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COMPARISON OF ISOZYME PATTERNS OF *AEDES AEGYPTI* POPULATIONS COLLECTED FROM PRE- AND POST-*BACILLUS THURINGIENSIS ISRAELENSIS* TREATMENT SITES IN THAILAND

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ABSTRACT. Isozyme patterns of 13 field-collected populations of *Aedes aegypti* from Thailand were compared using starch gel electrophoresis. Three populations were collected before the *Bacillus thuringiensis* var. *israelensis,* (*B.t.i.*) application was initiated. The other 10 populations were collected after the *B.t.i.* treatment. Results revealed that the number of polymorphic loci were lower in the *B.t.i.* treated populations as compared to controls. In addition, lower genetic variability was found in populations collected from *B.t.i.* treated sites (Mae Ka Sa [KS] and Mae Kud Luang [KL] village). These results are most likely due to a genetic bottleneck produced by the *B.t.i.* treatment. Heterozygosity increased in the months following *B.t.i.* treatment, probably because of immigration when the control program was withdrawn. However, the anticipated reduction in the expected heterozygosity was only observed in the KS site. This may be due to preexisting low heterozygosity in the KL population. No fixed differences in alleles were detected among the 13 populations.

KEY WORDS *Bacillus thuringiensis israelensis* control, *Aedes aegypti,* Thailand, heterozygosity

INTRODUCTION

Aedes aegypti (L.), a major vector of dengue virus, is commonly distributed throughout the tropics and subtropics. Increases in transportation have contributed to the movement of dengue virus-infected mosquitoes and viremic humans (Failloux et al. 1995). The taxonomic status and population genetics of *Ae. aegypti* are extremely important because of the wide involvement of this species in the transmission of human viral pathogens. The number of dengue cases has increased in the Asian region, including Thailand, which is considered to be a hyperendemic zone (Bhamarapravati 1990). Several control strategies have been employed to control *Ae. aegypti* larvae. Chemical control strategies, however, tend to cause environmental contamination and increase pressure for the evolution of insecticide resistance. Several efforts have been made to replace chemical insecticides with microbial larvicides such as bacteria (*Bacillus thuringiensis* var. *israelensis* [*B.t.i.*] and *Bacillus sphaericus*). These bacteria produce a toxic crystal protein during sporulation that has a specific activity against mosquito larvae (Aly et al. 1987). Several formulations are being developed and used in an operational control program (Mulla 1985).

In this study, we determined if *B.t.i.* treatment reduced genetic variabilty due to population bottlenecks. We analyzed and compared isozyme variability of *Ae. aegypti* populations collected before and after *B.t.i.* treatment. The study was conducted in 3 villages in northwestern Thailand.

MATERIALS AND METHODS

Mosquito populations: Specimens were collected from 13 populations of *Ae. aegypti* from 3 villages of Mae Ka Sa District in Mae Sot County, Tak Province, Thailand. Collections were made from July 1996 to April 1997, in the villages of Mae Ka Sa (KS) (20 km north of Mae Sot City), Mae Kud Luang (KL) (9 km southeast of Mae Ka Sa), and Mae Kud Sam Tha Mai (KT) (7 km southwest of Mae Ka Sa) (Fig. 1).

Specimens were collected from six sympatric populations of *Ae. aegypti* from Mae Ka Sa village (*B.t.i.* treated site). Of these, KS-C1 was collected before *B.t.i.* application started and 5 populations (KS-T1, KS-T2, KS-T3, KS-T4, and KS-T5) were obtained 1, 2, 3, 4, and 5 months, respectively after *B.t.i.* application (Table 1). Specimens were collected from five sympatric populations of *Ae. aegypti* from *B.t.i.* treated Mae Kud Luang village. Of these, KL-C1 was before treatment with *B.t.i.* and KL-T2, KL-T3, KL-t4, and KL-T5 were collected 2, 3, 4, and 5 months, respectively, after *B.t.i.* treatment. *Ae. aegypti* from Mae Kud Sam Tha Mai village (KT-C1 [July 1996], Kt-C2 [February 1997]) were untreated.

All *Ae. aegypti* samples were collected as larvae or pupae and reared individually to the adult stage. Fourth-instar larvae or pupal exuviae were preserved and each specimen was recorded and iden-

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