

Overcoming Repellency and Resistance in Cockroaches

 **BASF**

We create chemistry



Control Cockroaches in Challenging Environments

To your commercial kitchen customers, nothing is more important than their reputation. Sightings of cockroaches anywhere food is processed, stored, or served could damage their reputations, local health department ratings, and profitability. Yet, that's a risk whenever insecticides demonstrating cockroach resistance and repellency are used in any commercial kitchen account.

BASF Complete Cockroach Protocol includes **Alpine**[®] and **Phantom**[®] non-repellent insecticides. Together, **Alpine** and **Phantom** insecticides offer a cockroach solution that will:

- Eliminate repellency issues
- Manage resistance
- Protect your and your customers' reputations, local health department ratings, and profitability

Alpine[®]
Insecticides

Phantom[®]
Insecticides

Specific Benefits of Alpine® and Phantom® Insecticides that Control Cockroaches



Advantages of Alpine® WSG Water Soluble Granule and PT® Alpine® Pressurized Insecticides include:

- **Fast-acting non-repellent insecticides:** start killing cockroaches within minutes
- **Scheduling flexibility per label:** Crack & Crevice®, void, and spot treatments may be made while a food handling facility is in operation

“APPLICATIONS OF THIS PRODUCT IN FOOD/FEED AREAS OF FOOD/FEED HANDLING ESTABLISHMENTS MAY BE MADE AS A CRACK & CREVICE, VOID, SPOT OR GENERAL TREATMENT. General surface application may be used only when the facility is not in operation, provided exposed food/feed has been covered or removed from the area prior to application.”

- **Reduced Risk Status:** Contains dinotefuran, the only active ingredient granted Reduced Risk Status by the EPA for use in both public health and food handling establishments

Advantages of Phantom® Termiticide-Insecticide and PT® Phantom® II Pressurized Insecticide include:

- **Manages resistance:** Unique mode of action reduces the chance of developing resistance by disrupting energy production at multiple target sites within the cells of the cockroach
- **Resists rapid breakdown:** Insecticide is resistant to rapid breakdown from moisture and extreme heat, as well as high pH environments associated with cleaning products in food handling accounts
- **Faster performance:** Crystallization technology ensures bioavailability and faster performance on numerous surfaces, including porous, non-porous, and high organic matter
- **Non-repellent insecticide:** Highly effective, non-repellent technology that's undetectable to roaches

Repellent Insecticides Cause Cockroaches to Scatter

Using non-residual, repellent insecticides, such as pyrethrins, in your commercial kitchen accounts can be useful in flushing cockroaches from harborage areas. On the other hand, using repellent, residual pyrethroid insecticides increases the risk of unwanted roach sightings and bait contamination during and following treatment.

Alpine® and **Phantom®** non-repellent insecticides will kill cockroaches and protect your and your customers' reputations.

- Does **NOT** fragment or spread cockroaches into more sensitive areas like dining rooms and reception areas
- Does **NOT** stop roaches from foraging across a treated surface
- Does **NOT** contaminate **Alpine** cockroach gel bait placements
- Does **NOT** interfere with roaches feeding on bait or around treated area
- Does **NOT** disrupt cockroach feeding behavior if bait placements are nearby

