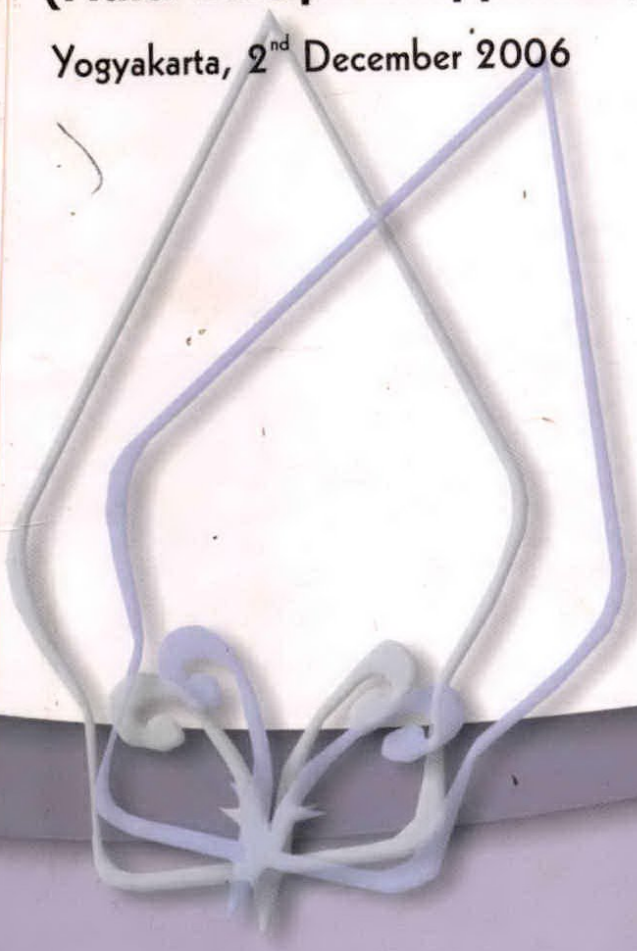


Proceeding

International Joint Seminar

**Muslim Countries and Development :
Achievements, Constraints and Alternative Solutions
(Multi-Discipline Approach)**

Yogyakarta, 2nd December 2006



Organized by:



ISBN 979-3700-10-6

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Universitas
Muhammadiyah
Yogyakarta



International
Islamic
University
Malaysia



Education and
Cultural Attache
Embassy of The Republic
Indonesia in Malaysia

**MESSAGE FROM THE RECTOR OF
UNIVERSITAS MUHAMMADIYAH YOGYAKARTA (UMY)**

Assalamu'alaikum warahmatullahi wabarakatuh

All praise be to Allah SWT, Lord of the world. Peace and blessings on Muhammad SAW, His Servants and Messenger.

First of all, as the rector of Universitas Muhammadiyah Yogyakarta (UMY), I would like to welcome to the honourable guests, Rector, Dean of Postgraduate Studies (CPS), Dean of ISTAC, Dean of IRKHS, Deputy Deans and Head Departments from various Kulliyah, lecturers, postgraduate students of International Islamic University Malaysia (IIUM), and all participants in this joint seminar.

Academic cooperation between UMY and IIUM started several years ago. The cooperation between us is based on a solid foundation; both us are Islamic universities having same missions to develop Islamic society, to prepare future generations of Islamic intellectuals, and to cultivate Islamic civilization. In fact, improving academic quality and strengthening our position as the producers of knowledge and wisdom will offer a meaningful contribution to the development of Islamic civilization. This responsibility is particularly significant especially with the emergence of the information and knowledge society where value adding is mainly generated by the production and the dissemination of knowledge.

Today's joint seminar signifies our attempts to shoulder this responsibility. I am confident to say that this joint program will be a giant step for both of us to open other pathways of cooperation. I am also convinced that through strengthening our collaboration we can learn from each other and continue learning, as far as I am concerned, is a valuable ingredient to develop our universities.

I sincerely wish you good luck and success in joining this program

Wassalamu'alaikum Wr, Wb.

Dr. Khoiruddin Bashori

Rector, UMY

**MESSAGE FROM THE RECTOR OF
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA (IIUM)**

Assalamu'alaikum warahmatullahi wabarakatuh

In the name of Allah, the most Gracious and the most Merciful. Peace and blessings be upon our Prophet Muhammad (S.A.W).

