively).

Organic farming is not better for ecology and wildlife

While organic farming is perceived as more environmentally friendly, the data don't support the claim that organic farming reduces environmental impact.

Organic pesticides are not better for biodiversity.

[Some organic pesticides](#) actually have worse ecological impact than conventional ones. Also, organic farming prohibits GE crops which can actually reduce the amount of pesticides needed for effective pest control. Because organic pesticides are not permitted to be altered to improve specificity or biodegradability, many organic pesticides are less effective, can bioaccumulate more, and have worse ecological impact by killing non-target species, including beneficial insects and soil microorganisms, many of which can be natural predators of the target pest in question.

For example, [organic pesticides used for aphids can kill multicolored Asian lady beetles and insidious flower bugs](#), both of which are natural predators of aphids. Many require much higher concentrations to be applied to have similar impacts as conventional pesticides. In addition, because organic farming prohibits GE crops, pesticides need to be applied where in conventional farming, a crop could be naturally resistant to a pest. A GM blight-resistant potato grown conventionally would not need fungicides like copper sulfate applied in order to control blight in organic farming.

Organic food has a larger impact on climate because of the greater area of land required to farm it

Organic farming requires more land use for equivalent yield

On average, organic farming uses 84% more land for similar yield. Organic agriculture yields lower crop productivity due to poorer nutrient availability and less effective weed and pest control. Organic produce generates higher nitrogen leaching, nitrous oxide emissions, ammonia emissions and has more acidification potential per unit of product. Nowadays, organic agriculture is now done mostly by big

corporations instead of local producers, so combining lower yields with intensive machinery use means that overall, in terms of emissions and pollution, organic agriculture is usually worse than conventional for the environment.

Since you need more land for similar yield, you have higher rates of habitat and land conversion. This means that in order to meet food demand, you have higher rates of local and global deforestation, encroachment on marginal lands or sensitive habitats, which can further harm wildlife and ecology. Organic farms may actually accelerate habitat loss, deforestation, and biodiversity decline.

Organic farming results in higher greenhouse gas emissions per unit of output

Organic practices rely heavily on organic amendments, such as compost and manure, which release methane and nitrous oxide—a potent greenhouse gas—during decomposition. Organic farming may necessitate more frequent soil tillage, contributing to soil carbon loss and exacerbating climate change. That's especially the case when comparing to GE conventional crops, which often don't require tilling and can minimize soil runoff and nutrient retention. [A meta-analysis inclusive of 71 peer-reviewed studies](#) demonstrated that organic products are worse for the environment. Organic milk, cereals, and pork generated higher greenhouse gas emissions per product than conventional counterparts. A 2018 Nature study confirmed that organic farming leads to higher emissions than conventional farming.

This study found that organic peas resulted in a 50% increase in climate impact due to lower yields. To produce the same amount of organic food, you therefore need a much bigger area of land. The greater land-use in organic farming leads indirectly to higher carbon dioxide emissions, thanks to deforestation.

Organic farming generally consumes more water per unit of yield compared to conventional agriculture

Organic practices rely on natural irrigation methods, such as rainwater harvesting and drip irrigation, which may be less efficient than conventional irrigation systems. Moreover, organic farms often require more intensive manual labor for weed control and crop management, leading to higher water demand for irrigation.

Demonizing affordable and nutritious conventional produce is harmful

The false dichotomy between conventional and organic isn't just misleading, it's dangerous. Our constant attention on natural versus synthetic only causes fear and distrust, when in actuality, our food has never been safer.

[Eating fewer fruits and vegetables due to fear of pesticides or the high price of organic food does far more harm to our health.](#) [Conventional produce has the same nutritional content](#) and is as safe to consume as 'organic' produce. [Most of Americans already don't eat enough fruits and vegetables](#), and produce contains important nutrients, fiber, and other substances that are extremely important to our health.

From a scientific point of view, organic foods are not superior. If you want to spend more money on them, go for it. But don't buy organic because you think it's better for you or for the planet, because it's not.

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