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STEMONA COLLINSIAE AS BIOPESTICIDE FOR COCKROACH CONTROL

Aurapa Sakulpanich, Anon Phayakkaphon, Napasorn Ransibrahmanakul, Nontapat Sarovath, Preeyanate Dathong, Yudthana Samung, Raweewan Srisawat, Jiraporn Ruangsittichai

INTRODUCTION

- ***Periplaneta americana*** are omnivorous, synanthropic insect, and **important insect vector of pathogenic and non-pathogenic microorganisms affecting to human and animal**. Several vector-borne diseases are occurred in human and animal. Thus, the elimination of insect vector can decrease the rate of transmission of pathogenic microorganisms including the occurrence of non-infectious disease "Cockroach allergy"
- ***Stemona collinsiae*** is an insecticidal plant containing abundantly an insecticide compound "didehydrostemofoline" and other substances. Its insecticidal activities against some pests and insect vectors are reported. But, **insecticidal activity against *P. americana* has never been reported.**
- **In this research**, we studied the nymphicidal and adulticidal activities of various *S. collinsiae* root extracts against important stages of *P. americana*: final-instar nymph and adult stage via oral and contact administrations.

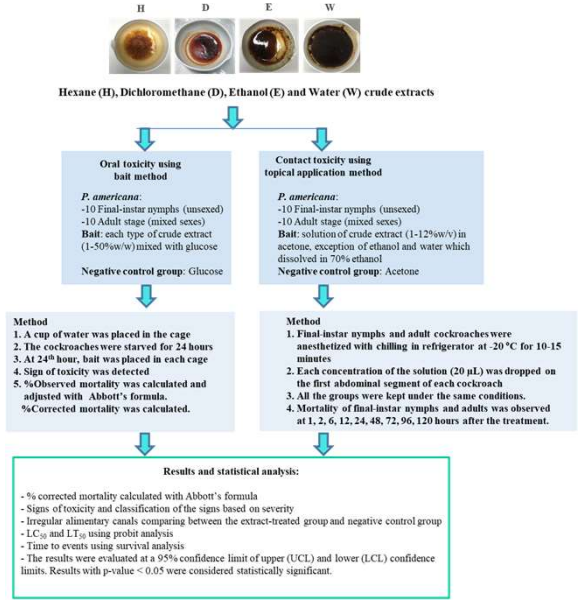
Fig 1: *Periplaneta americana* (Dictyoptera: Blattodea)

Fig 2: *Stemona collinsiae* root (Stemonaceae)

AIM

To detect the nymphicidal and adulticidal activities of various *S. collinsiae* root extracts against final-instar nymph and adult stage of *P. americana*

METHODS



RESULTS AND DISCUSSION

- Contact administration showed the same results as oral administration.
- Dichloromethane extract showed the highest %corrected mortality and followed by hexane extract and ethanol extract, respectively. The activities directly related with the content of didehydrostemofoline and unknown substances.
- All *P. americana,* which ingested and contacted the water extract, survived

Table 1: % corrected mortality at 48 hours of each extract

Type of extract	% corrected mortality at 48 hours			
	Final-instar nymph		Adult *P. americana*	
	Oral toxicity	Contact toxicity	Oral toxicity	Contact toxicity
Hexane extract	0-30	43-83	11-54	23-46
Dichloromethane extract	65-100	41-100	20-100	17-43
Ethanol extract	7-13	10-37	0-40	0-20
Water extract	0-0	0-0	0-0	0-0

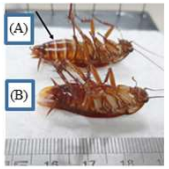


Fig 3: Swollen abdomen (black arrow) occurred in (A) adult *P. americana,* comparing with (B) adult *P. americana* in negative control group

- All *P. americana*, ingesting and contacting dichloromethane and hexane extracts, showed the same signs of toxicity: excited movement, tremor, motionlessness, swollen abdomen and dead. The swollen abdomen was irreversible symptom and it was found in all dead *P. americana*

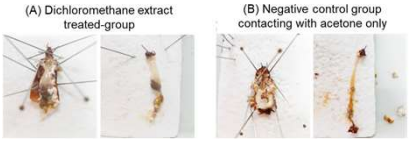
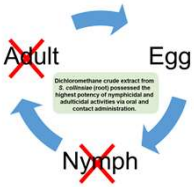


Fig 4: Swollen foregut of alimentary canal was found in the dissected *P. americana* which clearly occurred in (A) adult *P. americana* dropping with solution of dichloromethane extract, comparing with (B) *P. americana* in negative control receiving only acetone

OUTCOMES OF THE STUDY



- The dichloromethane crude extract could be used as an active ingredient in cockroach control products.
- Didehydrostemofoline was detectable in alimentary canal and body after *P. americana* ingested and contacted with dichloromethane and hexane extracts. Didehydrostemofoline could be used as chemical marker for quality control

REFERENCES

Phayakkaphon A, Dathong P, Ransibrahmanakul N, Sarovath N, Samung Y, Sakulpanich A. Oral toxicity of various *Stemona collinsiae* crude extracts against nymph and adult stages of American cockroach, *Periplaneta americana* (Dictyoptera: Blattodea). *Heliyon*. 2021 Sep 13;7(9):e07970. doi: 10.1016/j.heliyon.2021.e07970. PMID: 34585003; PMCID: PMC8453207.

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Presenter	Dr. Aurapa Sakulpanich Division of Pharmaceutical Sciences, Faculty of Pharmacy, Thammasat University, Rangsit Campus Pathum Thani, Thailand