

Roundup glyphosate weedkiller responsible for the decline in Monarch butterflies? Media and advocacy groups badly misreport study

News reporting at its best should be nuanced. There are rarely ‘black hats’ and ‘white hats’ when it comes to understanding the issues of the day, unless you are 60 Minutes which revels in journalism casting. Life is usually shades of gray—complex. When reporters address controversial topics, it’s not enough to just get the various elements ‘right’; the headline and the editorial thrust should responsibly reflect the multi-dimensionality of a topic; otherwise a story can muddy the understanding of a complex issue and ultimately undermine both science and the public’s trust in journalism.

Such is the case for a recent article reporting on a [study of Monarch butterfly population declines by an advocacy group](#), written for Cornell University’s [Alliance for Science](#), a solid, reputable source of unbiased scientific information.

screen shot at am

Why are Monarchs in decline? It’s a hotly-debated issue, with many studies with competing conclusions. Anti-biotechnology activist groups have singled out the herbicide glyphosate as a major driver of the decline, so the issue is embedded in a wider, inflamed debate over the controversial weedkiller. Which makes it all the more important that any new science on this issue should be contextualized.

The GLP has addressed this controversy extensively, including providing a dispassionate, science-based analysis in our [GMO FAQ resource](#). We interviewed and sourced a range of scientists on all sides of the issue. Here are two competing quotes, the first from a distinguished, independent scientist [discussing the evidence in the Proceedings of the National Academy of Sciences](#); the second from an activist scientist, representative of activist critics, who happens to be affiliated with an organization [known for its endorsements](#) of homeopathy and Chinese medicine [addressing the controversy](#):

"Herbicide-resistant crops....are clearly not the only culprit and, likely, not even the primary culprit: Not only did Monarch and milkweed declines begin decades before GM crops were introduced, but other variables, particularly a decline in the number of farms, predict common milkweed trends more strongly...."

— [J. H. Boyle, H. J. Dalglish, and J. R. Puzey, Proceedings of the National Academy of Sciences](#)

"Monarch butterfly numbers are dwindling. ... No less than an end to the mass spraying of glyphosate on [milkweed], predicated by Roundup-ready GM corn and soy, will do."

— [Dr. Eva Sirinathsinghji, Institute of Science in Society](#)

Here is what the GLP presented to the public in its [GMO FAQ](#) as the science consensus on this issue—which is accurate today:

There is intense scrutiny over the role that GMO crops (and, by extension, herbicides glyphosate and dicamba) often paired with them play in the health of the Monarch butterfly.

Butterfly population declines are often primarily blamed by activists and some scientists on farmers using herbicides to destroy milkweed — a poisonous weed that severely damages crops but is a critical food source for butterfly caterpillars — growing near their GMO crops. The issue is complex with researchers differing on the causes of the decline.

The insect is facing problems that appear to be more complex than a single culprit. Research suggests the Monarch faces numerous threats, most of them unrelated to the use of

herbicides, including climate change and degradation of their overwintering habitat in Mexico. A review of 116 years of data published in 2019 in the Proceedings of the National Academy of Sciences concluded that agricultural practices, including the use of herbicides, are responsible for less than 20 percent of the monarch decline, blaming most of the declines on deaths during annual migrations to and from Mexico. A [2020 study](#) using data compiled by the conservation group Monarch Watch challenges that conclusion, blaming the loss of milkweed on a variety of complex factors, including loss of breeding grounds for weeds due to urbanization and suburbanization, and weed control efforts by organic and conventional farmers.

That's the science consensus. Which makes it all the more baffling and disappointing when the Cornell Alliance for Science recently posted an article on its well-regarded site with its exaggerated and inflammatory headline and editorial thrust. The article's author, Denmark-based journalist Justin Cremer, opens the article—already tainted by its headline—with an exaggerated sentence that contradicts the central conclusion of the study it is reporting.

A new study suggests that extensive agricultural use of glyphosate herbicide is to blame for the decades-long decline in North America's monarch butterfly population.

Cremer subsequently writes that the study results “bolster the ‘milkweed limitation hypothesis.’ This theory points to the widespread use of glyphosate as the main cause of the population decline.”

