

GMO BEYOND THE SCIENCE

VIEW FROM A FARM: WITHOUT GLYPHOSATE, WHAT WOULD FARMING LOOK LIKE?

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HIGHLIGHTS

- On our farm we use what amounts to large soda-sized cup of glyphosate per acre
- GE crops and glyphosate allowed us to switch to more sustainable no-till farming
- “Superweed” problem no worse using glyphosate than other pest chemicals
- Our use of most toxic chemicals has gone down, as it has for most conventional farmers
- Banning glyphosate would result in using more toxic chemicals, abandoning no-till

The news earlier this year that the European Union stepped to the brink of banning the herbicide glyphosate got me thinking—what would our farming operation look like if we had this herbicide tolerant crop system taken away? It’s a question I’ve pondered for no other reason than to determine what my alternatives would be if the use of this chemical becomes a political football in the United States as it’s become elsewhere.

How would the loss of glyphosate change what we do now? Are the alternatives better or worse than the current production model? To be sure, thinking this through was not a pleasant exercise, but it’s a critical one considering how overheated the global discussion has become on this chemical.

Most people reading this are probably familiar with glyphosate. It goes by the trade name Roundup. It does a great job at killing weeds. If you do any gardening, you've probably bought it at your local hardware store and used it on your lawn safely for decades. We use glyphosate with crops, like soybeans, that are herbicide resistant. That means we can spray it after the weeds and/or the crop has emerged and it will kill the weeds but not harm the crops. For farmers and consumers, that's a good thing, I believe.

But if you're an anti-GMO activist, glyphosate is the root of all evil. They say that farmers, like me, drench our crops in this herbicide; turns farmers into chemical junkies; hurts beneficial insects; destroys the vitality of the soil; leads to a massive infestation of monstrous weeds; and worst of all that it will kill me of cancer. Science says none of these are true, and that's confirmed by my personal experience. But advocacy organizations are all over the Internet promoting these scare stories, and many of their claims are circulated by the mainstream news as if they are true. It hurts my brain to read that stuff.

There are people out there who truly believe that we farmers douse, drown, drench or saturate our crops in chemicals. Anti-GMO campaigners, organic activists and irresponsible news reports use those phrases all the time (see [here](#), [here](#), [here](#), [here](#)). In graphic form it often looks something like this meme from GMOFreeUSA pictured here:



Really?

Does GMOFreeUSA actually think we load up big tankers of herbicide and drown our crops with the stuff? First, they don't understand the meaning of the word drown; second, to really drench a crop we would have to use one of those big tanker airplanes they use to fight forest fires. The video in this link, for example, would qualify as a drenching, probably not a drowning. Sorry, that simply is not what we do on a modern farm.

Nothing could be further from the truth.

On our farm, we grow both GMO and non-GMO crops. When planting season arrives in Iowa, I begin applying herbicides to prepare for planting. On our no-till ground—the most sustainable form of agriculture, and it's been made possible by the use of GM crops—we use a combination of glyphosate, 2,4-D and metalachlor for corn. For soybeans we add a pre-packaged mix of chlorimuron, flumioxazin and thifensulfuron. On our tilled ground, we leave out the glyphosate and 2,4-D, as it's not needed because tillage kills the weeds that are present.

So, what about this drowning of our fields with glyphosate that we've been reading so much about? On our corn ground, before planting we apply 16 ounces of glyphosate along with a small amount of these other chemicals. To put that in perspective, it's a little more than half a gallon of total herbicide spread out over an acre, or roughly the size of a football field.

In other words, per square foot, on the corn ground we apply what amounts to 1/3 of a drop per square foot. On soybean ground it's approximately 1/12 of a drop per square foot. What we do is a misting and not a "dousing." We're not "drowning" plants in pesticides; we're using what amounts to an eyedropper.

That's what we do now. But as a farmer, I have to be sober about this. What happens if the activists scare enough people, or members of Congress, and a ban is put in place, like what may very well happen in Europe after the 18-month temporary renewal ends. What's the worst case scenario?

HERE'S HOW I USED TO FARM

I'm not saying it would be a full-on nuclear winter here, but it would be a regression to an earlier time, and I know a far less sustainable time, before glyphosate came into wider use in the late 1980s. To take a phrase from a show from a while back – "Imagine if you will... a time not long ago.... "

One of the biggest issues for all farmers, conventional and organic, is how to prepare the soil for seeding by clearing away, and preventing weed competition. Let's start at the

beginning of the crop cycle and work through this. As a farmer, the first thing I need to decide before the season even begins, is what type of production model should I use: conventional tillage; conservation tillage; or no-till?

