

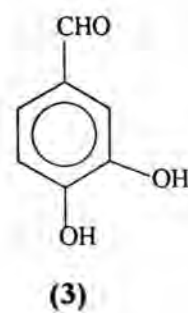
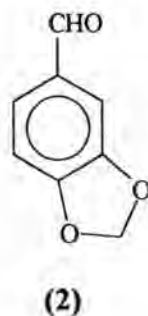
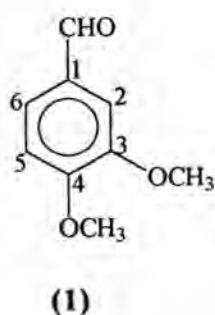
## CHAPTER IV

### CONCLUSION

During the course of this research, 17 ethanolic crude extracts were preliminarily bioassayed for antifeedant activity against *Galleria mellonella* Linn. Five samples gave promising results; among them the rhizomes of *Zingiber cassumunar* Roxb. were selected for further investigation.

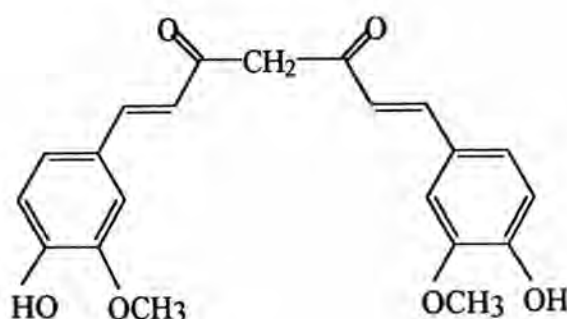
The extraction and initial fractionation by various organic solvents, hexane, dichloromethane, ethyl acetate and methanol of the rhizomes of *Z. cassumunar* were conducted. Each fraction was subjected to the antifeedant activity test. It was observed that ethyl acetate crude extract gave the highest activity, followed by hexane and dichloromethane extracts with moderate and low activity, respectively against *G. mellonella*.

By using bioassay as a guide to search for an active compound, the hexane crude extract was separated and led to the isolation of veratraldehyde (1) as an active principle. This compound revealed approximately 53% antifeedant at dose level 0.25% wt by wt. The percentage of the loss weight difference of treated bowl compared with that of control bowl during 48 hours was 71.44% (95% significance level for the *t*-test). In addition, the structure activity relationship (SAR) study was carried out. It was disclosed that piperonal (2) and 3,4-dihydroxybenzaldehyde (3) which are of closely related structures to veratraldehyde, in fact revealed high antifeedant activity, with 96.87 and 73.60 %, respectively at dose level 0.25% wt by wt.



This structure activity relationship study was clearly demonstrated that it was a good alternative to discover new active principles that have close structures to those isolated. Phytochemicals should therefore be evaluated for their activity against individual species, as other pest control agent. Conclusion drawn within or across feeding, phylogenetic, age or other categories would certainly result in appropriate estimates of structure activity relationships.

Curcumin (4) is another active compound that showed antifeedant activity against *G. mellonella* obtained from a dichloromethane fraction. The percentage of the difference in loss weight of treated bowl compared with that of control bowl was 74.06 % (95% significance level for the *t*-test).



(4)

According to literature cited, the species belonging to the genus *Zingiber* (family Zingiberaceae) were reported to have a great number of curcumin and related compounds. Some of them have been assessed for insecticidal activity such as phenylbutanoids type, 1,2-dimethoxy-4-(3-butanol) benzene and 1,2-dimethoxy-4-(4-acetylbutene) benzene against neonate larvae of the pest insect, *Spodoptera littoralis*.

There were two active fractions in ethyl acetate crude extract. A major component in the first fraction was found to be the same as veratraldehyde (1). The second one was composed of at least four components in its mixture. Unfortunately, this fraction was attained only small amount. The real active principle(s) from this fraction was therefore impossible to isolate.

This is the first report of the antifeedant properties of *Z. cassumunar* against *G. mellonella*. Moreover, it could be obviously seen from this work that the search for active principles by using bioassay test as a guide would ultimately lead to the desired products. The combined knowledge of the chemistry and biology including SAR study, would permit one to discover the useful compounds for specific purposes.