

# AMGUARD™

ENVIRONMENTAL TECHNOLOGIES  
An American Vanguard Company

## PROVERDE®

Low Impact Pest Solutions

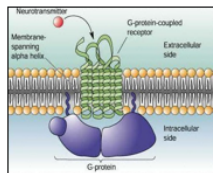


# PROVERDE®

Breakthrough Patented Technology

Step 1

Selection of active ingredients



Step 2

Selection of blends

$$1+1 > 2$$

Step 3

Proprietary boosting formulation

$$1+1+\alpha > 10$$

$$1+\alpha > 10$$

Patented platform

Patented blends

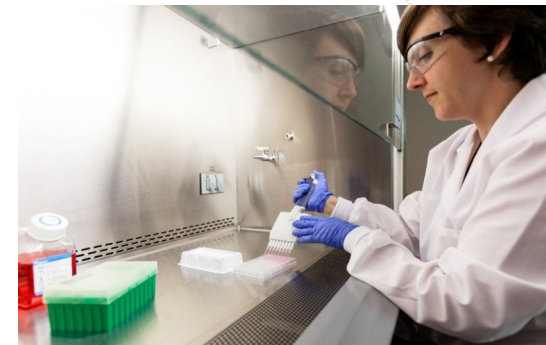
Patented formulations

**21 granted patents; 50 pending**

# PROVERDE®

## Key Technology Characteristics

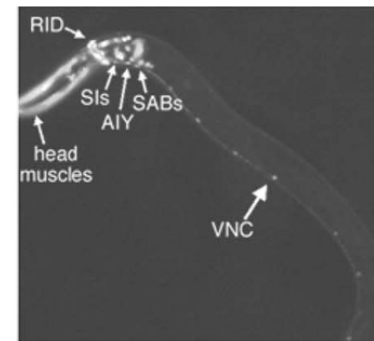
- Active ingredients target tyramine receptors
- Effective against both susceptible and resistant strains
- Excellent control using low levels of active ingredient
- Rapid kill
- Broad Spectrum of Activity
  - Crawling insects
  - Flying insects



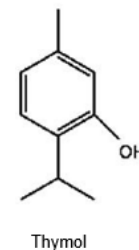
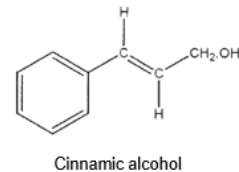
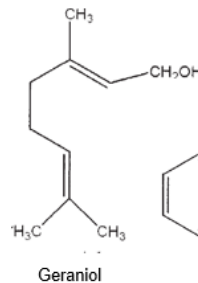
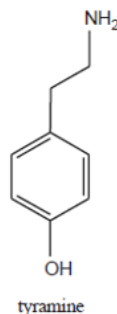
# PROVERDE®

## Mode of Action

- Primary mode of action on tyramine receptors
  - Tyramine receptors are G-Protein-Coupled Receptors (GPCRs)
- Tyramine
  - One of two neuroactive biogenic amines primarily found in invertebrates
- Function of tyramine in invertebrates is largely unknown but evidence exists for roles in:
  - Neuromuscular physiology
  - Locomotion
  - Olfaction
  - Reproduction



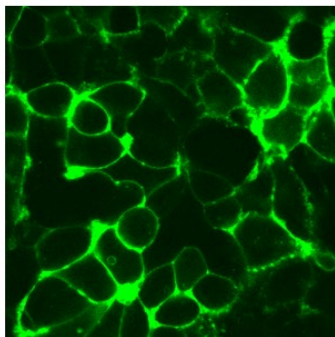
*C. elegans* with fluorescently labeled tyramine receptors showing expression in the head and ventral nerve cord



