

Pesticides & Climate Change: A Vicious Cycle

Climate change will have sweeping impacts on agriculture, some of which we’re seeing in real-time with unpredictable precipitation patterns and increases in the severity of extreme weather events. But how do pesticides specifically intersect with climate change? A new report by PAN Organizing Co-Director Asha Sharma, Senior Scientist Margaret Reeves, and Policy Fellow Calista Washburn explores this question, and we’re excited to give you a preview of the analysis.

The bottom line? Pesticides contribute significantly to greenhouse gas (GHG) emissions while, at the same time, climate change is expected to increase pesticide applications. It’s a vicious cycle.

Pesticides drive climate change

Very few studies calculate the GHG emissions of pesticide use over the full life-cycle (production, storage, shipment, application, breakdown) of the chemicals, which likely causes underestimates of true impact. In terms of production, 99% of all synthetic chemicals—including pesticides—are derived from fossil fuels. But they receive much less attention than nitrogen fertilizer, another key agricultural chemical input that creates dangerous levels of GHG emissions. Research has shown that the manufacture of one kilogram of pesticide requires, on average, about 10 times more energy than one kilogram of nitrogen fertilizer!

Pesticides can also release GHG emissions after their application, with fumigant pesticides shown to significantly increase nitrous oxide production in soils. Many pesticides lead to the production of ground-level ozone, a greenhouse gas harmful to both humans and plants.

Climate change & pesticide use

At the same time pesticide use is driving climate change, research shows the effects of our changing climate will likely lead to increased use of synthetic pesticides. Here’s why:

- Rising temperatures, heat stress and altered rain patterns are leading to decreased crop resilience. For example, drought conditions weaken plants’ natural defenses and change their biology, leaving them more vulnerable to pests.
- Rising temperatures will likely stimulate insect population growth in certain regions. Scientists also expect to see continued shifts in insects’ geographic regions and potential to survive winter.
- Because they have more diversity in their gene pool and a greater ability to acclimate, weeds are more resilient to climate change than cultivated crops. Research suggests weeds will have an increased ability to outcompete agricultural crops in many regions, leading to declining yields.
- Climate change speeds up pesticide degradation, meaning pesticides will be effective for less time, leading farmers to increase their pesticide application rates.

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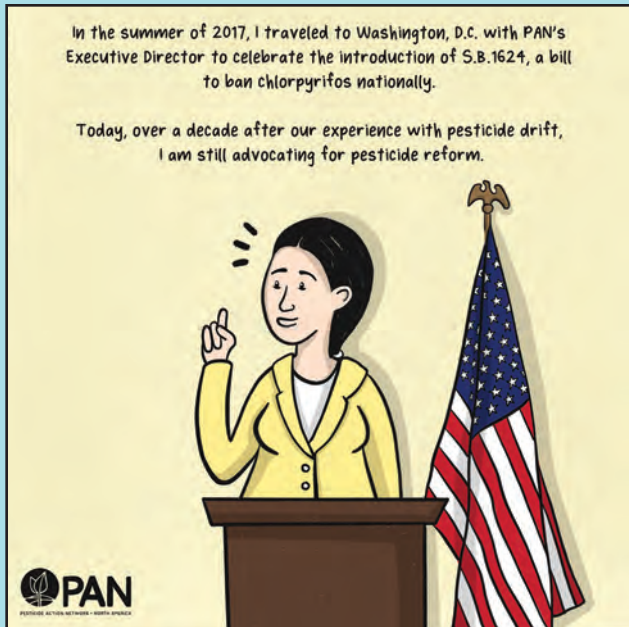
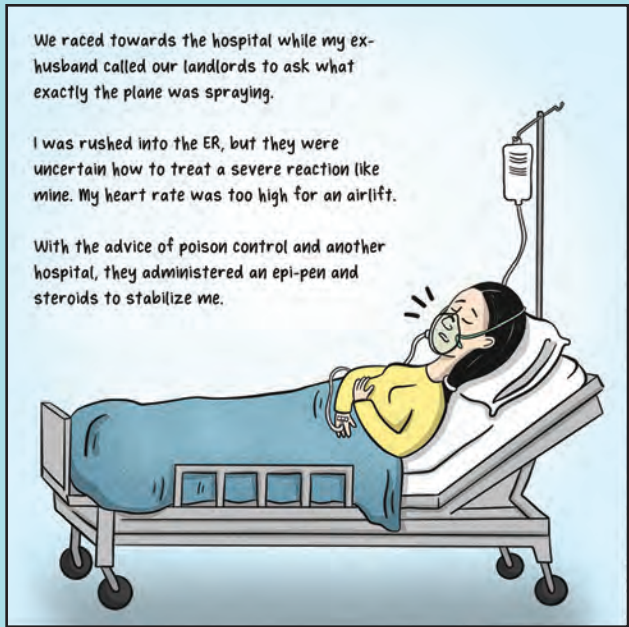
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Dealing with Drift

“Even though I was surrounded by the mist, I thought to myself, ‘this is not real, this cannot really be happening. The chemicals they were spraying on the adjacent field could not be drifting into our home.’”

