PROCEEDINGS

INTERNATIONAL CONFERENCE ON
HEALTH POLYTECHNIC SURABAYA

Interprofessional Collaboration of Non Communicable Disease on Asean Economic Community

November 15th-16th, 2016
PROCEEDING
INTERNATIONAL CONFERENCE ON HEALTH POLYTECHNIC SURABAYA

Interprofessional Collaboration of Non Communicable Disease an Asean Economic Community

November 15th-16th, 2016

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Health Polytechnic
Ministry of Health Surabaya Indonesia
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PREFACE

We are very pleased to introduce the proceedings of the first International Conference on Health Polytechnic Surabaya. First International Conference on Health Polytechnic Surabaya have the theme “Interprofessional Collaboration Of Non Communicable Disease On Asean Economic Community”. As we known Non Communicable Diseases (NCDs) mainly cardiovascular diseases, chronic respiratory diseases, diabetes and cancer are top killers in the South-East Asia Region, claiming an estimated 8.5 million lives each year. One third of these deaths are premature and occur before the age of 70 years, thus affecting economically productive individuals. As incomes rise and behaviour changes, certain health risks increase.

Coordinated actions are across all sectors of society required, including partnerships among governments, civil society, academia, international organizations and the private sector. People and communities must play bigger roles in maintaining their health individually and collectively while the Government will create an environment that promotes wellness and healthy living.

A major conference theme was related to the links on five topic Health Resources Standarization On Asean Economic Community, Non Communicable Disease trends in Asean, Role Interprofessional collaboration in overcome Non Communicable Disease. Technology services to overcome Non Communicable Disease. And Implication of Non Communicable Disease on Asean Economic Community. These were the issues addressed by the papers presented at the conference. The level of interest in the subject matter of the conference was maintained and over 90 suitable papers were submitted for presentation at the conference. This required the programme to be organised in three parallel sessions, each on a specific theme, to provide each paper with sufficient time for presentation and to accommodate all of them within the overall time allocated.

In the event, the conference was highly successful. The 98 presented papers maintained the high promise suggested by the written abstracts and the programme was chaired in a professional and efficient way by the session chairmen who were selected for their international standing in the subject.

The number of participants, at 200, was also highly gratifying, showing the enthusiastic of international interest in the subject.

Finally, it is appropriate that we record our thanks to our presenter, Reviewer, Editor, Organising Committee for their work. We are also indebted to Direktor Health Polytechnic Ministry Of Health Surabaya Indonesia. Without their support, the conference could not have been the success that it was. We also acknowledge the authors themselves, without whose expert input there would have been no conference.

The continuing success of this conference series means that planning can now proceed with confidence for the next event.

Chair of Organizing Committee

Dr. I Dewa Gede Hariwisana, ST. MT
Address from the Director of Health Polytechnic of Health Ministry Surabaya

Assalamu'alaikum wr. wb.

Good Morning ladies and gentleman.

First of all, let's say Thanks to Allah, who has been giving us guidance, happiness, healthy, and mercy, so we can attend and participate in this event without any obstacles. Praise and salutation upon our prophet Muhammad saw.

It is a great honour and pleasure for me to be able to welcome you to Surabaya at 1st International Conference on Health Polytechnic Surabaya. entitled: "Interprofessional Collaboration Of Non Communicable Disease On Asean Economic Community"

I would like to say welcome to Representative of Ministry of Health Indonesia, World Health Organization, speaker from Malaysia, Thailand and Philipines and all author and participant.

Health Polytechnic Surabaya have a vision "To be a center of education for health who have the morality and integrity with a competitive advantage" which in recent years have become common concern of Interdisciplinary research.

It is gratifying to note that the agenda of the Seminar covers five interesting topic. Health Resources Standarization On Asean Economic Community, Non Communicable Disease trends in Asean, Role Interprofessional collaboration in overcome Non Communicable Disease, Technology services to overcome Non Communicable Disease, Implication of Non Communicable Disease on Asean Economic Community.

I believe that tomorrow's expert conference will be of benefit to one and all, and that you will exchange with one another the useful experience.

