



**PennState**  
College of Agricultural Sciences

Out of Agriculture and into the Home: Development and commercialization of Aprehend<sup>®</sup>, a fungal biopesticide for the control and prevention of bed bugs

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**ConidioTec**  
*Natural Urban Pest Control*



By **Jasmin Fox-Skelly** 20th October 2023

Bed bugs around the world are developing resistance to insecticides, and infestations are making headlines. How do we deal with them?

**F**rance is currently in the grip of a bed bug invasion. This year, in Paris, bed bugs **have been reported** in schools, trains, hospitals and cinemas. But the infestation has been gathering pace for some time. In 2020, an entire unit in a French hospital had to close after a patient **was admitted carrying bed bugs**. The decision to close the unit was taken after investigations using a sniffer dog revealed that four rooms were infested. The closure lasted 24 days, and cost approximately US\$400,000 (£333,000) to treat.

It appears to be part of a **"global resurgence"** of bed bugs that has seen the creatures – small, oval-shaped insects smaller than a grain of rice – becoming a growing problem in cities around the world over the past two decades. Global travel – which has allowed the biting insects to leap continents hidden amongst the luggage of oblivious aircraft passengers – has made it easier for them to spread. But once they gain a foothold somewhere, a recent **study** suggests they may also be getting harder to treat.

In 2005, Warren Booth was a young postdoc researcher in North Carolina, when he began doing a seemingly strange thing. He contacted pest companies and asked them to send him common bed bugs, known as *Cimex lectularius*. Between 2005 to 2009, he managed to collect 161 examples from 38 US states, each taken from a separate infestation. He intended to study them, but his research was cut short when he was given a job as a geneticist by the University of Tulsa.

TIME

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## Bed Bugs Aren't Just a Problem in Paris. Here's Why



BY **ALICE PARK** OCTOBER 11, 2023 1:48 PM EDT

**T**he news reports are alarming to say the least. Paris, the city known for its style, cuisine, and *amour*, has a bed bug problem. **Video** of the insects crawling over Metro seats, in hotels, and swarming buses and movie theaters swept the internet, and bed bug anxiety reached a new high.

But what's behind the Parisian invasion? How did bed bugs launch such a widespread infestation of the city? With Paris hosting the first Olympics in the post-COVID-19 era next summer, those questions aren't just matters for idle conversation.

## What problems do you encounter with bed bug management?

- Very difficult to target by direct spray application
- Chemicals have short residual activity requiring multiple applications (2-week intervals)
- Walk on tips of claws
- Widespread insecticide resistance
- Challenging to get customers to prep for treatment



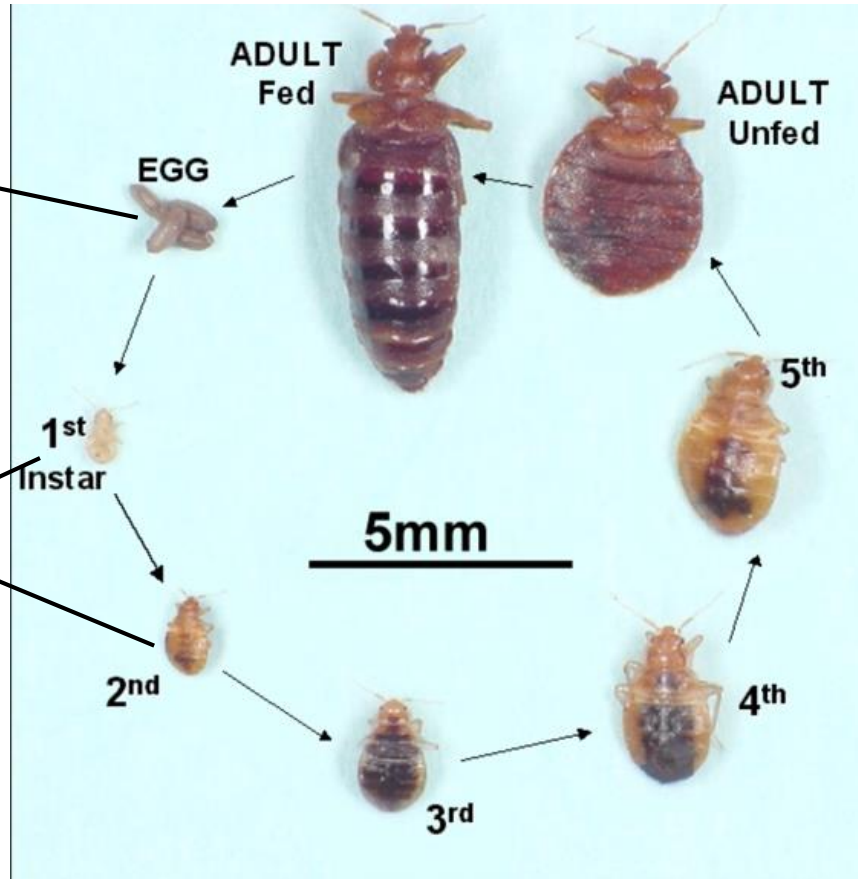
## Customer needs for a new product

- Good long-term residual efficacy
- Effective after brief contact with spray residue
- Effective against resistant bed bugs
- Fewer applications to achieve eradication
- Reduced preparation requirements

