ISBN: 978-602-0860-13-8

# Proceedings of 3rd International Wildlife Symposium

## October 18-20, 2016

*"Conserving Sumatran Wildlife Heritage for Sustainable Livelihood"*

Institute for Research and Community Service
University of Lampung

# 3rd INTERNATIONAL WILDLIFE SYMPOSIUM

*"Conserving Sumatran Wildlife Heritage for Sustainable Livelihood"*

# PROCEEDING

**ISBN: 978-602-0860-13-8**

**Organized by:**

**RESEARCH AND DEVELOPMENT CENTER OF ENVIRONMENT**
**INSTITUTE FOR RESEARCH AND COMMUNITY SERVICE**
**UNIVERSITY OF LAMPUNG**
**2016**

**PROCEEDING IWS 2016**

Person in charge:

**Warsono, Ph.D.**

Steering Committee:

**Dr. Hartoyo, M.Si.**

Organizing Commettee:

**Dr. Erdi Suroso, M.T.A.**

Editors:
Dr. Endang Nurcahyani, M.Si.
Dr. Ir. Sumaryo Gs, M.Si.

Published by:
Research and Development Center of Environment
Institute for Research and Community Service
University of Lampung
Jl. Sumantri Brojonegoro No. 1, Bandar Lampung 35145
Phone: +62-721-705173, Fax. +621-721-773798
E-mail: lppm@kpa.unila.ac.id

ISBN: 978-602-0860-13-8

## WELCOMING SPEECH FROM CHAIR PERSON OF THE ORGANIZING COMMITTEE

Distinguished guests,

- Minister of Environment and Forestry Republic of Indonesia, Dr. Siti Nurbaya or representing,
- Rector University of Lampung, Prof. Dr. Ir. Hasriadi Mat Akin, M.P.
- Honorable Keynote Speaker, Invited Speakers, participants, sponshorships, ladies and gentlemen

Assalamu'alaikum warohmatullohi wabarokatuh.
May God bless all of us.
Tabik pun.

It gives me great pleasure to extend to you all a very warm welcome to the 3rd International Wildlife Symposium (IWS 2016), here in Bandar Lampung.

Ladies and gentlemen, it is gratifying to note that symposium is designed to improve awareness on wildlife conservation and sustainability in order to improve the welfare of society. To increase the consciousness and understanding on the potenstial, economic value, and sustainable management of tropical wildlife through bioengineering application and to strengthen international scientific network of biological and related scientiests to share and exchange progress in various fields of wildlife research.

No matter how much we can do by ourselves on the institutional and national level, it is never enough. International level of collaboration work would be the best answer. Therefore I wish that this event which is attended by distinguished speaker and attendants from Malaysia, India, US, and Indonesia, would be a great opportunity for us to establish scientific collaboration between scientist internationally.

Hereby, on the behalf of Organizing Committee I acknowledge Dr. Siti Nurbaya, Minister of Environment and Forestry Republic of Indonesia or representing, and also to Mrs. Siti Nur Hidayati, Ph.D. (Middle Tennessee State University), as a keynote speaker, and also to the following invited speakers, Dr. Ashley Brooks (WWF Tigers Alive Initiativ), Dr. Barney Long (Global Wildlife Conservation), and drh. Dedi Candra (Way Kambas National Park) for willingness to share their valuable knowledge and scientific information.

To make this symposium happen, I would like to gratefully acknowledge to the valuable contributions from personal and institutional sponshorships including University of Lampung, Doctor Coffee, Aska Jaya, PT. Nestle Indonesia, Levi's Indonesia, and Rumah Kolaborasi (Ru-Ko). In particular, thanks a lot to the World Wide Fund (WWF) for supporting the financing of this symposium.

I would like also to take this opportunity to express my sincere thanks to the Head and Secretary of Research Institution and Community Service University of Lampung, for giving us opportunity and support to organize this symposium. Heartfelt thank is delivered to

steering committee, academic reviewers, organizing committee, for all participation and hard works. All of them have been working since the begining of the planning stage and they are still here today for all of us.

Despite our best efforts, it is inevitable that there is a lack in organizing this symposium and I proudly apologize to all invited speakers, oral and poster presenters, attendants, donators, and committee members.

Finally, I would like to offer my best wishes for a highly enjoyable, succesful, productive and fruitful symposium.

Thank you so much.

**Dr. Erdi Suroso**
Chair Person of the Organizing Committee

## OPENING REMARKS FROM THE HEAD OF RESEARCH INSTITUTION AND COMMUNITY SERVICE, UNIVERSITY OF LAMPUNG

Distinguished guests

- Minister of Environment and Forestry Republic of Indonesia, Dr. Siti Nurbaya or representing,
- Rector University of Lampung, Prof. Dr. Ir. Hasriadi Mat Akin, M.P.
- Honorable Keynote Speaker, Invited Speakers, participants, sponshorships, ladies and gentlemen

Assalamu'alaikum warohmatullohi wabarokatuh.
May God give us health and happiness.
Tabik pun.

