



# An adjuvant with physical mode of action

Recommended for professional use  
as a tank mix with insecticides  
to control resistant insect populations, especially  
**bed bugs**,  
in difficult to access locations.

## ADVANTAGES

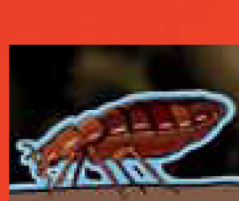
- ✓ Highly efficacious for the control of numerous insect pests.
- ✓ Physical mode of action reduces the possibility of insect pests becoming resistant.
- ✓ Synergistic effect permits a reduced rate of insecticide.
- ✓ Perfect in locations where pesticide pressure is highest; leading to greater chance of resistance.
- ✓ Combines different modes of action mechanisms: neurotoxic and physical.
- ✓ Non-toxic.
- ✓ Spreads quickly and evenly over the treated surface, enhancing the uptake and penetration of the insecticide.
- ✓ Changes the profile (duration) of exposure of the insect to the insecticide.
- ✓ Perfect tool to deal with the increasing problem of insecticide resistance.



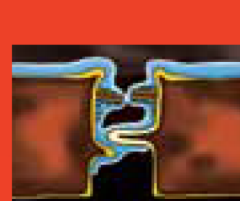
Quick and even spreading increases the likelihood that the insecticide will be transferred to the insect.



When applied, **Provecta**® creates a three dimensional network structure, thanks to the unique 3D-**ISN**® Technology.



Pests are immobilized, which increases the transfer of the insecticide (modified exposure profile).



Valves of the respiratory spiracles in insect exoskeleton are immobilized.



**Provecta**® increases the likelihood that the insecticide will be transferred onto the insect body.



A patent protected  
**breakthrough solution**  
from ICB Pharma.

Copyright © 2014 Research Information Ltd. All rights reserved. Reprinted with Permission.



Pest Innovations

INTRODUCES



HYBRID EFFICACY ENHANCER OF INSECTICIDES

# Provecta: a new approach to the inhibition of resistance to insecticides

by David Liszka\* and Partho Dhang\*\*

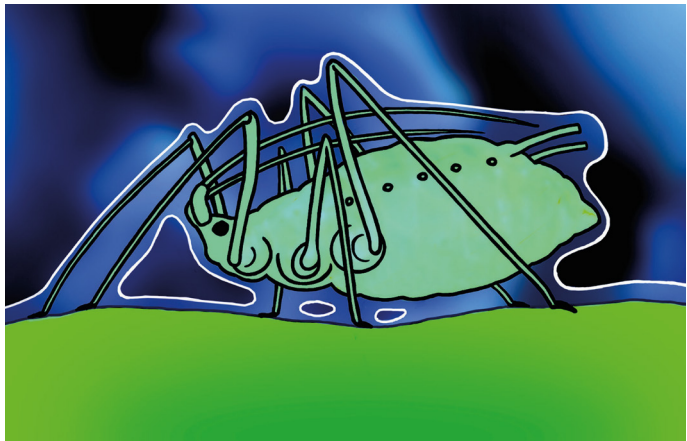
While insecticides have greatly improved human health and agricultural production worldwide, their usefulness has been limited by the evolution of resistance in many major pests, including some that became pests only as a result of insecticide use. Therefore it is of paramount importance that all future pest control tactics should take into account the possibility of resistance evolution. It is also possible that pest susceptibility, a valuable natural resource is being slowly squandered. It will probably never again be possible to achieve chemical control of insects on the scale achieved between 1945 and 1965 (Wood, 1981). Consequently better pest management requires a newer approach.

Adjuvants have been used for as long as pesticides themselves. In the early part of this century, animal proteins such as calcium caseinate were used as dispersants for lead arsenate and animal bone glues were used as stickers (Witt, 2012). Pesticides that were available then were not effective as now, they were difficult to formulate and dispersed inadequately. Only a few natural colloids and surfactants were available as aids or adjuvants. The focus on formulation aids such as adjuvants continued to grow as a means to enhance maximum effectiveness of a limited number of pesticides available. Today adjuvants are a well recognised part of formulation chemistry and help to increase the efficacy of products. Although these historic developments were all directed towards improvement of agriculture formulations, the

concept can also be used in urban pest control. As a consequence it will allow pest susceptibility to continue and reduce resistance built up in urban pests.

Adjuvants play a significant role in reducing several problems encountered during spray application, despite advancements having been made in discovering newer pesticide actives and improving application techniques. Problems encountered during pesticide application include: drift, coverage, adherence, volatilization, penetration, solubility, surface tension, foaming, suspension, evaporation, stability, incompatibility, alkalinity degradation and odour. Adjuvants are formulated to minimize these problems by buffering and sticking and also by reducing factors like foaming, spreading, evaporation, emulsification, drift, volatilization, and odour. Adjuvants also help highlight where spray has been applied, increasing compatibility, dispersing and wetting.