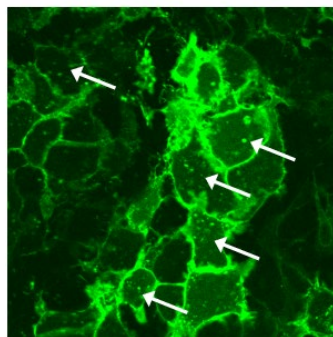
# PROVERDE®

## Tyramine Receptor Response to Thymol

- Most GPCRs internalize after prolonged stimulation



Buffer Control



Thymol

Arrows denote  
 internalized  
 receptors

- *C. elegans* cells expressing fluorescently labeled tyramine receptors
  - Internalize after activation with thymol making them unavailable for tyramine binding
  - Disrupts normal physiological processes in the target insect resulting in its death

\*J. Lei et al., Biochem Pharmacol 2010, 79(7), 1062

# PROVERDE® BROAD SPECTRUM INSECT KILLER

## Active Ingredients & Pests

- **Active Ingredients:**

- 1.3% Geraniol
- 0.2% Cinnamon Oil
- 98.5% Other Ingredients: White mineral oil, butyl lactate, carbon dioxide, isopropyl myristate, triethyl citrate, isopropyl alcohol, vanillin

- **Apply to the following pests:**

- **Crawling Insects:** Cockroaches, ants, crickets, beetles, earwigs, stink bugs, spiders, fleas, and ticks
- **Flying Insects:** Flies, gnats, mosquitoes, and moths



# PROVERDE® BROAD SPECTRUM INSECT KILLER

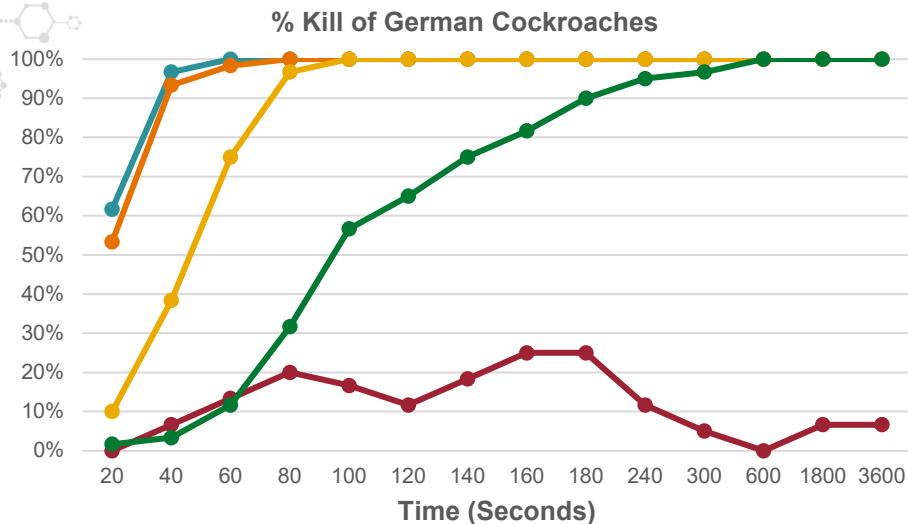
## How & Where to Use

- **Contact Kill:** Product may be used to treat insects on counter tops, sinks, floors, food preparation areas, in cabinets, around appliances, and any other areas where insects are or may be present.
  - After use, thoroughly clean up food contact surfaces.
- **Crawling & Flying Insects:** For best results, spray insect(s) thoroughly until wet. Ensure contact with as many insects as possible. Repeat as necessary.
- **Crack & Crevice Treatments:** Applications can be made, but are not limited to, baseboards, cabinets, walls, ceilings, door and window frames, and around water pipes and appliances. Using the injection tube provided, apply approximately:
  - 1 second of product per crack & crevice application
  - From 2 to 3 seconds of product per cubic foot of closed space treated.
  - Apply more liberally for heavy infestations.



