1st International Conference on Tropical Studies and Its Application (ICTROPS)

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Foreword from the Chairman of Organizing Committee

The International Conference on Tropical Studies and Its Application (ICTROPS) annual conference in November 9, 2017, is organized by Universitas Mulawarman in collaboration with Islamic Development Bank (IDB) and Ministry of Research, Technology, and Higher Education of The Republic of Indonesia. ICTROPS 2017 offers generous opportunities for renowned researchers and Industries across the globe to share ideas and knowledge especially in the area of Tropical Studies. The conference also aims to exchange information and networking among researchers and industries, in particular the member of the 4 in 1 consortium (Universitas Mulawarman, Universitas Sultan Ageng Tirtayasa, Universitas Jember and Universitas Negeri Malang).

ICTROPS 2017 with a theme "Tropical Studies and Application for Better Life" covers all key areas in Germ Plasm (Diversity), Ecosystem and Environmental Engineering, Ecological Integrity and Environmental Issue, Biodiversity Mapping, Natural and Basic Science in Tropical Studies, Biomaterial, Biotechnology and Renewable Energy, and Forestry.

For ICTROPS 2017, we received a large number of abstracts and there are 126 accepted abstracts for 103 oral presentations and 22 poster presentations. After peer review process, 68 papers were selected for publication in IOP conference series: Earth and Environmental Science.

On behalf of the organizing committee, I would like to thank all the reviewers for the effort, time and expertise in reviewing the papers to ensure the high quality and standard of peer-reviewed papers. Lastly, we also like to greatly thank all of the proceeding team for their hard work and constant dedication in preparing the proceeding through a long time process.

Dr. Rahmat Gunawan, M.Si
Chair of Organizing Committe

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Opening Ceremony of ICTROPS 2017

All participants of ICTROPS 2017

First Keynote Speaker: Prof. Alan L. Chaffee (Monash University, Australia)

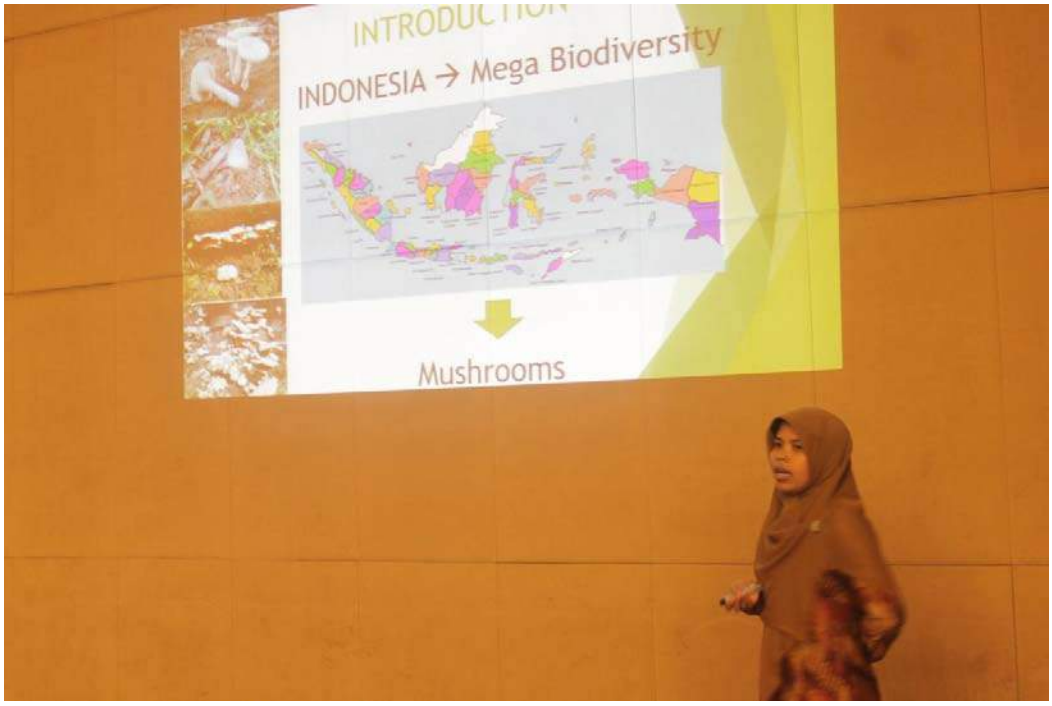
Second Keynote Speaker: Dr. Thi My Lien Do (Saigon University, Vietnam)

Conference gift from the Vice Rector IV of Universitas Mulawarman to Dr. Thi My Lien Do

