

RESEARCH NOTE

FIELD-SIMULATED RESIDUAL EFFICACY OF BETACYFLUTHRIN AGAINST *ANOPHELES SINENSIS* WIEDEMANN

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Abstract. The residual efficacy of a relatively new pyrethroid, betacyfluthrin was compared with DDT against *Anopheles sinensis* Wiedemann in some village houses in Penang, Malaysia, for a period of 30 weeks. Efficacy was determined by exposing laboratory-cultured *An. sinensis* mosquitos to treated wall surfaces with either betacyfluthrin at 15 and 25 mg/m² or DDT at 2,000 mg/m² for one hour. Betacyfluthrin provided a longer residual effect (up to 210 days with > 70% mortality) compared with DDT. The potential of betacyfluthrin as a candidate for residual spraying for malaria control is discussed.

Despite efforts in combating mosquito-borne diseases, malaria continues to be a dreaded disease of mankind with several million new cases each year. The latest survey by the World Health Organization (1993) reported that more than 300 million cases of malaria now occur per year worldwide. *Anopheles* mosquitos are the principal vectors for malaria. Since 1967, the malaria vector control program in Malaysia has been carried out with DDT residual house-spraying at 2,000 mg/m² (Vythilingam *et al.*, 1993). Although DDT resistance in *Anopheles* has become a major problem in many parts of the world, this insecticide was still considered effective against *Anopheles maculatus* in Peninsular Malaysia when susceptibility tests were last conducted using WHO resistance detection kits (Loong *et al.*, 1989).

Several studies on the efficacy of novel insecticides against *Anopheles* mosquito have been reported (Rohani *et al.*, 1993; Vythilingam *et al.*, 1992; Vythilingam *et al.*, 1993). The present study was conducted to determine the residual efficacy of a relatively new pyrethroid insecticide, betacyfluthrin against *Anopheles sinensis* under a field-simulated condition.

The *Anopheles sinensis* colony used in this study was established in the laboratory of Vector Control Research Unit (Universiti Sains Malaysia) (USM)

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in 1990. Adult sucrose-fed female mosquitos aged 3-10 days were used in all experiments. Two formulations used in this study were betacyfluthrin SC 12.5 and DDT EC 25. These insecticide formulations were provided by Bayer AG, Germany.

This study was conducted in a Malay rural village (Teluk Kumbar) with approximately 200 houses at the southeastern part of Penang Island, Malaysia. Prior to initiation of the study, sixteen houses with wood walls were randomly selected. These houses had never been subjected to insecticide wall sprays for more than 15 years. One house was set aside as a control while the remaining houses were sprayed with either betacyfluthrin at 15 mg/m² and 25 mg/m² or DDT at 2,000 mg/m². Three separate interior wall surfaces were treated per house. Wall surfaces were marked and sprayed with a manual hand sprayer. The control house was similarly marked and sprayed with water. Each marked area was approximately 1.0 m².

Bioassays were based on the WHO bioassay guideline for insecticide deposits on wall surfaces (WHO, 1978). Sucrose-fed female mosquitos aged 3-10 days were used in this study. This age range was chosen due to the difficulty to culture large number of *Anopheles sinensis* in the laboratory. In addition, our unpublished data revealed no significant difference in their susceptibility between those aged 2-10 days. Twenty mosquitos were placed inside a polyethylene cone-shaped container and exposed to insecticide-sprayed surfaces for 60 minutes. After 60 minutes exposure, these mosquitos

were transferred to clean containers with sucrose solution (10%) for observation of mortality at 24 hours post-treatment. The bioassay assessment was conducted at 1, 14 and 30 days after insecticide application followed by monthly assessments for 7 months or until mortality of mosquitos on treated surface dropped below 50%.

Both betacyfluthrin treatments provided a longer residual effect when compared with DDT (Fig 1). Betacyfluthrin at both doses was still able to cause > 70% mortality at day 210 post-treatment, while mortality from the DDT treatment applied was < 30% within 14 days. No mortality was observed in controls throughout this study.

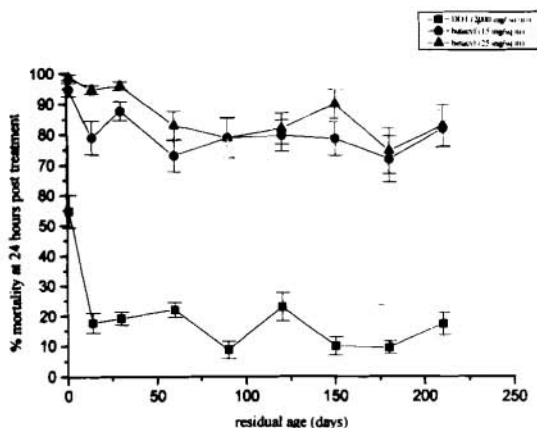


Fig 1—Residual efficacy of betacyfluthrin against *Anopheles sinensis*.

In Malaysia, the malaria vector control program still uses DDT at 2,000 mg/m² for residual wall spraying. In view of the results obtained in this study, it can be seen that the effectiveness of this chemical at this dosage has dropped to a level which may warrant review of the continuous application of this insecticide in control programs relative to betacyfluthrin.

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