EFFICACY OF INSECTICIDES AND COCKROACH RESISTANCE (1997)

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Following the failure of some applications against German cockroaches *(Blattella germanica)* in France, questions have been raised as to the role, and level, that insecticide resistance may have played in these failures.

To answer the question , samples of cockroaches were collected from two sites in the Paris area where infestation was observed in spite of regular insecticide applications, and were bred separately in the laboratory. Two strains were obtained : Raspail and Sainte Geneviève.

These two strains were compared to a standard susceptible lab strain (INA) for the level of susceptibility using the topical application test, and two insecticides with different chemistry: chlorpyriphos and deltamethrin. The choice of these insecticides was made on the basis that they represented best the two group of chemistry : organophosphates and pyrethroids. The results show that RF

$$\text{Resistance Factor} = \frac{LD_{50} \text{ field strain}}{LD_{50} \text{ susceptible lab strain}}$$

was of 8.4 for Ste Geneviève and 5.4 for Raspail with chlorpyriphos and respectively 89.2 and 50.8 for deltamethrin.

These results show that the two field strains have developed some level of tolerance to chlorpyriphos and significant resistance to deltamethrin.

The same susceptibility test of the two field strains was run with deltamethrin associated with synergists (piperonil butoxide and triphenyl phosphates) with improved efficacy. We know that piperonil butoxide is a multifunction mono-oxygenase inhibitor and that triphenyl phosphate is an esterase inhibitor. Thus, mono-oxygenase and esterase participate in the shift of susceptibility of those two strains.

A practical test was then set up comparing efficacy of different insecticide formulations on tiles, using both lab strains and field strains, and assessing persistence up to 90 days. The different formulations of chlorpyriphos gave better level of control in field strains than deltamethrin formulations and mixtures of active ingredients.

We can deduce from those results than even if some level of tolerance is detected it does not necessarily affect the level of control in field application, if precautionary measures are taken.

Proceedings of the 3rd International Conference on Urban Pests.
Wm H. Robinson, F. Rettich and G.W. Rambo (editors). 1999.