

PFAS and Agriculture



"Forever" chemicals are prevalent in pesticides and in agriculture: Why this matters for North Carolina

PFAS, per- and polyfluoroalkyl substances, are a class of chemicals known as "forever chemicals" due to their persistence in our environment and in our bodies. There are thousands of identified PFAS chemicals. Exposures to some PFAS have been linked to adverse reproductive impacts, high cholesterol, developmental effects, and increased risk of some cancers.^{1,2} PFAS are present in a wide variety of products people interact with every day, including pesticides.

PFAS and Pesticides: A Growing Problem

14% of all pesticide active ingredients on the market are PFAS forever chemicals, and that number is growing. In fact, a recent peer-reviewed study using data verified by the EPA revealed that nearly one-third of active ingredients approved in the last decade were PFAS.³ Testing and reporting on PFAS are not required for evaluation or approval of pesticide ingredients — meaning we do not have clear data on how widely used these chemicals are or how much they may be contributing to water contamination.



Summary At-A-Glance

- PFAS, or "forever chemicals" are fluorinated compounds that are highly persistent in the environment.
- North Carolina has the third highest level of PFAS exposure in the country.
- PFAS are linked to adverse reproductive impacts, high cholesterol, developmental effects, and increased risk of some cancers.
- PFAS are prevalent in pesticides and agriculture, contributing to potential water, soil, and food contamination.

PFAS + Pesticides in North Carolina

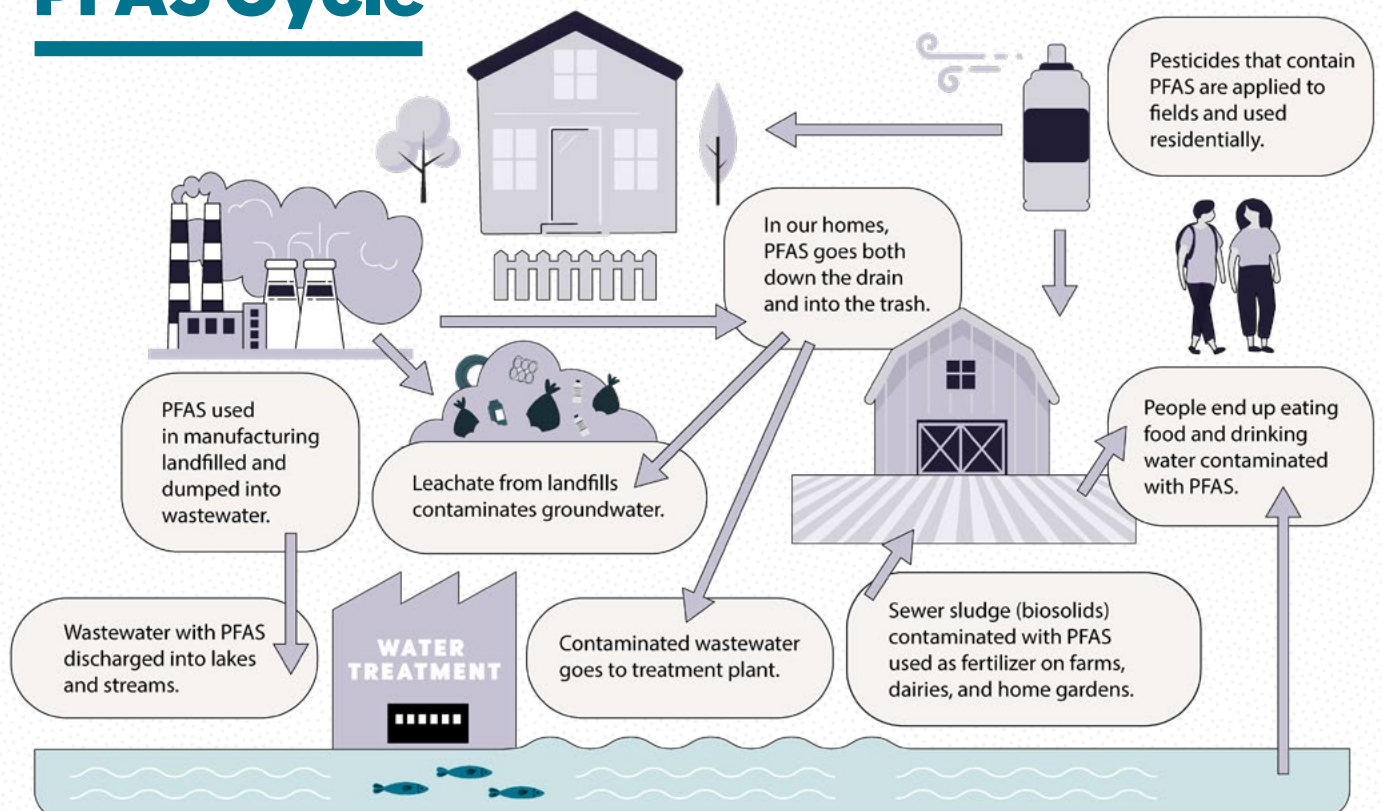
Pesticides containing PFAS active ingredients are used across the state