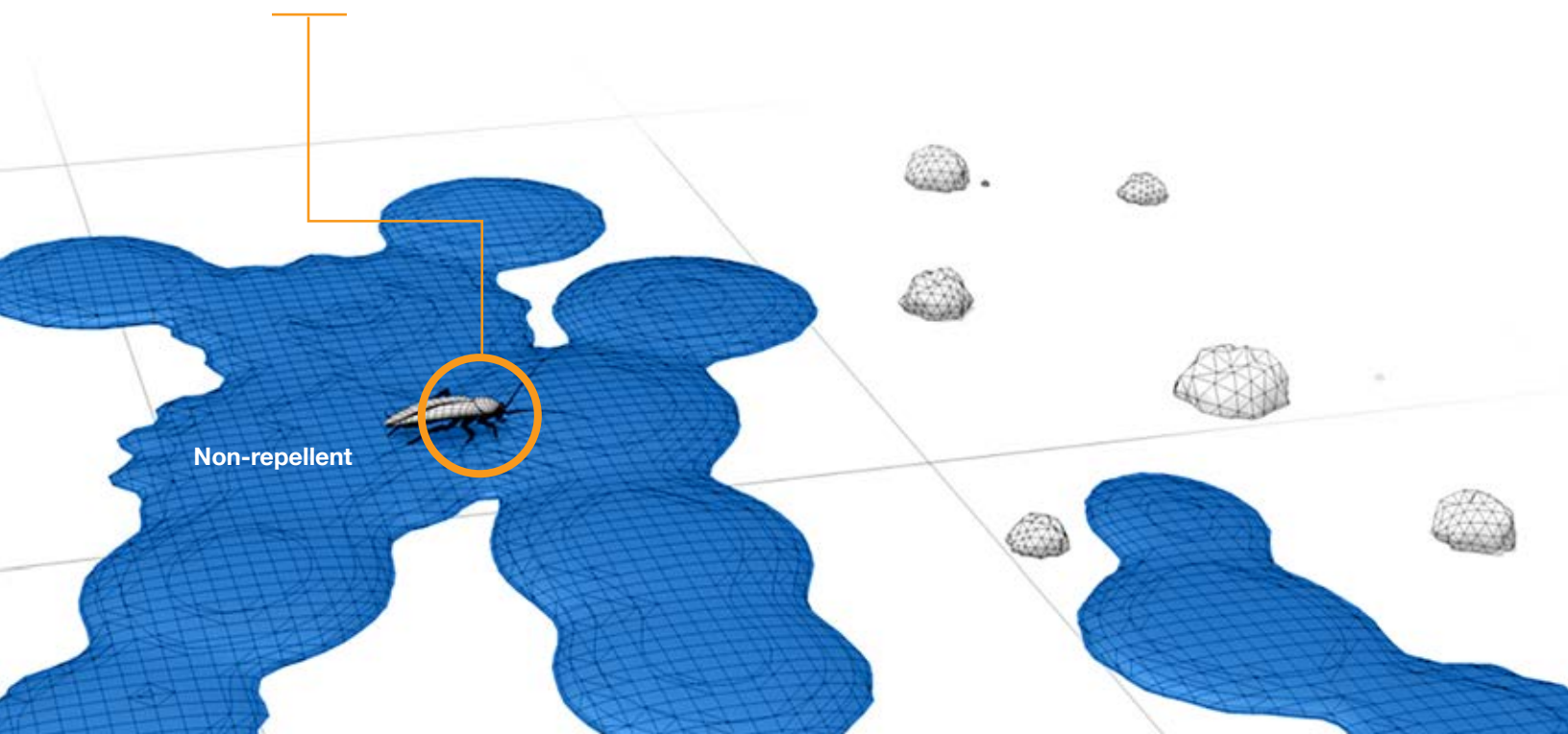
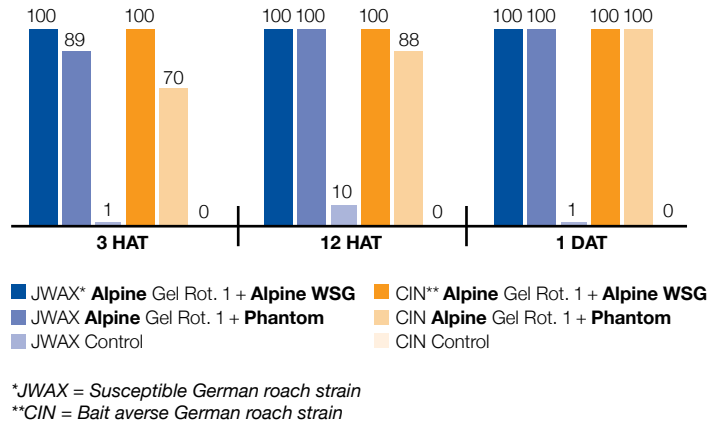


Figure 1: Results show that neither **Phantom**® termiticide-insecticide nor **Alpine**® WSG Water Soluble Granule insecticide interfere with feeding on bait placements when applied on or around treated areas.

“**Alpine**® cockroach gel bait rotation 1 reservoir/**Alpine WSG** insecticide was the most effective treatment and gave 100± 0% mortality within 3 hours of bait application in susceptible and bait-averse German cockroaches and American cockroaches. *No repellency was observed in any cockroach strain/species when the **Alpine** cockroach gel bait rotation 1 reservoir was treated with **Alpine WSG** insecticide.*”

Dr. Buczkowski

Figure 1: Average % Mortality of Treatments



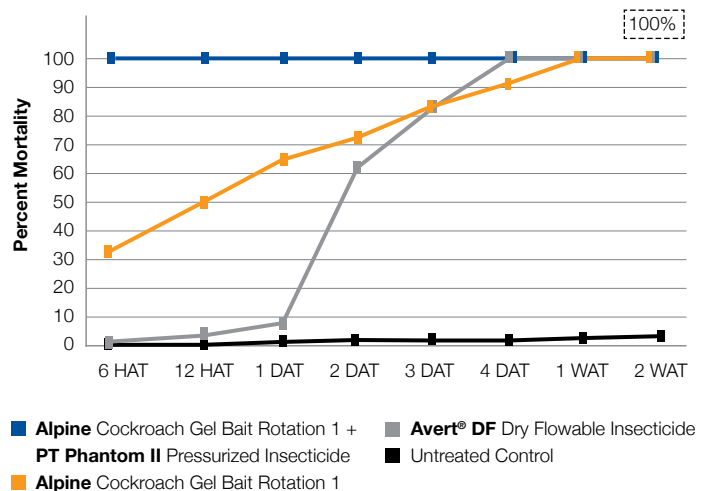
Figures 2 & 3: Results show combination treatment of **PT® Phantom II** pressurized insecticide sprayed on top of **Alpine**® cockroach gel bait create a clear advantage over bait alone.

