October 4, 2016

Docket ID: **EPA-HQ-OPP-2016-0385**

Environmental Protection Agency Docket Center (EPA/DC)
(28221T)
1200 Pennsylvania Ave, NW
Washington, DC 20460-0001

Re: **FIFRA SAP on EPA's Evaluation of the Carcinogenic Potential of Glyphosate; Request for Information and Comments.**

The Weed Science Society of America (WSSA) appreciates the opportunity to submit comments in regards to the FIFRA SAP's review of the carcinogenic potential of glyphosate. WSSA was founded in 1956 as a non-profit professional society that fosters an awareness of weeds and their impact on our environment. Our members include national and international weed scientists in academia, government, and industry who provide science-based information to the public and government policymakers while promoting research, education, and outreach activities.

WSSA fully supports EPA's Cancer Assessment Review Committee's (CARC) report on glyphosate (Docket ID: EPA-HQ-OPP-2016-0385-0014) and appreciates the scientific rigor and thoroughness of the CARC's review of all available epidemiology and carcinogenicity studies. WSSA agrees with the CARC's assessment that the few studies that the International Agency for Research on Cancer (IARC) selectively chose for its glyphosate review suffered from small sample sizes of cancer cases related to glyphosate exposure and had risk/odds ratios with large data variance beyond acceptable limits. Furthermore, WSSA feels that the IARC review process for glyphosate was flawed and represents a case of gross scientific negligence. There is no question that IARC arrived at their conclusion due to their inclusion of the positive findings from a selection of studies with known limitations, a lack of reproducible positive findings, and the omission of the negative findings from credible and reliable research.

Finally, WSSA would like to take this opportunity to comment on the ongoing importance of glyphosate as a weed management tool and submit information we have developed surrounding some common misconceptions about glyphosate and herbicide resistance management.

2014 WSSA FACT SHEET

Dispelling Common Misconceptions about Superweeds

(http://wssa.net/wp-content/uploads/WSSA-Fact-Sheet-on-Superweeds_16-Sep-2014.pdf)

Use of the term superweed has exploded in recent years and is frequently featured in news reports about herbicide-resistant weeds choking out crops. A few recent headline examples:

- **Superweeds Choke Farms** (*Des Moines Register, June 22, 2014*)
- **The Rise of the Super Weed Around the World** (*Wall Street Journal, June 23, 2014*)
- **U.S. Midwestern Farmers Fighting Explosion of "Superweeds"** (*Reuters, July 23, 2014*)
- **Superweed Spreading through Wall, Texas (***KLST-TV, July 29, 2014***)**
- **Super Weed Spreads Closer to Quad Cities** (*WQAD TV, August 4, 2014*)

While there is no science-based definition for superweed, the term is often used to describe weeds believed to have special capabilities that are helping them outcompete other plants in ways never experienced before. Many associate superweed with glyphosate-tolerant crops and the suspected transfer of resistance genes from these crops to weeds. The Oxford Dictionary, for example, is one of many online resources to define superweed as "a weed which is extremely resistant to herbicides, especially one created by the transfer of genes from genetically modified crops into wild plants."

But is that the truth? Are today's weeds "supercharged" in some way? And if so, why is that the case?

As a nonprofit organization that promotes science-based information about weeds, their impact on the environment and how they can be managed, the Weed Science Society of America (WSSA) has compiled the information below to clarify two common misconceptions about superweeds.

> **Misconception 1: Rampant gene transfer between genetically modified crops and weeds is creating weeds able to resist treatment by herbicides.**
>
> **Reality: There is no evidence that gene transfer is a major factor in the development of herbicide resistance. Instead, overreliance on herbicides with a single mechanism of action to control certain weeds has led to the selection of weeds resistant to that mechanism of action.**

The transfer of resistance traits from genetically modified crops to weeds growing in the field is rare, and the occurrences observed and reported to date have had minimal impact. The only currently known mechanism for any crop trait to move into weeds (or vice versa) is through cross pollination – a sexual crossing between the crop and the weed. Gene flow is more likely to happen if the crop and weed are sexually compatible, near relatives. Gene flow among more distantly related plant species is rare because they do not cross as readily. There are often physiological barriers, including pollen incompatibility, varying numbers of chromosomes and other factors that serve as impediments.