I Wish You an Enjoyable stay in Surabaya- Indonesia
Wassalamualaikum Warahmatullohi Wabarokatuh.

Drg. Bambang Hadi Sugito., M.Kes

Director
Health Polytechnic Ministry Of Health Surabaya
INTERNATIONAL CONFERENCE ON HEALTH POLYTECHNIC SURABAYA

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DETAM I AND II VARIETIES BY KINETIC MACERATION METHOD

Juliana Christyaningsih1, Rika Yulita2, Erni Mei Kristina1, Nofie Kusumawati Soegiono2
1Health Polytechnic Surabaya, Indonesia
2Faculty of Pharmacy University of Surabaya, Indonesia

ABSTRACT
Background: Soybean is one of the food-producing natural antioxidants. This study was to identify the antioxidant compounds from methanol extract of black soybean (Glycine max L. Merr) Detam I and II varieties.

Method: The extract of black soybean was defatted using n-hexane and the pulp was further extracted using 90% methanol. Qualitative analysis was performed using TLC and GC-MS with total time of analysis 20 and 80 minutes. TLC data exhibited that methanol extract of black soybean (Glycine max L. Merr) Detam II also contained flavonoids but its GC-MS-profile showed undetectable flavonoids.

Results: There were detected the presence of flavonols 3',4',5,7-OH, 3-O araglucone and hexadecanoic acid, methyl ester; pentadecanoic acid, 14-methyl, 1-methyl ester; 9,12-Octadecadienoic acid (Z, Z) - methyl ester and methyl 10-trans, 12-cis-octadecadienoate. However, there are some antioxidant compounds, i.e. Octanoic acid; Methyl 10-trans, 12-cis-octadecadienoate; Hexadecanoic acid; and 9,12-Octadecadienoic acid (Z, Z).

Key words: Detam I and II, Glycine max L. Merr, Antioxidants, TLC, GC-MS

INTRODUCTION
Many diseases are initiated by the presence of excessive oxidation reactions in the body. Oxidation reaction is needed by aerobic organisms for energizing metabolism and respiration processes, but on certain conditions, it must be implicated in various diseases and degenerative conditions, such as aging, arthritis, cancer, and others. The human body has a natural defense system against free radicals. It covers endogenous intracellular antioxidant which is consisted of enzymes synthesized by the body such as superoxide dismutase (SOD), catalase and glutathione peroxidase. Antioxidants in the body must be in sufficient number to eliminate and neutralize the effects of free radicals. If the number of free radicals in the body is increased, exogenous antioxidants (derived from food consumed) is required in higher amount.

Antioxidant compounds are contained in many vegetables and fruits, especially nuts and grains. Soybean is one of the food-producing natural antioxidants. Extract of soybean (Glycine max) Anjasmoro variety was proven effective in lowering the levels of lead in the blood of mice with lead intoxication which was equivalent to the effect of vitamin C supplementation. The Detam II variety of Glycine max was also proven to reduce the levels of lead in the blood of mice, but did not reduce the levels of malondialdehyde and significant organ damage.

The content of soybeans having antioxidant properties among others are α-linolenic acid, isoflavones, lecithin, lectins, linoleic acid, peptide, phytosterols, proteins, and saponins.

Among the antioxidant compounds, isoflavones become an object of research, and has been intensively evaluated as hipcholesterolemia, antioxidant, and estrogenic in blood vessels. The isoflavones in soybean consists of genistein (4',5,7-trihydroxyisoflavone) and daidzein (4',7-dihydroxyisoflavone), as well as the derivative of β-glycoside, genistin, and daidzin. Isoflavones are phytoestrogens which are found in soy beans and some studies have shown that isoflavones are the best phytoestrogens compared to other phytoestrogens. One of the two main isoflavones having estrogenic effect as an antioxidant and like molecule is genistein.

