

## Pyrethroid Resistance and Its Mechanism in Field Populations of the Sand Termite, *Psammotermes hypostoma* Desneux

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**Abstract :** Termites are eusocial insects that are found on all continents except Antarctica. Termites have serious destructive impact, damaging local huts and crops of poor subsistence. The annual cost of termite damage and its control is determined in the billions globally. In Egypt, most of these damages are due to the subterranean termite species especially the sand termite, *P. hypostoma*. Pyrethroids became the primary weapon for subterranean termite control, after the use of chlorpyrifos as a soil termiticide was banned. Despite the important role of pyrethroids in termite control, its extensive use in pest control led to the eventual rise of insecticide resistance which may make many of the pyrethroids ineffective. The ability to diagnose the precise mechanism of pyrethroid resistance in any insect species would be the key component of its management at specified location for a specific population. In the present study, detailed toxicological and biochemical studies was conducted on the mechanism of pyrethroid resistance in *P. hypostoma*. The susceptibility of field populations of *P. hypostoma* against deltamethrin,  $\alpha$ -cypermethrin and  $\lambda$ -cyhalothrin was evaluated. The obtained results revealed that the workers of *P. hypostoma* have developed high resistance level against the tested pyrethroids. Studies carried out through estimation of detoxification enzyme activity indicated that enhanced esterase and cytochrome P450 activities were probably important mechanisms for pyrethroid resistance in field populations. Elevated esterase activity and also additional esterase isozyme were observed in the pyrethroid-resistant populations compared to the susceptible populations. Strong positive correlation between cytochrome P450 activity and pyrethroid resistance was also reported. Deltamethrin could be recommended as a resistance-breaking pyrethroid that is active against resistant populations of *P. hypostoma*.

**Keywords :** *Psammotermes hypostoma*, pyrethroid resistance, esterase, cytochrome P450

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