


สารเคมีเพื่อการเกษตรจากดอกคำฝอย *Datura metel* Linn.



นางสาวสิริจันทร์ พัฒนพงศ์สิริกุล

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จุฬาลงกรณ์มหาวิทยาลัย

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AGROCHEMICALS FROM THE FLOWERS OF *Datura metel* Linn.

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งานวิจัยนี้เป็นการรายงานการศึกษาองค์ประกอบทางเคมีของดอกคำโพงและฤทธิ์ทางชีวภาพทางการเกษตรเป็นครั้งแรก จากการทดสอบฤทธิ์ทางชีวภาพเบื้องต้นพบว่าสิ่งสกัดอัลคาลอยด์แสดงความเป็นพิษต่อหอยเชอรี่ *Pomacea canaliculata* Lamark. นอกจากนี้พบว่า สิ่งสกัดเอทิลเอซีเทตแสดงความเป็นพิษต่อไรสีน้ำตาล *Artemia salina* Linn. ในระดับปานกลางและมีฤทธิ์ยับยั้งการเจริญเติบโตของเมล็ดผักกาดหอม *Lactuca sativa* Linn. เมื่อแยกสารจากส่วนที่แสดงฤทธิ์ทั้งสองได้สาร 9 ตัว โดยอาศัยสมบัติทางกายภาพ ปฏิกิริยาเคมีและข้อมูลทางสเปกโทรสโกปีพบว่า โครงสร้างสารที่แยกได้แก่ ของผสมของเอสเทอร์โซ่ตรง ของผสมสเตอรอยด์เอสเทอร์ ของผสมสเตอรอยด์ kaempferol scopolamine tropine aposcopolamine และอนุพันธ์ของ scopolamine 2 ตัว ผลการศึกษาฤทธิ์ทางชีวภาพชี้ว่า kaempferol แสดงฤทธิ์ความเป็นพิษต่อไรสีน้ำตาลในระดับต่ำ scopolamine มีฤทธิ์ฆ่าหอยเชอรี่และแสดงฤทธิ์ยับยั้งการงอกของรากเมล็ดผักกาดหอมในระดับสูง และยังพบว่า tropine ออกฤทธิ์ฆ่าหนอนกระทู้ผัก *Spodoptera litura* ในระดับสูง.

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This work was the first report on agricultural-based activity of the flowers of *Datura metel* Linn. From the preliminary biological screening test, the alkaloid crude extract revealed toxicity against *Pomacea canaliculata* Lamark. (golden apple snail). In addition, ethyl acetate crude extract displayed medium cytotoxicity against brine shrimp *Artemia salina* Linn. and plant growth inhibition against *Lactuca sativa*. The separation of two active fractions led to the isolation of nine substances. By means of physical properties, chemical reactions and spectroscopic evidences, the structures of four mixtures and four compounds could be deduced as a mixture of long chain esters, a mixture of steroid ester, a mixture of steroids, kaempferol, scopolamine, tropine, aposcopolamine, and two derivatives of scopolamine. The bioassay results indicated that kaempferol exhibited low cytotoxicity against brine shrimp. Moreover, scopolamine displayed the molluscicidal activity against golden apple snail and high root growth inhibition on *L. sativa*. In addition, tropine displayed insecticidal activity against *Spodoptera litura*.

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### List of Abbreviations

b	broad (NMR)
°C	degree celsius
CDCl <sub>3</sub>	deuterated chloroform
CH <sub>2</sub> Cl <sub>2</sub>	dichloromethane, methylene chloride
CHCl <sub>3</sub>	chloroform
CIGAR	constant time inverse-detected gradient accordion rescaled long-rang heteronuclear multiple bond correlation
cm <sup>-1</sup>	unit of wavelength
d	doublet (NMR)
DEPT	the distortionless enhancement by polarization transfer
DMSO	dimethylsulfoxide
DMSO- <i>d</i> <sub>6</sub>	deuterated dimethylsulfoxide
EtOAc	ethyl acetate
EtOH	ethanol
g	gram (s)
GC	gas chromatography
gCOSY	gradient correlation spectroscopy
gHSQC	gradient heteronuclear single quantum correlation
Hz	hertz
HPLC	high performance liquid chromatography
IR	infrared
J	coupling constant
kg	kilogram (s)
L	liter (s)
LC <sub>50</sub>	50% lethality concentration
LD <sub>50</sub>	50% lethality dose
m	multiplet (NMR)
M <sup>+</sup>	molecular ion
MeOH	methanol

**List of abbreviations (continued)**

mg	milligram (s)
mL	milliliter (s)
m.p.	melting point
MS	mass spectrometry
MW	molecular weight
m/z	mass to charge ratio
nm	nanometer
NMR	nuclear magnetic resonance
NOESY	nuclear overhauser enhancement spectroscopy
ppm	part per million
R <sub>f</sub>	retardation factor
s	singlet (NMR)
t	triplet (NMR)
TLC	thin layer chromatography
UV	ultraviolet
Vol.	volume
wt	weight
δ	unit of chemical shift
μg	microgram (s)

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