

IGRs give PMPs
the advantage
when controlling
insecticide-resistant
bed bugs.



Bed Bugs & RESISTANCE



TRUMPING *Resistance*

IGRs give PMPs the advantage when controlling insecticide-resistant bed bugs.



When it comes to controlling pyrethroid-resistant bed bugs, Insect Growth Regulators (IGRs) may be the pest management professional's trump card: The pests die faster when Gentrol® IGR is added to the treatment mix.

According to new third-party research, a mix of Gentrol® IGR and deltamethrin killed field-strain bed bugs highly resistant to pyrethroids nearly 4 times faster than deltamethrin alone. Bed bugs moderately resistant to pyrethroids died 2.3 times faster.

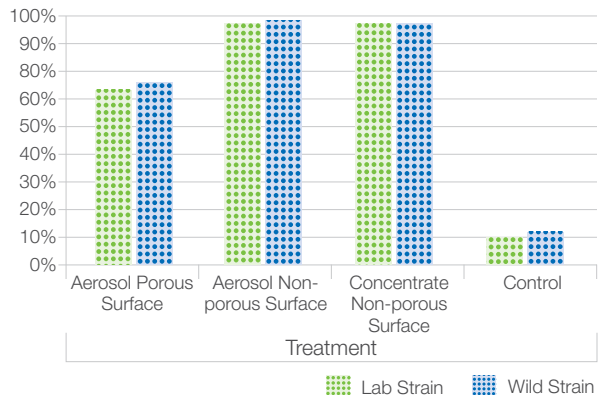
Adding an IGR to the mix reduced the resistance ratios by about 20 percent, said Doug VanGundy, senior director of research and development at Central Life Sciences.

The IGR helps keep the adulticide portion of treatment effective despite the pests' increasing resistance to pyrethroids, he explained.

With a four-month residual, Gentrol® IGR also helps control future populations that may come from neighboring apartments or be re-introduced at a later date.

The study, conducted for Central Life Sciences by Snell Scientifics, found third instar nymphs had nearly a 100 percent rate of mortality when exposed

Bed Bug Nymphal Mortality from Direct Exposure to Dried Residues of Gentrol® IGR



Two label rate applications 2 weeks apart. Third instar nymphs followed to adulthood.

Snell Scientifics 2012

to non-porous surfaces treated with Gentrol® IGR aerosol or concentrate over four weeks. More than 70 percent mortality was achieved when third instar nymphs rested on porous surfaces treated with Gentrol® IGR aerosol.

Municipalities are “extremely frustrated because of the continual re-infestation of bed bugs,” said Bob Muro, president of A & A Pest Control in Manchester, Conn.

That’s why he used Gentrol® IGR in combination with Zenprox® EC, a broad-spectrum insecticide, to treat

more than 2,000 public housing units, which included a mix of apartments, duplexes, elderly care units and multiple-family dwellings.

“We’ve seen a huge reduction in callbacks,” said Muro. The “right products and right program equals positive control, if not total elimination.”

Terminix-Triad Commercial Division Manager Joe Malinowski, who saw bed bug revenue jump 66 percent in June, switched to a Gentrol® IGR / Zenprox® EC treatment protocol after two senior techni-

cians field trialed the products for 90 days. One technician had zero callbacks; the other had a few but far less than the Greensboro, N.C., company had using other products.

THE BIG PICTURE. Not everyone agrees IGRs are effective on bed bugs, but reports from PMPs in the field are positive, observed John Neberz, business manager for Zoëcon Professional Products, a division of Central Life Sciences.

“While I respect the work being

How to Get the Most from IGRs

Insect Growth Regulators (IGRs) can boost your bed bug control efforts, if you use them correctly.

Ideally, pest management professionals should perform an initial application of Gentrol® IGR at label rate, followed by a secondary application two weeks later, said Doug VanGundy, senior director of research and development at Central Life Sciences.

Spreading the applications over two weeks lets PMPs target bed bugs “later in the life stage when they’re a bit more sensitive to the product.” The first application may hit just as third instar nymphs are ready to molt; the second application boosts the active ingredient’s effects on last instar nymphs.

“We always recommend using IGRs in combination with an adulticide. We would never advocate using Gentrol® IGR alone.” An adulticide, like Zenprox® insecticide, knocks back the population, while Gentrol® IGR acts as a safety net.

Gentrol® IGR can be tank mixed with other products, but be sure to adjust label rates accordingly. For example, one gallon of Zenprox® EC treats 1,000 square feet; one gallon of Gentrol® IGR Concentrate treats 1,500 square feet. “You have to reduce one or increase the other by a certain percentage to make the application interval equal.”

Apply these products thoroughly and then monitor the site. Depending

on the severity of the infestation, a second adulticide treatment may be necessary.

