

Advancing Artificial Intelligence for Precision Pesticide Application and Reduced Chemical Use in U.S. Agriculture

Artificial Intelligence and precision agriculture technologies offer significant potential to improve the effectiveness, safety, and efficiency of pesticide use while reducing overall chemical loads on the environment. By enabling targeted applications rather than blanket spraying, these tools can deliver strong economic benefits to farmers and meaningful environmental gains. The FRRCC is charged with evaluating how EPA can best support the responsible adoption of AI-driven precision technologies in pesticide management and how these tools should inform future regulatory and programmatic decisions.

The Committee should provide recommendations on the following:

- Assess how AI technologies are currently being used in U.S. agriculture for precision spraying, drone and aerial imaging, predictive pest modeling, robotic weed control, and integrated pest management (IPM). Analyze economic returns to producers and environmental benefits, including reduced pesticide usage, lower runoff, and improved water quality.
- Review and consider the contributions made by the Pesticide Program Dialogue Committee (PPDC) and the Pesticide Educational Resource Collaborative (PERC) on this topic.
- Recommend incorporating AI-enabled precision technologies into regulatory decisions, including pesticide labeling, permitting processes, applicator training, and environmental compliance programs if the committee determines that technologies provide clear benefits
- Identify opportunities for EPA to prioritize research, technical assistance, incentive programs, and partnerships with the private sector to accelerate voluntary grower adoption of these technologies, consistent with goals outlined in the MAHA Report.
- Provide strategic advice on how EPA can advance the MAHA initiative by balancing pesticide regulation with agricultural innovation, farm economic prosperity, reduced environmental contaminants, and protection of children's health.

Balancing Agricultural Conservation, Nutrient Pollution Reduction, and Farm Viability

Nationally, excess nutrients from point and nonpoint sources remain a widespread stressor negatively impacting water quality of the nation's lakes, rivers, and streams. Waters containing high nutrient levels are more likely to have degraded biological conditions than waters containing lower levels of nutrients. Anthropogenic nutrients are transported to downstream waters and are stored in areas that function as storage sinks including soils, sediments, and groundwater. Stores of "legacy" nutrients – accumulated in these sinks over years of past inputs – continue to impact water quality for seasons to years later even when successful conservation efforts have reduced inputs of excess nutrients from point and nonpoint sources. To address excess nutrients from nonpoint sources, farmers across the country have implemented substantial conservation practices to improve soil health and water quality, these efforts often come with real economic costs. Meaningful progress requires a clearer understanding of how conservation can deliver both environmental benefits and long-term economic viability for producers.

The Committee is charged with examining how to advance effective, economically sustainable conservation practices that reduce nutrient pollution while supporting strong farm economies. Specifically, the Committee should analyze and provide recommendations on the following:

- Evaluate the costs, returns, and economic incentives needed for widespread adoption of conservation practices, ensuring environmental stewardship aligns with farm profitability and long-term viability.
- Identify practical, scalable approaches to increase voluntary adoption of conservation practices across diverse agricultural regions and operation types.
- Explore collaborative models and tools that improve coordination across watersheds so that individual farm-level efforts translate into meaningful water quality improvements.
- Recommend how the EPA can better support farmers and rural communities through improved technical assistance, tools, education, and programs that integrate effective nutrient management, water quality protection, and rural infrastructure needs.
- Identify opportunities for EPA programs to better align water quality goals with the economic realities of production agriculture, including incentives, flexibility, and recognition of voluntary conservation efforts.