

## Strawmen and selective statistics: Did The New York Times botch its critique of GMO crops?

*Andrew Kniss is an internationally respected independent plant scientist and weed specialist at the University of Wyoming. He is best known for his focus on sustainable agriculture. This critique originally appeared on the blog that he contributes to, Control Freaks, under the title “The tiresome discussion of initial GMO expectations”—read it here—and reproduced with the permission of the author.*

A new article in the *New York Times* [[“Doubts About the Promised Bounty of Genetically Modified Crops”](#) by Dany Hakim] has questioned the benefits associated with genetically engineered crops (which I’ll call GMOs for brevity). The response to the article has been pretty predictable; folks who don’t like GMOs are circulating it to say [“I told you so.”](#) And ag-twitter has exploded with claims that the *New York Times* is biased against the technology.

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The article makes some reasonable points that GMO crops are not a ‘silver bullet’ cure all technology. But almost any reasonable person has already acknowledged that. In a nutshell, the article has 2 main conclusions: GMO crops don’t yield more, and GMO crops haven’t reduced pesticide use. These two items were initially claimed as reasons to invest in and adopt GMO crops, and for many years, we’ve been hearing about how these crops either have or have not met the initial expectations. Danny Hakim looked at some data and has come down pretty solidly on the side of “have not” met expectations. From the [Times article](#):

An analysis by The Times using United Nations data showed that the United States and Canada have gained no discernible advantage in yields — food per acre — when measured against Western Europe, a region with comparably modernized agricultural producers like France and Germany. Also, a recent National Academy of Sciences [report](#) found that “there was little evidence” that the introduction of genetically modified crops in the United States had led to yield gains beyond those seen in conventional crops.

Of all the arguments against GMO crops, the “failure to yield” talking point is among the oldest, and most exasperating to many of us who work in pest management. I addressed this issue a couple years ago:

If you take a broad look at national level data in the US, it is difficult to make a case that GMOs, as a monolithic entity, have had a dramatic impact on crop yields. But I can think of very few traditional plant breeding efforts that have led to a “quantum leap” in crop yields across the board. If the inability to generate a “quantum leap” in crop yield is a failure of crop biotechnology, it is also a failure of traditional plant breeding methods. Does this mean we

should stop investing money in traditional breeding efforts? Certainly not. Why should we expect GMO crops to have this kind of impact?

[T]he only reason we'd see an increase in crop yields due to [current GMO] traits is if we didn't have adequate tools to manage those pests prior to the introduction of the GMO traits. For corn and soybean in particular, it is not at all surprising we've not observed major yield increases due to these traits. Corn and soybean represent huge market opportunities for pesticide development, and therefore, many tools were already available to manage weeds and insect pests in those crops.

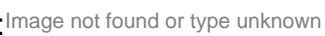
But there are situations where GMO traits have contributed to major yield increases.

In that post, I used regional USDA data (not national level data, which often 'washes out' any regional benefits of various technologies) to show that increases in yield trajectory are likely attributable to the adoption of GMOs. Please read it if you're interested in the question of GMOs increasing crop yields. Here, I'm going to instead highlight some of the issues with the pesticide use comparison Mr. Hakim relied upon to draw conclusions about how GMOs affected pesticide use. Mr. Hakim states in his article:

At the same time, herbicide use has increased in the United States, even as major crops like corn, soybeans and cotton have been converted to modified varieties. And the United States has fallen behind Europe's biggest producer, France, in reducing the overall use of pesticides, which includes both herbicides and insecticides.

...in France, use of insecticides and fungicides has fallen by a far greater percentage — 65 percent — and herbicide use has decreased as well, by 36 percent. — [Danny Hakim, NYT](#)

I have to say this comparison seems borderline disingenuous; certainly not what I'd expect from an "extensive examination" published in the New York Times. The NYT provides a few charts in the article, one of which supports the statement about France's reduced pesticide use. But the figures used to compare pesticide use in France vs the USA are [convoluted and misleading](#). First, the data is presented in different units (thousand metric tons for France, compared to million pounds in the US), making a direct comparison nearly impossible. Second, pesticide amounts are not standardized per unit area, which is critically important since the USA has over 9 times the amount of farmland that France does; it would be shocking if the U.S. didn't use far more pesticide when expressed this way. So I took the data presented by Mr. Hakim and converted it into the same units, and standardized by arable land, and this is what that

same data looks like: 

It is true that France has been reducing pesticide use, but France still uses more pesticides per arable hectare than we do in the USA. In the case of fungicide & insecticides, a LOT more. But a relatively tiny proportion of these differences are likely due to GMOs; pesticide use depends on climate, pest species, crop species, economics, availability, tillage practices, crop rotations, and countless other factors. And almost all of these factors differ between France and the U.S. So this comparison between France and the U.S., especially at such a coarse scale, is mostly meaningless, especially with respect to the GMO question. If one of France's neighboring EU countries with similar climate and cropping practices had adopted GMOs, that may have been a more enlightening (but still imperfect) comparison.