Comprehensive prep-work boosts treatment effectiveness. A & A Pest Control President Bob Muro moves furniture three feet from walls, recommends residents wash clothes and bedding in hot water prior to treatments, and requires all cleaned drawer contents be stored in rubber tubs until after treatment. His technicians disassemble beds and apply a complete product application to frames and headboards.

To prevent infestations from moving into other units, Muro treats units above, below and adjacent to the infested unit. “Bed bugs can travel quickly so we take an old school approach to ensure control.”

A & A Pest Control typically performs three treatments per unit in an alternating pattern: one application per week for weeks one, two and four; week three is dedicated to monitoring.

Communication with customers is absolutely crucial, said Joe Malinowski, commercial division manager at Terminix-Triad in Greensboro, N.C. Education and training help employees and residents understand the action steps they need to take so they can become part of the solution.

To help combat resistance, rotate products in your bed bug treatment program or use products with different modes of action, suggested John Neberz, business manager for Zoëcon Professional Products, a division of Central Life Sciences.



An adulticide, like Zenprox® EC insecticide, knocks back the bed bug population, while Gentrol® IGR acts as a safety net.



When the cost of a re-service easily can run \$150, the "level of comfort" gained by adding an IGR is worth it, says Terminix-Triad Commercial Division Manager Joe Malinowski.

done at universities across the country, what's happening in the lab and in the field are often two different things." Products perform differently against different strains of bed bugs, so no single study is reflective of the big picture. PMP feedback and Central Life Sciences' own trials show "IGRs are a valuable addition to any bed bug treatment protocol."

When the cost of a re-service easily can run \$150, the "level of comfort" gained by adding an IGR is worth it, said Malinowski. "The return on investment is far greater than the associated cost."

IGRs revolutionized flea and cockroach control, Malinowski observed. Using them to help control bed bugs has "got to help."

Neberz urged PMPs to assess the data. "Only by looking at the complete body of work on a particular subject do you get a clear picture of what's happening in the field."

Central Life Sciences will continue to conduct its own research and work with universities and third-party labs to evaluate Gentrol® IGR's efficacy. The IGR has been labeled for bed bug control since 2005.

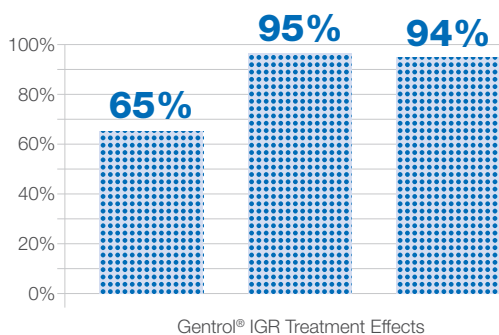
HOW IT WORKS. As a general surface spray or aerosol, Gentrol®

IGR moves into wall cavities, cracks and crevices to reach bed bugs other treatments may miss.

The non-repellent juvenile hormone disruptor prevents nymph-stage bed bugs from maturing. Exposed to the dried residue of active ingredient, (S)-hydroprene, pests are unable to molt out of their pupae stage and die, or adult pests become sterile and unable to reproduce. Thus, future generations are stopped.

A 2003 study conducted for Central Life Sciences found exposure to Gentrol® IGR caused 65 percent of hydroprene-exposed nymphs to die. In addition, 95 percent fewer nymphs and 94 percent fewer eggs were produced compared to untreated bed bugs (see chart below).

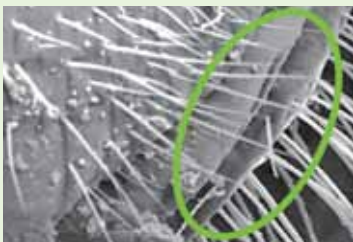
Gentrol® IGR (S)-hydroprene Efficacy*



Gentrol® IGR targets several aspects of the bed bug life cycle when nymphs are exposed to dried residues.

- 65%** of the hydroprene-exposed nymphs died.
- 95%** less nymphs were produced compared to untreated bed bugs.
- 94%** less eggs were produced compared to untreated bed bugs.

*Based on "Evaluation of Gentrol aerosol for efficacy against Bed Bugs" -Insect Control & Research, 2003



▲ Figure 1. Normal male bed bug reproductive organ (paramere).

IGR Effects on Insects

Gentrol® IGR contains the Insect Growth Regulator (S)-hydroprene. (S)-Hydroprene is a synthetic copy of a naturally occurring insect biochemical. IGRs prevent insects from completing their normal development into the adult stage. In insects with gradual metamorphosis, such as bed bugs, the impact is on the last nymphal instar, causing adults to have non-functional

reproductive organs.

