FLAVONOID COMPOUND FROM DICHLOROMETHANE EXTRACT OF *Crinum amabile* Donn. LEAVES

Undergraduate Thesis

Submitted as a requirement for submission of the final project to achieve an undergraduate degree in the Department of Chemistry

By:

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sudah dapat diajukan kembali kepada Program Studi Kimia Fakultas Sains dan Teknologi UIN Sunan Kalijaga Yogyakarta sebagai salah satu syarat untuk memperoleh gelar Sarjana Strata Satu dalam Program Studi Kimia.

Dengan ini kami mengharap agar skripsi/tugas akhir Saudara tersebut di atas dapat segera dimunaqsyahkan. Atas perhatiannya kami ucapkan terima kasih.

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Demikian kami sampaikan. Atas perhatianya, kami ucapkan terimakasih

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LETTER OF AGREEMENT

This letter to declear that

Student's name	: Andika Wahyu Afrianto
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This student has conducted a research in Student Mobility Program (25th Jan – 14th May 2019) with topic

"Chemical Constituent from the Leaves of *Crinum amabile* Donn."

As his Advisor, I give permission for this student to use the contents of the project result for completing his undergraduate program in Sunan Kalijaga State Islamic University.

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Kanda Panthong

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SURAT PERNYATAAN KEASLIAN SKRIPSI

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Menyatakan bahwa skripsi yang berjudul **"Flavonoid Compound from Dichloromethane Extract of *Crinum amabile* Donn. Leaves"** merupakan hasil penelitian saya sendiri, tidak terdapat karya yang pernah diajukan untuk memeperoleh gelar kesarjanaan disuatu Perguruan Tinggi, dan sepanjang pengetahuan saya juga tidak terdapat karya atau pendapat yang pernah ditulis atau diterbitkan orang lain, kecuali secara tertulis diacu dalam naskah ini dan disebutkan dalam daftar pustaka.

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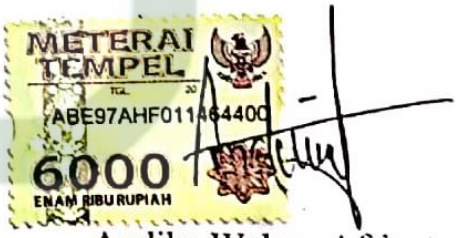

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MOTTO

"If you want to live with happy life, tie it to a goal, not to other people or objects"

-Albert Einstein

"Life is for dreaming, praying, and trying to be better in the world and prepare for the dayafter"

-Andika Wahyu Afrianto

"DREAM, BELIEVE, AND MAKE IT HAPPEN"

-AGNEZ MO

PAGE OF DEDICATION

With the gratitude to Allah SWT and shalawat with greetings to The Prophet Muhammad SAW, I dedicate this bachelor thesis to:

The almamater,

Department of Chemistry, Faculty of Science and Technology, State Islamic University of Sunan Kalijaga, Yogyakarta

PREFACE

In the name of Allah, The Most Merciful and The Most Beneficent. Praise and thanks for the presence of Allah SWT who has given me a healthy favor and knowledges until I can finish my study with the ease and fluency. Shalawat and greetings to The Prophet Muhammad SAW who had been bringing humans from darkest era to the era with full of knowledge. Alhamdulillah, the research with the tittle "Flavonoid Compound from dichloromethane Extract of *Crinum amabile* Donn. Leaves" can be resolved as one of the terms to get a bachelor's degree in chemistry science.

Thank you to everyone who had been giving me a support, motivation, and help in every step I did until this thesis finishes. The gratitude given to:

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17. All of the Indonesian Chemistry Student at PSU. Thanks for helping me to survive there.

For the sake of the perfection, the author is looking forward to suggestions that can make it better. The author hopes that this thesis can be useful to develop the chemistry science.

Yogyakarta, 20th August 2019

Author

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ABSTRACT

FLAVONOID COMPOUND FROM DICHLOROMETHANE EXTRACT OF *Crinum Amabile* Donn. LEAVES

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Assoc. Prof. Dr. Kanda Panthong

Flavonoid compound was isolated from *Crinum amabile* Donn. leaves. The aims of this research were to escalate the use of *Crinum amabile* Donn. From an accessory in Thailand's annual Loy Krathong festival to be a source of natural compounds by determining the isolation methods and flavonoids that contained.