It is my great pleasure to welcome all speakers and participants to the 3rd International Wildlife Symposium 2016 (IWS-2016) held in Meeting Room 2nd floor Rektorat University of Lampung, Bandar Lampung, Indonesia. I recognize that this symposium is principally designed to enhance and strengthen the contribution of researchers to the wildlife conservation. The theme of this event is "*Conserving Sumatran Wildlife Heritage for Sustainable Livelihood*". Therefore, I wish that this event will be a great opportunity and wonderfull venue to lay down a cooperative framework and to internationally establish scientific collaboration among scientiests.

Hereby, I appreciatively acknowledge Dr. Siti Nurbaya, Minister of Environment and Forestry Republic of Indonesia, and also to Mrs. Siti Nur Hidayati, Ph.D. (Middle Tennessee State University), as a keynote speaker, and also to the following invited speakers, Dr. Ashley Brooks (WWF Tigers Alive Initiativ), Dr. Barney Long (Global Wildlife Conservation), and drh. Dedi Candra (Way Kambas National Park) for delivering their valuable scientific information.

My appreciation also goes to the Steering Committee, Academic Reviewers, and the Organizing Committee that spend almost their valuable time to review, manage and organize this symposium effectively. I also would like to gretefully acknowledge to the valuable contributions from personal and institutional sponshorship and funding to make this program happen.

Finally, I wish you all best wishes to have meaningfull and useful symposium. Thank you.

Wassalamu'alaikum warohmatullohi wabarokatuh.

**Warsono, Ph.D.**
Head of Research Institutions and Community Service

**KEYNOTE SPEAKER**
**MINISTER OF ENVIRONMENT AND FORESTRY**
**REPUBLIC OF INDONESIA**

**AT 3rd INTERNATIONAL WILDLIFE SYMPOSIUM**
**Bandar Lampung, 18 October 2016**

Distinguished Participants,
Ladies and Gentlemen

**Assalamu'alaikum wr.wb**
**Good morning and May God bless us.**

It is my great honor and pleasure to attend to this event and deliver my speak. Let me express my appreciation to University of Lampung in collaboration with WWF Indonesia for organizing this symposium. Hopefully from this symposium which brings together scientific community and field experts, where we share knowledge, experience and concern, can enhance and synergize our efforts to cope issues in various aspects.

**Ladies and gentlemen,**

Indonesia should be proud to be a country which has rich biodiversity, reported it reaches 47.910 species, that makes Indonesia is well known as mega biodiversity country. At the same time, Indonesia is responsible to promote sustainable use of biodiversity to improve society and country's well-being.

This responsibility will be challenging for Indonesia, considering our country as one of the hot spot of biodiversity loss. The threat mainly coming from habitat loss caused by encroachment, forest fragmentation and forest fires as well as coming from illegal logging, and trade.

Plants and wildlife are one of supporting elements for human life, which their existence hold important and irreplaceable roles. Having that said, I would like to take this opportunity to encourage all of us to protect and conserve the sustainability of wildlife and plants as heritage for the next generation and sustainable livelihood.

**Ladies and gentlemen,**

Strategy and policy of Indonesian Government to secure the biodiversity are directed into three focuses namely protection, preservation and sustainable use of ecosystem, species and genetic resources. National regulation has been enacted, to mention some, including UU 5/ 1990, UU 41/ 1999, UU 32/ 2009, PP 7/ 1999, PP 8/ 1999 as well as strategic and action plan of several endangered and umbrella species such as sumatran tiger, orangutan, rhino, sumatran elephant, javan eagle, tapir, proboscis monkey (*bekantan*), maleo, banteng and babyrousa.

Our global commitment on biodiversity conservation also reflected on ratification of several conventions such as Convention on Biodiversity (CBD) through UU 5/1994, Ramsar through Keppres No 48/1991, UNFCCC through UU No. 6/1994 and protocols such as Kyoto Protocol through UU No. 17/ 2004, Nagoya Protocol through UU 11/ 2013 and Cartagena Protocol through UU 2/ 2014.

We also aware that in this global era, efforts on the conservation of biodiversity always in the spotlight of international attention. Threats on the biodiversity, for example illegal killing of endangered species have and will always be connected with the issues of deforestation and habitat destruction and these will be the entry points for discrediting and black-campaigning against Indonesia, that in turn can be impacted to Indonesia's products in the global market. Thus saving the biodiversity requires active participation from all stakeholders including private sector.

Biodiversity including ecosystem and genetic resources can and should be utilized in a sustainable manner for human welfare such as for source of food, clothes, medicine, water, energy, and oxygen, for controlling climate and disease, ecosystem balance as well as for leisure.

Sustainable use of biodiversity, for example as I mention before for source of food has been a main discussion in many forums. With the growth of human population, it is a must to conduct study and formulate strategy to maintain our natural resources that can be utilized not only for our generation but also for our kids' generation and further. With this regard, Indonesia as mega-biodiversity country plays an important role as source of germplasm which may contain useful substance for human health or important for bioprospecting to increase country's revenue.