Awards for the best oral and poster presentation

Plenary session

All invited speakers and the representatives of the member of the 4 in 1 consortium (Universitas Mulawarman, Universitas Sultan Ageng Tirtayasa, Universitas Jember and Universitas Negeri Malang)



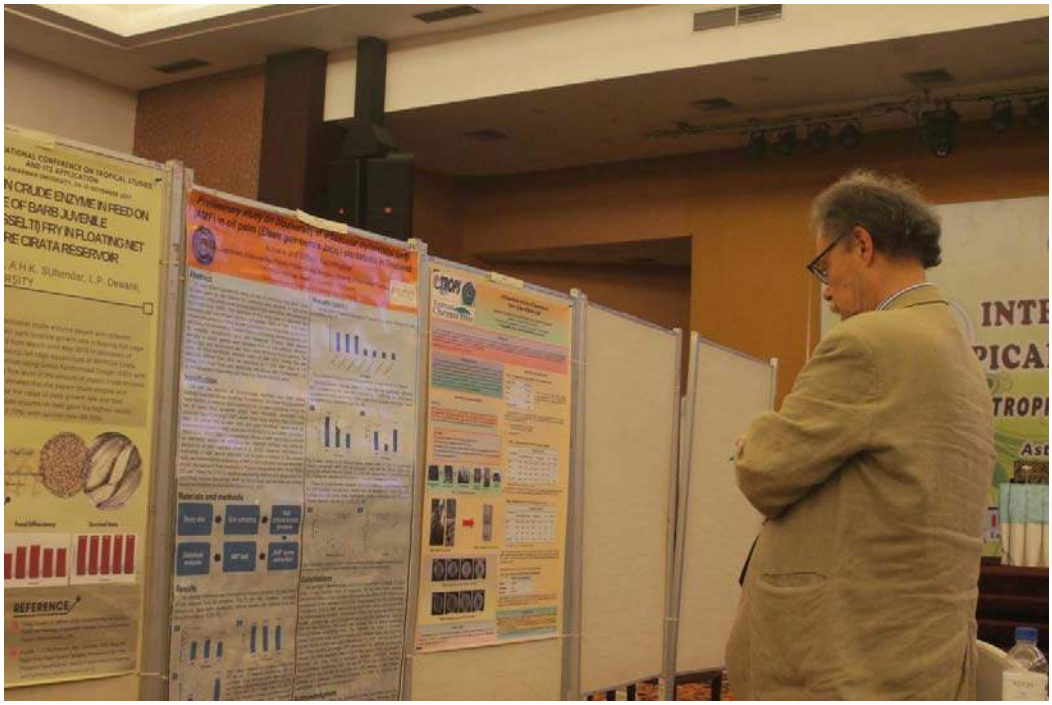
Parallel Session: Room 1

Parallel Session: Room 2

Parallel Session: Room 3

Parallel Session: Room 4

Judging process for the best poster (1)



Judging process for the best poster (2)

The organizing committee of ICTROPS 2017

Traditional dance for the closing ceremony

Supporting Agencies

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SUPPORTING AGENCIES

Peer review statement

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Peer review statement

All papers published in this volume of *IOP Conference Series: Earth and Environmental Science* have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

Membrane stabilization activity as anti-inflammatory mechanisms of *Vernonia amygdalina* leaves extracts

Membrane stabilization activity as anti-inflammatory mechanisms of *Vernonia amygdalina* leaves extracts

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Abstract. Inflammation is a normal process in the human body as a response to injury from healing process. Meanwhile, chronic inflammation will cause new health problems to patients. Anti-inflammatory agents generally used for those conditions, have several side effects to patients. The aim of this research was to find alternative anti-inflammatory agents, especially from natural sources.*Vernonia amygdalina* knew locally as "daun afrika" belong to family *Apiaceae* is one of those potential natural sources for alternative anti-inflammatory agents. This plant is known astraditionalmedicine from East Kalimantanfor health problems caused by the muscle stiffness and used as material in this research. The experimental method of anti-inflammatory measurement using membrane stabilization activity for *V. amygdalina* leaves extracts. The results showed that significant differences of EC_{50}($p<0.05$)achieved between indomethacin as the positive control (26.39 ± 2.91 µg/mL) with *V. amygdalina* leaves extracts for concentration 1% (131.81 ± 2.95 µg/mL) and 10% (62.54 ± 2.05 µg/mL). EC_{50} of *V.amygdalina* leaves extracts showed the potential anti-inflammatory activities. It could be concluded that *V. amygdalina* leaves extracts to have anti-inflammatory activities, which could be further developed as a new natural source of the anti-inflammatory agents.

