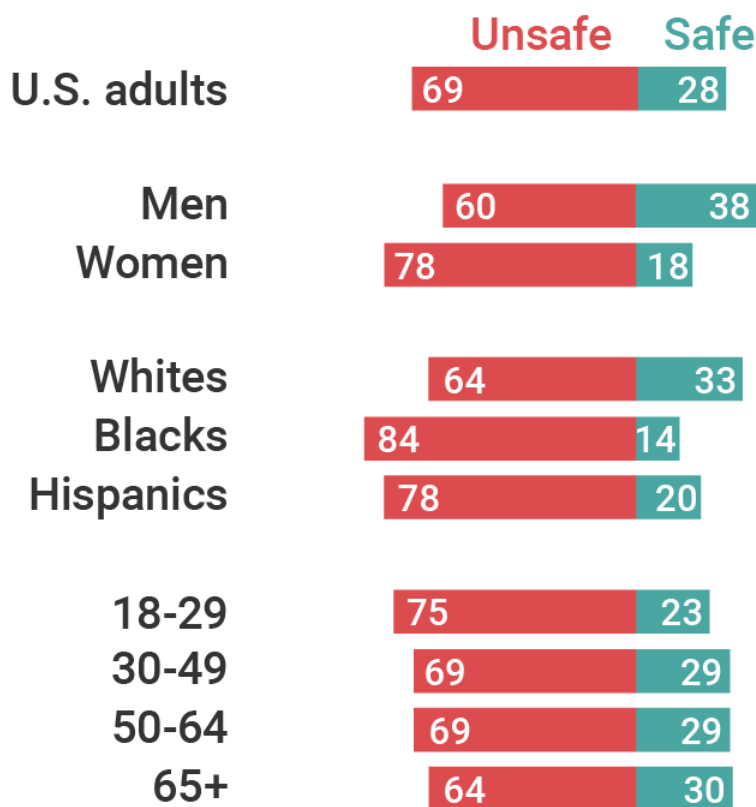


Are pesticide residues on food something to worry about?

In 1962, Rachel Carson's [Silent Spring](#) drew attention to pesticides and their possible dangers to humans, birds, mammals and the environment. Some of her conclusions and warnings have [not held up](#) over time, but Silent Spring launched a movement that changed how the U.S. thought about chemicals and biotechnology. Today, pesticides are still [high on the list of concerns](#) for consumers when they are deciding what food products to buy.

% of U.S. adults saying it is generally safe/unsafe to eat foods grown with pesticides



Pesticides, even at minute levels, are widely viewed as dangerous and bad for the environment. That belief is not based on current scientific evidence, but instead is shaped by general beliefs and values, often along the lines of 'natural is better'. There is also a widespread belief that conventional farming is

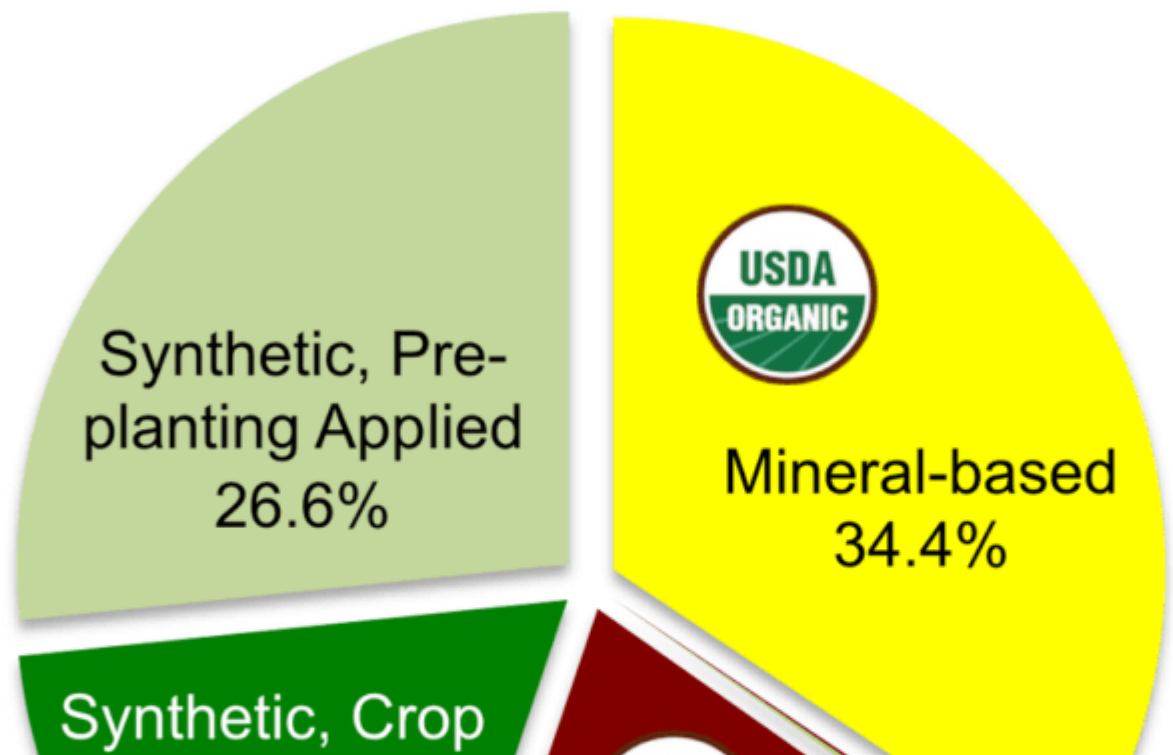
damaging consequences to the environment because it uses chemicals while organic farmers do not; that's not accurate. Consumers also widely believe that pesticide residues on their produce are dangerous to their health. That's not true, either. Study after study and statistics released by the Environmental Protection Agency and other independent agencies have found that 99+% of the fruits and vegetables produced in the US is safe to eat after washing.

