OP-147 [Bee Health]
Empowering beekeepers and their communities: educational strategies for mitigating pesticide risks to pollinators

Jennifer Bryan Goforth
Pollinator Stewardship Council

Pollinators are essential for global food production, yet their populations are declining due to multiple stressors, including habitat loss, climate change, and pesticide exposure. Pesticides, particularly neonicotinoids, have been widely implicated in colony losses through acute and chronic exposure, negatively affecting bee navigation, reproduction, and immune function. Despite increasing awareness of pollinator decline, many stakeholders—beekeepers, farmers, and the general public—lack access to practical, science-based guidance on reducing pesticide risks. Effective outreach programs are crucial to bridging the gap between scientific research and everyday practices that protect pollinators.

Although research has demonstrated the negative effects of pesticide exposure on bee health, practical mitigation strategies and identification of critical regulatory changes may be difficult to access and understand. Many stakeholders lack the knowledge or resources needed to identify pesticide risks, implement protective measures, and engage in informed advocacy for pollinator-friendly policies.

We show that targeted educational programs on pesticide risk reduction significantly improve knowledge, increase adoption of protective management strategies, and foster collaborative advocacy for stronger pollinator protection policies at local and national levels.

Since its inception, PSC's outreach programs have reached thousands of stakeholders across diverse sectors, including commercial and hobbyist beekeepers, organic and conventional farmers, backyard gardeners, and community members. Evaluation data demonstrate a increase in participants' ability to recognize pesticide risks, understand exposure pathways in pollinator populations, understand and identify pesticide exposure in managed colonies, and adoption of practices including Integrated Pest Management, pollinator-friendly food production methods, and advocating for pollinator-friendly policies. These outcomes underscore the power of education in driving measurable improvements in pollinator stewardship and sustainable beekeeping. Moreover, they highlight the critical role of education in translating scientific findings into actionable practices across residential, agricultural, and legislative sectors.

By providing beekeepers, farmers, and community members with the knowledge and tools to mitigate pesticide risks, this program strengthens pollinator health, improves hive sustainability, and fosters long-term resilience in pollination-dependent agricultural systems. Expanding such educational initiatives will be essential for bridging the gap between research and real-world application, empowering a broader coalition of stakeholders, and ultimately fostering a more pollinator-friendly agricultural and urban landscape.

Empowering Beekeepers and Their Communities: Educational Strategies for Mitigating Pesticide Risks to Pollinators

Jennifer Bryan-Goforth M.Ed.
Pollinator Stewardship Council
USA

Pollinator Stewardship Council

- Grew out of the National Honey Bee Advisory Board (NHBAB), a joint effort of:
  - American Beekeeping Federation (ABF)
  - American Honey Producers Association (AHPA)
- NHBAB:
  - brought together commercial beekeepers to engage with the EPA and advocate for stronger protections against pesticide-related bee mortality at the national level.
- The Pollinator Stewardship Council was formed out of the work of the NHBAB and became an independent nonprofit in 2011 to more effectively support pollinator protection through education, advocacy, and legal action.

Pollinator Stewardship Council

We work on behalf of the beekeepers of the US to see that our interests and concerns are brought forward in the national discussion of pesticide use and policy. We often collaborate with other organizations working to address pesticide impact including the American Bird Conservancy as well as industry groups like the American Beekeeping Federation.

We provide educational opportunities to help community members support pollinator health, to help farmers learn how they can support pollinators by using sustainable methods without reducing yield, and to help beekeepers understand and recognize the impact of pesticides on pollinator health.

- Pesticides—especially through chronic, sublethal exposure—are a major but often overlooked contributor to colony losses.
- Chronic exposure leads to disorientation, impaired reproduction, weakened immunity.
- Many beekeepers see the effects but don’t always connect them to pesticides.

Knowledge of Pollinator Losses Is Rising—But Beekeepers Still Lack Solutions

- Awareness of pollinator decline is growing, but practical tools to address pesticide risks are lacking.