1. Introduction

Inflammation is a physiological process in the body in response to a lesion on the body, such as onwork-related fatigue. Acute inflammation can be triggered by various stimuli and characterized by a rapid response of hosts to the site of infection or trauma tissue, i.e. delivery of leukocytes and plasma proteins such as antibodies, to the site of inflammation. Chronic inflammation may progress after acute inflammatory processes, which last for several weeks, months and even years [1].

During an acute and chronic inflammatory process, a number of chemical mediators released. A large number of inflammatory mediators released via arachidonic acid pathways, including prostaglandins, as a result of the breakdown of arachidonic acid by cyclooxygenase enzymes. Although this process is a physiological process in the body, if this process is excessive, it will appear adverse impact on patients. Anti-inflammatory drugs used to overcome this process, with a number of side effects related to the use of these drugs. Some of the most prominent side effects of using anti-inflammatory drugs are side effects on the gastrointestinal system that increase the risk of gastric ulcers; as well as the cardiovascular system that increases the risk of blood vessel occlusion due to

blood clots. This is what makes incessant efforts to find alternative anti-inflammatory drugs, especially those derived from natural materials [2].

Indonesia is a country famous for its biodiversity including rich medicinal plants, with ethnic and cultural diversity. Each ethnic group has the cultural repertoire. Each ethnic community has local wisdom, including the use of plants for traditional medicine. Knowledge of the use of medicinal plants by indigenous ethnicity is very important for the traditional andmodern medicine because many plant extracts for modern medicine are found through local knowledge approach. Utilization of medicinal plant data from ethnobotany research is an effective way of finding new chemicals used for treatment [3].

One of the medicinal plants suspected of having potential anti-inflammatory activity is *Vernonia amygdalina* Delile. These shrubs included in the *Apiaceae* family. This plant is commonly named as *daun afrika* in Indonesia or bitter leaf in English. A preliminary observation of the use of *V. amygdalina* is that these plants are commonly consumed by wild chimpanzees that look sick and at some later look healthy and do normally again [4]. The traditional use of this drug is for anti-worms, anti-malaria, and constipation [5]. Based on the above, this research intends to see the mechanism of action of anti-inflammatory extract of *V. amygdalina*leaves by using membrane stabilization test.

2. Material and methods

2.1. Medicinal plant sampling

The study conducted in September 2017. Sampling place of medicinal plants conducted in Kutai Kartanegara Regency, East Kalimantan. Processing of medicinal plant samples to the membrane stabilization testconducted at the Research Laboratory, Faculty of Medicine Mulawarman University.The study protocol approved by the Research Ethics Committee on Faculty of Medicine Mulawarman University.

2.2. Medicinal plant extraction

The crushed simplicia was then macerated with ethanol solvent. In this study used absolute ethanol solvent. For extract preparation, one part of the dry powder of the simplicia put into the macerator (weighed in the maceration bottle before insertion of simplicia and recalculated after insertion of simplicia), added 10 parts of the solvent (measuring volume before inserting). Then soaked for 6 hours while stirring occasionally (using an orbital shaker at 20 rpm for 10 minutes) at room temperature, then leave for 18 hours. The filtrate was separated by filtration using Whatman filter paper. The separation process repeated twice with the same type and number of solvents. All thefiltratewascollected, then evaporated withrotavapor vacuum at50°C until the viscous extract obtained. The resulting extract was then further dried by being placed in the desiccator containing blue silica gel inside an oven at50°C temperature. After obtained dry extract, the calculated yield obtained, the percentage of weight (b/b) between yield with powder weight of simplicia used by weighing. Dry extracts stored in refrigerators -20°C before the further test [6].

2.3. Membrane stabilization test

Fresh blood samples were taken with the addition of anticoagulants. The blood samples were centrifuged at room temperature. Supernatants (plasma and leukocytes) are carefully removed, while red blood cells washed with normal saline. The washing and centrifugation process wererepeated up to 5 times until the supernatant is clear. Then the erythrocyte suspension ready for the membrane stabilization test. This test using erythrocyte suspension with indomethacin as the positive control. The mixture consists of a hyposaline solution of sodium chloride, sodium phosphate buffer, erythrocyte suspension, test material (positive control standard and plant extract) and the last mixture added to normal saline. The test material was not added to the blood control, while the control of the drug was not added to the erythrocyte suspension. The solution mixture incubated in a water bath, followed by

centrifugation at room temperature. The discharged hemoglobin is read in the spectrophotometer at a wavelength of 560 nm. Percentage of membrane stability calculated by the following formula:

Membrane Stability = [100 – (Absorbance Treatment – Absorbance Control)] x 100% [7][8].

