

การเสาะหาสารควบคุมเพลี้ยกระโดดสีน้ำตาล *Nilaparvata lugens* (Stal)

จากพันธุ์ไม้ไทย



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SEARCHING FOR BROWN PLANTHOPPER *Nilaparvata lugens* (Stal) CONTROL
AGENTS FROM THAI PLANTS

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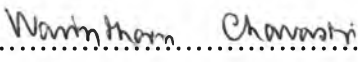
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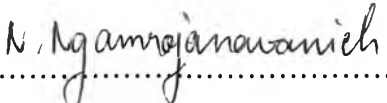
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จากผลการคัดเลือกและทดสอบฤทธิ์ทางชีวภาพเบื้องต้นของสิ่งสกัดเอทานอลจากพันธุ์ไม้ไทย 14 ชนิด พบว่าสิ่งสกัดของลูกชะพลูแสดงฤทธิ์เป็นยาฆ่าแมลงต่อตัวเต็มวัยของเพลี้ยกระโดดสีน้ำตาลดีที่สุด ด้วยค่า LC_{50} 3,981 ppm โดยวิธี Topical application เมื่อเปรียบเทียบกับอีโทเฟนพรอกซ์(5%) และแสดงฤทธิ์กับตัวอ่อนระยะ 5 ด้วยค่า LC_{50} 5,718 ppm และแสดงฤทธิ์กับตัวเต็มวัยของเพลี้ยกระโดดสีน้ำตาล ด้วยค่า LC_{50} 5,462 ppm โดยวิธี Parafilm จึงทำการสกัดแยกตามความมีขี้เป็นส่วน จากการศึกษาฤทธิ์ทางชีวภาพ พบว่า สิ่งสกัดเฮกเซนให้ฤทธิ์ทางชีวภาพดีที่สุด จึงทำการแยกสิ่งสกัดโดยใช้คอลัมน์โครมาโทกราฟี โดยใช้สมบัติทางกายภาพและข้อมูลทางสเปกโทรสโกปี สามารถพิสูจน์ทราบโครงสร้างได้ 6 ชนิด 1) pellitorine, 2) sylvamine, 3) stigmasterol, 4) 1-(3,4-methylenedioxyphenyl)-1E-tetradecene, 5) long chain carboxylic acid และ 6) methyl piperate สารทั้งหมดที่แยกได้ พบว่า pellitorine และ sylvamine เป็นสารกลุ่มอัลคาลอยด์และเป็นสารองค์ประกอบหลัก pellitorine และ sylvamine แสดงฤทธิ์เป็นยาฆ่าแมลงต่อเพลี้ยกระโดดสีน้ำตาล ด้วยค่า LC_{50} 3,834 ppm และ 2,827 ppm ตามลำดับเมื่อเปรียบเทียบกับคาร์โบซัลเฟน (98%) ด้วยค่า LC_{50} 2,859 ppm จากนั้นได้ศึกษาการเข้าจับกันระหว่างสารออกฤทธิ์ทั้งสองกับ acetylcholinesterase enzyme โดยวิธีโมเลกุลาร์ด็อกกิ้ง พบว่า สารออกฤทธิ์ทั้งสองชนิดสามารถเข้าจับกับเอนไซม์บริเวณแอคทีฟไซต์ได้ เมื่อเปรียบเทียบกับคาร์โบซัลเฟน โดยมีพลังงานการเข้าจับใกล้เคียงกัน ผลการศึกษาฤทธิ์ทางชีวภาพและการเข้าจับกันของ pellitorin และ sylvamine แสดงให้เห็นว่าสารดังกล่าวมีฤทธิ์เป็นยาฆ่าแมลงสำหรับตัวเต็มวัยของเพลี้ยกระโดดสีน้ำตาล

สาขาวิชา.....เทคโนโลยีชีวภาพ.....ลายมือชื่อนิสิต..... ปาณุศ ก่อศรีพิทักษ์กุล
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 PARINYA KORSRIPHITHAKKUL: SEARCHING FOR BROWN PLANTHOPPER
Nilaparvata lugens (Stal) CONTROL AGENTS FROM THAI PLANTS. THESIS
 ADVISOR: PROF. UDOM KOKPOL, Ph.D., THESIS COADVISOR : ASST PROF.
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From the results of preliminary screening bioactivity test of ethanolic extracts from 14 Thai plants, it was found that the extract of the fruits of *P. sarmentosum* displayed the strong insecticidal activity against adult brown planthoppers by Topical application method with LC_{50} 3,981 ppm compared with etofenprox (5%). In addition, exhibited LC_{50} 5,718 ppm against nymph fifth stage and showed LC_{50} 5,462 ppm against adult brown planthoppers by Parafilm method. Therefore, then extract were followed with solvent polarity parts. The bioassay-guided as a navigator of fractionation. The hexane extract displayed the highest bioactivity. Consequently, this extract could be separated by column chromatography by on the basis of physical and spectroscopic. The structure could be identified 6 compounds. 1) pellitorine, 2) sylvamine, 3) stigmasterol, 4) 1-(3,4-methylenedioxyphenyl)-1*E*-tetradecene, 5) long chain carboxylic acid and 6) methyl piperate. All the separated compounds pellitorine and sylvamine were alkaloid and major compounds. Both, pellitorine and sylvamine showed insecticidal activity against adult brown planthoppers by Topical application method with LC_{50} 3,834 ppm and LC_{50} 2,827 ppm when compared to carbosulfan(98%) with LC_{50} 2,859 ppm. From the study binding between bioactive compounds with acetylcholinesterase enzyme by molecular docking method. Found that both pellitorine and sylvamine were bioactive compounds could be bind in active site of AChE when compared carbosulfan were shown binding energy of compounds correlation. From this study the bioactivity and binding of pellitorine and sylvamine with acetylcholinesterase enzyme exhibit insecticidal activity against adult brown planthoppers.

Field of study.....Biotechnology..... Student's signature..... P. korsriphithakkul
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LIST OF ABBREVIATIONS

°C	degree Celsius
¹ H-NMR	proton nuclear magnetic resonance
¹³ C-NMR	carbon 13 nuclear magnetic resonance
CDCl ₃	denaturated chloroform
cm ⁻¹	unit of wavenumber
CH ₂ Cl ₂	dichloromethane
C ₆ H ₁₄	<i>n</i> -hexane
d	doublet (NMR)
dd	doublet of doublet (NMR)
s	singlet (NMR)
DMSO	dimethylsulfoxide
EtOAc	ethyl acetate
g	gram(s)
h	hour
IR	infrared
<i>J</i>	coupling constant
Kg	kilogram(s)
MeOH	methanol
m/z	mass per charge
min	minute(s)
mg	milligram(s)
mL	milliliter(s)
No.	number
ppm	part per million
s	singlet (NMR)
t	triplet (NMR)
wt/wt	weight by weight
δ	chemical shift