

Biochemical studies on malathion resistance, inheritance and association of carboxylesterase activity in brown planthopper, *Nilaparvata lugens* complex in Peninsular Malaysia.

ABSTRACT

Two sympatric populations of brown planthopper (BPH), one from rice and the other from *Leersia hexandra* were collected from each of five locations in Malaysia. All the tested malathion-resistant individuals of the rice BPH population and F1 generation (cross between malathion-resistant [usually caught on rice] and malathion-susceptible [usually caught on *Leersia*]) showed high esterase activity, while all malathion-susceptible individuals on *L. hexandra* showed low esterase activity. In the F2 generation, all the individuals tested against malathion were approximately 75% resistant and 25% susceptible and the inheritance pattern of esterase activity (high and low esterase activity) segregated in the same manner to a 3: 1 ratio. This confirms that resistance to malathion is mono-factorial and inheritance pattern of esterase activity is also linked to malathion resistance. Carboxylesterase or total esterase activity in BPH is inherited in a simple Mendelian fashion that is encoded by a single dominant gene. For the total esterase assay, average esterase activity levels in the rice-infesting population ranged from 17.64 to 19.37 nmoles 1-naphthol/mg protein while that in the *Leersia*-infesting population ranged from 5.29 to 6.11 nmoles 1-naphthol/mg protein. In terms of esterase activity, the two sympatric *Nilaparvata lugens* populations separated into two distinct groups. Results based on the tube color intensity test showed 96% and 98% resistant and susceptible individuals were present in the rice- and *Leersia*-infesting populations, respectively. In a filter paper test, the rice-infesting population had 94% with high esterase activity while the *Leersia*-infesting population had 96% with low esterase activity.

Keyword: Brown planthopper; Carboxylesterase assay; Inheritance study; Insecticide resistance; Rice.