To illustrate, global trade on medicinal herbs reach approximately US$ 60 billion/year. While protection of coral to support genetic resources for research on medicine can provide revenue US$ 55-1.110 per ha/year in South East Asia (source: CBD). Indonesia revenue on export from traditional medicine (jamu) reach US$ 113 million, while for domestic reach US$ 100 million (source: BPOM 2007).

**Ladies and gentlemen,**

Despite having all of potency and opportunity, there are also threats and challenges facing our existing biodiversity:

Globally, these includes pressure from human population growth which require demand for land, food, energy and clean water; climate change; and increasing demand of genetic resources for food and energy.

Nationally, these includes illegal logging, forest fire, encroachment, illegal trade, declining of wildlife population, loss of habitat, invasive alien species, as well as low resources capacity and quantity (human and fund) and lack of integrated database.

Hence enormous efforts have been taken by Government Indonesia namely:

a. public awareness and campaign by involving religious leader and other groups for promoting religious and local wisdoms as well as local engagement.
b. to restore and protect the population at local level in their habitat to prevent further damage to the population.
c. Strengthen coordination among government institutions and networking with CSO's.

Currently Ministry of Environment and Forestry Indonesia with relevant law enforcement institutions (Police, General Attorney, Financial Transaction Reports and Analysis Center, and Financial Services Authority) have commitment to support "multi door law enforcement". By implementing multi door law enforcement initiative including applying of

corruption and money laundry act in line with environmental, conservation and forestry act is expected that it could strengthen deterrent effects.

**Ladies and gentlemen,**

As we are all aware, illegal activity related to environmental and forestry including wildlife illegal trafficking is now even more sophisticated, organized and transnational crime, which involves a large network of actors that make up its own chain. We cannot stop it alone. Therefore collaborative among relevant actor/ stakeholder is badly needed to tackle these issues in effectively.

We believe that global collaboration through bilateral, regional and multilateral cooperation can increase the effectiveness in combating illegal activities such as wildlife trafficking. Hence, Indonesia has involved in global collaboration such as:

a. Bilateral cooperation with Vietnam and USA
b. Regional cooperation in the framework of the ASEAN-WEN (Wildlife Enforcement Network)
c. London Conference, Kasane Conference, The Hague Conference on wildlife
d. Multilteral Cooperation: Interpol, CITES, Global Wildlife Programme
e. We also have cooperation with International and National NGO concern in combating wildlife crime, such WWF, WCS, etc.

In this moment, I would also inform that we are in the progress renewing our conservation act in order to increase effectiveness of conservation efforts including wildlife law enforcement.

**Distinguish ladies and gentlemen,**

To develop strategy on biodiversity conservation and sustainable use require strong research and scientific evidence which will be needed to convince government agency and related stakeholder to be aware and act on the right approach. Thus, active participation of scientific community in communicating their knowledge should be appreciated and facilitated such as through this event.

To conclude, the efforts for the conservation of biodiversity required the involvement of us all, not just the governmental institutions only, but also private sectors, NGOs, civil societies and scientific community. I sincerely hope that this symposium can provide a media for us all to share knowledge, experience and concern, and to synergize all efforts.

***Wasalamualaikum Warahmatullohi Wabarohkatuh***

Bandar Lampung, 18 October 2016

Minister of Environment and Forestry,

**Dr. Siti Nurbaya**

# LIST OF CONTENTS

# THE COMPARISON OF TOXICITY PURIFIED ISOLATE OF WATER AND METHANOL EXTRACTS OF PAWDER LEAF *GLIRICIDIA MACULATA* ON MORTALITY SOURSOP MEALYBUG *PSEUDOCOCCUS CRYPTUS*

**Fahrul Aksah[1], Nismah Nukmal[2,3] and Emantis Rosa[2]**

[1]) Biology Magister Student [2]) Biology Department, [3]) Coresponding Author
e-mail: nismah.nukmal@fmipa.unila.ac.id

**ABSTRACT**

Soursop production in Indonesia continues to decline from year to year. One cause is the mealybug pest (*Pseudococcus cryptus*). The white lice suck the young fruits soursop to dry and stunted. To control the pest, using botanical insecticides more safety than synthetic insecticides. One of the plants that can be used is *Gliricidia maculata*. The leaves of *G. maculata* contain planty of an active compound flavonoid. The purpose of the study to compare the toxicity of the purified isolates of water and methanol extracts of *G. maculata* leaves on mortality soursop mealybugs (*P.cryptus*). Extraction was done by maceration series using various organic solvents (n-hexane, dichloromethane, methanol and water). Fractionation and purification of flavonoids from polar extracts were done by Chromatography Coloum. A set of laboratory experiment was conducted by using block design. Water and Methanol extracs (WE and ME) with 5 levels concentration i.e. 0%, 0.02%, 0.04%, 0.06% and 0.08%, and 3 replications. ANOVA was conducted to obtain the means and standarrd deviations of the experimental study, and Tukey's test at $\alpha = 5\%$ was peformed in order to obtain the different among the expelimental groups. Analisys Probit were used for compare the efectivities the exstracts. The result indicated the was toxic to mealybug pest (P. cryptus) with LC50 72 hours water extract 0,061% and metanol extract 0,096%. Therefore water extract more toxic than metanol extract.