Given all of these confounding factors, I wonder why France was singled out by Mr. Hakim as the *only* comparison to compare pesticide use trends. Pesticide use across Europe varies quite a bit, and trends in most EU countries are *increasing*, France is the exception in this respect, not the rule. In the early 1990's, France was using more herbicides compared to almost every other country, so it shouldn't be too

surprising that pesticide use decreased as formation of the EU began to standardize pesticide regulations after 1993. If the increase in herbicide use in the U.S. is due to GMOs, what can explain the increase in herbicide use throughout most of Europe, where GMO varieties are not available?

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But all of the discussion about weight of pesticides applied doesn't really provide much insight into pesticide use anyway, especially when it comes to the impacts of GMO crops. An increase in the weight applied could be due to replacing 5 or 6 different pesticides for one pesticide that is used at a higher rate. Or we could decrease pesticide weight applied by substituting one relatively safe pesticide for one that is highly toxic, but used at a lower rate. This problem was noted by the recent National Academies report on GMO crops (emphasis mine):

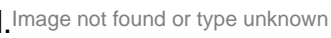
The use of HR crops sometimes initially correlated with decreases in total amount of herbicide applied per hectare of crop per year, but the decreases have not generally been sustained. However, such **simple determination of whether total kilograms of herbicide used per hectare per year has gone up or down is not useful** for assessing changes in human or environmental risks.

**RECOMMENDATION: Researchers should be discouraged from publishing data that simply compares total kilograms of herbicide used per hectare per year** because such data can mislead readers. – [National Academies, GE Crop Report](#)

Mr. Hakim cited the NAS report to support his conclusions on yield gains, but apparently missed this important recommendation from the report. Instead of looking at weight of pesticides applied, it is more instructive to look at the number of active ingredients being applied to each field. I [recently did this](#) for the U.S. and found that herbicide treatments were increasing in the three glyphosate resistant crops (corn, soybean, and cotton). But herbicide use was *also* increasing in rice and wheat, where no GMO varieties are commercially available. In fact, the pace of herbicide increase was *slower* in the GMO crops than non-GMO crops. From these data, one could make a plausible argument that GMO crops *have* decreased herbicide use, since the increase in herbicide use has been slower compared to non-GMO crops. But this

is the problem with trying to construct a narrative from imperfect, national-level data. I don't actually know whether GMO crops have increased or decreased herbicide use (and neither does Mr. Hakim). We can each use different versions of the best data available to fit a particular narrative if we want to. But the answer is far more complex than anything we can derive from data that weren't explicitly generated with

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this question in mind. 

Mr. Hakim decided not to delve too deeply into the toxicity differences in the pesticides being used, except for the following (rather remarkable) comment:

Pesticides are toxic by design — weaponized versions, like sarin, were developed in Nazi Germany — and have been linked to developmental delays and cancer. — [Danny Hakim, NYT](#)

I'm a little taken aback that Mr Hakim went [full Godwin](#) in the New York Times in an article about GMOs and pesticides. Setting that aside, it is indisputable that pesticides are, indeed, toxic. But so are antibiotics, and pet flea collars, and nutritional supplements, and salt, and caffeine, and almost every other thing we come into contact with in our daily lives. With respect to the impacts of pesticide use, the question should be *how* toxic, and to which organisms? The toxicity of different pesticides differs dramatically, by several orders of magnitude. And many pesticides are practically non-toxic to humans. To say that pesticides are all toxic, while certainly true, misses the point. The questions we should be asking is whether we are using pesticides that are more or less toxic than we would be using if we didn't have GMOs. Mr. Hakim decided not to address this issue. [But I have.](#)

The herbicide that we're using more of because of GMO crops has probably contributed to a major reduction in chronic toxicity (I say *probably*, because again, we can't know for sure what would happen in an alternate universe without GMOs). Glyphosate has a lower chronic toxicity than 90% of all herbicides used in the US in the last 25 years. In 2014 to 2015, glyphosate made up 26% of corn, 43% of soybean, and 45% of cotton herbicide treatments, yet only contributed 0.1%, 0.3%, and 3.5% of the total chronic toxicity of herbicide use in those crops, respectively.

There are trade-offs involved with every decision farmers make, including the choice to use (or not use) glyphosate and GMO crops. If GMO crops were not available in the U.S., or if glyphosate use were discontinued (as was recently proposed in the EU), the resulting displacement of glyphosate by other herbicides would almost certainly have a negative impact on chronic health risks faced pesticide applicators and farm workers.

I really hope the conversation can eventually move beyond whether GMO crops have met some arbitrary initial expectations, regardless of the origin of those expectations. If that means we all need to simply acknowledge that GMO's have failed to meet those goals, then fine. I concede. Not because I think the data overwhelmingly support that conclusion, but because this is a tiresome conversation that distracts from much more important issues in agriculture. GMO's have not (and will not) result in an agricultural panacea. But that doesn't mean they don't have value.

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