- Beekeepers, farmers, and the public often don’t know:
  - How to recognize pesticide exposure
  - What actions to take
  - How to advocate for change

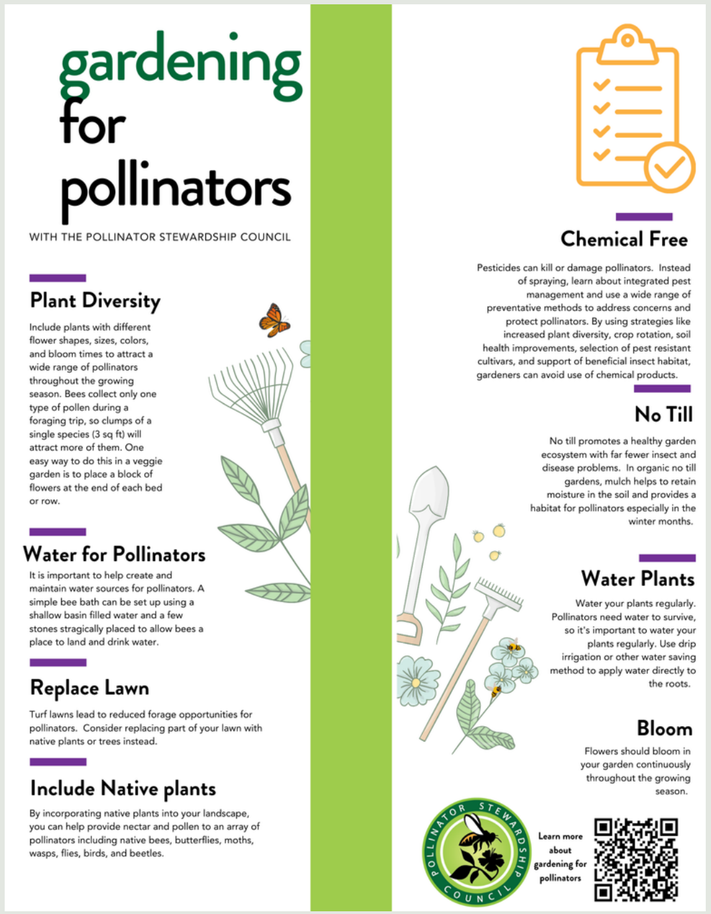
PSC created targeted outreach programs to:

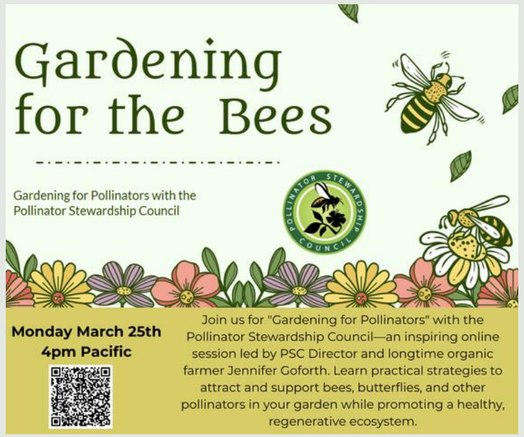
- Share science in plain language
- Provide practical steps to reduce exposure
- Empower beekeepers to influence local and national policy

Empowering Action Through Targeted Education

- Stakeholder-specific content: beekeepers, farmers, backyard gardeners, community members
- Focus on:
  - Common exposure routes (drift, dust, contaminated forage, water)
  - History of pesticide use and regulation
  - How to recognize signs of pesticide exposure in colonies
  - Pollinator-safe practices for agriculture and landscaping
  - IPM (Integrated Pest Management) strategies for pest control
  - Advocacy tools: how to report incidents and influence policy
- Delivered on different platforms:
  - publications
  - social media posts
  - webinars
  - videos