Even among sexually compatible crops and weeds, the opportunity for crop-weed gene flow depends on proximity of the crop plant to its wild weedy relatives. For example, there have been no reports of gene transfer in the more than 160 million annually planted acres of genetically modified corn, cotton and soybean crops where herbicide resistance weeds are such a significant

issue today. Since these crops don't have sexually compatible, near relatives in the U.S. and Canada, the risk of gene flow to other plants in the region is extremely low. Crops like sunflower, wheat and canola do have compatible weed relatives in their major production areas (e.g. wild sunflower, jointed goatgrass, and wild relatives of canola, respectively). As a result, the risk of gene flow between those crops and wild plants is greater. Where gene flow has occurred, the resulting plants are no more weedy than their parent plants.

> **Misconception 2: Herbicide use is creating a new breed of herbicide-resistant superweeds unlike anything we've ever seen before.**
>
> **Reality: The costly issue of herbicide resistance isn't new – and neither are the competitive characteristics of weeds. Although the number of acres affected by resistant weeds has increased over the last decade as more growers have come to rely solely on herbicides with a single mechanism of action for weed control, weeds have exhibited resistance to many types of herbicides over the past 40 years. Many weed populations have even evolved resistance to multiple herbicide mechanisms of action.**

Herbicide resistance is an important, costly and escalating issue, especially as growers have come to rely more than ever on a single class of herbicides that targets weeds in the same way. It is more critical than ever for a variety of carefully integrated weed management strategies to be used so weeds resistant to one method can be controlled in other ways before they have an opportunity to spread. This includes nonchemical means of weed control, such as crop rotation, tillage, cultivation, hand hoeing, seed capture, etc. The WSSA has created a variety of free educational materials and recommendations concerning resistance and how to avoid it, available online at http://wssa.net/weed/resistance.

As to those super powers that many individuals ascribe to herbicide-resistant weeds? Under herbicide-free conditions, resistant weeds are no more competitive or ecologically fit than their susceptible partners. Both can crowd out crops and other desirable plants by outcompeting them for water, nutrients, sunlight and space. They grow incessantly and can be prolific seed producers. A single Palmer amaranth plant, for example, can produce hundreds of thousands of seeds, regardless of whether it is herbicide resistant or not.

Weeds can be economically devastating if allowed to grow unchecked. As a result, we need to monitor vigilantly and use a variety of herbicide and non-herbicide strategies to control weed populations before they get out of hand.

2016 WSSA PRESS RELEASE

WSSA Scientists Say Herbicide Resistance Predates Genetically Engineered Crops by 40 Years

http://wssa.net/2016/07/scientists-say-herbicide-resistance-predates-genetically-engineered-crops-by-40-years/

LAWRENCE, Kansas – July 12, 2016 – You may think weeds resistant to herbicides are a new phenomenon linked to the overuse of glyphosate in genetically engineered crops, but according

to the Weed Science Society of America (WSSA) nothing could be further from the truth. This year marks only the 20th anniversary of glyphosate-resistant crops, while next year will mark the 60th anniversary of the first reports of herbicide-resistant weeds.

The first known report of herbicide-resistance came in 1957 when a spreading dayflower (*Commelina diffusa*) growing in a Hawaiian sugarcane field was found to be resistant to a synthetic auxin herbicide. One biotype of spreading dayflower was able to withstand five times the normal treatment dosage. That same year wild carrot (*Daucus carota*) growing on roadsides in Ontario, Canada was found to be resistant to some of the same synthetic auxin herbicides.

Since then, 250 species of weeds have evolved resistance to 160 different herbicides that span 23 of the 26 known herbicide mechanisms of action. They are found in 86 crops in 66 countries, making herbicide resistance a truly global problem.