For rural communities across the U.S., pesticide drift is a harsh reality. Since her own experience with pesticide drift in 2012, Bonnie Wirtz has become a fierce advocate for environmental justice and reduced pesticide use in rural communities. Here is her story:





After many years of pressure from environmental and labor groups, the EPA revoked all “tolerance levels of” chlorpyrifos residues in food in August 2021. Chlorpyrifos is known for its damaging effects on the human nervous system, and poses especially elevated risks for children.

While the 2021 ruling on chlorpyrifos is a huge win, we still have a lot of work ahead of us. EPA hasn't yet proposed the cancellation of chlorpyrifos registration, meaning non-food uses of the pesticide continue. Stories like Bonnie's are unfortunately all too common, but we will continue fighting. No one should have to navigate the harrowing experience of pesticide drift.

Read Bonnie's full drift story here: bit.ly/DealingDrift

ABOUT PAN PAN works to create a just, thriving food system, working with those on the frontlines to tackle the pesticide problem — and reclaim the future of food and farming. One of five regional centers worldwide, PAN North America links local and international consumer, labor, health, environment and agriculture groups into an international citizens' action network. Together, we challenge the global proliferation of pesticides, defend basic rights to health and environmental quality, and work to ensure the transition to a just and viable food system.

An environmental justice issue

Scientists caution that climate change will increase the movement of pesticides away from their intended targets, further polluting our environment and endangering public health. Increased temperatures are expected to result in more pesticide volatilization — when pesticides transform into a gas — meaning more pesticides in our air. Severe rain events are also expected to increase pesticide loss to our waterways.

In the U.S., people living in communities most exposed to pesticides — agricultural workers, rural communities, and residents living where pesticides are produced and wastes are dumped — are disproportionately low-income and people of color. The predicted increase in pesticide use will also compound other climate change effects

that impact these communities, such as extreme heat and wildfire smoke.

This is both a climate crisis and a racial injustice.

Real solutions

Despite these findings, the reduction of synthetic pesticide use has been omitted from climate change solutions. Instead, synthetic pesticide use has been presented as a climate change mitigation strategy by industrial agriculture interests.

The real solution addresses all sides of this vicious cycle: agroecology! The adoption of alternative agricultural systems minimizes or eliminates synthetic fertilizer and pesticide use while increasing the resilience of our farming systems to better withstand climate change impacts.

Governments can start by adopting measurable goals to reduce synthetic pesticide use in climate policies. Laws and regulations should be written to uphold and promote the rights of groups most impacted by synthetic pesticide use. Finally, policies should be developed that provide improved technical assistance and incentives for farmers to adopt farming practices that protect community and ecosystem health.

And, while we work toward future policy and practice change, we can collectively support the advocacy work of organizations and impacted communities fighting for climate justice now.

Stay tuned for the full report in January 2023!

Meet PAN Board Member Sapna Thottathil

In 2009, Sapna Thottathil’s research on agroecology in India introduced her to Thanal — an organization that trained organic farmers throughout the state of Kerala, energized a continental organic farming movement, and coordinated a ban on harmful pesticides with PAN Asia Pacific. Upon working with our regional partners, Sapna shared, “I was drawn to PAN’s ability to be simultaneously both grassroots and global.”

When Sapna continued her research through a PhD program in Berkeley, she was excited to connect with PAN North America, “especially because of its dedication to both science-based and community-driven research.”

Sapna published a book about Kerala’s organic farming movement in 2014. After finishing her research in India, she

became involved in the farm-to-institution (schools and hospitals) movement in the U.S., observing that sustainable, organic and humane food options were often unavailable. “I appreciate that PAN is helping to create a food system where sustainable agriculture can and should be the norm, so that kids and patients will be served better food as the default.”

As a staff member at the University of California, Sapna continues to work on sustainable food procurement efforts and recently helped to develop an Integrated Pest Management policy for campuses and health centers across the state. Sapna will be completing her tenure as a PAN Board member in late 2022. We are grateful for her years of service and advocacy for safer food systems!



I come from a family of farmers and I’ve observed when pests strike or crops fail, farmers are forced to make tough decisions. I’ve seen many health problems in communities exposed to pesticides. PAN is working to remove these chemicals while also supporting farmers.”

Sapna Thottathil

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