Backyard Gardeners & Small Farms





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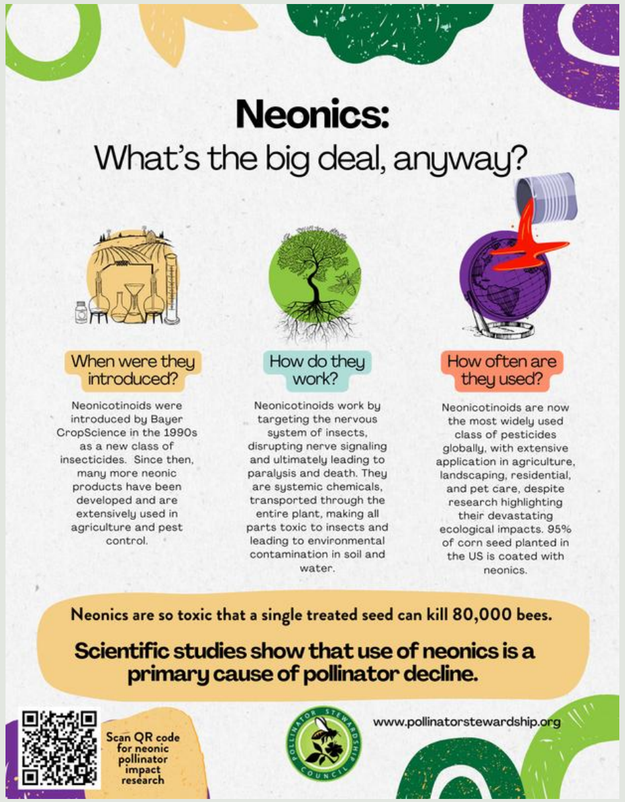
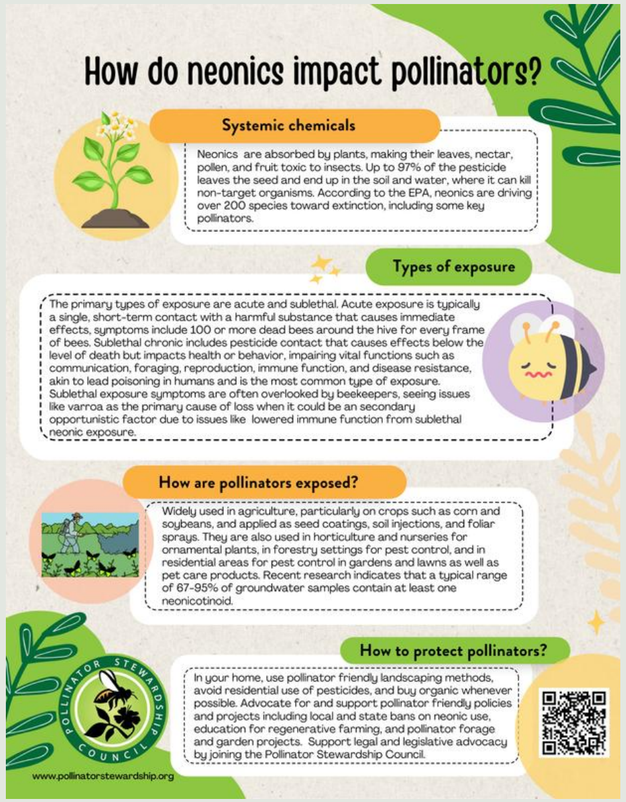
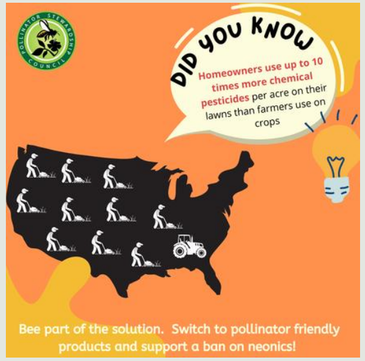
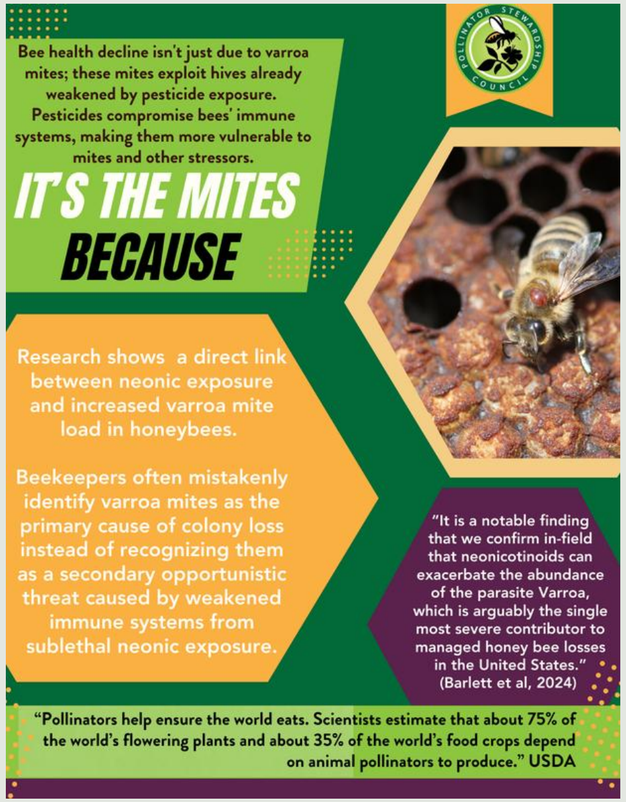
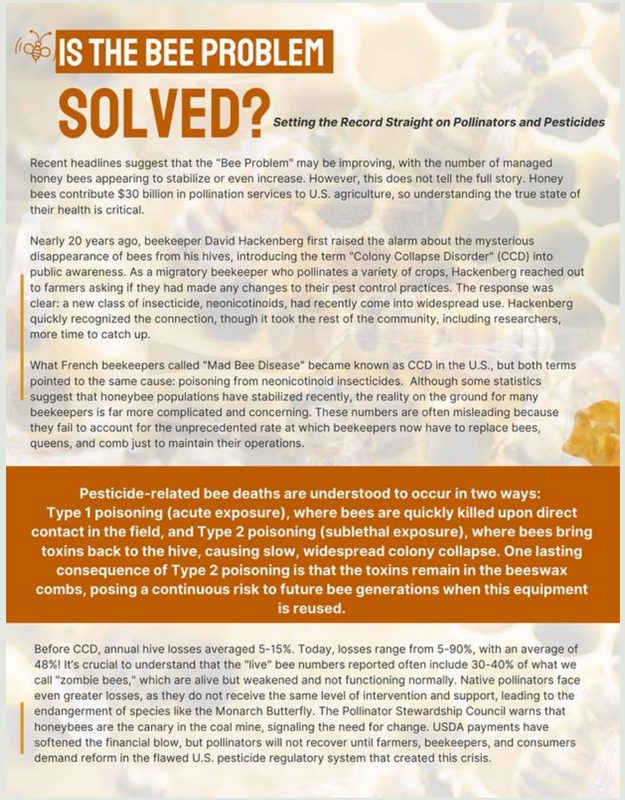