# Bed bug biology

5-20 days to hatch

**Bloodmeal required between each life stage**



**Bed bugs are excellent at hiding, but they MUST come out to feed.**

Photo credit: Stephen L. Doggett

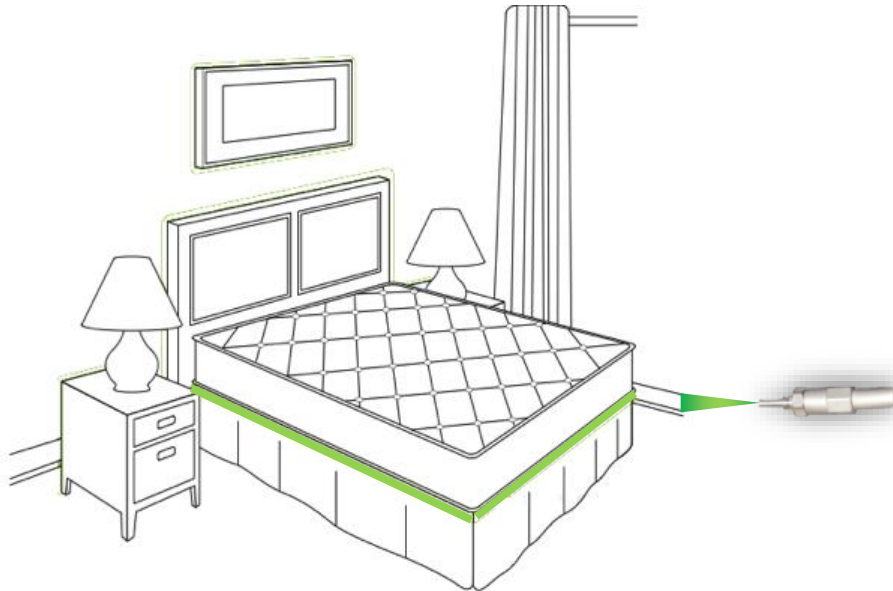
# Innovations that made Aprehend the go-to bed bug product in the US and Canada:

- Ready-to-use oil formulation
- Specifically designed ULV spray kit
- Online training modules for Pest Management Professionals (PMPs)



# Aprehend<sup>®</sup>

- ✓ Control existing bed bug infestations
- ✓ Prevent the establishment of introduced bed bugs
- ✓ Barrier effective for up to 3 months

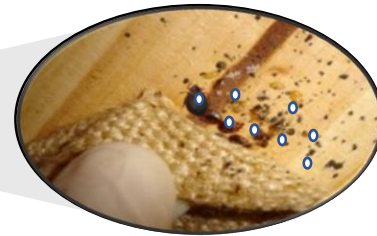
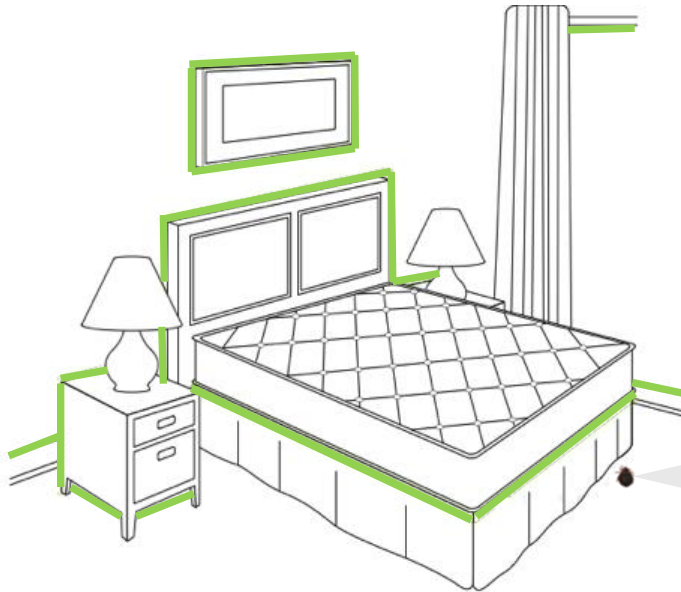


- Bed frames
- Headboard
- Box spring
- Picture frames
- Chairs, couches
- Nightstand
- Baseboard areas



## Strategic 'barrier' application

- ✓ Bed bugs spread the disease to others in the population





# Value proposition

- Single application required for remediation - saves technician time and travel
- Strategic spray application – fast, efficient services
- Minimal customer preparation required – better for customer
- Proactive treatments (quarterly service) – expanded service offerings
- Will work in cluttered environments – tackle the jobs other companies refuse
- No resistance – more confidence in achieving control
- Natural with non-toxic mode of action – customer acceptance

## The keys to innovation are found outside of the laboratory

- Talk to end users to establish their actual needs
- Develop product attributes based on customer discovery
- Expand expertise beyond biology





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