We used to rely a lot on conventional tillage (and many organic farmers still do). Conventional tillage is a system in which the ground is tilled either in the fall after the previous crop is harvested or early in the spring before planting. A plow rolls the ground, which doesn't do much good for the soil structure—it speeds up the decomposition of crop residue and soil organic matter. That leads to increases in carbon release from the soil via CO₂. Not good, and a practice that we've eliminated in our operation. In fact, we have not used a moldboard plow (like the one seen below) in probably 25 years.



Next, we used a disk to level the ground and remove any weeds that may have germinated after the primary tillage was complete. The secondary tillage step was always done in the spring, and the timing could be anywhere from a few days to a few weeks prior to planting. If weeds were present, we would perform yet another tillage pass. Then we would plant.

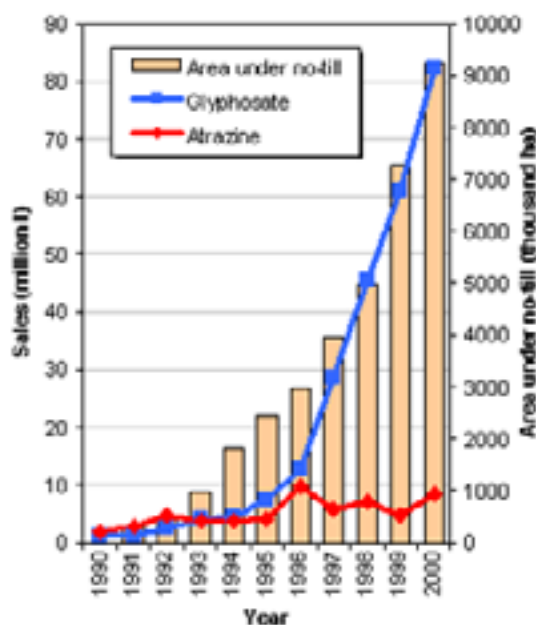
After planting, but before the crop emerged, we would make a herbicide application to prevent weeds from germinating and competing with the crop. Weeds are a bitch. They really are. They steal water and nutrients from the crop, and can out-compete them because of their aggressive growth. Organic farmers say that they are their number one headache; they use a combination of soil management techniques, some of which we use as well, and natural chemicals (some of which are quite toxic, like copper sulfate).

Depending on the crop, we would usually use a wide variety of pre-emergent herbicides. These products were efficient in reducing broadleaf weeds and relatively good at preventing grass type weeds but they weren't 100 percent effective. Yep, it meant that we had to do one or two more tillage passes, this time with what we called a row-crop cultivator. So in total we made at times up to five tillage passes for each crop season. And once weeds emerged, we didn't have many crop-safe herbicide options. Weedy fields were common, and resulted in loss of yield, and another increase in weed pressure the next season.

As we farmers became more aware of the damage tillage could do, we added conservation tillage to the mix, which resulted in less turning of the soil. Herbicides improved but they still weren't 100 percent effective. However, we were able to cut the number of tillage steps down from five to as few as two.

In the late 1970's, the production system called no-till was being developed. It was interesting to me as it solved a few of the soil issues, but as a complete system it didn't seem workable when first introduced. It was heavily dependent on intense management. Even with all its ecological advantages, most conventional (and organic farmers, then and now) did not adopt it because it just didn't control weeds very well—unless you used a lot of chemical applications, and few farmers, organic or conventional, want to do that.

Everything began to change in 1996, when herbicide tolerant (Ht) crops were introduced. The first to market were soybeans tweaked to have a tolerance to glyphosate, known as Roundup Ready. You could spray a field with glyphosate to prevent weeds from growing, and if you had to spray after the soybeans emerged, the crop was unharmed. This started to get interesting. Suddenly, as the chart below makes clear, the various systems started to come together in a great ecological package. I was able to cut down drastically on the use of far more toxic chemicals and substitute glyphosate, which was also more effective, and that enabled us to move to more no-till farming, a huge boost to our commitment to sustainability. Everything was coming together, as you can see here:



HOW HERBICIDE RESISTANT FARMING HAS CHANGED FARMING, AND ME

The older generation of farmers loved to see fields that were flat and free of surface residue prior to planting. They took great pride in the ability to plow and not have a single corn stalk on the surface. I get that, however I'm not as OCD as those old guys were. They liked things neat and orderly. That tendency went back for generations. You see, we have traced our farming lineage back to colonial days, and we've always been farmers in the New World. We worked our way through what is now known as Long Island, through New Jersey, then Ohio and Indiana, landing in East Central Iowa. When I say I had to fight some history, I really had to fight some history. Many farm families in the Midwest followed a similar path, and they equally hated disorder. No-till was first seen by many Midwest farmers as nearly sacrilegious; residue everywhere, and weeds were sometimes allowed to emerge. Scandalous!

I had to fight that perspective in our own operation. I'm not a traditional guy. I love to make hamburger out of sacred cows, and I try to do it nearly every day in my farming operation. Other farmers around us had begun to use no-till for planting soybeans into corn residue, but they still mostly tilled using conservation tillage prior to planting corn. For them, the traditional process was hard to break. But we jumped into the no-till production system with both feet.

Let's look for a second at the herbicides we used in the past, compared to what we use now—what we would have to go back to if glyphosate were banned. We still use a range of older chemicals, primarily, acetachlor, metalachlor, pendimethalin, atrazine, dicamba, 2,4-D and glyphosate. They've all been around since I started farming in the early 1980's, and most were produced much earlier—including glyphosate. No, glyphosate is not new, despite what the activists say and it wasn't invented for use on herbicide tolerant crops. It's been on the market since 1974, and quickly became the best-selling herbicide in the world. Why? Because it is so effective, and allowed us to cut down on the use of far more toxic chemicals. For example, I've reduced my use of paraquat—which, although safe for farming, is 1500 times more toxic than glyphosate—to almost nothing.

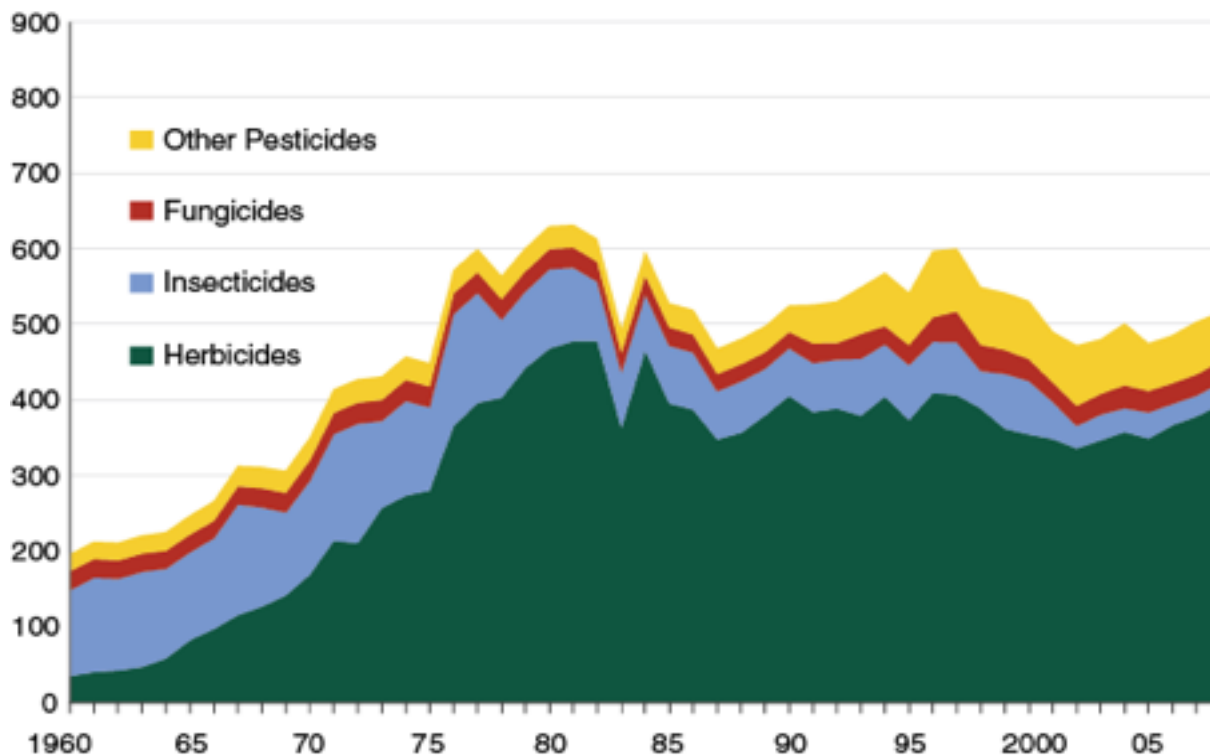
What about claims that since the introduction of herbicide resistant GMO crops we use even more chemicals than we did before? That's not my experience, as I will explain, despite what you may read on some websites. Sure, its use has gone up. How could it not! It's paired with GMO crops whose use has boomed.