Supporting Beekeepers





Supporting Beekeepers

DID YOU KNOW?

Most damage to bees is through sublethal exposure.

When we think of pesticide exposure, we typically think of an acute kill after a spray application but more bees are killed through sublethal exposure over time. With this type of exposure, the basic functions of bees are impaired and they lose their ability to communicate, forage, reproduce, and fight off pathogens and parasites due to weakened immunity and lack of vigor.
Dr. James Nieh suggests that this type of exposure is similar to lead poisoning in humans.

Loss of forage due to pesticide damage

Indirect impacts can also be catastrophic to bees. Dicamba is a highly volatile herbicide used in soybeans and other crops to control weeds and is prone to drift. It has caused massive damage to non-target plants and in 2021 alone, the EPA received more than 3,500 damage reports from farmers and landowners due to off-target movement of dicamba. This type of damage results in a significant reduction of forage for bees, with some commercial beekeepers reporting massive colony losses due to reduced forage in areas where dicamba use is common.

Pesticide use often not tracked or reported

Most commodity crops are grown with treated seeds. Neonics are the most common type of seed coating. After seeds are planted, these systemic chemicals are subsequently found in soil, all parts of the plant including flowers and pollen, and in streams, lakes, and groundwater. Neonics have been proven to be highly toxic to bees, yet the US stopped tracking the amount of neonics used in agriculture back in 2011! We no longer even know how many pounds of these dangerous chemicals are being applied each year in our food system. Neonics have been banned in the EU since 2018, and PSC is working to remove them from the market in the United States to protect our critical pollinators.

