All about *Stratiolaelaps scimitus* predatory mites

By Dr. Michael Wolfin, Luke Reynolds

What are predatory mites (*Stratiolaelaps scimitus*)?

S. scimitus predatory mites are considered beneficial biocontrol agents. They are small (see **Figure 1** for scale), carnivorous arthropods that live in the soil. These mites have been used for decades in other crops to kill fungus gnat larvae (yes, the same flies that plague the mushroom industry). These mites are also known to kill other mites in compost as well. *S. scimitus* predatory mites are likely natural enemies of the mushroom flies in the wild. While the pasteurization process kills all of the beneficial and pathogenic organisms in commercial mushroom compost, these mites would probably be found in wild mushroom growing substrate.

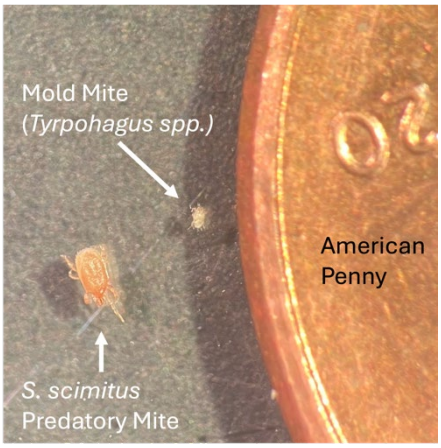


Figure 1. Predatory mite size scaled with a mold mite and an American penny

Do *S. scimitus* predatory mites kill mushroom flies in compost?

Yes. *S. scimitus* predatory mites cannot see and hunt by vibration. Studies by the PSU Mushroom Fly Research Team showed that one mite can kill more than 11 fly larvae in mushroom compost in only 3 days (**Figure 2**)!

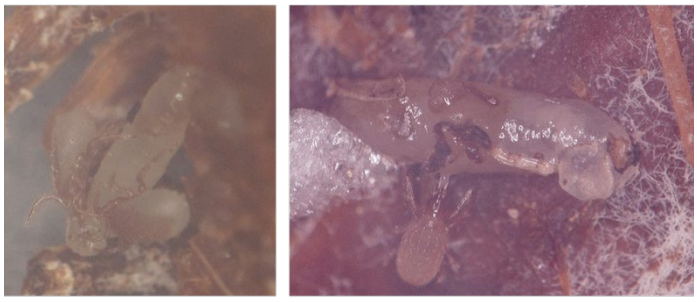


Figure 2. Predatory mites feeding on dead mushroom fly larvae.

Do *S. scimitus* predatory mites pose a threat to my crop?

Probably not. The PSU Mushroom Fly Research Team has done extensive studies that showed *S. scimitus* do not damage the growing mushroom mycelia. Additionally, their studies also showed that the mites transmit 95% fewer dry bubble (*L. fungicola*) colonies compared to mushroom phorid fly adults. Studies are ongoing to evaluate *S. scimitus* transmission of green mold (*T. aggressivum*).

Also, these mites live exclusively underground. While they can't "see", they can detect light, and are *strongly* repelled by light. So, these mites should not accumulate on the mushrooms or interfere with picking at all, as they prefer to be in the hunting in the compost/casing.

Unlike flies, mites are more likely to be contained to the growing room that they are applied in because they cannot fly. The mites will likely be steamed off in the compost at the end of the growing cycle. If a mite makes it out of a growing room it will likely just burrow into the soil and continue hunting.

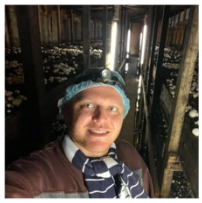
How should I apply *S. scimitus* predatory mites to control mushroom flies?
The PSU Mushroom Fly Research Team is testing two different application methods- mixed in and applied with the supplement, and hand applied on the beds. Mites that were mixed with the supplement lived for at least 45 days in the mushroom compost. Studies are inconclusive as to which application method is better, but early data (and grower feedback) indicate hand applications to the compost may be more effective. If hand applying to beds, ensure mite media is applied evenly across the bed and not clumped in a pile.

During low infestations, as seen on Australian farms in March 2025, it is recommended to apply 40,000 mites per 400 sq meters of growing space. It is best to apply the mites to the compost as early as possible to ensure the compost is protected from invading pests (both mites and flies). Early application of predatory mites will also allow them to begin reproducing and laying eggs early in the cycle, which will boost their numbers in the compost as flies begin to invade the rooms in higher numbers. It takes between 10-34 days for a mite to go from egg to adult depending on compost temperatures. Adult mites can lay 3 eggs per day.

Want to know more?
Visit the PSU Mushroom Fly Research Team Website:
https://sites.psu.edu/mushroomflyteam/
Contact Dr. Wolfin at mvw5315@psu.edu

About the authors:

Dr. Michael Wolfin
Principal Investigator
PSU Mushroom
Fly Research Team



Luke Reynolds
PhD Student
PSU Mushroom
Fly Research Team