Chiang Mai University Kagawa University Joint Symposium 2018 TH

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CLINICAL PROFESSOR NIWES NANTACHIT, M.D.

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UNI
MAI
CHIANG

PRESIDENT



WELCOME TO CHIANG MAI UNIVERSITY

On behalf of Chiang Mai University, I would like to warmly welcome all participants to the 7th Chiang Mai-Kagawa University Joint Symposium 2018.

Chiang Mai University is honored to host this 7th Symposium that focuses on Healthy Aging and Sustainable Society: Global Development 4.0, with five sub-themes:

- Food and Agriculture: Food, Agriculture, and Biotechnology.
- Energy: Environmental Design, Smart Devices, and Robotics-Mechatronics.
- Aging Society: Health, Wellness, Care and Biomedicine.
- Smart Cities and Attitudes towards Them: Digital Technology, Internet of Things (IoT), Artificial Intelligence, and Embedded Technology.
- Creative Economy: Development of Culture, High valued and top of line Services.

The Thai participants represent our entire university community, with professors, students, administrators, and staff coming from our many faculties and research centers.

That we are now sharing our seventh symposium is a testament to the depth of the relationship between our two universities. As in years past, this symposium will no doubt strengthen that relationship even further, and increase the avenues for our shared research and knowledge. As always, CMU hopes that this symposium will also inspire students to apply to the CMU – KU exchange program.

Distinguished participants, I wish you every success in this symposium, and with the joint research and endeavors that will follow. Also, for our out of town guests, please be sure to find the time to explore and enjoy the natural and cultural aspects of our beloved Lanna, and may your stay here in a Chiang Mai be a memorable one.

N. Nantachit

Clinical Professor Niwes Nantachit, M.D. President of Chiang Mai University

YOSHIYUKI KAKEHI, M.D., PH.D.



KAGAWA UNIVERSITY

PRESIDENT

Warm greetings from Kagawa University. On this occasion of the 7th Joint Symposium between Chiang Mai University and Kagawa University, I am delighted to announce that we have about 70 members in our delegation participating in the symposium. This number is by far, the largest we have sent to Chiang Mai University for the symposium.

Chiang Mai University and Kagawa University have come a long way since our institutions first signed the Memorandum of Understanding in 1990. Our collaboration and friendship seems to get stronger as we continue to work with one another in the area of research and student exchange.

A major channel of collaboration is this joint symposium. The 1st Symposium was launched at Chiang Mai in 2007. Since then, both institutions have taken turns to be the host. This year, I am happy to note that the joint symposium is into the 12th year.

The overall theme for the symposium is 'Healthy Aging and Sustainable Society: Global Development 4.0'. Under this umbrella, the sub-themes are Food and Agriculture, Energy and Sustainable Technologies, Aging Society on Health, Wellness, Care and Biomedicine, Smart Cities, and Regional Economy and Creativity. As in previous symposiums, there is a session for posters with submissions by students from both sides.

The 'pre-symposium' event is marked by a gathering for the alumni members of Kagawa University. We are indebted to Chiang Mai University for the kind offer to assist in the planning and execution of this gathering.

For Kagawa University, this symposium offers an opportunity to reiterate the foremost position of Chiang Mai University in the scheme of international relations at Kagawa University.

In closing, I hope that all delegates from both sides will find this symposium to be as enjoyable and fruitful as the previous ones. We look forward to further strengthening our ties with Chiang Mai University in the future.

Joshiyaki Kakeho

Yoshiyuki Kakehi, M.D., Ph.D. President of Kagawa University

CHIANG MAI UNIVERSITY KAGAWA UNIVERSITY JOINT SYMPOSIUM 2018

CMU COMMITTEES

The 7th Joint Symposium CMU and KU 27-29 August 2018 Chiang Mai University

CMI	U CHAIR
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Faculty of Medicine	Professor Kom Sukontason, M.D., Ph.D.
Faculty of Science	Professor Saisamorn Lumyong, Ph.D.
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Coordinator, Research Administration center	Ms. Priraya Rithaporn

KU COMMITTEES

The 7th Joint Symposium CMU and KU 27-29 August 2018 Chiang Mai University

KU executive team		
Professor Masaaki Tokuda	Vice President International Affairs	
Professor Seiichi Fukai	Dean, Faculty of Agriculture	
Professor Katsumi Imaida	Ex-Dean, Faculty of Medicine	
Professor Lrong Lim	Director, International Student Center	
KU Steering Committee		
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Professor Yasushi Mino	Dean, Faculty of Law	
Professor Shinobu Sato	Dean, Faculty of Economics	
Professor Natsuo Ueda	Dean, Faculty of Medicine	
Professor Shunichi Hasegawa	Dean, Faculty of Engineering and Design	
Professor Seiichi Fukai	Dean, Faculty of Agriculture	
Professor Shinji Hara	Dean, Graduate School of management	
KU Organizing Committee		
KU OIgailiZi	ng Committee	
Professor Masaaki Tokuda	Vice President International Affairs (Chair)	
Professor Masaaki Tokuda Professor Lrong Lim	Vice President International Affairs (Chair) Director, International Student Center	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi	Vice President International Affairs (Chair) Director, International Student Center Faculty of Education	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi Associate Professor Yoshiteru Tsujigami	Vice President International Affairs (Chair) Director, International Student Center Faculty of Education Faculty of Law	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi Associate Professor Yoshiteru Tsujigami Professor Ranade Ravindra Raghunath	Vice President International Affairs (Chair) Director, International Student Center Faculty of Education Faculty of Law Faculty of Economics	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi Associate Professor Yoshiteru Tsujigami Professor Ranade Ravindra Raghunath Professor Kenji Wada	Vice President International Affairs (Chair) Director, International Student Center Faculty of Education Faculty of Law Faculty of Economics Faculty of Medicine	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi Associate Professor Yoshiteru Tsujigami Professor Ranade Ravindra Raghunath Professor Kenji Wada Professor Yoshiro Imai	Vice President International Affairs (Chair) Director, International Student Center Faculty of Education Faculty of Law Faculty of Economics Faculty of Medicine Faculty of Engineering and Design	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi Associate Professor Yoshiteru Tsujigami Professor Ranade Ravindra Raghunath Professor Kenji Wada Professor Yoshiro Imai Professor Osamu Kawamura	Vice President International Affairs (Chair) Director, International Student Center Faculty of Education Faculty of Law Faculty of Law Faculty of Medicine Faculty of Medicine Faculty of Engineering and Design Faculty of Agriculture	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi Associate Professor Yoshiteru Tsujigami Professor Ranade Ravindra Raghunath Professor Kenji Wada Professor Kenji Wada Professor Osamu Kawamura Visiting Professor Hisanao Noda	Vice President International Affairs (Chair) Director, International Student Center Faculty of Education Faculty of Law Faculty of Law Faculty of Economics Faculty of Medicine Faculty of Engineering and Design Faculty of Agriculture International Office	
Professor Masaaki Tokuda Professor Lrong Lim Professor Yumiko Takagi Associate Professor Yoshiteru Tsujigami Professor Ranade Ravindra Raghunath Professor Kenji Wada Professor Kenji Wada Professor Yoshiro Imai Professor Osamu Kawamura Visiting Professor Hisanao Noda Lecturer Toru Takamizu	Ng CommitteeVice President International Affairs (Chair)Director, International Student CenterFaculty of EducationFaculty of EducationFaculty of EconomicsFaculty of MedicineFaculty of Engineering and DesignFaculty of AgricultureInternational Office	
RCO OTgain21Professor Masaaki TokudaProfessor Lrong LimProfessor Yumiko TakagiAssociate Professor Yoshiteru TsujigamiProfessor Ranade Ravindra RaghunathProfessor Kenji WadaProfessor Yoshiro ImaiProfessor Osamu KawamuraVisiting Professor Hisanao NodaLecturer Toru TakamizuLecturer Mika Shioi	Ng CommitteeVice President International Affairs (Chair)Director, International Student CenterFaculty of EducationFaculty of EducationFaculty of EconomicsFaculty of MedicineFaculty of Engineering and DesignFaculty of AgricultureInternational OfficeInternational Office	
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- Faculty of Law
- Faculty of Humanities คณะมนุษยศาสตร์
- คณะรัฐศาสตร์และรัฐประศาสนศาสตร์
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 - Faculty of Associated Medicine Sciences คณะพยาบาล



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The 7th Joint Symposium CMU and KU 27-29 August 2018 Chiang Mai University

Prayasrivisarnwaja Room, Fl. 1

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Prasert Rujirawong Room, Fl. 2 Boonsom Martin Room, Fl. 2 Pin Malakul Room, Fl. 3 Tawan Kangwanpong Room, Fl. 4

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Planning Division Room, Fl. 5

The 7th Joint Symposium CMU and KU 27-29 August 2018 Chiang Mai University

Monday, 27 August 2018

Venue: Pin Malakul Room, Fl. 3 and Tawan Kangwanpong Room, Fl. 4 Office of the University, Chiang Mai University

 8.30 - 09.00 hrs.
 Registration

 09.00 - 09.30 hrs.
 Opening Ceremony

Opening Report Assoc. Prof. Dr. Sampan Singharajvarapan Advisor to the President for Research

Welcome Address Clinical Professor Niwes Nantachit, M.D. President of Chiang Mai University

Keynote Address Professor Yoshiyuki Kakehi (Video) President of Kagawa University

Congratulatory address Mr. Kazunori Kawada Consul-General of Japan in Chiang Mai

Souvenir Presentations, Group Photograph

Venue: Pin Malakul Room, Fl. 3 and Tawan Kangwanpong Room, Fl. 4 Office of the University, Chiang Mai University

09.30-10.30 hrs.	Panel Discu Moderators:	 Assion on "Aging Society" CMU - Asst. Prof. Dr. Sirirat Panuthai Faculty of Nursing KU - Prof. Dr. Masaaki Tokuda Vice Present of Kagawa University
10.30 - 11.00 hrs.	Coffee/Tea l	break
Research Presentatio	on	
11.00–12.00 hrs.	Parallel sess	sions on
	Session A1	-Smart Cities and Attitudes towards Them (Prayasrivisarnwaja Room, Fl. 1, Office of the University)
	Session A2	-Regional Economy and Creativity (Pin Malakul Room, Fl. 3, Office of the University)
	Session A3	-Aging Society (Tawan Kangwanpong Room, Fl. 4, Office of the University)
	Session A4	-Energy and Sustainable Technologies (Boonsom martin Room, Fl. 2, Office of the University)
	Session A5	-Food and Agriculture (Planning division Room, Fl. 5, Office of the University)

12.00–13.00 hrs. Lunch

Research Presentation

13.00–15.20 hrs.	Parallel sessions on		
	Session A1	-Smart Cities and Attitudes towards Them	
		(Prayasrivisarnwaja Room, Fl. 1, Office of the University)	
	Session A2	-Regional Economy and Creativity	
		(Pin Malakul Room, Fl. 3, Office of the University)	
	Session A3	-Aging Society	
		(Tawan Kangwanpong Room, Fl. 4, Office of the University)	
	Session A4	-Energy and Sustainable Technologies	
		(Boonsom Martin Room, Fl. 2, Office of the University)	
	Session A5	-Food and Agriculture	
		(Planning division Room, Fl. 5, Office of the University)	

14.20-15.20	Coffee/Tea break
15.20–17.20 hrs.	Poster Presentation
18.30-20.00 hrs.	Welcome Reception at Prayasrivisarnwaja Room, Office of the University, Chiang Mai University
	"Best Poster Presentation" award
	Welcome dinner by Advisor to the President for Research
	(Assoc. Prof. Dr. Sampan Singharajvarapan, CMU)
	Congratulatory message by Vice President of International Affairs

(Professor Dr. Masaakii Tokuda, M.D. , KU)

Note: CMU: 3 shows of Lanna and contemporary style

KU : Students activities

- (1) UDON PPT presentation by KU Faculty of Agriculture students
- (2) Dance (Soran bushi) by KU Faculty of Agriculture students
- (3) Performance by KU Faculty of Economics



Tuesday, 28 August 2018

Venue: The Royal Agricultural Station Inthanon, Chiang Mai

09.00 - 11.00 hrs.	Field Trip
	-Sightseeing Spots in the Station The Royal 80th Anniversary Garden
	-Siribhume Waterfall & Siribhume Royal Garden
	-Rhododendron Garden
	-Ferns Greenhouse
	-Flower and Ornamental Plants Greenhouse
	-Hydroponics Vegetables Greenhouse
10.30 hrs.	Coffee/Tea break
	Remark: Snack will be served in the minivan.
12.00 - 13.30 hrs.	Lunch at The Royal Agricultural Station Inthanon restaurant
13.00 -16.00 hrs.	-Visit Phra Maha Dhatu Nabhamethanidol
	and Nabhapolbhumisiri (The Great Holy Relics Pagoda
	Nabhamethanidol and Nabhapolbhumisiri)
	-Visit Ang Ka Natural Trail (400 meters walk)
17.30 hrs.	Dinner at Saen Kham Terrace Restaurant at Baan Nai Fun 2
19.00 hrs.	Depart for Kantary hotel and Uniserv

Wednesday, 29 August 2018

09.00-11.20 hrs.	Panel Discussion on	
	Session A2	-Regional Economy and Creativity
		(Pin Malakul Room, Fl. 3, Office of the University)
	Session A3	-Aging Society
		(Tawan Kangwanpong Room, Fl. 4,
		Office of the University)
	Session A4	-Energy and Sustainable Technologies
		(Boonsom Martin Room, Fl. 2, Office of the University)
	Session A5	-Food and Agriculture
		(Planning division Room, Fl. 5, Office of the University)

11.20 – 11.30 hrs **Coffee break**

Venue: Pin Malakul Room, Fl. 3 and Tawan Kangwanpong Room, Fl. 4 Office of the University, Chiang Mai University

11.30-12.30 hrs.	Round-table Discussion on Future Link Activities
	CMU Executive attendees: Advisor to the President for
	Research, Acting Director of Research Administration Center, CMU
	KU Executive attendees: Masaaki Tokuda, Katsumi Imaida,
	Seiichi Fukai and Yumiko Takagi
	Moderators: CMU - Assoc. Prof. Dr. Sampan Singharajvarapan
	KU - Prof. Lrong Lim
	-Agenda-
	Symposium assessment
	General observations / impressions
	Collaboration and joint research possibilities
	Other link activities
	• The 8 th Joint Symposium between KU and CMU
	Coffee / Tea will be served in the meeting room.

12.30 hrs.	Closing remark: CMU - Assoc. Prof. Dr. Sampan Singharajvarapan KU - Prof. Dr. Masaaki Tokuda
12.40 hrs.	Lunch will be served in the meeting room
14.00 - 17.00 hrs.	Shopping at Robinson Airport Plaza, Chiang Mai (Dinner by own-self)
17.00 hrs.	Leave Robinson Airport Plaza to Chiang Mai International Airport
19.00 hrs.	Depart from Chiang Mai International Airport





The 7th Joint Symposium CMU and KU

27 August, 2018

Chiang Mai University

SESSION PROGRAM

11.00-12.00 hrs.



Monday, 27 August 2018

Session 1: Smart Cities and Attitudes towards Them

Venue :	Prayasrivisarnwaja Room, Fl. 1
Chair Person :	Phudinun Singkhamfu (CMU), Yumiko Takagi (KU)
11.00-11.20	A Critical Framework for Application of Information Technology (IT) <u>Peter Lutes</u> , Toru Takamizu and Arran Chambers
11.20-11.40	The Trial Production of Physically Handicapped Persons for Input Interface using the Motion tracking <u>Eiichi Miyazaki</u> , Satoshi Sakai, Kimihiko Taniguchi, Shoudai Sano, Tomohiro Noda and Hazime Kondo
11.40-12.00	The Development of Student's Beliefs in Mathematics and Mathematics Education <u>Mitsuru Matsushima</u>

Session 2 : Regional Economy and Creativity

Venue :	Pin Malakul Room, Fl. 3
Chair Person :	Pichayalak Pichayakul (CMU), Ravindra Raghunath Ranade (KU)
11.00-11.20	DMO and the Characteristics of Tourism in Kagawa Prefecture <u>Naoyuki Hara</u>
11.20-11.40	Community Potential for cycling and cultural tourism: A case of Mae Hong Sorn Village <u>Narong Sikhiram</u>
11.40-12.00	Spatial Analysis of Tourist Areas in Burundi Dancille Nizevimana

Session 3 : Aging Society

Venue :	Tawan Kangwanpong Room, Fl. 4
Chair Person :	Sirianong Namwongprom (CMU), Kimie Tanimoto (KU)
11.00-11.20	Wearable sensor reveals lifestyle habits of elementary school children <u>Hiromi Suzuki</u> , Kanae Kanda, Tomohiro Hirao and Nobuyuki Miyatake
11.20-11.40	Effect of Self-selected Lifestyle Modification Program on Glycosylated Hemoglobin among Older Persons with Type 2 Diabetes <u>Pimweera Lalam</u> , Rojanee Chintanawat and Linchong Pothiban
11.40-12.00	The Effects of Kangaroo Care: A Literature Review <u>Mayu Suzuki</u> , Junko Saijo and Kimie Tanimoto

Session 4 : Energy and Sustainable Technologies

Venue :	Boonsom Martin Room, Fl. 2
Chair Person :	Wasawat Nakkiew (CMU), Yoshiro Imai (KU)
11.00-11.20	Experimental study on a seismic reinforcement method for traditional stone houses in the Kingdom of Bhutan <u>Satsuki Murai,</u> Mitsuhiro Miyamoto and Takayoshi Aoki
11.20-11.40	Study on Vibration Characteristics of Stone Building Based on Seismic Observation <u>Mitsuhiro Miyamoto</u> and Yoshihiro Morito
11.40-12.00	Effect of agricultural alternation in the reduction of potential contaminate overland sediment over the Mae Tao Basin, Thailand <u>Komsoon Somprasong</u>

Monday, 27 August 2018

Session 5 : Food and Agriculture

Venue :	Planning Division Room, Fl. 5
Chair Person :	Chanakarn Prom-u-thai (CMU), Takeshi Katayama (KU)
11.00-11.20	Bioactive compounds from Thai indigenous plants for the development of the eco-friendly agriculture <u>Hisashi Kato-Noguchi</u> , Sirinapa Chaipon and Prapaipit Suwitchayanon
11.20-11.40	Effect of sonication on the antimicrobial properties from <i>Basella</i> <i>alba</i> stem extracts <u>Srirana Buadoktooma</u> and Yuthana Phimolsiripol
11.40-12.00	Occurrence of ochratoxin A in roasted and instant coffee commercially available in China, Indonesia, Vietnam, and Thailand <u>Osamu Kawamura</u> , Fang Xia-Yan, Arum Baasithu, Dao Nhat Quang and Kraisate Wongworapat





The 7th Joint Symposium CMU and KU

27 August, 2018

Chiang Mai University

SESSION PROGRAM

13.00-15.20 hrs.



Monday, 27 August 2018

Session 1: Smart Cities and Attitudes towards Them

Venue :	Prayasrivisarnwaja Room, Fl. 1
Chair Person :	Phudinun Singkhamfu (CMU), Yumiko Takagi (KU)
13.00-13.20	Proposal on Dietary Education Research and Dietary Habits Research in East Asia Countries- International Contribution through Comparative Study of Diabetes and Obesity <u>Yumiko Takagi</u> , Tomohiro Hirao, Nobuyuki Miyatake, Masaaki Tokuda, Masahiro Ogawa, Nik Anni Tuah and Hjh Fazean Irdayati binti Idris
13.20-13.40	What is a "Smart Person"? A Study of Education and the Learning Required for Japan's Future <u>Yoshiki Sakurai</u>
13.40-14.00	Prediction of Total Organic Carbon Storage with Artificial Neural Network Model in 9 Northern Province, Thailand <u>Tawee Chaipimonplin</u> , Suphatida Aumthong and Chakrit Chotamonsak
14.00-14.20	Inferring Passenger Travel Demand to Improve Urban Mobility in Developing Countries Using Cell Phone Data: A Case Study of Senegal Santi Phithakkitnukoon

Session 2 : Regional Economy and Creativity

Venue :	Pin Malakul Room, Fl. 3
Chair Person :	Pichayalak Pichayakul (CMU), Ravindra Raghunath Ranade (KU)
13.00-13.20	Efforts in Kagawa region towards economic development – the use of culture, religion, art and tourist attractions <u>Ravindra R. Ranade</u>
13.20-13.40	Development Economics Reconsidered: From a Gandhian Viewpoint Kazuya Ishii
13.40-14.00	A Double-Copula Stochastic Frontier Model with Dependent Error Components and Correction for Sample Selection Songsak Sriboonchitta, Jianxu Liu, Aree Wiboonpongse and Thierry Denoeux
14.00-14.20	Empirical Causal Relationships between Money Supply and Stock Markets in China <u>Feng Yao</u> and Juanwei Li

Session 3 :	Aging	Society
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Venue :	Tawan Kangwanpong Room, Fl. 4
Chair Person :	Sirianong Namwongprom (CMU),
	Kenji Wada (KU)
13.00-13.20	Rare sugar D-allulose prevents progression and development of obesity and type 2 diabetes in diabetes model rats <u>Akram Hossain</u> , Kazuyo Kamitori, Tetsuyo Iida, Masaaki Tokuda and Akira Nishiyama
13.20-13.40	GLP-1 release and vagal afferent activation mediate the beneficial metabolic and chronotherapeutic effects of D-allulose <u>Masaaki Tokuda</u> , Akram Hossain, Kazuyo Kamitori and Yusaku Iwasaki
13.40-14.00	Development of a Community Volunteer Caring Model for Older Person with Chronic Illness <u>Nattaya Suwankruhasn</u> , Sirirat Panuthai and Suvat Supasit
14.00-14.20	Medical Information Database Integration for Japanese Pharmacovigilance <u>Hideto Yokoi</u> and Masatoshi Tanigawa

Session 4 : Energy and Sustainable Technologies

Venue :	Boonsom Martin Room, Fl. 2
Chair Person :	Wasawat Nakkiew (CMU), Yoshiro Imai (KU)
13.00-13.20	Abstract-writing Support Tool for Foreign Students to describe Foreign Articles Shunsuke Doi and Yoshiro Imai
13.20-13.40	Dynamic Monitoring of Wat-Umong Stupa Under Natural Vibration <u>Chinnapat Buachart</u> , Chayanon Hansapinyo, Mitsuhiro Miyamoto, and Manabu Matsushima
13.40-14.00	Restoration Planning System for Resilient Road Networks after an Earthquake Disaster <u>Kyosuke Takahashi</u> , Wataru Shiraki, Hitoshi Inomo and Chikako Isouchi
14.00-14.20	Palladium Catalyst on Graphene for Deoxygenation of Biodiesel by Strong Electrostatic Absorption Technique <u>Benjaporn Kreatananchai</u>

Session 5 : Food and Agriculture

Venue :	Planning Division Room, Fl. 5
Chair Person :	Chanakarn Prom-u-thai (CMU), Hisashi Kato (KU)
13.00-13.20	Chimeric Characteristics of Bud-mutation Carnation Cultivars "MINAMI series" <u>Hayato Morimoto</u> , Takako Narumi-Kawasaki Takejiro Takamura and Seiichi Fukai
13.20-13.40	Isoprene Degradation by Soil Bacteria Associated with Tropical Economic Plants <u>Toungporn Uttarotai</u> , Sakunnee Bovonsombut, Sunanta Wangkarn and Thararat Chitov
13.40-14.00	Investigation of Bioactive Components of Forest Biomass in Southeast Asia <u>Takeshi Katayama</u> , Toshisada Suzuki, Tanachai Pankasemsuk, Ayako Katagi, Masaaki Tokuda, Dimas Andrianto, Fuki Matsuno and Syahidah
14.00-14.20	Biodiesel production from Tung oil, and isolation and identification of antioxidant compounds from defatted seeds <u>Toshisada Suzuki</u> , Tetsuaki Kato, Megumi Matsuyama, Fukagawa Yuki and Takeshi Katayama
Venue :	Planning Division Room, Fl. 5
Chair Person :	Chanakarn Prom-u-thai (CMU), Osamu Kawamura (KU)
14.20-14.40	Red mite (<i>Dermanyssus gallinae</i>) monitoring and trapping device Yuta Imade, Tetsuya Kondo, Yumi Kayahara, Peter Lutes, Shinji Matsubara, Meiji Arai and <u>Yoshiki Matsumoto</u>
14.40-15.00	Actinobacteria Associated with Arbuscular Mycorrhizal Funneliformis mosseae Spores, Taxonomic Characterization and Their Beneficial Traits to Plants Krisana Lasudee, Shinji Tokuyama, Saisamorn Lumyong and <u>Wasu Pathom-aree</u>
15.00-15.20	ACRS Gene Cluster for Host-selective ACR-toxin Biosynthesis in Alternaria alternata rough lemon pathotype Matsuoka, S., Nikaido, S., Izumi, Y., Masunaka, A., Ohtani, K., Tamaki, Y., Mochizuki, S., Gomi, K., Ichimura, K. and <u>Akimitsu, K.</u>



The 7th Joint Symposium CMU and KU

29 August, 2018

Chiang Mai University

SESSION PROGRAM

09.00-11.20 hrs.



Wednesday, 29 August 2018

Session 2 : Regional Economy and Creativity

Venue :	Pin Malakul Room, Fl. 3
Chair Person :	Pichayalak Pichayakul (CMU), Ravindra Raghunath Ranade (KU)
09.00-09.20	On Strategies for Improvements in Relatively Less Developed Regions Ravindra R. Ranade
09.20-09.40	Limitation of ThaiLabanXML Standard Representing in Unity 3D Program Akharawin Mahamud, <u>Yootthapong Tongpaeng</u> and Pradorn Sureephong
09.40-10.00	Factors affecting sustainability of Community-Based Tourism Projects: Locational Analysis in Limpopo Province <u>Maselebalo Nchabeleng</u>
10.00-10.20	Risk Framework Analysis for Creative Industries in ASEAN-5 Stock Exchanges <u>Chukiat Chaiboonsri</u> and Prasert Chaitip

Session 3 : Aging Society

Venue :	Tawan Kangwanpong Room, Fl. 4
Chair Person :	Sirianong Namwongprom (CMU), Katsuya Hirano (KU)
09.00-09.20	Development of Low Calorie Thai Custard using Rare Sugar <u>Rujee Rattanasathien</u> , Kanlaya Chunjai, Rujirat Pudwan, Bumnet Saengrut, Benjamas Suksatit and Surat Tanprawate
09.20-09.40	Quality of handwashing water research at elementary schools in Kandal Stueng District, Cambodia <u>Takeshi Yoda</u> , Kensaku Miyamoto, Joji Doi, Mika Nomura, Kanae Kanda, Haruna Yoda, Yuko Shimizu and Tomohiro Hirao
09.40-10.00	Perception of Male Nurses among Hospitalized Children and Their Families <u>Hiroaki Kawakatsu</u> , Junko Saijo, Kumiko Hiragi, Mayu Suzuki, Nobuko Tokuchi and Kimie Tanimoto

Session 3 :	Aging Society
Venue :	Tawan Kangwanpong Room, Fl. 4
Chair Person :	Sirianong Namwongprom (CMU), Akram Hossain (KU)
10.00-10.20	Trends towards the acceptable macronutrient distribution range in Japan: a joinpoint analysis of energy intake data of national nutrition survey in Japan from 1946 to 2015 Syed Mahfuz Al Hasan, Kanae Kanda, Takeshi Yoda, Yugo Okabe, Yusuke Yamadori, Akitsu Murakami, Mika Kamano and Tomohiro Hirao
10.20-10.40	Development of "Kratib Kao" for Controlling Rice Consumption for Older Persons with Diabetes <u>Sirirat Panuthai</u> , Chiraporn Tachaudomdach and Chomphoonut Srirat
10.40-11.00	D-allose induces tumor suppressive factor TXNIP (thioredoxin interacting protein) through transcriptional and translational regulation <u>Kazuyo Kamitori</u> , Nobuhiro Kanaji, Hiroshi Hoshikawa, Fuminori Yamaguchi, Youyi Dong, Ayako Katagi, Chisato Noguchi, Yuichiro Fujiwara and Masaaki Tokuda

Session 4 : Energy and Sustainable Technologies

Venue :	Boonsom Martin Room, Fl. 2
Chair Person :	Wasawat Nakkiew (CMU), Yoshiro Imai (KU)
09.00-09.20	Application and Evaluation of Register-transfer level Visual CPU Simulator for Computer Architecture and other computer-based Education Shinya Hara and Yoshiro Imai
09.20-09.40	A Study of Big Data Analysis based on Python Program for Electric Power Demand and some kinds of Weather Information Shinya Hara, Shunsuke Doi and <u>Yoshiro Imai</u>
09.40-10.00	Catalysts for polymer electrolyte membrane fuel cells by Strong Electrostatic Adsorption <u>Sukanya Pothaya</u>
10.00-10.20	Grid-Flux-Oriented Control and Synchronization for a Doubly-Fed Induction Generator System <u>Sutthimat Mueangngoen</u>
10.20-10.40	Relatively Low Strength and Self-Cured Geopolymer for Road Construction Applications: The Study of Compaction Characteristics of the Crushed Rock Geopolymer Material <u>Peerapong Jitsangiam</u> , Teewara Suwan and Prinya Chindaprasirt

Wednesday, 29 August 2018

Session 5 : Food and Agriculture

Venue :	Planning Division Room, Fl. 5
Chair Person :	Chanakarn Prom-u-thai (CMU), Masashi Sato (KU)
09.00-09.20	Food and Energy Farm <u>Nobutaka Ito</u>
09.20-09.40	Cloning and Heterogeneous Expression of D-Glucoside 3-Dehydrogenase Gene of <i>Rhizobium</i> sp. and Its Application for New Pathway of Rare Sugar Production. <u>Goro Takata</u> , Akkharapimon Yotsombat, Kohei Mino, Tae Hasegawa and Kenji Morimoto
09.40-10.00	Cancer Chemopreventive Potential of Thai Purple Rice Rawiwan Wongpoomchai
Venue :	Planning Division Room, Fl. 5
Chair Person :	Chanakarn Prom-u-thai (CMU), Kazuya Akimitsu (KU)
10.00-10.20	Growth-inhibitory effect of D-arabinose against the nematode <i>Caenorhabditis elegans</i> : Discovery of a novel bioactive monosaccharide <u>Masashi Sato</u> , Mariko Koyama and Tomoya Shintani
10.20-10.40	Potent inhibitory effects of D-tagatose on the growth, acid production, water-insoluble glucan synthesis, and biofilm formation of <i>Streptococcus mutans</i> <u>Takaaki Ogawa</u> , Yuichi Nagamine, Khaleque Hasibul, Ayano Tada, Masaaki Tokuda, Tomomi Kuwahara, Fujiwara Yuichiro and Minoru Miyake
10.40-11.00	Factors Determining Consumers's Demand for Fat Reduced Northern Thai Sausage (Sai Oua) Janrija Jirasripaidhoon
11.00-11.20	Control of Basal Stem Rot Disease in Oil Palm Seedling by Streptomyces palmae sp. nov. Saisamorn Lumyong and Kanaporn Sutjarit



CHIANG MAI UNIVERSITY KAGAWA UNIVERSITY JOINT SYMPOSIUM 2018


CHIANG MAI UNIVERSITY KAGAWA UNIVERSITY JOINT SYMPOSIUM 2018

27-29 August, 2018

Session 1 :

Smart Cities and Attitudes towards Them

Chair Person :

Phudinun Singkhamfu (CMU) Yumiko Takagi (KU)

Session Program 11.00-12.00 hrs. Session Program 13.00-15.20 hrs.

Venue: Prayasrivisarnwaja Room, Fl. 1

Monday, 27 August 2018

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Venue :	Prayasrivisarnwaja Room, Fl. 1	
11.20-11.40	40 The Trial Production of Physically Handicapped Persons for Input Interface using the Motion Tracking <u>Eiichi Miyazaki</u> , Satoshi Sakai, Kimihiko Taniguchi, Shoudai Sano, Tomohiro Noda and Hazime Kondo	
Venue :	Prayasrivisarnwaja Room, Fl. 1	
11.40-12.00	00 The Development of Student's Beliefs in Mathematics and Mathematics Education <u>Mitsuru Matsushima</u>	
Venue :	Prayasrivisarnwaja Room, Fl. 1	
13.00-13.20	Proposal on Dietary Education Research and Dietary Habits Research in East Asia Countries- International Contribution through Comparative Study of Diabetes and Obesity <u>Yumiko Takagi</u> , Tomohiro Hirao, Nobuyuki Miyatake, Masaaki Tokuda, Masahiro Ogawa, Nik Anni Tuah and Hjh Fazean Irdayati binti Idris	44
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Venue :	Prayasrivisarnwaja Room, Fl. 1	

A Critical Framework for Application of Information Technology (IT)

Peter Lutes^{1*}, Toru Takamizu^{2*} and Arran J. Chambers^{2*}

¹Faculty of Agriculture, ²International Office, Kagawa University *E-mail: plutes@ag.kagawa-u.ac.jp, takamizu@cc.kagawa-u.ac.jp, chambers@cc.kagawa-u.ac.jp

INTRODUCTION

There has been a recent trend towards adoption of Information Technology (IT) to enhance productivity, quality, and innovation. In particular, in tertiary education, IT has been promoted by increased funding for innovation and the adoption of IT, in part because of the perception that IT promises increased efficiency, lower costs and improved education, and in part because IT has become such a pervasive part of modern life. This rapid push from stakeholders (government, administrators, students and parents) to adopt IT has led to its rapid and widespread use with which educators have experienced varying results.

