

Conference Program & Extended Abstract

The Natural Pigments Conference for South-East Asia
In Conjunction with: LCMS WORKSHOP from SHIMADZU

RESEARCH AND DEVELOPMENT

OF PIGMENT-BASED INNOVATION AND TECHNOLOGY

22-23 AUGUST 2016

The Core R&D Center, Universitas Ma Chung

Malang, East Java, Indonesia

Organized by:



SHIMADZU
Excellence in Science

Partners:



Supported by:



DAAD
Deutscher Akademischer Austausch Dienst



PT DITEK JAYA
Analytical & Measuring Instruments



np-sea.machung.ac.id

PREFACE

Opening Remark from The Chairman of The 3th-NPSEA

Dear researchers and friends,

On behalf of the organizing committee, I would like to give you a warm welcome in the 3rd Natural Pigments Conference for South-East Asia (NP-SEA) 2016.

Natural pigments are the most obvious and eye-catching substances that can be found in flowers, leaves, bird feather, algae, photosynthetic bacteria, and many more. These pigments have been used as bountiful colorants for food, cosmetics, and textiles and very close connected to the culture of South-East Asia. If we look closely, pigments such as chlorophylls and carotenoids play importance role as key pigments, which capture radiant of energy from the Sun in the process called photosynthesis – a process that convert solar energy into fuels. In agriculture, the natural pigments are important photosensors and indicators for health status. There are many applications that have been revealed through the study of structure and function of natural pigments.

We are looking forward of your active participation during the Natural Pigment Conference for South-East Asia to present your works, to raise questions, and triggers discussion on the recent research and development of pigment-based innovation and technology. We are inviting high profile scientists and practitioner in the industry as the keynote and plenary speakers. We wish that their presence would be a great encouragement and motivation for students and young researchers in the South-East Asia to take part in the research and development of natural pigments.

We are very happy to have 125 participants including the keynote speaker, plenary speakers, invited speakers, poster speakers, students and other participants from Germany, Switzerland, France, US, the Philippines, Singapore, and Indonesia. In this event, we would like to extend our acknowledgement to our partners, who support us financially, i.e. Kemenristekdikti, DAAD, ITS Scientific as well as PT Ditek Jaya and Shimadzu (Asia Pacific) Pte Ltd. We thanks to the Indonesian Society Pigment Researchers (Himpunan Peneliti Pigmen Indonesia, HP2I) for cooperation as steering committee, the Indonesia Pharmacist Association (Ikatan Apoteker Indonesia, IAI) for certifying this event with 6 credit points, the Indonesian Chemical Society (Himpunan Kimia Indonesia, HKI) and Indonesian-German Network (IGN) for disseminating this event to their members. We thanks also to Universitas Ma Chung for having this venue with superb facilities and supports from the staffs.

I do hope that you will find your time here enjoyable and a source of many insights that will help to advance the understanding of natural pigments and to encourage the collaborations and friendship, scientific exchange, the development of joint interests and project that are of scientific and economic importance in order to exploit the natural pigments and their importance in the most aspect of living, e.g. food and health, fashion, agriculture and advanced technologies.

Thank you very much and please enjoy this event.

Yours sincerely,

Tatas H.P. Brotosudarmo, Dipl.Chem., Ph.D

Chair of the NP-SEA 2016

Opening Remark from The Rector of Universitas Ma Chung

Dear Friends, participants of the Natural Pigments Conference for South East Asia 2016.

Welcome to Universitas Ma Chung, welcome to Malang, a beautiful city in Indonesia. We are happy that natural pigments experts from several countries, Indonesia, German, Switzerland, USA, France, the Philippines and Singapore gathered together here to share their knowledge and research results. We hold the NP Conference South East Asia this year in Universitas Ma Chung, Malang. It is not by chance that the international conference is holding here, because Universitas Ma Chung has an expertise in Natural Pigments which is institutionally embodied as Ma Chung Research Center for Photosynthetic Pigments (MRCPP). MRCPP is not only supported by Universitas Ma Chung but also by Indonesian government by recognizing MRCPP as one of the national scientific center of excellence.

