ORIGINAL ARTICLE

Development of permethrin resistance in Culex quinquefasciatus Say in Kuala Lumpur, Malaysia

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Abstract  The resistance status towards permethrin among the laboratory strain, the permethrin-selected strain and four field strains of Culex quinquefasciatus collected in Kuala Lumpur, Malaysia was determined using three standard laboratory methods: WHO larval bioassay, WHO adult bioassay and biochemical microplate assay. Cx. quinquefasciatus permethrin-selected strain larvae were the least susceptible to permethrin with a resistance ratio of 47.28-folds, whereas all field strain larvae of the same species were tolerant to permethrin with resistance ratios of more than 3-folds. In contrast, in adult stage, the permethrin exposed permethrin-selected strain (resistance ratio = 1.27) was found to be more susceptible to permethrin than all permethrin-exposed field strains (resistance ratios = 2.23–2.48). Complete mortalities for all strains of Cx. quinquefasciatus adults proved the effectiveness of the synergist, piperonyl butoxide (PBO). For the biochemical microplate assay, the reduction of the mean optical density of elevated oxidase activity of three field strains upon exposure to PBO confirmed the association between oxidase activity and permethrin tolerance. On the other hand, irregular patterns of the mean optical density of elevated oxidase activity in

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