Keywords : extract water , methanol , powder leaves (*G.maculata*) , soursop mealybug (*P.cryptus*)

## 1. INTRODUCTION

Soursop plant is one of the agricultural commodities. Soursop production in Indonesia has declined to 15% from the previous year (Agricultural Statistics 2009). One reason is that pests and diseases in plants soursop fruit. One of the pests that cause a decline in the production of soursop is mealybug (*Pseudococcus cryptus*). The existence of mealybugs can reduce the production of soursop fruit up to 58% (Ivakdalam, 2010).

To overcome the mealybug pest attacks on crops soursop typically used synthetic insecticides. The use of synthetic insecticides are not appropriate and for a long time will bring bad effects. That requires insecticide safer and environmentally friendly, such as using vegetable insecticides derived from plants (Prijono, 2005; Siswanto and Karmawati, 2012). One of the plants that can be used as an insecticide plant are the leaves of Gliricidia (*Gliricidia maculata* Hbr.). Gliricidia leaves has coumarin active ingredients that are insecticides, rodenticides and bactericidal (Manglayang Farm, 2006).

The purpose of this study was to determine the comparative toxicity of water extract and isolate pure methanol extract of leaves of Gliricidia against mealybugs on soursop.

## 2. RESEARCH METHODS

### Tools and Materials

The tools used machetes and treasure, Disk Mill machine, scales, jars, gauze pads. Materials used in this research that plant leaves Gamal and mealybugs (P. cryptus). The tools used are glass jars, filter Bunchner, Freezedrayer, TLC (Thin Layer Chromatography), electric heating, capillary pipette, digital cameras stationery. N-hexane, dichloromethane (DCM), and methanol with a brand J.T Beker, distilled water. AmberliteXAD KK-4, Plat TLC (thin layer chromatography),. TLC Reagent SbCl3

Section, AlCl3, and CeSo4, aluminum foil, Erlenmeyer flask, test tubes, spatulas, analytical balance, oven, beaker, beakers, pipettes, funnels, filter paper, and hot plate.

**The course of study**

Materials prepared for bioassay ie 1x pistil soursop fruit as much as 30 pieces measuring 2-3 cm and are free of pests. Preparation for the bioassay ie plastic cups and containers to soak test medium. Gauze to cover plastic cups. Brush and a pin to move and put the test insects in the test medium. Extracts used to bioassay that extracts polar (water and methanol) Gliricidia leaf powder, sucking insects soursop fruit (*P. cryptus*) adult stage females who are already acclimatized for 1 day prior to treatment, soursop fruit as a test medium.

Gliricidia leaves that have been dried for milled using Disk Mill machine to a powder and wrapped in plastic, solvents Hexana, DCM, methanol and water.

Gliricidia leaf powder extract water maceration results that show the deposition of amorphous form is filtered with filters Buncher, in order to separate the sediment (EA) and the filtrate (FA) it. Furthermore EA drayer freeze dried. Pasta obtained do bioassay against mealybug pest. The filtrate (FA) was purified by fractionation by column chromatography method using KK-AmberliteXAD-4 and isolated slope (gradient elution). Fractions were collected based on volume. Each fraction was tested content of flavonoids by TLC method and positive fractions containing flavonoids will do bioassay against mealybug pest.

The methanol extract of dried Gliricidia leaves contain lots of chlorophyll, chlorophyll with a method to separate column chromatography (CC) using silica and isocratic. The filtrate methanol been cleared of chlorophyll (FM) direfraksikan using the method of using the column AmberliteXAD KK-4. Fractions were collected based on the volume and content of each fraction was analyzed using the method of flavonoids thin layer chromatography (TLC). The fraction of the isolated flavonoid-rich test keserangga tested pest mealybugs (P. cryptus) in plants soursop. The selected active fraction is the fraction rich in flavonoids with a low amount of matrix and provide a high activity against test insects.

Each compound found on the fractionation stages of bioassays performed against pest infestation white female adult stage and the test medium used was pistil soursop. This is done to screen for compounds active insecticide. Bioassays were carried out is the test of mortality with residual effect (residual effect).

Residue testing conducted by soaking soursop with 5 degree of concentration that is (0%, 0.05%, 0.010%, 0.015% and 0.020%) for 10 minutes, 10 heads mealybugs (*P. cryptus*) female adults who had been acclimatized for 1 days before treatment is placed on the pistil of soursop fruit that has been soaked with gliricidia leaf extract and maintained in test containers. Observations of insect mortality trial conducted at 12, 24, 48 and 72 hours after treatment. These trials were conducted each with 3 replications.

