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To: Speaker Corey Johnson and the New York City Council
Re: INTRO #15245, an amendment to existing LAW #37
November 18, 2020

Honorable Speaker Johnson and Members of the New York City Council, I appreciate the chance to explain some of the benefits for the City of New York if INTRO #1524 is passed and thoughtfully implemented. But first, let me summarize my experience and scientific work on the use of Roundup and other glyphosate-based herbicides (GBHs).

The fraudulent chronic testing of glyphosate in the 1970s by a contract lab called IBT became a major issue for the federal EPA, since the Agency had approved dozens of uses of Roundup in the absence of a single, valid chronic study. Back then, I worked as the Staff Director of the House Subcommittee with jurisdiction over the national pesticide law (FIFRA). We spent considerable time over two years trying to understand how and why the IBT debacle occurred, and what the EPA and the pesticide industry needed to do in response.

I have studied and published many reports and peer-reviewed papers on changes in the use of Roundup and GBHs, GBH regulation, and the health and environmental impacts arising from GBH use. These include papers I co-authored with other scientists on the toxicological and human health risks arising in the wake of heavy use of GBHs.

Glyphosate Use

My 2012 paper in the peer-reviewed journal ***Environmental Sciences Europe*** quantified the impact of genetically engineered, Roundup Ready crops on pesticide use in the US (https://enveurope.springeropen.com/articles/10.1186/2190-4715-24-24/metrics). It has been downloaded over 299,000 times, and is the most heavily accessed paper in the 20+ year history of the journal.

My 2016 paper on changes in US and global GBH use over the last 40+ years documents the meteoric rise in farmer reliance on glyphosate and GBHs starting in the late 1990s (https://enveurope.springeropen.com/articles/10.1186/s12302-016-0070-0/metrics). According to the journal, “This article is in the 99th percentile (ranked 82nd) of the 345,503 tracked articles of a similar age in all journals.”

This GBH use paper is the source of statistics you may have encountered -- enough glyphosate is applied annually in the US to spray about three-quarters of a pound of glyphosate on ***every acre of harvested cropland in the US***. Globally, enough

glyphosate is sprayed every year to apply ***about two-thirds of a pound of glyphosate on every actively farmed acre on the Planet***.

For over a decade, glyphosate has been by far the most heavily applied pesticide in history. Several serious problems have arisen more so from how widely GBHs have been used -- and overused -- than from glyphosate's innate mammalian toxicity. These include:

- The global spread of dozens of glyphosate-resistant weeds that are now driving overall herbicide use upward;
- Adverse impacts on pollinators and biodiversity, soil health, water quality, and aquatic ecosystems;
- Contribution to the development and progression of tens of thousands of cases of non-Hodgkin lymphoma over the last 30 years in the U.S. population, with many thousand more cases diagnosed annually that have been brought on or made worse because of heavy and repeated exposures to GBHs; and
- Possible contributions to other health risks including other cancers, GI tract problems, liver and kidney diseases, and adverse birth outcomes among heavily exposed rural populations and applicators.

IARC vs. EPA on Glyphosate Oncogenicity

In 2015, EPA concluded pure glyphosate was "unlikely to be carcinogenic in humans," while the International Agency for Research on Cancer (IARC) classified glyphosate and GBHS as "probable human carcinogens." How two institutions with access to world-class scientific expertise could reach such different conclusions has been, and will remain the #1 debate throughout the Roundup-NHL litigation.

I published a widely read, open-access paper in 2019 reporting on the way the US EPA and IARC assessed the genotoxicity of glyphosate and GBHs. Its title frames its relevance in the EPA vs. IARC debate -- "How did the US EPA and IARC reach diametrically opposed conclusions on the genotoxicity of glyphosate-based herbicides?" (https://enveurope.springeropen.com/articles/10.1186/s12302-018-0184-7/metrics).

This 2019 paper explains that EPA and IARC relied on very different sets of glyphosate and GBH genotoxicity studies. EPA focused almost exclusively on proprietary, unpublished genotoxicity assays conducted by Monsanto and other GBH registrants. Only one of 95 of the registrant-conducted assays were positive for genotoxicity (1%).

IARC based its assessment of glyphosate and GBH genotoxicity on published, peer-reviewed studies encompassing 122 assays, of which 89 were positive for genotoxicity (73%). IARC placed heavy weight on five key studies in exposed human populations (four positive); EPA largely ignored them.

The most recent genotoxicity study considered by EPA and IARC at the time they classified glyphosate and GBHs with respect to cancer was published in January 2015. Since then and through 2018, at least 27 additional peer-reviewed studies were

published (Table 4 in my paper lists them all). Twenty-six of the 27 new studies reported one or more positive genotoxicity assays. Since the end of 2018, several more glyphosate and GBH genotoxicity assays have been published, the vast majority of which has also been positive.

You can access my glyphosate and GBH papers on my website, Hygeia Analytics (https://hygeia-analytics.com/about/who-we-are/#publications).

Roundup's Role in Non-Hodgkin Lymphoma

Over the last four years, I have served as an expert witness on behalf of plaintiffs in the litigation involving the possible connections between Roundup use and exposures and non-Hodgkin lymphoma (NHL). My work on the litigation has allowed me access to the 8-plus million documents in the confidential discovery record. I have reviewed thousands of internal Monsanto emails, documents, reports, and data spanning the late 1970s through 2019.

