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CONSTITUENTS OF ORYZANOLS IN JASMINE RICE BRAN

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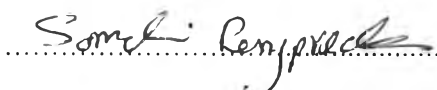
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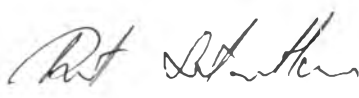
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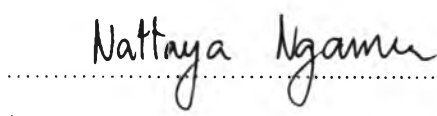
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การศึกษาและเปรียบเทียบองค์ประกอบของออริซานอลที่สกัดได้จากรำของข้าว 4 พันธุ์ที่ปลูกในประเทศไทย ได้แก่ ปทุมธานี 1, ขาวดอกมะลิ 105 (ข้าวหอมมะลิ), สันป่าตอง 1 (ข้าวเหนียว) และ กข ชัยนาท 1 (ข้าวขาว) เมื่อนำรำข้าวแต่ละพันธุ์มาสกัดด้วยตัวทำละลายอินทรีย์ที่เหมาะสมจะได้น้ำมันรำข้าวชนิดหยาบ (Crude Rice Bran Oil) แล้วจึงสกัดแยกองค์ประกอบของออริซานอลจากน้ำมันรำข้าวโดยใช้ Silica Column Chromatography และ Preparative TLC หลังจากนั้นนำสารสกัดที่ได้มาวิเคราะห์องค์ประกอบของออริซานอลโดยใช้เทคนิค mass spectrometry/ mass spectrometry (MS/MS) จากการทดลองพบองค์ประกอบของออริซานอลจำนวน 10, 7, 5 และ 2 ชนิดในน้ำมันรำข้าวที่ใช้ทำการทดลองทั้ง 4 ชนิดตามลำดับ 24-methylenecycloartanyl ferulate และ cycloartenyl ferulate ทั้ง 2 ชนิดนี้ พบในน้ำมันรำข้าวทุกชนิด sitosteryl และ/หรือ Δ^7 -sitosteryl ferulate, campesteryl ferulate และ stigmastanyl ferulate พบในน้ำมันรำข้าวสันป่าตอง 1, ขาวดอกมะลิ 105 และ ปทุมธานี 1 นอกจากนี้ยังพบอีกว่า cycloartenyl caffeate, campestanyl ferulate และ 24-methylenecholesteryl ferulate พบได้ในน้ำมันรำข้าวขาวดอกมะลิ และปทุมธานี 1 ส่วนองค์ประกอบอื่น ๆ นั้นคือ campesteryl caffeate, 24-cycloart-25-ene-3 β ,24-diol-3 β ferulate และ 24-hydroxy-24-methylcycloartanyl ferulates พบเฉพาะในรำข้าวปทุมธานี 1 จากนั้นนำออริซานอลที่สกัดได้มาศึกษาประสิทธิภาพในการต้านอนุมูลอิสระ (antioxidant activity) เปรียบเทียบกับ α -tocopherol และออริซานอลมาตรฐาน โดยทำการตรวจสอบในระบบที่เร่งปฏิกิริยาโดย 2,2'-diphenyl-1-picrylhydrazyl radical (DPPH) พบว่า ออริซานอลที่สกัดได้จากข้าวทุกพันธุ์มีประสิทธิภาพในการต้านอนุมูลอิสระ โดยเฉพาะ ออริซานอลที่สกัดได้จากรำข้าวสันป่าตอง 1 มีประสิทธิภาพสูงที่สุดและมีค่า IC₅₀ 25.00 μ g/ml ในขณะที่ออริซานอลมาตรฐาน, ออริซานอลที่สกัดได้จากรำข้าว กข ชัยนาท 1, ปทุมธานี 1 และ ขาวดอกมะลิ 105 มีประสิทธิภาพในการต้านอนุมูลอิสระลดลงตามลำดับ