First and foremost, I felt honoured, on behalf of the university to be warmly welcomed and to be given the opportunity to work hand in hand, organizing a respectable conference. Indeed, this is a great achievement towards a warmer bilateral tie between the International Islamic University Malaysia (IIUM) and Universitas Muhammadiyah Yogyakarta (UMY) after the MoU Phase.

I would also like to express my heartfelt thanks to Centre for Postgraduate Studies (CPS), Postgraduate Students Society (PGSS), contributors, paper presenters, participants and our Indonesian counterpart for making this program a prestigious event of the year.

This educational and cultural visit is not only an avenue to foster good relationship between organizations and individuals and to learn as much from one another but a step forward in promoting quality graduates who practices their ability outdoor and master his or her studies through first hand experience. The Islamic platform inculcated throughout the educational system namely the Islamization of knowledge, both theoretical and practical, will add value to our graduates. This comprehensive excellent we strived for must always be encouraged through conferences, seminars and intellectual-based activities in line with our lullaby: The journey of a thousand miles begin by a single step, the vision of centuries ahead must start from now.

My utmost support is with you always. Looking forward to a fruitful meeting.

Ma'assalamah

Wassalamu'alaikum Wr, Wb.

Prof. Dato' Dr. Syed Arabi Iddid

Rector, IIUM

**MESSAGE FROM EDUCATION AND CULTURAL ATTACHE
EMBASSY OF THE REPUBLIC OF INDONESIA
KUALA LUMPUR**

Assalamu 'alaikum warahmatullahi wabarakatuh

All praise be to Allah SWT. This is the moment where implementation of MoU between Universitas Muhammadiyah Yogyakarta (UMY) and International Islamic University Malaysia (IIUM) comes in the form of action by organizing this Joint Seminar. The efforts of both sides to implement the MoU are highly appreciated, especially, in the context of which both universities effort to enhance the quality of education.

Substantially, I believe that this Joint Seminar will bring many benefits. In term of the development of knowledge, it is a means for developing academic quality, for exchanging of information on academic development, as well as for constructing intellectual atmosphere at both universities. In term of international relations, both universities have taken part in increasing close relationship between Malaysia and Indonesia. RUM and UNY as well are using 'soft power' to increase bilateral relations among citizens which brings a lot of benefits for both nations.

Therefore, I hope that both RUM and UMY can make use of this program as a 'kick-off' for other programs in the future, especially in using UMY's vast networks with other Muhammadiyah Universities in various cities in Indonesia as well as IIUM's network. The support of IIUM for UMY also means a progress for IIUM and UMY. I hope such joint program will continue in future for betterment of both Indonesia and Malaysia. Embassy of the Republic of Indonesia in Kuala Lumpur will always support these efforts.

To our honorable guests, Rector, Dean of Postgraduate Studies (CPS), Dean of ISTAC, Dean of IRKHS, Deputy Deans and Head Departments from various Kulliyah, lecturers and students of IIUM, I warmly welcome you to Yogyakarta. I hope you enjoy your stay in the cultural city of Yogyakarta.

Finally, as the Attache of Education and Cultural, Embassy of the Republic of Indonesia, Kuala Lumpur, I sincerely wish you good luck *and a successful program with unforgettable memories.*

*Wabillahit Taufiq Wal Hidayah
Wassalamu 'alaikum warahmatullahi wabarakatuh.*

M.Imran Hanafi

Education and Cultural Attache, Embassy of the Republic of Indonesia

MESSAGE FROM DEAN CENTRE FOR POSTGRADUATE STUDIES

Assalamu'alaikum warahmatullahi wabarakatuh

Praise be to Allah. May the peace and blessings of Allah be on the last prophet and messenger, our master Muhammad and on his household and companions. It is a great privilege for me to foreword this message to this wonderful event that is jointly organized by the Universitas Muhammadiyah Yogyakarta (UMY) and International Islamic University (IIUM).

First and foremost I would like to record my special gratitude to management of Universitas Muhammadiyah Yogyakarta for their co-operation.

In order to obtain comprehensive excellence, the Centre for Postgraduate studies has always facilitates postgraduate students of the university to achieve the highest quality in their academic work. This seminar is one of the many programs that Centre for postgraduate studies has to ensure quality graduates.