## 3. RESULTS AND DISCUSSION

A. Extraction Methanol Extracts Water And Leaf Extract Gamal

Results maceration storey of 500 grams of powdered leaves of Gliricidia, obtained methanol extract as much as 6 liters. The evaporated 6 liters of extract obtained 80 grams of crude extract. Results frezdrayer 80 grams of crude extract, obtained 23 grams of extract in the form of pasta. Results freezdrayer 500 ml of water extract obtained 6 grams of water extract, the rest of which is not in frezdryer stored in the refrigerator.

Test the water extract of crude extract and methanol extract of leaves of Gliricidia $LC_{50}$ value obtained for 0.034% water extracts and methanol crude extract of 0.025%. The $LC_{50}$ value is used as the determination of the concentration on testing water and methanol extract of leaves of Gliricidia against mealybug pest death.

a. Purification of the crude extract water (hydrolysis)

Hydrolysis of 2.5 grams of water extract obtained precipitate (EA) in crystalline form as much as 1 gram and filtrate (FA) in the form of the aqueous phase as much as 35 ml of yellowish and phase as much as 15 ml of ethyl acetate brownish (Figure 1).

**a** **b** **c**

Figure 1. Results of hydrolysis of water extract: a. aerobic phase. ethyl acetate phase, c. crystal water phase

Hydrolysis extract water to the water phase test TLC, the TLC plate looks are still many spots on the chromatogram indicates there are still many other compounds. Crystals to the water phase TLC test was done and the result is only one spot on the chromatogram and obvious, it is expected that the compound is already used as a pure and bioassays on mealybugs (P.cryptus) on soursop plant.

b. Purification of the crude extract methanol (fractionation)

Fractionation results obtained as much as 1 gram of methanol extract using KK Amberlite XAD-4 obtained 29 fractions. The same visual merged into one in order to obtain 6 fractions. The test results obtained TLC 6 fraction 1 fraction (19) is thought to be a pure compound content of flavonoids (Figure 2).

fractions 19

The test results purity done by monitoring by TLC with eluent same that DCM: methanol (4: 1), the plate TLC seen the content of flavonoid compounds in extracts of pure methanol and pure extract of leaf water gamal shown their patches of yellow and brown on TLC plate (chromatograms) after being sprayed visualization CeSo4, AlCl3, NaOH and H3BO3 (Figure 3).

The test results show only a fraction of the 19 flavonoids continued to test the purity by TLC, the results of purity testing that has been done is obtained in the form of chromatogram shows a single spot. These results indicate that the isolate is relatively pure in TLC (Suteja et al, 2016).

From the testing that has been done can be seen that the methanol extract and water Gliricidia leaves can be used as a vegetable insecticides to control pests on crops soursop mealybugs because they contain secondary metabolic compounds. Seen from RF Value (Retention Factor) of methanol extract and water extract of leaves of Gliricidia (Table 1).

Rf value of flavonoid compounds in the extract water is higher than the value of the methanol extract of leaves of Gliricidia RF (Table 1). This shows the polar extract more water from the methanol extract is seen that the yellow spots on the methanol extract thicker than the water extract caused during the process of hydrolysis do not break the glucoside flavonoid glycoside compounds. Water

extracts and methanol extract showed almost identical Rf values in any comparison with the 4 visualization reagent, it indicates that the compound is a compound identified. According to Khopkar, (1990), the value of RF indicates the identification of a substance that is sought.

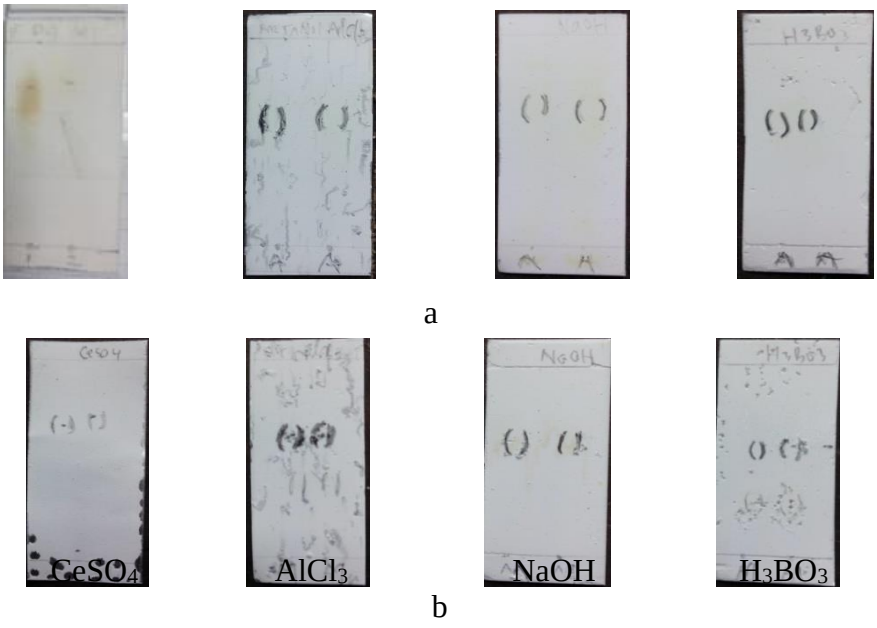


Figure 3. TLC chromatogram analysis results of water extracts (a) and the methanol extract (b) Gliricidia leaves with visualization CeSO4 solvent, AlCl3, NaOH, H3BO3.