Two IT adoptions (video conferring and social media), as pilot studies, were developed to assist international students with Japanese language learning. Instructors and students were interviewed as to the efficacy of the adoption of IT for language learning.

METHOD

The first pilot study applied high-cost technology, a Polycom[®] System, for video teleconferencing. Students were taught 6 lessons over a 6-week period. The second pilot study asked students to use their own smart devices and LINE[™] for writing exercises. The exercises were provided in PDF files and after completion the students submitted the exercises by PDF flies over a 7-month period.

For both pilot studies, student progress was evaluated by the instructors, and by student feedback on their progress.

Table 1.	Comparison	of Methodology

Method	Video	Smart Phone/	
	Conferencing	LINE TM	
Set up	Approx.	No cost*	
Costs	1,400,000 JPY	(used existing	
		devices)	
Duration	6 weeks	28 weeks	
Participants	12 - 3*	3	

*participation decreased weekly

RESULTS AND DISCUSSIONS

For the first pilot study, instructors found video conferencing to be cumbersome and awkward both for classroom management and instruction. The promise of seamless integration of video conferencing was not realized. There were technical difficulties with the system itself, requiring an IT specialist, and both instructors and students found operation of the system to be unintuitive with a steep learning curve. Students complained that it was difficult to hear the instructor and easy to get distracted from the lesson. Both instructors and students reported that students had made less progress than a typical language class.

Whereas in the second pilot study, instructors found it very simple to connect and send assignments through the LINE[™] "Group" function. Student submissions arrived in real time and feedback could be easily and quickly given, whenever the instructor had free time. Students were pleased by the ease of submission and the quick response from the instructor. Students also reported that seeing in real time that other students had already submitted exercises motivated them to work faster. Both instructors and students were familiar with LINE[™] and so there were no technical difficulties. Both the instructor and students reported a significant improvement in the students' Japanese language writing skills.

Table II	Comparison	of Results
	Comparison	OI ICoulto

Point of View	Evaluation Item	Video Conferencing	Smart Phone/ LINE™
Instructor	Language Improvement	Little or no improvement	Significant Improvement
	Use again	NO	YES
	Motivation	Reduced	No Change
Student	Language Improvement	Little or no improvement	Significant Improvement
	Use again	NO	YES
	Motivation	Reduced	Increased

CONCLUSIONS

While the application of IT has a great intuitive appeal, particularly with high-cost adoptions, IT in itself should not be considered the solution to addressing education issues. The impact on student and instructor engagement, the ease of use and how IT makes some activities easier to conduct, to understand, to monitor and to support should be considered. A simpler lowcost IT approach using technology that students and instructors are already familiar with should be considered as a first option.

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The Trial Production of Physically Handicapped Persons for Input Interface using the Motion Tracking

Eiichi Miyazaki^{1*}, Satoshi Sakai¹, Kimihiko Taniguchi², Shoudai Sano², Tomohiro Noda³ and Hazime Kondo²

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INTRODUCTION

Touch panels have been spreading due to the increase of smartphones, tablets, etc. However, some people have difficulty using touch panels for various reasons, and this has caused a digital gap^[1].

In this study, we developed an interface that tracks motions of arbitrary parts which are selected with a mouse from a webcam screen. This is composed of a virtual keyboard and a virtual mouse, which utilize a webcam and a microcontroller, instead of ordinary keyboards and mice. An arbitrary motion of a user functions as a trigger for the interface, through the analysis of moving pictures taken by a webcam.

Such a trigger activates the virtual keyboard and mouse. Therefore, it became possible to operate a computer with moving pictures taken by a webcam. Since it gets triggered only by parts which a user can move voluntarily, it was indicated that it is possible to provide an interface that detects users' purposed motions.



(a) Startup Screen



(b) Motion Detection Figure 1. Tracking Screen

TRACKING SYSTEM

BoofCV^{[2],} which is a computer vision library for Java, was used for tracking. In this study, "Tracking Object," which is a demo program, had its function extended, and detected the user's vertical and horizontal motions as a 4-direction trigger. The actual program execution screen is shown in Figure 1. Panel (a) is a startup screen, and a user first selects tracking areas with a mouse by dragging. Panel (b) is a tracking screen, and the system tracks only the area inside the square. If the tracking areas move a predetermine distance (pixels), the system detects it as a trigger. In Panel (b), it detected rightward motion.

By applying this, it is possible to have control of external devices by controlling the microcomputer board through mouse operation, key input and serial ports.

CONCLUSION

We developed a prototype motion tracking system with a webcam and a computer in this study, and found that motion only in chosen areas can be provided as an interface input. From now on, we would like to get feedback of the system, select the control device, etc. and the control of home appliances, to "improve the quality of daily lives" of users in various scenes^[3].

ACKNOWLEDGEMENTS

This study was conducted as part of Year 2017 Grants-in-Aid for Scientific Research (Basic Research Program (C)), "Elucidation of Physically Disabled Children's Communication Mechanism with Multimodal Interface" (Project Number 15K01460), and we would like to express our heartfelt gratitude.

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The Development of Student's Beliefs in Mathematics and Mathematics Education

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INTRODUCTION

In a mathematics class, a teacher's teaching method and view of mathematics have a fundamental influence (Minato and Hamada, 1994). There are investigations and theoretical research about these aspects (e.g., Nagasaki, 1998; Leder, G.C. et al., 2003). However, there is little research on enhancing how to view mathematics and how to teach mathematics within the faculty of education. Therefore, this study aimed to investigate the ways of viewing and teaching mathematics third-year faculty of education student. In particular, it considered how 15 lessons of the "Arithmetic Education" affected students' beliefs on mathematics and mathematics teaching.

RESEARCH METHOD

This study involved an investigation and the consideration of results. The investigation consisted of two types of questionnaires; before and after a series of "Arithmetic Education" lessons. A total of 15 lessons were conducted at the district National University by a third-year student of the faculty of education, from April to July, 2017. Of the total 101 participants, the number of efficacious questionnaires was 83 (35 men, 48 women). The lessons were conducted by a faculty third grader; the students were 13 mathematics majors, and 70 other subject majors. In addition, the questionnaire utilized the same items included in a survey administered to about 1500 elementary, junior high school, and high school teachers, in 1996 (Nagasaki, 1998). The contrasts between the results of this study and implemented curriculum, and the results of the 1996 investigation are presented.

THE IMPREMENTED CURRICULUM OF "ARITHMETIC EDUCATION"

The author conducted 15 "Arithmetic Education" lessons of 90 minutes each; each lesson comprised four parts. In part I, for about 20 minutes, students reflected on the previous lecture using reflective sheets that were completed by them at the end of the previous lecture. The concrete content from previous lecture on which the students reflected included points that the students were unclear about or had felt the need of questioning, etc.. In part II, lasting about 30 minutes, the teacher explained the key concepts of the present lecture to the students and gave them some easy problems to solve. In part III, for about 30 minutes, students were divided in pairs or groups of three to gain an in-depth understanding of the key contents of the participants lecture using the jigsaw method. The jigsaw method ensures that there is dialogue among learners'. Finally, in part IV, lasting about 10 minutes, students reflected on their learning through the jigsaw method and wrote their own reflection of their lesson on their sheet. The outline of the all the curriculum topics discussed in the 15 lessons and the contents of the jigsaw method are presented in Table 1. In addition, the content parenthesis in the Dialogue material column represents dialogue data. For example, since the dialogue data of the first lesson were contents for the mathematics education's aim of character building, practical, and cultural, this implies that in this case of jigsaw method was implemented by a group of three students. Students in charge of a Dialogue material do not know other materials. After students understood about a material in a group, all materials were gathered and unify by students with in charge of every materials. They conducted another dialogue in new group of three about the viewpoint.

Table 1. Implemented Curriculum of Arithmetic
Education

No	Content	Dialogue material
1	the transition of the	aim (character
	course of study and	building, practical,
	the aim of Arithmetic	and cultural)
2	competency, natural	definition of the
	number	natural number
		(set, Peano axioms)
3	count, numeration,	ancient numeration
	numeration system	system (Egypt,
		Babylonia, Rome)
4	addition, subtraction	types of calculation
	inverse thinking	and how to calculate
		(addition, subtraction)

5	multiplication, division, the thought of unification/evolution division calculation by writing, extension of multiplication, number line: set of	division (partitive division, quotative division) definition of multiplication (ratio, quantity)
7	expression Four-stages instruction of quantity, preservation, extensive quantity, Intensive quantity	learning (knowledge, studying)
8	constructivism, fraction, decimal	make sense of fraction, rational number and continuance
9	ratio, the way of researching teaching materials, number line: calculation	ratio (same kind/ different kind, ratio/ commission of ten percent/ percentage)
10	division of fraction, expression system, deduction/induction/ analogy	division of fraction (number line, area figure)
11	function variable, the idea of functional way	proportion (the definition of elementary or junior high school, ratio, probability, similar figure)
12	geometry activity of operating, definition/property, idealization/ abstraction, programming education	figure (connotation/ denotation, naming, recognizing conception)
13	utilization of data, figure graph, dot plot, five-number summary, box plot, statistical investigative cycle	PPDAC (types of thinking, interrogative cycle, dispositions)

14	curriculum how to write a lesson plan, lesson of problem solving	mathematical essence (four grade: division calculate by writing, five grade: fraction of each different denominator addition/subtraction
		six grader: velocity)
15	toward a practical teaching. reflection on this series of lessons	Nothing

RESULTS OF THE TWO QUESTIONNAIRES

In both pre-and-post-lesson questionnaires, there were two questions about how to view mathematics and expectations of mathematics education. A respondent chose one from the following four choices; 1 = strongly agree, 2 = generally agree, 3 = generally disagree, and 4 = strongly disagree. In order to consider the transfiguration from the pre- to postlesson questionnaire, the author performed the Wilcoxon signed rank test as a two-tailed test. Table II presents the results of the postlesson questionnaire, of the 1996 large-scale investigation (511 persons), and those of this study. The values in Table II are the sum of the percentage of affirmative reactions. In addition, since question No.9, 15, 16, 17, 20, 28, and 29 were rated on the invert scale, they were reversed and counted. The results indicated significant differences among 34 of the 55 items. The movement of all responses of the median changed in the affirmative direction in the postlesson questionnaire, except for question No.24.

Table 2. Results of the Two Questionnaires

I. H	low to view mathematics	Post	1996
1	Mathematics develops logical thought.	100.0	95.3
2	Mathematics develops judgment.	97.6†††	71.9
3	Mathematics develops creative power.	95.2†††	65.3
4	Mathematics arouses intellectual curiosity.	94.0†††	84.7
5	Mathematics develops problem solving.	100.0	94.7
6	Learning abstract mathematics facilitates mathematical application.	94.0††	64.5
7	Learning mathematical application facilitates logical thinking.	96.4††	75.9
8	Learning mathematical application deepens understanding of abstract mathematics.	95.2††	71.2
9	Mathematics is not practical.	83.1†	71.7
10	Wide use of mathematics is made in society.	95.2††	64.9
11	Mathematics is a game of symbols.	49.4††	27.4
12	Mathematics is necessary for daily life.	85.5††	79.2
13	Mathematics is abstract.	63.9†	48.1
14	Mathematics is not considered apart from world.	89.2††	74.5
15	Mathematics should only be taught to more able pupils.	81.9	92.0
16	Mathematics is more appropriate for boys than girls.	85.5†††	94.0
17	Many pupils fall behind in mathematics.	31.3	40.6
18	Mathematics is needed by everyone.	89.2††	77.7

19	Mathematics is a	92.8	61.0
	developing subject.		
20	Formality of mathematics	50.6	56.1
	is restricting.		
21	Mathematics is beautiful.	81.9†	44.1
22	Mathematics is free from	66.3†††	44.1
	external constraint.		
23	Mathematics has clarity.	89.2††	78.0
24	Mathematics can be	37.3†	60.0
	learned on an individual		
	being.		
25	Mathematics can be	89.2†††	50.2
	learned together		
26	in a group.	100.01	00.4
26	Many different cultures	100.0†	89.4
	mathematical thinking		
27	In mathematics afforts	80.2	72.7
21	in learning are rewarded	09.2	12.1
28	Only by persevering you	13.1	74.3
20	can enjoy mathematics	13.1	74.5
29	In mathematics efforts	88.0	91.4
	in mathematico, choi to	00.0	
	in learning not rewarded.		2112
30	in learning not rewarded. Everyone can enjoy	85.5†††	71.0
30	in learning not rewarded. Everyone can enjoy mathematics.	85.5†††	71.0
30 II. I	in learning not rewarded. Everyone can enjoy mathematics. Expectations of	85.5††† Post	71.0 1996
30 II. I mat	in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education	85.5††† Post	71.0 1996
30 II. I mat 31	in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students'	85.5††† Post 98.8†††	71.0 1996 93.9
30 II. I mat 31	in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy.	85.5††† Post 98.8†††	71.0 1996 93.9
30 II. I mat 31 32	in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student	85.5††† Post 98.8††† 100.0†	71.0 1996 93.9 98.3
30 II. I mat 31 32	in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of	85.5††† Post 98.8††† 100.0†	71.0 1996 93.9 98.3
30 II. I mat 31 32	in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics.	85.5††† Post 98.8††† 100.0†	71.0 1996 93.9 98.3
30 II. I mat 31 32 33	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to 	85.5††† Post 98.8††† 100.0† 94.0††	71.0 1996 93.9 98.3 90.4
30 II. H mat 31 32 33	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. 	85.5††† Post 98.8††† 100.0† 94.0††	71.0 1996 93.9 98.3 90.4
30 II. I mat 31 32 33 34	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. To emphasize the 	85.5††† Post 98.8††† 100.0† 94.0††	71.0 1996 93.9 98.3 90.4 81.8
30 II. I mat 31 32 33 34	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. To emphasize the appreciation of 	85.5††† Post 98.8††† 100.0† 94.0††	71.0 1996 93.9 98.3 90.4 81.8
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30 II. I mat 31 32 33 34 35	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. To emphasize the appreciation of mathematics. To emphasize the beauty 	85.5††† Post 98.8††† 100.0† 94.0†† 94.0††† 75.9†††	71.0 1996 93.9 98.3 90.4 81.8 50.4
30 II. I mat 31 32 33 34 35	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. To emphasize the appreciation of mathematics. To emphasize the beauty of mathematics. 	85.5††† Post 98.8††† 100.0† 94.0†† 94.0††† 75.9†††	71.0 1996 93.9 98.3 90.4 81.8 50.4
30 II. H mat 31 32 33 34 35 36	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. To emphasize the appreciation of mathematics. To emphasize the beauty of mathematics. To emphasize the logical 	85.5††† Post 98.8††† 100.0† 94.0†† 94.0††† 94.0††† 89.2††	71.0 1996 93.9 98.3 90.4 81.8 50.4 62.2
30 II. I mat 31 32 33 34 35 36	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. To emphasize the appreciation of mathematics. To emphasize the beauty of mathematics. To emphasize the logical property of mathematics. 	85.5††† Post 98.8††† 100.0† 94.0†† 94.0††† 75.9††† 89.2††	71.0 1996 93.9 98.3 90.4 81.8 50.4 62.2 20.2
30 II. H mat 31 32 33 34 35 36 37	 in learning not rewarded. Everyone can enjoy mathematics. Expectations of hematics education To develop students' autonomy. To have student experience pleasure of mathematics. To attach importance to thinking mathematically. To emphasize the appreciation of mathematics. To emphasize the beauty of mathematics. To emphasize the logical property of mathematics. To have students acquire accomputation of backstoped ability. 	85.5††† Post 98.8††† 100.0† 94.0†† 94.0††† 75.9††† 89.2†† 94.0	71.0 1996 93.9 98.3 90.4 81.8 50.4 62.2 89.3

38	To have students understand the basic knowledge of mathematics.	98.8	95.5
39	To emphasize communication in mathematics.	72.3†††	47.0
40	To emphasize the importance of proof in mathematics.	79.5†††	42.2
41	To increase topics on mathematics usefulness in society.	98.8	79.2
42	To increase topics on mutual understanding of various cultures.	75.9†††	51.7
43	To increase recreational topics.	78.3	64.9
44	To increase topics on history of mathematics.	53.0††	34.5
45	To increase topics on appreciation of mathematics.	79.5†	55.3
46	To attach importance to students' activities.	100.0††	93.1
47	Not to lower quality of mathematics content than now.	97.6	51.8
48	To think about learning that meet students' different degrees of progress.	96.4	95.1
49	To think about learning that meet students' interest.	97.6	95.7
50	To make good use of calculators and computers.	78.3	82.0
51	To advance evaluation that shows each students' progress.	98.8	95.5
52	To advance evaluation that takes up students' good points.	97.6	94.7

53	To have students acquire	85.5	37.9
	abilities of problem		
	solving helpful to		
	entrance examination.		
54	To prevent students	90.4	90.8
	from falling behind the		
	others.		
55	To appeal the importance	75.9†	50.6
	of mathematics to		
	society and parents.		

†...p<.05 ††...p<.01 †††...p<.001

DISCUSSION

Three characteristic points were highlighted by the transfiguration of the pre-and-post-lesson questionnaires, based on its correspondence with implemented curriculum, and contrast with the 1996 investigation.

First, in question No.16, the significant differences were observed, although they have not been studied by students as learning contents. The cause of this expression may be the use of the jigsaw method as the learning method. If this assumption is right, learning based on a dialogue may be able to solve the gender in mathematics education issue.

Second, compared with 1996 investigation results, students in this study had their own view

of mathematics, which included "mathematics is too difficult" and "I will continue doing my best alone in order to understand mathematics". This way of viewing mathematics may be connected to absolutism. When such a student becomes a teacher, his/her lesson may be based on the mathematics view of absolutism. An absolutism-based mathematics lesson cannot be child-centered (Minato and Hamada, 1994). This lesson of Arithmetic Education is based on dialogue, it cannot compel students to change their way of viewing mathematics sufficiently. It is an important subject concern to change students' way of viewing mathematics to become child-centered mathematics class everywhere.

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Proposal on Dietary Education Research and Dietary Habits Research in East Asia Countries- International Contribution through Comparative Study of Diabetes and Obesity

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Childhood obesity is a global problem in the 21st century, mainly affecting low-and-middleincome countries and associated with serious health complications. It is known to increase risk of non-communicable diseases (NCDs) in adulthood and premature onset of illnesses at younger ages, resulting in a shift towards longer life spans with chronic diseases. The behavioral risk factors causing obesity are unhealthy eating behaviors. Studies show that nutrition education taught at schools has significant positive effects on the knowledge and practice of healthy diets among children. Our earlier work on nutrition education found that the current nutrition education may need to integrate food preparation, cooking demonstrations and practice to reinforce the nutrition knowledge that students learn in schools. In this research, we will conduct and analyze intake situation surveys, and in parallel, recommend practical health management through activities such as workshops with the Brunei government via University of Brunei Darussalam, and

collaboratively establish primary and secondary education that promotes an understanding of the importance of food education in Brunei. The findings of this research can be used by professionals and teachers to plan, implement and evaluate nutrition education in Asian schools and would be useful for other countries with similar demographic characteristics and cultures.

INTRODUCTION

Childhood obesity is a global problem in the 21st century mainly affecting many low-andmiddle income countries and associated with serious health complications. The behavioural risk factors causing obesity are unhealthy eating behaviours. Studies had shown that nutrition education taught at schools has significant positive effects on knowledge and practice of healthy diets among children. Our earlier work on nutrition education in Bruneian schools found that the current nutrition education may need to integrate food preparation, cooking demonstration and practice to reinforce the nutrition knowledge that students learned in schools. Also, teachers described a healthy diet as balance and varieties dietary consumption, taking breakfast and eating regularly at the set times, furthermore they associated healthy eating with traditional and home-cooked food. The previous and this work are part of a larger collaborative project on school based nutrition education for lifestyle related diseases between Universiti Brunei Darussalam and Kagawa University Japan. Up to date, there is no evidence showing knowledge, attitude and practice on healthy nutrition among school teachers and the effectiveness of nutrition education intervention in Brunei. The findings of this project can be used by the policy makers, professionals and teachers to plan, implement and evaluate nutrition education in Bruneian schools and would be useful to other countries with similar demographic characteristics and culture.

RESULTS AND DISCUSSIONS

The education system in Brunei Darussalam is modeled on the British system. Following one year at pre-primary school, children enroll in primary school for six more years.

In Brunei Darussalam, home economics is included in the curriculum at the secondary school level, although it is not given great emphasis as a school subject. The current Sistem Pendidikan Negara Abad Ke-21 (SPN21) educational system specifies that, for the lower secondary education, home economics is taught as one part of "Business, Art, and Technology" (BAT) subject. For the upper secondary education, home economics is no longer a subject for all students, though there is an elective subject called "Food and Nutrition."

From a comparative perspective with Japan, it may be beneficial that the school curriculum includes home economics that emphasizes a combination of theory and practice as one subject so as to promote a healthy lifestyle among children. For example, in home economics classes in Japan, students have many opportunities to learn food selection and cooking methods, which are not taught in Brunei Darussalam's science classes. As a result, when Japanese students eat out or bring take-away food home, they may be equipped with the knowledge associated with the choice of food. Therefore, it is necessary to provide an opportunity for citizens, in particular, children, to learn how to select and cook food properly. It is important for the school curriculum in Brunei Darussalam to begin incorporating special topics and classes on home economics tailored to the needs of the society.

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What is a "Smart Person"? A Study of Education and the Learning Required for Japan's Future

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INTRODUCTION

If "Smart Cities" are developed in Japan, "smart persons" will also necessarily live there. What is such a "smart person"? What kind of human beings are they? How can they be brought up? How can they be educated? What kind of issues are they facing?

This paper aims to consider, from the viewpoints of education and learning, human beings in the future (a "smart person"?) who will live in "Smart Cities."

RESULTS AND DISCUSSIONS

1. How should we see the future society?

Contemporary Japanese society is characterized by various keywords, such as globalization, declining birthrate, ageing society, and information society. Furthermore, recently we frequently hear new words such as "AI", "IoT", "big data", and "Smart Cities." When and where will "Smart Cities" be realized?

According to Shirai Nobuo, such cities stay in the experimental stage and take a little more time in order to be real systems that can be introduced to society, including economic efficiency. Shirai indicated firstly that the concept of "Smart Cities" lacks software and humanware in spite of the fact that cities consist of not only hardware (technology) but also software (institutions) and humanware (people's consciousness and connections). Secondly, Shirai remarked that the concept lacks any consideration of the participation of the residents, and is thus primarily lead by companies. It will be important for the people to think about their own future society by themselves.

2. How will school education in Japan tackle future society?

Courses of Study in Japan are revised about once every ten years. The new Courses of Study announced in March 2017 assume that children will be able to adapt to the future society of around the year 2030. The Central Education Council in Japan regards this society as an era difficult to predict. It is becoming increasingly difficult to see the future in a society where globalization and information progress rapidly. In such a society, diverse subjects exert a mutual influence at a high speed and one event can propagate itself widely and complicatedly. The forecast of Michael Osborne of Oxford University, that the nearly half of all work will be automated 10 or 20 years from now, was cited in the discussion of issues in the special committee for the planning educational curriculum of the Central Education Council. It is not however a definitive description of society in 2030.

The new Courses of Study have emphasized a turn from a "contents-based curriculum" to a "competency-based curriculum." This means that it is more important what children can do rather than what teachers instruct children.

The required competencies for children can be divided into the three factors: 1. What children know and what can they do (knowledge and skills), 2. How they use what they know and what can they do (thinking ability, judgment ability, power of expression, etc.), and, 3. How children take part in society and live a better life (ability to learn, their humanity, etc.) Thus, it seems difficult to separate contents from competencies.

From the viewpoint of "Smart Cities", it is noteworthy that "Information Utilization Ability" has been introduced additionally to basic competency for learning, apart from language ability. Accordingly, programming language education will be required at elementary school from 2020. However, society does not always proceed linearly. The educational world has to take an appropriate distance from the demands of industry.

3. How can we be "Smart Persons"?

According to the reports of the Cabinet Office's Advisory Board on Artificial Intelligence and Human Society (2017) "education for properly utilizing AI technology" and "the cultivation of capabilities that are essential for human beings and capabilities that only humans can perform" is necessary. We must begin to discuss these issues. Through such a dialogue we can hope to be "smart persons". The word "smart" here means possessing sharpness and intelligence.

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Prediction of Total Organic Carbon Storage with Artificial Neural Network Model in 9 Northern Province, Thailand

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This research focus on using artificial neural network to predict the total organic carbon storage (TOC, kg/m²) in paddy filed soil in 9 provinces (Chiang Mai, Chiang Rai, Mae Hong Son, Lamphun, Lampang, Phrae, Nan, Phayao and Uttaradit) from input variables; soil property (CEC, %Silt+Clay, Bulk density, pH, SOM and %TOC) and land use intensity (years of using, plow or not plow, types of fertilizer, burn or not burn of rice stubble and remove or not remove of rice stubble). In order, to get all information, soil samples and questionnaires need to be collected over 9 provinces. In addition, all two type of input variables (soil property and land use intensity) and number of hidden node are investigated, to find out which parameters influence to the total organic carbon storage in paddy filed soil.

INTRODUCTION

Total Organic Carbon Storage (TOC) is the amount of carbon that available in soil and environmental service. To measure the TOC value it takes more times and money, so if we could have a better tool to help us for estimate or predict TOC it would be very helpful. An Artificial Neural Network model (ANN) is the model that has the capability to learn and predict some events or something such as forecast flood^[1], forecast soil loss^[2], predict Cu, Cd, Zn and Pb in soil^[3].

Moreover, there are many researches of using ANN to estimate TOC by using different information. For example, using topography, geology, soil and vegetation information^[4] or Gamma ray, bulk density, deep induction resistivity log data, sonic transit time^[5] or daily temperature, precipitation, runoff, catchment elevation, catchment location, catchment area, area of peatland expressed as fraction of catchment^[6] or petrophysical data^{[7][8]} or vis-NIR spectroscopy^[9] or hyperspectral of satellite image with field spectroscopy^[10] or climate, topography and satellite image^[11]. However, none of researchers have applied land use intensity information for TOC prediction. The objective of this study is investigation the ANN performance of predict TOC with soil properties and land use intensities.

DATA AND METHODOLOGY

We classified only paddy fields with Thailand soil series group for each province, then we random interview farmers in 9 Provinces (Figure1) and collected soil samples (total 198 farmers). The information of interview is about land use intensities; (1) year of using this land, (2) plow or not plow, (3) types of fertilizer; Chemical, Organic and mixed between chemical and organic, (4) burn or not burn of rice stubble and (5) remove of not remove the rice stubble. In addition, 7 parameters of soil property are selected; CEC (Cation Exchange Capacity, cmol/ kg), % of Silt+Clay, bulk density (g/cm³), pH, %SOM (Soil Organic Matter), TOC (kg/m2)



Figure 1. Study area

and %TOC, also the maximum and minimum value of each soil property are 15.55/1.20 kg/ m² (TOC), 3.88/0.26 (%TOC), 1.94/0.92 g/cm³ (Bd), 46.60/1.0 cmol/kg (CEC), 95.04/12.32 (%Silt+Clay), 7.95/4.72 (pH), 6.79/0.21 (%SOM) and 50/6 years. In addition, it has been found only 1 sample with no plow, 67 samples using only chemical fertilizer, 11 samples using only organic fertilizer and 120 samples using both fertilizer, 46 samples with burn the rice stubble and 100% do not remove rice stubble.

This study is about using ANN model to predict TOC from soil properties and land use intensity. For finding which parameters influence TOC in soil, so 4 experiments have been investigated.

- Model A: 6 soil properties (CEC, % of Silt+Clay, bulk density, pH, SOM and %TOC) and 5 land use intensities (11 input variables).
- Model B: only 6 soil properties (6 input variables).
- Model C: only 5 soil properties without %TOC (5 input variables).
- Model D: 5 soil properties without %TOC and 5 land use intensities (10 input variables).

All 198 samples were divided into 2 groups, one for learning (161 samples) and testing (37 samples). The neural network model in this study use Levenberg-Marquardt (LM) learning algorithm with validation data set as randomly, so this model was repeat running model for 30 times and the results for each model is the average of 30 results.

Table 1 presents number of interview farmers in 9 provinces. It can be seen that some provinces have few number of samples it is because of when out team went to the paddy field area, it was very difficult to find the farmer around that area.

Province	Training	Testing
Chiang Mai	10	2
Chiang Rai	29	7
Mae Hong Son	41	10
Lamphun	4	1
Lampang	14	2
Phrae	21	5
Nan	12	3
Phayao	16	5
Uttaradit	14	2

Table 1. number of samples for training and testing for each province.

Moreover, number of hidden nodes are investigated, in this study, number of hidden nodes are set to n and 2n where n is number of input variables. As a result, hidden nodes of model A are 11 and 22 nodes, model B are 6 and 12 nodes, model C are 5 and 10 nodes and model D are 10 and 20 nodes.

RESULTS AND DISCUSSIONS

Fig 2. Shows the results of prediction TOC (kg/m²) that represent in black line. Model C and D, which use input variable similar with Model A and B excepted %TOC show better results than models that include %TOC as input variable.



Figure 2. Results of model A, B, C and D

For better finding the best model performance, an error equation (1) is applied, if the error value close to zero it means that model is good performance.

$$\text{Error} = |ai - a'i| \tag{1}$$

Where ai is the observed TOC value a'i is the predictions TOC value

Fig 3 shows the model's error value of prediction. It is obvious that models using input variables without %TOC seem to be able to predict TOC values as the average of errors for model An, A2n, Bn, B2n, Cn, C2n, Dn and D2n are 2.80, 2.80, 2.79, 2.70, 1.72, 1.79, 1.77 and 1.83 respectively. In addition, for different number of hidden nodes, it has been found that using hidden node n and 2n provided similar result. However, the average error value shows that model Cn (soil property without %TOC and number of hidden node same with number of input variables)



Figure 3. Errors of model A, B, C and D

Basically, the amount of TOC would depend on soil property itself and land use intensity is the major parameter of control the amount of TOC in paddy soil. However, this study can be concluded that predicts TOC (kg/m²) from soil properties; CEC, % Silt+Clay, bulk density, pH and SOM could be used as the input variables, but overall results is not perfect fit. The reasons to explain why model C, which uses only soil properties without %TOC, is the best model than other models, are %TOC actually calculated from TOC values (kg/m²) and %TOC values overall are less than TOC values as a result it influences model performance and make model was underprediction. In addition, all samples of this study are not cover or have no variety of all land use intensity types such as all 198 samples did not remove rice stubble and almost 100% of sample plow the soil.

For the future research, more soil properties may need to be conducted and with more varieties of land use intensities or using only land use intensities as input variables.

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Inferring Passenger Travel Demand to Improve Urban Mobility in Developing Countries Using Cell Phone Data: A Case Study of Senegal

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A rise in population, along with urbanization, has been causing an increase in demand for urban transportation services in the sub-Saharan Africa countries. In these countries, mobility of people is mainly ensured by bus services and a large-scale informal public transport service, which is known as paratransit (e.g., car rapides in Senegal, Tro Tros in Ghana, taxis in Uganda and Ethiopia, and Matatus in Kenya). Transport demand estimation is a challenging task, particularly in developing countries, mainly due to its expensive and time-consuming data collection requirements. Without accurate demand estimation, it is difficult for transport operators to provide their services and make other important decisions. In this paper, we present a methodology to estimate passenger demand for public transport services using cell phone data. Significant origins and destinations of inhabitants are extracted and used to build origin-destination matrices that resemble travel demand. Based on the inferred travel demand, we are able to reasonably suggest strategic locations for public transport services such as paratransit and taxi stands, as well as new transit routes. The outcome of this study can be useful for the development of policies that can potentially help fulfill the mobility needs of city inhabitants.

27-29 August, 2018

Session 2 :

Regional Economy and Creativity

Chair Person :

Pichayalak Pichayakul (CMU) Ravindra Raghunath Ranade (KU)

> August 27th, 2018 Session Program 11.00-12.00 hrs. Session Program 13.00-15.20 hrs.

> August 29th, 2018 Session Program 09.00-11.20 hrs.

> > Venue: Pin Malakul Room, Fl. 3

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DMO and the Characteristics of Tourism in Kagawa Prefecture

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INTRODUCTION

Recently not only Japan but Kagawa prefecture has big problems which consist of depopulation and aging. Almost of all prefectures are struggling to overcome the problems.

One of the solutions is tourism. As a tool of industry development and regional vitalization, tourism –especially inbound tourism- is used all over the country. There are some successful cases in Japan. Kagawa prefecture started to engage in tourism promotion about ten years ago.

In Japan the government (Japan Tourism Agency) allows the prefecture, region or city to make a DMO. DMO is a destination marketing or management organization and means an organization that promotes a city, region, or prefecture in order to increase the number of visitors. A DMO promotes economic development of a destination by increasing visits from tourists and business travelers. Kagawa Prefectural Tourist Bureau was approved to become a DMO by Japan Tourism Agency in 2017. Kagawa DMO consists of

Kagawa prefectural office, city and town offices in Kagawa prefecture, city and town tourist bureaus in Kagawa prefecture, Kagawa University and companies which relate to tourism like railway, hotel and tourism agency.