Let's examine these controversies in more detail

Still, dangerous myths persist. Scare tactics from advocacy groups, many funded by the organic industry, have convinced a majority of consumers that organic produce is grown with no chemicals and therefore is safer and healthier than conventionally grown foods. When the Soil Association, a major organic accreditation body in the UK, asked consumers why they buy organic food, [95% of them said their top reason was to avoid pesticides](#). That organization, like many people, believe that organic farming involves little to no pesticide use. That's inaccurate. Nonetheless, this 'conventional wisdom' is widely disseminated by the media, on [fringe but widely read](#) Internet sites as well as many mainstream publications.

Organic farmers use a wide array of chemicals, both natural and on limited circumstances, synthetic. Claims that organic produce is safer and healthier because it uses no or less chemicals are not supported by independent studies. Many consumers believe organic foods are not grown using pesticides or are safer because the chemicals they do use are mostly naturally-derived. No again. More produce is grown in California than in any other state. According to state and USDA statistics, over half of all the pesticides used in California by all categories of farmers are active ingredients that are [approved for organic](#).

2013 California Crop Pesticide Use By Category (based on pounds active ingredient)



The misconception that organic food is safer because its 'grown without chemicals' spurs many consumers to buy organic produce instead of more affordable conventional produce. Crop chemophobia has also spurred movements to ban synthetic pesticides (even though some synthetic chemicals are used and approved by organic farmers). However, most organic foods are [also grown using pesticides](#). The main difference is that the most of the pesticides used to grow organic food are derived from natural sources rather than produced synthetically. Some organic pesticides are actually more toxic than their synthetic counterparts, as synthetic pesticide development is not limited to the requirements of sticking to solely natural sources. Nevertheless, the bulk of organic-approved pesticides are used by conventional farmers, mostly sulfur compounds used to control fungus.

[su_panel color="#3A3A3A" border="2px solid #3A3A3A" radius="2" text_align="left"]**Editor's note: This is part six of a six-part series on pesticides and food. Read [part one](#), [part two](#), [part three](#), [part four](#), and [part five](#).**[/su_panel]

Perpetuating myths about pesticide use

What are the facts about pesticides used in agriculture and pesticide residues in food today? Can pesticides play a role in the future of sustainable, environmentally-friendly agriculture?

Pesticides are ubiquitous in agriculture, used by all farmers to control weeds, insect infestation and diseases. As the [US Department of Agriculture writes](#), "pesticides, together with fertilizers and improved seed varieties, have contributed to substantial increases in crop yields over the last 80 years." Scientists have worked to drastically improve pesticides over this time by increasing their effectiveness while designing them to be more targeted, thus decreasing the overall toxicity of crop chemicals used on crops. They are far less toxic to *non-target* flora and fauna than earlier generation pesticides. Their safety, biodegradability and effectiveness have improved so much that they are sometimes better for the environment (and less expensive) than chemicals used by organic farmers.

