สารควบคุมแมลงจากแก่นของไม้แดง *Xylia xylocarpa* Taub.

นางสาววรรณฑณี สิทธิวงษ์

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INSECT CONTROL AGENTS FROM HEARTWOOD OF *Xylia xylocarpa* Taub.

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ผลการศึกษาฤทธิ์ทางชีวภาพเบื้องต้นจากพันธุ์ไม้ไทย 17 ชนิด ชี้ให้เห็นว่าสิ่งสกัดไดคลอโรมีเทนจากแก่นของไม้แดง แสดงฤทธิ์ต้านการกินต่อหนอนกระทู้ผักในระดับสูง และยังแสดงการยับยั้งการเจริญของกล้าผักกาดในระดับต่ำ จึงเลือกศึกษาองค์ประกอบทางเคมีของสิ่งสกัดดังกล่าว พบสารบริสุทธิ์ 8 ชนิด และของผสมอีก 2 ชนิด โดยอาศัยสมบัติทางกายภาพ ปฏิกิริยาเคมี และข้อมูลทางสเปกโทรสโกปีพบว่า โครงสร้างสารบริสุทธิ์ที่แยกได้แก่ 8(14),15-isopimaradiene, 8(14),15-isopimaradiene-3-one, 3-oxomanoyl oxide, 8(14),15-isopimaradiene-3α-ol, 8(14),15-isopimaradiene-3β-ol, 8(14),15-isopimaradiene-18-oic acid, β-sitosterol และ 8(14),15-isopimaradiene-3,18-diol และของผสม 2 ชนิด ได้แก่ ของผสมซึ่งมี 8(14),15-isopimaradiene-3-one และ 7,15-isopimaradiene-3-one เป็นส่วนประกอบ และของผสมของ 8(14),15-isopimaradiene-3β-ol, 7,15-isopimaradiene-3β-ol และ 8(14),15-isopimaradiene-18-ol ได้นำสารบริสุทธิ์ที่ได้มาทดสอบฤทธิ์ต้านการกินของหนอนกระทู้ผักพบว่า 8(14),15-isopimaradiene-18-oic acid แสดงฤทธิ์สูงสุด โดยมีค่า ED_{50} = 2.75×10^{-7} mol/cm^2 นอกจากนี้สารทั้งหมดที่แยกได้ยังแสดงฤทธิ์ต้านการกินต่อปลวกในระดับสูง และไม่แสดงการยับยั้งการเจริญของกล้าผักกาด

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WANTANEE SITTIWONG: INSECT CONTROL AGENTS FROM HEARTWOOD OF *Xylia xylocarpa* Taub. THESIS ADVISOR: PROF. UDOM KOKPOL, Ph.D. THESIS CO-ADVISOR: ASST. PROF. WARINTHORN CHAVASIRI, Ph.D.,143 pp. ISBN 974-17-5505-8.

The preliminary biological activity screening from seventeen Thai plants revealed that the dichloromethane extract from the heartwood of *Xylia xylocarpa* exhibited high antifeedant activity against the common cutworm, *Spodoptera litura* and low phytotoxicity against lettuce seedlings. The chemical constituents investigation disclosed eight pure compounds and two mixtures. By means of physical properties, chemical reactions and spectroscopic evidences, the structures of isolated compounds could be deduced as 8(14),15-isopimaradiene, 8(14),15-isopimaradiene-3-one, 3-oxomanoyl oxide, 8(14),15-isopimaradiene-3α-ol, 8(14),15-isopimaradiene-3β-ol, 8(14),15-isopimaradiene-18-oic acid, β-sitosterol and 8(14),15-isopimaradiene-3,18-diol, including two mixtures: a mixture containing 8(14),15-isopimaradiene-3-one and 7,15-isopimaradiene-3-one and a mixture of 8(14),15-isopimaradiene-3β-ol, 7,15-isopimaradiene-3β-ol and 8(14),15-isopimaradiene-18-ol. Among isolated substances, 8(14),15-isopimaradiene-18-oic acid exhibited the highest antifeedant activity against *S. litura* at ED_{50} = $2.75x10^{-7}$ mol/cm^2. In addition, all of the isolated compounds showed strongly feeding inhibitory against termites and gave negative tests for phytotoxicity against lettuce seedlings.

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List of Abbreviations

AFI	antifeedant index
°C	degree of celsius
CDC	control disk consumption
CH_2Cl_2	dichloromethane, methylene chloride
$CHCl_3$	chloroform
cm^{-1}	unit of wavelength
COSY	correlated spectroscopy
d	doublet (NMR)
dd	doublet of doublet (NMR)
ddd	doublet of doublet of doublet (NMR)
dt	double triplet (NMR)
EtOAc	ethyl acetate
EtOH	ethanol
FI	feeding inhibitory
g	gram (s)
GCMS	gas chromatography mass spectrometer
HMBC	heteronuclear multiple bond correlation experiment
HSQC	heteronuclear multiple-quantum coherence experement
J	coupling constant
kg	kilogram (s)
wt	weight
NMR	nuclear magnetic resonance
IR	infrared
L	liter (s)
m	multiplet (NMR)
MeOH	methanol
mg	milligram (s)
mL	milliliter (s)
m.p.	melting point
MS	mass spectrometry
MW	molecular weight

List of abbreviations (continued)

m/z	mass to charge ratio
M^+	molecular ion
ppm	part per million
s	singlet (NMR)
SD	standard deviation
t	triplet (NMR)
TLC	thin layer chromatography
δ	chemical shift
μg	microgram (s)
R_f	retardation factor