RESULTS AND DISCUSSIONS

The number of international visitors to Japan in 2016 was 24.04 million, exceeding the record of 19.74 million set in 2015, an increase of 21.8% from the previous year. It was the fourth consecutive record-setting year. The number of international visitors to Japan from Asia reached 22.8% over the previous year with 20.1 million people, and the percentage of international visitors to Japan occupied 83.6%. The reason why the number of international visitors to Japan has increased steadily is that tourism is regarded as the pillar of Japan's economic growth strategy, and one of the main components of the regional revitalization. Other reasons include the implementation of bold initiatives that have never been done before, such as visa relaxation, consumption tax exemption for international visitors, improving the acceptance environment through multilingual notation and enhancing the CIQ system, all brought about through promotions resulting from cooperation between the Japan National Tourism Organization (JNTO) and other tourism officials.

The amount of consumption in Japan by international visitors rapidly expanded from 2012 and rose 7.8% from the previous year to 3.7476 trillion yen in 2016.

In 2015, Japan had resulted in a total annual payments surplus (1.0902 trillion yen) for the first time as a calendar year in the 53 years since 1962. In 2016, the surplus in the travel balance increased further, reaching 1.3266 trillion yen.

In Kagawa prefecture the number of international visitors who stayed at was about 40,000 people in 2012 and increased by about 450,000 people in 2017. During these years the flight between Hong Kong and Takamatsu was taken in 2016 and the flight between Kaohsiung and Takamatsu and the flight between Shanghai and Takamatsu were taken in 2017. Korea, China, Taiwan, Hong Kong are the main markets and, in collaboration with local travel companies and media, promotion has been carried out according to characteristics of each market. Kagawa prefecture sets up a multi-lingual call center dedicated 24 hours daily and translates conversations and e-mails to tourist facilities, accommodation facilities, restaurants and retail stores.

The survey for visitors shows that the evaluation of accommodation facilities in Kagawa prefecture was higher than national average. That is, the quality of accommodation facilities was high and visitors felt hospitality.

It can be said that tourism promotion has been successful these years in Kagawa prefecture.

On the other hand, there are some problems. There are as follows. 1) Kagawa DMO doesn't make a clear definition of their target or their marketing strategy. 2) They have not grasped the players who are engaged in tourism yet. 3) They can't grasp the tourism behavior of international visitors. 4) Tourist information exists separately and it can't be unitized. 5) The ratio of repeaters is lower than other destinations. And the proportion of intention to re-visit is lower than others. 6) The evaluation of the natural landscape and the townscape in Kagawa is lower than other destinations.

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Community Potential for cycling and cultural tourism: A case of Mae Hong Sorn Village

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The research is conducted to evaluate the community potential for cycling and cultural tourism at Ban Muang Pon Village, Khun Yaum District, Mae Hong Sorn Province. The data by questionnaires was collected from two sources: 60 villagers and 85 tourists, in-depth interview, and participatory observation in all activity. The first data collection is from community members, who are involved with community based tourism activities and the second source is from 85 tourists, focused on tourist expectation and satisfaction with the activities provided. The topics covered include; Community based tourism management, Community tourism activities, food service, homestay accommodation and security as well as evaluation of the rally activities with community tour. Measurements scaled the attractiveness of the cycle route and attractions in the area.

The survey found that the Community expectations for tourist services and community satisfaction towards tourist services at a satisfactory level. It was likely to increase in every evaluated category after they had experience in tourist service. Same as the tourists, who come for the bike rally activity, the expectations for the community and the satisfaction of tourists to the community was found to be at a satisfactory level. The result from this study will be used to further develop Community Based Tourism activities, as well as Sport and Cultural Tourism for the future market.

Introduction

The 'Bike for Dad' activities attracted mass interest in Thailand in 2015. King Maha Vajiralongkorn led the Bangkok procession and hundreds of thousands of others took part across the country (Terry Fredrickson, 2015). This activity spurred demand for cycling tourism which has increased over the last two year. Biking is not merely a type of physical exercise, but it also offers a rich and meaningful experience that supports physical and mental well-being.

Promoting bike tourism can help improve the tourism industry, reduce carbon footprint and save energy, as well as create more employment opportunities (Executive Yuan, 2014). The bike rally and activities combined tourism and transportation facility from other cities to showcase, cultural diversity. This activity invited bike riders from Chiang Mai, Lam Phun, Lam Pang, and Mae Hong Sorn Province to explore the beautiful village and culture.

RESULTS AND DISCUSSIONS

Site Preparation & Opportunity In Cycling Tourism

Community collaboration was very important for site preparation, by community's leader, women group, souvenir group, Home Stay group, the community young tour guide; called "TEAM". A meeting was organized to understand the activities of all stakeholders.

Discussions focused on the important aspects of good cycling destination: bike trial with good signage, routes with variation and good description of place to stop, things to do along the route and places to eat, safe bike parking, dry rack for wet clothes, good map, local food and drinks, good accommodations, good sight-seeing areas and cultural experience.

COMMUNITY POTENTIAL IN CULTURAL TOURISM

Muang Pon village is located in Khun Yaum District in Mae Hong Sorn Province. People in the community have a strong Tai Yai culture since the majority had migrated from Shan State, Burma since the year 1801. The community maintains its Tai Yai traditions very well. The highlights of Muang Pon Community, is for the tourists to join the colorful Buddhist celebrations; stroll along the streets of Muang Pon, admiring traditional Tai Yai architecture, including Muang Pon temple and rustic wooden homes thatched with leaves and intricately carved, tiered gables; watch nimble-fingered artists weave and carve bamboo, wood and metal into exquisite patterns; and enjoy healthy and delicious Tai Yai cuisine with welcoming host families.

Tourist can join a festival of the Tai Yai calendar, from December to November, including monthly celebrations. Local people in Muang Pon are particularly keen to invite guests to join in and learn from this living culture. Guests who visit this village during traditional celebrations can help local people to prepare for the festival, for example, by learning how to make simple paper decorations, preparing special local food, etc.

Muang Pon morning market offers the perfect introduction to the healthy, herbal Tai Yai kitchen. In addition to enjoying delicious food at home, guests can meet organic farmers, visit the morning market from 05.00 – 06.00 am to buy typical local snacks, drop by Muang Pon food processing group to taste healthy fruit and nut snacks, or simply go for a stroll in the late afternoon to pick up home-made snacks from tiny stalls which families set up every day.

Furthermore, tourist can met the local artisans and find unique souvenirs. There are many artisans in Muang Pon, and the chance to watch and learn from them such as, Tai Yai dress is considered an appropriate symbol of Mae Hong Son, blending beauty, natural simplicity and attention to detail. In Muang Pon, local women produce Tai Yai clothes individually and in artisan groups. Members of the 'Tai Yai Dressmaking Group' share work: designing, cutting and stitching different sections of clothing and helping to finish final dresses. Kup Tai, the iconic Tai Yai conical bamboo hats are also produced in Muang Pon, for sale as souvenirs in Mae Hong Sorn and further afield. Tourist can learn how to make bamboo weaving products with the expert villager.

There are many community groups in Muang Pon, where work and opportunities

are shared between several families and artists. Muang Pon's Food Processing group uses mainly organic ingredients, including solar-dried fruits. They offer discounted prices to local youth, to encourage them to eat healthily. Members of the community based tourism group donate 5% towards group management and activities from their income.

Tourist Expectation And Community Potential

Tourist expectation and community potential, was evaluated by questionnaires in 6 categories; 1) Community based tourism service and management skills, 2) Public relations skills, 3) Tourism site and activity 4) Food service to tourists 5) Accommodation services (Home stay) and 6) Community safety. The tourist evaluated their expectation immediately when they arrived in the village, before joining the bike rally activity. It was found that tourist expectation in the high level in every category. Same as the villager's potential in tourism, they evaluated themselves in a high level; but it was less than tourist expectation in every category. (see Figure 1)



Figure 1. Community expectation & satisfaction, Tourist expectation & satisfaction in community potential in tourism

After finishing the bike rally activity, researchers evaluated community member and tourist satisfaction in the same 6 categories. It was found that tourist satisfaction was higher than their expectation then in tourism potential, local food, homestay and safety. But it was lower than their tourist expectation in management and public relations.

Community members, involved with tourism and

Rally activities, rated their satisfaction level higher than their expectation in every category. This finding will empower the members to support the new tourism activities.

For the rally activity, cycling, researchers evaluated the marketing activity, rally activity and tourism route along with attractions. It was found that tourist satisfaction was higher than their expectation, in the high level scores. Same as the community member was rated themselves in the high level score also. When comparing the tourist and community satisfaction it was found that tourist appreciated the marketing activity and rally activity at a high level; but was lower than community satisfaction in tourism route and attractions. (see Figure2)



— Community Depetation -----Community satisfaction ----Tourist Depetation with satisfaction Figure 2. Community expectation & satisfaction, Tourist expectation & satisfaction in Marketing activity, rally activity and Tourism route & attraction.

CONCLUSION

Community expectations for tourist services and community satisfaction towards tourist services are at a satisfactory level. It was likely to increase in every evaluated category after they had experience in tourist service. Same as the tourists, who came for the bike rally activity, the expectations for the community and the satisfaction of tourists to the community are at a satisfactory level. The results from this study will be used to develop the Community Based Tourism activity, as well as Sport and Cultural Tourism for the future market.

ACKNOWLEDGEMENT

This project was supported by Ministry of Tourism and Sports Mae Hong Sorn Province.

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Spatial Analysis of Tourist Areas in Burundi

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INTRODUCTION

Today, Burundi Tourism is still at the embryonic stage and its development is at a very low speed. According to WTTC 2018, the total contribution of Travel and Tourism to GDP was BIF271.7bn (USD151.0mn), 5.1% of GDP in 2017.

The aim of this paper is to clarify the usage of tourist areas in Burundi from a spatial perspective based on criteria of accommodation price and accessibility. This paper introduces a spatial tourism actuality to Burundi stakeholders useful for the promotion of inbound tourism. The data analysis adopted in this research is the spatial analysis.

ANALYSIS

1. Accommodation Price criteria

A destination where the prices are high may earn a reputation of being exclusive or luxuryoriented. Therefore, price levels influence valuefor money-perceptions (Alastair M. Morrison, 2013).

467 Accommodation facilities prices and geometric coordinates were collected in 18 provinces of Burundi and they were divided into 3 equal intervals groups to form three classes: - High Price: 13,500- 1,138,800 BIF

- Medium Price: 8,500- 12,500 BIF

- Low Price: 4,000- 8,000 BIF

Note: BIF is Burundi currency called Burundian Franc

1US \$ = 1,755.70 BIF

On the map, Kernel Density Estimation were used to evaluate areas where there is a high concentration of high price accommodation, medium price accommodation and low-price accommodation.

2. Accessibility criteria

This paper focuses on the accessibility of the two main elements of Tourism: Accessibility to accommodations from National Roads and accessibility to attractions from Accommodations. Buffering is one the most commonly used proximity techniques in GIS because distance constraint is a major concern in many types of spatial-analysis applications (Lan Mu, 2008). 400m, 1.5km and 3km buffer were considered as walking distance for 5min, 15min and 30min, respectively (i.e. 6km/h) (Yong, Y., Ana V; 2012).

RESULTS AND DISCUSSION

The combination of the accommodation price criteria and Accessibility criteria resulted into a creation of 8 different tourist areas in Burundi.



Figure 4. spatial map of Tourist areas based on accommodation price and accessibility criteria Note: HP: High Price; HA: High Accessibility; MP: Medium Price; MA: Medium Accessibility, LP: Low Price; LA: Low Accessibility.

However, Bull (1994) points out that when a hotel is well located, this increases its value, thus allowing hotel managers to charge a premium in a comparison. Thus, the high accessibility of a tourist areas should imply the high price of accommodation. Based on the above fact, the researcher has therefore grouped all the 8 tourist areas obtained from the analysis in to three tourist areas categories: Equitable area with attributes of HP- HA, MP- MA and LP- LA; Biased area which has the opposite attributes than the equitable area and Tolerable area that is in between the above two tourist areas categories.

However, this study only focuses on the spatial analysis to assess the tourist areas in Burundi. The future researches should focus on the details about the internal factors within the tourist areas such as the accommodation facilities, Entrance fees to the attractions, service delivery etc.

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Efforts in Kagawa region towards economic development – the use of culture, religion, art and tourist attractions

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INTRODUCTION

The regional economies in Japan have always made great efforts to uplift themselves. Kagawa is no exception. The region is not very remote but links with the central economy are weak. The purpose of this note is to look at the possible strategies and efforts made for its development. The first section looks at the possible uses of culture, art, religion and tourist attractions for boosting the economy. The second discusses if these efforts are at the cost of other regions or there is a complementary effect possible. The presentation will be made by 10 undergraduate students at Kagawa University - namely -Dong Chen, Kosuke Hayakawa, Taishin Hirata, Sakina Ikawa, Tsukika Iwashima, Mami Kato, Rie Nakagiri, Masami Noguchi, Madoka Ouchi and Kazunori Yakushiji.

POSIIBILITIES FOR EFFORTS

Culture of a region is obviously important. Kagawa, being the smallest of prefectures has its own well defined – based on work ethics, noodle lunches and evenings in downtown. With the expansion of suburban communities and car driving work force, the bubbling down town started looking deserted since past 15 years or so. The shutters were down, the shops not very attractive and food and drink places started looking forlorn. This was particularly important for Takamatsu city, the urban hub of the region. Efforts were needed to be made by real estate developers, banks, local government and the downtown traders to work something out and revitalize the old culture. This led to the reconstruction of the area called Marugamemachi the central part of Takamatsu city.

Religion was always very important for this region. The famous priest called KoboDaishi introduced important tenets of Budhism to Japan, He was born in this area and he and others later on developed a series of temples -88 in all – spread over Shikoku. Kagawa has its share of 22 of them. There is a strong tradition of pilgrims visiting these temples in succession and renewing their personal lives. Past few years, effort have been made to use this tradition to revitalize the local economy. The pilgrimage by itself has been put of for inclusion in the UN list of World Heritage, NGOs, temples and the local government have gotten together to promote the tradition. Art in Japan tends to be for the moneyed class. A lot of Japanese artists were influenced by Western art and a few of very noted ones made this area as their home. The area has a number of charming and quaint islands and some artists converted one of the islands as an open air museum. The islands around are linked by boats – but they do remain what they are – islands. The local government and art oriented people got together and started organizing events and attracted art lovers from all over the world this gave the regional economy a boost.

Tourism has always been an integral part of efforts of development whenever possible. Three important landmarks belong to this area. One is an extremely well laid Japanese garden which some think is better than the 3 famous ones in other parts of Japan. There is volcanic tableland which was a site for a famous medieval battle and is much popular for visitors. The third is a famous shrine on the mountain with a very classical Kabuki theatre at its base, Efforts have been made by the local government to improve the landmark and think of boosting tourism through these.

Last, but not the least, it is a folly to discount contribution of youth in the development of any region. Many of the regional economies have taken a nosedive in Japan because the youth has migrated to other urban centers leaving the areas for frail older generation. Luckily, there is an input of youth into Kagawa area because of the education as well as a flourishing job market. The young population has made some exciting contributions to the economy. Quantitatively, it may not be so big but it compensates in quality.

EFFECTS OF THE EFFORTS

Development looks different if it is of the zero-sum variety, If a region grows at the cost of some other, it is not always clear that it is a change for the better. If it has a complementary effect on the development of other regions then it is much more welcome and appreciated, It is important to look at the Economics of the efforts in Kagawa. The presentation by the students looks at the evaluation of the efforts. They do not use high tech concepts of cost-benefit analysis or opportunity costs, but should be seen as a first tentative step towards a better analysis.

CONCLUSION

The strategies for development that use a zero sum kind of philosophy are detrimental to the overall economy, but those which result in enlarging the cake are the ones that need to be adopted. Perhaps, stating the obvious. We skip the references. But following are the wiki pages for those interested. https://en.wikipedia.org/ wiki/Takamatsu,_Kagawa https://en.wikipedia.org/ wiki/Takamatsu,_Kagawa https://en.wikipedia.org/ wiki/Shikoku_Pilgrimage https:// en.wikipedia.org/wiki/Naoshima,_Kagawa https://en.wikipedia.org/wiki/Sanuki_ udon

Development Economics Reconsidered: From a Gandhian Viewpoint

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INTRODUCTION

Development Economics not only prescribes ways for a given society to achieve development, but it also functioned as an anti-communist ideology in the context of the Cold War. As the United States and other capitalist societies implemented development assistance on a large scale to prevent the poor countries from turning communist, Walt W. Rostow's theory of "take-off" had a great impact on development economics that was formed afterwards.

At the conclusion of the Cold War, the focus of development economics shifted from economic enhancement of a given society to that of people's freedom. Then Amartya K. Sen formed with others the theory of "human development" at the United Nations Development Programme (UNDP), which has since been widely accepted in the field of development studies.

Both Rostow and Sen seem to praise what was attained in developed societies. However, not every society could pursue the same level of material affluence as that in the United States, subject to the limits of global resources and environment. Contrary to their theories, Ernst F. Schumacher, Gandhian economist, coined a concept of *Small is Beautiful*. In this presentation, I would like to review development economics from a Gandhian viewpoint. Firstly, I will show how development of the Third World became an important issue in the context of the "East-West" conflicts. Secondly, the two development theories, mentioned above, would be critically analyzed. Thirdly, a Gandhian viewpoint, expressed in Schumacher's work, will be discussed. Lastly, it will be considered what a form of socioeconomically and environmentally sound economics would be like.

FINDINGS

The global poverty was recognized in the context of the "East-West" problem in the middle of the 20th century. Oliver Franks mentioned in his address before the US Committee of Economic Development in 1960: "Earlier the problems of East-West tension were dominant: now we have a North-South problem of equal importance. It is connected with the former but has its own independent and equal being" [Franks 1960: 20]. Assuming that underdevelopment is the cause of poverty, development economics started to prescribe ways of economic growth for the Third World, with a purpose of preventing them from turning communist. In this context, Rostow's theory of "take-off" asserted that a given society would experience 5 stages of economic growth: 1) traditional society, 2) the preconditions for "take-off", 3) "take-off", 4) drive for maturity, and 5) the age of high mass-consumption [Rostow 1960]. At the conclusion of the Cold War, the focus of development studies slightly shifted from economy to people. The UNDP invented a concept of "human development" based on Sen's idea of "capability" [UNDP 1990].

However, both Rostow and Sen, like many other economists, seem to praise what was attained in highly developed societies and fail to recognize that every one of 7.4 billion people on the earth would never be able to appreciate the same level of living standard as the average citizen of the United States.

Questioning the idea to "follow the road to riches", Schumacher asserted in his *Small is Beautiful* that it would be necessary for us to reduce our needs with the limit of the earth. This argument was based on Gandhi's words: "The earth provides enough to satisfy every man's need, but not for everyman's greed" [Schumacher 1973: 29].

CONCLUSION

Since the days of Adam Smith, economists have long been concerned about how to provide human employment and welfare on the process of economic growth. On the other hand, Schumacher and other Gandhians would consider how people could live together within this closed planet. Many people might refuse the idea of a "small economy". However, the more unrealistic the idea may look, the more fundamental criticism of the status quo it would conceive. This idea, based on Gandhism, would suggest us a way for a sustainable society, in order for us to renovate modernity from within itself.

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Empirical Causal Relationships between Money Supply and Stock Markets in China

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INTRODUCTION

With the deep economic reforms and development of China's economy, the causal relationship of stock price indices and money supply factors have become one of the hottest topics in national economy. Based on traditional model, Wang and Zou (2011) showed that the impact of money supply on Shanghai and Shenzhen stock markets is significant, but Xiao et al. (2012) showed that M2 and interest rate have no effect on stock market, Zhang et al. (2013) also showed that M1 has a significant effect on stock prices. Li et al. (2017) showed that M2 has no significant effect on stock prices. Granger's non-causality approach (Granger 1969) is broadly applied to investigating the causal relations of multiple time series. In view of Granger's non-causality idea, Hosoya (1991) introduced the causal measure of one multiple time series to another in the time domain as well as in the frequency domain. Yao & Hosoya (2000) proposed the Wald test of the one-way effect causal measure. In this paper we apply the approach of one-way causal measure to analyze the dynamic causal relationships between monetary policy and stock price index in China.

ECONOMETRIC MODEL AND DATA

We summarize the main results of the causal measures of the one-way effect for multiple timeseries based on ECM. For mathematical details see Yao & Hosoya (2000), Yao (2007). Denote $Z(t) = (X(t)^*, Y(t)^*)^*$, consider a non-stationary but integrated with order one multiple time series process generated by the following ECM

 $\Delta Z(t) = \alpha \beta^* Z(t-1) + \sum_{k=1}^{a} \Gamma(k) \Delta Z(t-k) + \mu + \varepsilon(t)$ (1) The frequency-wise measure of one-way effect from {*Y*(*t*)} to {*X*(*t*)} can be defined by

 $M_{Y \to X}(\lambda | \theta, \psi) = \log \left(\det f_{11} / \det \left\{ f_{11} - \tilde{f}_{12} \tilde{f}_{22}^{-1} \tilde{f}_{21} \right\} \right)$ (2) The overall measure of one-way effect can be defined by

$$M_{Y \to X}(\theta, \psi) = \frac{1}{\pi} \int_0^{\pi} M_{Y \to X}(\lambda \mid \theta, \psi) d\lambda$$
(3)

The integral of the frequency-wise measure of one-way effect on the specific frequency bands can be used for testing the long- and short-run causal relationships. Johansen's likelihood ratio approach (Johansen 1996) is applied to determine cointegration rank and the corresponding adjusting matrix.

We discuss the monthly data (from July 2010 to December 2017) of M1, M2, interbank Call Rate (CR), Shanghai Stock Exchange Composite Index (abbreviated as SH), Shenzhen Stock Exchange Composite Index (abbreviated as SZ). M1 and M2 are from the People's Bank of China. Call Rate is judged by the monthly average of 1-day interest rate at the end of the month, based on the website of Shanghai Interbank Offered Rate. SH and SZ are the monthly average of daily treading results at the end of the month, based on the Wind Economic Database.

EMPIRICAL CAUSAL RELATIONSHIPS

The empirical results show us that both of SH and SZ give strong effect on M2. We can see the effects reach their peak around 7-months cycle, and the effects are long-run. As for the reverse, only the one-way effect of M2 to SH is observed but seems only long-run. The effect of SH to M1 is significant but not short-run. The effect of SZ to M1 is much larger than that of M1 to SZ. The effect of M1 to SZ is significant but only longrun. SZ give strongly effect on M1.

The effects of CR to SH and revers are only significant at 0.1 critical level. The effects of CR to SZ and the reverse are significant. Both of the effects of SH and SZ to CR are very small and only long-run. The effect of CR to SZ is not long-run. We also observed that the effect of stock market indices in China to M2 is much larger than the effect of stock market indices to M1.

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On Strategies for Improvements in Relatively Less Developed Regions

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INTRODUCTION

The regional economies are linked to the central economy, however remote the region is. The purpose of this note is to look qualitatively at the possible strategies for development of regional economies. The first section looks at lessons of history and what are the key issues at the back of strategies. The second discusses strategies employed in post war Japan and how the regions were connected to the central economy.

LESSONS FROM HISTORY

In History, there have always been winners and losers. In Economics, we talk about Haves and Have-nots. Sociology, Political Science, inevitably, have things to say on what constitutes an underdeveloped region and how we may think about improving the situation. There are supposed to be regions in the USA where development left the Ghost Towns behind. If we look at the history of big cities, eg, Los Angeles was just a village of about 1000+ population in 1830s. But the 1849 Gold Rush in the San Francisco area ensured that ranches for beef and fruit developed in Southern California in 20 years, and Los Angeles continues to grow even now. They took the opportunity, but it was not at the cost of other regions. To give another example, the French had heavy influence in some southern American states – the main city there being New Orleans. But it is interesting to see why the monument - jokingly sometimes called the lady with the ice-cream cone - is not in New Orleans but is in New York. New Orleans was a good port which had access to the heartland and the breadbasket of Illinois etc. because of the great rivers like Mississippi and others. But the politicians of New York State had vision. They used upstate New York to connect the Hudson and the great lakes using canals and the lock mechanism to raise the boats on top of mountains and bring them down on the other side. Atlantic trade flourished and as New York City was nearer to France it developed more than New Orleans. The French were happy to gift the Statue of Liberty to New York City. There would be many more such examples possible. The main point to note, however, is Geography, opportunity, political will and economic investment are the key issues for the development of regions. Incidentally the NY Governor was one Mr. Clinton. He did grab the opportunity, but it was at the cost of South USA.

DEVELOPMENT STRATEGIES IN JAPAN

Let us look at Japan in this context. It was a war machine till 1945, with no advantage of Geography, the opportunities in Asia were monopolized by the European usual suspects. The political will was with the rightists, so investments were made in the war machinery. After the Americans left in 1950s, Japanese thinking turned inwards. They still had no geographical advantage, opportunities had moved to Europe, thanks to the Marshal plan, but the political will was strong and had many communistic ideas - not as much in the political sense but in a social structural sense. They tried investments in multiple new industries. Many attempts failed. Some of us who are old enough, may remember how Japanese goods were looked down upon in India till about early 1960s. The opportunity of Olympics arrived in 1964. There was old network of railway mainly connecting Tokyo and Osaka-Kobe via Shizuoka, Nagoya and Kyoto. Cheap land and a quest for a short route resulted in the New Trunk Line (SHINKANSEN) - known popularly as the Bullet train. The point of interest from South Asian perspective is that, while connecting the two cities, it was ensured that the old network was updated and used as a feeder framework at the multiple hub points on the route, allowing for development of the local regions. Secondly, Japan got EXPO 70. It was decided to develop the Osaka region, many of us - old enough may remember the square shaped transistor radios handed as gifts. They were brought to India, copied and I do remember buying one in Chandani Chowk in Delhi in 1975. Thirdly, there was an eccentric dreamer in Japan over 150 years

ago who imagined Japanese people able to walk across the 4 main islands. It is worth noting that the shortest distances between the main island and the other 3 are of the order of about 10 to 15 kilometers. The influential political leadership of the cold regions of northern Japan resulted in the island of Hokkaido being connected with an undersea tunnel and some bridges. These got cities like Sapporo and Otaru into the development designs - both generating linked urbanization of surrounding areas. Also, the Bullet train network was extended southwards to get cities like Okayama and Hiroshima into the main economy, and further to the city of Fukuoka in the southern island of Kyushu. The somewhat neglected island of Shikoku which is like a baby animal to the mother island of Honshu was the last to be connected with a 15 kilometer series of bridges over the sea. These bridges were double decker ones with the train as well as road connection. This happened in late 1980s. And the Japanese celebrated by organizing a walk over the bridges to fulfill the eccentric dream. Throughout this development, it was made sure that the development of regions is not at the cost of others. This aspect of the strategy is rather important.

CONCLUSION

The strategies for development that use a zero sum kind of philosophy are detrimental to the overall economy, but those which result in enlarging the cake are the ones that need to be adopted. Perhaps, stating the obvious. We skip the references.

Limitation of ThaiLabanXML Standard Representing in Unity 3D Program

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An intangible cultural heritage (ICH) is a practice and expression in Thai dance representing emotion of each character through dance movement. In Asia, such living traditional art forms could be preserved with the help of technology. Many countries have been preserved and recorded the dance movement using various Dance Notation Systems. The most commonly used and well known in European counties, the United States and Asia is an Abstract Symbol Systems called "Labanotation". Labanotation system is one of the developed systems to record the dance movement. Yet, the system could not fully translate and represent the dance movement data into 3D animation. In the past, two standards had been implemented to translate and display the dance movement, LabanXML, and MovementXML standard. However, both standards could not meet the need of representing Thai dance in 3D animation due to some of the limitation. Hence, ThaiLabanXML standard had been developing for interpreting Thai Laban notion scores into ThaiLabanXML files to translate the human-readable information such Thai Laban notation score to machine-readable information such ThaiLabanXML file using the developed plugin and a compatible computer language to display Thai dance movement in Unity 3D

program. This paper will focus on the elaborate advantage and disadvantage on ThaiLabanXML standard collaboratively with Unity 3D program to represent Thai dance movement in 3D animation.

Keywords—Intangible Cultural Heritage; Dance Notation System; Labanotation; ThaiLabanXML, Human-Readable Information; Machine-Readable Information; Unity 3D Program

INTRODUCTION

UNESCO has listed Thai dance as a living traditional art form. However, there is a risk of disappearing and transforming. The dance notation systems had been created to record human movement^[1]. The most common system that had been widely used is the Labanotation system. The system supports the notator with various abstract symbols for recording human movement^[1]. Using a Labanotation system to record Thai dance movements is challenging and a few researchers had been working on $it^{[2,3]}$. To implement our project, the experts had been invited to write Thai Laban notation scores and the scores are interpreted to Extensible Markup Language (XML) using the ThaiLabanXML standard to generate the ThaiLabanXML file.
This process will support the project to translate the human-readable information to machinereadable information for further display Thai dance movement in 3D animation. This paper will focus on the process of achieving the ThaiLabanXML standard and the limitation of ThaiLabanXML standard using in Unity 3D program to represent Thai dance movement in 3D animation^[4,5].

RELATED WORK

A. LabanXML & MovementXML Standard LabanXML created a semantic representation for human movement and used in LabanWriter, Calaban, and Labanatory storing the dance notation scores in a graphical format, storing the symbol as a graphical object with x and y coordinates^[6]. The issues on LabanXML is that it is not flexible enough to support such a complex and delicate dance movement. However, LabanXML standard provided a fundamental point of knowledge to interpret human-readable data to display in 3D animation^[7,8]. Later, MovementXML standard was developed to give more flexibility to the system and still followed the rules of Labanotation System.

METHODOLOGY

To represent Thai dance movement in 3D animation through the process of interpreting Thai Laban Scores into ThaiLabanXML file, there must be the standard to ensure the translation is completely verified. When the ThaiLabanXML standard created using XML, many experiments had been tested due to importing the ThaiLabanXML file into Unity 3D program, created the plug in to read and write the ThaiLabanXML in Unity3D, how to translate Laban symbols and create a right syntax name to connect into GameObject in Unity 3D program etc.

A. Thai Laban Scores

Thai Laban Scores is created by Dr. Dharakorn Chandnasaro. He specialized on recording dance movement using Labanotation system^[2]. Thai Laban Scores is referencing from Thai dance notation system which created new symbols for describing the fundamental of Thai dance movement. For example a basic hand gesture such as jeeb and wong etc^[3].

B. ThaiLabanXML

ThaiLabanXML standard has been developing due to the reason of translating human-readable information into machinereadable information representing Thai dance movement on 3D animation. The standard is referenced from LabanXML^[9], creating a semantic representation for human movement using XML to transfer the semantics of Laban symbols. In addition, MovementXML^[6] had been developed to improve the flexibility of transferring the semantics of Labanotation symbol such as the direction measurement on degree etc.

ThaiLabanXML is a standard to interpret Thai Laban notation score into ThaiLabanXML file similar to LabanXML syntax (direction, body parts, level) which already defined the syntax name^[6]. Besides, LabanXML provided the pattern for creating ThaiLabanXML standard. However, MovementXML provides more function to record the movement which benefits to ThaiLabanXML. Consequently, two advantages had been implemented in ThaiLabanXML are: • The number of beats in each measure is not fixed, it could be changed due to Thai dance rhythm could be changed according to the song.

• The repeat-type element can be exacted repeat movement or sagittal-symmetry which always happened in Thai dance movement. Repeat the same gesture movement on another side of the movement.



Figure 1. Methodology to transfer Thai Laban Scores and represent machine-readable information in 3D animation focusing on implementing ThaiLabanXML standard.

After adding two advantages of MovementXML and writing ThaiLabanXML using the defined syntax name^[7]. These are three functions added in ThaiLabanXML:

• Writing ThaiLabanXML is stared from the left column that is closest to the middle of the table then right, after that spread out from left to right again. For instance, starting from column of left support (point1L) and move to the right column of the same body part (point 1R) until the whole column is being recorded completely and then move to the next column that is closest to the middle of the table (point2L), (point2R) so on. The process will repeat this way until all the column is being recorded.



Figure 2. Example of Thai dance notation system using Wong symbol (chay mue)

• The position of the body part is described together. For example:

o LabanXML,

<support side = "left"> represents left support

o ThaiLabanXML,

<Body part = "left_support">

<Body part> had been used as the name of attribute instead of <support side> and the value is the columns name. This helps the writer to write XML faster and provide the convenience for the future extension of the data and modify the data.

• The value of the attribute is given by the name of the symbol. hence, it is easier in the process of developing the data information also to be studied and to improve the standard.

CONCLUSION

The result on representing Thai Dance movement using ThaiLabanXML file, the character is positively moved in Unity 3 program via ThaiLabanXML loader process (container, loader). Nevertheless, the limitation of ThaiLabanXML standard is: 1) The standard is specially designed to translate the Thai Laban scores; hence it would be covered only limited gesture of center Thai dance. 2) The gesture represents the composition of body position together the reader must understand the Thai dance before recording. 3) Limitation of variable name due to a various Thai gesture movement. 4) Contact and Tap functions, Gesture Jeeb, Wong, Flod, Space are not implemented into Unity 3D. Future works will start by solving the issue from the limitation step by step to get the most efficient vision of ThaiLabanXML fitting with Unity 3D program to represent the Thai dance movement in 3D animation. In addition, cover more gesture in regional Thai dance.

