ORGANOPHOSPHATE RESISTANCE IN CULEX QUINQUEFASCIATUS SAY

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Detoxification by non-specific esterases is a common mechanism of organophosphate resistance in mosquitoes. Some of these esterases also degrade naphthyl esters to α-naphthol. This property has been used to develop a simple filter paper test (FP/Est test) for detecting resistance, whereby the α-naphthol is combined with Fast Garnet to produce a coloured precipitate, the intensity of which indicates the level of esterase activity[1]. The FP/Est test was used to assess the level of resistance in an indoor resting population of Culex quinquefasciatus under anti-malarial malathion spray pressure for the previous 3 years in a new settlement area in Mahaweli System C. Fourth instar larvae reared from field collected gravid females were used in the test, squashes of individual larvae being spotted on filter paper strips and subjected to the test procedure. Esterase activity as indicated by the degree of colour development of the spots was assessed using a Tobias model RCX densitometer. High esterase activity indicative of resistance, occurred in 35% of 104 larvae tested. Diagnostic dose tests using 50% w.p. malathion (5 mg/l, 24 hour exposure) showed 66% of 100 larvae tested to be resistant. By contrast, a sample of the same species from Kandy, where the population is not under malathion pressure, showed high esterase activity in only 3% of 96 larvae tested by FP/Est and a 5% resistance level in 100 larvae tested by diagnostic dose tests. It is evident that organophosphate resistance develops rapidly in this important vector species under insecticidal pressure, a factor that can complicate filariasis vector control operation in malarious areas.

References:

Pasteur, N. and G.P. Georghiou (1989). Improved filter paper test for detecting and quantifying increased esterase activity in organophosphate-resistant mosquitoes (Diptera : Culicidae). J. Econ. Entomol. 82:347-353.