"Given all the media attention paid to glyphosate, you would think it would have the greatest number of resistant weed species," says David Shaw, Ph.D., a Mississippi State University weed scientist. "Though there are currently 35 weed species resistant to the amino acid synthesis inhibitor glyphosate, there are four times as many weed species resistant to ALS inhibitors and three times as many resistant to PS II inhibitors."

Scientists say what is unique about glyphosate resistance is the severity of selection pressure for resistance development. More than 90 percent of soybean, corn, cotton and sugar beet acres in the U.S. are glyphosate tolerant and receive glyphosate treatments – often multiple times per year.

"The sheer size of the crop acreage impacted by glyphosate-resistant weeds has made glyphosate the public face for the pervasive problem of resistance," says Shaw. "But resistance issues are far broader than a single herbicide and were around long before glyphosate-resistant, genetically engineered crops were even introduced."

Research shows that resistant weeds can evolve whenever a single approach to weed management is used repeatedly to the exclusion of other chemical and cultural controls – making a diverse, integrated approach to weed management the first line of defense. Many growers have had great success fighting resistance by adopting a broader range of controls.

One example is found in the experiences of U.S. cotton growers in the southern U.S. After years of relying on glyphosate for weed control, resistant Palmer amaranth (*Amaranthus palmeri*) began to overrun crops and caused yields to plummet. Today integrated weed management programs that use a diverse range of controls have become commonplace in cotton, despite the higher cost. Growers are using cover crops, hand-weeding, tillage, weed seed removal and herbicides with different mechanisms of action in order to keep Palmer amaranth at bay.

There have been tradeoffs. Additional herbicides, labor and fuel have tripled the cost of weed control in cotton. In addition, increased tillage has raised concerns about soil erosion from water and wind. But for now, the crop has been preserved.

"Although diversification is critical to crop sustainability, it can be difficult to make a decision to spend more on integrated weed control strategies," says Stanley Culpepper, Ph.D., a weed

scientist at the University of Georgia. “As a result, many of the most successful diversification efforts can be found in crops like cotton where change became an imperative.”

Culpepper says that in addition to costs, another barrier to adoption of integrated weed management is the belief by some that new types of herbicides will be invented to take the place of those no longer effective on resistant weeds. But the HPPD-inhibitors discovered in the late 1980s for use in corn crops are the last new mechanism of action to make its way out of the lab and into the market.

“It would be naïve to think we are going to spray our way out of resistance problems,” Culpepper says. “Although herbicides are a critical component for large-scale weed management, it is paramount that we surround these herbicides with diverse weed control methods in order to preserve their usefulness – not sit back and wait for something better to come along.”

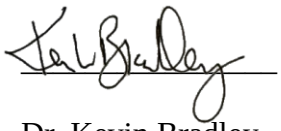
Concluding Remarks

The WSSA does not want to downplay that herbicide resistance is an important, costly and escalating issue. Currently, there are 16 weed species with documented resistance to glyphosate in the United States with 38 states having at least one glyphosate-resistant weed species (Table 1). Seventy percent of the 128 cases of glyphosate-resistant weeds currently found in the United States are from five weed species: *Conyza canadensis* (25), *Amaranthus palmieri* (23), *Ambrosia artemisiifolia* (15), *Amaranthus tuberculatus* (14), and *Ambrosia trifida* (12).

At the same time, we want to point out that **glyphosate still remains a critical vegetation management tool that is very toxicologically and environmentally safe.** Glyphosate is the only broad-spectrum, systemic herbicide that is labeled for control of more than 230 weeds with over 400 labeled uses in almost every type of crop, non-crop, pasture, right-of-way, turf, and ornamental production setting. In addition, glyphosate is only one of 14 herbicides labeled for aquatic weed control in lakes, ponds, streams, and irrigation canals.