I would therefore like to thank all the participants and programme coordinators who have worked hard to realize this event.

May Allah SWT shower His blessing upon us.

Wassalamu'alaikum Wr, Wb.

Prof. Dato' Dr. Wan Rafei Abdul Rahman
Dean, Centre For Postgraduate Studies

**MESSAGE FROM THE ACTIVE
PRESIDENT OF POSTGRADUATE STUDENTS'**

Assalamu'alaikum warahmatullahi wabarakatuh

On behalf of Postgraduate Students' Society (PGSS), my gratitude and appreciation to our beloved Dean of Studies, the Embassy of Indonesia in Kuala Lumpur, Muhammadiyah Yogyakarta and the organizing committee of IIUM and the Universitas Muhammadiyah Yogyakarta for their huge success. Postgraduate Students' Society (PGSS) under the supervision of the Center for Postgraduate Studies (CPG) is pleased to host this event.

As I strongly believe that the initial stages of unity are the key to building the new generation, who will represent the future more, such programs, not only achieve the mission of our universities but to achieve the global mission and vision. Therefore, I believe today, we have to have understanding and then only we can appreciate our diverse cultures and acknowledge the different strengths and weaknesses through knowledge in this age of information. I am sure this joint seminar will initiate unity among the future leaders along with integrating them.

Thank you,

Mohd Nabi Habibi

Active President Postgraduate Students' Society (PGSS)

MESSAGE FROM PROGRAM DIRECTOR

Assalamu'alaikum warahmatullahi wabarakatuh.

Praise be to Allah. May the peace and blessings of Allah be on the last Prophet and Messenger, our master Muhammad and on his household and companions.

Honestly speaking, we are pleased to be trusted by Postgraduate Students' Society (PGSS) and Centre for Postgraduate Studies (CPS) to organize the programme named Educational and Cultural Visit to Yogyakarta, Indonesia. For this, We express our gratitude to the management of both PGSS and CPS. This programme is of immense value. It has the potentials to promote intellectual endeavor, develop leadership capabilities and enrich cross-cultural understandings. We sincerely believe and hope that program of this kind will be organized in a regular fashion in future.

It is a great privilege for us to play twofold role in organizing this event: *as a host* and *as guest*. In fact, this is a fascinating experience to manage this event. Since our inception here, we have found meaningful interaction of students in an interweaving of cultures into complicated, yet beautiful, embroidery of social fabric. We are proud to say that this dearly loved university has produced graduates of high quality, who are distinct from those of the local universities.

Finally, we wish to express our special thanks to Bapak M.Imran Hanafi, Education and Cultural Attache of Indonesian Embassy, Bapak Herdaus, S.H., Assistant of Immigration Attache of Indonesian Embassy, Bapak Tharian Taharuddin for their immensely valuable assistance and co-operation in making this program a success. I sincerely appreciate all local committees at Yogyakarta, the colleagues and program coordinators and committee members who worked diligently to materialize this event. We wish to pass on good wishes to the PGSS for their valuable efforts it expended for this event.

May Allah s.w.t shower His blessing upon us.

Wassalam,

Nasrullah

Programme Director

Todi Kurniawan

Co-Programme Director

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***Moringa Oleifera* Seeds For Use in Water Treatment**

Eman N. Ali*, Suleyman A. Muyibi, Hamzah.M. Salleh,
Mohd Ramlan M. Salleh, Md Zahangir Alam
Bioenvironmental Engineering Research Unit (BERU)
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International Islamic University Malaysia

Abstract

*Developing countries and third world countries (including some Muslim countries) are facing potable water supply problems because of inadequate financial resources. The cost of water treatment is increasing and the quality of river water is not stable due to suspended and colloidal particle load caused by land development and high storm runoff during the rainy seasons especially in a country like Malaysia. During the rainy seasons the turbidity level increases and the need for water treatment chemicals increase as well, which leads to high cost of treatment which the water treatment companies cannot sustain. As a result, the drinking water that reaches the consumer is not properly treated. Therefore, it is of great importance to find a natural alternative for water coagulant to treat the high turbidity. It has been found that *Moringa oleifera* is the best natural coagulant discovered yet, that can replace aluminium sulphate which is used widely all around the world. This study is focusing on *Moringa oleifera* seeds to find the active constituents which are responsible about the coagulation mechanism and improving the coagulation property. This will help in producing this alternative locally as *Moringa oleifera* is grown in Malaysia and can be of great benefit for the country.*

Keywords: *Moringa oleifera*; water treatment; natural coagulant; river water; alternatives; Turbidity; bioactive constituents.