ACKNOWLEDGEMENT

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Factors Affecting Sustainability of Community-Based Tourism Projects: Locational Analysis in Limpopo Province

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INTRODUCTION

Community-based tourism (CBT) is a type of sustainable tourism that promotes propoor strategies in a community setting, which its initiative aim is to involve local residents in the running and management of small tourism projects as means of alleviating poverty and providing alternative income source for community members. (Amstrong, 2012)

The aim of the study is to clarify the usage of community-based tourism projects within tourist's areas in Limpopo Province. The approach of the study is locational analysis through GIS. The clarification of the study has two types of categories: 1) community beneficiation and 2) sustainability. In community beneficiation three variables will be analyzed: a) type of employment, b) salary range c) number of people working at CBT. For sustainability, four variables will be analyzed: a) price, b) packages, c) tourists arrivals, d) tourist sites.

RESULTS

The combination analysis show findings indicate that community-based tourism in Limpopo has become an important source of community beneficiation for the local communities in employment, with most CBT's employing their employees as permanent employees and earning minimum wage. 25 CBT's out of 36 CBT's in Limpopo employ their staff permanently.

Table 1. Combination analysis of communitybeneficiation

		Combination of number of employees and salary range			
		Small-me- dium Low salary	Small-me- dium High salary	Medi- um-large Low salary	Medi- um-large High salary
Type of em- ploy- ment	Tem- porary	Mopani Sekhu- khune	N/A	N/A	N/A
	Perma- nent	Capricorn Vhembe Waterberg	N/A	N/A	N/A

Table 2 shows the conclusion of tourist arrivals and combination of price and packages. The results from the two combination analysis were taken into account that CBT's in

Limpopo have four types for types. The most advantages types are found in Mopani, Vhembe and Sekhukhune.

Table 2. Combination analysis of sustainability	y
Combination of price cost and packages	

			Combination of price cost and packages			
			Low price Yes	Low price No	High price Yes	High price No
	Tourist arriv- als	Low tourist flow	-Capricorn -Waterberg	N/A	-Vhembe	N/A
		High tourist flow	-Sekhu- khune	N/A	-Mopani	N/A



Figure 1. Locational analysis of CBT sustainability in Limpopo Province

DISCUSSION AND CONCLUSION

Through employment provision (permanent and temporary), CBT's contribute because most employees are permanent employees this results that staff can sustain about employment. CBT's charge good prices and that provide packages have the opportunity to remain sustainable because they receive good number of tourist arrival. Although number tourists arrivals is just above average because most CBT's in all the five districts receive tourists. Mopani district remains to be more attractive in the province. The results shows that in from CBT to tourist sites Waterberg district has no relationship most because tourists sites are further than 60km from CBT. The study shows CBT's in Limpopo are not benefiting the local residents in earnings and growth, shows that tourism is growing rapidly in Limpopo by the number of tourists arrivals so the potential of CBT's to grow is not limited.

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Risk Framework Analysis for Creative Industries in ASEAN-5 Stock Exchanges

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ABSTRACT

The foundation of the MSBVAR-BCAPM model is considered in order to perform active support for creative economy with potential stock exchanges. ASEAN-5 stock exchanges procedures have adopted the potential to increase stock exchange¹ progress for the 'creative' inputs and outputs impact the end user market research. The risk framework analysis for formal creative industry is basically distinct in terms of periods of expansion or reducing depressed belonging to creative industries. The quantitative study uses daily data collected from 2010-2016 getting-together Indonesia, Malaysia, the Philippines, Thailand and Singapore, respectively. In a relatively simple methodology the MSBVAR-BCAPM model is designed to assist in the application by leading the researcher through a series of an inquiry in risk and return values of stock markets interactive platform. A well-organized risk framework analysis of MSBVAR-BCAPM model is attempt to provides insight into the origin problems by talking a question of how well a model captures key aspects of capital market transmission mechanism as an ideal values reform induces effects on parameters bullish market, bear market, and regular market, respectively.

Keywords: ASEAN-5 Stock Exchanges, MSBVAR-BCAPM Model, Formal Creative Economy, Risk and Return Values,

¹a regional effort that will accelerate the economic growth of the area's creative industries. https://www.495partnership.org/495-mw-creative-economy-network

27-29 August, 2018

Session 3 :

Aging Society

Chair Person :

Sirianong Namwongprom (CMU) Kimie Tanimoto (KU) Kenji Wada (KU) Katsuya Hirano (KU)

> August 27th, 2018 Session Program 11.00-12.00 hrs. Session Program 13.00-15.20 hrs.

> August 29th, 2018 Session Program 09.00-11.20 hrs.

> Venue: Tawan Kangwanpong Room, Fl. 4

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Wearable Sensor Reveals Lifestyle Habits of Elementary School Children

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INTRODUCTION

Bad lifestyle habits have negative impact on children's health, academic achievement and relationships with their classmates. Our previous study proved the feasibility of the study using wearable sensors to grasp the lifestyle habits of children accurately and make appropriate interventions^[1].

RESULTS AND DISCUSSIONS

We chose 11 fourth graders and their parents in Kagawa and had children wear wearable sensors (Fitbit Flex 2^[2,3]) and record their afterschool activities for a week. Both children and parents answered self-administered questionnaire regarding the family members, lifestyle habits and school life, their height and weight, sleeping and exercise time and mental health. We used JMP Pro 12.1 (SAS Institute Inc., Cary, NC) for analysis. Participated children were 7 boys and 4 girls, in which 4 children joined only indoor activities. Other characteristics of participants were shown in Table 1. The number of steps per day was about 14,500, slightly more than previous studies (13,000 steps). On weekdays, 70% of the total steps were related to school, while after school was 30%. Commuting school was responsible for 20% of the total steps (see Table 2, Figure 1). Those who go to school by bus, therefore, lack of exercise and need interventions for that. Lifestyle varies among children (Table 3). Children's sleeping time was significantly less than the time recognized by parents (see Table 4). Wearable sensors give a good chance for both parents and children to recognize the lifestyle habits and help them to make changes for better life.



Figure 1. Steps Of Samples According To The Day

	MEDIAN (MIN, MAX)
Height (cm)	132 (126-141)
Weight (kg)	35.0 (24.6-46.0)
BMI	18.8 (15.2-24.1)
BMI z-score	1.2 (-1.2-2.5)
Number of after-school activities	2 (1-5)

Table 1. Background of children.

Table 2. Step counts.

	AVERAGE ± SD	%
Total	14,506±5,438	
Weekends	11,744±6,377	
Weekdays	15,611±4,631	
Commuting school	3,077±1,594	19.7
In school	7,871±2,903	50.4
After school	4,389±2,838	28.1

Table 3. Life-style habits.

	WEEKDAYS	WEEKENDS
Sleep	8 h 4 min (45)	8 h 29 min (71)
Media*	66 min (36)	109 min (80)
Study at home	45 min (18)	42 min (37)
Exercise**	33 min (34)	106 min (127)

Average (Standard Deviation).

* Screen Viewing Including Watching Tv And Playing Games. **Physical Exercises After School.

Table 4. Differences in parent-child's perceptions	S
of Children's Lives (Paired T-Test)	

N=11	AVERAGE OF DIFFERENCE ON WEEKDAYS	AVERAGE OF DIFFERENCE ON WEEKENDS
Sleep	-40.1 min (p=0.02)	-58.8 min (p=0.12)
Media*	-15.8 min (p=0.46)	2.9 min (p=0.88)
Study at home	-1.7 min (p=0.80)	-1.3 min (p=0.91)
Exercise**	-5.8 min (p=0.68)	47.0 min (p=0.11)

* Screen Viewing Including Watching Tv And Playing Games. **Physical Exercises After School.

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Effect of Self-selected Lifestyle Modification Program on Glycosylated Hemoglobin among Older Persons with Type 2 Diabetes

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INTRODUCTION

Type 2 diabetes is the most common chronic disease among older persons and is the major cause of death in this population. Self-care to control the disease is certaining necessary. This quasi experimental research aimed to examine the effect of the Self-selected Lifestyle Modification Program on glycosylated hemoglobin among older persons with type 2 diabetes.

Method; Participants were 44 older persons with type 2 diabetes attending diabetes clinic at two Health Promotion Hospital in Chiang Mai province during October 2017 to March 2018. The participants were equally by group matched regarding age, gender, duration of diabetes disease, diabetes medication and comorbidity. The experimental group receiving Self-selected Lifestyle Modification Program developed by the researcher, while the control group did not receiving in this Self-selected Lifestyle Modification Program. Data collected before and after participated 12 weeks including personal data collected by the Demographic Data Record Form and glycosylated hemoglobin level tested by the COBAS C501. Data were analyzed using descriptive statistics, independent t-test, and paired t-test.

RESULTS AND DISCUSSIONS

Results

(1) the decrease of glycosylated hemoglobin in the experimental group receiving the Selfselected Lifestyle Modification Program was significantly more than that in the control group did not receiving the Self-selected Lifestyle Modification Program at (p<0.01) (see table 1).

Table 1. Compare glycosylated hemoglobin levels between the experimental group and the control group after receiving the Self-selected Lifestyle Modification Program.

	HbA1C after program							
sample	before		after		-	C D		1
	X	S.D.	X	S.D.	d	5.D.	ť	p-value
control group	8.1	0.85	7.8	1.18	-0.24	1.14		
							2.59	0.01**
experi- mental group	8.5	1.03	7.4	0.85	-1.14	1.15		

**p<0.01

(2) Glycosylated hemoglobin after receiving the Self-selected Lifestyle Modification Program was significantly lower than before receiving the Program at (p<0.001) (see table 2).

Table 2. Compare glycosylated hemoglobin levels before and after receiving the Self-selected Lifestyle Modification Program in experimental groups.

experimental	HbA1C					
groups	X	S.D.	t	p-value		
before	8.5	1.03				
			4.55	.000***		
after	7.4	0.85				

**p<0.001

Discussion

This study aimed to evaluate the effect of Self-selected Lifestyle Modification Program on reducing glycosylated Hemoglobin levels by measuring glycemic indexes before and after intervention in Health Promotion Hospital in Chiang Mai province. A study showed that the patients in the intervention group had significant reduction of the glycosylated hemoglobin levels after receiving the Selfselected Lifestyle Modification Program as compared to the control group, indicating that program had positive effects for controlling glycosylated hemoglobin levels among older persons with type 2 diabetes.

This Self-selected Lifestyle Modification Program is developed based on self-determination theory^[1], including three main components; autonomy, competence, and relatedness that facilitate health behavior change. The researcher allowed the participants to choose the type of exercise and set up their own daily menu based on preferences; educated them to exercise follow FITT principle^[2] and control diet based on their BMI. The researcher motivated them to change their lifestyle behaviors by monitoring their blood sugar and using peer group every two weeks for facilitate them to solving problem. The level of HbA1C among older persons with type 2 diabetes is decrease after participating in this program for 12 weeks. This is other research finding^[3] that using the DEXLIFE 'self-selected

'lifestyle intervention program in people with risk of diabetes induced a significant decrease in blood glucose after 12 weeks of training.

CONCLUSIONS

The results indicate that health care personal can use the Self-selected Lifestyle Modification program for providing care to older persons with type 2 diabetes so the HbA1C can be effectively controlled.

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The Effects of Kangaroo Care: A Literature Review

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INTRODUCTION

Kangaroo care (KC), which mother holds her infant by skin-to-skin after delivery or in Neonatal Intensive Care Unit, is a kind of care for mothers and their infants. It makes physiological or psychological change to them, therefore many studies have done to reveal the effect. The aim of this literature review is to clarify the effect of KC.

RESULTS AND DISCUSSIONS

The literature search was performed on the databases Ichushi-Web, the largest abstract database of medical and nursing study in Japan. The search included all publications from January 2008 to May 2018. The search terms were: "kangaroo care". A total of 251 matches were screened. Studies were included if they were related to effect of kangaroo care, 18 studies were finally included in the review.

Five studies measured by physiological indicates such as body temperature, heart rate of infants. Nine studies measured by psychological indicates such as questionnaire of attachment. Two studies were interview to mothers. Other two studies identified the effect on breastfeeding and growth of infants. 1. Body temperature

Compared with the body temperature of infants prior to KC, it significantly increased during KC^[1,2]. Compared with control group, the time-of-arrival to 36.5 °C in experimental group was significantly shorter^[3]. As time of KC longer, the body temperature of mothers and infants showed significantly higher increase compared to prior to KC^[4]. However, other study did not sustain the correlation between time of KC and body temperature^[1]. There was no evidence of correlation between the body temperature of infants and the room temperature, weight of infants, starting time of KC from birth, blood loss of mothers, the body temperature of mothers^[1]. There was no correlation between the body temperature of infants and mothers and corrected age of infants^[4].

2. Heart rate, Oxygen saturation

In KC group, significant increase in heart rate observed compared with control group. Compared to control group, there was no significantly differences the time in SpO_2 to be increased^[3].

3. Psychological scales

Several studies analyzed that positive feeling toward their infants increased after KC^[5, 6], even though fathers^[7]. Especially, as the time of KC longer, the attachment to their infants more increased, and it correlated to the score of maternity blues^[6]. KC is a factor of positive feeling toward contact with their infants, and that feeling related to consisting the attachment^[5]. KC also the factor of satisfying the delivery^[8]. Compared with control group, pain or fatigue, sleepiness after delivery decreased significantly in the KC group^[9]. However, KC didn't affect to the positive feeling toward infants^[9].

4. Qualitative study

Compared with prior to a cesarean section and KC, mothers sunk in that they had their own babies^[10]. The experience of KC after birth for mothers consisted from 7 categories: 1)sinking of birth, sense of accomplishment, 2) pain relieve after delivery, 3) impressed by viable baby, 4) increasing attachment, 5) relieved by watching baby's safe, 6) feeling of bonding with family, 7) relief from isolated^[11].

5. Breastfeeding and growth of infants

There was no correlation between KC and the ratio of breastfeeding^[12], the amount of breast milk, and the growth of infants^[13]. However, the KC group, one study supports the intense to higher ratio of breastfeeding at home^[13].

In conclusion, there are less physiological studies about the effect of KC, and few studies set the control group. Further studies are required to identify other physiological effect of KC with controlled trial test.

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Rare sugar D-allulose prevents progression and development of obesity and type 2 diabetes

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INTRODUCTION

Rare sugar D-allulose has been evaluated having anti-obese and anti-diabetic effects. It has been shown as a unique metabolic regulator against hyperlipidemia and hyperglycemia in rats^[1,2] and human^[3], and thus represents as a safe and non-toxic compound to maintain body fat and blood sugar levels.

MATERIALS AND METHODS

Treated OLETF rats were fed 5% D-allulose in drinking water. Control OLETF and healthy control LETO were fed water only. Body weight, food, drink, blood glucose and insulin were measured. Serum was collected for biochemical analysis. Oral glucose tolerance test was performed. Liver, pancreas, abdominal fat and other organs were preserved for various measurements.

RESULTS

D-allulose notably controlled abdominal fat and thus prevented body weight gain. D-allulose improved insulin resistance through the maintenance of blood sugar in the treated rats. OGTT showed markedly reduced blood sugar after glucose load suggesting improvement of insulin resistance. D-allulose attenuated pancreas β -cell fibrosis and thus preserved islets, evaluated by staining. Serum levels of proinflammatory adipocytokines were controlled well by D-allulose.

CONCLUSION

Rare sugar D-allulose might be a promising strategy for the prevention of obesity, maintenance of blood sugar, and preservation of pancreas β -cells and thus prevention and improvement of life-style related diseases.

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GLP-1 release and vagal afferent activation mediate the beneficial metabolic and chronotherapeutic effects of D-allulose

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INTRODUCTION

The obesity pandemic is a serious worldwide health problem: 39% of adults (1.9 billion) are overweight/obesity, and these numbers are increasing. Obesity is a major risk factor for type 2 diabetes, cardiovascular, and cerebra diseases. Overeating and abnormal feeding rhythm contribute to development of obesity. D-Allulose (D-psicose), a C-3 epimer of D-fructose, is a rare sugar existing in small amounts in nature, and its physiological effects has been shown^[1]. Here we show that oral administration of D-allulose induces GLP-1 release, activates vagal afferent signaling, reduces food intake and promotes glucose tolerance in healthy and obese-diabetic animal models^[2].

RESULTS AND DISCUSSIONS

Peroral (p.o.) administration of D-allulose (Allu) at 1 and 3 g kg⁻¹, but not 0.3 g kg⁻¹, into the stomach using a stainless feeding needle decreased cumulative food intake for 0.5, 1, 2, 3, and 6h after injection in C57BL/6J mice

fasted overnight (16h) (Figure 1). Subsequently, cumulative food intake at 24 h after p.o. d-allulose returned to normal levels and body weight was not altered at 24 h.



As oral administration of D-allulose was particularly effective, we explored the involvement of gut-related mechanisms. Active GLP-1 concentrations in portal vein significantly increased at 0.5 h and plateaued at 1 and 2 h after oral administration of d-allulose (1 g kg⁻¹), returning to baseline at 3 h (Figure 2). In contrast, total glucose-dependent insulinotropic polypeptide (GIP), cholecystokinin (CCK), and peptide YY (PYY) concentrations did not change.

In high fat diet (HFD)-fed obese mice, subchronic p.o. administration of D-allulose once daily at light phase (LP) onset (7:30) attenuated LP hyperphagia to restore diurnal feeding rhythm, and thereby suppressed daily hyperphagia, obesity, adiposity, and impaired glucose tolerance. Conversely, subchronic D-allulose at dark phase onset (19:30) was ineffective in attenuating LP hyperphagia. D-allulose has been shown to have a chronotherapeutic action.



Figure 2.



Figure 3.

Our study clearly demonstrated that the release of GLP-1 by oral D-allulose activates vagal afferents, which in turn suppresses food intake and improves glucose metabolism (Figure 3). This is in consistent with previous reports that neural pathways contribute to the effect of GLP-1 and DPP-4 inhibitors on food intake and glucose metabolism. This vagal afferent-mediated link of endogenous GLP-1 to food intake and glucose metabolism is consistent with previous reports.

GLP-1 release and vagal afferent activation mediate the beneficial metabolic and chronotherapeutic effects of D-allulose

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Development of a Community Volunteer Caring Model for Older Persons with Chronic Illness

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INTRODUCTION

Currently, Thailand has 16.5 percent of the population that aged 60 and over.^[1] Aging society leads to an increase of health problems and health needs. The information from Health and Welfare Survey showed that 36.8% of the male older persons and 42.3% of the female older persons have chronic illness.^[2] Older persons with chronic illness need continuity and longterm care. Some older persons live alone or with family members who are unable to care for them. Thus, they need help from others. People in the community can severe as care providers for older persons.

The purpose of this study was to develop a community volunteer care model for older persons with chronic illness in Nong Hoi village housing, Muang district, Chiang Mai.

RESULTS AND DISCUSSION

This research and development study consisted of 5 processes: 1) surveyed and analyzed the current situation, problems and needs; 2) designed a preliminary care model for older persons with chronic illness in conjunction with people in the community and stake holders; 3) pilot trial of the model with volunteer caregivers and the community management team; 4) evaluated and improved the model; and 5) distributed among people in community, neighborhoods, and stake holders. The results showed that;

1. Factors affecting group construction, processes of the group, and roles in a community volunteer care model.

The group leader and mainstay were an important factor of group construction of community volunteer care model. Starting off the community leader held a meeting with community members and brainstormed about older people in community. They summarized the problems that have complications from chronic health problem worse; Family members have inadequate knowledge and skills for caring their elder; some older person didn't have caregiver or live alone. The community leader invited people to be a volunteer. Community volunteers for older person care consists of 16 persons: female 15 persons, male 1 person, aged between 36-63 years old, mean 53.5 years. Education levels were primary school to bachelor (Most primary school 43.75%). Careers were commerce, employment, housekeeper, and beautician (most commerce 50%).

Other factors were volunteers have relationships with the elderly and their families in a kinship and have regular interaction. Thirdly, volunteers lived in close proximity to the elderly's home. Fourth, volunteers meet their own needs to help the elderly in the community. Fifth, team had regularly interaction and good relationship so the operation was smooth. Sixth, there is a centralized workplace for performing activities. Seventh, every member of the group participated in the planning and operations. Eighth, care activities that meet the need of elderly and family members. Finally, there were alliance to drive activities such as education institutions, and public and private departments.

The roles in a community volunteer care model showed in the Table 1.

Table 1. The roles and coordination in a communityvolunteer care model.

	Role/Activities
Volunteer	Home visit, Assess need and health problem of elderly and family, Teach family members and caregiver about elderly care, Arrange daily volunteer schedules for take care elderly people at home, Give advice information face to face and phone calls, Rotate regularly stay in the office.
Community leader	Push forward the working group, Provide the place to work in office, Allocate budget for operations, Find resources to support operations.
Nurse from municipal hospital	Provide medication and medical equipment, As a consultant, Home visit.
Social Development Officer	Provide social welfare, Provide assistance to needy older person and family, Coordination nursing home.
Instructor Nurse from university	Arrange volunteer training in nine topics: personal hygiene, feeding, nutrition, pressure sore care, physical therapy, transfer assistance, excretion care, oxygenation and inhaler, medication management; Advocate community to write project and submit for getting fund from National Health Security Office, As a consultant, Home visit.

2. Pattern, methods and processing stages in a community volunteer care model.

The care model included health care and social welfare (elderly allowance, disability living allowance, and safety environment). The caring team consists of volunteer, community leader, nurse from municipal hospital, social development officer, and instructor nurse from university. They worked together to do the practice guideline of elderly care.

After volunteers were trained for caring older persons. The volunteers assessed the older persons and divided them into two groups: the first groups were independence/low dependence; and the second groups were high dependence or bed ridden. The care program for the first groups consisted of teaching and motivating older persons to control health risk factors, and health promotion activities. Moreover, community management team was advocated to write project and submit for getting fund from National Health Security Office. The second group received home visits, health assessments, and assistance from volunteer caregivers and the health care team. Older person with acute problems were referred to the municipal hospital.

Older person can ask for help at the office at 09.00-12.00 every day.



Figure 1. a community volunteer care model for older persons with chronic illness

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Medical Information Database Integration for Japanese Pharmacovigilance

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Abstract - Japanese Government, Ministry of Health Labour and Welfare (MHLW) and Pharmaceuticals and Medical Devices Agency (PMDA) have developed Medical Database Integration System for Japanese Pharmacovigilance. The system is called MID-NET (Medical Information Database NETwork) and used for data collection by pharmaceutical companies. The system is based on integration of Electronic Medical Recording system (EMR) in 10 hospital groups (23 hospitals totally). Kagawa University Hospital is a member of the project All EMR needed to unify the data format based on Japanese Standard format regarding to Health Level Seven (HL7) ver. 2.5, that is international standard of health information. They also needed the code mapping from their private codes in their hospitals to standard codes unified by PMDA. With the unification, we can make a unified query to the databases and make in run via a data center which organize the hospital databases.

In 2018, we have started the service after several years' preparation. We are experiencing some differences of coding policy in joining hospitals. Therefore, a "governance center" is planned to establish for governance of master maintenance and coding policy.

BACKGROUND

We have been preparing for full-scale implementation of the MID-NET (Medical Information Database NETwork) system project^[1] along with other collaborating hospitals under the leadership of Pharmaceuticals and Medical Devices Agency (PMDA) in this project from 2015. As the hospitals provide Electric Medical Record (EMR) data to the MID-NET system, we have been investigating the quality of the integrated data source.

In particular, we confirmed that the EMRs in our managing database are accurately transferred to the integrated data source of the MID-NET system, and we also conducted validation studies of the integrated data source to assess potential sources of bias in outcome and exposure. These validation studies were conducted to prevent the dissemination of misleading or inaccurate information by pharmaco-epidemiology studies using MID-NET system.

SCHEME OF MID-NET SYSTEM

The system is based on integration of Electronic Medical Recording system (EMR) in 10 hospital groups (23 hospitals totally). All EMR needed to unify the data format based on Japanese Standard format regarding to Health Level Seven (HL7) ver. 2.5, that is international standard of health information. They also needed the code mapping from their private codes in their hospitals to standard codes unified by PMDA. The ICD-10 code, International Classification of Disease is wellknown classification code made by World Health Organization (WHO) and already used by Japanese medical institutions for health insurance claim. MID-NET decide to use several standard codes for the data unification. JLAC-10, a Japanese domestic code for laboratory test results; HOT code, standard code for drugs approved in Japan.

With the standard codes, we can set one query for database to gather information of drugs and relating symptoms which might be side-effects of the drugs. The information extracted from SS-MIX storage server will be anonymized and get more unification by PMDA secondary mapping system. The information is provided as a result of data extraction. The results data are sent to a data center which are securely connected with 23 member hospitals. Users can get the data at "onsite center" where makes us directly connect to the data center. (Figure1)

In 2018, we have started the service after several years' preparation. We are experiencing some differences of coding policy in joining hospitals. Therefore, a "governance center" is planned to establish for governance of master maintenance and coding policy.

METHODS AND RESULTS

We have been conducted the validation studies for selection algorithms on several exposures and outcomes as following. <Exposure>

- 1. Administration of injectable carbapenem antibiotic agents for inpatients
- 2. Administration of injectable platinum agents for inpatients
- 3. Administration of injectable aminoglycoside antibiotic agents for inpatients
- 4. Administration of injectable alkaloid antineoplastic agents for inpatients
- 5. Administration of alkylating antineoplastic agents for inpatients
- 6. Administration of injectable antibiotic agents for patients
- <Outcome>
- 1. Disseminated intravascular coagulation
- 2. Anaphylaxis
- 3. Gastrointestinal perforation



From the presentation of Dr. Uyama (PMDA) (partially modified)

Figure 1. Workflow and Dataflow of MID-NET

Patients data were selected respectively from the integrated data source of the MID-NET system based on the presence of the drug YJ-code on "exposure" and the presence of one or more the disease ICD-10 diagnosis codes on "outcome". These selected patients' data as "potential case" were reviewed by medical doctors with the referring individual medical records, and were classified into "positive case" and "negative case". The validity of the selection algorithm was described as the positive predictive value (PPV), defined as the proportion of patients with a positive test who actually have the condition.

In these studies, PPV was calculated as the proportion of confirmed "positive case" based on the chart review (gold standard) among "potential case" as follows:

PPV = [Number of patients with "positive case" based on the chart review] / [Number of patients with "exposure" or "outcome" based on the selection algorithm]

Table 1 displays the calculated PPVs for each individual study on "exposure". The PPVs for injectable carbapenem antibiotic agents, injectable alkaloid antineoplastic agents, alkylating antineoplastic agents and injectable antibiotic agents were generally high, ranging from 77.8% to100.0%. The PPV for injectable aminoglycoside antibiotic agents was 47.8%, lower than others. Table 2 displays the calculated PPVs for each individual study on "outcome". The PPVs for disseminated intravascular coagulation, anaphylaxis and gastrointestinal perforation were 39.2%, 33.3% and 56.0%, respectively.

DISCUSSION

Although there was variation due to drugs, many validation studies on "exposure" showed higher PPV than that of "outcome". On the other hand, almost all validation studies on "outcome" showed poor PPV. These results suggest that to identify the outcome based on the selection algorithm is more difficult than that of the exposure. In order to identify the "positive case" accurately from the integrated data source of MID-NET system, further studies are needed to investigate for setting the more appropriate algorithm.

Additionally, we strongly need reasonably, accurately and timely master maintenance for both of two extractions (exposure and outcome). For the adequate master maintenance, MID-NET team has been making study of establishing a method of maintenance workflow and a system which support the workflow. They propose "Governance center" to control the maintenance workflow.

In the future, we will continue to pursue highly-precision management of EMRs at Kagawa University Hospital HIS and enhance the utility value of MID-NET system.

Table 1. The calculated PPVs for each individual study on "exposure".

Exposure	Potential case(n)	Positive case(n)	Negative case(n)	PPV(%)	95%CI
1.	23	23	0	100.0	100.0 - 100.0
2.	1	1	0	100.0	100.0 - 100.0
3.	717	343	374	47.8	44.2 - 51.5
4.	787	612	175	77.8	74.9 - 80.7
5.	458	407	51	88.9	86.0 - 91.7
6.	79912	71652	8260	89.7	89.5 - 89.9

Table 2. The calculated PPVs for each individual study on "outcome".

Exposure	Potential case(n)	Positive case(n)	Negative case(n)	PPV(%)	95%CI
1.	199	78	121	39.2	32.4 - 46.0
2.	45	15	30	33.3	19.6 - 47.1
3.	100	47	53	47.0	37.2 - 56.8

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Development of Low Calorie Thai Custard Using Rare Sugar

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INTRODUCTION

Recently, Thai people consume sugar four times higher than the recommendation of the World Health Organization (World Health Organization, 2013). High sugar consumption related with obesity and non-communicable diseases (NCD). Thai people love Thai dessert and sweet. These behavior makes Thai people have excessive energy intake, high blood glucose level and high risk for hypertension, cardiovascular diseases, stroke and type 2 diabetes. Health care providers expected to reduce sugar consumption and solve these health problems. Rare sugar is a low calories sweetener and was extracted from natural plants. There are many evidence supports that the rare sugar is good for health. We developed the prototype low calories Thai custard in this study. We reduced sugar cane and palm sugar using the rare sugar

METHODS

This study was conducted followed a research and development (R and D) framework. We

customized the low calories Thai custard. We gave 313 participants a questionnaire, a sample of prototype low calories Thai custard and a sample of Thai traditional custard. We surveyed the participants' opinions about each sample.

RESULTS

We found mean opinions' score of color and overall of 2 custards were equal. Mean opinion score on the fine texture of the low calories Thai custard was finer than the traditional Thai custard. However sweetness of the 2 custards was no statistically significant by the Chi – square test. Furthermore, participants volunteered that they preferred taste of the low calories Thai custard.

CONCLUSIONS

There is possible to replace sugar by using the rare sugar in Thai desserts and Thai foods and could reduce sugar consumption and calories intake of Thai people. It may be advantage for health promotion and NCD prevention in Thai people.

Quality of Handwashing Water Research at Elementary Schools in Kandal Stueng District, Cambodia

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INTRODUCTION

Cambodia is one of the highest developing countries in the Southeast Asia region. Cambodia has sustained an average growth rate of 7.6% in 1994-2015, ranking sixth in the world. Economic growth reached 6.8 percent in 2017, according to preliminary estimates by authorities, and is expected to remain strong over the next two years (6.9% in 2018 and 6.7% in 2019), as recovering tourism activity coupled with fiscal expansion compensate for some easing in garment exports and construction growth^[1].

On the other hand, health and education remain both important challenges and development priorities for Cambodia. 32% (or approximately 0.5 million) of children under five are stunted. While net enrollment in primary education increased from 82% in 1997 to 97% in 2016, lower secondary completion rates, at 48% in 2015, are significantly below the average for lower middle-income countries. As of 2015, 70 percent of Cambodia's population (12.3 million people) do not have access to piped water supply, and 58 percent (9.3 million people) do not have access to improved sanitation^[1].

Therefore our group and NPO "UDON House" are now managing for school health project in Kandal Stueng district, Kandal Province, Cambodia. At the first to start this project, we checked the quality of hand washing water for elementary schools in this district.

METHODS

Our study was conducted from the end of March to April, 2017. We used simplified methods to detect specific water quality materials. Checking items for evaluation of quality of water are as follows; pH, nitrite nitrogen, nitrate nitrogen, iron, total mineral balances, total alkaline balances, arsenic, and density of normal bacteria and E. coli.

The targeted schools were randomly selected from school list, but many schools did not have handwash equipment, so finally we selected seven schools with handwash equipment. There were different sources of handwashing water in these schools; four schools' water was from shallow well water, two schools' water was from tap water, and one school's water was from both tap and rain water.

RESULTS

There were no nitrite nitrogen and nitrate nitrogen in the tested water. Bacteria and E.coli were only found at schools using shallow wells (see table 1). Tap water and rainfall water were totally clean and considerable for good to drink. Arsenic was found from the water of shallow wells.

Table 1. Average of water quality of handwash equipment by water sources.

Variables	Shallow wells	Tap water	Tap water and rain
рН	7.0	7.0	6.4
Nitrite nitrogen (mg/l)	0	0	0
Nitrate nitrogen (mg/l)	0	0	0
Iron (mg/l)	1.0	0.5	0
Total mineral balances (mg/l)	152.5	120.0	0
Total alkaline balances (mg/l)	135.0	14.0	0
Arsenic (mg/l)	0.08	0	0
*Density of normal bacteria	100<	-	-
*Density of E. coli	<10	-	-

*The densities of bacteria were shown by researchers' count of red spots after 24 hours cultivation.

DISCUSSIONS

We consider the water from shallow wells are available for handwashing, although some water were found bacteria and arsenic. If they use it as drink water, we cannot recommend, but it's no problem just wash their hands after toilet, or before eating. We caution about these findings for pupils and teachers in these elementary schools.

