

**Effects of azadirachtin and other polar components of neem,  
*Azadirachta indica* on specific tissues of American cockroaches,  
*Periplaneta americana***

A THESIS PRESENTED

BY

K.A.B.Chandani Hemamala Kodikara

TO THE

FACULTY OF GRADUATE STUDIES

In the partial fulfillment of the requirement

for the award of the degree of

MASTER OF PHILOSOPHY

IN CHEMISTRY

OF THE

University of Kelaniya, Kelaniya,

Sri Lanka.

May 2001

## Abstract

Azadirachtin, a potent insect antifeedant and a growth inhibitor safe to non-target organisms was isolated from Sri Lankan neem seeds. The effect of azadirachtin on the body weight of adult male and female cockroaches was examined for 7 days. Body weight and faecal production of treated insects were compared with that of the control insects. The body weight of all the treated cockroaches decreased at the doses  $> 1 \mu\text{g}/\mu\text{l}$  while that of the control insects increased continuously. All treated cockroaches produced less faeces when compared with control insects.

Both *in vivo* and *in vitro* experiments were carried out in order to examine the effect of azadirachtin on midgut enzymes of adult female cockroaches. The activities of protease, invertase and amylase were measured separately in both azadirachtin treated cockroaches ( $1 \mu\text{g}/\text{g}$  body weight) and the control cockroaches using the methods previously described. The *in vivo* results showed that the azadirachtin treated cockroaches exhibited a 50% reduction of the activity of all three enzymes although azadirachtin had no inhibitory effect on the activity of midgut enzymes *in vitro* studies. The same experiment was carried out with ligatured cockroaches in order to study the effect of neurohormones on the secretion of midgut enzymes. In contrast, there was no difference between the azadirachtin treated and the untreated ligatured insects. This suggests that the strong antifeedent effect of azadirachtin in cockroaches *Periplaneta americana*

is associated with the disruption of endocrine events and consequently inhibits the secretion of mid gut enzymes by the secreting cells of the gut.

A steam distillate from the neem seed kernel was analysed by gas chromatography and combined gas chromatography-electroantennographic detector to detect bioactive compounds for *Periplaneta americana*. Thirty six FID peaks were observed in the gas chromatogram and only five compounds showed electrophysiological (EAG) responses.