Indonesia is one of the countries with a rich biodiversity, and consequently rich of natural pigments source. However, natural pigments industry in Indonesia and South East Asia is still lag behind the developed countries, whereas it is expected that the demands of natural pigments in various industries will increasing in the future. Therefore the research on natural pigments is one of the important research field. Indonesian government is also promoting the dissemination of research results to be applied in industry, not only finish in scientific publication.

Many kind of natural pigments in Indonesia and their properties are still unknown, they are remains to be investigated to provide benefit for human welfare. The international research cooperation in natural pigments will accelerate the rate of discovery and innovation in applying the knowledge for human welfare. Therefore, this conference is an important conference not only for the pigments research society but also for other research field and industry.

Besides the conference I hope the participants can also enjoy the natural beauty of Malang and its historic heritage.

I hope you enjoy staying in Malang, obtain a great benefit from the conference, and develop cooperation framework with other conference participants.

I wish to thank the speakers, poster presenters, students, and other attenders for attending the conference also partners who supported the conference.

Malang, August 18, 2016

Rector of Universitas Ma Chung

CONTENTS

Preface	1
Opening Remark from The Chairman of The 3 th -NPSEA	2
Opening Remark from The Rector of Universitas Ma Chung	3
Content	5
Organizing Committee	7
Scientific Program	11
General Schedule	12
Schedule of Oral Presentation	14
Schedule of Poster Presentation	16
Extended Abstracts of Keynote & Plenary Speaker	19
Extended Abstracts of Oral Presentation	29
Extended Abstracts of Poster Presentation	75
List of Workshop Participants	131

International Scientific Committee

1. Ferry F. Karwur, Ph.D. (Satya Wacana Christian University, Indonesia)
2. Prof. Dr. Hideki Hashimoto (Kwansei Gakuin University, Japan)
3. Prof. Dr. Hugo Scheer (Ludwig Maximilians University, Germany)
4. Leenawaty Limantara, M.Sc., Ph.D. (Universitas Pembangunan Jaya, Indonesia)
5. Prof. Dr. Ocky Karna Radjasa (Diponegoro University, Indonesia)
6. Tatas H.P. Brotosudarmo, Dipl.Chem., Ph.D. (Universitas Ma Chung, Indonesia)
7. Prof. Dr. Yuzo Shioi (Universitas Ma Chung, Indonesia)

Organizing Committee

- | | |
|---|--|
| 1. Chairman | : Tatas H. P. Brotosudarmo, Ph.D. |
| 2. Secretary | : Selvia Septa Rani
: Katarina Purnomo Salim, S.Gz., M.P.
: S. Alfisyah Nur Aziza, S.Si. |
| 3. Treasurer | : Rosita Dwi Chandra, S.TP., M.FoodSt(Adv)
: Amelia Myristi Lolita, A.Md. |
| 4. Public relation | : Tatas H. P. Brotosudarmo, Ph.D.
: Dr. Yuyun Yuniati, S.T., M.T. |
| 5. Program | : Tatas H. P. Brotosudarmo, Ph.D.
: Monika N. U. Prihastyanti, M.Nat.Sc.
: Novie Maria Setiawati, S.IP. |
| 6. Scientific program and poster | : Heriyanto, S.Si., M.Si., M.Sc.
: Dion Notaria, S.Farm., M.Sc., Apt.
: Rehmadata Sitepu, S.Farm., M.Si., Apt. |
| 7. Accommodation, equipment, and transportation | : Teddy Martono Jeremia, S.E.
: Marcelinus Alfasisurya Setya Adhiwibawa, S.P.
: Gigih Devy Rosalinda, S.IP. |

The 3rd Natural Pigment Conference for South-East Asia (NP-SEA) Secretariat Office
Ma Chung Research Center for Photosynthetic Pigments (MRCPP)
Universitas Ma Chung, Villa Puncak Tidar N01, Malang 65151 East Java, INDONESIA
Tel./Fax +62 341 550 171/175, E-mail: mrcpp@machung.ac.id

8. Documentation and publication : Marcelinus Alfasisurya Setya Adhiwibawa, S.P.
: Evan Hutomo Eka Putra, S.Kom.
: Dwi Endra Krisna
9. Food and beverages : Renny Indrawati, S.TP., M.Nat.Sc.
: Dr. Yuyun Yuniati, S.T., M.T.
10. Usher : Zuri Rismiarti, S.Si., M.Si.
: Martanty Aditya, M.Farm-Klin., Apt
11. Proofreader : Prof. Dr. Yuzo Shioi
: Prof. Eugenius Sadtono, Ph.D.