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The steryl ferulate (γ -oryzanol) contents of rice bran of 4 different Thai rice varieties, i.e., Pathumthani 1 and Kao Dok Mali 105 (Jasmine rice), Sunpatong 1 (glutinous rice) and Go Ko Chai Nat 1 (white rice) were extracted individually by appropriate solvents, and crude rice bran oils, the products, were further purified using silica column chromatographic and preparative thin-layer chromatographic methods. Mass spectrometry/ mass spectrometry (MS/MS) was used for identification of individual oryzanol constituents. From those tested crude rice bran oils, 10, 7, 5 and 2 components of oryzanol were extracted, respectively. Both 24-methylenecycloartenyl ferulate and cycloartenyl ferulate were found commonly in all tested varieties. Also, sitosteryl and/or Δ^7 -sitosteryl ferulate, campesteryl and/or Δ^7 -campesteryl ferulate and stigmastanyl ferulate, were found in Sunpatong 1, Kao Dok Mali 105 and Pathumthani 1. In addition, cycloartenyl caffeate, campestanyl ferulate and 24-methylenecholesteryl ferulate were found in Kao Dok Mali 105 and Pathumthani 1. Other components, i.e., campesteryl caffeate, 24-cycloart-25-ene-3 β ,24-diol-3 β ferulate and 24-hydroxy-24-methylcycloartenyl ferulate found in Pathumthani 1 only. Compare with α -tocopherol and standard oryzanol, antioxidant activities of those extracted oryzanol were performed individually in 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical system. Oryzanol extracted from Sunpatong 1 rice bran, IC₅₀ 25.00 μ g/ml, possessed the highest antioxidant activity among the tested oryzanols.

Field of study..... Biotechnology.....Student's signature.....*Lek Vejjanukroh*
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LIST OF ABBREVIATIONS

AAPH	= 2,2'-azobis(2-methylpropionamide) dihydrochloride
br s	= broad singlet (for NMR spectral data)
°C	= degree Celsius
¹³ C-NMR	= carbon-13 nuclear magnetic resonance
CDCl ₃	= deuterated chloroform
CHCl ₃	= chloroform
CH ₂ Cl ₂	= dichloromethane
cm	= centimeter
COSY	= ¹ H- ¹ H correlation spectroscopy
δ	= chemical shift
°C	= degree of Celsius
DPPH	= 2,2'-diphenyl-1-picrylhydrazyl radical
d	= doublet (for NMR spectral data)
dd	= doublet of doublet (for NMR spectral data)
dt	= doublet of triplets (for NMR spectral data)
ε	= molar absorptivity
EIMS	= electron impact mass spectroscopy
EtOAc	= ethyl acetate
g	= gram
HMBC	= Heteronuclear Multiple Bond Correlation
HPLC	= high performance liquid chromatography
HSQC	= Heteronuclear Single Quantum Coherence
¹ H-NMR	= Proton Nuclear Magnetic Resonance
Hz	= hertz
IR	= infrared spectroscopy
i.g.	= intragastric
i.p.	= intraperitoneal
LDL	= low density lipoprotein
l	= liter

kg	= kilogram
LC-MS/MS	= liquid chromatography-mass spectrometry/ mass spectrometry
μl	= micro liter
λ_{max}	= wavelength of maximum absorption
$[\text{M}+\text{H}]^+$	= protonated molecular ion
m	= multiple (for NMR spectral data)
MeOH	= methanol
mg	= milligram
μg	= microgram
μm	= micrometer
MHz	= megahertz
ml	= milliliter
mm	= millimeter
MS	= mass spectrometry
ν_{max}	= wave number at maximum absorption
ng	= nanogram
NMR	= nuclear magnetic resonance
No.	= Number
ppm	= part per million
q	= quartet (for NMR spectral data)
s	= singlet (for NMR spectral data)
t	= triplet (for NMR spectral data)
TLC	= thin layer chromatography
UV	= Ultraviolet
VLDL	= very low density lipoprotein
Vis	= visible
V	= volume
H ₂ O	= water
W	= weight