

Where Do Herbicide Resistant Weeds Come From, Part 1?

AGRI-VIEWS

by Chuck Otte, Geary County Extension Agent

In recent years, okay, maybe over the past 20 years, we have watched as herbicide resistant weed populations have developed in response to use of herbicides primarily in crop production. There tends to be a lot of confusion about these herbicide resistant weeds and a lot of really bad information, especially on the internet. If you hated genetics in science classes, you may want to run screaming out of the room now, but I'll try to keep this really basic!

Contrary to what you may have heard or what some internet sources may try to lead you to believe, herbicides, at the rates used in fields, are generally not mutagens. The herbicides did not cause a change in the individual genes of plants. What happens is a very basic plant breeding principle called, selection.

The early herbicides, whether they were arsenicals, like MSMA, or plant growth regulators, like good old 2,4-D, worked on a very basic dosage principle. The more you applied, the quicker the damage would be seen and the more completely they worked on a plant population. 2,4-D is a growth regulator that has an impact, primarily, on broadleaf weeds, but not so much on grass. Very tiny amounts of 2,4-D will actually accelerate growth in plants. But get a little more on the plant and all of a sudden its system goes haywire and it essentially grows itself to death. Small annual plants can be killed with low rates, larger perennial plants took a larger dosage for the same effect.

As we became better at understanding how plants grew and the biochemical pathways within the plants, we learned how to interrupt a crucial pathway with very low rates of a herbicide. All of a sudden instead of applying quarts or pounds per acre, we were controlling weeds with a fraction of an ounce per acre!

Then along came all of the Roundup Ready technology. Roundup (Glyphosate) was a herbicide that came out in the 1970s that was promoted as being non-selective systemic herbicide. If you sprayed it on a green actively growing plant, it would kill that plant. It was phenomenally effective. We couldn't use it on growing crops but we could control weeds between crops or before planting without using tillage equipment that wasted water, energy and carbon in the soil. Roundup was the revolution that no-till and reduced till farming really needed.

The next step came when a gene was discovered in a bacteria that was resistant to the herbicide glyphosate. It took around a decade for scientists to figure out how to get this gene into soybeans and corn. Once they were able to get the gene into these crops, it took several more years to then develop the amount of seed required, and government acceptance, to allow these crops to be used in farmer's fields. In just a few years, farmers were suddenly able to spray a growing corn or soybean crop with glyphosate to control all the weeds that were growing. No pre-plant application, no tillage, just spray with glyphosate and have a perfectly clean field.

With all these changes, and general elimination of mechanical tillage of fields, we suddenly had a revolutionary shift in the kinds of pressure that we were putting on the weeds that we had in our crop fields. In essence, we were changing the selection pressure on the weed populations and a shift in troublesome weed species was inevitable. Next week, the discovery and rise of herbicide resistant weed populations.