Introduction

Water supply is a basic need required for living creatures and human being specifically. In this world the amount of resources available to living creatures are limited. About 75% of the present world population lives in the developing countries of the world. About 1.2 billion people still lack safe drinking water and more than 6 million children die from diarrhea in developing countries every year. However, it is untenable and unbelievable under all situations that waterborne diseases still kill on the average 25,000 people every day in developing countries while millions suffer the debilitating effects of these diseases (Kalbamatten & Burns, 1983). Safe drinking water is essential to the health and welfare of a community and water from all sources must have some form of purification before consumption. Various methods are used to make water safe and attractive to the consumer. The method employed depends on the character of the raw water. One of the problems with treatment of surface water is the large seasonal variation in turbidity (McConnachie, G.L, et al 1999).

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Current operational procedures at many treatment works in developing countries are based on arbitrary guidelines, particularly in relation to the dosage of chemicals. Besides that, there is also the problem of inadequate number of skilled workers and inadequate laboratory facilities to monitor process performances required to operate the plants (Muyibi, S. A. (1998).

Coagulation-flocculation followed by sedimentation, filtration and disinfection, often by chlorine, is used worldwide in the water treatment industry before distribution of treated water to consumers (Ndabigengesere, A. and Narasiah, K. S. 1998).

Many coagulants are widely used in conventional water treatment processes for potable water production. These coagulants can be classified into inorganic coagulant, synthetic organic polymer, and naturally occurring coagulant. Synthetic polyelectrolytes are used as primary coagulant as well as coagulant aid to improve the strength of particle aggregates, enhance coagulation and deposition (filtration) (Muyibi, S. A., et al 2001).

Naturally occurring coagulants are usually presumed safe for human health while there is a fear by using aluminum salts that may induce Alzheimer's disease (Martyn *et al.*, 1989). Some studies on natural coagulants have been carried out and various natural coagulants were produced or extracted from microorganisms, animals or plants (Ganjidoust, H., et al 1997; Kawamura, S. 1991; Lee, S.H., et al 1995).

Recently, however, there has been a resurgence of interest in natural coagulants for water treatment in developing countries (Ndabigengesere, A. and Narasiah, K. S. (1998).

Moringa oleifera is one of the most wide spread plant species that grows quickly at low altitudes in the whole tropical belt, including arid zones. It can grow on medium soils having relatively low humidity (Ndabigengesere, A., et al 1995). *Moringa oleifera* seeds are an organic natural polymer.

Jahn (1984) has presented *Moringa oleifera* as a coagulant after her studies in the Sudan (Jahn, S.A.A. 1984; Jahn, S.A.A. 1988) when she noticed that Sudanese village women used it at home to clear the turbid Nile water. Later, many researchers have reported on the various uses of *Moringa oleifera* seeds as coagulant and coagulant aid in the last 10 years. *Moringa oleifera* coagulant has been found to have high coagulation activity only for high turbidity water. The activity is low for low turbid water (Muyibi, S. A. and Evison L.M. (1995). Therefore, it is important to improve the characteristics of this plant by identifying its bioactive constituents, which has high coagulation activity. This is one of the objectives of this study.

Methodology

1- Materials

Dry *Moringa oleifera* seeds used in this study were collected from gardeners in Serdang area, Selangor Darul Ehsan, Malaysia (Figure 1, 2, shows the tree and pods with seeds). The extraction of oil carried out by electro thermal Soxhlet using hexane. The bioactive constituents were extracted from *Moringa oleifera* using phosphate buffer (0.1M), jar test for measuring coagulation activity, turbidimeter for turbidity measurements, and the river water samples (low, medium, and high turbidity from Sungai Pusu, IIUM) were collected to apply jar test.



Figure 1, *Moringa oleifera* Tree.