# PROVERDE® BROAD SPECTRUM INSECT KILLER

## Efficacy



- PROVERDE® Broad Spectrum Insect Killer
- Competitor #1: 0.1% Imiprothrin, 0.1% Cypermethrin
- Competitor #2: 0.025% Prallethrin, 0.01% Lamda-Cyhalothrin
- Competitor #3: 2.0% Permethrin
- Competitor #4: 0.02% Deltamethrin, 0.05% S-Bioallethrin

**German Cockroach Direct Spray Bioassay**  
Aerosol Spray – 10 insects/assay unit – 6 reps



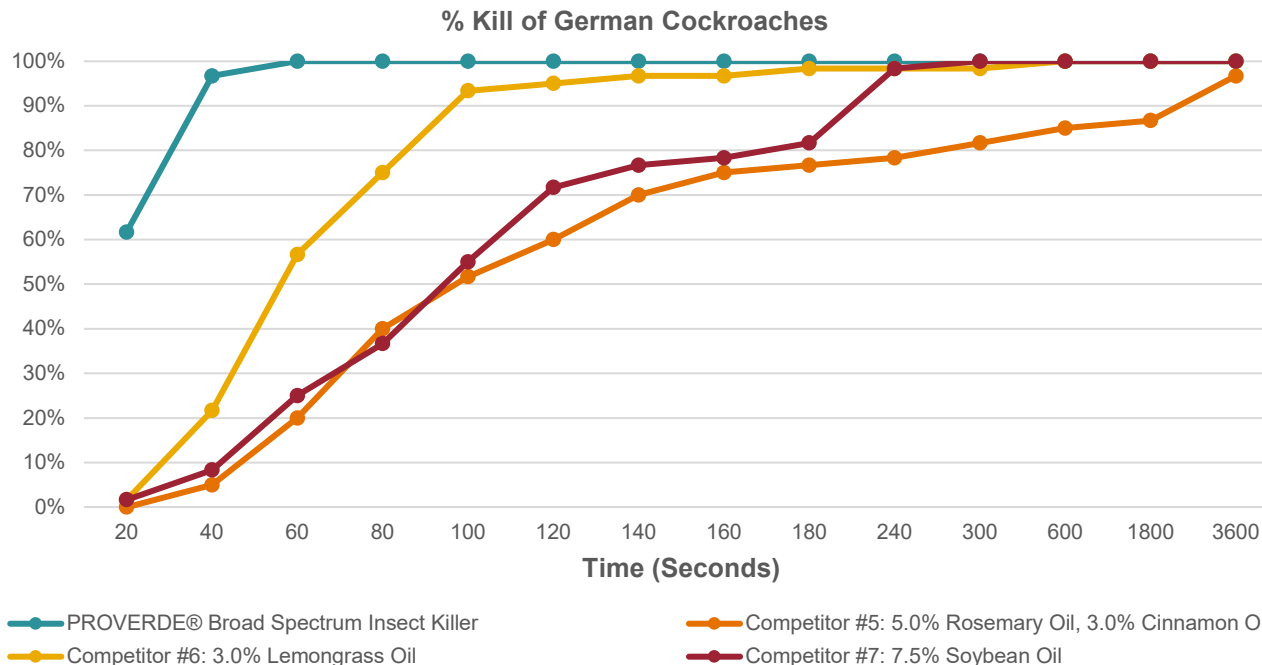
- PROVERDE® Broad Spectrum Insect Killer
- Competitor #1: 0.1% Permethrin, 0.35% Tetramethrin, 0.1% d-cis/trans allethrin
- Competitor #2: 0.15% Permethrin, 0.25% d-trans allethrin
- Competitor #3: 0.02% Deltamethrin, 0.05% S-Bioallethrin

**House Fly Direct Spray Bioassay**  
Aerosol Spray – 10 insects/assay unit – 6 reps



# PROVERDE® BROAD SPECTRUM INSECT KILLER

## Efficacy

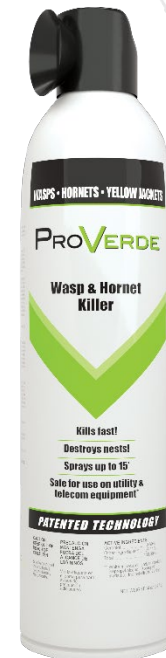


**German Cockroach Direct Spray Bioassay**  
Aerosol Spray – 10 insects/assay unit – 6 reps

# PROVERDE® WASP & HORNET KILLER

## Active Ingredients & Pests

- **Active Ingredients:**
  - 0.89% Geraniol
  - 99.11% Other Ingredients: White mineral oil, carbon dioxide, isopropyl alcohol, isopropyl myristate, triethyl citrate, vanillin
- **Apply to the following pests:** wasps, hornets, yellowjackets, and bees



