

**Bed bugs  
are re-emerging.**

**It's up to you  
to fight back.**



# The bed bug battle begins with knowledge.

**They've been with us longer than you think.**

Bed bugs, *Cimex lectularius*, have been with man since we slept in caves. The earliest historical citations about them go back to 423 B.C. In the United States, bed bugs came over with the first explorers and were a problem until the introduction of DDT in the late 1930's provided the first major advance in bed bug control. Following on the heels of DDT were organophosphates which also provided excellent control.

Throughout the years, an evolving regulatory environment has removed or limited the tools that were available for controlling bed bugs causing infestations to ebb and flow.

**New ideas to fight the resurgence of an old foe.**

Recently, bed bug infestations have enjoyed a resurgence, to the point where bed bugs are like a new pest. It is not often the pest control industry is faced with new pests to deal with. The occasional introduced ant species can be challenging, but in general these are localized problems. Bed bugs, however, are a nationwide pest problem in the U.S.

The resurgence of this age old pest has become a significant problem in dorm rooms, hotels, apartments, and permanent residences alike. Today's mobile society and the loss of key pesticide tools present a unique challenge for Pest Management Professionals trying to successfully control bed bugs. A variety of methods need to be implemented for a successful management program.



## **Knock them down and keep them down.**

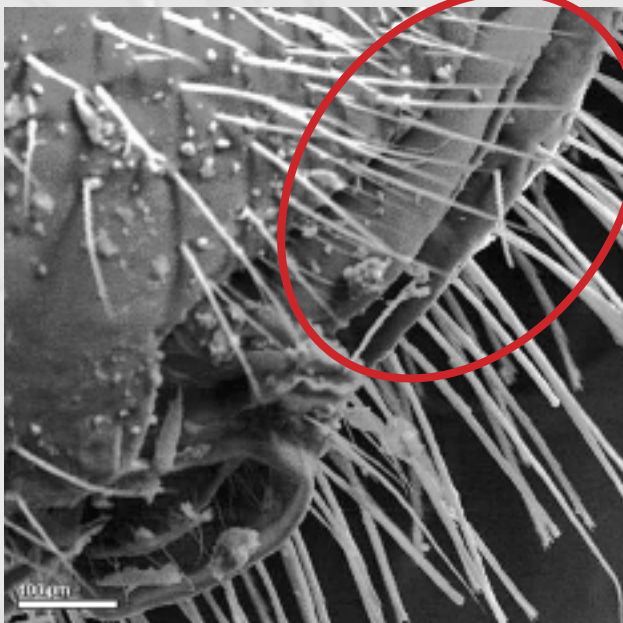
Conventional adulticides are an important tool, as well as sanitation and exclusion. Other important tools include Insect Growth Regulators (IGRs). IGRs have a strong history of controlling a wide variety of insects such as cockroaches and fleas. In combination with adulticides and other measures, IGRs keep insect populations under control by breaking the life cycle and preventing infestations from rebounding.

Gentrol® is an IGR that is well known to Pest Management Professionals (PMPs). Gentrol® was introduced to the industry in the mid '80's and has been used to successfully control cockroaches, stored product pests, drain and fruit flies. The recent addition of bed bugs to the Gentrol® label offers PMPs another tool in the challenge to control bed bugs.

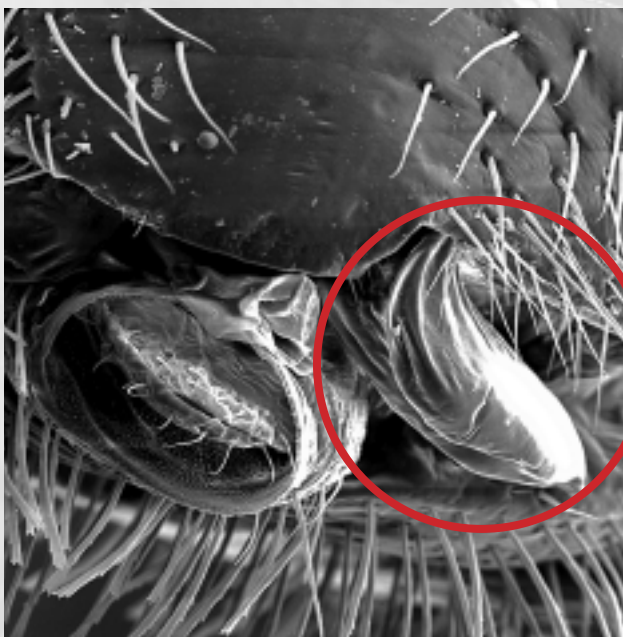
## **Additional points of interest for fighting bed bugs.**

- The primary mode of action for Gentrol® is to affect bed bug reproduction. When reproduction is affected the insect population declines, reducing the infestation.
- Gentrol® works on bed bugs, as in cockroaches, by preventing the nymphs from developing into reproductively functioning adults. Electron microscopy shows that in cockroaches and in bed bugs the organs responsible for normal copulation and reproduction do not develop. In the case of male bed bugs, the paramere, or reproductive organ, fails to develop normally. As a result, successful copulation cannot occur.