But that's kind of a silly statistic. If critics were genuinely interested in sustainability, they'd ask, "Has the overall use of the chemicals and in particular the most toxic chemicals gone up?" Those are questions that really matter to the soil and humans. The answers are clear, according to independent government statistics. According to the USDA, in a **2014 report**, pesticide use in the US peaked in 1981, and has trended downward since then. Here are

two graphs they used to illustrate the trend. Note the drop off beginning in 1996 when GMO crops were introduced.

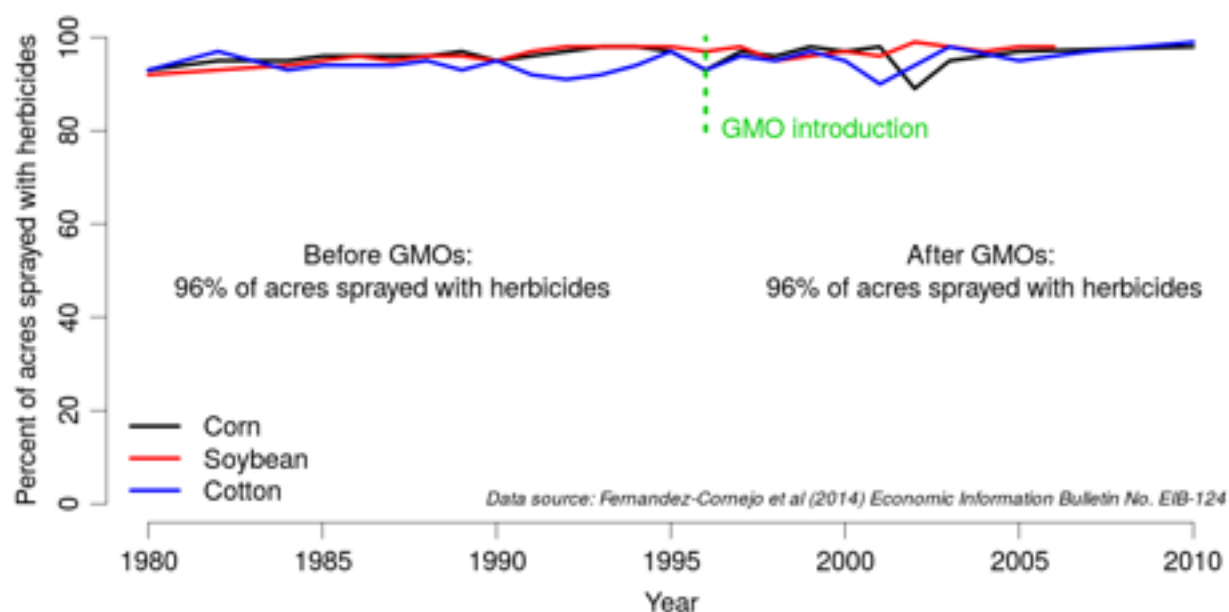
Pesticide use in U.S. agriculture peaked in 1981 (21 selected crops, 1960 -2008)