# PROVERDE® WASP & HORNET KILLER

## How & Where to Use

- **Kills stinging pests on contact:** Hold product upright with nozzle directed away from face. For best results, spray insect(s) thoroughly until wet.
  - Use as a contact spray for killing stinging pests in common residential, commercial and institutional areas such as decks and patios, playgrounds, housing complexes, docks, outdoor refuse areas, storage facilities, attics, garages, and other indoor and outdoor environments.
  - Sprays up to 15'
  - Safe for use on utility & telecom equipment\*
- **Destroys nests:** Aim product at nest by holding container upright with nozzle directed away from face with the prevailing wind at your back. Press nozzle down and apply product until the nest is thoroughly saturated to ensure population is terminated.

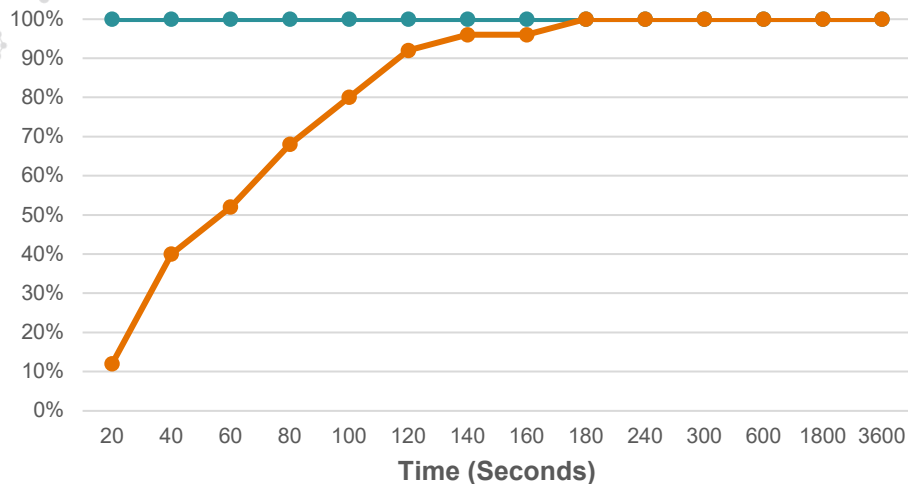


\*Dielectric breakdown voltage of 33,730 volts

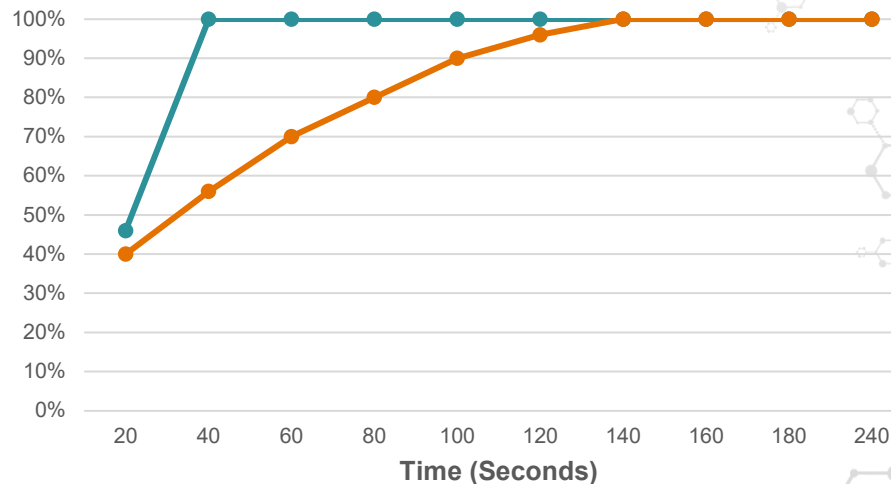
# PROVERDE® WASP & HORNET KILLER

## Efficacy

**% Knockdown of Paper Wasps**



**% Kill of Yellowjackets**



● PROVERDE® Wasp & Hornet Killer    
 ● 0.2% Tetramethrin, 0.2% Sumithrin

**Paper Wasp Direct Spray Bioassay**  
Aerosol Spray – 5 insects/assay unit – 5 reps

● ProVerde® Wasp & Hornet Killer    
 ● 1.0% Peppermint Oil, 0.5% 2-Phenethyl Propionate