Gentrol® Aerosol and Gentrol® IGR Concentrate work on bed bugs by preventing the nymphs from developing into reproductively functioning adults. Electron microscopy shows that in bed bugs the organs responsible for normal copulation and reproduction do not develop. In the case of male bed bugs, the

A WINNING COMBINATION. Using an IGR makes good business sense. Muro's customer base has nearly doubled despite the economy, a fact he attributes to referrals. More municipalities are choosing us because of our treatment success." The results of Gentrol® IGR and Zenprox® insecticide "are remarkable."

Even more satisfying: happy tenants. "Getting a positive testimonial from residents makes it worth it," he said.

PMPs rely on the peace-of-mind that comes with using a technology that works. "Our IGRs are still

Zoëcon is continuing to conduct research and develop products that combine IGRs and adulticides to stay one step ahead of bed bugs.

the industry standard for the pest management industry," said Neberz. Whether for bed bugs, cockroaches or fleas, "they're excellent control agents."

And they meet the U.S. Environmental Protection Agency's increasingly stringent requirements. "The beauty of IGRs is they have a

Gentrol® IGR Reduces Resistance Ratios in Highly Pyrethroid Resistant Bed Bugs

Direct Applications to Adult Bed Bugs

Test Substance	LT90 (min)		Resistance Ratio Highly pyrethroid resistant bed bug strain
	Pyrethroid susceptible field strain	Highly pyrethroid resistant field strain	
Deltamethrin only	425	38728	91
Gentrol® IGR + Deltamethrin	182	13430	74

Application rates were 0.3% deltamethrin/0.06% hydroprone. One hour exposure then removed to clean surface.

Snell Scientifics 2012



Gentrol® IGR is Non-Repellent

Percent repellency of field strain Bed bugs when exposed to treated mattress fabric.					
Test Substance	30 min	60 min	120 min	180 min	240 min
Untreated	13	12	8	10	10
Gentrol® IGR	13	7	10	13	13

Choice test with adult bed bugs using mattress fabric treated with Gentrol®

wonderful environmental profile," said Neberz. "They were very benign 25 years ago and they still are very benign today."

Central Life Sciences is selling more IGRs today than at any time in its history, a reflection of the benefits of this innovative technol-

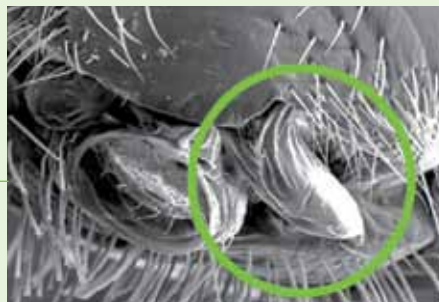
ogy across a broad range of pests, he added. The company is continuing to conduct research and develop products that combine IGRs and adulticides to stay one step ahead of bed bugs, a challenging adversary that continues to pose problems for PMPs around the globe.

"Everybody's looking for the silver bullet in the bed bug war," whether that's freezing, steam, heat, conventional pesticides or vacuuming, said Malinowski.

The goal is to deliver excellent service and gain control on the first visit to maximize profitability, but the reality is sometimes you're going to have failures. When every re-service cuts into profit, adding an IGR to the mix to improve results "cannot hurt," Malinowski said. 🐛

paramere – or reproductive organ – fails to develop normally. As a result, successful copulation cannot occur (see Figures 1 and 2).

► Figure 2. Gentrol® IGR affected male bed bug reproductive organ (paramere). Exposed male bed bug molted into an adult, but with the paramere deformed.



A QUICK KILL in *High-Stakes* Bed Bug Control

A new player has entered the bed bug control game: Non-repellent Zenprox® Aerosol insecticide, a pyrethroid-like chemical that delivers fast knock down of bed bug populations and two weeks of residual activity. It is effective in suppressing egg hatch of bed bugs and kills newly hatched bed bugs.

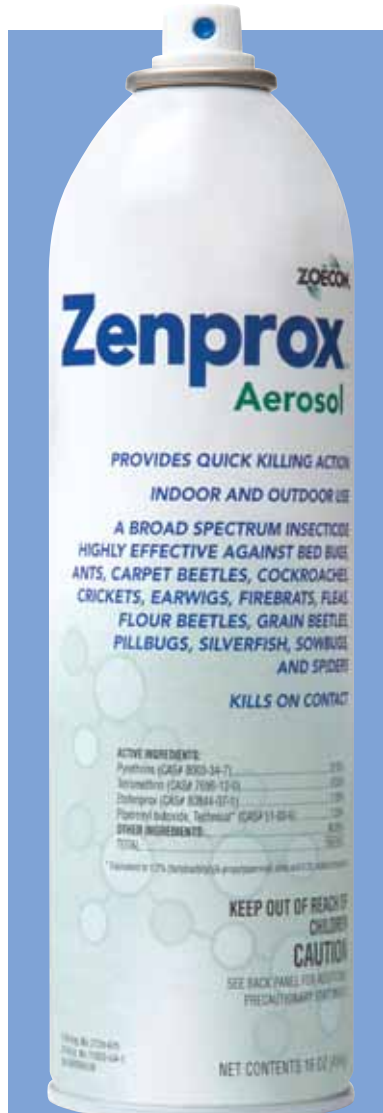
Not your typical pyrethroid, it has a different chemical structure – the active ingredient, Etofenprox, is a pyrethroid ether while most pyrethroids are esters – but it has the same mode of action, explained Doug VanGundy, senior director of research and development at Central Life Sciences.