Using U.S. Geological Survey maps and NC's pesticide registration database to understand the extent of PFAS active ingredients in pesticides used in North Carolina, we found:

- PFAS active ingredients in **1,000+ pesticide products currently approved** for use by licensed pesticide applicators or residential applicators in North Carolina.
- **7 PFAS active ingredients used every year on record** in North Carolina.
- At least 40 pesticides with PFAS active ingredients applied at medium to heavy amounts in North Carolina (estimated in pounds per square mile).
- Use of pesticides containing PFAS active ingredients is most heavily concentrated in eastern NC.
- Several pesticides containing PFAS active ingredients are approved for use near schools and where families live, work, play, and pray.

For the list of pesticide active ingredients that are PFAS forever chemicals, see insert.

PFAS Cycle



PFAS moves through the environment and our agriculture system via manufacturing, biosolids, farm inputs, landfills, treatment facilities, and consumer products. *Image adapted from Sierra Club "Sludge in the Garden."*

Impacts for North Carolina

Farmland Contamination



Agriculture is a top industry in the state. The presence of forever chemicals may impact a farm's bottom line anywhere across the state, whether practicing conventional or organic agriculture. Farm inputs containing PFAS have important implications due to the long-term effects of these chemicals in our environment.

Implications for farmers

- Pesticide labels do not identify when they include PFAS ingredients.
- Contamination from forever chemicals may be present on purchased land depending on use history, water supply, or proximity to industrial facilities.
- PFAS can permeate into food via soil and water⁴, in addition to via pesticide residues.
- **Land where biosolids have previously been applied may be contaminated with PFAS.** Check before buying or leasing.
- PFAS have been used in food packaging and many consumer products that end up in compost supply chains.
- PFAS regulations are evolving. It may be in the interest of farmers to address potential PFAS sources on the farm before it becomes an even more costly burden.

Maintaining trust in the quality of farmers' food supply is critical to business success. NC farmers need to understand the implications of PFAS on their property and nearby land to ensure access to profitable markets, business sustainability, and long term viability of the land. Soil is the basis of the economy. We need it to be healthy.

Pollinators



Several pesticides containing PFAS are especially harmful to pollinators.

- Bifenthrin, a PFAS active ingredient **present in more than 200 insecticide products registered for use in NC**, is highly toxic to bees⁵ and designated by EPA as a "possible human carcinogen."
- Sulfoxaflor is another PFAS active ingredient that is very toxic to bees and has been under scrutiny since 2019 for its harmful effects on pollinators⁶.
- As weather changes bring more rain and an uptick in mosquito pressure, we are seeing increased use of several PFAS active ingredients like bifenthrin that kill essential pollinators.

Public Health



We need more information about the risks of PFAS on farms, in food, and in our everyday lives so that families can make healthy choices.

- **North Carolina has the third highest level of PFAS exposure in the country.**
- Some PFAS have been shown to impact fertility, thyroid and immune function, and are linked to gastrointestinal and liver damage, high cholesterol, and cancer.
- Forever chemicals are prevalent in many kinds of food packaging, another pathway for exposure, disproportionately impacting those with fewer fresh food options.
- With high levels of PFAS already in our bodies from water pollution and other sources, we must reduce additional pathways to protect community health from the cumulative impacts of so many sources of exposure.



Policy Solutions for North Carolina

Testing, Research, and Standards

We need action to understand and limit PFAS contamination sources on the farm, including from pesticides that contain forever chemicals as active or inert ingredients. Testing requirements and standards cannot overly burden farmers already shouldering many costs and pressures.

- Federal agencies are working to understand and respond to PFAS in our food system. The Food and Drug Administration is developing a new systematic approach to post-market assessment of chemicals in food, including unintentional contaminants like PFAS.⁷ In October 2024, the US Department of Agriculture announced its research branch is working on a roadmap for PFAS in agriculture.⁸ This may not be a priority under the current administration.
- Maine's response to PFAS in agriculture has included legislative action and comprehensive assistance from the state for impacted farmers.⁹ In 2022, Maine banned the application of sludge as fertilizer. Maine's department of agriculture supports farmers with testing assistance, individualized mitigation plans, and advice for continued safe operation. North Carolina should consider similar action.

Transparency and Awareness

Farmers need to know the impacts of the chemicals they are using to ensure short- and long-term viability of the land. Communities need to be informed about what is in our water and food to make healthy choices for families. Manufacturers and agencies can play a role in making ingredient information and pesticide use data more available to farmers and consumers.

- See insert for a list of active ingredients in pesticides that are PFAS.
- The NC General Assembly and NC Department of Agriculture must be leaders in helping farmers and eaters understand what is in their food and what is safe.