ACKNOWLEDGEMENT

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Perception of Male Nurses among Hospitalized Children and Their Families

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INTRODUCTION

In Japan, the rate of male nurses was very low (2.7% in 1996), however recently that rate has been raised to 7.3% in $2016^{[1,2]}$. As the proportion of male nurses has increased, it is important to understand the roles of them in patients. People often use stereotypes to judge others. Many people think each gender has specific traditional roles in Japan. The prevailing feminine nature of nursing with a caring image has been symbolized as epitome of femininity^[3]. There are barriers for male nurses which are the public perception of nursing profession, social values, and patient preferences^[4]. However male nurses distinguish their roles from those of female nurses even if male nurses are a minority group^[5].

The purpose of this study was to reveal how hospitalized children and their families perceive male nurses.

The study protocol was approved by the Ethics Committee at the Faculty of Medicine, Kagawa University, Japan.

RESULTS AND DISCUSSIONS

A qualitative descriptive design was used to explore the image of male nurses as perceived by long-term hospitalized children and their families. Participants were recruited through purposive sampling. The inclusion criteria were: (i) having hospitalization for more than six months at university hospital pediatric ward; (ii) their age was at least 10years-old when they were hospitalized; and (iii) willingness to enroll in the study. Seven children (3 boys and 4 girls) and their families met the criteria and agreed to participate (Table 1).

Data were collected through in-depth, semistructured interviews. Interviews were recorded after obtaining verbal and paper consent, and transcribed verbatim for analysis. All of the children and their families had already known the male nurses before hospitalization. Most of them had no specific preconceived image of the male nurses. Only one mother who had adolescent girl was hard to accept male

Gender Age hospitalize		Age hospitalized	Period hospitalized	Diagnosis	Family
1	М	11y	1 year	Leukemia	Mother
2	F	16y	1 year	Osteosarcoma	Mother
3	F	14y	1 year	Lymphangiomatosis	Mother
4	М	15y	1.5 year	Leukemia	Father
5	М	11y	6 months	Leukemia	Mother
6	F	14y	6 months	Leukemia	Mother
7	M	11y	6 months	Leukemia	Mother

Table 1. Characteristics of participants.

nurses at the pediatric ward in early days of hospitalization. As days passed, boys gradually thought that male nurses were easy to interact and offered many distractions. Girls realized that male nurse were attentive about their changing condition or emotion. Boys and girls recognized communicative competence of male nurses. Their families described that male nurses were gentle and calm.

This study setting has unspoken rules for male nurses performing some intimate and personal care such a bed bath and enema for girl patients. All participants did not have negative image for male nurses and they recognized that male nurses were members of medical professional.

Although families didn't state much direct support to the family from male nurses, all participants described male nurses were significant member for pediatric nursing.

CONCLUSION

This study identified that there were significant positive attitudes about male nurses from pediatric patients and their families who received care from male nurses. Children hospitalized and their families can have positive feelings toward male nurses by various consideration related to gender. Regardless of the gender, male nurses have important roll to patients as professional nursing members.

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Trends towards an Acceptable Macronutrient Distribution Range in Japan: a Joinpoint Analysis of Energy Intake Data of the National Nutrition Survey in Japan from 1946 to 2015

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The aim of this research was to analyze the temporal trends in macronutrient distribution (MD) of energy intake in the Japanese diet from 1946 to 2015. Energy and macronutrient intakes data were obtained from the national nutrition survey, an annual nationwide survey in Japan. We used joinpoint regression analysis to investigate significant changes in trends and to identify the year in which the acceptable macronutrient distribution ranges were achieved. The annual percentage change (APC) was computed for each period in the trends.

INTRODUCTION

The changes in dietary history have quickened over the last three centuries and after World War II it has gained momentum. This momentum shift can be linked to the high level of diet-related non-communicable diseases (DR-NCDs)^[1]. In 2002, the Institute of medicine developed acceptable macronutrient distribution ranges (AMDRs) for carbohydrate, protein, and fat and set forth an evidence-based range that has a role in reducing DR-NCDs^[2]. Healthy dietary patterns are a global priority to reduce DR-NCDs. Due to the long life expectancy^[3] and lower incidence and mortality from coronary artery disease^[4], the world is now focusing on the Japanese diet and the Japanese diet boom. Hence, the aim of this study was to analyze the temporal trends and significant changes in macronutrient distribution (MD) in the Japanese diet from 1946 to 2015. Moreover this analysis also identified the year, when Japan achieved acceptable macronutrient distribution ranges (AMDRs) for carbohydrate, protein, and fat.

METHODOLOGY

Energy and macronutrient intakes data were obtained from the national nutrition survey in Japan which has been conducted annually since 1945^[5]. This survey provides information on the food and nutrient intake of the Japanese people along with some basic information required for a healthier Japan. For this paper, we used joinpoint regression analysis for analyzing the temporal trends^[6].

	Trend 1	Trend 2	Trend 3	Trend 4		
	Period	Period	Period	Period		
	(APC) ^a	(APC) ^a	(APC) ^a	(APC) ^a		
Energy	1946-1949	1946-1962	1962-1969	1969-2015		
	(3.06) ^a	(0.03)	(1.07) ^a	(-0.47)ª		
Macronutrient D	Macronutrient Distribution					
Carbohydrates	1946-1960	1960-1977	1977-1999	2002-2015		
	(-0.48) ^a	(-1.21) ^a	(-0.35) ^a	(-0.17) ^a		
Protein	1946-1999 (0.49) ^a	1999-2002 (-2.59)	2002-2015 (-0.18)			
Fat	1946-1961	1961-1967	1967-1979	1979-2015		
	(3.85) ^a	(7.49) ^a	(2.99) ^a	(0.19) ^a		

Table 1. Trends in energy and distribution of macronutrients.

^aAPC is annual percentage change of energy and macronutrient distribution of energy; The annual percentage change is significantly different from 0 (two-sided P < 0.05);



Figure 1. Trends in MD of carbohydrate, protein, and fat in the Japanese diet from 1946 to 2015; horizontal lines represents the upper (UL) and lower limit (LL) of the AMDR or tentative dietary goal for preventing life-style related diseases (DG) in Japan. a,b,c Denotes the annual percent change (APC) in the MD of carbohydrate, protein, and fat, respectively that is significantly different from 0 (P < 0.05).

RESULTS AND DISCUSSIONS

The MD of carbohydrates in the Japanese diet decreased by about 22.0%, while the MD of fat increased by 20% from 1946 to 2015. The MD of carbohydrates showed a significant and stable downward trend from 1946 to 2015^[7]

except for 1999 to 2002. Like carbohydrates, the MD of fat increased significantly at a marked rate from 1946 to 1967 (APC = 4.7%) and then at a slower rate (APC = 2.9%) until 1979; after 1979 the rate of increase slowed to only 0.2% till 2015. This finding was supported by The MD of protein increased gradually for a long period, from 1946 to 1999 (APC = 0.5%) and after 2002 it almost leveled off. The MD of carbohydrates and fat entered into the AMDRs in the first half of the 1970s while protein entered into the range in the second half of the 1950s. Upgrades and changes in food composition table might be act as an artifact in explaining the changes in trends. This study explored the significant changes in micronutrient distribution in the Japanese diet towards the AMDR. Before the concept of AMDR was published, Japan already had been adapted to this healthy distribution of diet which might be a reason for their extended life expectancy and the reduced DR-NCDs.

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Development of "Kratib Kao" for Controlling Rice Consumption for Older Persons with Diabetes

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ABSTRACT

Diabetes is a chronic disease commonly found in the Thai aged populations. This research aimed to develop and examine the feasibility of rice container or Kratib Kao to control rice consumption in persons with type 2 diabetes. The subjects consisted of 32 persons with type 2 diabetes living in Chiang Mai Province. This research was divided into 2 phases, first phase; the Kratib Kao was developed and examined the feasibility of Kratib Kao as an innovation device that controls the consumption of sticky rice in subjects by using focus group discussion with 12 subjects. Convenient wampling method based on the eligibility criteria of fasting blood sugar above 130 mg/dl or hemoglobin A1c above 7% was used to recruit 20 subjects in the second phase of feasibility testing.

The results of the study revealed that Kratib was composed of 2 parts: the Kratib Kao and the control panel base. The Kratib Kao was woven with bamboo and round in shape. It had a lid and a bamboo base, with a diameter of 14 centimeters. The capacity was 1 kilogram of sticky rice. For the second part, the control panel base was rectangular in shape and made of plastic. It was 15 centimeters wide, 20 centimeters long, and 5.5 inches high. It consisted of 1) on-off switch, 2) rice selection button, 3) recording button, 4) rotary switch for selecting meal, 5) display, 6) base, 7) charging port, 8) charging cable, and 9) memory card slot.

After 1 month, calorie intake from carbohydrate was decreased from 783.69 kilocalories or 49.28 % to 568.42 kilocalories or 35.73% of total calorie intake per day which is below the recommendation (<50%). Considering each type of rice, calorie intake from sticky rice and plain rice was also decreased from 255.59 to 203.61 kilocalories and 363 to 131.84 kilocalories for each meal. Moreover, the subjects reduced rice consumption at dinner resulting in lower calorie intake from 294.02 to 198.48 kilocalories. All subjects satisfied with Kratib since it immediately feeded the data back to them and make them control the amount of rice each meal.

INTRODUCTION

The prevalence of diabetes mellitus in older persons rose from 15.0% in 2011 to 18.2% in 2014 (Strategy and Planning Division, Office of Permanent Secretary, 2014). However, there is a small proportion of patients with diabetes who can control their blood sugar to the target level. Blood sugar level can be controlled by appropriate eating habit.

RESULTS AND DISCUSSION

A. Characteristics of the rice containers or Kratib Kao

The second version of rice container was woven with bamboo. It had a shape that was familiar to the sample and was lightweight. The base featured more functions such as a button for selecting meals and a button for recording. The numerical display was adjusted to be more readable. Its overall weight was lighter. The developed wicker rice container had two main parts. For the first part, the rice container was woven with bamboo (Number 1) and round in shape. It had a lid and a bamboo base, with a diameter of 14 centimeters. The capacity was 1 kilogram of sticky rice. For the second part, the control panel base (Number 2) was rectangular in shape and made of plastic. It was 15 centimeters wide, 20 centimeters long, and 5.5 inches high. It consisted of 1) on-off switch (A), 2) rice selection button (B), 3) recording button (C), 4) rotary switch for selecting meal (D), 5) display (E), 6) base (F), 7) charging port (Number 4), 8) charging cable (Number 3), and 9) memory card slot.

B. Instructions:

The steps of using the rice container are as follows:

1) Put cooked rice in the rice container.

2) Press a button to select the type of the rice.

3) Rotate the rotary button to select the meal (breakfast, lunch, dinner).

4) Press the Switch-On button (red) and wait until the display shows "OK".

5) After the "OK" disappears from the display, put the rice container on the base. The energy from the rice in the rice container will appear on the display.

6) Press Record button. The display will show "SAVE 1".

7) Press Switch-Off button and remove the rice container from the base. Eat the rice.

8) After eating, repeat the same steps as before eating: 1) Press a button to select the type of the rice, 2) Rotate the rotary button to select the meal, 3) Press the Switch-On button (red) until the display shows "OK", 4) Put the rice container on the base, 5) Press Record button. The display will show "SAVE 2", and 6) Press Switch-Off. The battery should be charged after use every day or every two days. When fully charged, the charging will stop automatically.

C. Findings



Feasibility of using the rice container to control rice consumption.

Before the experiment, the sample used the rice container for one week to collect data regarding the amount of rice consumption and record all kinds of food consumed on a daily basis. Then, the data were utilized to calculate energy using Nutrifact software (See Table 2).

After the experiment, the sample used the rice container for one month to collect data concerning the amount of rice consumption and record all kinds of food consumed on a daily basis. The data were then utilized to calculate energy using Nutrifact software (See Table 1).
Table 1. Energy intake each day, energy intake from carbohydrate each day and percentage of energy intake from carbohydrate before the experiment.

Groups	Energy from carbohydrate	Total energy	Percent
Before the experiment	783.69	1590.12	49.28
After the experiment	568.42	1593.50	35.73

From Table 1, compared with energy from all kinds of food, the average daily energy intake from carbohydrate before the experiment was 49.28%. Each day, the sample gained an average of 1590.12 calories from food, of which 783.69 calories were from carbohydrate. After the experiment, the daily energy from carbohydrate, compared with energy from other kinds of food, was 35.73%. The sample gained an average of 1593.50 calories daily, of which 568.42 calories were from carbohydrate.

The data of carbohydrate intake from rice as main food gained from the use of the developed rice container to record the rice intake in each meal before and after the experiment were as presented in Table 2.

Table 2. Amount of carbohydrate as described by each meal and type of rice before and after the experiment.

Meals/Type of	Sticky rice (n = 8)		White rice (n =1)		
Rice (Kilocalories)	Before experiment	After experiment	Before experiment	After experiment	
Breakfast	247.42	215.88	363	121.3	
Lunch	225.32	196.47	0	141.4	
Dinner	294.02	198.48	0	132.9	
\overline{X}	255.59	203.61	363	131.84	

From Table 2, before the experiment, the sample consumed sticky rice as their main food. The largest quantity of sticky rice was consumed for dinner, giving nearly 300 calories (294.02) only from rice. In contrast, white rice was consumed in a large quantity for breakfast, giving an average of 363 calories.

After the experiment, it was found that the sample consumed both sticky rice and white rice. Rice was consumed in the largest quantity during breakfast, giving an average of approximately 200 calories (215.88) only from rice. White rice was consumed in the largest quantity at lunch (141.4 calories).

D. Satisfaction with the rice container

After using the rice container to control rice intake, the sample reported a high level of satisfaction. They were satisfied with the shape and the usage of rice container. They revealed that the use of rice container allowed them to know how much white rice and sticky rice they ate. When they wanted to reduce their rice intake, the rice container would show them how much they had to reduce. Despite some complications to use at the beginning, the sample became familiar with the rice container over time and no longer experienced difficulties. The use of rice container could reduce the amount of rice consumption. Although it remained unknown whether this could decrease blood sugar level, the samples were satisfied that at least they could reduce their sticky rice intake. In the long run, they would not need the rice container because they have learned how to estimate the right amount of rice by themselves.

E. Discussion

The rice container was developed to control the amount of rice consumption with functions that could be used by persons with diabetes to control the quantity of rice intake. This can be explained by the characteristics of rice container that was designed to show the quantity of rice and the energy gained from the rice. It also provided knowledge regarding how to control an intake of carbohydrate from rice and flour, especially white rice and sticky rice. This device enabled persons with diabetes to have more accurate control over their rice intake in each meal. After the experiment, it was found that the intake of white rice and sticky rice of the sample decreased to a lower level than prior to the experiment. This resulted in decreased levels of energy gained from carbohydrate by 35.75% of daily energy intake. In addition, the function of the rice container that allowed the users to select between breakfast, lunch, and dinner made it more convenient to plan the portions for each meal. Following the experiment, it was found that the behavior of the sample shifted from having a big dinner to having a big breakfast. They also ate less rice during dinner. However, there was no reduction in their daily energy intake, suggesting that the sample compensated for their less carbohydrate intake by increasing their consumption of other kinds of food. This was consistent with the guideline for diabetic persons who need to control their blood sugar level, which suggested that they should control the energy from their carbohydrate intake to lower than 50% of daily energy intake (Diabetes Association of Thailand under the Patronage of Her Royal Highness Princess Maha Chakri Sirindhorn, 2014). Yet, the sample continued to consume sticky rice as main food because most of them were elderly people with an average age of 54.79 years who lived in the northern region and had a culture of eating sticky rice as main food. However, after the experiment, the sample reduced their intake of sticky rice.

The study findings were congruent with those of the study by Ahn and colleagues (2010) who compared the effect of small-sized rice bowls (capacity = 200 calories), normal-sized rice bowls (capacity = 380 calories) and no bowls on controlling carbohydrate intake of type 2 diabetic persons. The experiment lasted for 12 weeks along with controlling an intake of other kinds of food. When compared to before the experiment, it was found that the sample who used small-sized bowls had a reduction in energy intake, carbohydrate and fat intake with statistical significance after the experiment. Also, this reduction was greater than that in the sample who used normal-sized bowls and the control group with statistical significance. Similarly, Ahn and colleagues (2010) conducted a study to compare the effect between small bowls and food exchange on body weight, blood sugar level, and lipid level in obese persons with type 2 diabetes. After 12 weeks of study, it was found that the experiment group who used small bowls had reduced HbA1c, body weight, energy intake, protein, carbohydrate, and fat. However, no differences were found between the group who used small bowls and the group undergoing food exchange method.

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D-allose induces tumor suppressive factor TXNIP (thioredoxin interacting protein) through transcriptional and translational regulation

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We analyzed molecular mechanisms of TXNIP increase caused by D-allose, using human hepatocarcinoma cell line HuH-7. The inhibitor analyses showed that D-allose specifically increased TXNIP amount through activation of both p44/p42 MAPK pathway and p38MAPK pathway. These two MAPK pathways turned out to regulate TXNIP amount in translational level. Meanwhile, D-allose increased the transcription factor MondoA in nuclei. Overall, the present data show how D-allose specifically increases TXNIP in transcription and translation level, leading to the growth inhibition of cancer cells.

INTRODUCTION

D-allose, the C3-epimer of D-glucose, inhibits proliferation of various cancer cell lines^[1]. We have reported that D-allose treatment increased thioredoxin interacting protein (TXNIP), an anti-tumor molecule. We have also showed that TXNIP is responsible for the anti-proliferative activity of D-allose through two independent mechanisms; one is the cell cycle arrest at the G1/S checkpoint^[2], and the other is the down-regulation of the glucose transporter GLUT1^[3] (Figure 1). Further analysis revealed that D-allose exerts growth inhibitory effects on tumor tissues in model mice, and that TXNIP increased in D-allose-treated tumor tissues^[4,5,6]. These findings raised the possibility of D-allose and TXNIP to utilize in cancer treatments.

RESULTS AND DISCUSSIONS

We analyzed the molecular mechanisms of TXNIP up-regulation caused by D-allose in hepatocellular carcinoma cell line HuH-7. The inhibitor analyses showed that D-allose specifically increased TXNIP amount through activation of both p44/p42 MAPK pathway and p38MAPK pathway. Inhibition of each pathway didn't decrease TXNIP mRNA, but inhibited phosphorylation of Mnk1, which is responsible for protein translation. Taken together, these two MAPK pathways regulate TXNIP in translational level. Overall, TXNIP is up-regulated through both p44/p42 MAPK pathway and p38MAPK pathway,

Next we focused on the transcriptional regulation of TXNIP. D-allose clearly increased the transcription factor MondoA in the nuclei, which had been reported to participate in the TXNIP transcription^[7]. Therefore TXNIP upregulation by D-allose is possibly depend on MondoA in the hepatocellular carcinoma cell line.

Overall, the present data show how D-allose specifically increases TXNIP in transcription and translation level, leading to the growth inhibition of cancer cells (Figure 2). To establish a strategy of cancer therapy utilizing D-allose and TXNIP, present molecular analysis regarding the D-allose effect on cancer cells would make a great contribution.



Figure 1. D-allose causes growth inhibition of cancer cells.





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27-29 August, 2018

Session 4 :

Energy and Sustainable Technologies

Chair Person :

Wasawat Nakkiew (CMU) Yoshiro Imai (KU)

August 27th, 2018 Session Program 11.00-12.00 hrs. Session Program 13.00-15.20 hrs.

August 29th, 2018 Session Program 09.00-11.20 hrs.

Venue: Boonsom Martin Room, Fl. 2

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Experimental study on a seismic reinforcement method for traditional stone houses in the Kingdom of Bhutan

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The purpose of this study is to propose a seismic reinforcement method for the traditional Bhutanese stone houses. Element tests were conducted to collect experimental data and confirm their effectiveness. The test specimens were defined by three parameters: loading type, mortar type, and reinforcement type. The results show that cement mortar enhances the strength of stone masonry walls significantly compared to mud mortar. In addition, steel bars inside the walls can serve as an effective reinforcement.

INTRODUCTION

Traditionally, houses in Bhutan are made of natural materials, such as rammed earth and stone, which are easily available. An example of a traditional Bhutanese stone house is shown in Figure 1. Structurally, these traditional houses are built without connections between the roof and walls. Therefore, seismic reinforcement for walls is crucial for these houses.

Earthquakes occur frequently around the Himalayas, including Bhutan. Since 2000, two M6 earthquakes have caused severe damage to houses in the country. Consequently, it is necessary to improve the seismic performance of these houses. The following are typical patterns of earthquake damage: separation of walls at intersections, vertical cracks, and wall collapse. They are caused by inadequate wall connections or straight joints inside the wall. To prevent damage caused by earthquakes, a reinforcement method for walls, using cement mortar or steel bars, is proposed. However, there are no experimental data proving the effectiveness of this method is available. To obtain such data and confirm the method's effectiveness, it is important to conduct element tests.



Figure 1. Traditional Bhutanese stone house

Figure 2. Test set up for out-of-plane (bending)

SPECIMENS FOR ELEMENT TESTS

A total of six specimens were tested; three for in-plane (shear) and three for out-of-plane (bending) testing. The specimens for the shear tests were 1.2-m-long, 0.6-m-thick, and

1.2-m-high, while the sample height for the bending tests was 1.8 m. The test specimens were labeled using "X-Y-Z" format: U-MM-S, U-CM-S, R-CM-S, U-MM-B, U-CM-B, and R-CM-B. Here, "X" denotes either the unreinforced (U) or reinforced (R) specimens. "Y" denotes the type of mortar, namely, either mud mortar (MM) or cement mortar (CM). "Z" denotes the shear test (S) or the bending test (B). Figure 2 shows the test set-up adopted for the bending test. The specimen wall was pulled in the horizontal direction with a chain block anchored to a steel frame. The applied load on wall was recorded by a load cell, and displacement transducers were used to measure the displacement at different heights of the specimen.

RESULTS AND DISCUSSIONS

The maximum loads recorded in the shear tests were 7.79 kN (U-MM-S), 26.78 kN (U-CM-S), and 28.38 kN (R-CM-S). U-MM-S showed the smallest shear strength and the maximum U-CM-S load was approximately 3.4 times higher than that of U-MM-S. U-MM-S and U-CM-S showed cracks within the stone masonry wall; however, this was not the case for R-CM-S, which experienced rocking at the base. The maximum R-CM-S load may even exceed 28.38 kN (the value mentioned earlier).



Figure 3. Load Displacement curve from bending tests

The maximum loads recorded in the bending tests were 5.49 kN (U-MM-B), 7.99 kN (U-CM-B), and 13.29 kN (R-CM-B). Figure 3 shows the comparison of the relationship between bending load and displacement. The maximum U-CM-B load is approximately 1.4 times higher than that of U-MM-B. U-MM-B showed the lowest bending strength. Owing to the limitations of the test set-up and chain block capacity, R-CM-B showed rocking at the base; however, no cracks were observed in the wall. The maximum R-CM-B load may increase more than 1.6 times the maximum U-CM-B load.

The test results show that cement mortar enhances the strength of the stone masonry wall significantly compared to mud mortar. Moreover, reinforcing the walls with steel bars is suitable for the stated purpose.

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Study on Vibration Characteristics of Stone Building Based on Seismic Observation

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In Japan, ensuring the seismic resilience of historical buildings is essential to their preservation. However, very few studies have addressed historical masonry buildings, such that essentially no seismic observation data is available to evaluate either their seismic performance or their need for seismic reinforcement. The aim of this study was to clarify the structural behavior of stone buildings during an earthquake based on seismic observations. The seismic observation for Wadamisaki Battery made of stone were conducted. Based on this results, multi-mass system model which considered both sway and rocking motions was developed. From the results of the seismic observations and seismic response analysis, the effect of the dynamic soilstructure interaction on stone buildings during an earthquake was clarified.

INTRODUCTION

Many large earthquakes have struck Japan since the Southern Hyōgo Prefecture earthquake in 1995. Therefore, ensuring the seismic resilience of historical buildings is essential to ensuring their preservation. However, very few studies have addressed historical masonry buildings built from the likes of brick or stone, such that almost no seismic observation data is available for evaluating either their seismic performance or need for seismic reinforcement. The aim of this study was to clarify the structural behavior of historical stone buildings during an earthquake based on seismic observations.

The stone-built Wadamisaki Battery is located in the city of Kobe. The diameter of the Wadamisaki Battery is about 15 m at ground level and about 14 m at the second floor. Its height is about 11.5 m. The Wadamisaki Battery has a cylindrical configuration, as shown in Figure 1. Fortunately, an opportunity to investigate the Wadamisaki Battery was presented during its renovation. Soil studies revealed that the ground at the site is soft. Because it is a rigid structure, built on soft ground, the Wadamisaki Battery predominantly exhibits sway and rocking motions during an earthquake. As such, it is expected that the effect of damping caused by the dynamic soil-structure interaction on the structural behavior will be considerable.

SEISMIC OBSERVATION AND ANALYSIS MODEL

After the completion of the renovation work, to estimate the vibration properties of the Wadamisaki Battery during an earthquake, seismometers were mounted on the stone of the Wadamisaki Battery as well as on the ground in the vicinity of the Battery.

A multi-mass system model for the Wadamisaki Battery, considering the sway and rocking motions, was constructed based on seismic observations. The structure above the base is expressed as a ten degree of freedom system; each layer of stone is assumed to be a single mass. This analysis is elastic and does not consider the uplift behavior and bending deformation of a structure. Rayleigh damping is applied, with the first and second damping ratios assumed to be 0.05.

RESULTS AND DISCUSSIONS

Figure 2 shows a comparison of the maximum acceleration, as obtained by observation and analysis, at the roof level during the observed earthquake in both directions. The observed wave at the ground level of the Wadamisaki Battery was used as the input wave for the seismic response analysis. Results of the analysis were in good agreement with the measurements. In addition, the sway and rocking deformations are more than 90%, implying that the effect of damping by the dynamic soil-structure interaction is considerable. It was found that, for the seismic response analysis, a sway-rocking model considering the effect of damping by the dynamic soil-structure interaction is adequate for simulating the behavior of the Wadamisaki Battery during an earthquake.



Figure 1. Front view of Wadamisaki Battery



Figure 2. Comparison of maximum acceleration at the top of building

ACKNOWLEDGEMENT

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Effect of Agricultural Alternation in the Reduction of Potential Contaminate Overland Sediment over the Mae Tao Basin, Thailand

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ABSTRACTS

Natural deposition of heavy metal is one of the contamination's causes which, causing lots of negative impact to both environment and ecology. Utilization of soil, water or other natural resources from this deposition can extensively pollute the environmental elements. The Mae Tao Basin in Mae Sot district, Thailand, is a cadmium contaminated area, where the transcendent media transporter of the contaminant is sediment leached from various surface runoff. Consistent of many studies results, the agricultural practice in the upstream of the basin can cause substantial effects to the contamination over the basin. In order to pursue the best selection on vegetation type that can be sustainably cultivated, the Revised Universal Soil Loss Equation (RUSLE) incorporated with remote sensing and geographic information system (GIS) software were applied. Ten differences cultivation type were selected as the subsidizing land use type over the area. The scenarios from the estimation using integrated approaches were compared to define the best cultivation type that can reduce the effect of the erosion over the contaminated area of this basin. The study results demonstrate that subsidizing of cornfield with a plantation, containing lower C factor than 0.6 can significantly reduce the potential erosion. Conversely, the study of the effect of soil preservation measurement must be further integrated.

Abstract-writing Support Tool for Foreign Students to describe Foreign Articles

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We have designed and implemented usercentered Abstract-writing support editor system and begin to evaluate it in the practical situation. A word similar to each word of the manuscripts sent by Word2Vec accept as a set of candidate and a set of candidate to replace the word of the original manuscripts can be selected. With this system, we can retrieve suitable terminology or vocabulary in the comparable documents for our choice in our similar context, select one among the relevant candidates for our sentence, and accomplish reader-friendly paragraph/chapter/ article by ourselves and in a relatively short time.

INTRODUCTION

It is important to select the appropriate vocabulary when writing articles. However, when writing in foreign languages, appropriate vocabulary may not come up with. Therefore, in this research, we developed a document-writing support tool for abstracts of foreign articles. Use Word2Vec to digitize words and display similarly used words as conversion candidates. Users can easily convert words in sentences by selecting words from the displayed candidates.

SYSTEM WITH ABSTRACT-WRITING SUPPORT FUNCTION BASED ON WORD2VEC

Concept of designing our document-writing support system is as follows; (1) acquiring abstract and so on from the related documents, (2) selecting the target words by means of machine learning based on 'Word2vec' into accumulation in the form of dictionary, and (3) providing suitable candidate (expression, technical terminology) from the dictionary in order to support document-writing.

Figure 1 shows concept of our documentwriting support system with 'Word2vec'.



Figure 1. Concept of Designing our Abstract-writing Support Tool

Dictionary is the dedicated one for users to refer and obtain the recommended candidate(s) to help them to write a document by themselves. Our system can search the dictionary to pick up some candidates from it, show the list of candidates, and place the expression selected by user onto the document.

USER INTERFACE OF OUR SYSTEM

Figure 2 shows User-Interface on a browser for Abstract-writing Support Tool. The lefthand and upper text frame receives a part of 'Abstract' by user. The focused sentence through specification by Mouse Drugging has been transferred from browser to the server. After computation by 'Word2vec' service for providing feasible candidates back to the browser, users can find the possibly replaceable candidates in the right-hand text frame and easily select one of them for modification of the original sentence. Users can obtain newly modified sentence through replacement of the focused word with selected candidate. They can confirm that their manipulation of document modification by means of history of replacement. With the above manipulation, our user has obtain the newly modified sentence from the original one.





RESULTS AND DISCUSSIONS

This paper describes Document-writing support system realized with server-client computing model. The system includes a server part which can perform natural language processing facility and machine learning computation and client part which can provide user interface to support document-writing. The former is based on 'Word2vec' for machine learning computation. The latter is implemented as a web-based user interface with HTML and JavaScript. Our system totally facilitates document-writing support service by means of recommendation of suitable candidates for given sentence which are replaceable and potentially improved for document writing.

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Dynamic Monitoring of Wat-Umong Stupa Under Natural Vibration

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The present research shows the results of acceleration at top and base of Wat Umong stupa, Muang Chiang Mai, due to the natural vibration. Two accerelometers were set at the base and near the top of stupa. The Fourier analysis of measured data illustrate that the fundamental frequency of stupa is around 3.5 Hz, and ratio of peak acceleration between top versus base of the stupa are in the range of 3-5 times. The result of natural frequency show silgthly greater than the value obtained from available finite element analysis from literature.

INTRODUCTION

Chiang Mai City has been considered as a cultural city founded more or less 700 years ago. Pagoda is one of the historical evident telling the past life regarding the people respects on Buddha and the historical buildings are very important. However, as Chiangmai is a moderate seismic prone area, the buildings have been suffered from earthquake damages. Collection of the pagodas in Chiangmai leads to classification into three main groups as inverted bell shape, palace (square) shape and other shape (not classified into the first two shapes). Furthermore, the dynamics characteristics of many historical stupas in Chiang Mai were investigated by many researchers^[1,2].

Umong pagoda is located in the Chiang Mai city, having inverted bell shape is 16.48 m. in base diameter and 25.72 m. high. The available data from ambient vibration test and finite element analysis were reported in^[2]. However, they may have some limitation of approximation, e.g. material parameter used to construct the finite element model, the detail inside the pagoda, and etc. Hence, the aim of this study was to clarify the structural behavior of historic Umong pagoda during an earthquake based on seismic observation via Fourier analysis^[3] and from structural identification techniques^[4].

To estimate the vibration properties of the Umong stupa, the accelerometers were attached at base (Ch2) and near the top of stupa (Ch3), as show in Figure 1. The accelerometer can measure the acceleration in all three directions, North-South (NS), East-West (EW), and up-down (UD). Then the Fourier analysis of acceleration at foundation and top of Umong stupa was performed to find the Natural frequency (dominated response) of the stupa. Then the structural identification method was performed^[4]. The objective function of structural identification technique are sumof-square of deviation between measured data and acceleration obtained from well-known Newmark's scheme (average acceleration method). Stupa was assumed to be a single mass-spring-damper system, and the objective function was minimized versus two dynamic parameters, namely, Natural Frequency (Hz) and damping factor. The results from present Fourier analysis and structural identification scheme was then compared to verify each other.



Figure 1. The location of accelerometers attached to Umong stupa

RESULTS AND DISCUSSIONS

The measured acceleration data is shown in table 1. Note that the unit gal means centimeter per second-square. The ratio of peak acceleration between top versus base of stupa (Ch3/Ch2) are varied from 3-5. Fourier analysis obtain the value of Natural Frequency equals to 3.5 Hz. The result from structure identification scheme is almost the same with Fourier analysis. The damping factor obtained from structural identification system is equal to 0.02. Note that the Natural Frequency from finite element analysis is approximately equal to 2.3 Hz, which is lower than result obtained from present study.

Direction	M: Accele (g	in. cration al)	Max. Acceleration (gal)		
	Ch2	Ch3	Ch2	Ch3	
NS	-0.83	-2.47	0.81	3.20	
EW	-1.33	-5.34	0.98	5.14	

Table 1. Measured peak acceleration.

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Restoration Planning System for Resilient Road Networks after an Earthquake Disaster

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INTRODUCTION

This study is aimed to develop a planning system for early recovery related to road networks damaged by an earthquake. Restoration priority of the road network depends on its purposes. Road restoration works set a common goals and must effectively use the limited resources. However, because recovery purposes in each region organization may be different, it is difficult to build consensus among them.