2.4. Data analysis

Membrane stabilization activity was tabulated in mean ± SD, then calculated the EC_{50} value. Differences to controls analyzed with the ANOVA test and said significant if $p < 0.05$.

3. Results and discussion

Based on Figure 1, the lowest absorbance of *V. amygdalina* 1% was found in dose of 100 mg/ml with its absorbance is 0.383 ± 0.001. Based on Figure 2, the lowest absorbance of *V. amygdalina* 10% was found in dose of 100 mg/mL with its absorbance is 0.190 ± 0.010. Thehalf maximal effective concentration(EC_{50}) value of membrane stabilization activity of *V. amygdalina* 1% is 131.81 ± 2.95 mg/mL and 10% 62.54 ± 2.05 mg/mL when compared with indomethacin 26.39 ± 2.99 mg/mL, showsinFigure 3.

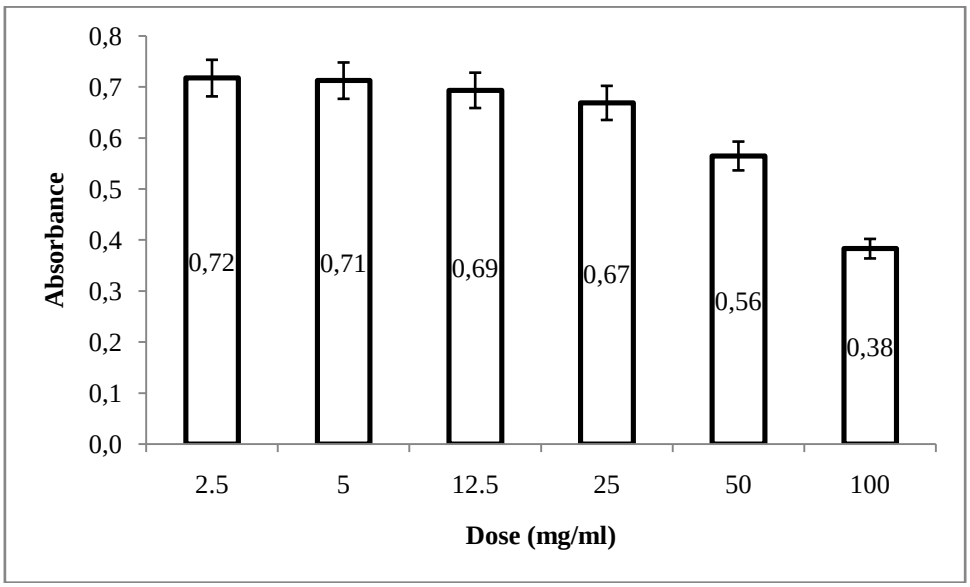

Figure 1. Absorbance of*V. amygdalina* 1% in different concentration

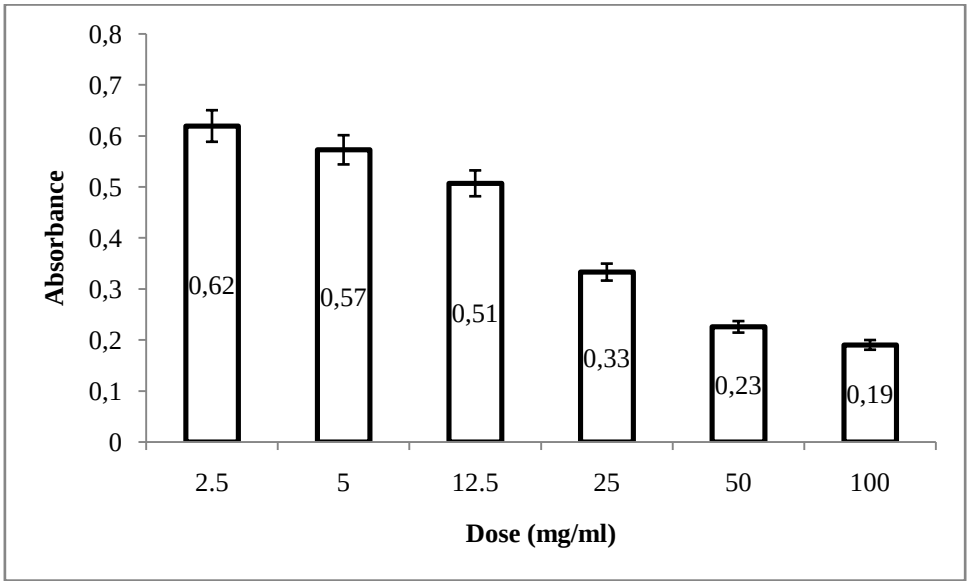

Figure 2. Absorbance of*V. amygdalina* 10% in different concentration

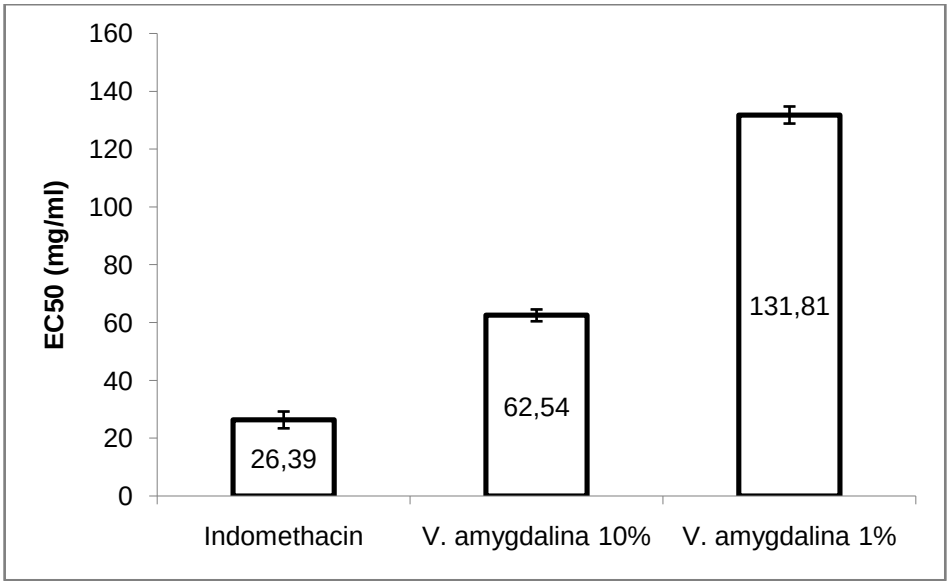

Figure 3. Differences of EC_{50} results in membrane stabilization test between *V. amygdalina*1%, 10%, and indomethacin as positive control (ANOVA p=0.000)

The smaller of EC_{50}value the better the anti-inflammatory activity as membrane stabilization. The results showed that indomethacin as a positive control had better anti-inflammatory activity than *V. amygdalina* on membrane stabilization activity. This suggests that membrane stabilization activity is a possible mechanism of action for the anti-inflammatory activity of *V. amygdalina*.

This plant synonym is*Bracheilema paniculatum* R.Br., *Cacalia amygdalina* Kuntze, *Cheliusia abyssinica* Sch.Bip.ex A.Rich., *Decaneurum amygdalinum* DC., *Vernonia adenosticta* Fenzl exWalp., *Vernonia eritreana* Klatt, *Vernonia giorgii* De Wild., *Vernonia randii* S.Moore, *Vernonia* Benth., and *Vernonia weisseana* Muschl.This plant can grow as high as 2-5 m in the tropics, has a hard stem with a