

A large, faint watermark of the US Environmental Protection Agency logo is centered in the background. It features a stylized flower with three leaves and a circular center, surrounded by the text "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY".

Antibacterial and Antifungal Pesticides and Potential for Resistance

Susan Jennings
Senior Advisor for Public Health
Office of Pesticide Programs
US Environmental Protection Agency
December 9, 2024



Resistance and Public Health

- Antimicrobial resistance in bacteria and fungi is a top threat to the public's health
- Fungal diseases are increasing worldwide
- Worldwide, antimicrobial resistance threatens progress in healthcare, food production, and ultimately life expectancy
- In the U.S., fungal disease accounts for more than 75,000 hospitalizations and nearly 9 million outpatient visits every year, direct medical costs estimated at \$6.7 to \$7.5 billion year



Antibacterials and Antifungals as Pesticides

- Antibacterial and antifungal pesticides are regulated under FIFRA¹
 - FIFRA requires EPA to determine that any registered pesticide is not expected to cause unreasonable adverse effects on human health or the environment
- Resistance is considered an adverse effect under FIFRA

¹ Federal Insecticide, Fungicide, and Rodenticide Act



Pesticide and Human Drug Resistance

- Some antibacterial and antifungal pesticides share characteristics with antibacterial and antifungal drugs
- If bacteria or fungi become resistant to a pesticide, that strain may also be resistant to drugs that share similar characteristics
 - This may cause a drug to treat a bacterial or fungal infection to not work well against those resistant bacteria or fungi



Benefits of Antibacterial Pesticides

- Bacterial pest pressure appears to be increasing on agricultural crops (much as it is on human health)
 - Number of antibacterial pesticides registered for use on crops is limited
- Uses may be critical to maintaining health of a single year's harvest or even the viability of the industry (e.g., citrus greening)



Benefits of Antifungal Pesticides

- Widely used in agriculture, turfgrass, and ornamental production to manage diseases that can cause heavy yield and quality losses
- Fungicides control a broad spectrum of fungi, including those that cause powdery mildews, leaf spots, wilts, and rusts
- Antifungals are considered vital to maintaining food supplies



Regulating Antibacterial and Antifungal Pesticides

- Office of Pesticide Programs (OPP) must consider the “economic, social, and environmental costs and benefits of the use of any pesticide” [FIFRA sections 2(bb) and 3(c)(5)]
 - Antibacterial and antifungal pesticides may have high benefits
 - Extensive data limitations create uncertainty about the potential for resistance to develop
- Risk/benefit analysis is challenging



Regulating Pesticides and Resistance Risks

- Goal: reduce the potential for drug resistance, while allowing availability of antifungal or antibacterial products
- For antibacterials, typical risk reduction techniques can apply
- For fungicides, these may not be appropriate due to substantial uncertainties on how resistance develops in the environment



Assessing Resistance Potential for Fungicides

- EPA has a standing approach for assessing resistance from antibacterial pesticides
 - Adapted from FDA's assessment for animals
- EPA is investigating methods to address fungicide resistance concerns in its decisions
- EPA, HHS, and USDA (White House oversight) created framework for collaboration on resistance risks (published October 2024)



Addressing Uncertainty

- EPA published a concept note to solicit stakeholder input on an appropriate risk assessment process
 - Posed questions about research and mitigation approaches
 - Responses were not sufficient to resolve the questions
 - Many uncertainties remain on underlying mechanisms of resistance (how/when/where pathogens develop resistance)
- The recently published framework outlines a collaborative approach
 - Framework's Appendix A specific research questions
- Limitations on composting may reduce spread



Assessing the Risk: A Collaboration

- Framework creates new Interagency Drug and Pesticide Efficacy Workgroup (IDPREW)
 - Chaired by EPA and comprised of experts from CDC, FDA, USDA
- IDPREW to provide expert opinion to EPA on resistance issues involving antifungal or antibacterial pesticides
- EPA retains sole regulatory authority for these decisions



Interagency Drug and Pesticide Efficacy Workgroup

- IDPREW is the first step towards a broader approach to regulating antibacterial and antifungal pesticides
- EPA will continue to refine its assessments
 - Substantial uncertainties exist regarding the resistance risks to human and animal health
 - In future, EPA may consult with outside experts (through workshops, a Scientific Advisory Panel, or other forums)



Next Steps

- EPA has begun implementing the framework to establish an interagency workgroup
- Given the amount of uncertainty, regulating these pesticides remains challenging
- EPA remains committed to sound science and transparency as we move forward
 - Public opportunities to provide data, input on IDPREW findings, assessments, draft decisions