

ActiveGuard's Sub-Lethal Effects Reduce Pest Impact of Bed Bugs

Permethrin-impregnated mattress liners prevent even highly resistant bed bugs from feeding and laying eggs.

Bed bugs are a significant public health concern, and their comeback and negative impact on humans have stoked a wave of control efforts in the pest control industry. With highly resistant bed bug populations infesting hotels, homes and any environment that holds their favorite “harborage”—a mattress or box spring—professionals have struggled to land on a *long-lasting* treatment measure.

ActiveGuard® Mattress Liners, with fabric that is impregnated with the pyrethroid permethrin, could change the way the pest control industry manages bed bugs by providing a proven method of stopping even the most stubborn bed bug populations from living on.

Dr. Susan Jones, a professor of entomology at Ohio State University, has tested bed bug products in her lab for a number of years. Recently, she has worked with Allergy Technologies to investigate ActiveGuard fabric to gain a better understanding of how the material works against bed bugs.

ActiveGuard is labeled to kill bed bugs, generally within 72 hours. However, what happens after initial brief contact with the fabric? Dr. Jones' latest research uncovers new findings about bed bug behavior that could be a game-changer for pest management professionals (PMPs) fighting bed bugs. Her study introduced an alternative metric for measuring bed bug control efficacy: *sublethal effect*. This is the point at which bed bugs display a change of behavior, such as reproduction, feeding or growth. This factor is important because it can help us understand how permethrin uptake

from ActiveGuard fabric alters bed bug behavior.

“When bed bugs bite humans, they have a very negative impact, so if we can reduce their *biting* impact, then we reduce their *pest* impact,” Dr. Jones explains, adding that less biting relates to feeding. When bed bugs do not take a bloodmeal from humans, their ability to lay eggs and reproduce is severely impacted. And, when feeding and fecundity (egg laying) behaviors are minimized (or eliminated), the bed bug population eventually fails.

Dr. James Ballard of Ballard Pest Management Consulting calls ActiveGuard a “shiny bullet,” adding that there’s no silver bullet in bed bug control because an integrated pest management (IPM) approach must be implemented. But what has been missing from bed bug IPM until ActiveGuard is a preventive measure, or a final step to prolong treatment. ActiveGuard provides this solution because it effectively provides sustained bioavailability of permethrin for two years. Plus, Dr. Jones' research showed that ActiveGuard's sublethal effect impacts even the most resistant bed bug populations.

Dr. Ballard is an industry consultant working with Allergy Technologies who has been involved in the pest management research space for more than 30 years. “If you have highly resistant bed bug populations that can’t feed, their resistance systems are of lesser consequence,” he points out, calling the sublethal effect displayed in Dr. Jones' research an important phenomenon because it eliminates bed bug resistance status as a barrier to controlling the pests.



Dr. Susan Jones, Ohio State University

Controlling Bed Bug Behavior

Dr. Jones' research focused on how ActiveGuard can impact bed bug behavior. Five different bed bug strains were used during the investigation, from susceptible to highly resistant populations. The bed bugs were placed on ActiveGuard Mattress Liners for two periods of time: 1 minute and 10 minutes. “We wanted to see if the bugs would feed after brief exposure to the fabric,” Dr. Jones explains.

After just one minute of exposure, Dr. Jones noticed sublethal effects including less feeding. “Even though bed bugs don’t die outright with short exposures to the fabric, their feeding behavior is affected,” Jones says. “Bed bugs exposed to ActiveGuard were taking smaller bloodmeals than bugs that had not been exposed to the fabric.” Following 10



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— *Dr. James Ballard*



minutes on *ActiveGuard*, only one female out of 52 in the study laid eggs.

The study showed that 10-minute exposure to *ActiveGuard* yielded a more intense sublethal effect—virtually no fecundity. Even shorter exposures of 1-minute to the fabric lessened bed bugs' life-sustaining behaviors. Bed bugs that eat less produce fewer eggs, and *ActiveGuard* markedly interfered with the bed bugs' life cycle.

