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## ABSTRACT

*Lycorma delicatula*, more commonly known as the spotted lanternfly, is an insect species native to parts of Asia, primarily China, India, and Vietnam. However, it has recently traversed to South Korea, Japan, and the United States, which has led to some issues arising. Lanternflies feed on a wide range of host plants, including fruit trees, ornamental plants, and hardwood trees. This has posed a significant threat to agriculture and plant life as these insects excrete honeydew, which attracts other pests and promotes the growth of sooty mold. Efforts to mitigate its impact on agriculture and ecosystems have been made with the usage of various methodologies. In our research study, we choose to analyze the three main types of methods that scientists typically use to deal with invasive species, specifically focusing on the invasive species of the spotted Lantern fly. These methods include introducing a biological control, mechanical control, and chemical control within spotted lantern fly habitats.



**Figure 1:** Mechanical control using glue traps. Image credit: Elda Rosenberg from Brooklyn, NY United States. July 14, 2023.

### MECHANICAL CONTROL

In the study “Developing Traps for the Spotted Lanternfly” (Francese et al., 2020) researchers worked to determine which type of glue trap was the most effective in capturing and killing lantern-flies. Each trap was equipped a 53 mg/d methyl salicylate lure, which has previously been proven to attract all life stages of lanternflies. We can see this shown in figure 3. As a result, the most effective traps were ones that were wrapped around the entire tree, specifically the BugBarrier Tree Band.

### PROS

- Is able to capture lanternflies in all life stages
- Non-toxic to the environment
- Relatively easy to use

### CONS

- The glue trap bands are messy
- Need to be replaced often to rid of debris
- Deteriorates and loses its stickiness after a short amount of time
- Possibility of trapping other wildlife (ex. birds)



**Figure 2:** Biological control using fungi. Image credit: Colin Purrington, <https://www.inaturalist.org/observations/35455894>, CCO.

### BIOLOGICAL CONTROL

In the study “A pair of native fungal pathogens drives decline of a new invasive herbivore” (Clifton et al., 2019) researchers identified two Northern American fungal pathogens called “Batkoa major” and “Beauveria bassiana” that were able to lead to a localized collapse of the spotted lantern fly. Researchers collected dead lantern flies alongside an apple orchard at Angora Fruit Farm near Reading, Pennsylvania and tested each cadaver for evidence of fungal cells. They found that almost all dead *L. delicatula* adults on tree trunks were killed by *B. major* (97%) and attacked by fungal rhizoids. The spotted lantern fly cadavers on the ground was a mix of *L. delicatula* killed by *B. major* (51%) or *B. bassiana* (49%).

### PROS

- Extremely successful in killing the spotted lantern fly. No other known species have been successful thus far.
- Sustainable method of control, reducing the need for synthetic chemicals

### CONS

- Possibility of attachment to other insects
- The control agent may become invasive itself, leading to new ecological problems (ex: Cane toads in Australia.)



**Figure 3:** Chemical control using insecticides. Image credit: Daniel Abugre Anyorigya, CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons

### CHEMICAL CONTROL

In the study “Evaluation of insecticides for control of the spotted lanternfly” (Leach et al., 2019) researchers conducted a series of tests to determine which insecticide caused 100% mortality among lanternflies. Several were tested for their effects on eggs, nymphs, and adult lanternflies, and chlorpyrifos was the only compound that was able to successfully kill lanternflies at each of these life stages.

### PROS

- Is able to kill lanternflies in all life stages (egg, nymph, and adult)
- Kills majority of lantern-flies impacted with high mortality rate

### CONS

- Harmful to the environment and potentially to surrounding native animals
- More difficult to manage and use
- Chemical controls may lead to invasive species developing resistance

## Discussion

ADDRESSING INVASIVE SPECIES REQUIRES A COMPREHENSIVE STRATEGY, WEIGHING THE VARIED MERITS AND DRAWBACKS OF MECHANICAL, CHEMICAL, AND BIOLOGICAL CONTROLS. CONSIDERING THE MULTIFACETED CHALLENGES POSED BY INVASIVE SPECIES CONTROL, A PROMISING APPROACH FOR MANAGING SPOTTED LANTERN FLIES COULD INVOLVE AN INTEGRATED PEST MANAGEMENT STRATEGY, LEVERAGING THE STRENGTHS OF EACH METHOD WHILE MITIGATING THEIR RESPECTIVE DRAWBACKS.

### LITERATURE CITED