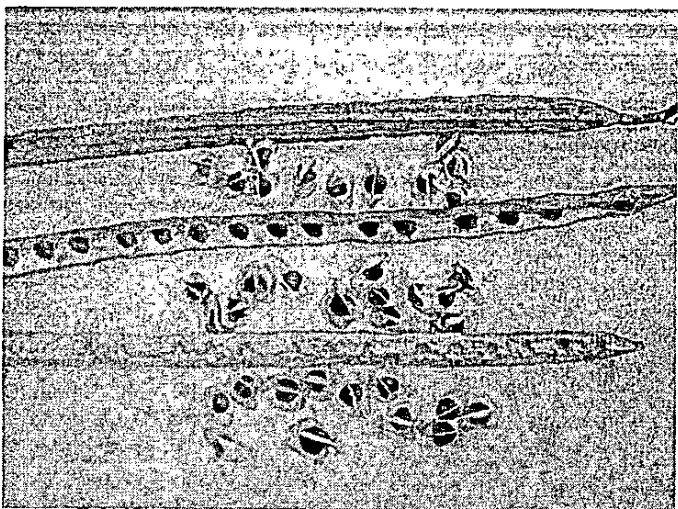


Figure 2, *Moringa oleifera* Pods and Seeds from Serdang, Malaysia.

2- Oil Extraction

The extraction of oil carried out by electro thermal Soxhlet using hexane. The oil percentage was 35% w/w. The dried cake was used in this study while the oil kept for other research work.

3- Extraction of bioactive constituents

Weighing of 10gm of *Moringa oleifera* cake, adding of 100ml of phosphate buffer (0.1M) with pH 7.5, mix with gentle stirring at 4°C for 2hours to extract the bioactive constituents, then centrifuge the contents at 6000 rpm for 30 min, the supernatant was injected to the Ion Exchange column to separate the bioactive constituents.

4- Jar Test

Jar test for measuring coagulation activity, turbidimeter for turbidity measurements, and the river water samples (low, medium, and high turbidity from Sungai Pusu, IIUM) were used to apply jar test. The turbidity for river water samples were 43.9, 91, and 333 for low, medium and high turbidity, respectively.

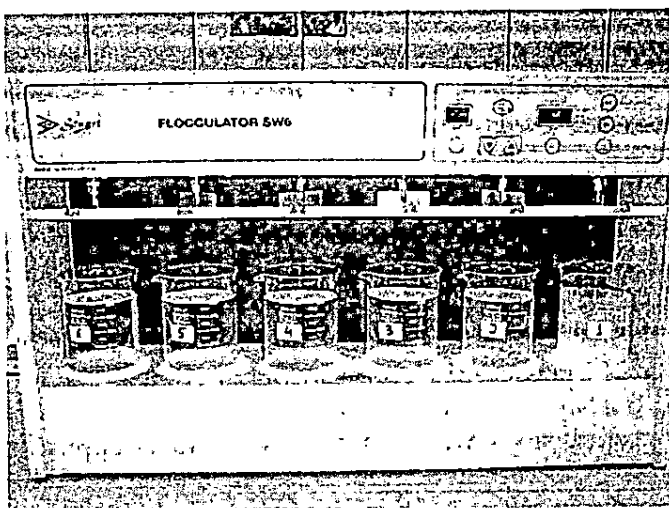


Figure 3, Jar test for high turbidity river water.

Results and Discussion

The processed *Moringa oleifera* was improved by isolation of bioactive constituents from the seeds as a coagulant/flocculant which gave turbidity removal of 95.5%, 98.5%, and 99.3% for the treatment of river water with low, medium and high turbidity, respectively. The results showed that the dosage of coagulant to be added was decreased which means decreasing of sludge volume produced (one of the main problems with using aluminum salts and need to be treated with more chemicals).

The residual turbidity for all samples was lower than 5NTU, which is the standard set by WHO for drinking water.

Table 1, Jar test results

Initial turbidity NTU	Dosage of processed <i>Moringa oleifera</i> (mg/l)	Residual turbidity NTU	Turbidity removal %
Low (43.9)	0.05	1.99	95.5
Medium (91)	0.15	1.40	98.5
High (333)	0.30	2.20	99.3

Conclusion

Moringa oleifera can be used as a natural coagulant/flocculants alternative to the aluminum and other metallic salts.

Acknowledgment

The authors are grateful to the Ministry of Science Technology and Innovation. Project (IRPA 09-02-08-10002 EAR).

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