POLLINATOR STEWARDSHIP COUNCIL

WHY DO POLLINATORS NEED PROTECTION?

Last year, beekeepers in the United States were faced with an average loss of 42% of their hives. For many who work close to pesticide-intensive farming practices, the losses have run much higher—often 70-95%. This devastatingly high rate is in stark contrast to the normal season losses of 10-15% that is still enjoyed by those who forage on pesticide-free wild lands or open range. Between 1992 and 2014 U.S. agricultural landscapes became 48 times more toxic to pollinators, with neonicotinoids accounting for 99% of that increase in oral toxicity. Due to massive increase in annual loss, the industry of supplying replacement bees to U.S. beekeepers has become a vital element in American apiculture. Beekeeping in the U.S. is on life support.

Science solidly links our current "Insect Apocalypse" to the widespread adoption of systemic pesticides including neonicotinoids. This great body of evidence has sparked many regulatory agencies to greatly curtail use of or completely ban neonicotinoids, as in the European Union. In the United States, the regulatory authority within the Environmental Protection Agency (EPA), continues to sit on their hands. The beekeeping industry's extensive work with EPA over the past 12 years has given us some important insights into this dysfunctional system that allows pesticide manufacturers to perform their own safety test data, which is typically the only data used for pesticide approval and registration. This clear conflict of interest interferes with the work of honest and highly qualified risk assessment staffers at EPA, resulting in dangerous products being registered and remaining in use.

Bees are the modern-day "canary in the coal mine" of pesticide-intensive agriculture. Honeybees are a critical component of our country's food supply, and provide pollination of more than 90 crops and one out of every three bites of food we eat. In 2018, the USDA estimated that honeybee pollination accounted for $15 billion in added crop value alone.

By protecting pollinators, we can protect the future of our food system.

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Although chemical companies promote the idea that seed coatings are absolutely essential to ensure yeild, countless studies have proven that they are ineffective and in 2021 the EPA stated that "seed treatments provide little or no overall benefits....Published data indicates that in most cases there is no difference in soybean yield when soybean seed was treated with neonicotinoids versus not receiving any insect control treatment." Neonic seed coatings have been banned in the EU since 2013 and data shows no discernable reduction in crop yields.

PSC believes that farmers and beekeepers are working toward the same goal: a thriving and robust food system. We believe this can be accomplished without the use of neonics, as demonstrated in Europe over the past decade.

LEARN MORE AT WWW.POLLINATORSTEWARDSHIP.ORG

POLLINATOR STEWARDSHIP COUNCIL

BEEKEEPER ON THE FRONTLINES:

Battling Pesticides to Protect Pollinators and Our Future

As a commercial beekeeper moving hives through large-scale crops and orchards, I face constant exposure to Type 2 poisons from insecticides, fungicides, Insect Growth Regulators, and Genetically Engineered Pesticides.

Native pollinators face even greater losses, as they do not receive the same level of intervention and support, leading to the endangerment of species like the Monarch Butterfly. pollinators will not recover until farmers, beekeepers, and consumers demand reform in the flawed U.S. pesticide regulatory system that created this crisis.

I must replace dead hives regularly throughout the year, with as many as one-third to one-half of my bees operating at diminished capacity at any given time. To manage this, I'm forced to build extra colonies in the spring, knowing that heavy losses will follow throughout the growing seasons.

Before CCD, annual hive losses averaged 5-15%. Today, losses range from 5-90%, with an average of 48%. It's crucial to understand that the "live" bee numbers reported often include 30-40% of what we call "zombie bees," which are alive but weakened and not functioning normally.

However, the numbers reported to the USDA and Bee Informed Partnership reflect a temporary peak, not the ongoing mortality rates. Beekeepers like myself are forced to "overbuild" our colonies as excessive mortality has become the new normal.

www.pollinatorstewardship.org

In honor of National Pollinator month,
Pollinator Stewardship Council Presents

Ask An Expert

Commercial Beekeepers Answer Your Pressing Questions!

Tuesday June 25th

ONLINE AT 6PM EASTERN

PSC Board Members and Commercial Beekeepers will discuss pesticide exposure in commercial beekeeping and be available for Q&A. This is a great opportunity to meet with experts and ask questions to help improve your business and bee health!