Here's the problem: This headline and statements contradict the actual study ... as even Cremer himself acknowledges in an otherwise solidly-reported piece. Also, Cremer does not alert the reader to the source of the data for the study: a Monarch butterfly advocacy group, Monarch Watch. It's standard to inform the reader of potential conflicts of interest.

What does the study actually conclude and how are activists reporting on this complex issue?

Milkweed is used exclusively by Monarchs for egg laying on their multi-generational migration from Mexico to Canada and back. As Cremer later points out, the [actual study](#), published in *Frontiers in Ecology and Evolution*, and headed by University of Kansas emeritus professor (and Monarch expert) Orley Taylor and Iowa State University butterfly authority John Pleasants, is not focused on the glyphosate issue in the main. Its intent, the authors clearly state, is to analyze a popular hypothesis that the severe (more than 90 percent) Monarch population decline over the past few decades is due to losses during the butterfly's southern migration.

The study supports an alternative hypothesis—that milkweed supply declines are a driving force, among many other issues, for the decline of these beautiful creatures. And what's behind the milkweed decline? It's not glyphosate directly as the headline asserts; rather, it's land use changes (more on that below).

The world's most-used weedkiller has long been a popular target of genetic engineering opponents

because it's used with herbicide-tolerant "Roundup Ready" (glyphosate) corn and soybean, which now comprise more than 90 percent of all such crops grown in the United States. Previously, these groups blamed the GMO plants themselves for milkweed and Monarch declines. Conservation group [Environmental Action](#) summed up the activist case in a recent petition urging individual states to ban glyphosate:

WE NEED TO BAN ROUNDUP TO SAVE MONARCHS.

If we want to save the monarch migration, one of nature's greatest phenomena, we need to stop the habitat destruction that's been causing their numbers to plummet.

A great step that your state can take? Ban Roundup, the weed killer whose active ingredient, glyphosate, decimates the milkweed plant monarchs rely on to survive.

More recently, activist groups have called for home-improvement retailers Lowe's and Home Depot to stop selling Roundup (and its generic equivalents) because of its alleged impact on butterflies. Not long after the paper and Alliance for Science story were published, groups like Friends of the Earth and [CommonDreams](#) called for a sales ban.

In their pleas, the groups also cited the World Health Organization's (WHO) International Agency for Research on Cancer (IARC) 2015 monograph, which linked glyphosate to certain cancers ([a conclusion refuted by every regulatory agency in the world, including the WHO itself](#)), and promoted organic farming methods (which do not exclude pesticides and also target milkweed removal).

There were media groups that contextualized the story, making the Alliance for Science report stand out even more. ScienceDaily handled it well, focusing on what the study was actually about: a refutation of the 'migratory hypothesis'.

[screen shot at pm](#)

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Science News concluded: These findings support the conclusion reached by a team of experts that sustaining the monarch migration will require the restoration of over a billion milkweed stems in the Upper Midwest in the coming years."

Even the progressive online magazine DownToEarth [handled the headline and the story with appropriate nuance](#), writing, "The findings led researchers to conclude that a billion milkweed stems needed to be

restored in the Upper Midwest in the coming years to sustain Monarch migration.” It did not single out one weed removal system or product.

So, what’s really behind the milkweed decline?

This is where things get complicated, and where the author of the Cornell Alliance report did not do his homework. Taylor told the Genetic Literacy Project that once glyphosate became popular, [years before](#) the introduction of GM corn and soy in the mid-1990s, it did almost eliminate milkweed from farmland. But, he added, that effect ended around 2006. Taylor, his co-author Pleasants and others were more concerned in 2000 about the use of GM crops bred [to express Bt](#) (*Bacillus thuringiensis*) Cry toxin, which kills caterpillars, although [recent research](#) indicates these insect-resistant plants probably don’t pose a risk to butterflies.

In fact, research has shown recent resurgences of Monarch butterflies, though their populations still remain significantly lower than their peak, as the Genetic Literacy Project explains in its [FAQ on Monarchs and pesticides](#):

According to the independent Illinois Butterfly Monitoring Network, the population in 2018 reached the highest levels of the past 25 years, and the fourth highest level since 1993. The number of butterflies heading south to Mexico may reach as many as 250 million over the 2018-19 winter. At its peak in the 1990s, the population reached an estimated 900 million.