Each variety of Soybean consists of Specific Ingredients. The Agency research beans and tubers of Indonesia (2010) states that black soybean Detam I variety, an Indonesian native variety, has protein content higher than other soybean varieties.
To determine the existence of genistein and other antioxidant compounds in soybean Glycine max Detam I variety, it is necessary to analyze using Gas Chromatography-Mass Spectrometer. In this study, soy bean was extracted by kinetic maceration using 80% methanol. Kinetic maceration is a simple extraction method, in addition the stirring will enhance the contact of crude drug with the solvent and accelerate the diffusion process of the components to be extracted. Thus, the extraction process of genistein and other antioxidant compounds will be more effective.

RESEARCH METHOD
Materials Research : Glycine max Detam I seed, n-hexane, 80% methanol, silica gel GF254, chloroform (CHCl₃), ethyl acetate, Genistein (Sigma) and demineralized water
Instrument Research: electrical stirrer (IKA Labortechnik RW 20 N), rotary evaporator (BUCHI Rotavapor R - 114), waterbath (BUCHI Waterbath B - 480), BUCHI Vacuum Controller V - 850, BUCHI Vacuum Pump, V700, sieve mesh 20, analytical scales (Ohaus PA 214 , AND GR - 202), Water Bath Memmert, TLC (Camag), Camag UV lamp, GC - MS Shimadzu QP Model - 2010 SE, injection syringes 0.2 μm of nylon membrane filter (Whatman)
Preparation of Soybean Methanol Extract
The soybean seed Detam I was ground using a blender and sieved to 20 mesh to form a fine powder. Five hundred gram of soy bean powder was macerated kinekically with 1 L of n-hexane and then re-macerated twice in the same way. The pulp was re-extracted with 1 L of 80% methanol for an hour, filtered and the filtrate was collected in a container. The residue was further re-macerated with 80% methanol for 3 times. The methanolic extract was evaporated under vacuum using rotary evaporator until thick extract was obtained.

Identification of Flavonoids in Soybean Methanol Extract using TLC
The presence of flavonoids in the methanol extract of soybean was identified using TLC with silica gel GF254 as stationary phase under mobile phase of chloroform : ethyl acetate (6 : 4). Chromatogram was observed under UV light (365 nm) and derivatized using ammonia

Analysis of Genistein and other antioxidant compounds in Glycine max Detam I using GC-MS

Methanol extract of soybean (61.3 mg) was dissolved in 10 ml of methanol in measuring flask and then filtered using membrane filter (0.2 μm) inserted in a syringe injection. The extract was analyzed qualitatively using GC-MS. The column was Restek semipolar (Crossbond® 5% diphenyl/95% dimethyl polysiloxane) 60 m length x 0.25 mm ID x 0.25 μm df, with helium carrier gas, injection volume of 1.00 mL and the ionization energy of the instrument was 70 eV. Analysis was done on two conditions as follows:

The first condition:
Injector temperature : 230°C
Column temperature : 150°C for 2 minutes, then increased to 240°C for 10 minutes.
Interphase temperature : 250°C
Flow rate : 1.21 ml/min
Total analysis time : 20 minutes

The second condition:
Injector temperature : 230°C
Column temperature : 60°C for 10 minutes, then increased with a temperature rise of 4°C per minute to 220°C for 10 minutes, then increased with a rise of 1°C per minute until the final temperature of 240°C.
Interphase temperature : 250°C
Flow rate : 0.8 ml/min
Total analysis time : 80 minutes

The chromatogram of soybean methanol extract was compared with the chromatogram of genistein standard (Sigma), which was prepared by dissolving 0.3 mg of genistein in 3 ml of methanol.
RESULT
Organoleptic characteristics (color, shape and smell) of methanol extracts of Glycine max seed Detam 1 are presented in Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shape</td>
<td>Hard and agglomerate (very thick)</td>
</tr>
<tr>
<td>2</td>
<td>Color</td>
<td>Blackish brown</td>
</tr>
<tr>
<td>3</td>
<td>Smell</td>
<td>Rather stimulate</td>
</tr>
</tbody>
</table>

Identification of Flavonoids using TLC
Results of flavonoid identification (Table 2) exhibited that extract showed a dark blue fluorescence (Figure 1a) under UV light (365 nm) and a yellow color under ammonia exposure which was quickly faded (Figure 1b). However, genistein standard did not show these color under the same chromatographic condition. These indicated that extract of Glycine max Detam 1 contains flavonoids.