Yes, organic produce still contains [pesticides and pesticide residues](#). [They do not use organic fairy dust]. Yet, many activist organizations try to promote misleading information about the use of farm chemicals by both organic and conventional farmers. That helps perpetuate the 'accepted wisdom' organic crops are either grown without chemicals or the natural chemicals they use are far safer than those used by conventional farmers. That's inaccurate. Where did these myths originate and who continues to propagate them?

In the US today, many 'natural'-promoting websites and dozens of environmental advocacy groups, some funded by the organic industry, perpetuate this dangerous myth. The Environmental Working Group is generally (dis) credited with having the most influence in spreading misinformation about the presence of chemicals in our food. Since 1995, the EWG has produced an annual list called the [Dirty Dozen](#) to call out specific produce that they claim should be avoided because they have more pesticide residue than other produce. Released each spring, the list has become somewhat of a media event.

Why do almost no [independent scientists nor health officials nor serious journalist](#) take its ratings seriously. For one, it rejects the Environmental Protection Agency's tolerance levels ([explained here](#)),

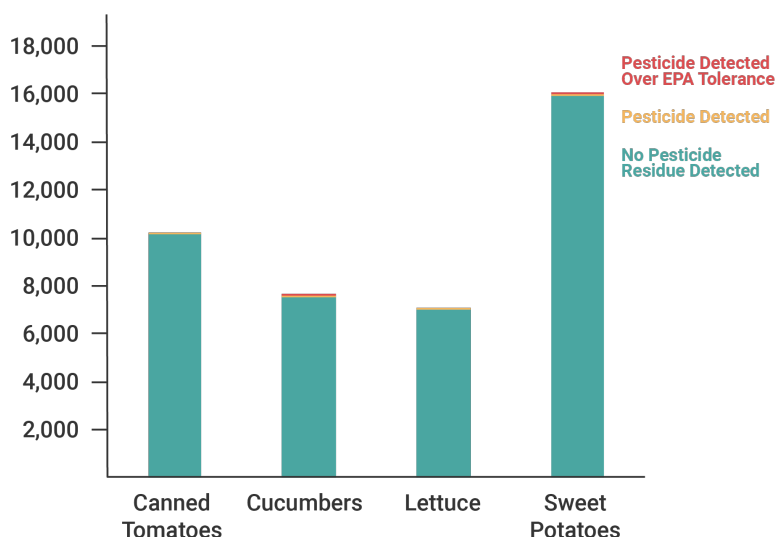
instead relying on its murky proprietary evaluation process which it refuses to disclose. EWG misleads consumers into believing that the very presence of chemical residues pose a danger to humans. That's not true. Even the highest levels of pesticide residue found on produce on its hit list are [well below a level that would be dangerous to humans](#). As the Environmental Protection Agency [explains](#): "The presence of a detectable pesticide residue does not mean the residue is at an unsafe level."

How does the US government oversight process work? Steve Savage, a scientist and GLP contributing writer, notes that "Each year the USDA and its 10 state-level partner agencies go out and collect more than ten thousand food samples from commercial channels within the US food system" as part of its Pesticide Data Program.

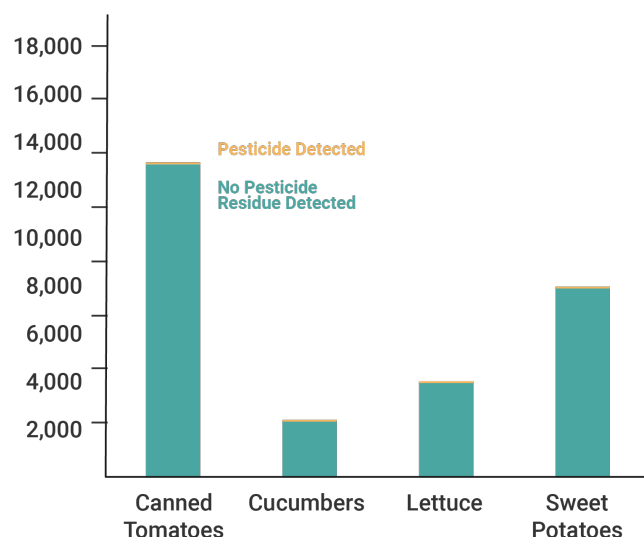
The samples are taken to the USDA's national lab or to one of 7 state laboratories throughout the US. There they are prepared the way they would normally be at the household level (washing, peeling etc), and then analyzed using very sensitive technologies that can accurately measure the amounts of more than 300 different pesticides and pesticide metabolites. For 2021 (the 31st year of the PDP) there were 10,127 samples and a total of 27,541 residue detections. For their Dirty Dozen List, the EWG essentially treats all of those detections as equally problematic. To do that truly represents "data abuse."