A Unique Delivery System

ActiveGuard is the foremost permethrin-impregnated mattress liner available on the market, and the product bears no cautionary signal words on its label. Ideally, the liner is installed in an inverted position on the underside of the box spring, which is where bed bug populations typically proliferate. “*ActiveGuard*'s formulation represents a unique and proprietary delivery system that offers sustained bioavailability of permethrin for two years and is likely responsible for rapidly introducing the active ingredient into bed bugs.”

“It appears that the lipophilic (fat or lipid soluble) nature of the formulation allows the permethrin to be brought into the insect body very quickly,” Dr. Jones says, pointing to the sublethal effects observed during her investigations.

ActiveGuard Mattress Liners last up to two years. This makes the product an ideal “cap” to a complete bed bug integrated pest management program, or as the centerpiece of a preventive program for sites that dealt with past infestations or wish to avoid a serious bed bug problem.

“*ActiveGuard* is an incredibly important part of a bed bug IPM program because of its longevity due to sustained bio-availability of permethrin as compared to other products used,” Dr. Ballard says.

Applying Lab Findings to “Real-World” Field Situations

Extensive use of *ActiveGuard* in a variety of hotel settings has demonstrated significant reductions in infestations found after installation. However, Allergy Technologies is committed to continued laboratory and field investigations of the *ActiveGuard* Mattress Liner. The next step will include studies where PMPs will implement *ActiveGuard* as part of an IPM approach in lower income housing to confirm the product works similarly in this application.

“As Allergy Technologies looks at

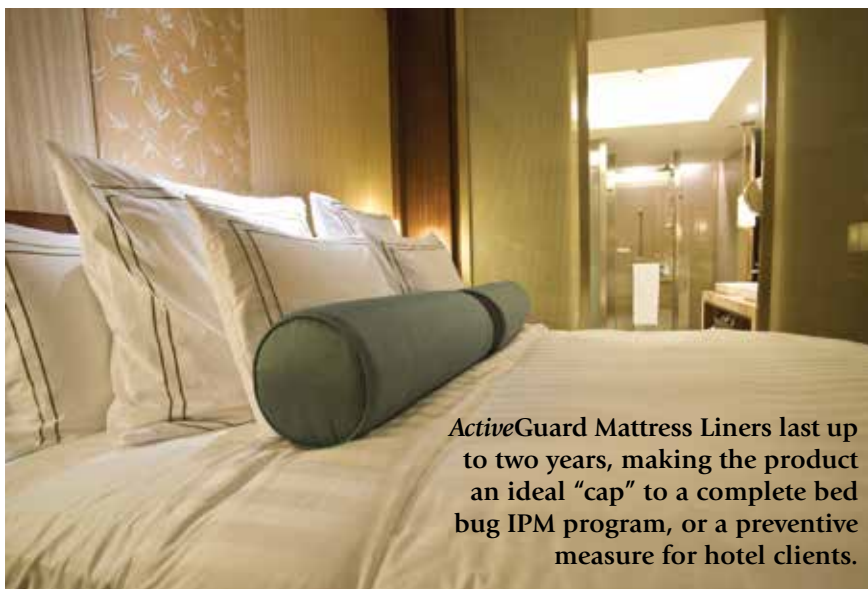
ActiveGuard in motels and homes, guests report fewer bites or no bites because if the bugs have any contact with the fabric for a short period of time, they are not wanting to even probe the skin or feed,” Dr. Jones reports.

ActiveGuard Fills a Bed Bug IPM Gap

What we know today from this research is that *ActiveGuard* alters bed bug behavior to the extent that the insects could very well end their own life cycle as a result of brief contact. Bed bugs may spend as little as 1 minute of time on an *ActiveGuard* Mattress Liner before they begin losing a desire to feed. Finally, *ActiveGuard* is effective on even highly resistant bed bug populations, which takes resistance status out of the control picture—and that's a problem PMPs struggle with when managing bed bugs over the long-term.

“At the end of the day, other bed bug technologies cannot sustain control against bed bugs to the extent that *ActiveGuard* does,” Dr. Ballard says.

For more information about *ActiveGuard* Mattress Liners, contact your local distributor or visit www.allergytechnologies.com.



***ActiveGuard* Mattress Liners last up to two years, making the product an ideal “cap” to a complete bed bug IPM program, or a preventive measure for hotel clients.**