SCIENTIFIC PROGRAM

GENERAL SCHEDULE

THE 3RD NATURAL PIGMENTS CONFERENCE FOR SOUTH-EAST ASIA (NP-SEA) 2016

August 22, R&D Center Universitas Ma Chung

Monday, August 22, 2014		
The 3rd Natural Pigments Conference for South-East Asia (NP-SEA) 2016		
Time	Program	Room
07:00 – 08:00	Registration	R&D Center 1 st floor
08:00 – 08:10	Opening Remark by Conference Chairman by Tatas H. P. Brotosudarmo, Ph.D.	R&D Center Hall 6 th floor
08:10 – 08:45	Keynote Speaker : <i>[Chlorophylls: From Photosynthesis to Photodynamic Therapy]</i> by Prof. Dr. Hugo Scheer (Moderator : Leenawaty Limantara, Ph.D.)	R&D Center Hall 6 th floor
08:45 – 09:10	Plenary Speaker : <i>[Chlorophyll Breakdown During Leaf Senescence: A Novel Role for TIC55 as a Hydroxylase of Phyllobilins, the Products of Chlorophyll Breakdown]</i> by Prof. Stefan Hörtensteiner (Moderator : Leenawaty Limantara, Ph.D.)	R&D Center Hall 6 th floor
09:10 – 09:35	Plenary Speaker : <i>[The Untapped Richness of Pigment-producing Marine Organisms and Their Associates]</i> by Prof. Ocky Karna Radjasa (Moderator : Leenawaty Limantara, Ph.D.)	R&D Center Hall 6 th floor
09:35 – 10:00	Plenary Speaker : <i>[Marine Fungal Pigments Diversity and Potential Use]</i> by Dr. Kustiariyah Tarman (Moderator : Leenawaty Limantara, Ph.D.)	R&D Center Hall 6 th floor
10:00 – 10:15	Coffee break	R&D Center Hall 4 th floor
10:15 – 10:50	Keynote Speaker : <i>[Potential Market of Pigments in Daily Life: Food, Health and Fashion in Indonesia]</i> by Ir. Thomas Darmawan (Moderator : Ferry F. Karwur, Ph.D.)	R&D Center Hall 6 th floor
10:50 – 11:15	Plenary Speaker : <i>[Review on the Metabolites of Monascus]</i> by Dr. Philippe J. Blanc (Moderator : Ferry F. Karwur, Ph.D.)	R&D Center Hall 6 th floor
11:15 – 11:40	Plenary Speaker : <i>[Nexera UC, New Concept On-pine SFE-SFC-MS: Principles and Applications of SFE-SFC-MS/MS]</i> by Dr. Xing Jie (Moderator : Ferry F. Karwur, Ph.D.)	R&D Center Hall 6 th floor
11:40 – 12:05	Plenary Speaker : by Prof. Sherry A. Tanumihardjo, Ph.D. (Moderator : Ferry F. Karwur, Ph.D.)	R&D Center Hall 6 th floor
12:05 – 13:30	Lunch	R&D Center Hall 4 th floor