blackish color, and leaves are oval-shaped green with a distinctive odor and bitter taste. The active components of *V. amygdalina* are saponins, alkaloids, terpenes, steroids, coumarins, flavonoids, phenolic acids, lignans, xanthones, anthraquinones, edotid and sesquiterpenes [9]. The biological activity of *V. amygdalina* that showas antibacterial, antifungal, antiparasitic, antimalarial, antiviral,

pesticides, antimutagenic, anticancer, anticoagulant, antioxidant, antidiabetic and hypolipidemic effects [10].

There have been studies that have demonstrated central and peripheral analgesic effects of *V. amygdalina*extract, by testing of experimental animals with formalin test and induced writhing assay [11]. Other studies have also found that *V. amygdalina* extract is capable of inhibiting rat paw edema induced by carrageenan and xylene-induced rat ear edema. The study showed that *V. amygdalina* extract had in vivo anti-inflammatory activity [12].

Throughout the researcher's knowledge, this is the first study to investigate the *in vitro*anti-inflammatory activity of *V. amygdalina* leaves extracts, using membrane stability test. The mechanism of *V. amygdalina* leaves extracts as an anti-inflammatory agent suspected through the flavonoid content. An important mechanism for anti-inflammatory activity is inhibition of enzymes that produce eicosanoid, including A2 phospholipase, cyclooxygenase, and lipoxygenase, thereby lowering prostanoid and leukotriene concentrations. Other mechanisms included inhibition of histamine release, phosphodiesterase, protein kinase and transcriptase activation [13].

4. Conclusion

The results of this study show the anti-inflammatory activity of *V. amygdalina* through membrane stabilization mechanism. Further research needed to allow *V. amygdalina* developed as a new anti-inflammatory agent based on medicinal plants.

Acknowledgement

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