Fig 1. Identification of Flavonoids in the Extract of Glycine max Detam 1 (a) under UV light (365 nm) and (b) Derivated with ammonia vapor
A1 : Genistein standard
A2 : methanol extract of Glycine max Detam 1

Table 2. Compound Composer (????) Standard of Genistein in 20 Minutes

<table>
<thead>
<tr>
<th>Retention time (min)</th>
<th>MR</th>
<th>Compounds corresponding database from GC-MS Shimadzu QP 2010 SE</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.720</td>
<td>162</td>
<td>Ethanesulfonyl chloride*</td>
<td>C₂H₅Cl₂O₂S</td>
</tr>
<tr>
<td></td>
<td>103</td>
<td>Butanenitrile</td>
<td>C₄H₆CN</td>
</tr>
<tr>
<td></td>
<td>108</td>
<td>Carbonochloridic acid</td>
<td>C₃H₅ClO₂</td>
</tr>
<tr>
<td></td>
<td>186</td>
<td>Ethane, 1,2-bis (2-Chloroethoxy)</td>
<td>C₅H₁₂Cl₂O₂</td>
</tr>
<tr>
<td></td>
<td>152</td>
<td>1-Chloro ethyl carbonate</td>
<td>C₅H₇ClO₃</td>
</tr>
<tr>
<td>14.365</td>
<td>562</td>
<td>Tetracontane</td>
<td>C₄₀H₇₈₂</td>
</tr>
<tr>
<td></td>
<td>618</td>
<td>Tetracontane</td>
<td>C₄₄H₉₀</td>
</tr>
<tr>
<td></td>
<td>366</td>
<td>Hexacosane</td>
<td>C₃₆H₇₄</td>
</tr>
<tr>
<td></td>
<td>408</td>
<td>Celidoniol, deoxy</td>
<td>C₂₉H₆₀</td>
</tr>
<tr>
<td></td>
<td>296</td>
<td>Heneicosane*</td>
<td>C₂₁H₄₄</td>
</tr>
</tbody>
</table>

Compounds were detected using database WILEY8.LIB
*: The compound was detected using database NIST08s.LIB
Figure 2. The GC chromatogram of Genistein in 20 Minutes

Table 3. The constituent compounds Methanol Extracts of Glycine max Detam I in 20 Minutes