Time	Program	Room
13:30 – 14:45	Invited speaker – Session 1	R&D Center 6 th floor (Class A)
		R&D Center 6 th floor (Class B)
14:45 – 15:45	Coffee Break Poster Session	R&D Center Hall 4 th floor
15:45 – 16:45	Invited speaker – Session 2	R&D Center 6 th floor (Class A)
		R&D Center 6 th floor (Class B)
16:45 – 17:15	3 rd NP-SEA Awards for Best Poster and Closing Remark	R&D Center Hall 6 th floor
17:15 – 18:00	Preparation for Gala dinner	-
18:00 – 20:00	Gala dinner	Balai Pertiwi
Tuesday, August 23, 2014		
Shimadzu Advance Liquid Chromatography Mass Spectrometry (LCMS/MS) Technologies and Applications Workshop in Junction with The Natural Pigments Conference for South-East Asia		
Time	Program	Room
07:00 – 8:00	Registration	MRCPP R&D Center Hall 3rd floor
08:00 – 09:00	Session 1 : Introduction of LCMS/MS and Application	
09:00 – 12:00	Session 2 : Technical Workshop (I)	
12:00 – 13:00	Lunch	
13:00 – 16:00	Session 3 : Technical Workshop (II)	
16:00 – 16:15	Closing	

Schedule of Oral Presentation

Oral Presentation – Session 1			
Meeting Hall at 6 th Floor of The R&D Center (Class A)			
Moderator: Dr. Ir. Edia Rahayuningsih, M.S.			
Time	Authors	Title	Code
13:30-13:45	Delianis Pringgenies, Riyanda Idris, Muhammad Zainudin	The Antioxidant Activity of Carotenoid Pigments in the Bacterial Symbionts of Seagrass <i>Syringodium isoetifolium</i>	ON-01
13:45-14:00	Victor Aprilyanto, Andrea Putri Subroto, Chris Darmawan, Reno Tryono, Condro Utomo, and Tony Liwang	In Vitro Selection of single guide RNA for Effective Cleavage of Exon-3 VIRESCENS Gene in Oil Palm Using CRISPR/Cas9 System	ON-02
14:00-14:15	Abdullah Muzi Marpaung, Nuri Andarwulan, Purwiyatno Hariyadi and Didah Nur Faridah	The Color Stability of Butterfly Pea (<i>Clitoria ternatea</i> L.) Petal Extract at pH 6 to 8 are Highly Uncertain	ON-03
14:15-14:30	Mohammad Junus	Algae Cells Density in Various Planting Period and Liquid Sludge Biogas Unit Proportion	ON-04
14:30-14:45	Uun Yanuhar	The Involvement Fragment Pigment Protein (FPP) Microalga <i>Nanochloropsis oculata</i> of Response Heat Shock Protein 70 (HSP70) of Infection Nervous Necrotic Viral (NNV) on Grouper	ON-05
Room at 6 th floor of The R&D Center (Class B)			
Moderator: Prof. Erlinda A. Vasquez			
13:30-13:45	Windu Merdekawati	The Uniqueness of Seaweed Pigments	ON-06
13:45-14:00	Ermiziar, T., Saragih, R., Hanum, L.	Natural Pigment from Red Colour Melinjo Peels	ON-07
14:00-14:15	Pujiyanto, Muhammad Iqbal Prawira Atmadja and Dadan Rohdiana	Theaflavin, Natural Pigment on Black Tea and Its Pharmacological Activities	ON-08
14:15-14:30	Failisnur, Sofyan and Anwar Kasim	Dyeing of Cotton Fabric with Natural Dye from Gambier (<i>Uncaria gambir</i> Roxb.)	ON-09
14:30-14:45	Defri Yona and Park Mi Ok	Seasonal variation of phycoerythrin chromophores of <i>Synechococcus</i> spp. in the East Sea, Korea	ON-10