While I have paid close attention over 40 years to all key events in the regulatory history, use, and testing of glyphosate and Roundup, I was shocked repeatedly as I read internal company documents, many of which are now in the public domain, setting forth what Monsanto knew decades ago about the risks associated with heavy worker exposures to Roundup, and ***what they did, and did not do in response to that knowledge.***

The Core Paradox of Roundup

Roundup was once thought the most effective herbicide ever discovered, and one of the least toxic to mammals. It is a shame, indeed tragic, that it has been marketed and regulated in ways leading to grossly excessive use, and sometimes dangerous levels of human exposures.

As a result, there are now over two dozen weeds that have become resistant to glyphosate. Tens of thousands of people here in the US, and an unknown but no doubt much larger number globally have battled non-Hodgkin lymphoma that was either triggered, or made worse and harder to treat, by high and/or repeated exposures to glyphosate during applications of Roundup or other GBHs.

Since the early 1980s, Monsanto has successfully kept regulators, the scientific community, and Roundup users largely in the dark regarding the human health risks facing applicators. Individuals spraying Roundup frequently, for several hours per day over a number of years, face the greatest risks. Grounds keepers and weed-control staff and contractors working for the State of New York, its counties and municipalities, are among the most heavily exposed, and most heavily at risk.

Definitive information surfaced during the litigation that shows that urban and suburban applications of Roundup by people using handheld or backpack sprayers lead to much

higher dermal exposures than those experienced on the farm. It also became clear that glyphosate exposures to the general public via their diets are a small fraction of the exposure a person might get from just one hour of spraying a GBH with a handheld applicator.

A worker in the New York City Parks Department assigned to weed management duties during the spring and through mid-summer might typically spray herbicides for 2 to 6 hours per day, for 3-4 days per week for about 4 months. As part of their job, such a person might engage in 100 hours, to as many as 300 hours applying herbicides in a calendar year.

On some of those days, and during a few applications, things will not go exactly perfectly. For example, less than perfect weather conditions (aka wind). An applicator might face the need to control more mature weeds needing a heavier rate of application. The hand wands used to direct the spray pattern frequently leak, covering the applicator's hand. Spills happen when workers are loading their sprayer tank, hoses spring leaks, values malfunction, and high exposures can occur when spray equipment is cleaned and serviced.

For people that spray herbicides as part of their jobs using handheld equipment, it is very hard to avoid a few such episodes every year. For most of these applicators, there will be one or a few very-high exposure episodes every few years, even among those individuals who are careful.

Most plaintiffs in the Roundup-NHL litigation recalled several days when they were heavily exposed, to the point, for example, where pant legs were soaked through, hands were covered for hours, or the herbicide had soaked through much of their clothing.

It is this sort of high exposure scenario that can turn a relatively safe herbicide like Roundup into a potential cause of significant harm to people's health.

As herbicides are currently used in New York City, applicators are at the greatest risk, but members of the public using public spaces soon after applications can also be exposed at levels sufficient to pose heightened risks, especially among vulnerable segments of the population. Those potentially more vulnerable include --

- Individuals currently battling cancer,
- People administered drugs that suppress their immune systems,
- Women planning on becoming pregnant, or pregnant,
- Young children, and
- Anyone with an infection or health condition that lessens the capacity of their immune system to deal immediately and effectively with aberrant cell growths that can progress to cancer.

In short, a lot of people.

I support passage of INTRO #1524 because there are ample effective, affordable, and safer ways to manage weeds and other pests in New York City Parks. Plus, citizens in New York City can share the city's public spaces with a few weeds here and there without appreciable inconvenience or aesthetic sacrifice.

As the City invests in broader non-chemical pest management practices and strategies as a result of passage of INTRO #1524, their effectiveness will incrementally rise, and their costs will fall as city employees master the science and art of non-chemical pest control strategies.

In addition, the private sector is beginning to invest serious capital in the discovery and commercialization of new tools, machines, equipment, monitoring methods, and biopesticides. The surest way to encourage such investments, and speed positive technological change, is to support those companies and service providers working to make pest management simpler, safer, and more reliable.

If the City were to continue relying predominantly on chemical pesticides, the collateral damage will incrementally rise, and the number of high-exposure episodes among City employees and members of the public will invariably increase. At some point in the future, the City will likely have to defend its decision to use pesticides in a court of law. As other jurisdictions have learned, the cost of even one pesticide-human health lawsuit can approach, or even exceed the entire budget dedicated to New York City's pest management program.

Our national nightmare with Covid will hopefully deepen appreciation of what it takes to keep people safe, not just in a single apartment or a house in the suburbs, but in large, vibrant, and diverse metropolitan areas. Many Covid-inspired lessons will apply to how both individuals and societies deal with pests, from the coronavirus to ants and roaches, mice and rats, grubs, pigweed and dandelions. Perfecting how to control pests in city parks is one of many small steps that will collectively enhance environmental quality, biodiversity, and wellness and well-being inside city limits.

Thank you for the opportunity to share these thoughts with you.