In this study, we develop the planning system using a concept of resilience engineering. Several restoration schedule cases are presented to demonstrate the effectiveness of the proposed system.

RESULTS AND DISCUSSIONS

Figure 1 shows the flow of recovery strategy study using our proposed system. The proposed system assumes use in normal conditions before a disaster, such as in a workshop on road recovery strategies. We formulate the appropriate assignment of recovery teams and proper work orders as a combinatorial optimization problem. The proposed system presents the optimized recovery plan by using Genetic Algorithms. The system user discusses the effectiveness of the plan created by the system. In an emergency, the analysis conditions and recovery plan most similar to the actual damage conditions are retrieved and provided to system users.

This study also presents an analysis of the case of Takamatsu city as a usage example of the proposed system. The four cases with different clearing priorities were created. The difference in priority roads in each case was considered by changing the road importance value. These are "Case study 0: no priority," "Case study 1: compliant with guideline," "Case study 2: medical facilities prioritized," and "Case 3: lifeline facilities prioritized."

The results are shown in Figure 2 and Figure 3. The recovery rate increased most rapidly in Case study 1. This seems to be because of effective recovery through the concentrated recovery of the central area with many first priority routes. On the other hand, in Case study 3, where lifeline facilities were prioritized, road recovery was not effective because the routes to lifeline facilities were distributed over a broad area. These results showed that road recovery proceeded most rapidly in "Case study 1: compliant with guideline," and there was little difference, suggesting the effectiveness of road recovery planning according to guidelines (Figure 3).

Future works are social implementation for the Nankai Trough earthquake and quantitative evaluation of our system.



Figure 1. The proposed system assumes use in predisaster. The system user creates a road network, determines the analysis condition of the recovery plan, and discusses the effectiveness of the plan created by the system.



Figure 2. It shows the result of case study 1. Roads to be recovered by the third day and sixth day after the disaster are shown in sky blue and pink, respectively.



Figure 3. In four cases, roads are recovered most promptly in eight days: Case studies 0 and 1.

Palladium Catalyst on Graphene for Deoxygenation of Biodiesel by Strong Electrostatic Absorption Technique

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ABSTRACTS

This research was to prepare the palladium catalysts supported on graphene for the deoxygenation process to convert the palm brunch oil to C18-C20 bio-diesel like hydrocarbon. The Strong Electrostatic Adsorption (SEA) technique was applied for the adsorption of Pd precursor onto the support. The Point of Zero Charge (PZC) of graphene had the pH about 4.6. The Pd percentage loading was analyzed by using inductively coupled plasma spectroscopy (ICP). The adsorbed Pd precursor onto graphene was reduced in hydrogen environment in order to produce Pd crystalline particles. The Pd crystalline particles were analyzed by X-Ray Diffraction (XRD) to observe the crystalline structure and to identify Pd metal. Moreover, the average Pd particle size and size distribution were examined by using Transmission Electron Microscopy (TEM). The Palladium supported on Graphene can be convert palm brunch oil by Deoxygenation process. The product of conversion yielded that are Heavy oil (54.2 wt%), Light oil (23.6 wt%), Gas (22.1 wt%) and residues (0.1wt%) respectively. For the future work, the deoxygenation product will be analyzed for finding the selectivity of diesel-like hydrocarbon by gas chromatography mass spectrometry (GC-MS). Key words: Strong Electrostatic Adsorption, Catalysts, Deoxygenation process, Biodiesel, Heterogeneous catalyst, Palladium

Application and Evaluation of Register-transfer level Visual CPU Simulator for Computer Architecture and other computer-based Education

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In our study, a new educational tool for Computer Architecture and other related subjects has been developed. The tool can provide simulation of assembly program code (instead of machine language), demonstration of several kinds of sample programs and visualization of Register-transfer-level structure/behavior, namely micro-operation. Our educational tool for CPU simulation has been designed and implemented in JavaScript programming language as Web service. Its users can select simulation modes by micro step, by machine cycle, by automatic repetition of such cycles and backward of micro step. Our Visual CPU Simulator has been also well-evaluated through some kinds of questionnaires by users/learners in many types of classroom lectures. It is confirmed that the simulator has been very useful and effective to learn Computer Architecture and behavior/organization of CPU by means of its application.

INTRODUCTION

It is very much important for students of universities and higher education to understand structures and behaviors of computer precisely. We have developed a new CPU simulator for learners to recognize internal structure and register-transfer level micro-operation of CPU of computer graphically and concretely. Our CPU simulator can visualize machine-cycle level behavior as well as micro-operation level one. It has been designed and implemented using JavaScript so that it can be run not only on PC's browser but also on tablet/smartphone. Thanks to these factors and their functions, the CPU simulator was able to play an important role in understanding how the computer works in terms of micro-operation.

SYSTEM CONFIGURATION

It is important for learners to handle the simulator smoothly and correctly in order to understand how a computer works graphically. User interface has been designed and implemented carefully for learners to recognize inner structures and behaviors of CPU more clearly. Figure 1 shows user interface of our CPU simulator.

Our CPU simulator equips and presents four useful modes of execution of loaded programs. Four execution mode will be as follows :

- machine-cycle level (one step execution)
- repetition of machine-cycle level (autonomous execution)

- micro-operation level
- backward execution of micro-operation level

In these four operation modes, our CPU simulator can be efficiently and effectively used.





EVALUATION

After using the simulator in the actual classroom lecture, we conducted a questionnaire survey consisting of 7 questions for the first year students of undergraduate students. An example of the question is as follows.

- Do you think that our simulator can help you to understand data flow inside of computer?
- Is change of color for registers and connection lines useful for you to understand data flow inside of CPU?

Approximately more than 65% agreed from the answers to the above questions, it was confirmed that CPU simulator is useful for computer and CPU understanding.

RESULTS AND DISCUSSIONS

We have developed CPU Simulator written in JavaScript to demonstrate how a computer works graphically. One of the useful characteristics of our CPU simulator is to visualize Inside structure and behavior of a CPU through the Registertransfer level micro- operations. With its four executing modes, users can manipulate our CPU simulator to- wards maximal performance and learners can understand how a computer processes its program codes at the level of microoperations effectively and efficiently.

From the result of questionnaire, we think it is confirmed that our simulator realizes good users' learning and understanding how a computer work graphically.

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A Study of Big Data Analysis based on Python Program for Electric Power Demand and some kinds of Weather Information

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Nowadays, data mining and so-called "Big Data Analysis" becomes more and more popular and useful in our social lives. We have already tried to apply techniques of data mining into some fields in order to visualize normally unknown or veiled relation. This time, we have focused on electric power demand, which is one of the indices or barometers of social lives and typical energy consuming. And we want to know and visualize how such electric power demand has been affected by the effect of environmental condition. With consideration of some districts such as Hokkaido, Tokyo and Shikoku (in Japan), our focused demands above have been visualized by means of relations with weather information as environmental conditions. We are designing and implementing Python-based Numerical Analysis System for future expandable energy consuming prediction together with accessible open social data.

INTRODUCTION

Visualization will be more and more important for us to make some decisions properly and prospectively. Data mining techniques and Big data approaches can bring us a very fruitful seed for visualization. And environmental fitness is also very important for us to perform our decision without unnecessary dissipation of power and overspending. Green computing and energy saving become important for us to maintain sustainable society^[1,2].

This study will try to analyze open accessible information about electric power demand(s) of some districts in Japan and demonstrate visualization of relation among environmental conditions which we can usually obtain information just as weather reports. And we would like to apply our data mining technique to find out normally unknown or hidden relation as an example of Big Data Analysis-based approach in order to retrieve effective and/or dominant conditional elements from uncertain situation^[3].

APPROACH OF BIG DATA ANALYSIS

We have focused electric power demand in East-north part, Middle one and West-south one of Japan, because these three districts locate apart one another and possibly most reliable data can be delivered for our open access through the Internet. So we very naturally selected the three major electric power companies given in Table 1. It provides acquired open-accessible data, calculated average temperature, amount of precipitation and hours of sun-shining as environmental conditions at the same time, and performed data mining analysis for visualization of relation between electric power demands and environmental conditions.

Hokkaido	Tokyo	Shikoku		
Haldraida				
Electric Power Co.	Tokyo Electric Power Co.	Shikoku Electric Power Co.		
Sapporo	Tokyo	Matsuyama		
Average Temperature A mount of Precipitation, Hours of Sun-Shining				
	Electric Power Co. Sapporo Ave A mon Hou	Electric Electric Power Co. Power Co. Sapporo Tokyo Average Temper A mount of Precip Hours of Sun-Sh		

Table 1.	Characteristics	of big	data	of our	target
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Figure 1. Relation between Average Temperature and Electric Power Demand in the domain Area of Tokyo Electric Power Co.

RESULTS AND DISCUSSIONS

In order to set up for big data analysis, we have acquired data for electric power demand from each electric power company and retrieved data from weather information database by means of our Perl programming language-based application. These are very tough and sometimes time-consuming jobs because we don't know normally where and/or how we can obtain suitably, smartly and smoothly.

After our Big Data Analysis, we have found that there have been special or probably similar relations between electric power demands and environmental conditions among the three focused areas of Japan. Figure1 shows relations between electric power demands and average temperatures in Tokyo (our capital, middle in Japan).

On the shape of graphs about the relation between demand and temperature, almost all of figures are confirmed to be definitely similar with one another. Just like right-hand hyperbolic curve, we can clearly recognize the three diphycercal curves on the y-axis of the point of the lowest demand.

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Catalysts for polymer electrolyte membrane fuel cells by Strong Electrostatic Adsorption

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ABSTRACT

Catalysts for polymer electrolyte membrane fuel cells by Strong Electrostatic Adsorption S. Pothaya, K. Punyawudho Department of Mechanical Engineering, Faculty of Engineering, Chiang Mai University, 50200, Thailand *Corresponding author: konlayutt.p@cmu.ac.th Abstract The study was to prepare the platinum on graphene as the catalysts for the Proton Exchange Membrane Fuel Cell (PEMFC). The strong electrostatic adsorption (SEA) technique was used to adsorb Pt precursors onto supported graphene for better Pt particle distribution. The pH shifts were performed to determine the point of zero charge (PZC) for supported graphene. The platinum tetraammine ([NH3) 4 Pt] 2+, PTA) metal precursor was adsorbed at low

PZC. After the SEA process, the samples were examined the Pt loading by inductively coupled plasma spectroscopy (ICP). The adsorbed PTA on graphene were, then, reduced in hydrogen environment creating the crystalline Pt particles onto the supported graphene. Consequently, the average size particle and metal distribution were inspected by the transmission electron microscopy (TEM). The electrochemical properties were tested by the cyclic voltammetry (CV) and the sweep techniques. The oxygen reduction reaction (ORR) was also used to evaluate the limiting current. Moreover, the catalytic degradation during electrochemical reaction was also observed after 2,000 cycles of reduction and oxidation reaction. Key words: Pt/C catalysts, strong electrostatic adsorption, Platinum, PEM fuel cell

Grid-Flux-Oriented Control and Synchronization for a Doubly-Fed Induction Generator System

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ABSTRACT

This paper presents a synchronization method and the power control by using a gridflux-oriented control (GFOC) algorithm for a two-level back-to-back converter fed doublyfed induction generator (DFIG) system. Here, the synchronization process and power control with toque/speed modes of the generator are controlled by a unique rotor current control. Based on the GFOC algorithm for the regulation of the stator magnetizing current, the exciting component of the rotor current is fully controlled, and the variation of the subsynchronous, synchronous, and supersynchronous speed is controlled by the torque component of the rotor current for the stator power control. The performance of the proposed GFOC algorithm with DFIG drive is verified through the simulation results considering the DFIG as connected/disconnected to ac mains, and torque/speed-control modes.

Relatively Low Strength and Self-Cured Geopolymer for Road Construction Applications: The Study of Compaction Characteristics of the Crushed Rock Geopolymer Material

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ABSTRACT

At present, the research question of how to bring geopolymer for using as a part of road construction materials with an aim to replace cement is a challenging question in the field of civil engineering. Particularly, geopolymer is as a stabilizing agent for road rehabilitation and construction. This research concentrated on the compaction characteristics of geopolymer having crushed rock as a parent material, socalled crushed rock geopolymer (CR-GP). CR-GP is a mixture of standard crushed rock (B) and liquid alkaline activator (L), which consist Na₂SiO₃ and NaOH. Test variables for this study were influent factors affecting to compactibility of CR-GP. After re-examining of the standard crushed rock used in this study, it was then mixed with the 6 molar-concentration of L by which this directly relates to a road compaction

period in the field. The Na₂SiO₃:NaOH ratio was controlled as 0:100, 50:50 and 100:0 with L/B equal to 0.25. The compaction tests on CR-GP designed for this study were then performed following the standard compaction effort (592.5 kJ/m^3) and the modified compaction effort (2693.3 kJ/m³). Test results showed that compaction curves of GR-GP can be established as the bell curve with a peak point like a normal one-peak compaction of soil. Based on such CR-GP compaction curve, the maximum dry density (MDD) and the so-called optimum liquid alkaline activator content (OLC) can be established. The modified compaction curve showed higher MDD and less OLC, compared to the standard compaction curve. Outcomes of this study can be as foundation knowledge of how to construct effectively geopolymer for road construction.

Keywords: geopolymer, road construction materials, compaction

27-29 August, 2018

Session 5:

Food and Agriculture

Chair Person :

Chanakarn Prom-u-thai (CMU) Takeshi Katayama (KU) Hisashi Kato (KU) Osamu Kawamura (KU) Masashi Sato (KU) Kazuya Akimitsu (KU)

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Bioactive Compounds from Thai Indigenous Plants for the Development of the Eco-friendly Agriculture

Hisashi Kato-Noguchi*, Sirinapa Chaipon and Prapaipit Suwitchayanon

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The extracts of citronella grass and Indian heliotrope inhibited growth of wide range of plant species including weed plants. Active components in those extracts were isolated and identified as myrislignan and N-octanoyl tyramine for citronella grass and as methyl caffeate for Indian heliotrope.

INTRODUCTION

Plants produce large number of secondary metabolites and some of the compounds show biological activity, such as germination and growth inhibitory effects on other plants^[1]. Those compounds have potential as either herbicides or templates for new herbicide classes, and are more environmentally benign than most synthetic herbicides^[2]. However, the information on the bioactive compounds in Thai indigenous plants is limited. Therefore, we investigated bioactive compounds with allelopathic activity in Thai indigenous plants for the development of eco-friendly agriculture.

RESULTS AND DISCUSSION

1. Citronella grass

Citronella grass (*Cymbopogon nardus* (L.) Rendle) is a perennial grass belonging to the family Poaceae. Many researchers have studied the exploitation of the active compounds in this plant for medicinal purposes, but there have been no studies on its bioactive compounds with allelopathic activity. Therefore, we investigated the allelopathic active compounds in citronella grass. An aqueous methanol extract of citronella grass significantly inhibited the germination and the growth of cress (*Lepidium sativum* L.), lettuce (*Lactuca sativa* L.), barnyard grass (*Echinochloa crus-galli* (L.) P. Beauv.), and Italian ryegrass (*Lactuca sativa* L.).

The root extract of citronella grass was subjected to bioassay-guided fractionation to isolate bioactive compounds and two active compounds were finally isolated and identified as N-octanoyl tyramine and myrislignan. Myrislignan is a major acyclic neolignan in seeds of Myristica fracgrans. A few studied have been reported on the biological properties of myrislignan, such as deterrent feeding activity in rat, anti-inflammatory in lipopolysaccharidestimulated macrophages cells, and inhibitory activity against the production of nitric oxide. However, there is a lack of information about allelopathic activity of myrislignan. Since there does not appear to be any relevant citations, this study may be the first report on isolating *N*-octanoyl tyramine from citronella grass.

2. Indian heliotrope

Indian heliotrope (*Heliotropium indicum* L.) belongs to the family Boraginaceae. The plant has been used as a folk medicine because it possesses various biological activities. It is also identified as a common weed which grows wildly in crop fields in tropical and subtropical regions of the world. However, there is few studies about bioactive compounds with allelopathic activity in this plant.

An aqueous methanol extract of Indian heliotrope inhibited shoot and root growth of barnyard grass, foxtail fescue (*Vulpia myuros* (L.) C.C.Gmel.), timothy (*Phleum pretense* L.), cress, lettuce and rapeseed (*Brassica napus* L.). The extract of Indian heliotrope was subjected to bioassay-guided fractionation to isolate bioactive compounds and an active compound was isolated and identified as methyl caffeate. Methyl caffeate inhibited the growth of lettuce and foxtail fescue. The results suggest that methyl caffeate may contribute to the growth inhibitory effect of Indian heliotrope and may play an important role in allelopathic effect of Indian heliotrope.

CONCLUSION

We found the extracts of citronella grass and Indian heliotrope inhibited growth of wide range of plant species including weed plants. Active components in those extracts were isolated and identified as myrislignan and *N*-octanoyl tyramine for citronella grass and as methyl caffeate for Indian heliotrope. As the use of chemicals increases throughout the world, agricultural weed control alternatives to the present synthetic herbicide-dominated programs are now being given wide consideration. Controlling weeds through natural bioactive compounds is one strategy to reduce dependency on synthetic herbicides^[3]. The present findings suggest that citronella grass and Indian heliotrope are probably useful for weed suppressive residues and/or soil additive materials in the variety of agricultural settings to reduce dependency on synthetic herbicides.

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Effect of Sonication on the Antimicrobial Properties from *Basella alba* Stem Extracts

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INTRODUCTION

Basella alba commonly known as Ceylon spinach. It is commonly grown for its young shoots, which make a succulent, slightly mucilaginous vegetable^[1]. *Basella alba* is a good source of vitamin A, C and B9, thiamine, riboflavin, niacin and several antioxidants. This plant also contains essential amino acids^[2]. Some reports have been shown that the extracts from *Basella rubra* had the antimicrobial properties for *Escherichia coli, Pseudomonas aeruginosa*^[3]. Several researches have also reported the positive effect of sonication as improvement of extract properties^[4].

Therefore, the objective of this research was to investigate the antimicrobial properties of Ceylon spinach from *B. alba* stem. The *B. alba* stem was extracted using Soxhlet apparatus (95% Ethanol) and sonicated at different times (10, 25 and 40 min) and amplitude (60, 80 and 100%). The antimicrobial activities were determined by minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) for *Staphylococcus aureus, E. coli, Salmonella Typhimurium and P. aeruginosa.*

RESULTS AND DISCUSSION

Results showed that the concentration at 100 mg/mL of all extracts could inhibit S. aureus and *E. coli*. The extract concentration at 100 mg/mL which sonicated at 60% amplitude for up to 40 min could also inhibited P. aeruginosa and S. *Typhimurium*. For the extracts sonicated at 80% and 100% for up to 40 min, it was shown that the MIC values of *P. aeruginosa* and *S. Typhimurium* were at 50 mg/mL as shown in Table 1. For MBC (Table 2), the concentration at 100 mg/mL of all extracts could kill S. aureus and E. coli. The extracts at 100 mg/mL which sonicated at 60% amplitude for 10, 25 and 40 min could kill P. aeruginosa and S. Typhimurium. Whereas the minimum bactericidal concentration of the extracts which sonicated at 80% and 100% for 10, 25 and 40 min showed the MBC values of P. aeruginosa and S. Typhimurium at 50 mg/ mL. From our results proved that increasing amplitude resulted in increasing antimicrobial activities. Sonication can increase surface area and the extracts can release into outer membrane of bacteria^[5]. The extracts had different MIC

and MBC values for four stains. Bacteria have different membrane structures, gram positive bacteria have a bacterial cell wall with a thick peptidoglycan layer so it is more difficult to kill gram positive bacteria than gram negative bacteria^[4].

Table 1. MIC of *B. alba* stem extracts with different conditions.

Amplitude	Time (min)	MIC (mg/mL)				
(70)	(IIIII)	S. aureus	E. coli	S. Typhimurium	P. aeruginosa	
60	10	100	100	100	100	
80	10	100	100	50	50	
100	10	100	100	50	50	
60	25	100	100	100	100	
80	25	100	100	50	50	
100	25	100	100	50	50	
60	40	100	100	100	100	
80	40	100	100	50	50	
100	40	100	100	50	50	

Table 2. MBC of *B. alba* stem extracts with different conditions.

Amplitude	Time	MIC (mg/mL)				
(70)	(11111)	S. aureus	E. coli	S. Typhimurium	P. aeruginosa	
60	10	100	100	100	100	
80	10	100	100	50	50	
100	10	100	100	50	50	
60	25	100	100	100	100	
80	25	100	100	50	50	
100	25	100	100	50	50	
60	40	100	100	100	100	
80	40	100	100	50	50	
100	40	100	100	50	50	

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Occurrence of Ochratoxin A in Roasted and Instant Coffee Commercially Available in China, Indonesia, Vietnam, and Thailand

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Occurrence of ochratoxin A (OTA) in Chinese (31 roasted and 19 instant), Indonesian (30 roasted and 30 instant), Vietnamese (32 roasted and 30 instant), and Thai (30 roasted and 38 instant) coffees was performed using an immunoaffinity column-HPLC method. In Chinese coffee, 3 (9.7%) of roasted (Ave. 0.06 µg/ kg of OTA) and 7 (36.8%) of instant coffee (Ave. 0.09 µg/kg) were contaminated. In Indonesian coffee, 1 (3.3%) of roasted (Ave. 0.06 µg/kg) and 11 (36.7%) of instant (Ave. 0.12 µg/kg), were contaminated. In Vietnamese coffee, 10 (31.3%) of roasted (Ave. 0.09 µg/kg) and 14 (46.7%) instant (Ave. 0.24 µg/kg) were contaminated. In Thai coffee. 4 (13.3%) of roasted (Ave. 0.13 µg/kg) and 28 (73.7%) of instant (Ave. 2.15 µg/kg) were contaminated. Instant coffee was contaminated with OTA at a higher frequency and higher concentration than roasted coffee. There was no sample more than OTA regulatory limits of EU. Therefore, it seems that the risk of OTA in retail coffees in China, Indonesia, Vietnam, and Thailand was a sufficiently low.

INTRODUCTION

Ochratoxin A (OTA), which have nephrotoxic, teratogenic, and genotoxic effects on animals and humans, are produced principally by several species of *Aspergillus* and *Penicillium verrucosum*^[1]. OTA occur in various cereals and beans and their related products, wine, meats and meat products. OTA (Figure 1), which is classified as a possible human carcinogen (Group 2B) by IARC^[1], is the most potent ochratoxins.

Coffee has been found to be contaminated with OTA at a relatively high frequency. In EU, the OTA regulatory limit is 5 µg/kg for roasted coffee and 10 µg/kg for instant coffee^[2]. Southeast Asia is one of the major coffee production areas, but the contamination data of OTA in coffee, which is marketed in Southeast Asia, are limited. So, we collected commercially available roasted (123 samples) and instant (117 samples) coffees (total 240) from China, Indonesia, Vietnam, and Thailand. OTA in commercial coffees were analyzed by an in-house immunoaffinitycolumn (IAC) HPLC method^[3].



Figure 1.

RESULTS AND DISCUSSIONS

Total 240 commercially available roasted (123 samples) and instant (117 samples) coffees were collected from Thailand in 2012-13^[4], China in 2015, Indonesia and Vietnam in 2016. OTA in these coffees were analyzed by an inhouse IAC-HPLC method^[3].

In roasted coffee, 18 (14.6%) of samples were contaminated with OTA with the overall average 0.09 μ g/kg. The overall average was calculated as half of the limit of quantification (as 0.05 μ g/kg) for samples for which OTA was not detected. The highest contaminated roasted coffee from Thailand was 1.00 μ g/kg. But, it is 1/5 of regulatory limit (5 μ g/kg) of EU. The contamination frequency of Vietnamese roasted coffee was higher than that of other countries, but there was not much difference in overall average (Table 1).

Table 1. Occurrence of OTA in Roasted coffee.

	China	Indonesia	Vietnam	Thailand
Samples	31	30	32	30
Positives	3	1	10	4
(%)	9.7%	3.3%	31.3%	13.3%
Overall average* (μg/kg)	0.06	0.06	0.09	0.13
Max. (µg/kg)	0.28	0.21	0.22	1.00

*The overall average was calculated as half of the limit of quantification (as 0.05 $\mu g/kg)$ for samples for which

OTA was not detected.

In instant coffee, 60 (51.3%) of samples were contaminated with OTA with the overall average 0.81 µg/kg. Instant coffee was contaminated with OTA at a higher frequency and higher concentration than roasted coffee. The highest contaminated instant coffee from Thailand was 4.68 µg/kg. But, it is less than half of regulatory limit (10 µg/kg) of EU. The contamination frequency and overall average of Thai roasted coffee was higher than that of other countries (Table 2).

Table 2. Occurrence of OTA in Instant coffee.

	China	Indonesia	Vietnam	Thailand
Samples	19	30	30	38
Positives	7	11	14	28
(%)	36.8%	36.7%	46.7%	73.7%
Overall average* (µg/kg)	0.09	0.12	0.24	2.15
Max. (µg/kg)	0.24	0.49	1.22	4.68

*The overall average was calculated as half of the limit of quantification (as $0.05 \,\mu\text{g/kg}$) for samples for which OTA was not detected.

The TDI of OTA was 15 ng/kg body weight/ day = 750 ng /50 kg of person/ day. When considering with the most contaminated coffee, in order to exceed TDI, it is necessary to drink more than 75 cups (10.5 L) of roasted coffee (10 g/140 mL) or instant coffee (2 g/140 mL) every day. Therefore, it seems that the risk of OTA in retail coffees in China, Indonesia, Vietnam, and Thailand was a sufficiently low.

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Chimeric Characteristics of Bud-mutation Carnation Cultivars "MINAMI series"

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Bud-mutation carnation (*Dianthus* caryophyllus L.) cultivars "MINAMI series" consists of nine cultivars with various petal colors. The sectorial mutations of petal color were observed in "MINAMI series". Some mutation types; sinus blotch, streak mutation and dynamic mutation, were found. The types of the mutation suggest that "MINAMI series" cultivars are periclinal chimera, which have genetically different cell layers. In addition, the relationship between the mutated-petal color and the parental-petal color showed that the cell layer rearrangement might be one of the bud-mutation causes in "MINAMI series".

INTORUDUCTION

Carnation is one of the most important cut flowers in the global flower market. Carnations with various petal colors have been bred by both cross breeding and bud mutation, but the bud-mutation mechanism remains unclear. Carnation bud-mutation cultivars "MINAMI series" has various petal colors and the genealogy is clear^[1] (Figure 1). To elucidate the bud-mutation mechanism, the derivation cause of "MINAMI series" has been investigated by both flavonoid pigment and genetic analysis. The analysis revealed that the flower-color variation is produced by the differences in the composition and the type of flavonoid pigments, which are determined by the expression level of flavonoid biosynthesis-related genes^[2]. The results could explain how genetically "MINAMI series" were produced by continuous bud mutations. However, the main cause of the bud mutation is still unknown. Cell layer rearrangement, inner cells (L2 or L3) displace L1 cells causing flavonoid pigment accumulation, seems to be one of the causes of flower color change^[3]. This phenomenon was found in chimeric carnations by the irradiation studies. In this study, the patterns of sectorial petal color changes in "MINAMI series" were observed to understand the derivation mechanism more clearly.



Figure 1. Ten cultivars of "MINAMI series" (Morimoto et al., in press).

RESULT AND DISCUSSION

Sectorial mutations were found in some cultivars of "MINAMI series". The chimeric mutation types; sinus blotch, streak mutation and dynamic mutation were shown in Figure 2a-c. 'Poly Minami' and 'Sakura Minami' had sinus botches. The petal color of the sinus blotches of the two cultivars corresponded to those of 'Tommy Minami' and 'Orange Minami', respectively. Carnations with sinus blotches seem to be periclinal chimera^[3], and they are formed by the outcropping of inner cells (L2 or L3)^[4]. These facts mean that inner cells have the genotype to express the petal color of sinus blotch and the inner cells in "MINAMI series" have the genotypes of 'Orange Minami' and 'Tommy Minami'. Red streak mutations were found in 'Orange Minami', 'Feminine Minami' and 'Passion Minami'. The petal color of the streaks corresponded to that of 'Tommy Minami'. The streak mutation observed in the three cultivars might be also caused by the outcropping of the inner cells having the genotype of 'Tommy Minami' into the epidermis as the formation of sinus blotch. In another observation, dynamic mutation was found frequently in 'Tommy Minami'. Petals of 'Orange Minami' were formed in the flower of 'Tommy Minami'. In addition, the mutant had the doubled ovaries. The facts suggest that the dynamic mutation is produced from the inner cells having the genotype of 'Orange Minami' by the malfunction of the

flower primordia differentiation.

Above results indicated that "MINAMI series" has the genetically different cell layers and the L2 or L3 cells have the genotype of 'Tommy Minami' or 'Orange Minami', or vice versa. Considering that the mutated-petal colors correspond to the existing petal colors of 'MINAMI series", the derivations of 'Poly Minami' to 'Orange Minami' and 'Feminine Minami' to 'Tommy Minami' might be due not to genetic change but the cell layer rearrangement.



Figure 2. Chimeric mutations in "MINAMI series" cultivars. The sinus blotch (a), streak mutation (b) and dynamic mutation (c) are shown by arrows.

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Isoprene Degradation by Soil Bacteria Associated with Tropical Economic Plants

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INTRODUCTION

Isoprene (C_5H_8) is the second most abundant natural hydrocarbon in the atmosphere after methane (Müller et al., 2008). Isoprene is a colorless volatile organic compound that is highly reactive. It could bond with free radicals or react with nitrogen oxides in the atmosphere to form ozone, one of the most powerful direct greenhouse gases (Fehsenfeld et al., 1992; IPCC, 2001). Isoprene is largely emitted by terrestrial plants (Sharkey et al., 2008). Since agriculture in our modern times is primarily done in the form of massive agriculture (Reid, 2011), this will unavoidably result in an increase in emission of isoprene into the atmosphere. In Thailand, the traditional small farming is also being replaced by massive agriculture; as a result, crop plantation area is expanding.

Since a significant portion of isoprene is absorbed into soil, which can be eliminated by soil microorganisms, we therefore aimed to investigate the abilities of soil microorganisms associated with some tropical economic crop plants to consume this compound. Soil from the plantations of oil palm (*Elaeis guineensis* Jacq.), rice (*Oryza sativa* L.), cassava (*Manihot esculenta* (L.) Crantz), sugarcane (Saccharum officinarum L.) and rubber tree (*Hevea brasiliensis* Muell. Arg.) were analysed for isoprene consumption rates for 5 days. Chemical and microbial compositions of the soils were also analysed.

RESULTS AND DISCUSSIONS

In order to test degradation of isoprene, gas chromatography-flame ionization detector (GC-FID) was used to measure the concentration of isoprene in each microcosms. Statistical analysis was performed using SPSS statistics version 17.0. It was found that the reduction rates of isoprene consumption in soil were between 26.23% to 41.94%. The minimum rate was found from the soil taken beneath cassava (Manihot esculenta (L.) Crantz), while the maximum isoprene consumtion rate was observed from the soil beneath sugarcane (Saccharum officinarum). Significant consumptions of isoprene were found in the soils associated with sugarcane, rubber tree, and oil palm, which were 41.9%, 40.9%, and 32.5%, respectively, while reduction in rice sample and cassava were no significant difference (P> 0.05), which were 29.28% and 26.23%.

Interestingly, the soil from sugarcane plantation, in which the highest isoprene consumption rate was observed, had the highest content of exchangeable calcium (1743.06 mg/ kg), approximately 3 times higher than the other crops, which is 652.29 mg/kg in rubber tree, 516.25 mg/kg in oil palm, 469.36 mg/kg in rice and 611.34 in cassava.

Numbers of bacteria in the soil samples associated with different plants were not significantly different (P < 0.05). However, the types of bacteria in the soils differed. Sixtyone isolates of bacteria that have ability to use isoprene as a carbon source were isolated from soil taken from soil samples, which were 34 isolates of rod-shaped gram-positive, 14 isolates of cocci gram-positive, 7 isolates of rod-shaped gram-negative and 6 isolates of cocci grampositive.



Figure 1. The reduction rates of isoprene consumption in soil taken from beneath various trees.

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Investigation of Bioactive Components of Forest Biomass in Southeast Asia

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INTRODUCTION

In tropical and subtropical regions such as Southeast Asia, a wide variety of woody plants is distributed as valuable genetic resources to provide bioactive constituents. To search bioactive compounds in the forest biomass is important for the biomass utilization and human health. At the 5th and 6th KU-CMU Joint Symposium 2014 and 2016, respectively, Katayama, one of the authors, gave presentations on "Research and development of pharmaceuticals and agrochemicals by utilizing bioactive substances of plants produced in South East Asia, and biomass utilization of fast-growing trees" as the core areas and themes of International Academic Research at Kagawa Univ., on the basis of collaboration between Kagawa Univ. and Chiang Mai Univ., Thailand as well as Bogor Agricultural Univ. and Hasanuddin Univ., Indonesia.

At this symposium, the authors would like to present three topics as below as recent advances of the previous topic, on the basis of the same collaboration as above.