**Refer to Figures 1 & 2.**



**Figure 1: Normal male bed bug reproductive organ (paramere). Scanning electron microscope (SEM) image of a normal male bed bug paramere.**



**Figure 2: Gentrol® affected male bed bug reproductive organ (paramere). Scanning electron microscope (SEM) image of a hydroprene exposed male bed bug which molted into an adult, but with the paramere deformed.**

- In addition to reproductive anomalies, there is research showing that some nymphs exposed to Gentrol® die prior to molting into adults.

**Refer to Figure 3.**

- There is information in the public domain that suggests Gentrol® causes bed bug females to produce more eggs. This was a one time evaluation where immature bed bugs that escaped being affected by Gentrol® produced more eggs than the control replicates. These females that produced more eggs were not exposed to Gentrol® at the time they were reproductive.

IGRs can affect fecundity – i.e. adult female insects exposed to IGRs generally produce fewer eggs than unexposed females. According to the Monograph of Cimicidae (1966), bed bug egg production varies between individuals and continues up to 12 weeks after the first blood meal. Egg production during that first week after a blood meal ranged from 5 to 16 eggs per week. Egg production increased as the females aged with as many as 27 eggs produced per week during the 12 week observation period.

- In studies generated to satisfy EPA registration requirements, Gentrol® provided efficacy by inhibiting the development of the next generation of nymphs by 92%. In other words, nymphs exposed to a Gentrol® treatment were unable to reproduce. Mortality was also observed in this study where 66% of the exposed nymphs failed to survive to adults. Of those surviving to adults, reproduction was significantly reduced by 92% from the untreated control population. There was an average of 3 nymphs produced vs. an average of 61 produced in the untreated control group. **Refer to Graph 1.**

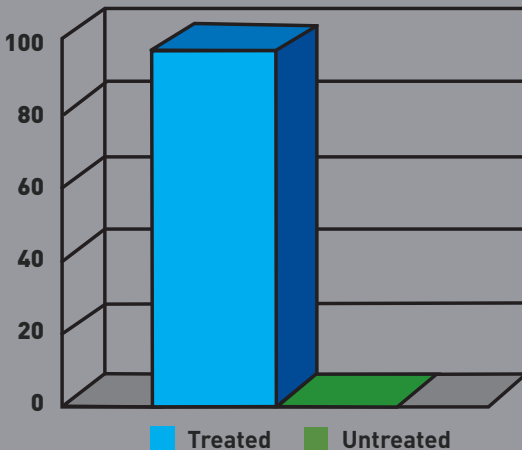
**IGRs are, and will continue to be, a sustainable tool in the Pest Management Professional's arsenal to keep bed bugs and other insects under control.**

**Figure 3.**  
Mortality during the molt to the adult.  
Image of a hydroprene exposed  
bed bug which died mid-molt  
between 5th instar and adult.  
It shows the rupture of the  
hindgut through  
the exoskeleton.



**Graph 1.**  
Efficacy of Gentrol® by preventing reproduction.

**Hydroprene Efficacy Against  
*Cimex lectularius***  
*Percent Inhibition of Next Generation Nymphs*



Reduction in next generation of nymphs.  
Initial exposure to mid-instar nymphs.  
Study completed at 8 weeks.



## **GENTROL® WORKS FOR YOU**

With the recent bed bug resurgence, your customers need more than a traditional adulticide. Gentrol® will work for you to help eliminate bed bug infestations and give your customers the reassurance they need.

Gentrol® is an odorless, non-repellent formulation with the active ingredient (S)-Hydroprene, an Insect Growth Regulator (IGR) that prevents immature bed bugs from becoming normal reproductive adults.

Gentrol® works for you by stopping future generations of infestations. Gentrol® has an excellent toxicity profile and is approved for use in sensitive accounts.

**It's time to get on top of the bed bug problem.**

**Contact your distributor, call 1-800-248-7763  
or visit [www.zocon.com](http://www.zocon.com).**



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