Table 1. Values of RF on the analysis of secondary metabolites (flavonoids) with TLC methods methanol extract and water extract of leaves of Gliricidia with a developer solution DCM: methanol (4: 1)

| visualization reagent | RF Extract Pure water | RF Pure Methanol |
|---|---|---|
| $CeSO_4$ | 0,87 | 0,82 |
| $AlCl_3$ | 0,80 | 0,80 |
| NaOH | 0,80 | 0,75 |
| $H_3BO_3$ | 0,75 | 0,70 |

c. Mortality Hama White Lice treated with water and methanol Leaf Extract Gamal

The percentage of deaths mealybug pests on crops treated with methanol extract of soursop leaves of Gliricidia can be seen in Figure 4.

In Figure 4 and 5 seen from the death of mealybugs (*P. cryptus*) on soursop plant extract with water occurs at 12 hours of treatment reaches 6.66%, while the methanol extract of 3.33% at a concentration of 0.02%. At the methanol extract at a concentration of 0.04% at 12 hours and 24 hours have not experienced death, so also the water extract at a concentration of 0.06% and 0.08% at 12 hours. This is presumably because at 12 hours and 24 hours has not happened death in white lice because the insecticide has not been taken into the body mealybug is very little that has not been damage organs mealybugs, but in the next hours as at 24 hours, 48 hours, and 72 hour at each concentration there have been many deaths (Figure 4 and 5).

Death of test insects is increasing along with the increase of time and concentration of observation, the higher the concentration of extract used, the percentage of deaths caused also higher due to the longer time and high concentrations into the body test insects it will cause a lot of damage to the body mealybug.

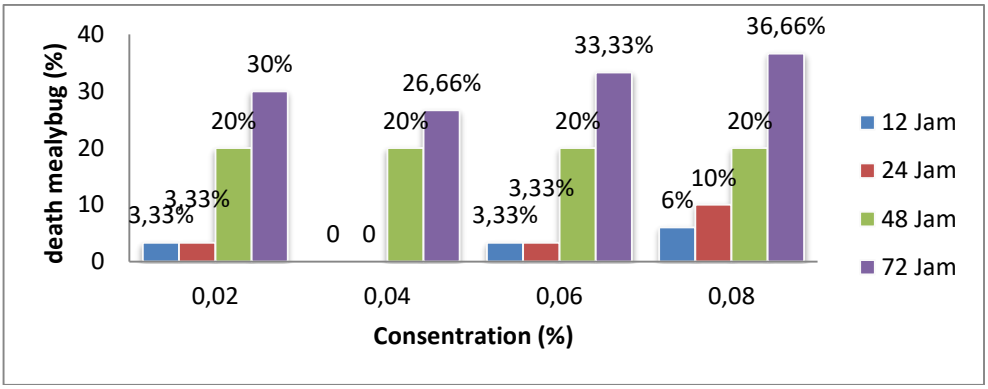


Figure 4. Percentage of deaths pest mealybugs (P.cryptus) on soursop plant (A.muricata) treatment of the methanol extract of leaves of Gliricidia at concentrations and at different times.

The percentage of deaths mealybug pest with Gliricidia leaves water extract treatment can be seen in Figure 5.

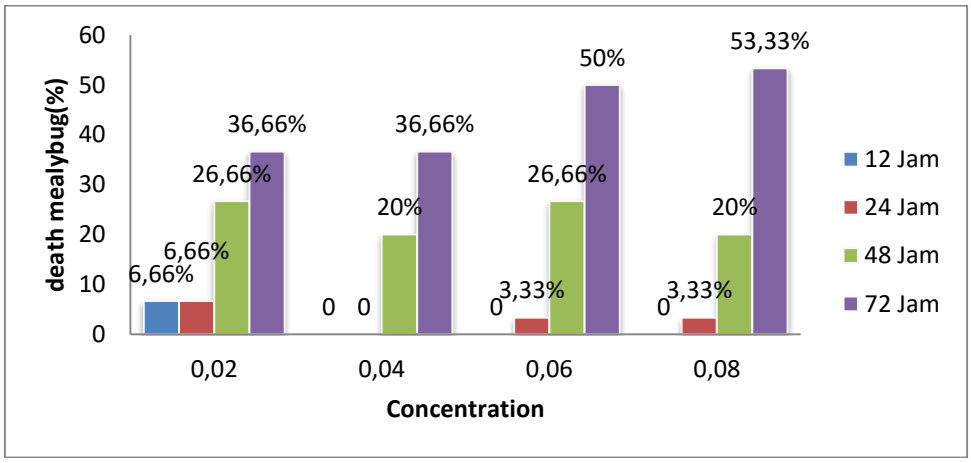


Figure 5. Percentage of deaths pest mealybugs (P.cryptus) on soursop plant (A.muricata) Gliricidia leaves water extract treatment at different concentrations and time.