RESULTS AND DISCUSSIONS

1. Anticancer activity of an antioxidative catechol neolignan isolated from defatted seed residue of *Jatropha curcas*, a biodiesel fuel plant cultivated at Chiang Mai Univ.^[1]

Previously, Suzuki et al. isolated antioxidative catechol ligans/neolignans from the MeOH extracts of the defatted kernel^[2]. This is the first investigation on the role of anti-carcinogenicity of isoamericanol A (IAA) from the seed extract^[1]. It was found that IAA is capable of inhibiting cell proliferation in a dose-dependent manner on the human cancer cell lines of MCF-7, MDA-MB231, HuH-7, and HeLa. Flow cytometry analysis showed IAA significantly induces cell cycle arrest at G2/M on MCF-7 cells. At both protein and mRNA levels examined by western blot and real-time PCR, the results revealed increased expression of BTG2 (B-cell translocation gene 2), p21 (p21^{WAF1/CIPI}), and GADD45A (growth arrest and DNA-damageinducible, alpha) after IAA treatment, but inversed expression in CDK1 (cyclin-dependent kinase 1) and cyclins B1 and B2. All these effects contribute to G2/M cell cycle arrest. Furthermore, these results coincide with the changes in molecular expressions determined by DNA-microarray analysis. Our findings indicate that IAA has an inhibitory effect on cell proliferation of MCF-7 through cell cycle arrest, giving it great potential as a future therapeutic reagent for cancers.

2. Screening of antioxidant and antidiabetic activities of five underutilized fruits in Java^[3, 4]

Five underutilized fruits, Baccaurea racemosa, Mangifera caesia, Pouteria campechiana, Sandoricum koetjape, and Syzygium cumini from Java were screened for DPPH free radicalscavenging activity and α -glucosidase inhibitory activity. Successive extraction of these fruits was performed with ethyl acetate and methanol. The ethyl acetate extract of S. cumini ripe seeds exhibited significant DPPH free radicalscavenging activity (IC₅₀: 4.91 μ g/mL), which was stronger than that of trolox (IC₅₀: 7.08 μ g/ mL). P. campechiana ripe fruit pulp and raw fruit pulp, B. racemosa ripe fruit peel, and S. cumini ripe seeds exhibited significant α-glucosidase (from yeast) inhibitory activity. Furthermore, the methanol extract of S. cumini ripe seeds showed moderate α -glucosidase (from rat small intestine) inhibitory activity. The results indicated that S. cumini has the potential to be used for the development of functional foods with carbohydrate decomposition-inhibitory and antioxidant activities.

3. Antifungal and antitermite activities of *Sandoricum koetjape* heartwood^[5].

Sandoricum koetjape Merr. (Meliaceae), also known as wild mangosteen, is a kind of tree that produces fruits, and various parts of the tree have medicinal properties. Antitermite and antifungal

activities of this heartwood extract were tested to develop effective and environmentally friendly agents to control termites and wood-rotting fungi. The heartwood mill was extracted with acetone and then methanol giving their extracts, which were successively fractionated using *n*-hexane, ethyl acetate, and water to afford their six soluble fractions. The antitermite test against a subterranean termite, Coptotermes formosanus revealed that the acetone extract and its fractions had the strong antifeedant activity classified into III-IV of the antifeedant class, and that the methanol extract and its fractions had a lower antitermite activity belonging to I-II of the antifeedant class. The antifungal test indicated that against Trametes versicolor the *n*-hexane fraction of the methanol extract had the strongest activity belonging to the strong category according to the antifungal activity values, while against Fomitopsis palustris all the extracts and fractions had the weak category.

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Biodiesel Production from Tung oil, and Isolation and Identification of Antioxidant Compounds from Defatted Seeds

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INTRODUCTION

Various plant oils are used as raw material for biodiesel fuel (BDF), for example rapeseed oil in Europe, soybean oil in USA, and palm oil in Southeast Asia. Since the utilization of edible oil is feared to lead to an increase in food prices, non-edible materials as BDF attracted attentions on a renewable energy concept. In this study, non-edible Tung oil was chosen as raw materials to produce BDF.

Tung tree (*Vernicia fordii*), which is a deciduous tree of the Euphorbiaceae, is native to southern China and introduced to Japan in the 19th century. Tung oil was used for light, oil paper, paint, varnish, and printing ink in old days, the production of Tung oil is very limited in Japan. The seeds contain about 40% oil that contain toxic compounds and is not suitable for edible use. The tung oil classified as a drying oil containing about 80% of eleostearic acid (9*c*, 11*t*, 13*t*-octadecatrienoic acid, 18:3) with three conjugated double bonds. Tung oil is readily oxidized due to the three unique conjugated double bonds in eleostealic acid.

It is possible that high antioxidant active compounds would be contained in the Tung seed to prevent oxidation of the oil. In this study, we investigated to isolated and identified antioxidant compounds form the defatted seeds.

RESULTS AND DISCUSSIONS

(1) Production of BDF from blend Tung oil

The BDF from 100% tung oil contained 77.3% of eleostearic acid methyl ester, and 5.96% of fatty acid methyl ester (FAME) with one double bond. The iodine vale and the kinematic viscosity of the BDF from 100% Tung oil was 153 and 7.09 mm²/s, which were too high and did not conform to the JIS.

To reduce iodine value and kinematic viscosity, Tung oil and waste edible oil were blended and BDF was prepared. Iodine value of BDF from 30% Tung oil and 70% waste edible oil was 118, which value was less than JIS. The AV and density of the blended BDF was 0.297 and 0.891, respectively. The kinematic viscosity of the blend BDF was 5.22 mm²/s, but this value did not conform to the JIS.

In order to reduce both iodine value and kinematic viscosity of BDF, Tung oil BDF was hydrogenated with palladium carbon at 50°C. The composition of FAME with one double bond in the hydrolyzed BDF was 93.5%. Other physical property values of hydrogenated BDF are under study.



Figure 1. Isolated and identified antioxidative compounds from defatted seed of Tung tree.

(2) Isolated and identified antioxidant compounds form the Tung seeds.

Defatted seeds of Tung tree was extracted in Soxhlet extractors with *n*-hexane. Ethyl acetate and methanol, successively. The ethyl acetate and methanol extracts were partitioned between ethyl acetate and water. The four extracts, EtOAc-organic, EtOAc-water, MeOHorganic, and MeOH-water fractions were tested for phenolic content and antioxidative activity using Folin-Ciocalteu method and DPPH (2, 2-diphenyl-1-picrylhydrazyl) method, respectively. The MeOH-organic fraction showed a high content of phenolic compounds and exhibited a relatively strong antioxidative activity. Eight compounds were isolated from the MeOH-organic fraction, and identified as 3,4-dihydroxybenaldehyde, a catecholtype lignan (3,3'- bisdemethylpinoresinol), six neolignans (isoamericanol A, americanol A, isoamericanin A, americanin A, 9'-O-methylisoamericanol A, 9'-acetylamericanol A,). All isolated compounds showed high antioxidative activities. These results indicated that the antioxidative compounds would inhibit oxidation of oil in Tung tree seeds

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Red mite (*Dermanyssus gallinae*) Monitoring and Trapping Device

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INTRODUCTION

Dermanyssus gallinae^[1], known as the "red mite," is a hematophagia ectoparasite, commonly found in laying hens and is one of the most important epidemiological and economic problems. Red mite infection induces a decrease in egg production, poor egg quality and can ultimately lead to premature death of hens from substantial blood loss^[2].

Additionally, the red mite is a transporter various diseases^[3]. So an increase in amount of red mites, may lead to a higher outbreak risk. The red mite causes large economic losses worldwide^[4]. The red mite has been recognized as a new threat in the poultry industry that must be understood and controlled^[5].

However, red mite contamination in industrial farms is difficult to evaluate and excessive use of insecticides may contribute to the problem because of the occurrence of chemical resistance red mites^[6].

Furthermore, the most effective timing for control applications of red mites, and the most effective extermination method is unknown. We have developed an electrostatic charged device (*i*-Trap[®], Kondo-Electric Co., Ltd.) which can attract and capture red mites without the use chemicals or insecticides. This device has an electrical charge from static electricity that is created by the polyurethane composition of the material. The *i*-Trap[®] attracts and traps the red mites. This allows for quantification of the red mite infestation population from which the contamination level for red mites can be determined.

In this study is require more investigate the i-Trap[®] capability to attract other ectoparasites other than mites and factors that influence trap attracting mechanism.

MATERIALS AND METHODS

A polyurethane-based trap that uses preliminary an electrostatic charge to attract the ectoparasites, was installed into the chicken cage at Northern Thailand during 2015 to 2016. After each test, the *i* -Trap[®] was collected put in a sealed box with chloroform to kill the ectoparasites inside the *i* -Trap[®]. The *i* -Trap[®] was then opened and photos were taken of both sides of the polyurethane with a digital camera (WG-30W, Ricoh Co., Ltd) from a height of 20 cm.

RESULTS AND DISCUSSIONS

The *i*-Trap[®] is a patented device in US, China and EU which has proved to be able to attract and trap the red mite in Japan. As it works by mimicking electrostatic charge between the animal skin and feather/fur, there is a possibility that the *i*-Trap[®] could also work against other ectoparasites.

The result of field study in a chicken farm in Northern Thailand, the i-Trap[®] captured the tropical fowl mites



Figure 1. We have developed an electrostatic charged devicewhich can attract and capture red mites without the use chemicals or insecticides. This device has an electrical charge from static electricity that is created by the polyurethane composition of the material. The *i*-Trap[®] attracts and traps the red mites. This allows for quantification of the red mite infestation population from which the contamination level for red mites can be determined. *i*-Trap[®] series, Japan 5690986 5660480, USA US9510583, Europe 14743512.7

(*Ornithonyssus bursa*) at the traditional integrated farm. Interestingly, our results are shown incomparably on the field research at Indonesian poultry farm that iTrap[®] not only able to trap the tropical fowl mites but also other ectoparasites such as bed bugs (*Cimex hemipterus*) that infest chicken (Satrija et al. unpublished data).

Finally, in this study shown the comparison of captured mite on i-Trap[®] that are attractants for different parasites reveals that the electrostatic

response cues that common seeking behaviors it may conserve. One of the best ways to control ectoparasite is by using chemicals. But, the increased risk of parasite resistance for chemicals, awareness of both risk decreases the efficiency of chemical used to control parasites. Our trap will contribute to know how electrostatic charged area and responses used to host-seeking cues at the molecular and cellular level should greatly facilitate the development of more effective control strategies.

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Actinobacteria Associated with Arbuscular Mycorrhizal Funneliformis mosseae Spores, Taxonomic Characterization and Their Beneficial Traits to Plants

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INTRODUCTION

Actinobacteria are Gram-positive bacteria with high %G+C content and known prolific producers of bioactive compounds. Our research effort are focused on the diversity of actinobacteria in various environments. Gram positive bacteria associated with AM fungal spores have been reported including several actinobacterial species such as *Streptomyces*^[1,2] These mycorrhizal associated actinobacteria showed interesting properties on biocontrol and plant growth promoting activities. Currently, we are interested in these mycorrhizal associated actinobacteria which may be a good source of novel taxa for bioprospecting. In this study, we report on the isolation of actinobacteria from spores of Funneliformis mosseae and provide evidence of their potential in agriculture as plant growth promoter in mung bean and rice.

RESULTS AND DISCUSSIONS

Five actinobacteria strains were isolated from spores of F. mosseae using selective media. Phylogenetic analyses based on a 16S rRNA gene sequences showed that the isolates belonged to the genera Pseudonocardia and Streptomyces. These isolates were able to produce siderophores, indole-3-acetic acid (IAA) and solubilized phosphate in vitro at varying level. Streptomyces sp. isolate S3 produced the highest IAA and high activity of phosphate solubilization and siderophore production. DDH result identified it as S. thermocarboxydus. The results provide evidence that actinobacteria were associated with arbuscular mycorrhizal spores of F. mosseae. The inoculation of mung beans (*Vigna radiata*) with this strain resulted in a significant increase in fresh weight, root length and total length as an effect of IAA production. In an experiment with rice (Oryza sativa), S. thermocarboxydus isolate S3 promoted the growth of rice plants grown in low nutritional soil under induced

drought stress. The ability of this organism to promote plant growth confirms the potential of using actinobacteria for agricultural purposes.



Figure 1. Phosphate solubilization and siderophore production by *S. thermocarboxydus* S3.

Table	1.	Molecular	identification	of	isolated
actino	ba	cteria.			

Isolate	Similarity (%)	Closest match
48	99.86	<i>Streptomyces thermocarboxydus</i> DSM 44293 ^T
S1	99.28	Streptomyces spinoverrucosus NBRC 14228 ^T
\$3	99.93	Streptomyces thermocarboxydus DSM 44293 ^T
S4	99.75	Streptomyces pilosus NBRC 127772 ^T
S4-1	99.79	Streptomyces pilosus NBRC 127772 ^{T}
SP	98.56	Pseudonocardia nantongensis KLBMP 1282 ^T



Figure 2. Rice growth promotion by *S. thermocarboxydus* S3.

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ACRS Gene Cluster for Host-selective ACR-toxin Biosynthesis in *Alternaria alternata* Rough Lemon Pathotype

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INTRODUCTION

Phytopathogenic fungus Alternaria alternata rough lemon pathotype produces host-selective ACR-toxin (Figure 1). ACR-toxin causes mitochondrial dysfunctions in sensitive citrus cultivar. A draft sequence of genome from A, alternata rough lemon pathotype identified ACR-toxin biosynthesis cluster ACRT, and identified three TOX genes, ACRTS1 encoding hydroxylase, ACRTS2 encoding polyketide synthase and ACRTS3 encoding cyclase, respectively. These genes exist only in the genome of A. alternata rough lemon pathotype in particular small dispensable chromosome with a size of 1.5 Mb^[1,2]. The presence of these genes was linked perfectly with ACRtoxin production. Examination by targeted gene disruption and RNA-silencing identified that these genes are essential for ACR-toxin biosynthesis^[1-3].



Figure 1. Chemical Structure of ACR-toxin I produced by *Alternaria alternata* rough lemon pathotype^[1-3].

RESULTS AND DISCUSSIONS

We identified the role of respective genes, which exist in 1.5 Mb chromosome of ACRtoxin producer (A. alternata rough lemon pathotype), using targeted gene disruption and RNA-silencing. All these genes have multiple copies or pseudogene in the genome, and a disruption of single copy usually led a reduction of transcription of the target gene but not terminated the toxin production (Figure 2). Further attempt using RNA silencing was necessary to knock-down the transcript at undetectable level to terminate the toxin production (Figure 2). Using these elucidation strategies, we made their roles of ACRTS1, ACRTS2, and ACRTS3 in ACR-toxin production clearly^[1-3].

We transformed these *ACRTS1*, *ACRTS2*, and *ACRTS3* genes into *A. alternata* (isolate O-94), which does not have the 1.5 Mb chromosome and hence does not produce ACR-toxin, to further examine the role of these genes in the toxin production. However, insertion of these genes was not enough to let isolate O-94 produces ACR-toxin, and additional gene(s) encoding the toxin biosynthesis enzyme(s)



Figure 2. Elucidation of 1.5 Mb chromosome genes on involvement for ACR-toxin biosynthesis in *A. alternata* rough lemon pathotype using targeted gene disruption and RNA-silencing. Upper panels indicate transcription analyses of each gene using RT-PCR Southern blots, and lower panels indicate ACR-toxin detection (Rf=0.24) on TLC plates from wild type (WT) of this pathogen as well as targeted gene disruption mutants (D) and RNA-silencing mutants (S)^[1-3]. was expected.

Another trial of mining examination from draft sequence of 1.5 Mb chromosome of *A. alternata* rough lemon pathotype found another ORF putatively encoding thioesterase. This ORF also exists only in the 1.5 Mb chromosome of ACR-toxin producers, and the putative function of this ORF product (thioesterase activity to end polyketide synthesis by ACRTS3) well fits for our expected synthesis pathway of ACRtoxin. Further evaluation using our strategies is currently progressing.

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Food and Energy Farm

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ABSTRACT

We human beings are now facing and tackling two global issues of energy and environment. Due to the poor policy of rice production control, Rice agriculture is at stake in Japan. Half of the farmers are highly aged over 65 years and successors are not growing up. Paddy fields are not actively and efficiently used. It looks most of them have been planted to the extent of the complaint. In this paper the food and energy production from rice compared with solar power generation is discussed from the effective use of paddy fields because Rice is a buffer resource available for food and energy for sustainable development^[1].

INTRODUCTION

In the beginning of 1970s Japan was attacked by oil crisis twice. It was really awful unforgettable experiences for the Japanese people who have never experienced before. Most of them got to know importantly how much they relied on the energy coming from outside and have lived because more than 95 % of the oil was coming from outside. In addition to attention for environmental issues, efforts were begun to search for new type of energy resources which do not depend on petroleum since this time. Biomass energy was closed up as the promising one from the viewpoint of carbon neutral among the options. On the other hand Japan was facing to the overproduction of rice, therefore the production control was implemented as national policy just to keep the rice price high for farmers enough to live on farm due to the drastic reduction of rice consumption and this policy has been continued almost a half century. Huge land area was newly reclaimed for large scale rice farming, however most of them are not in use and left abandoned without cultivation (Figure 2 and Figure 3).

BUFFER RESOURCES FOR FOOD ℰ ENERGY

The author proposed the project on Bio-energy production by use of extra rice based on the following merits such as 1) Rice consumption increase, 2) Eco-friendly energy resources to cover food and energy issues, 3) Efficient use of newly lands, 4) Technology transfer of R/D and innovation related to food and energy production, 5) Solving rice overproduction issue, 6) Efficient use of Rice as buffer resources, however once the policy is decided, countermeasures against it can't be approved. National government was always inactive especially for rice issue. E3 Bio-ethanol to be blended 3 % into regular gasoline was officially approved for use in 2007, but it was imported from France made from wheat instead of using rice produced in Japan. This shows how much the government was nervous and kept away from rice issue under the policy they made Due to a long span operation of production control policy, more than a half of farmers are aged over 65 years old. They can't live on farm and the abandoned paddy field is now equal to 420,000 ha, Some of the farmers cooperatives are launching bio-energy production project from rice. Solar power generation plant is also increasing to get installed in those abandoned paddy fields. (Figure 1)

At present, the assumed annual power generation of solar power panels sold by Japanese manufacturers is about 200 kWh/m2. Converting this into heat calories yields 720 MJ. On the other hand, bio-fuel production varies greatly. depending on the crop used. In case of ethanol production from what you harvested with 1 (ha) planting, 2133 liters for corn, 2133/10000 x 22.1 = 4.7 MJ/m2. In sugar cane, 5191 liters, 5191/10000 x 22.1 = 11.47 MJ, In rice, 1637 liters (as a yield of 3.8 ton/ ha), 3.617 MJ. In potatoes, 2797 liters can be produced. 2797/10000 x 22.1 = 6.18 MJ. In rice, if the yield / ha is 5 tons, 5 x 430 liters = 2180liters. 4.8 MJ. Since ethanol has a calorific value of 22.1 MJ/liter, Calculating it per square meter, it is only about 5 MJ a year in maize. Sugarcane is most suitable for ethanol production. It can reach 25 MJ a year even if we utilize cultivation method called multi-harvest variety and stocking. Speaking of energy production per area, photovoltaic power is 30 times more efficient than bio-fuel production, which is the

most efficient. The solar photovoltaic panels produced by humans are more efficient than photosynthesis of plants.

EU announced no more Gasoline / Diesel fuel based cars beyond 2040. China and US also agree with this announcement and are going to follow. Even for the bio-fuel based cars are targeted. Electric vehicles and hydrogen fueled vehicles become mainstream. What should we do for biofuel based car? This means that the ultimate type of energy means celery in electricity, however how electricity can be generated is an important point to think. There can be seen many ways to generate electricity. Of course biomass is one of the hopeful resources, but they can't be used directly to generate electricity. Bio-based energy such as bio-fuel or bio-gas must be produced from bio-resources like agricultural / animal waste, anyway, then those type of energy can be used for generating electricity. This means simply that the same amount of CO2 will be produced at the centralized specific place only, but it will prevent dispersing in the atmosphere. Based on this concept, bio-fuel can't be used for operating cars directly, however electricity can be used instead. TOYOTA is now working on the project named Tri - Gen (abbreviated expression from electric generation by use of bio-resources including biomass, biogas, various waste, then three things are produced. They are hydrogen, electricity and water which are all eco-friendly not to jeopardize the environment. Solar panel should be installed and mounted on the roof, then the farmland shouldn't be used. Farmland should be used for growing buffer resources available for food and energy in addition to the merits of creating job opportunity.

CONCLUSION

Which one should be produced, Food or Energy in the paddy field? Solar Power plant energy conversion efficiency is higher than bio-mass energy, however the merits of growing biomass can be found more than solar power generation plant such as 1) More flexible use of paddy field, 2) Job opportunity creation for farming, 3) Biomass can be grown up as buffer resources for food and energy, 4) Unfortunately solar power plant installation is increasing in those paddy fields, however they should be used at least more than 10 to 20 years once if they were installed to pay back the initial cost of investment in addition to the difficulty of frequent removal and exchange, 5) It looks strange to see what and how Japan is going to do for food issue, Due to the rapidly increasing human population, preparation for food issue should be secured for feeding food consisting of 2QSL, Quantity, Quality, Safety and Liability. Those newly reclaimed huge lands, but mostly left abandoned should be used actively for collaboration with ASEAN Economic Community to promote Smart Agriculture promotion for

making Asia a world pantry and regional peace keeping in addition to the sustainable development of economy considering the current dynamic change of situation not only in Asia, but also in global society.

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Figure 2. Newly reclaimed land by national government located at the border between Mie nad Aichi prefecture

	Newly	Reclaimed	l National L	and for Far.	m Use	
	Name of Sites	Budget Spent (billi. Yen)	Project duration (from/ to)	Total area (ha)	Current Status	
	Nakaumi	62.231	1963 1984	1,858	Project stopped	
9	Kisozaki) 16.35	1966 1989	368	Unused	
	Ariake bay	6.69	1967 1976	927	Unused	
	Yokaku- bay	13.78	1969 2005 ha	140	Project stopped	
	Isahaya 237.0 1,470 1,470			1,470	Extd. to 2006	
	Source: Yomiuri Newspaper, October 7, 1999					

Figure 3. Newly reclaimed land for farm use by Ministry of Agriculture, Forestry & Fisheries, but left abandoned without cultivation



Figure 4. Tri - Gen Project proposed by OYOTA under progress

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Cloning and Heterogeneous Expression of D-Glucoside 3-Dehydrogenase Gene of *Rhizobium* sp. and Its Application for New Pathway of Rare Sugar Production.

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The objective of this study is cloning and recombinant expression of D-Glucoside 3-dehydrogenase (G3DH) gene into E. coli, and potential application of recombinant G3DH for rare sugar production. The recombinant G3DH was produced with E. coli JM109. This enzyme showed enzyme activity and expressed as soluble form. The gene consists of 2,711 bp encoding 3 subunits of G3DH. The molecular mass was estimated to be 66 kDa by SDS-PAGE. The optimum pH and temperature of the recombinant G3DH were pH 7.5 and 40 °C, respectively. For substrate specificity, the recombinant G3DH showed better affinity with disaccharides and glucose derivatives. Finally, D-allose production was performed by a threestep process of enzymatic-dehydrogenation, chemical reduction and acid-hydrolysis, using cellobiose as the starting material. The yield of D-allose was estimated to be 30% from cellobiose.

INTRODUCTION

D-Glucoside 3-dehydrogenase (G3DH; EC 1.1.99.13) was first discovered and characterized in Agrobacterium tumefaciens^[1] and later found in other organisms. G3DH catalyzes the dehydrogenation of hydroxyl group at the C-3 position of D-glucose to their corresponding 3-ketoglucoside^[2]. When disaccharides are provided as substrates, G3DH would catalyze from the non-reducing end of the glycosides. Rare sugars are defined as saccharides and their derivatives occurring only in a small quantity in nature. D-allose, classified as a rare sugar, has been reported several times for its physiological features^[3]. Mass-production of D-allose has been established based on the Izumoring strategy using enzymatic reactions^[4].

We have investigated the utilization of G3DH isolated from *Rhizobium* sp. to improve D-allose production. Figure 1 shows a strategy of D-allose production procedure. Cellobiose is first oxidized to 3-ketocellobioside (β -1,4 3-keto-D-glucosyl-D-glucoside) by G3DH,

and subsequently converted to β -1,4 D-allosyl-D-glucoside by chemical reduction under mild conditions. After that, the two disaccharides are acid-hydrolyzed to D-glucose and D-allose at theoretical yields of 75% and 25%, respectively. In this study, we describe that G3DH from *Rhizobium* sp. was cloned and overexpressed in *E. coli* to apply for the rare sugar production.

RESULTS AND DISCUSSIONS

To amplify G3DH gene by PCR, a set of primer, based on G3DH sequence of Rhizobium sp., was designed with BamHI and HindIII at 5' and 3' region, respectively. The recombinant plasmid was constructed by inserting the amplified G3DH gene into pQE30 vector, and expressed in E. coli JM109 cells. The resultant recombinant enzyme was then purified and characterized. This enzyme showed enzyme activity and expressed as soluble form. The gene consists of 2,711 bp encoding 3 subunits of G3DH. The molecular mass was estimated to be 66 kDa by SDS-PAGE. The optimum pH and temperature of the recombinant G3DH were pH 7.5 and 40 °C, respectively. For substrate specificity, the recombinant G3DH showed better affinity with disaccharides and glucose derivatives.



Figure 1. A strategy of D-allose production using G3DH from *Rhizobium* sp.

Finally, D-allose production was performed by a three-step process of enzymaticdehydrogenation, chemical reduction and acid-hydrolysis, using cellobiose as the starting material. The yield of D-allose was estimated to be 30% from cellobiose. This result indicates that D-allose can be produced by this strategy three-fold higher than the conventional method.

ACKNOWLEDGEMENT

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Growth-inhibitory effect of D-arabinose against the nematode *Caenorhabditis elegans*: Discovery of a novel bioactive monosaccharide

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Biological activities of unusual monosaccharides (rare sugars) have largely remained unstudied until recently. We compared the growth inhibitory effects of aldopentose stereoisomers against the animal model Caenorhabditis elegans. Among these stereoisomers, the rare sugar D-arabinose (D-Ara) showed particularly strong growth inhibition. The IC₅₀ value for D-Ara was estimated to be 7.5 mM, which surpassed that of the potent glycolytic inhibitor 2-deoxy-Dglucose (19.5 mM) used as a positive control. The D-Ara-induced inhibition was recovered by adding either D-ribose or D-fructose, but not D-glucose. These findings suggest that the inhibition could be induced by multiple mechanisms, for example, disturbance of D-ribose and D-fructose metabolism.

INTRODUCTION

The biological activities of unusual monosaccharides (rare sugars) have largely remained unstudied until recently. We have previously reported that D-allulose, the C3 epimer of D-fructose (D-Fru) had growth inhibitory effect against larvae of the nematode Caenorhabditis elegans.^[1] C. elegans is an attractive multicellular animal model for biological research because of its small size, short lifecycle, ease of maintenance, and routine genetic manipuration.^[2] Thus, we believe that growth assays using larvae of C. elegans are a convenient and useful primary screening method to search for biologically active rare sugars. Here, we report a comparison of the growth inhibitory effects of aldopentoses against C. elegans, and that among them D-arabinose (D-Ara) exerted particularly strong inhibition. In addition, we discuss the mechanisms responsible for D-Ara-induced inhibition based on the results of rescue experiments by simultaneous treatment with D-Rib, D-glucose (D-Glc), or D-Fru.

RESULTS AND DISCUSSIONS

We first compared the growth inhibitory effects of all the aldopentose stereoisomers in the *C. elegans* model. Each stereoisomer was evaluated at a concentration of 42 mM with the growth assay using first-stage larvae (L1). Among the



Figure 1. Growth inhibition of *C. elegans* by aldopentoses.

eight aldopentose stereoisomers, D-Ara, the C2 epimer of D-Rib, showed particularly potent inhibition of nematode growth (Figure 1). The IC_{50} value for D-Ara was estimated to be 7.5 mM from the dose-response curve. 2-Deoxy-D-glucose (2-DG), which is a potent glycolytic inhibitor was used as a positive control, and its IC50 value was found to be 19.5 mM. The strength of the inhibitory effect of D-Ara surpassed that of 2-DG.

Next, we performed a rescue experiment aimed to reinstate D-Rib metabolism by simultaneous treatment with both D-Ara and D-Rib. In addition, D-Glc and D-Fru were used in the rescue experiments as negative controls. As expected, simultaneous treatment with both D-Ara and D-Rib dose-dependently abolished the growth inhibitory effect of D-Ara (Figure 2). This finding reveals that one possible cause of inhibition is a disturbance in D-Rib metabolism by D-Ara. D-Glu did not recover the nematode growth at a concentration of even 125 mM (Figure 2). Contrary to our expectation, however, treatment with D-Fru canceled the inhibitory effect similar to D-Rib (Figure 2), which suggests that D-Ara may also interfere with D-Fru metabolism. These results from the rescue experiments indicate that D-Ara could interfere at multiple points in C. elegans metabolism.



Figure 2. Effects of D-Rib, D-Glc, and D-Fru on growth inhibition by D-Ara.

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Potent inhibitory effects of D-tagatose on the growth, acid production, water-insoluble glucan synthesis, and biofilm formation of *Streptococcus mutans*

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INTRODUCTION

The Gram-positive bacterium Streptococcus mutans (S. mutans) plays one of the most important roles in the development of dental caries, which is the most common oral infectious disease in the world. As part of the mechanism of dental caries, S. mutans adheres to an acquired pellicle formed on the tooth surface, synthesizes glucan by the action of glucosyltransferases (gtf), and promotes the formation of dental plaque. In the dental plaque, S. mutans produces organic acids as a result of carbohydrate metabolism. These organic acids induce demineralization of the tooth surface, resulting in dental caries. Xylitol is a well-known sugar that prevents dental caries. However, the preventive effect of xylitol has been shown to be remarkably inhibited by the existence of another monosaccharide that can be metabolized by S. mutans. Kagawa University Rare Sugar Research Center established a simple method to produce rare sugars in large amounts from inexpensive D-glucose and D-fructose. Most types of rare hexoses are now available for experiments to determine their functional characteristics.

In the present study, we examined the effects of 4 rare ketohexoses (D-psicose, L-psicose, D-tagatose and L-tagatose) on the growth, acid production, water-insoluble glucan synthesis, and biofilm formation of *S. mutans.* Figure 1 shows the structural differences of four rare sugars including D-fructose and xylitol.

D-fructose	D-psicose	L-psicose	D-tagatose	L-tagatose	xylitol
CH ₂ OH	CH ₂ OH	CH20H	CH ₂ OH	CH ₂ OH	CH₂OH
H-C-OH	н-с-он	ОН-С-Н	н-с-он	ОН-С-Н	H-C-OH
H-C-OH	H-C-OH	ОН-С-Н	он — с — н	Н-С-ОН	0Н-С-Н
0Н-С-Н	H-C-OH	0Н-С-Н	0Н-С-Н	Н-С-ОН	H-C-OH
C=0	Č=O	Č=0	C=0	C=0	CH20H
CH ₂ OH					

Figure 1. Chemical structures of the monosaccharides used in the study.

RESULTS AND DISCUSSIONS

[1] We examined and compared the inhibitory effects of D-tagatose on the growth, acid production, and water-insoluble glucan synthesis of *S. mutans*, with those of xylitol, D-psicose, L-psicose and L-tagatose. S. mutans was cultured for l2h in a medium containing 10% (w/v) of xylitol, D-psicose, L-psicose, D-tagatose or L-tagatose, and the inhibitory effect of *S*.

mutans growth was assessed. Each sugar showed different inhibitory effects on *S. mutans*. Both D-tagatose and xylitol significantly inhibited the acid production and water-insoluble glucan synthesis of *S. mutans* in the presence of 1% (w/v) sucrose. However, the inhibitory effect of acid production by D-tagatose was significantly stronger than that of xylitol in presence of sucrose.

[2] Monitoring S. mutans growth over a 24 h period revealed that D-tagatose prolonged the lag phase without interfering with the final cell yield. This growth retardation was also observed in the presence of 1% sucrose, although it was abolished by the addition of D-fructose. S. mutans biofilm formation was significantly inhibited by growth in sucrose media supplemented with 1 and 4% D-tagatose compared with that in a culture containing sucrose alone, while S. mutans formed granular biofilms in the presence of this rare sugar. The inhibitory effect of D-tagatose on S. mutans biofilm formation was significantly more evident than that of xylitol. Growth in sucrose media supplemented with D-tagatose significantly decreased the expression of glucosyltransferase, exo-β-fructosidase and D-fructose-specific phosphotransferase genes but not the expression of fructosyltransferase compared with the culture containing sucrose only. The activity of cell-associated glucosyltransferase in S. mutans was inhibited by 4% D-tagatose. These results indicate that D-tagatose reduces water-insoluble glucan production from sucrose by inhibiting glucosyltransferase activities, which limits access to the free D-fructose released during this process and retards the growth of S. mutans.

CONCLUSIONS

Foods and oral care products containing D-tagatose are anticipated to reduce the risk of caries by inhibiting *S. mutans* biofilm formation.