The following graph shows the total number of tests done by the USDA for pesticide residues on specific vegetables in 2017, the number of detections found, and the number of detections over the EPA tolerance for the specific pesticide detected. The data is from the [USDA pesticide data program](#). Clearly, both conventional and organic produce is very safe, and very low levels of pesticides are detected in general.

USDA Pesticide Detection on Conventional Vegetables, 2017



USDA Pesticide Detection on Organic Vegetables, 2017



EWG also does not evaluate organic produce, which typically contain [levels of pesticide residue similar to what is on conventional fruits and vegetables](#). Although organic-funded advocacy groups do not evaluate

the presence of organic chemicals on fields, in some cases organic chemical use exceeds that of conventional crop protection products. K-State Jackson County horticulture and extension scientist [Dennis L Patton explains](#):

The truth is that many organic pesticides are more toxic than those developed in the lab.... [A] pesticide is a product labeled to kill a pest. Therefore, organic products that kill pests are chemicals, just like their non-organic counterparts. The main difference is how they were created. ...

Why did I indicate that organic produce may be treated with more pesticides than conventional produce? The simple answer is that organic products breakdown more rapidly, providing a shorter period of protection before another application must be applied for control. This shorter interval is what can account for a greater number of applications and more product being applied to a specific crop.

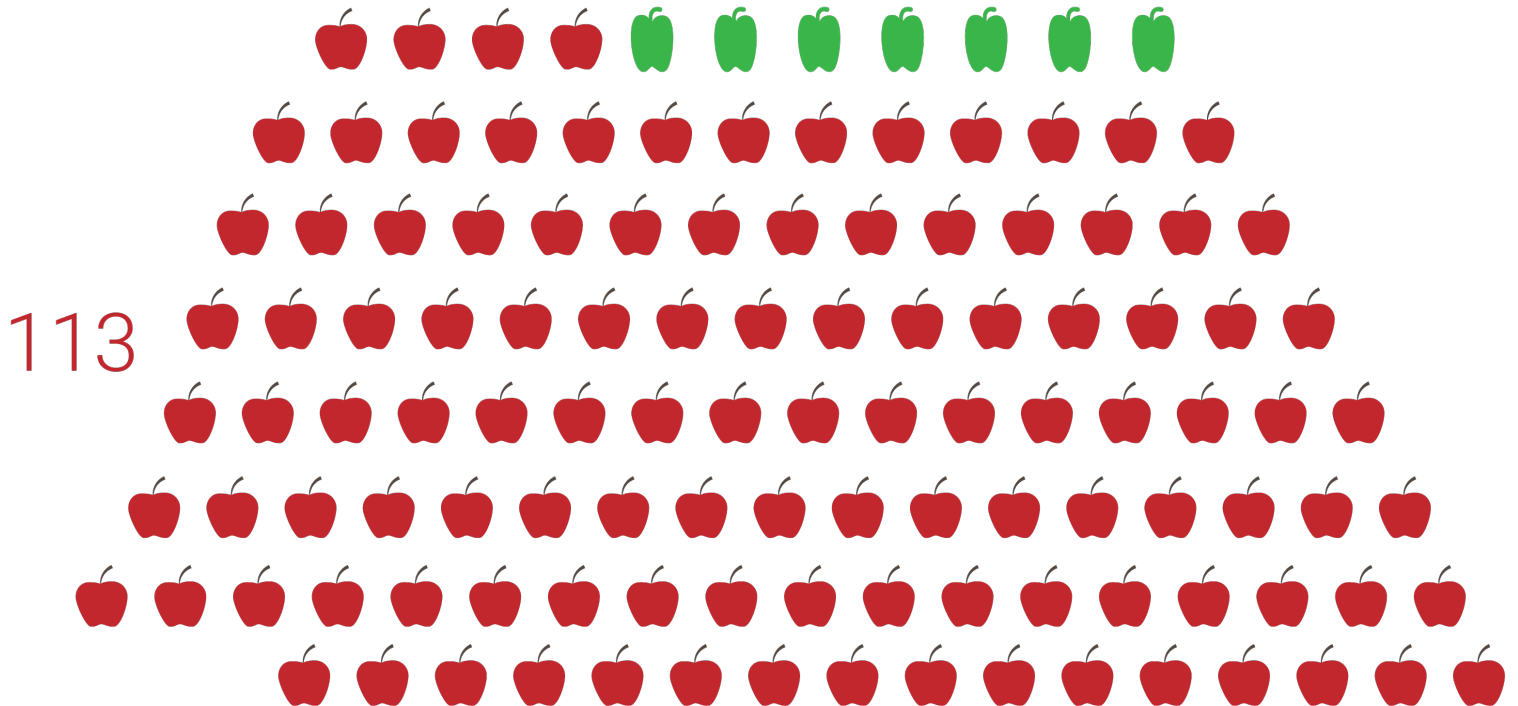
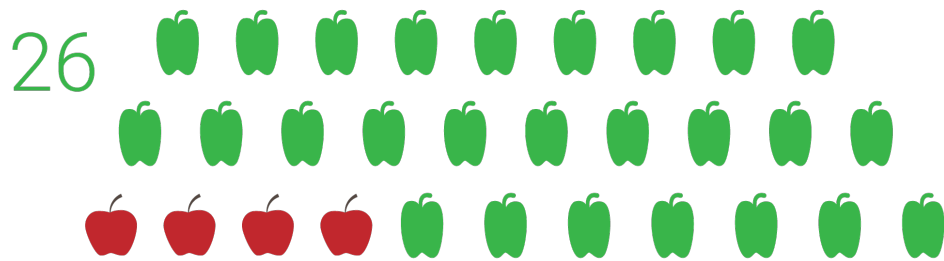
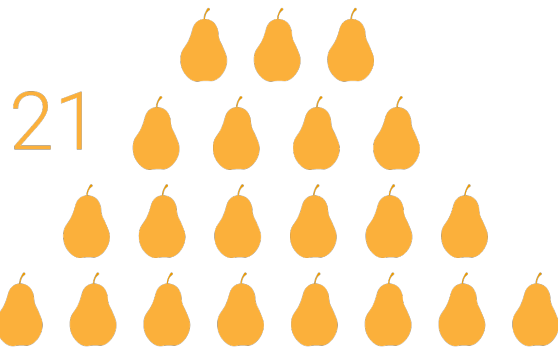
The debate then comes into how these pesticides breakdown, how easy they are to wash off before consumption, and a personal judgement of the information. The bottom line is both conventional and organically grown food has pesticide residues on them when they come home from the grocery store or farmers market.