The separation of flavonoids was carried out by using chromatographic techniques to purify CH_2Cl_2 extract of *Crinum amabile* Donn. leaves. Column chromatography with silica gel and sephadex as stationary phases, thin layer chromatography, and preparative thin layer chromatography were the chromatographic techniques used in this research. The pure compound obtained in the form of white-yellow solid with the R_f value of it chromatogram is 0.44. Compound identification using ^{1}H-NMR spectrometer showed the presence of protons from the CH=CH ortho with the appearance of a doublet of doublet (dd) each having *j* values of 8.5 Hz and 8.1 Hz with chemical shifts in the range of 6.5 ppm and 7 ppm. The CH=CH ortho group with the appearance of doublet of doublet of doublet (ddd) each having *j* values 8.4 Hz and 9 Hz with chemical shifts in the range of 7.2 ppm to 7.4 ppm. The methoxy group ($-OCH_3$) was detected on chemical shift 3.8 ppm. Spectrometries of analysis showed that flavonoid compound obtained was 4-Hydroxy-7-Methoxyflavan.

Key Words: *Crinum amabile* Donn., chromatography techniques, 4-Hydroxy-7-Methoxyflavan

ABSTRAK

SENYAWA FLAVONOID DARI EKSTRAK DIKLOROMETANA DAUN *Crinum amabile* Donn.

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Assoc. Prof. Dr. Kanda Panthong

Telah dilakukan isolasi senyawa kelompok flavonoid dari daun tumbuhan *Crinum amabile* Donn. Penelitian ini bertujuan untuk meningkatkan penggunaan *Crinum amabile* Donn. dari aksesoris pada festival tahunan Loy Krathong di Thailand menjadi salah satu sumber sediaan senyawa alam dengan cara menentukan metode isolasi dan senyawa flavonoid yang terkandung didalamnya.

Pemisahan flavonoid dilakukan dengan menggunakan teknik kromatografi untuk memurnikan ekstrak CH_2Cl_2 daun *Crinum amabile* Donn. Teknik kromatografi yang digunakan meliputi kromatografi kolom dengan fasa diam silika gel dan sephadex, kromatografi lapis tipis dan kromatografi lapis tipis preparatif. Senyawa murni yang diperoleh berbentuk padatan putih-kekuningan dengan nilai R_f dari kromatogramnya adalah 0.44. Hasil identifikasi senyawa dengan spektrometer ^{1}H-NMR menunjukkan adanya proton dari gugus CH=CH orto dengan penampakan *doublet of doublet* (dd) berturut-turut memiliki harga *j* sebesar 8.5 Hz dan 8.1 Hz dengan pergereran kimia berada dalam kisaran 6.5 ppm dan 7 ppm. Gugus CH=CH orto degan penampakan *doublet of doublet of doublet* (ddd) berturut-turut memiliki harga *j* sebesar 8.4 Hz dan 9 Hz dengan pergeseran kimia berada pada kisaran 7.2 ppm hingga 7.4 ppm. Gugus metoksi (-OCH_3) terdeteksi pada pergeseran kimia 3.8 ppm. Hasil analisis menunjukkan bahwa senyawa flavonoid yang didapatkan adalah 4-Hidroksi-7-Metoksiflavan.

Kata Kunci: *Crinum amabile* Donn., teknik kromatografi, 4-Hidroksi-7-Metoksiflavan

CHAPTER I
INTRODUCTION

A. Research Background

Natural products (NPs) has been widely used throughout the world for thousands of years to treat human diseases. The NPs are complex mixtures of hundreds of chemical constituents and as a result is difficult to evaluate and identify the active components that may be responsible for their efficacy (Fu, Yanwei *et al*. 2019). The NPs and its chemistries understanding led approaches and analyses in purifications, characterization, structure determination, functions, interrelational chemical and metabolic dynamics as well as vigorously diversified characteristics and pharmacology based usage and roles led to streamlining of the advancements in the farther understanding and contributions to the discipline which is seeing an unprecedented growth in terms of knowledge of the more complex products and their implications in understanding and unraveling the superior analytical, bioengineering and medicinal uses (Khan, 2018).

Atun (2014) stated that the development of natural product research has progressed more rapidly with the discovery of chromatographic separation techniques and spectroscopic molecular structure determination in the mid 20th century. By using this method, several structures of bioative compounds have been found, for example the discovery of alkaloids such as vinblacin and vincristine from *Catharanthus roseus* plants as a cancer drug or the discovery of taxol from the *Taxhus brevifolia* plants as a drug of uterine cancer. This prompted pharmaceutical companies to explore the bioactive compounds from plants as a lead compound for the discovery of new drugs. Nowadays, more than 30% drug reagents on the market are the natural products compound. Thus, there will be more new drugs that come from nature, both from plants and animals or organisms.