<table>
<thead>
<tr>
<th>Retention time (min)</th>
<th>MR</th>
<th>Compounds corresponding database from GC-MS Shimadzu QP 2010 SE</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.015</td>
<td>194</td>
<td>Alpha-D-Glucopyranoside, methyl*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>Alpha-D-Galactopyranoside, methyl</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>Alpha-methyl-D-Manopyranoside*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>10.115</td>
<td>194</td>
<td>Alpha-D-Galactopyranoside, methyl*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>194</td>
<td>178</td>
<td>Alpha-L-Galactopyranoside, methyl 6-deoxy</td>
<td>C₇H₁₄O₃</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>Alpha-D-Glucopyranoside, methyl*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>10.180</td>
<td>496</td>
<td>Ergosta-2,24-dien-26-oic-acid, 27-(acetyloxy)-5,6-epoxy-22-hydroxy-1-oxo-delta-lactone</td>
<td>C₅₀H₹₀O₆</td>
</tr>
<tr>
<td>155</td>
<td></td>
<td>4-Aminocyclohexanone, N-acetyl*</td>
<td>C₉H₁₃NO₂</td>
</tr>
<tr>
<td>225</td>
<td></td>
<td>N-Cyclosodecylacetamide*</td>
<td>C₁₄H₂₇NO</td>
</tr>
<tr>
<td>10.230</td>
<td>129</td>
<td>Butyrodehde, semicarbazone</td>
<td>C₇H₁₄N₃O</td>
</tr>
<tr>
<td>172</td>
<td>598</td>
<td>2-Isopropyl-4,6-dimethyl-1,3,2-Oxathiaborinane*</td>
<td>C₆H₉BOS</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>Flavonol 3',4',5,7-OH, 3-O Araglucoside</td>
<td>C₂₆H₃₆O₁₆</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>Alpha-D-Galactopyranoside, methyl*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>Alpha-Methyl-D-Mannopyranoside*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>Alpha-D-Glucopyranoside, methyl*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>11.670</td>
<td>159</td>
<td>Indole-3-Acetaldehyde*</td>
<td>C₈H₉NO</td>
</tr>
<tr>
<td>159</td>
<td></td>
<td>2-Hydroxytriphenyl*</td>
<td>C₁₀H₁₉NO</td>
</tr>
<tr>
<td>370</td>
<td></td>
<td>N-Dinitrophenyl-1-Tryptophane*</td>
<td>C₂₇H₁₄N₄O₆</td>
</tr>
<tr>
<td>11.840</td>
<td>194</td>
<td>Mome Inositol</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>3-O-Methyl-d-Glucose*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>194</td>
<td></td>
<td>4-O-Methylmannose*</td>
<td>C₇H₁₄O₄</td>
</tr>
<tr>
<td>14.070</td>
<td>270</td>
<td>Hexadecanoic acid, methyl ester</td>
<td>C₁₇H₃₄O₂</td>
</tr>
<tr>
<td>270</td>
<td></td>
<td>Pentadecanoic acid, 14-methyl, -methyl ester</td>
<td>C₁₇H₃₄O₂</td>
</tr>
<tr>
<td>354</td>
<td></td>
<td>9-Octadecenoic acid, 12-(Acetyloxy)-methyl ester [R-(Z)]</td>
<td>C₁₉H₃₄O₄</td>
</tr>
<tr>
<td>17.035</td>
<td>294</td>
<td>9,12-Octadecadienoic acid (Z, Z)- methyl ester</td>
<td>C₁₉H₃₄O₂</td>
</tr>
<tr>
<td>294</td>
<td></td>
<td>Methyl 10-trans, 12-cis-octadecenoate*</td>
<td>C₁₉H₃₄O₂</td>
</tr>
<tr>
<td>294</td>
<td></td>
<td>8,11-Octadecadienoic acid, methyl ester</td>
<td>C₁₉H₃₄O₂</td>
</tr>
</tbody>
</table>

Compounds were detected using database WILEY8.LIB

*: The compound was detected using database NIST08s.LIB

Compounds typed in bold are compounds with antioxidant effects
Fig 3. The GC Chromatogram of Glycine max Detam I extract in 20 Minutes

Table 4. Summary of Compound Composer (????) of Genistein in 80 Minutes

<table>
<thead>
<tr>
<th>Retention on time (min)</th>
<th>MR</th>
<th>Compounds corresponding database from GC-MS</th>
<th>Formula</th>
<th>Shimadzu QP 2010 SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.520</td>
<td>104</td>
<td>Trimethyl borate</td>
<td>C₄H₆BO₃</td>
<td></td>
</tr>
</tbody>
</table>

Compound was detected using database WILEY8.LIB

* : The compound was detected database NIST08s.LIB ???