USE THE QR CODE TO REGISTER FOR THIS FREE EVENT!

www.pollinatorstewardship.org

Bret Adee
Owner, Adee's Honey Farm, one of the largest beekeeping operations in the world. Bret is a founding member of PSC, has served on the National Honey Bee Advisory Board, and has been featured in media outlets and documentaries including The Pollinators.

Dave Hackenberg
Owner, Hackenberg Apiary for over 50 years with thousands of colonies and is credited with discovering CCD in 2006. David has held prominent positions in beekeeping organizations and has been featured in media outlets and documentaries including The Pollinators.

Integrated Pest Management (IPM):

PROTECT POLLINATORS, MANAGE PESTS

WHAT IS IPM?
A smart, step-by-step approach to control pests with the least risk to bees and the environment.

THRESHOLDS
Only take action when pest levels exceed economic or ecological thresholds.

CONTROL OPTIONS (STEPWISE APPROACH):
- Cultural: timing plantings, removing pest habitat.
- Mechanical/Physical: barriers, traps, hand removal.
- Biological: encourage predators, parasites, or microbial controls.
- Chemical: last resort, applied carefully and only when necessary.

PREVENTION
Healthy soils, crop rotation, habitat for beneficial insects

MONITORING
Regular scouting and identifying pest AND beneficial species.

Manage pests wisely. Protect pollinators. Build resilient ecosystems.

3 EASY STEPS
TO KEEP YOUR BEES SAFE IN THE NEIGHBORHOOD

TURN NEIGHBORS INTO BEE AMBASSADOR ALLIES!

01 CONNECT ON SOCIAL MEDIA AND AT EVENTS

ESTABLISH A RAPPORT WITH NEIGHBORS: JOIN NEXTDOOR, FB GROUP OR OTHER ONLINE PLATFORM TO CONNECT WITH OTHERS IN YOUR AREA. SHARE PHOTOS OF BEES POLLINATING FRUIT TREES IN THE NEIGHBORHOOD. ATTEND EVENTS AND INTRODUCE YOURSELF AS THE NEIGHBORHOOD BEEKEEPER!

02 INTRODUCE YOURSELF

PRINT AND DISTRIBUTE A FLYER HIGHLIGHTING THE BENEFITS OF BEES AND WAYS TO KEEP THEM HEALTHY AND SAFE. INCLUDE YOUR CONTACT INFO AND A LIST OF POLLINATOR FRIENDLY PRODUCTS OR STRATEGIES TO USE IN PLACE OF DANGEROUS PESTICIDES. REQUEST THAT NEIGHBORS CONTACT YOU BEFORE SPRAYING TO HELP KEEP BEES SAFE.

03 SHARE THE BOUNTY AND CREATE BUY IN!

BOTTLE UP SOME 1 OZ SAMPLE JARS AND SHARE WITH NEIGHBORS. INCLUDE A LITTLE TAG THANKING THEM FOR KEEPING BEES SAFE FOR ANOTHER SEASON!