Crinum plants are one of the interesting types of plants used as an object in natural products research. The genus *Crinum* belongs to the *Amaryllidaceae* family and comprises approximately 160 species distributed throughout the tropics and warm temperate regions of the world, mainly in Asia, Australia, Africa and America. The *Crinum* genus have commercial, economical and medicinal importance. Hybridization of *Crinum* plants is widespread. Besides its popularity as an ornamental garden plant with beautiful blossoms, the plant attracts considerable attention due to various medicinal properties as antitumor, immunostimulating, analgesic, antiviral, antibacterial, and antifungal. Several species are cultivated as ornamentals and for medical purposes. The plant has been used in the folk medicine of many countries (Tram, Nguyen Thi Ngoc *et al.* 2002).

Crinum as a type of plant that commonly used in the medical sector has many chemical constituents which are spread from the bulbs, stem, leaves and flowers. Based on the review of the pharmacology of *Crinum* species, this genus has yielded more than 170 different compounds, most of which are alkaloids (Fennell, 2001). Refaat (2013) had reviewed, non-alkaloidal constituents contain in *Crinum* plants. The non-alkaloidal constituents contain in *Crinum* are flavonoids, chromones, coumarins, ionones, sterols, triterpenes, hydrocarbons, alcohols, aldehydes, ketones, esters, ethers, and carbohydrates, and the most common compound found in non-alkaloidal groups are flavonoids. Zuhra (2008) stated that flavonoids are part of phenolic or polyphenolic compounds that function as antioxidants. Flavonoids can reduce the free radicals and act as anti-free radicals. Whereas, Asih (2009) stated that isoflavones in flavonoid groups can be used as anti-cancer by inhibiting the growth of cancer cells.

One of the *Crinum* species which is possible to contain flavonoid compounds is *Crinum amabile* Donn., the flower of the family of *Amaryllidaceae* and has the common name as Giant Spider Lily. It has dark green strap like leaves may be more than 3 feet long

by 4 inches wide. The flowers are shaped like tubes that flair opens into a crown of narrow petals. The petals are white with a pink longitudinal stripe on the underside. Red and pink fragrant flowers sit atop a succulent, cylindrical flower stalk that is 1 to 3 feet tall with a 6 inch long floral tube bears 6 petals and sepals, and rosy stamens from the throat of this tube. This flower has many functions as a drug in medical use. Tram *et al*. (2002) said that in the Vietnamese folk medicine, *Crinum amabile* Donn. was used as an emetic, rheumatism and earache. Besides that, the pharmacological effects are efficacious as neutralizing toxins (antidotes), worm medicine (antalminitic), stimulates the boils, eliminates swelling (antiswelling), and relieves pain (analgesics).

Crinum amabile Donn. flowers or known as *Plub Plueng* in Thailand are usually used for the Thailand's annual Loy Krathong festival in November. Considering the application of this plant in medical sector, the research is carried out to isolate the flavonoids contained in this plant. This is a cooperative research conducted with Assoc. Prof. Dr. Kanda Panthong who has extracted Thai's *Crinum amabile* Donn. leaves. This research work on the isolation process of these extract to get the pure compound of flavonoids as a natural product on it that can be used for medical drugs. The process is carried out using chromatography techniques and the compound characterized with Nuclear Magnetic Resonance (NMR).

B. Scopes

The scopes of this research are,

1. The extract used in this research came from the leaves of *Crinum amabile* Donn.
2. PL-3-F18 and PL-3-F19 were the CH_2Cl_2 extract used in this research
3. Instrumentations used in this research were column chromatography, thin layer chromatography (TLC), preparative-thin layer chromatography (P-TLC), and nuclear magnetic resonance (NMR)

C. Objectives

The objectives of this research are,

1. Separate the flavonoid compounds from *Crinum amabile* Donn. leaves
2. Determine the kind of flavonoid compound on the *Crinum amabile* Donn. leaves and predict its structure elucidation

CHAPTER V
CONCLUSION AND RECOMMENDATION

A. Conclusion

Based on the research that has been conducted, it can be concluded that,

1. The method that can be used to seperate the flavonoid compounds from *Crinum amabile* Donn. leaves is chromatographic techniques such as column chromatography, thin layer chromatography, and preparative thin layer chromatography.
2. Based on the NMR analysis, 10 types of proton hydrogen were found in this compound and 1 methoxy group and that is correlated to 4-Hydroxy-7-methoxyflavan

B. Recommendation

Based on the development of research related to natural products, the author suggest that further research can be carried out to test the bioactivity of 4-Hydroxy-7-methoxyflavan, so in the few years from now it can be applied in the medical world.

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