Oral Presentation – Session 2			
Meeting Hall at 6 th floor of The R&D Center (Class A)			
Moderator: Mr. Victor Aprilyanto			
15:45-16:00	Darda Efendi, H. Muthmainnah, T.S. Arzam, I. H. Sumiasih, R. Poerwanto, and Y.A. Purwanto, A. Agusta, and S. Yuliarni	Degradation of Chlorophyll and formation of β -cryptoxanthin and β -citraurin in Citrus Degreening	ON-11
16:00-16:15	Edia Rahayuningsih	The Sustainable Economic Development through Research, Production, and Application of Natural Dye	ON-12
16:15-16:30	Delicia Yunita Rahman, Dwi Susilaningsih and Marc J.E.C. van der Maarel	Heterotrophic growth of LIPI13-AD014 for Phycocyanin Production	ON-13
16:30-16:45	Muh. Thoyib, Catur Harsito, Suyitno, Syamsul Hadi	Simple Procedure for Reducing Cratering Defect of Water-Based Paint Using <i>Caesalpinia Sappan</i> Dye	ON-14
Room at 6 th floor of The R&D Center (Class B)			
Moderator: Dr. Dadan Rohdiana			
15:45-16:00	Anna Yuliana, Marlia Singgih Wibowo, Elin Julianti	Toxicity Level of Monascus Pigments Using Ecosar Program	ON-15
16:00-16:15	Erlinda A. Vasquez, Candelario L. Calibo, Ronnel M. Godoy and Lady Fatima G. Palermo	Alteration of the Chlorophyll Content in Phytoplasma-Infected Cassava	ON-16
16:15-16:30	Rika Wahyuningtyas & Uun Yanuhar	The Expression of MHC Class 1 in <i>Cyprinus carpio</i> Infected Koi Herpes Virus through Induction of Crude Protein from Macroalgae <i>Halimeda</i> sp	ON-17
16:30-16:45	Mada Triandala Sibero, Kustiariyah Tarman, Rita Sahara	Exploration of Red Pigment from Coastal Endophyte Fungi Isolated from <i>Hydnophytum formicarum</i>	ON-18

Poster Presentation			
Room at 4 th floor of The R&D Center			
14:45 – 15:45			
No	Authors	Title	Code
1	Elfi Anis Saati, Sita Ayu Pangesti, Sri Winarsih and Moch. Wachid	Co-pigmentation Anthocyanins of Rose Pigment (varieties of Batu Local) with Catechin from Black Tea and Green Tea Extracts	PN-01
2	Andreas Lucky Effendy, Rollando	In silico screening study of potent human breast cancer drug from natural pigments	PN-02
3	Antonius Herry Cahyana, Kam Natania and Hong Fu Sheng	Study on Antioxidant Activity, Binding Capacity and Stability of Curcumin-Functionalized Fe ₃ O ₄ Magnetic Nanoparticles	PN-03
4	Ayda Krisnawati and M. Muchlish Adie	Consistency of Biomass Production from Several Soybean Genotypes in Various Agro Ecology of Indonesia	PN-04
5	Diah Mustika Lukitasari, Rosita Dwi Chandra, Heriyanto, Renny Indrawati	Stability and Antioxidant Activity of Microencapsulated Pigment from Red Spinach (<i>Amaranthus tricolor</i>) for Food Colourants	PN-05
6	Elin Julianti, Laida Neti Mulyani, Marlia Singgih Wibowo, Susanti	Comparison Different Extraction method of C-Phycocyanin, a Phycobiliprotein from Dry Biomass of <i>Spirulina platensis</i>	PN-06
7	Ervika Rahayu NH, Dini Ariani, Miftakhussolikah, Maharani P.E., Yudi P	The Effect of Yellow Natural Color from Turmeric on Physical and Sensory Properties of Arenga Starch- <i>Colocasia Esculenta</i> L. Noodle	PN-07
8	Giacinta Mutiara Beta Maharani, Filiana Santoso, and Abdullah Muzi Marpaung	Stability Improvement of Anthocyanin from Various Local Plants using Metal Complexation	PN-08
9	Kam Natania, Antonius Herry Cahyana, Melanie Cornelia dan Edison Sutiyono	Microencapsulation of Soursop (<i>Annona muricata</i> Linn.) Leaf Tea Extract Using Natural Mucilages	PN-09