The methanol extract and water extract of leaves of Gliricidia began to kill insects after 12 hours of treatment and at each treatment results of different test insect mortality. Water extract more lethal test insects between 10% - 20% compared with the methanol extract of leaves of Gliricidia (Figure 4 and 5).

Death mealybug treated water extract 16.67% higher than the methanol extract at 72 hours (Figure 15 and 16), it is suspected the existence of the resistance mechanism in plants soursop mealybug mealybugs due to be taken from a field while testing is done on a laboratory scale, Insect resistance to insecticides can be defined as the development of the ability of strains of insects to tolerate doses of poison that can kill most of the individuals in the normal population in the same species.

Results of analysis of variance showed a significant difference between treatments. Concentration of observation time, and the interaction of concentration and time, showed a significant difference ($P < 0.001$). While the average mortality mealybug when seen from a comparison between the extract, the extract concentration and, between the concentration, time and the extract was not significantly different ($P = .0,030 - 0,753$).

The results of Tukey's test at $\alpha$ level of 5% of the average death mealybug pests are treated extracts of methanol and water extract of leaves of Gliricidia at 72 hours after treatment can be seen in Table 3.

Table 3. Average mortality mealybug (*P.cryptus*) on soursop plant (*A.muricata*) (tail ± SD) after treatment with the methanol extract and water extract of leaves of Gliricidia.

| Concentration (%) | The average mortality mealybug (tail) ± SD% | |
|---|---|---|
| | Extract metanol | Extract water |
| 0,00 | 0,00±0,000 a | 0,00±0,000 a |
| 0,02 | 3,00±1,000 b | 3,66±0,577 b |
| 0,04 | 2,66±0,557 b | 4,66±1,115 b |
| 0,06 | 3,66±2,082 b | 5,00±1,732 b |
| 0,08 | 3,33±0,577 b | 5,33±1,528 b |

Description: The average value followed by the same letter are not significantly different line on the level of α = 5% by HSD test

Table 4. Average mortality mealybug (P.cryptus) on soursop plant (A.muricata) (tail ± SD) after treatment with the methanol extract and water extract of leaves of Gliricidia at a concentration of 0.08%.

| Hours (time) | The average mortality mealybug (tail) ± SD% | |
|---|---|---|
| | Extract metanol | Extract water |
| 12 | 0,66±0,577 a | 0,00±0,000 a |
| 24 | 1,00±1,000 a | 0,33±0,577 a |
| 48 | 2,00±1,000 b | 2,00±0,000 b |
| 72 | 3,33±0,577 c | 5,33±1,527 c |

Description: The average value followed by the same small letter in the column are significantly different at the level of α = 5% by HSD test

Water extracts and methanol extract at a concentration of 0.02%, 0.04%, 0.06% and 0.08% showed no significantly different results against the average death mealybugs but significantly different from the concentration of 0.00% (Table 3). Tukey's test results showed that the methanol extract and water ekstak not significantly different in the deadly mealybug. When viewed from different concentrations and time after treatment at the level of α = 5% was significantly different, it is suspected that a very small time difference. While both extracts significantly different when seen from the time difference. This is presumably the higher the concentration, the more toxins that enter the body that damage mealybug.

Death mealybugs were treated with an extract of water and methanol at 12 hours after treatment was not significantly different at 24 hours after treatment but significantly different with 48 and 72 hours after treatment. It shows that the effect on the time of death mealybug, the longer observation time after the treatment the higher the death rate mealybug.

Comparison of the average mortality mealybug between water extracts and methanol extract at all concentrations and at different observation showed no significant differences. This is presumably because the water extracts and methanol extract were treated against mealybugs have the same concentration between the extract.

Tukey's test results showed that the methanol extract and extract water in the deadly mealybug significantly different at the level of α = 5% at a concentration of 0.08%. It can be seen the number of deaths on mealybugs on plants soursop, in other words, a pure extract water more effectively kill pests mealybug than pure methanol extract (Table 4).

LC50 and LT50 Values probit analysis result of pure methanol extract and pure extract water can be seen in Table 5 and Table 6.

Based on the LC50 value, the average death mealybug pest with menggunakann extracts more water than the methanol extract of leaves of Gliricidia. Seen from the water extract LC50 lower than methanol extract of leaves of Gliricidia. LC50 value of the pure extract water is lower than 0.035% pure methanol extract. whereas LC50 at 12,24 and 48 hours have not detected due to the death of white pest infestation on plants soursop has not reached 50% (Table 5).