- **PT Phantom II** pressurized insecticide increased **Alpine** cockroach gel bait consumption for German cockroaches
- **PT Phantom II** pressurized insecticide and **Alpine** cockroach gel bait combo treatment results in high mortality across species and strains

Figure 2:
German Cockroach Bait Consumption
Susceptible vs. Bait Averse

Product	G. Roaches Susceptible (JWAX Strain)		G. Roaches Bait Averse (CIN Strain)	
	bait take	rat chow	bait take	rat chow
Alpine Cockroach Gel Bait Rotation 1	4.8	1.0	0.2	2.2
Alpine Cockroach Gel Bait Rotation 1 + PT Phantom II Pressurized Insecticide	7.0	1.7	2.8	2.0
Untreated Control	2.6	3.1	2.0	3.4

Figure 3:
German Cockroach CIN Strain:
Male and Female Mortality to Various Baits



Sustainable Approach to Managing Cockroach Resistance

Using pyrethroid products on pyrethroid resistant cockroach strains is risky to your commercial kitchen business. The treatment result could cost you time and money for retreatments, as well as jeopardize your commercial kitchen customers' reputations, local health department ratings, and profitability.

Alpine and **Phantom** insecticides provide a more sustainable approach to killing strains of pyrethroid resistant roaches.

- **Residual Insecticide Rotation Plan: Alpine** and **Phantom** insecticides both contain different modes of action, active ingredients, and classes of chemistry that are also different from pyrethroids
- **Phantom's Chemistry Minimizes the Chance of Developing Resistance:**
 - Its active ingredient, chlorfenapyr, is a pro-insecticide
 - Chlorfenapyr's mode of action (uncouplers of oxidative phosphorylation) is different from all other registered insecticides because it disrupts energy production at multiple target sites within the cells

Manage Resistance in Cockroaches with a Residual Insecticide Rotation Plan:

1. Apply **PT Alpine** or **Alpine WSG** insecticides during regular service visits (e.g. weekly/monthly calls)
2. Apply **PT Phantom II** pressurized insecticide or **Phantom** termiticide-insecticide quarterly when rotating **Alpine** cockroach gel bait rotation 1 and 2 reservoirs

How Insecticide Resistance Occurs

Strains of a species no longer react negatively to a particular active ingredient.



When roach populations are exposed to insecticides containing the same active ingredient, those with the resistant gene survive.



The survivors reproduce and pass on their resistance to their offspring.



The resistant population grows.



The cycle is repeated when the same insecticide is continually used.



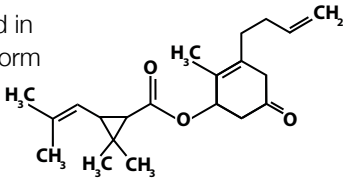
Over time the resistant roaches will become numerous in population.



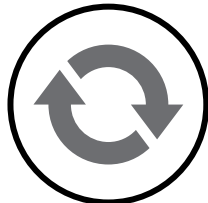
Phantom Pro-Insecticides: An Element to Managing Resistance

Cockroaches may become resistant to traditional insecticides like **pyrethroids** because:

A pyrethroid in its original form



Pyrethroid **processed** within insect



Pyrethroid is neutralized by insect's own enzymes as part of its metabolism

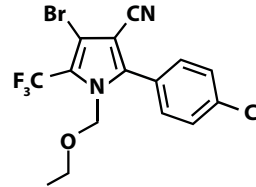
Insect Survives

Limitations to pyrethroid insecticides:

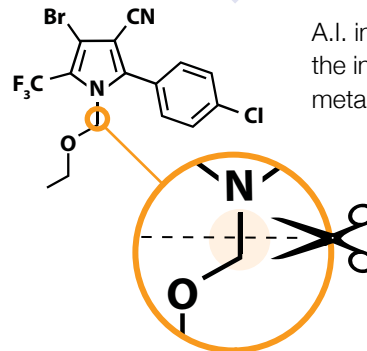
- Insects use their internal enzymes to break down insecticides, such as pyrethroids
- Resistant strains may possess higher levels or more efficient forms of these enzymes
- Insects destroy the toxin or quickly rid their bodies of the toxic molecules

Cockroaches are less likely to develop resistance to **Phantom pro-insecticides** because:

Chlorfenapyr in its original form

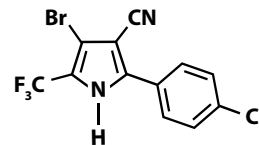


A.I. interacts with the insect's internal metabolism



Sprayed on or around insect

More toxic version is created inside insect



Molecule is altered by the insect's own internal process

Insect Dies

Advantages of Phantom pro-insecticides:

- After entering the insect, it is metabolized into a chemical form that is more toxic to the insect than in its original form
- Since the insect's own chemical reaction creates the more toxic form of the active ingredient, the chance of developing resistance to the active ingredient is minimized

Solve the Problems of Repellency and Resistance in Cockroaches

Use **PT® Alpine** pressurized insecticide, **Alpine WSG** insecticide, **PT® Phantom II** pressurized insecticide, and **Phantom** termiticide-insecticide as part of the BASF Complete Cockroach Control Protocol.

To find out more, contact your local BASF sales representative or visit pestcontrol.basf.us

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Always read and follow label directions.

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PSS 16-20-936