Poster Presentation			
Room at 4 th floor of The R&D Center 14:45 – 15:45			
No	Authors	Title	Code
10	M. Muchlish Adie and Ayda Krisnawati	Identification and Clustering Soybean Genotypes with High Biomass Production as a Source of Renewable Energy	PN-10
11	Melanie Cornelia and Oktafielia Putri	Application of Goji Berry Fruit (<i>Lycium barbarum</i> L.) extract as Food colorant in Dried Noodle	PN-11
12	Miftakhussolikah, Dini Ariani, Ervika RNH, Azkia Nastiti, Yudi Pranoto	Effect of Additional Suji Leaves and Turmeric Extract on Physicochemical Characteristic and Antioxidant Activity of Arenga-Canna Noodle	PN-12
13	Selfina Gala, Dhaniar Rulandri Widoretno, Delita Kunhermanti, Lailatul Qadariyah, Sumarno and Mahfud	Microwave-assisted Extraction of Natural Dyes from Jackfruit Wood Waste (<i>Artocarpus heterophyllus</i> Lamk)	PN-13
14	Renny Indrawati, Gita, Kristine, Melissa, Yuyun Yuniati, Leenawaty Limantara	How extensive does the artificial dye color our food?	PN-14
15	Swanty Rahmazania Mustika and Abdullah Muzi Marpaung M.P	Color properties and Stabilizing Effect of Metal ion on Blue Anthocyanin Color from Buni (<i>Antidesma bunius</i>) Fruit	PN-15
16	Rosita Dwi Chandra, Renny Indrawati, Mario Sent Anugrah, Jodiawan, Ricky Santoso, Tatas H. P. Brotosudarmo, Leenawaty Limantara	Uncovering the Availability of Products Enriched with Vitamin A in Local Supermarket	PN-16

Poster Presentation			
Room at 4 th floor of The R&D Center			
14:45 – 15:45			
No	Authors	Title	Code
17	Yudi Purnomo, Fajar Audra Pratama, Nur Rohman	Hepatoprotector and Anti-Hemolysis Activity of Tommato (<i>Lycopersicon pimpinellifolium</i>) Juices In Rats Induced Alum	PN-17
18	Endang Kusdiyantini, Iffan Alif, Salma Fuadiyah, Dyah Wulandari, Anto Budiharjo	Identification of Red-Pigmented Thermophile Bacteria Isolated from Gedong Songo Hot Spring, Semarang – Central Jawa	PN-18
19	Setiyono, E., Pringgenies., Heriyanto, Prihastyanti, M.N.U, Shioi, Y., Brotosudarmo, T.H.P	Carotenoid Analysis from <i>Erythrobacter flavus</i> Symbiont of <i>Acropora nasuta</i>	PN-19
20	Husnatain, I.D., Salim, K.P., Heriyanto, Purwantiningrum, I., Harijono, Limantara, L.	Effect of Dried Fruit Processing on Lycopene Content and Pigment Composition of Tommato (<i>Lycopescicum esculentum</i> var Marta)	PN-20
21	Wibowo, A.A., Elim, P.E., Heriyanto, Prihastyanti, M.N.U, Shioi, Y., Brotosudarmo, T.H.P	Effect of Drying Treatments on the Concentration of Fucoxanthin and Chlorophyll <i>a</i> and Pigment composition of Three <i>Sargassum</i> Species	PN-21
22	Yuyun Yuniati, Renny Indrawati, Jovine, Tantiana, Wynona	Tracing the antioxidant-rich products in local groceries: naturalness, biofunctionality, and price	PN-22
23	Yuyun Yuniati, Juliana, Lidwina Angelica Soetantijo, and Ratna Yulianti Wijaya, Renny Indrawati	Preparation of Antioxidant Drinks from Mulberry <i>Morus nigra</i> L.	PN-23

Uncovering the Availability of Products Enriched with Vitamin A in Local Supermarket

Rosita Dwi Chandra^{a*}, Renny Indrawati^a, Mario Sent Anugrah^b, Jodiawan^b, Ricky Santoso^b, Tatás H. P. Brotosudarmo^a, Leenawaty Limantara^{a,c}

^a Ma Chung Research Center for Photosynthetic Pigments (MRCPP), Universitas Ma Chung, Jl. Villa Puncak Tidar N-01, Malang – 65151, East Java, Indonesia

^b Department of Chemistry, Faculty of Science and Technology, Universitas Ma Chung, Jl. Villa Puncak Tidar N-01, Malang – 65151, East Java, Indonesia

^c Universitas Pembangunan Jaya, Jl. Cendrawasih Raya B7/P, South Tangerang-15413, Banten, Indonesia

Abstract

Products containing vitamin A has appeared in nearly every aisle of the supermarket. It can be food and drink products as well as supplements which contain different amount of vitamin A. Most of food manufacturers around the world recognize that vitamin A provides functional and nutritional properties which could enhance the value of finished products in every consumer category. The amount of vitamin A in some type of food and drink product as well as supplements was uncovered in this study. From short study, it was found that there were two continents produced supplements containing vitamin A in which the highest number of production was provided by America. In addition, the amount of vitamin A fortified in snack was higher than that in instant food, while in the drink product the highest amount of vitamin A was provided in dairy based powder drink.