**Yellowjackets Direct Spray Bioassay**  
Aerosol Spray – 5 insects/assay unit – 5 reps

# PROVERDE® DUST INSECTICIDE

## Active Ingredients & Pests

- **Active Ingredients:**

- 4.1% Thyme Oil
- 95.9% Other Ingredients: Sodium bicarbonate, calcium carbonate, calcium silicate, wintergreen oil, isopropyl myristate

- **Apply to the following pests:** cockroaches (including both resistant and non-resistant strains), ants, fleas, crickets, spiders, silverfish, and wasps



# PROVERDE® DUST INSECTICIDE

## How & Where to Use

- Dust may be applied to areas where insects harbor or travel. To be used in and around residential and commercial/industrial structures such as apartments, condominiums, homes, hotels, motels, resorts, hospitals, multi-family housing, schools, nursing homes, offices, restaurants, kitchens, laboratories, factories, modes of transport (not to include airplane cockpits), garages, storage units and other areas of human habitation or activity.

# PROVERDE<sup>®</sup> DUST INSECTICIDE

## How & Where to Use

- **For Indoor Use:** Apply to wall voids, cracks and crevices where insects harbor, including, but not limited to behind backsplashes, baseboards, and under carpet tack strips. Prior to use, test a small inconspicuous area to check for possible staining.
- **Cockroaches:** Apply to wall voids, cracks and crevices where cockroaches may be harboring. Dust will kill those cockroaches that are directly contacted and those that enter the area after application.
- **Ants:** Apply directly to ant trails or to nesting sites. Carpenter ants may nest in areas associated with excess moisture or leaks within the structure. Inspect and locate such areas where nests and ant activity is suspected. It may be necessary to drill holes in order to treat into hidden void areas where ants may harbor, nest or travel.
- **Food Areas and Food Handling:** Apply product directly into voids in food preparation areas such as walls, floorboards, under and around appliances, waste disposal areas and any other area where insects may be hiding or harboring. For use on non-food contact surfaces. If incidental contact occurs, clean up thoroughly.

# PROVERDE<sup>®</sup> DUST INSECTICIDE

## How & Where to Use

- **For Outdoor Use:** For control of crawling pests that enter structures from outdoor areas, apply along edges of patios, cracks or expansion joints in or along foundations or pavement, driveways, porches, doorways (to include French and sliding glass doors), windowsills and weep holes. Dust may also be applied in those areas where pests harbor around the structure to include under doormats, under and around potted plants, patio furniture, columns, eaves and soffits. For best results, apply dust directly to insects. Re-apply as needed or if dust becomes wet.
- **Stinging Insects:** Stinging insects may be killed using this product. Care should be taken when attempting to kill these insects. The applicator may wish to consider the use of an aerosol contact kill product such as ProVerde<sup>®</sup> Wasp & Hornet Killer. For optimal results, application should be made during dawn or dusk when insect activity is low and colony members are present within the nest. Using a hand or powered duster, apply dust directly into the nest entrance or to the void area where stinging insects have colonized. Care should be taken to inspect and locate all nest entry areas. It may be necessary to create application access by drilling holes where suitable. Follow up to check for complete control of nest after 24 to 48 hours. Note that nests may be located either indoors or outdoors.