Should consumers be wary of the presence of trace chemicals on our produce? Again, the answer is 'no'. According to Patton, "We should [always] use smart food handling and safety practices when preparing our food, whether it's conventionally or organically grown." Just like anything that goes into your body, it's the dose (the amount) that matters, and data show the residue amounts are far too minuscule to impact human health. It should also be noted that fruits and vegetables naturally contain "toxic" chemicals like [aluminum](#), [nicotine](#) and [capsaicin](#). But the amounts are so low that it's not something we need to worry about.

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In sum, conventional and organic produce have such low amounts of pesticides on it that you could [eat your weight in fruit every day and still not be in danger of any health problems from the pesticides](#). The following graphic shows the number of servings of pears, bell peppers, and apples a [child could eat every day](#) without negative health effects from pesticide residues, even if the produce has the highest level of pesticide ever recorded by the USDA.



It's distressingly clear to the science community that many 'facts' reported in the media or posted online are oversimplified compared to the real challenge of producing food in the most healthy and efficient way possible. It is easy to call organic 'good' and conventional 'bad', but that is not accurate and not the best way to improve farming practices going forward. Many changes and improvements in pesticides and farming practices have been made over the last few decades, but to continue improving, we need to evaluate each pesticide, technology and farming practice individually and constantly compare them with alternatives. This is the only way to accurately and scientifically meet the challenges we face in the future, including the growing threat of increasing population and climate change.

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GLP Executive Director Jon Entine edited the story and added information for context.