Keywords: vitamin A, food products, supplement

*Corresponding author: E-mail Address : rosita.dwi@machung.ac.id
Telephone Number : 06281331221228

1. Introduction

Food cannot be separated from human beings as it provides nutrients for energy and health. Therefore, a wide variety of food products have been produced in order to fulfil the human needs. However, in some products the availability of nutrient is not sufficient to fulfil the daily needs as the public health nutrition problems have been found especially in some developing countries. One of the major problems that is often found is vitamin A deficiency. It has effected around 83 million adolescents in Southeast Asia, 190 million preschool-aged children and 19 million pregnant and lactating women around the world [1]. Vitamin A deficiency has resulted in the subclinical condition, causing the decrease of retinol serum by less than 20 µg/dL. It will then impact on the visual ability and immune system, which in some cases it could be followed by mortality [2].

Following this, most food manufacturers have competed in producing vitamin A fortified products. A wide range of food products including drink products and supplements containing vitamin A has been found in nearly every supermarket in developing countries including Indonesia. Diets of Indonesian people which are mainly based on the poor sources of vitamin A such as rice, legumes and cereals could be attractive and potential effective for food fortification

[1]. Therefore, vitamin A fortified food products are required by developing countries including Indonesia. This study was aimed to uncover food and drink products as well as supplement which contained vitamin A in some local supermarket in Malang, Indonesia.

2. Methodology

This study was a qualitative study in which survey of products enriched with vitamin A was conducted in some supermarket in Malang, Indonesia. It was carried out from the end of July to the beginning of August.

The food products surveyed were grouped in snack and instant food products, while the drink products were grouped in non-dairy based drink, dairy based drink and dairy based powder drink. In addition, survey of supplement was carried out on the internet as it is the most used market media of this product. The data was shown based on the continent of the company.

3. Results and discussion

A number of food products including snack and instant food have been found to contain vitamin A. It can be seen in Fig. 1 which shows that the average of

PN-16

vitamin A fortified in snack was higher than instant food, $0.400\% \cdot g^{-1}$ and $0.355\% \cdot g^{-1}$ respectively. The example of instant food products that was observed in the survey were instant noodle, pasta, macaroni and meat based product. Meanwhile, the snack surveyed were kind of biscuit, wafer, and seaweed based products.

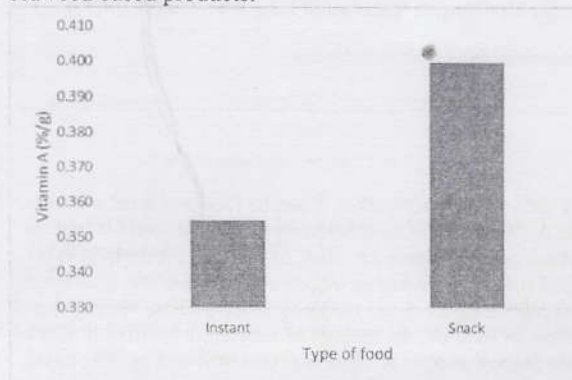


Fig. 1. The average percentage of vitamin A contained in snack and instant food products

Regarding to drink products, the surveyed products were classified in three type of product, which were non-dairy based drink (MND), dairy based drink (MD) and dairy based powder drink (SD). Fig. 2 represents the average percentage of vitamin A contained in the mentioned products. It can be seen that the amount of vitamin A in the non-dairy based drink was higher than that in the dairy based drink, $0.38\% \cdot mL^{-1}$ and $0.235\% \cdot mL^{-1}$. Meanwhile, for the dairy based powder drink the percentage of vitamin A found was the highest, $1.698\% \cdot g^{-1}$.