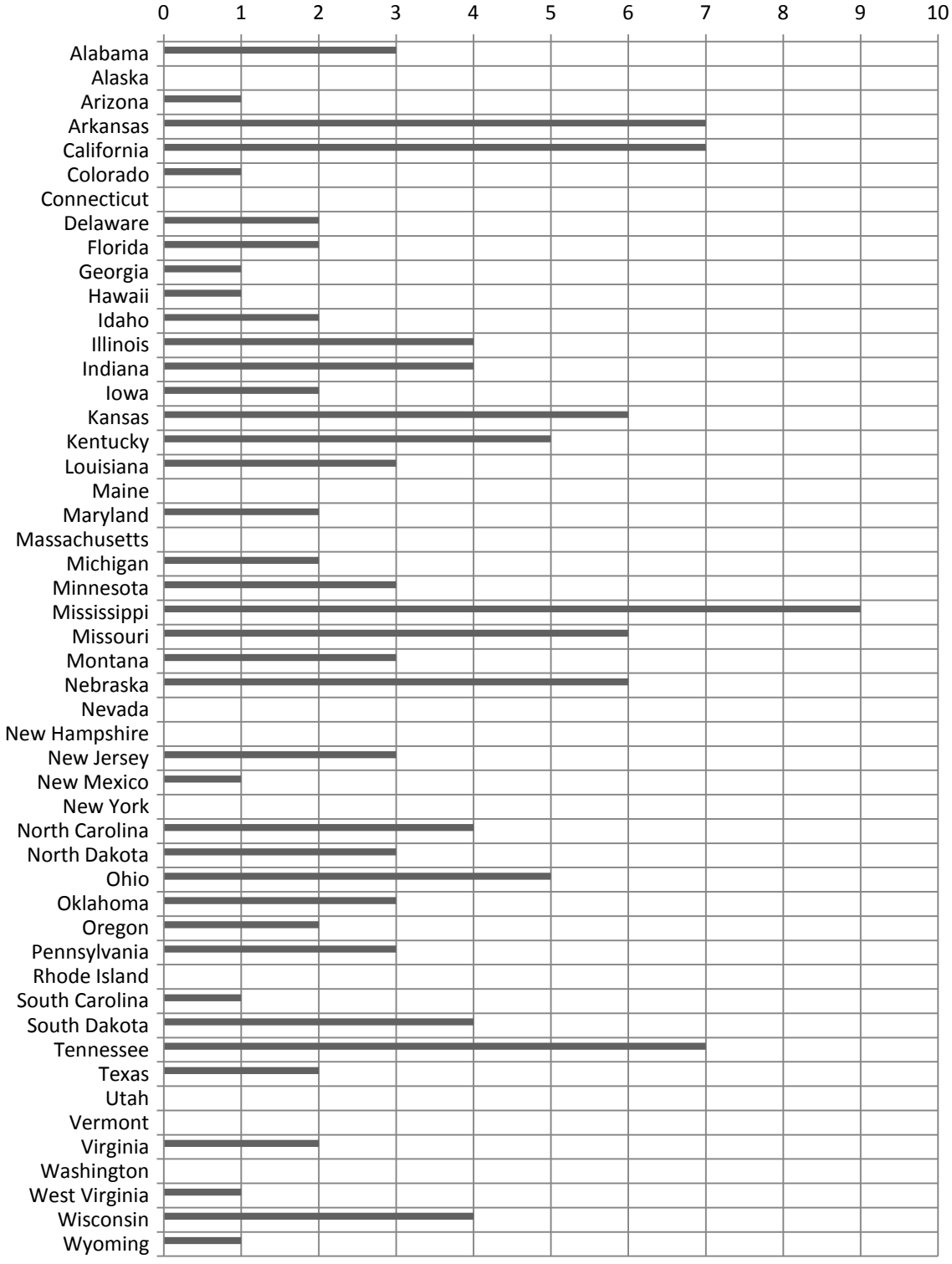
WSSA appreciates the opportunity to provide these documents and comments to the FIFRA SAP and would be happy to offer the expertise of our members to answer any questions you may have.

Sincerely,



Dr. Kevin Bradley
President
Weed Science Society of America

Table 1. Glyphosate Resistant Weeds Species by State - Sept. 2016



Source: www.weedscience.org