# PROVERDE<sup>®</sup> DUST INSECTICIDE

## Application Rate

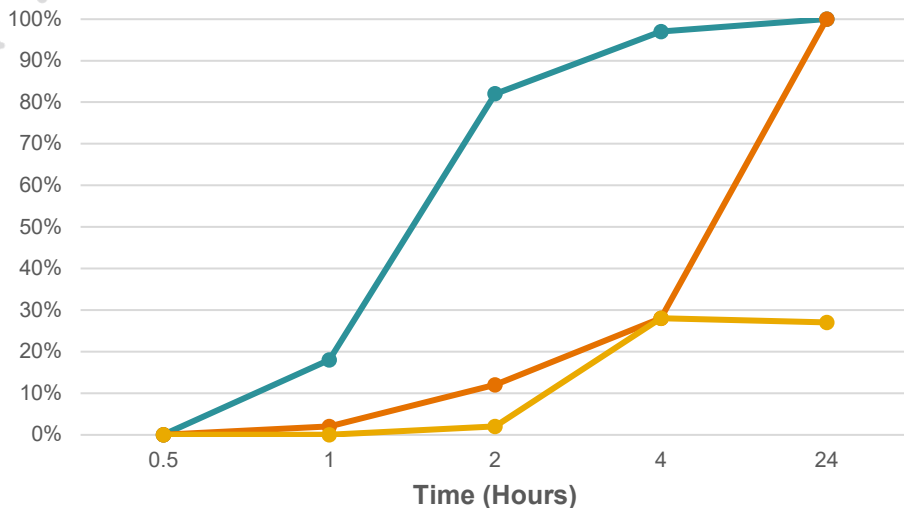
- The amount of product to be applied will vary with the site but should usually be in the range of 12-45 oz. per 100 ft<sup>2</sup>.
  - For heavy infestations or for use on spiders or larger insects such as American cockroaches, the 45 oz. rate is recommended.
- For best results, apply dust directly to insects. Re-apply as needed or if dust becomes wet.
- If incidental contact occurs on food contact surfaces, clean up thoroughly.



# PROVERDE® DUST INSECTICIDE

## Efficacy

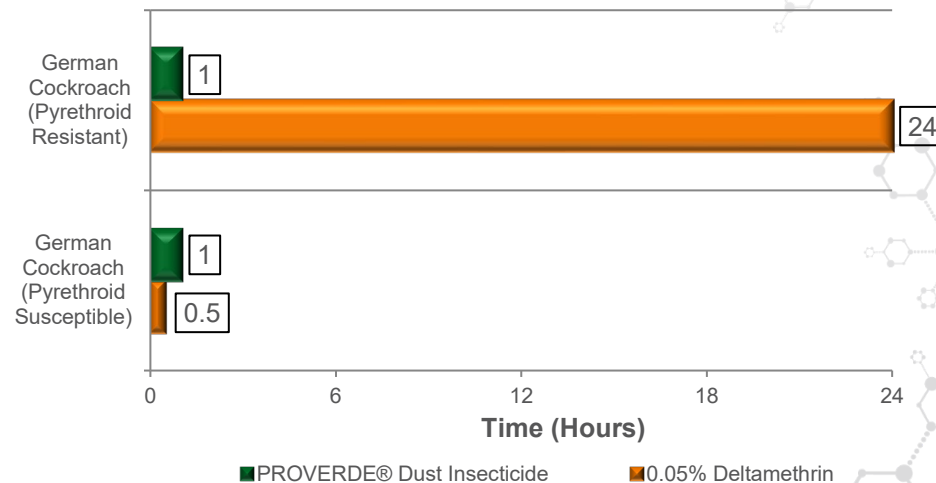
**% Kill of German Cockroaches**



—● PROVERDE® Dust Insecticide      —● Competitor #1: 0.488% Permethrin  
—● Competitor #2: 0.05% Deltamethrin

**German Cockroach Forced Exposure Bioassay**  
Dust Forced Exposure Assay – 10 insects/assay unit – 3 reps

**Time to 100% Kill of German Cockroaches**



■ PROVERDE® Dust Insecticide      ■ 0.05% Deltamethrin

**German Cockroach Forced Exposure Bioassay**  
Dust Forced Exposure Assay – 10 insects/assay unit – 3 reps

ProVerde Dust Insecticide is comparable to 0.05% Deltamethrin insecticide vs. pyrethroid-susceptible cockroaches but has superior performance against pyrethroid-resistant insects.



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