Besides food and drink products, some supplements have been observed to contain vitamin A. The survey was conducted on the internet by searching for the products providing vitamin A. Fig. 3 shows that there were two continent where the supplements could be readily accessed. Those continent were America and Asia. However, only one product from Asia that could be found during the study and the average of vitamin A contained was 50 % lower than that from America, which was 6 000 IU (International Units). Meanwhile, in the America, there were eight products found with the average of vitamin A 12 500 IU. This shows that the vitamin A provided by supplement company from America is little higher than the daily need, while it is lower in Asia. The World Health Organization recommends that supplements during pregnancy should not exceed 10 000 IU of vitamin A. This is equal to 3 000 μg of retinol equivalents (RE) per day or 25 000 IU (7 500 RE) per week [3]. In addition, the upper limit of

vitamin A regulated by the Food and Nutrition Board of the National Academy of Sciences is 10 000 IU per day [4].

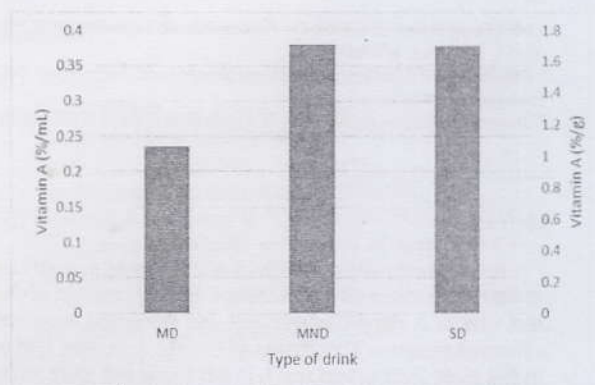


Fig. 2. The average percentage of vitamin A contained in non-dairy based drink (MND), dairy based drink (MD) and dairy based powder drink (SD)

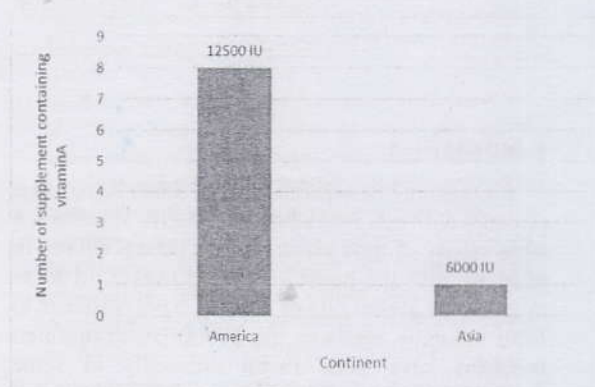


Fig. 3. The continent producing vitamin A supplement

4. Conclusion

Most of food and drink products in the market has been fortified with vitamin A. The highest content of vitamin A was found in the snack and dairy based powder drink. Meanwhile, the supplement produced by America provides higher vitamin A than that in Asia. However, both values are categorised in higher and lower than the recommendation of daily need.

References

- [1] Dary, O. & Mora, J. O. (2002). Food fortification to reduce vitamin A deficiency: International vitamin A consultative group recommendations. *The Journal of Nutrition*, 132(9), 2927S-2933S.

- [2] Ridwan, E. (2013). Cakupan Suplementasi Kapsul Vitamin A dalam Hubungannya dengan Karakteristik Rumah Tangga dan Akses Pelayanan Kesehatan pada Anak Balita di Indonesia Analisis Data Riskesdas 2010 [Supplementation of vitamin A in the relationship to the characteristic of household and the access to health service for toddler in Indonesia]. *Buletin Penelitian Sistem Kesehatan*, 16(1), 1–9. [Bahasa Indonesia].
- [3] World Health Organization. (1998). *Safe vitamin A dosage during pregnancy and lactation*. Document WHO/NUT/98.4

World Health Organization. Switzerland: World Health Organization.

- [4] Food and Nutrition Board, Institute of Medicine. (1990). *Nutrition during pregnancy, weight gain, nutrient supplements*. Washington, D. C.: National Academy Press.