Since 2006, corn and soy production have surged, partly due to overall demand but largely because of the 2007 Renewable Fuel Standard (RFS), signed by President George W. Bush, that encouraged the use of corn-based ethanol in gasoline. The RFS subsequently boosted corn production and, according to Taylor, led to 24 million acres of marginal land being converted to corn crop—more than three quarters of this land was grassland that probably once had milkweed. So, politics is the main driver of the rise in the use of milkweed-killing weedkillers. If glyphosate was banned tomorrow, other weedkillers that are more harmful would replace it and butterflies would be no better off.

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In other words, the decline is complex. Even a prominent researcher at Monarch Watch, the source of the data, challenged the simplistic ‘glyphosate theory’; according to Cremer, Anurag Agrawal, who was not one of the study’s researchers, “cautioned” Cremer that “the situation is more complex than the study suggests and said Monarchs are experiencing stress from multiple sources.” But that caution is contradicted by the headline opening line and much of the reporting in Cremer’s piece.

The real issue, as weird as it may sound, is ‘how do we restore weeds’, for that’s where Monarchs flourish. Weedy areas are targeted by all farmers, organic and conventional. Monarchs fair no better in organic farms, where they are removed through carbon-belching machinery by hand rather than by using

glyphosate or dicamba. The main driver in the reduction of weedy areas, as this study and others conclude, is not the use of glyphosate but urbanization and suburbanization, and the removal of wild areas for housing and industrial uses.

Commenting on the Alliance for Science article Taylor noted:

The text shows there is a failure to understand that long-term trends in populations are based on long-term trends. The trend here is loss of habitat and not mortality during migration or at other times in the annual cycle.

Andrew Kniss, weed scientist at the University of Wyoming, tweeted shortly after the Alliance for Science article posted. Echoing Taylor, he observed that this was an issue of milkweed habitat losses because of land use, not herbicides.

kniss monarch tweets

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“Glyphosate is better than most herbicides,” he wrote...and that includes weed control chemicals used by organic farmers. If farmers did not use glyphosate, they would just substitute something else—almost certainly more toxic and ecologically compromising—and the problem would persist. Kniss’s perspective that this issue is far more complex than the simplistic ‘glyphosate is harmful’ chants dovetails with the conclusions of a 2016 [Cornell University study](#):

In the face of scientific dogma that faults the population decline of monarch butterflies on a lack of milkweed, herbicides and genetically modified crops, a new Cornell University study casts wider blame: sparse autumnal nectar sources, weather and habitat fragmentation.

In other words, this problem is rooted in the removal of weedy plots and not a glyphosate or even a herbicide issue per se. Both organic farmers and conventional farmers need to remove milkweeds; the

method of removal should not be the issue. The CAS article served to legitimize out-of-context attacks on a safe and effective herbicide. Intended or not, it implied that farming systems that rely primarily on synthetic weedkillers are more likely to endanger the Monarch than farming systems using 'natural' chemicals or machines to control weeds. Does anyone really believe that if glyphosate or dicamba or a mechanical tiller was not available, farmers would allow weeds, including milkweed, to inundate their farms?

Going forward

So, what kind of “everyday kindness” could improve the fate of the Monarch butterfly?

Monarch Watch and other groups have spent years advocating for accelerated planting of milkweed, especially along the migratory corridors through the US and the Canadian Midwest. If farmers can't do it (or won't, because milkweed is a weed and farming is a precarious business) on their farms, addressing areas could work: public areas, highway medians, federal lands, parks, homes and schools. Taylor's paper called specifically for replanting 1.4 million stems of milkweed to return to levels seen 40-50 years ago; where they are replanted is a separate issue.

At Monarch Watch, “we now have over 30,000 registered sites with at least twice that number that have been created but not registered,” Taylor said. “There are plenty of opportunities to provide habitats for monarchs and pollinators in lots of marginal areas around farms and even in suburban and urban environments.”

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