

# Safer, more sustainable pest management

*Managing pests is essential to healthy, safe and productive agricultural, urban, residential and natural areas. However, chemical pesticides can cause air and water pollution and unintended harm to nontarget organisms. Exposure to pesticides has also been linked to human health problems. In addition, many pests eventually develop resistance to commonly used chemicals, rendering them ineffective. Researchers at land-grant universities across the United States are developing alternative and integrated pest control methods that are safer and more sustainable.*

### Successful examples include:

- Integrated pest management (IPM) combines different strategies — such as modifying habitats, releasing natural predators, growing resistant crop varieties and using pesticides — to provide pest control. IPM is especially important as pests develop resistance to certain tactics and stakeholders raise concerns about the environmental and human health risks of chemical pesticides. Since 1996, 10 northeastern states — **Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island** and **Vermont** — have joined forces, along with representatives from the U.S. Department of Agriculture and Environmental Protection Agency, to coordinate integrated pest management efforts in the region. This multistate committee facilitates communication among IPM programs at northeastern land-grant universities, helping researchers and Extension educators stay current on emerging pest issues, program needs and stakeholder needs.
- The overuse of horticulture chemicals creates significant environmental contamination and pollution. For example, homeowners can apply up to 10 times the amount of pesticides per acre compared to farmers. To reduce environmental contamination and pollution, University of **Wisconsin** Extension's plant diagnostics services follow an IPM approach, which encourages using pesticides and fertilizers only when needed and prioritizing the least toxic approaches.

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## Environmental Stewardship

Through its programming, people in households and commercial horticulture practitioners are becoming more sufficient in growing their own food and reducing negative environmental impacts when caring for plants, growing food and gardening.

- Potential environmental and human impacts associated with turfgrass management have garnered scrutiny from regulatory agencies, environmental organizations and local governments. In **Indiana**, Purdue Extension's Turfgrass Integrated Pest Management integrates applied research and extension on biology, ecology and management of insects in turfgrass environments. The turfgrass IPM research efforts provide the backbone for in-person and remote-learning sessions, reaching 850 individuals who completed Commercial Applicator Category 3b Turf Management continuing certification hours.
- For mosquito control, people often use insecticides to spray as much as possible to kill the pesky insects, which can transmit the deadly disease malaria to humans. But this form of control doesn't discriminate between beneficial and nuisance insects and also builds resistance among mosquitos and insects that survive through natural selection and mutations. **Virginia** Tech researchers, in a collaboration with the University of Lausanne in Switzerland, have found a potential roadmap to removing a mosquito's ability to transmit malaria.
- **Montana** State University and MSU Extension provide plant pest identification through the Schutter Diagnostic Laboratory. The lab recommendations are based on IPM principles, where IPM is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic and environmental risks. The lab is also an important resource for early detection of new pests and works with the agriculture industry to prevent the spread of waterhemp and Palmer amaranth into the state.
- The world's largest continuous stand of roseau cane is vanishing from the Mississippi River Delta, and a group of cross-disciplinary researchers in **Louisiana** are collaborating to find a solution to stop the die-off, which is associated mainly with the roseau cane scale, an invasive insect pest that latches onto the plant's stem. Cross-disciplinary researchers with the LSU AgCenter and other state agencies are collaborating to find a solution to controlling the insect and investigating other factors that may contribute to the plant's health.
- The United States is the largest producer and exporter of corn in the world, but nearly half of its organic corn supply is imported, leaving a potential commercial market largely untapped. Risks posed in managing insects and weeds without conventional pesticides often deter producers from transitioning their fields to organic corn production. In **Pennsylvania**, an interdisciplinary research team at Penn State conducted a study that determined that inoculating corn seeds with a common soil fungus can provide alternative tactics for organic growers to fight pests.
- Researchers at **Ohio** State University developed a new technology that could prove valuable for early detection of beech leaf disease as well as other forest diseases. This new advanced tool gives managers a leg up on the disease by allowing them to carefully map its true distribution and implement management strategies ahead of the moving disease front.
- While pesticides are a necessary tool for farmers to protect their crops from insect pests that can inflict severe damage on crops, native bees risk contact with pesticide residues even months after spraying. A team of researchers led by the **Arkansas** Agricultural Experiment Station

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found that nonlethal levels of pesticides can cause life-altering effects on native bee larvae, including impeding some bees' ability to fly and navigate. Understanding these health effects and finding potential mitigating factors will help producers better manage native bee populations.

- Peanut is a valuable crop but is plagued by diseases and pests. In the United States, the use of chemical control accounts for over 30% of the total cost of crop production. The University of **Georgia** Institute of Plant Breeding, Genetics and Genomics is dramatically improving pest and disease resistance of the peanut crop using breeding schemes that incorporate wild species. This will reduce farmer costs, increase yield, reduce fuel use and lower the environmental impact of farming.

### Aphids

*Aphids are serious agricultural pests that can cause up to 40% loss in yield on various **New York** state crops such as apples, soybean, corn and many vegetables. These insects can develop resistance to pesticides quickly and can be difficult to control on crops. In a study, Cornell Agricultural Experiment Station collected a diversity of bacteria that occur naturally on crops and determine if they could protect plants from aphids. The team collected bacteria from healthy plants at local farms and isolated bacteria that produce fluorescent color. This culture collection included a diversity of bacteria that naturally occur on plants, many of which have not previously been studied for impacts on aphids. Researchers demonstrated that bacteria on plants are likely influencing aphid feeding choices in complex ways, with implications for agricultural pests. The use of naturally occurring beneficial bacteria to control pests would increase environmental sustainability in agriculture.*