Fig 4. Gas chromatography spectra of Standard Genistein in 80 Minutes
<table>
<thead>
<tr>
<th>Retention time (min)</th>
<th>MR</th>
<th>Compounds corresponding database from GC-MS Shimadzu QP 2010 SE</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.320</td>
<td>44</td>
<td>Nitrogen oxide</td>
<td>N₂O</td>
</tr>
<tr>
<td>44</td>
<td></td>
<td>Carbon dioxide</td>
<td>CO₂</td>
</tr>
<tr>
<td>4.610</td>
<td>82</td>
<td>1-Chlorofluoroethane</td>
<td>C₂H₄ClF</td>
</tr>
<tr>
<td>4.670</td>
<td>64</td>
<td>1,1-Difluoroethylene-2,2-D2</td>
<td>C₂D₂F₂</td>
</tr>
<tr>
<td>92</td>
<td></td>
<td>2-Mercaptoethanoic acid</td>
<td>C₂H₄O₂S</td>
</tr>
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<td>5.260</td>
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<td>1,1-Difluoroethylene-2,2-D2</td>
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<td>82</td>
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<td>1-Chlorofluoroethane</td>
<td>C₂H₄ClF</td>
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<td>104</td>
<td>Boric acid</td>
<td>C₃H₅BO₃</td>
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<td>Acetic acid</td>
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<td>8.525</td>
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<td>Acetyl oxide, anhydride</td>
<td>C₄H₈O₃</td>
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<tr>
<td>72</td>
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<td>Acetylsalicylate</td>
<td>C₆H₆O₃</td>
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<tr>
<td>46.925</td>
<td>194</td>
<td>Alpha-D-Glucopyranoside, methyl</td>
<td>C₆H₁₀O₆</td>
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<tr>
<td>194</td>
<td></td>
<td>Beta-D-Glucopyranoside, methyl</td>
<td>C₆H₁₀O₆</td>
</tr>
<tr>
<td>56.010</td>
<td>270</td>
<td>Hexadecanoic acid, methyl ester</td>
<td>C₁₆H₃₂O₂</td>
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<tr>
<td>270</td>
<td></td>
<td>Pentadecanoic acid, 14-methyl, -methyl ester</td>
<td>C₁₅H₂₄O₂</td>
</tr>
<tr>
<td>63.705</td>
<td>294</td>
<td>9, 12-Octadecadienoic acid (Z, Z), methyl ester</td>
<td>C₁₄H₂₂O₂</td>
</tr>
<tr>
<td>294</td>
<td></td>
<td>8,11-Octadecadienoic acid, methyl ester</td>
<td>C₁₄H₂₄O₂</td>
</tr>
</tbody>
</table>

Compounds were detected using database WILEY8.LIB
* : The compound was detected database NIST08s.LIB (???)
Compounds typed in bold are compounds with antioxidant effects

Figure 5. The GC spectra of Glycine max Detam 1 Extract In 80 Minutes
DISCUSSION

Analysis of genistein and other antioxidant compounds using GC-MS revealed that there were 4 antioxidant compounds, i.e.: hexadecanoic acid, methyl ester and pentadecanoic acid, 14-methyl, -methyl ester at retention time of 14.070 minutes. Moreover, 9,12-Octadecadienoic acid (Z, Z) - methyl ester and Methyl 10-trans, 12-cis-octadecadienoate were detected at retention time of 17.035 minutes. In the first condition of observation, flavonols compound i.e. 3’,4’,5,7-OH, 3-O Araglucoside was found. This indicated that the extract contains flavonoids. In the total analysis time of 80 minutes, there were 3 same antioxidant compounds were detected as in the total analysis time of 20 minutes, namely: hexadecanoic acid, methyl ester and pentadecanoic acid, 14-methyl, -methyl ester at retention time of 56.010 minutes and 9,12-Octadecadienoic acid (Z, Z) - methyl ester at retention time of 63.705 minutes. Using these two conditions, the presence of genistein in soy methanol extract could not be detected. This could be caused by the type of GC-MS column used. In this work, we used semipolar column which has maximum temperature of 250°C. Previous studies found that genistein could be observed at 300°C. This research is reinforced by several studies that found the isoflavone content in soybean \textsuperscript{11,12} and soybean may enhance the body immunity through the formation of immunoglobulin in diabetic rat with infected K.pneumoniae \textsuperscript{13}

CONCLUSIONS AND RECOMMENDATION

The extract of Glycine max Detam 1 variety contains flavonoids based on the analysis using TLC and GC. The presence of Flavonols 3’,4’,5,7-OH, 3-O Araglucoside and 4 other antioxidant compounds, such as hexadecanoic acid, methyl ester; pentadecanoic acid, 14-methyl; -methyl ester; 9,12-Octadecadienoic acid (Z, Z) - methyl ester and methyl 10-trans, 12-cis-octadecadienoate were detected, nevertheless the presence of genistein could not be detected.

REFERENCES


7. Sugano, Michihiro, 2006, Soy in Health and Disease Prevention, CRC Press Taylor and Francis Group


