



AGRICULTURAL SYSTEMS

Protecting plants and animals from pests

An increasing number of pests and diseases threaten our ability to produce safe and nutritional food. Land-grant researchers and Extension educators are developing innovative solutions to help farmers defend their crops and livestock.

SUCCESSFUL EXAMPLES INCLUDE:

- Biological controls being developed for nursery and greenhouse by **Tennessee** scientists reduced the cost of Japanese beetle control by \$109 to \$738 per treated acre and enabled growers to cut their insecticide rate for flatheaded borer management in half.
- **California** Extension research showed that IPM practices were more effective at controlling spider mites in almonds than preventative miticide sprays. Eliminating the sprays on 80,000 acres saved growers about \$2.2 million and reduced CO₂ greenhouse gas emissions by nearly 880,000 pounds.
- **Arkansas** researchers evaluated the effectiveness of the preplant fumigant Telone II and seed-applied abamectin to help soybean producers find the most cost-effective path to control nematodes and increase yields.
- The brown marmorated stink bug (BMSB) feeds on more than 100 plant species, including most fruits and vegetables. **North Carolina** researchers found that the bug prefers cowpeas and bell peppers and notified small vegetable growers of the bug's damage potential.
- When cattle producers in **New Mexico** used integrated pest management (IPM) methods for horn fly control, cattle weaning weight gained approximately 30 pounds, giving an estimated \$11 return for every \$1 spent on fly control.
- A team of **Pennsylvania** researchers found that insecticide-treated nets baited with a BMSB pheromone and draped over a shepherd's hook draws and kill hundreds of BMSB adults and nymphs. This new tactic allows some control of BMSB without applying a pesticide to crops.
- **Ohio** researchers found that Brome mosaic virus (BMV) is a major pathogen of Ohio wheat. In the greenhouse and in field, they demonstrated that BMV infection can cause up to 60% wheat yield loss.
- A **Pennsylvania** research team has found a group of flavonoid compounds produced in sorghum that act as natural pesticides and fungicides against aphids and anthracnose.
- **Maine** IPM scientists track potential pest outbreaks to provide growers with current information on treatments to minimize the number of pesticide applications and maximize potato yield.

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MATING DISRUPTION REDUCES ALMOND DAMAGE WITH SUSTAINABLE TECHNIQUE

Navel orangeworm feeds exclusively on almond kernels, making it the top pest of **California's** 1.3 million acres of almonds. California Extension research shows that releasing a chemical pheromone used by female moths to attract males impairs the male moth's ability to locate a mate to reproduce.

Pest control advisers reported the percentage of almond acreage using mating disruption in the southern San Joaquin Valley

rose from 16.3% in 2017 to 39.0% in 2019 and in the northern San Joaquin Valley from 6.5% in 2017 to 37.7% in 2019.

Navel orangeworm damage at harvest was reduced 47.4% across all participating orchards over two years. This increased almond crop value by more than \$250 per acre—more than twice the expense of employing the novel management technique. Mating disruption is more sustainable because it reduces reliance on pesticides, reduces groundwater contamination and avoids resistance problems for pests and diseases.

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The Land-Grant University System is a uniquely American institution, and has operated successfully for more than a century. The landgrantimpacts.org website documents and demonstrates the collective and individual impacts of the national system of joint teaching, research, and extension institutions.

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