

## THE DEVELOPMENT OF MICRO-ENCAPSULATED FORMULATIONS OF THE PYRETHROID INSECTICIDE LAMBDA-CYHALOTHRIN

S D BAKER, N G WILLIAMS

ZENECA Public Health, Jealott's Hill Research Station, Bracknell, Berks RG12 6EY

Insecticide formulations used for the residual control of insect pests of public health importance must possess special characteristics. High biological activity is of paramount importance, but the formulation must also retain its activity for many months on a range of surfaces some of which may be highly porous and chemically reactive. These adverse environments can detoxify the insecticide deposit by decomposition of the active molecule or by simple absorption of the formulation. The formulation should offer low or no risk to the user applying the chemical and any persons living in close proximity to the site of application. The latter is an important consideration where control may be required for long periods of time.

The technique of micro-encapsulation applied to insecticides has the potential to provide these characteristics.

Lambda-cyhalothrin was encapsulated by the inter-facial polymerisation process. To optimise the biological activity and toxicological characteristics, the key parameters of capsule particle size, wall thickness and wall permeability were investigated. By varying these parameters it was possible to prepare formulations of nominally different release rate and pick-up characteristics. Subsequent testing highlighted the specific formulation with best biological activity and toxicological profile. Microscopy provided a method to study the mode of action of the formulation and two main scenarios were proposed.

Between three and five months control of *Blattella germanica* (German cockroach) has been achieved on a variety of surfaces such as painted and unpainted wood, vinyl tile and cement at application rates as low as 10mg ai/m<sup>2</sup>. These formulations have also demonstrated excellent extended residual control of *Periplaneta americana* (American cockroach), *Musca domestica* (housefly), *Ctenocephalides felis* (cat flea) and *Aedes aegypti* (Yellow fever mosquito).

Micro-encapsulated formulations of lambda-cyhalothrin have been rationally designed to give high levels of control of public health pests on a variety of surfaces and under different environmental conditions. Low toxicological classification coupled with the application advantages of an aqueous liquid formulation ensure low hazard to the user.