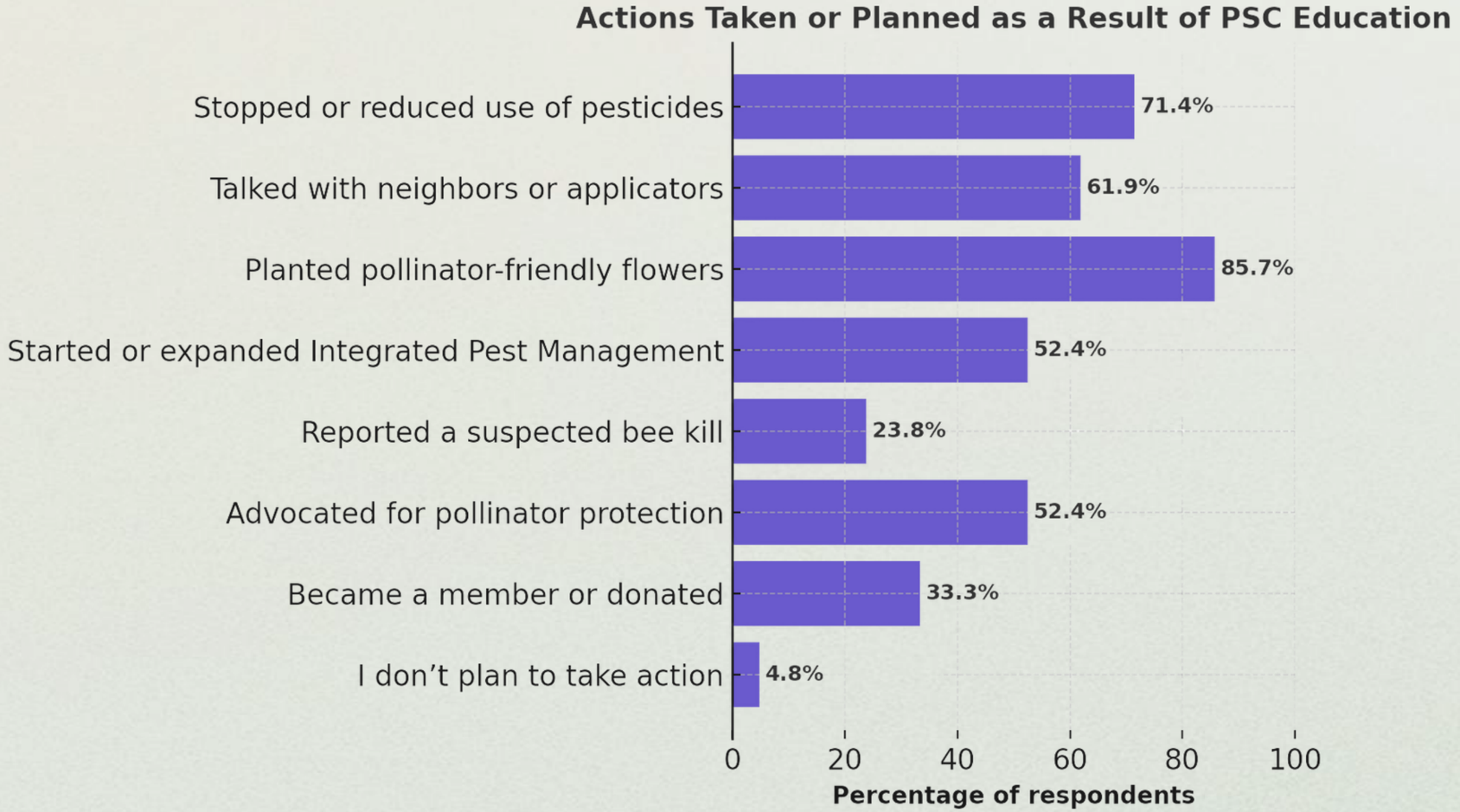
Outcomes

- Knowledge Gains: 100% of respondents increased knowledge of how sublethal pesticide exposure impacts pollinators; 55% reported a significant increase.

- Exposure Pathways: 100% improved understanding of how pesticide exposure occurs (e.g., drift, treated seeds, contaminated pollen, residential use); 60% reported a significant increase in understanding.

- Resource Value: After receiving the materials, 91% of respondents felt more empowered to take action to protect pollinators in their home, garden, farm, or community.

- 91% of participants said they were likely or very likely to recommend PSC’s educational materials to others in their community.


Actions Taken or Planned as a Result of PSC Education
Stopped or reduced use of pesticides
71.4%
Talked with neighbors or applicators
61.9%
Planted pollinator-friendly flowers
85.7%
Started or expanded Integrated Pest Management
52.4%
Reported a suspected bee kill
23.8%
Advocated for pollinator protection
52.4%
Became a member or donated
33.3%
I don’t plan to take action
4.8%
0
20
40
60
80
100
Percentage of respondents

Moving Foward

- Expand education programs
- Translate more research into accessible tools beekeepers can use
- Create materials in multiple languages and delivery formats
- Encourage peer-to-peer sharing
- Increase collaboration with other organizations to expand reach

Thank you!

Resources

Jennifer Bryan-Goforth
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contact@pollinatorstewardship.org

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