Million pounds of pesticide active ingredient

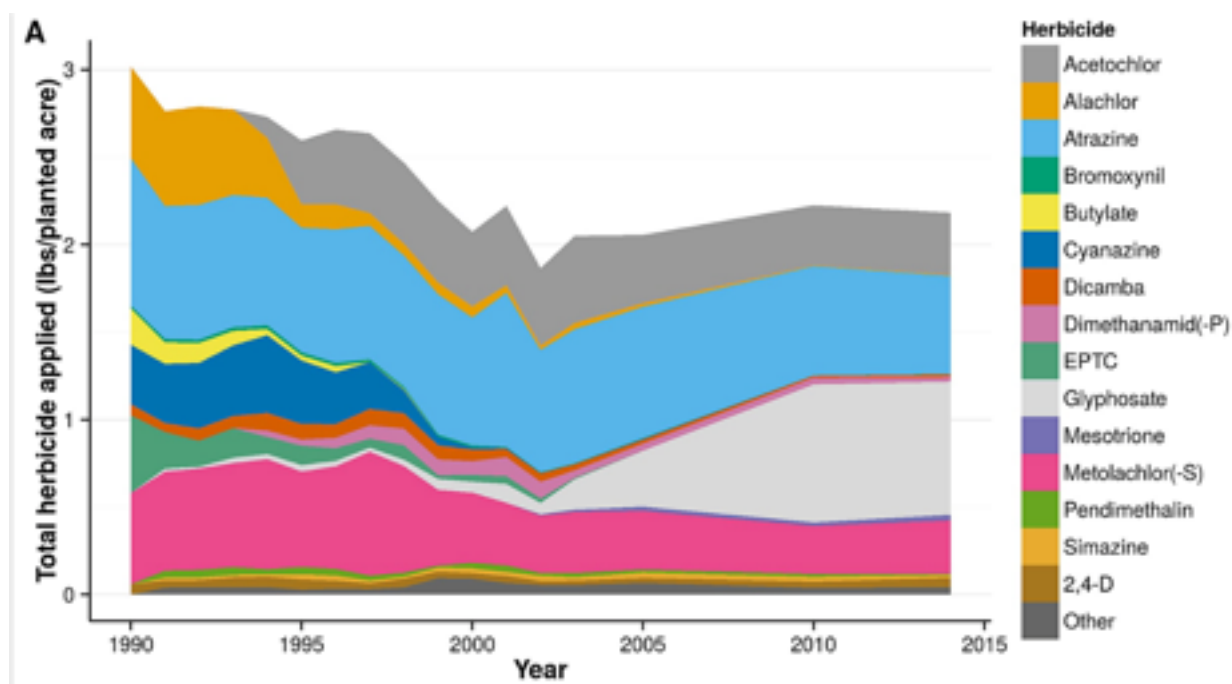


Source: USDA, Economic Research Service using USDA, National Agricultural Statistics Service and proprietary data.

While glyphosate use has, of course, grown, it has not increased the use of chemicals, as some claim.



Glyphosate, a very mild toxicant, has replaced far harsher ones, as this chart of the usage of chemicals on corn in the US, though 2015, illustrates.



Source: Wyoming Weed Sciences

What about the claim, made as an accusation, that glyphosate causes “superweeds”? I hear it mentioned quite a bit. It’s a genuine issue for farmers, but the reality is weed resistance is nothing new. Pests, whether they are weeds or insects, evolve. It’s what they do. According to the Weed Science Society of America, weed resistance predates herbicide tolerant crops by at least 40 years. Our job as farmers is to be stewards of not only the land, but of the herbicide tolerant technology and herbicides themselves, it is also our responsibility to minimize the chance of resistance. Banning glyphosate won’t solve the

superweed problem. Soybean farmers who have switched away from glyphosate to other conventionally bred non-GMO herbicides such as ALS inhibitors have it even worse—their superweed problem is far worse than with glyphosate. Beware of what you wish for.

SUSTAINABILITY

That brings me to my last, and likely most important, point. Let's look forward instead of back. I dislike the term 'sustainability' because it's such an ill-defined buzzword. Sustainable farming is a nebulous term, because everything we do involves environmental trade-offs. Our operation attempts to embrace the three pillars of ecological farming: It has to be economically stable, environmentally sound and socially acceptable. The concept we've handed down for generations isn't unique to us; it's ingrained in our family to leave the land in a better condition than we found it. That means lots of things. I must take care of the soil so it remains fertile for my lifetime and for my children, and for all generations to come.

So then, what happens if herbicide tolerant crops, or specifically glyphosate, is taken away? Simply said, we can only use what's on the shelf already. We'd have to regress to a prior production model that includes one of several distasteful options. including more tillage and less environmentally smart chemicals.

That's simply not acting as a steward to our land and our children.

Dave Walton is a full-time Farmer in Cedar County Iowa, 6th Generation, growing GM and non-GM corn, soybeans, alfalfa and hay on 500 acres. Iowa State University, studied Animal Science. Director, Iowa Soybean Association and licensed Commercial Pesticide Applicator and former Certified Crop Advisor.

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