Zenprox® Insecticide has an environmentally friendly toxicity profile similar to Insect Growth Regulators (IGRs), which makes it “an attractive addition to our product line,” he said. “It’s a low toxicity product that is highly effective.”

The synergist PBO “gives it a little bit of a kick,” providing quicker knockdown, greater residual action, and helps overcome resistance.

Zenprox® EC can be used as a broadcast, crack-and-crevice or spot treatment to control pests in homes, hotels, schools and commercial properties. It is labeled for broadcast applications indoors.

“We were one of the first companies to recognize bed bugs were an



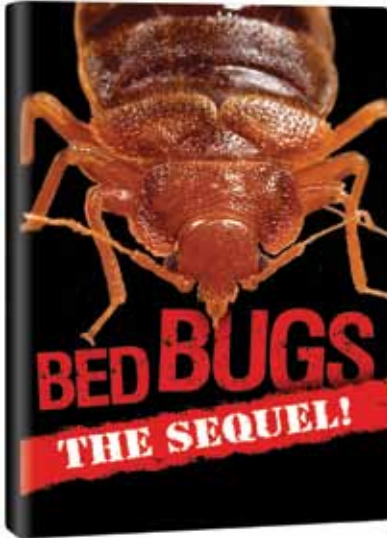
The specially-designed Zenprox® Aerosol can features an ergonomic actuator that provides 360-degree spray capability.

up and coming problem,” he added. With the launch of the Zenprox® products, “we’re extending our product line and growing our commitment to the bed bug market.” Combined with Gentrol® IGR, it breaks the re-infestation cycle and minimizes callbacks and retreats.

The specially designed Zenprox® Aerosol can features an ergonomic actuator that provides 360-degree spray capability (upside down spraying). An extension tube also allows pest management professionals to treat hard-to-reach areas.

Zenprox® Aerosol is available in a 16-ounce can with six cans per case. This product is labeled for commercial and residential accounts in non-food handling areas and also can be used for outdoor perimeter and surface treatments of up to three feet on the foundations of buildings.

Zenprox® EC is a broad spectrum insecticide covering more than 25 species, including fleas, spiders, ants, cockroaches and mosquitoes. “Our main objective was to streamline the offering for pest management professionals by providing one product for a variety of applications,” said John Neberz, business manager, Zoëcon Professional Products division. “The four active ingredients, including Etofenprox, provide quick-killing action of all labeled pests.” 🐜



Bed Bugs: *The Sequel!*

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.

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, including the Zoëcon complete line of bed bug control products – Gentrol® Aerosol, Gentrol® IGR Concentrate, Zenprox® EC and Zenprox® Aerosol.

It's time to get on top of the bed bug problem with the help of Zoëcon. Contact your distributor, call 1-800-248-7763 or visit www.zocon.com for more information about IGRs and bed bugs. 🐛



Gentrol® IGR, featuring ground-breaking IGR technology, revolutionized flea and cockroach control for PMPs. It is now being used in combination with adulticides to control challenging bed bug problems.



GENTROL® IGR AND ZENPROX® PRODUCTS ALLOW PROFESSIONALS TO BE MORE:

- **EFFECTIVE** – Bed bugs are resilient, professionals need more than one weapon.
- **ECONOMICAL** – Suppressing resurgence means reducing expensive callbacks and retreats.
- **ESTABLISHED** – Long residuals and suppressed resurgence means long-term control.
- **ENCOMPASSING** – Gets into walls, cracks and crevices to control the bed bugs you can't see.

Professional bed bug treatments should always include Gentrol® IGR in conjunction with Zenprox® products. Instant results are hard to come by with bed bug control, but over time using Gentrol® IGR plus a Zenprox® insecticide will help eliminate infestations and prevent rebounds. Zoëcon provides PMPs with bed bug solutions that can meet varying levels of infestation and/or application needs.

For more information about the Zoëcon complete line of bed bug solutions visit www.zoëcon.com/bedbugs.

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