Table 5. The value LC50 probit analysis result of pure methanol extract and pure extract water Gliricidia leaves 12-72 hours after treatment.

| Hours after treatment | Value $LC_{50}$ (%) | | |
|---|---|---|---|
| | Extract metanol | Extract water | Difference (%) |
| 12 hours | ** | ** | ** |
| 24 hours | ** | ** | ** |
| 48 hours | ** | ** | ** |
| 72 hours | 0,096 | 0,061 | 0,035 |

** Note: You can not be detected due to the death of mealybug is less than 50%

LC50 values below 5% concentration showed that the extract pure water more effectively kill pests on plants mealybugs soursop compared to pure methanol extract. If the vegetable insecticides kill insects by organic solvents with concentrations <5%, it is said to be effective (Prijono, 2005).

Table 6. Value LT50 probit analysis result of pure methanol extract and pure extract of leaves of Gliricidia water at different concentrations.

| Concretation (%) | Value$LT_{50}$ (hours) | | |
|---|---|---|---|
| | Extract Metanol | Extract Water | Difference (%) |
| 0,00 | ** | ** | ** |
| 0,02 | 91,288 | 84,912 | 6,376 |
| 0,04 | 86,406 | 71,887 | 14,519 |
| 0,06 | 83,210 | 69,411 | 13,799 |
| 0,08 | 95,876 | 69,296 | 26,58 |

Extract the water faster kill mealybug pests compared to the methanol extract of leaves of Gliricidia, as seen in the LT50 values at various concentrations (Table 6).

Based on the value of water extract lower LT50 26.58 hours of pure methanol extract, meaning that the power to kill time faster than the water extract of the methanol extract (Table 6). Based on the LC50 and LT50 values results of tests performed, extract pure water and pure methanol extract can be used as an insecticide can kill pests of vegetable and mealybugs on plants soursop. LC50 and LT50 values (Table 6 and Table 7) water extract is more effective than the methanol extract of leaves of Gliricidia.

## 4. CONCLUSION

Gliricidia leaves extract water more effectively kill pests on plants mealybugs soursop than methanol extract of leaves Gamal. The higher the concentration and the longer the time the more the higher the death mealybug.

## REFERENCES

Direktorat Jendral Hortikultura. 2011. Peningkatan produksi, produktivitas, dan mutu produk tanaman buah berkelanjutan.
http://www.google.co.id/url?sa=t&rct=j&qNilai+ekonomi+tanaman+buah.pdf. diakses 27 November 2015

Ivakdalam LM. 2010. Dampak ekonomi serangan hama asing invasif *Paracoccus marginatus* (Hemiptera: Pseudococcidae) pada usahatani pepaya di kabupaten Bogor [*Tesis]*. Bogor (ID): Sekolah Pascasarjana, Institut Pertanian Bogor.

Manglayang Farm. 2006. *Hijauan Pakan Ternak.* http://manglayang.blogsome.com/2006/03/06/hijau-pakan -ternak-gamal-gliricidia/ . Diakses pada tanggal 18 Desember 2015.pukul 10.50 WIB.

Nukmal, N, N.Utami, dan Suprapto. 2010. *Skrining Potensi Daun Gamal (Gliricidia maculata Hbr.) Sebagai Insektisida Nabati*. Laporan Penelitian Hibah Strategi Unila. Universitas Lampung.

Nukmal, N., Utami, N., dan Pratami, G.D. 2011. Isolasi Senyawa Flavonoid Dari Ekstrak Air Serbuk Daun Gamal (*Gliricidia maculata*) dan Uji Toksisitasnya Terhadap Hama Kutu Putih Pepaya *(Paracoccus marginatus). Seminar Nasional dan Musyawarah Anggota 2011 Perhimpunan Entimologi Indonesia Cabang Bandung*. Tanggal 16-17 Februari 2011.

Prijono, D. 2005. *Pemanfaatan dan Pengembangan Pestisida Nabati.*Makalah Seminar Ilmiah. Jurusan Proteksi Tanaman Fakultas Pertanian. Universitas Lampung.

Siswanto dan Karmawati, E. 2012. Control Of Cocoa Main Pest (Conomorpoha cramerella And Helopeltis spp.) Using Botanical Pesticide And Biological Agents. Pusat Penelitian dan Pengembangan Perkebunan. *Perspektif* Vol. 11 No. 2. Issn: 1412 - 8004. Hlm 103 - 99. Bogor.

Tarumingkeng, R.C. 2001. *Pengaruh Pestisida Terhadap Kehidupan Organisme Tanah*. http://core.kmi.open.ac.uk/download/pdf/12217742.pdf. diakses tanggal 07 November 2015 pukul 14.35 WIB.

Tarumingkeng, R.C. 1992.*Insektisida; Sifat, Mekanisme Kerja dan Dampak Penggunaannya.* UKRIDA Press. 250p.