This article discusses a totally new adjuvant that enhances the efficacy of the formulation through a physical mechanism; a completely new and promising approach to the current problems in the pest control industry. The product "Provecta" is a unique mixture of polymeric compounds that are combined in spray tanks with insecticides for more effective treatment. It generates a specific contact action resulting in dehydration and eventual suffocation through the following mechanisms:



## SPREADING

When applied it provides quick and even spread, helping penetration precisely in the treated surface. It also increases the likelihood that the insecticide is transferred to the insect by contact, enhancing the bioavailability of the active ingredient. This is a crucial parameter when dealing with resistant pest populations living in inaccessible locations, e.g. bed bugs (Fig 1).



## IMMOBILIZATION

After application it creates a cross-linked 3-Dimensional network structure on the treated target pest surface, tightly covering the pest insects and immobilizing them. This leads to increased exposure to the toxicant. It also improves the efficacy through additive effects of the two mechanisms, namely neurotoxic and physical (Fig 2).



Fig 3 Immobilization of the valve of respiratory spiracle

## DEHYDRATION AND/OR SUFFOCATION

Once applied, the formulation completely penetrates the body surface of the pest and fills their spiracles (which have hair at the opening for filtering and a valve for controlling air flow) either preventing them from closing or keeping them closed. This leads to dehydration and suffocation. Both the physical effects eventually kill the insect pest (Fig 3).

All these combined features, enhanced spreading, immobilization (exposure profile modification) and physical effects, significantly improves the efficacy of the formulation and results in quicker mortality (Figs 4 to 6).

## DISCUSSION

Insecticides used in urban pest control can have a strong impact on human health (Dhang, 2011) and the environment. However, their use is constrained by evolving resistance in pest insects, resulting in higher insecticide dosages to provide effective treatments. Demand for safe pest management needs more efficient methods including environmental and non-target species safety. With increase in cost and tighter regulations, a product such as an adjuvant with a unique mode of action, could be a perfect candidate for modern and effective alternative. Provecta, an effective adjuvant with physical action against pests may help deal with the expanding problem of resistance to insecticides.

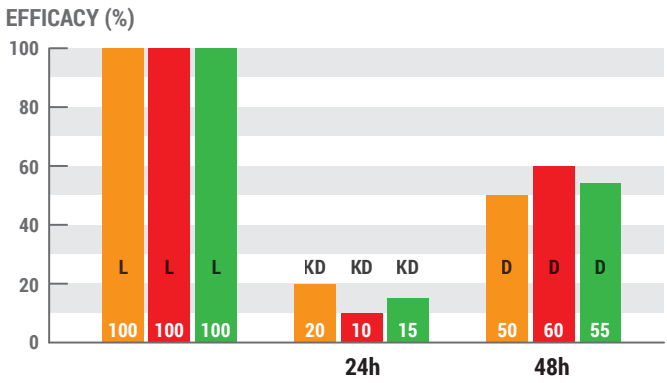


Fig 4 Performance of fipronil + lambda cyhalothrin ( 0,1% CS ) against adult bed bugs (*Cimex lectularius*)

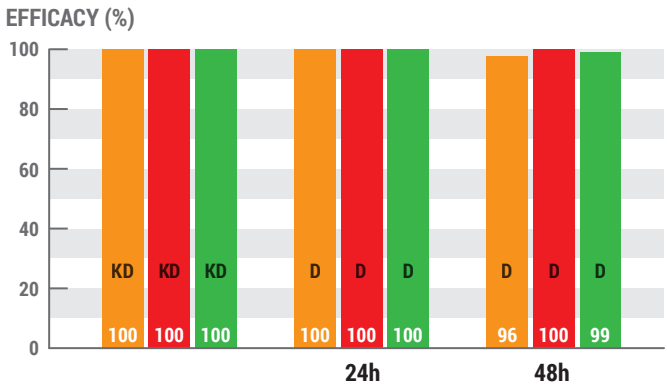


Fig 5 Performance of fipronil + lambda cyhalothrin ( 0,1% CS ) in tank mix with 0,2% PROVECTA against adult bed bugs (*Cimex lectularius*)

## MODIFICATION OF EXPOSURE PROFILE

KDT (min.)	K-Othrine	K-Othrine+Proventa
50	21.1	16.3
90	38.6	28.8
95	47.4	34.9
99	74.5	53.3

Fig 6 Knock Down Time in minutes of *Blattella germanica* males, forced contact on non-porous surface. [ K-othrine : 0,1% ], [ PROVECTA : 0,1% ]

For more information contact:  
pawel.swietoslawski@icbpharma.com

## REFERENCES:

Wood, R.J. (1981) In Genetic Consequences of Man-made Change (Bishop, I.A. and Cook, L.M., Eds), pp. 53-96, Academic Press Witt J. M. (2012) . Agricultural spray adjuvants Oregon State University Pesticide Safety Education Program (PSEP) fact sheets. Dhang, P (2011). Insecticides as urban pollutants. In: Dhang, P (ed.) Urban Pest Management: An Environmental Perspective CAB International London, pp 1-18. Mallet J., (1989). The Evolution of Insecticide Resistance: Have the Insects Won? TREE vol. 4, no. 7 1, November International Pest Control, Volume 57, Number 4, July/ August 2015, page 234

\*ICB Pharma, ul. Mozdierzowcow 6a, 43-602 Jaworzno, Poland

\*\* Independent Consultant, 2410 Belarmino Street, Makati City, Philippines.