Resources for Farmers

Because of the persistence of PFAS compounds, we need solutions that meet the needs of farmers as they learn about the prevalence and impact of forever chemical contamination on their land. A North Carolina organic farmer found levels of PFAS far exceeding EPA safe standards in water and produce after testing voluntarily.¹⁰ The business halted sale of their products and invested in expensive water filters and testing measures with the goal of resuming safe sales of produce with sound conscience. North Carolina can support farmers like this with funding, testing, and clear information as we continue to understand the connections between PFAS and agriculture.

PFAS are not going away on their own. North Carolina needs action on PFAS in pesticides and on farms to ensure economic security, environmental sustainability, and food safety in our agricultural system.



Contact





































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




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Endnotes

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2. US Environmental Protection Agency, "Our Current Understanding of the Human Health and Environmental Risks of PFAS," accessed October 30, 2024, <https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas>
3. Nathan Donley et al., "Forever Pesticides: A Growing Source of PFAS Contamination in the Environment," *Environmental Health Perspectives* 132, no. 7 (2024), <https://doi.org/10.1289/EHP13954>
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9. Maine Department of Agriculture, Conservation, and Forestry, "PFAS Response," accessed September 30, 2024, [https://www.maine.gov/dacf/ag/pfas/pfas-response.shtml#:~:text=To%20date%2C%20no%20federal%20standards,parts%20per%20trillion%20\(ppb\)](https://www.maine.gov/dacf/ag/pfas/pfas-response.shtml#:~:text=To%20date%2C%20no%20federal%20standards,parts%20per%20trillion%20(ppb))
10. Ava Brendjord, "Castle Hayne farmer won't sell produce due to forever chemical contamination," WECT, July 12, 2024, <https://www.wect.com/2024/07/12/castle-hayne-farmer-wont-sell-produce-due-forever-chemical-contamination/>

Pesticides Used in NC That Contain PFAS Forever Chemicals

Active Ingredient Name	Type of Pesticide	Primary Crop(s) or Areas Used On
Acifluorfen; Sodium acifluorfen *+	Herbicide	
Benfluralin +	Herbicide	
Bicyclopyrone	Herbicide	
Bifenthrin +	Insecticide	
Broflanilide	Insecticide	
Bromethalin	Rodenticide	
Chlorfenapyr	Insecticide	
Cyflufenamid +	Fungicide	
Cyflumetofen	Miticide/Insecticide	
Dithiopyr	Herbicide	
Ethalfuralin *+	Herbicide	
Fipronil +	Insecticide	
Flazasulfuron	Herbicide	
Flonicamid	Insecticide	
Fluazifop-P-butyl +	Herbicide	
Fluazinam +	Fungicide	
Flucarbazone-sodium	Herbicide	
Fludioxonil +	Fungicide	
Flufenacet +	Herbicide	
Flumetralin *+	Plant growth regulator	
Fluometuron *+	Herbicide	
Fluopicolide +	Fungicide	
Fluopyram +	Fungicide	
Fluridone +	Herbicide	
Flurprimidol	Plant growth regulator	
Flutianil	Fungicide	
Flutolanil +	Fungicide	
Fluvalinate	Insecticide	
Fomesafen; Fomesafen Sodium *+	Herbicide	
gamma-Cyhalothrin; lambda-Cyhalothrin *+	Insecticide	
Hexaflumuron	Insecticide	
Hydramethylnon	Insecticide	
Indoxacarb +	Insecticide	
Isoxaflutole +	Herbicide	
Lactofen +	Herbicide	

Mefentrifluconazole	Fungicide	
Metaflumizone	Insecticide	
Norflurazon +	Herbicide	
Novaluron +	Insecticide	
Noviflumuron	Insecticide	
Oxathiapiprolin +	Fungicide	
Oxyfluorfen +	Herbicide	
Penoxsulam	Herbicide	
Penthiopyrad +	Fungicide	
Picoxystrobin +	Fungicide	
Prodiamine	Herbicide	
Prosulfuron +	Herbicide	
Pyrasulfotole	Herbicide	
Pyridalyl	Insecticide	
Pyrifluquinazon	Insecticide	
Pyroxasulfone +	Herbicide	
Pyroxsulam +	Herbicide	
Saflufenacil +	Herbicide	
Sulfoxaflor +	Insecticide	
Tefluthrin +	Insecticide	
Tembotrione +	Herbicide	
Tetraconazole +	Fungicide	
Tetraniliprole	Insecticide	
Tiafenacil	Herbicide	
Tralopyril	Antimicrobial	
Trifloxystrobin +	Fungicide	
Trifloxysulfuron-sodium +	Herbicide	
Triflumizole +	Fungicide	
Trifluralin *+	Herbicide	
Triflusulfuron-methyl +	Herbicide	

* used every year on record

+ estimated medium to heavy use in NC



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