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Factors Determining Consumers's Demand for Fat Reduced Northern Thai Sausage (Sai Oua)

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INTRODUCTION

Thai government has turned its attention to a new kind of economic activity which is known as "creative economy". It has announced a new model for development in order to enhance the potential of Thai products and enable them to compete in the world market. The key concepts of this model include changing from the manufacture of mass products to innovative products through technology, creativity, and new methods and changing from production based to service based economy. As Thai food products are already internationally recognized. Chiang Mai is considered a major city after Bangkok as it is seen as an exuberant city of art, culture, and local products. The local northern Thai food, or so called Lanna food is well known to tourists from all over the world. "Sai Oua" is a sausage which is considered to be the main food in Lanna Khantoke which is a northern-style food course used to welcome visitors. It is one of the most famous local food among tourists. New product launches rapidly because of changing business strategies or customer needs. Some product needs to be included newly trends such as environmental and health concerns during the process of product development.

"Fat Reduced Northern Thai Sausage (Sai Oua)" was produced through the food innovation's approach.

There for, this study aimed to investigate factors determining consumer's demand for northern Thai sausage (Sai Oua). There are four objectives for this study, 1) to employs the SWOT method to analyze the organization's situation on the production of the fat reduced northern Thai Sausage, 2) to study behavior concerning consumption of the fat reduced northern Thai sausage (Sai Oua), 3) to identify factors influencing these consumers to consume the fat reduced northern Thai sausage (Sai Oua), and 4) to evaluate consumer's satisfaction with their consumption of the fat reduced northern Thai sausage (Sai Oua).

RESULTS AND DISCUSSIONS

At this phase of the research, the result of this study found that the majority of those consumers with product preference for Fat Reduced Northern Thai Sausage were characterized as female, aged 25-35, single, master's degree graduate, student, and having monthly income above 15,000 baht level. Factors contributing to these consumer's consumption of Fat Reduced Northern Thai Sausage were identified to include products as the most dominant factors, followed by the factors of process, and process.

On consumers's satisfaction, the study revealed that consumers were most satisfied with the process, trailed by the process.

Moreover, SWOT analysis was applied in this study which is frequently used in environmental management as a diagnostic method to identify key factors influencing the success or failure of an organization's project.

Table 1. Strengths, Weaknesses, OpportunitiesAnd Threats SWOT analysis.

	Similarity (%) Closest match		
	Helpful to Objective	Harmful to Objective	
Internal Origin	 Trust High quality High technology Productivity Brand royalty Know how. 	- High cost - Loss of human resource capacity (Marketing part)	
External Origin	 Healthy food trend Souvenir. High seasons. 	- High budget of promot- ing/marketing	

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POSTER PRESENTATION The 7th Joint Symposium CMU and KU 27-29 August, 2018 Chiang Mai University

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The 7th Joint Symposium CMU and KU

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A Study on Visualization Accompanied the Three-dimensional Sense by Color

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ABSTRACT

In color psychology, there are a lot of studies on the three-dimensional sense of figures by color. In that domain, human perception and impression have been central issues for a long time (e.g. Sun and Perona, 1998). In mathematics education, the study on visualization of figures have researched (e.g. Kawasaki, 2000), however there is little study based on color psychology. Therefore, this study of mathematics education is based on it. Also, it is important to think about the color in the mathematics classes which ICT is used from now on. The purpose of this research is two points. First, it is proposing the framework how to recognize the spatial figures that is easy to feel three-dimensional sense. This framework is based on color psychology. Second, it is pointing out the textbook that is written based on color psychology through the framework. This investigation is focused on the mathematics textbooks in high school and junior high school. As a result, there was nothing conscious of the three-dimensional sense by color. So, every textbook has still room for improvement.

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Active, Selective, and Recyclable Iridium Catalysts for Dehydrogenative Silylation of Styrenes Prepared *in situ* from Ir Complexes and Metal Oxides

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ABSTRACT

Silyl-substituted alkenes are an important chemical feedstock. On the other hand, highly selective solid catalysts for dehydrogenative silylation of styrenes to silyl-substituted alkenes have not been reported yet.

Here, novel combined catalysts composed of Ir complexes and CeO_2 have been developed, which show their excellent activity and the selectivity for the dehydrogenative silulation of styrene. Concomitant hydrosilulation was completely suppressed, implying the excellent selectivity to silulakenes. Very high turnover numbers (TON, over 120,000) and turnover frequencies (TOF, over 6,000 h⁻¹) were achieved. These novel, reusable catalysts are promising from scientific, environmental, and practical viewpoints.

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Air Pollution Monitoring and Modelling in Maize Cultivation

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ABSTRACT

Open biomass burning is an important source of air pollution in Chiang Mai. The major cause is forest, bush and field fires in the area. Almost area in Northern of Thailand was severely affected by a smoke-haze pollution episode caused by the emissions of forest and crop fires. As we known, air pollution has both acute and chronic effects on human health, affecting a number of different systems and organs. The study aims to monitor the PM2.5, PM10 concentrations by using a small sensor in the study area. Moreover, to analyse backward trajectories for finding the sources of air mass trajectory which came to the focus area. This study focused on Chiang Dao district, were located in the Northern in Chiang Mai, Thailand. We considered the data of land use to compare in each type of land use (forest, maize cultivation and rice cultivation) in the area, then analyze the data by burning area and active fire (hotspot) from the Fire Information for Resource Management System (FIRMS) distributes Near Real-Time (NRT) active fire data within 3 hours of the satellite overpass from both the Moderate Resolution Imaging Spectroradiometer (MODIS) and the Visible Infrared Imaging Radiometer Suite (VIIRS). The Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model is widely used to generate backward trajectories in giving starting locations. Then, we analyzed the air mass trajectory by using the HYSPLIT model with backward trajectory to analyze the source of air mass moving to the Chiang Dao district during the haze season for 4 months (January-April, 2018). The results shown the most burning areas and number of hotspots in Chiang Dao came from forest areas. The result of the three-day backward trajectories of the air masses arriving at Chiang Dao during the haze season were all found the air mass from the south direction in January, the west direction (Myanmar) in February and March and the southwest in April. For further, these findings could improve the understanding of haze pollution from open biomass burning and suggest the need to avoid open biomass burning during post-harvest seasons to develop the air pollution policy for the future.

Keywords: Air pollution, Maize cultivation, Particulate matter, Chiang Dao, Hysplit model, Air mass backward trajectory analysis

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Chiang Mai University

KU

Annual Variation of Light Attenuation Coefficient and its Controlling Factors in Bisan Strait, the Seto Inland Sea, Japan

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ABSTRACT

The Bisan Strait is a shallow strait (mean depth 13.9 m) in the Seto Inland Sea. Due to strong tidal currents, the strait is a vertically well-mixed, throughout the year. Therefore, water clarity and temporal variability in Bisan Strait may differ from those of the neighboring embayment, Harima Nada, where seasonal stratification occurs. In this study, we examined light attenuation coefficient (K_d) and shading components in seawater during an annual period both in a site at Bisan Strait and Harima Nada Embayment. Our results indicated that K_d in Bisan Strait (0.23-0.92 m⁻¹) was 1.8 times higher than that of Harima Nada on average, mainly due to higher concentrations of non-algal particles (tripton) suspended in the euphotic layer. The annual variability of Kd in Bisan Strait was primarily related with that of tripton concentration in the euphotic layer (p<0.01), and the trend did not match with that of Harima Nada Embayment. The tripton suspended in the euphotic layer of Bisan Strait seems to be mainly composed of suspended sediment. To test this idea, we are clarifying the chemical characteristics of tripton in Bisan Strait.

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Chiang Mai University

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Assessment of Allelopathic Properties of Thai Medicinal Plants

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ABSTRACT

Allelopathy is an ecological phenomenon by which plant releases secondary metabolites that affect the growth or development of other plants or organisms. Interestingly, medicinal plants are considered to be a potential source of secondary metabolites and some of them are reported to have allelopathic activities. Thailand is one of the countries with a variety of indigenous medicinal plant species, which may have potential to provide natural active substances. In this study, therefore, we selected 12 Thai medicinal plants to investigate for the allelopathic activity against the growth of test plant species. Aqueous methanol extracts of 12 medicinal plants exhibited their inhibitory effects on the growth of test plants. The average inhibition percentage of 12 medicinal plants extracts on the growth of test plants were greater than 80% of control growth. The aqueous methanol extracts of *Phlogacanthus pulcherrimus* exhibited strong inhibitory activity on the growth of both cress and barnyard grass. This study suggests that the extracts of 12 medicinal plants may possess allelopathic potential and *P. pulcherrimus* may potent candidate for isolation of allelopathic active substances.

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Biennial Cycle of Leaf Shedding by a Giant Bamboo Phyllostachys edulis Affects C-based rather than N-based Net Primary Production of Secondary Rural Forests, Kagawa Prefecture, Western Japan

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ABSTRACT

Giant bamboo, *Phyllostachys edulis* (Moso bamboo), is a species of Poaceae growing over eastern Asia. In Japan, P. edulis was introduced from China in the last century, mainly to product young sprout as a food material (*TAKENOKO*, in the sense of 'child of bamboo' in Japanese). In recent decades, the planted bamboos in the agricultural fields in Japan have not been well managed and were then abandoned, because the low-priced TAKENOKOs imported from China prevailed in Japan. The shoots of *P. edulis* invade and replace the adjacent fields into the bamboo forests rapidly by their vegetative reproduction (clonal growth). The harmful effects of extensive expansion of *P. edulis* have been increasingly relevant to ecosystem management in Japan. Thus, we have been studying the effects of *P. edulis* invasion into the secondary forests in Kagawa prefecture and western Japan. We hypothesize that the life-history traits of *P. edulis*, such as 2-yr cycle of leaf-litter production, affect the seasonal changes in forest structure, year-to-year changes in forest production and matter cycle in the forest ecosystems. We found that *P. edulis* dominance induced 2-yr cycle improvements of forest light environment, though the dense overstory of *P. edulis* invaded forests were often tightly closed.

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Chiang Mai University

ΚU

Characterization of Carbendazim-Resistant of Pestalotiopsis sp. and Botrytis cinerea Causing Strawberry Disease

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ABSTRACT

Fifty-six isolates of Pestalotiopsis sp. causing strawberry leaf blight and eighteen isolates of Botrytis cinerea causing strawberry gray mold were collected from markets and orchards in Chiang Mai province. The carbendazim-resistant of the pathogen was evaluated on potato dextrose agar amended with different concentrations of carbendazim. The results showed that Pestalotiopsis sp. thirty-nine isolates were highly resistant, seventeen isolates were sensitive phenotype. All B. cinerea isolates were highly resistant to carbendazim. Analysis of the ß-tubulin gene sequence from Pestalotiopsis sp. indicates that mutations occurred at codon 79 and codon 102. A serine (AGT) to Lysine (AAA) replacement at codon 79 (S79K) and a Valine (GTA) to Alanine (GCA) replacement at codon 102 (V102A). Highly resistant isolates of B. cinerea were indicated that two mutations occurred at codon 198, a glutamic acid (GAG) to alanine (GCG) replacement (E198A) and a glutamic acid (GAG) to valine (GTG) replacement at the same amino acid position (E198V). Moreover, a mutation at codon 170 (V170A), a valine (GTC) to alanine (GCC) replacement and 206 (A206V), A alanine (GCT) to valine (GTT) replacement were detected in highly resistant isolates of B. cinerea. The efficiencies of fungicides against the mycelia growth of carbendazim-resistant and sensitive pathogens according to poisoned food technique were studied. The result showed captan at recommended concentration exhibited the highest inhibitory effect to Pestalotiopsis sp. and B. cinerea at 100%. Furthermore, at the recommended concentration of thiram and chlorothalonil exhibited the inhibitory effects to carbendazim-resistant isolate of B. cinerea with 100% and 93.70%, respectively.

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Chiang Mai University

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Current Situation of Technical Intern Trainee as Care Worker.

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ABSTRACT

In Japan, They are expected to meet users' needs, including medical care and the nursing of elderly people, as Japan enters into an aging society with a declining birthrate.

Recently, it is important theme of the shortage of care works in Japan. To handle this issue, the number of "Technical Intern Trainee" as care workers in Japan from foreign countries are increasing. The purpose of this study was to clarify the current situation of Technical Intern Trainee in Japan.

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Chiang Mai University

KU

Drying of Longan without Stone by Low-pressure Superheated Steam

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ABSTRACT

This research aims to investigate the use of low-pressure superheated steam (LPSS) drying for longan without stone. The effects of drying conditions, i.e., drying temperature and pressure on the drying kinetics and quality of dried products (in terms of color, shrinkage, and rehydration) were investigated. The experiments were carried out at the drying temperatures of 70 - 90°C and absolute pressures of 7 - 15 kPa. Sample with an initial moisture content in the range of 350 - 400°C dry - basis was dried until its moisture content of 18% dry - basis was obtained. Results showed that drying rate increased with increasing drying temperature and with decreasing pressure. The total color difference seemed to decrease as drying temperature decreased and as pressure increased. The percentage of shrinkage decreased when drying temperature increased and pressure decreased while rehydration increased when drying temperature and pressure increased. The models of drying kinetics in terms of semi-t

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Elucidation of the Chemical Composition of Tung Tree (Vernicia fordii) to Clarify the Potential for Medicinal Use

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ABSTRACT

The Tung tree (*vernicia fordii*), a deciduous tree of the Euphorbiaceae, is native to southern China and was introduced to Japan in the 1900s. The seeds contain about 40-60% oil that is comprised of toxic compounds and is not edible. Tung oil is classified as a drying oil with a high (approximately 80%) eleostearic acid (9*c*, 11*t*, 13*t*-octadecatienoic acid, 18:3) content with three conjugated double bonds. Tung oil was originally produced in Japan in the 1900s, and used for light, oil paper, paint, varnish, and printing, but fell out of use in favor of more advanced technologies and materials. Currently, the production of Tung oil is very limited in Japan.

Previous investigations have reported the presence of toxic constituents (Okuda, 1974), sterols (Okuda, 1975), coumarins (Fozder, 1989), amino acid (Okuda, 1975), and triterpenes (Pei, 2013) from the Tung tree. While there has been some research on the properties (Nitidandhaprabhas, 1978) and biodiesel production of Tung oil, the chemical constituents and biological activities of the Tung tree are not fully known. As such, this study investigated the chemical constituents of the Tung tree as a first step in clarifying the potential for medicinal use.

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Evaluation of Bone Quality and Bone Strength in Femurs of Layer Hens

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ABSTRACT

Bone quality and bone strength in femurs of layer hens is directly related to the health and productivity of layer hens. In a previous study, we established the decline in bone quality was due to forced molting by feeding restriction for layer hens and that the mineral balance in feed is strongly related to maintenance of bone quality (Ishikawa et al., 2018). However, the relationship between the bone quality and bone strength has not been clarified. In this study, we investigated the local mechanical relevance of femoral cortical bone used in the previous study. Bone strength was analyzed by a micro Vickers hardness tester. For the analysis of bone quality, calcification and the carbonate/phosphate ratio, a Fourier transform infrared spectrometer was used. Bone strength was significantly higher in high Ca feed group than high mineral feed group pre-molting. Calcification did not differ for any groups while the carbonate/phosphate ratio was significantly higher in high Ca feed group than high mineral feed group pre-molting. A positive correlation was found from the analysis of bone strength and calcification. Our results suggest that bone strength and bone quality are related and have an important role in the evaluation of bone.

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Evaluation of Materials and Structure for Sustainable Control of the Chicken Mites

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ABSTRACT

In the global poultry industry, ectoparasites, such as red mite (*Dermanyssus gallinae*), are widespread and acaricides are used for control red mites. However, since the transfer of acaricide to eggs is a problem, a mite control method that reduces the acaricide usage is required. We have already developed red mites trapping devices, the i-Trap and i-Trap 2, which utilizes the attraction of red mites to an electrostatic charge. These traps generate an electrostatic charge because they are made from a patented polymer material. In this study, in addition to material combinations, we investigated the influence of structure on behaviors of red mites and electrostatic charge. We investigated the capture capability of red mites and electrostatic charge by combination of wood engraved with grooves and polyvinyl chloride board. When rubbed with a nonwoven fabric wiper, the combination of wood and polyvinyl chloride board produced a larger electrostatic charge than wood alone, and resulted in a higher capture rate of red mites. The success of capturing the mites, according to the combination and structure of the materials, suggests that a red mite control method could be developed that focuses on the material and structure inside the poultry house.

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Functional Analysis of Nonpathogenic Gene RipAA of Ralstonia Solanacearum Causing Extensive Damage to Plants

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ABSTRACT

Bacterial pathogens employ a type III secretion system to deliver effector proteins into the host cell to disrupt the defense response. In this study, we screened *R. solanacearum* effectors using the yeast expression system and identified RipAA as one of the effectors that causes growth inhibition in yeast. Interestingly, GFP-tagged RipAA is specifically localized to the daughter cell membrane in yeast cells. Western blot analysis revealed that RipAA is hyperphosphorylated in its predicted auto-inhibitory domain and this phosphorylation is dependent on the plasma membrane localization in yeast. We found that RipAA causes growth inhibition that is stimulated through membrane localization and subsequent phosphorylation in yeast. RipAA was originally identified as an avirulence gene, AvrA, which elicits the defense-associated hypersensitive response (HR) on the non-host plants, such as *Nicotiana benthamiana*. Various RipAA mutants analyzed in yeast were also expressed in *N. benthamiana* by transient expression and investigated. The putative active center mutant (C183S) in yeast did not occur in HR. Therefore, we think the position 183rd cysteine is important for the function of RipAA.

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Growth-inhibitory Effect of the Rare Sugar D-arabinose against the Nematode Caenorhabditis Elegans, and its Mechanism of Action

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ABSTRACT

We have reported that the rare sugar D-arabinose (D-Ara) inhibited the growth of the nematode Caenorhabditis elegans. However, its mechanism of action is still not clear. We have also reported that this inhibitory effect was diminished by the addition of D-fructose, but not by that of D-glucose. D-Ara is presumed to be phosphorylated by sugar kinases to yield D-Ara 5-phosphate (D-Ara-5P) in cells. In preliminary experiments using yeast glycolysis enzymes, D-Ara-5P showed inhibitory activity against glucose phosphate isomerase (GPI), but no activity against hexokinase. On the basis of these findings, we focused on GPI as a target enzyme of D-Ara-5P.

Crude enzyme solutions obtained from the homogenates of C. elegans adults were used in this study. The IC50 (50% inhibitory concentration) value of D-Ara-5P was evaluated against C. elegans GPI. The known GPI inhibitor 6-phosphogluconic acid (6-PG) was used as a positive control. It was observed that D-Ara-5P exhibited a slightly weaker GPI-inhibitory activity than 6-PG. We believe that the GPI-inhibitory activity of D-Ara-5P accounts for at least a part of its growth-inhibitory effect.

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Identification of an Allelopathic Substance in *Lamium amplexicaule* L. extracts

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ABSTRACT

Lamium amplexicaule L. is an annual weed belonging to the Lamiaceae family. In our previous research, the aqueous methanol extracts of *L. amplexicaule* had the concentration dependent inhibitory activity on the growth of several test plants, suggesting that *L. amplexicaule* may have allelopathic activity. However, allelopathic substances of the plant have not yet been identified. Therefore, the present research aimed to isolate and identify the allelopathically active substances in *L. amplexicaule* extracts. The extracts of *L. amplexicaule* inhibited the shoot and root growth of cress concentration-dependently. Bioassay-guided separations of the extracts, led to identification of an allelopathically active substance methyl caffeate. Methyl caffeate significantly inhibited the shoot and root growth of cress and Italian ryegrass. The concentrations required for 50% growth inhibition (I50 values) of methyl caffeate on shoots and roots were 1.36 and 2.02 mM for cress, respectively, and 2.51 and 1.08 mM for Italian ryegrass, respectively. The present results suggest that *L. amplexicaule* extracts may contain at least an allelopathically active substance methyl caffeate.

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Implementation of Fresh Longan Solid Waste as Substrate in Production System for Whole Cells of Yeast Candida tropicalis TISTR 5306 in Batch and Continuous Modes

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ABSTRACT

Pretreated dried longan solid waste powder (LSWP) in 1.84% (w/w) Ca(OH)2 with different commercial enzymes resulted in the total sugars of 14.4±0.13 g/l. The cultivation of Candida tropicalis TISTR 5306 for 24 h in LSWP extract with sugar adjustment to the concentration level of 100 g/l supplemented with ammonium sulphate produced dried biomass and ethanol concentration levels of 5.40±0.04 and 24.9±0.83 g/l, respectively. The ethanol production yield on consumed substrates (Yp/s) and dried biomass production yield on consumed substrates (Yx/s) were 0.41 ± 0.01 and 0.044 ± 0.0001 g/g, respectively. The kinetics study of whole cells and ethanol production from C. tropicalis TISTR 5306 in 1 l scale of batch mode production system at 30 °C for 48 h with different aeration rate of 2.190 vvm for 24 h prior to 1.095 vvm for the next 24 h resulted in ethanol and dried biomass at the concentration levels of 13.8±0.36 and 2.65 ± 0.10 g/l, respectively with the specific growth rate of yeast at 0.035 per h. The continuous mode production system of 1 l scale was carried out by varying 3 levels of feeding rate (F), namely, 37.8, 29.4 and 21.0 ml/h for 264 h. The dried biomass production at the highest concentration level of 1.92±0.26 g/l was obtained from F of 21.0 ml/h with the cultivation time of 60-120 h. The ethanol production at the highest concentration level of 1.92±0.26 g/l was obtained from F of 21.0 ml/h with cultivation time of 60-120 h. The ethanol production at the highest concentration level of 1.92±0.26 g/l was obtained from F of 21.0 ml/h with cultivation time of 60-120 h. The ethanol production at the highest concentration level of 21.8±0.57 g/l was obtained at F = 29.4 ml/h with cultivation time of 132-192 h.

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Investigation for Nephrotoxic Mycotoxin 'Ochratoxin A' in Instant Noodles Manufactured in Japan, China, Indonesia, Vietnam and Thailand

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ABSTRACT

Ochratoxin A (OTA) is nephrotoxic and renal carcinogenic mycotoxin, produced by several species of *Aspergillus* and *Penicillium verrucosum*. OTA contaminates cereals (rice, corn, and wheat) and other common products (coffee, beer, cocoa and wine). Commercially available instant noodles (128 samples) were collected from Japan (30), China (12), Indonesia (30), Vietnam (30) and Thailand (30) in 2016-2017 and analyzed for OTA contamination by an immunoaffinity column-HPLC method.

OTA contamination was found in 102 samples (79.7%), with an average contamination level of 0.115 μ g/kg of OTA. All Indonesian instant noodle samples (100%) were contaminated (avg. 0.236 μ g/kg), which was significantly higher than the contamination rates and levels for Japan 92.3% (avg. 0.110 μ g/kg), China 83.3% (avg. 0.134 μ g/kg), Vietnam 63.3% (avg. 0.110 μ g/kg), and Thailand 63.3% (avg. 0. 0.134 μ g/kg).

A risk assessment for human consumption was conducted for the sample with highest contamination, Indonesian instant nodles (0.744 ppb) for a person with a body weight of 50 kg consuming 2 servings daily. This would result in an intake of 148.8 ng OTA per day, which is equivalent to 19.8% of TDI. At this rate, no negative impacts on human health are expected.

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Meaning and Acceptance Process of Acquired Disability

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ABSTRACT

This literature review aims to clarify the struggle of people with disabilities in their life times. Having a disability has a huge impact on people in terms of the bodies, minds, and surrounding, including other people. Once they become disabled, they cannot let go of their past selves and accept their present condition. Unless they are able to reconstruct an identity as disabled people, they will have difficulties adjusting to society. More significant than physical limitation caused by disabilities are social influences. For instance, someone disabled in his/her twenties must live with a disability for the rest of his/her life. One implication of this review is the need to provide support to young people who become disabled.

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Mutation of D-glucoside-3-dehydrogenase from *Rhizobium* sp. S10.

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ABSTRACT

D-Glucoside-3-dehydrogenase (G3DH) is a flavine adenine dinucleotide (FAD) enzyme, which oxidizes the hydroxyl group at C-3 position of glucosides to their corresponding 3-ketoglucosides. This reaction can be applied for rare sugar production. We have isolated and characterized G3DHs from both of *Rhizobium* sp. L35 and *Rhizobium* sp. S10. Although, the molecular mass and the optimal condition of both enzymes are similar, there is a difference in the property of substrate specificity. While, G3DH of *Rhizobium* sp. S10 showed highest activity against gentiobiose, G3DH of *Rhizobium* sp. L35 showed highest activity against cellobiose and 40.0% relative activity against glucose-1-phosphate. The objective of this study is to find a key amino acid residue that affects the substrate specificity of G3DH. The site-directed mutations were introduced to the genes of G3DH from *Rhizobium* sp. S10. As the resultant mutant enzymes named S128F, D133ER134G, Q151D, E174D and P191R showed various difference substrate specificity with authentic enzyme.

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Physical and Chemical Properties of Bio Diesel Fuel from Tung oil

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ABSTRACT

Tung tree (*Vernicia forudii*), which is a deciduous tree of the Euphorbiaceae, is native to southern China and introduced to Japan. The seeds contain about 40% oil that not suitable for edible use. Tung oil contains about 80% of eleostearic acid. (9*c*, 11*t*, 13*t*-octadecatrienoic acid, 18:3) with three conjugated double bonds.

In this study, bio diesel fuel (BDF) was made from Tung oil, and physical and chemical properties of the BDF were measured. The iodine value of BDF from 100% Tung oil was 153, which was too high and did not conform to JIS. To reduce iodine value, Tung oil and house waste oil were mixed and BDF was synthesized. Iodine value of BDF from 30% Tung oil and 70% house waste oil was 118, which value was less than JIS, while a kinematic viscosity of the blend BDF was 5.22 mm²/s, which did not conform to JIS. In order to reduce both iodine value and kinematic viscosity of BDF, Tung oil BDF was hydrogenated with palladium carbon at 50°C. The composition of fatty acid methyl esters with one double bond in the hydrolyzed BDF was 90.5%. Other physical property values of hydrolyzed BDF were understudy.

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Plant Growth Promoting Activity in some Rare Actinomycetes

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ABSTRACT

Actinomycetes are Gram positive bacteria with very good ability to produce bioactive compounds that can apply in many fields such as medicine, industry and agriculture. Actinomycetes can produce phytohormones which could promote plant growth. Hence, it is the aim of this study to investigate plant growth promoting ability of 8 rare actinomycete strains (Dermacoccus nishinomiyaensis DSM20448T, D. abyssi MT1.1T, D. barathri MT2.1T, D. profundi MT2.2T, W. marianensis MT8T, Tsukamurella sp. MT6.1, Tsukamurella sp. MT6.3 and Tsukamurella sp. MT6.7). All strains could produce IAA in the tryptophan-added culture broth. D. nishinomiyaensis DSM20448T produced the highest IAA of 101.01±8.61 µg/ml under sodium chloride stress (450 mM of NaCl). For siderophore production, none of the strain produced siderophore zone on Chrome Azurol S (CAS) agar. However, all strains were able to produce hydroxamate and catecholate siderophores in CAS broth. D. abyssi MT1.1T produced the highest hydroxamates and catecholates of 1153.75±8.84 and 43.86±8.96 µmol/l, respectively. Phosphate solubilization was done on Pikovskaya agar and in broth. D. nishinomiyaensis DSM20448T produced the largest clear zone of phosphate solubilization (8.83±0.29 mm) on agar whereas W. marianensis MT8T released the highest amount of phosphorus in the broth (170.00±14.52 µg/ml). D. nishinomiyaensis DSM20448T was chosen for plant growth promoting experiment in Khao Dowk Mali 105 rice. Under non-stress condition, no significant difference in the height, number of roots, fresh weight and dry weight were found between control and inoculated rice (P 0.05). However, under salt stress (150 mM NaCl) the height, number of roots, fresh weight and dry weight of the rice inoculated with D. nishinomiyaensis DSM20448T was higher than control (P 0.05).

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Research in Applied Life Sciences at the Faculty of Agriculture, Kagawa University

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ABSTRACT

The Faculty of Agriculture of Kagawa University offers may opportunities for research for both domestic and international students. The Applied Life Sciences Course is one of five main courses offered at the Faculty of Agriculture. Research and education in Applied Life Sciences utilizes the latest technology to focus on biological phenomena, and the functions of life forms (microorganisms, plants higher animals) at both the molecular and genetic levels. Research covers a wide range of topics subjects such as the development of useful organisms and the efficient use of bioresources. The presenters will provide an overview of the main research areas and activities of research groups and research laboratories.

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Research in Bioresource & Functional Chemistry at the Faculty of Agriculture, Kagawa University

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ABSTRACT

The Faculty of Agriculture of Kagawa University offers may opportunities for research for both domestic and international students. The Bioresource & Functional Chemistry Course is one of five main courses offered at the Faculty of Agriculture. Research and education in Bioresource & Functional Chemistry centers on developing key knowledge of and the application of a variety chemical substances with biological functions, and on how chemistry and biology of affects and interacts with various ecosystems. Research and education in focusses investigation of biologically derived functional chemicals, the elucidation of how these substances are generated, and effective application of biomass as a resource. The presenters will provide an overview of the main research areas and activities of research groups and research laboratories.

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Research in Bioresource Production Science at the Faculty of Agriculture, Kagawa University

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ABSTRACT

The Faculty of Agriculture of Kagawa University offers may opportunities for research for both domestic and international students. The Bioresource Production Science Course is one of five main courses offered at the Faculty of Agriculture. Research and education in Bioresource Production Science focuses on concepts and principles of bioresources production, post-harvest and environmental planning and controls to help ensure a safe, stable food supply. Research and education is organized around evaluation of genetic resources, selective breeding, production technologies, and logistic systems. Basic and applied theories are investigated systematically and verified through experiments and fieldwork at the University Farm. The presenters will provide an overview of the main research areas and activities of research groups and research laboratories.

27-29 August, 2018

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Research in Food Science at the Faculty of Agriculture, Kagawa University

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ABSTRACT

The Faculty of Agriculture of Kagawa University offers may opportunities for research for both domestic and international students. The Food Science Course is one of five main courses offered at the Faculty of Agriculture. Research and education in Food Science focuses first on developing an understanding of food functions, chemical interactions, properties of processed foods, and food safety, and then the development of food products, and then addressing key food issues (food safety, & food functionality). The presenters will provide an overview of the main research areas and activities of research groups and research laboratories.

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Search for Novel Genes Involved inHost-selective ACT Toxin Production by Co-immunoprecipitation with anti-ACTT1 Antibody in the Tangerine Pathotype of *Alternaria alternata*

Tsugi, Y., Tanaka, S., Katsumoto, M., Shimagami, T., Masunaka, A., Miyamoto, Y., Ohtani, K., Mochizuki, S., Tsuge, T., Yamamoto, M., Ichimura, K., Gomi, K. and Akimitsu, K.

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ABSTRACT

Alternaria alternata tangerine pathotype produces host-selective ACT toxin and causes Alternaria brown spot disease of tangerines and their hybrids. We identified ten genes by draft sequencing of genome from the tangerine pathotype. These genes have been analyzed functionally using target gene disruption and RNA silencing, and confirmed to be essential for ACT-toxin biosynthesis and the pathogenicity of the tangerine pathotype. The six *ACTT* genes involved in the biosynthesis of the 9, 10-epoxy-8-hydroxy-9-methyl decatrienoic acid (decatrienoic acid) moiety sharing with AK-and AF-toxins produced by Japanese pear and strawberry pathotypes. However, additional enzymes as well as genes encoding these enzymes are expected from the estimated biosynthesis pathway of the compound, and we hypothesized that these enzymes might stay together as a protein complex to increase the efficiency of decatrienoic acid production. Therefore, we search the additional enzymes related with decatrienoic acid biosynthesis by co-immunoprecipitation using anti-ACTT1 polyclonal antibodies following TOF-MS analysis, and these examinations found multiple candidates of decatrienoic acid biosynthesis enzymes.

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The Effect of Rare Sugar D-allose on Wild Type and Transgenic *Arabidopsis thaliana*

Ejima, S., Moriguchi, K., Matsudaira, K., Fukumoto, T., Kano, A., Ohtani, K., Izumori, K., Mochizuki, S., Ichimura, K., Gomi, K. and Akimitsu, K.

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ABSTRACT

Rare sugar is defined as monosaccharide with a low abundance in nature. One of the rare sugars, D-allose, which is the epimer of D-glucose at C3, has an inhibitory effect of growth on rice and *Arabidopsis thaliana*. While, the *Arabidopsis glucose-insensitive2* (*gin2*) mutant, which is the mutant of loss of AtHXK1, did not show any inhibitory effect on growth by D-allose treatment. Addition to the results of *A. thaliana* mutant, overexpression of D-allose kinase AlsK from *Escherichia coli* in rice plant showed high A6P production and strong inhibitory effect on growth when D-allose was treated to it. These results suggested that, A6P production by HXK is essential to effects of D-allose in plants. Further evaluation of a role of HXK on the effect of D-allose is progressing.

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The Outbreak of MRSA with the Pacifier in NICU: A Case Report

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ABSTRACT

We report the outbreak in our Neonatal Intensive Care Unit, Kagawa University hospital. In 2016, an outbreak of Methicillin-Resistant Staphylococcus Aureus occurred in NICU. We analyzed the transmission routes of infection by the PCR-based open-reading frame typing method. As a result, we detect the pacifier as the route of MRSA. After changed proper way of management of pacifier, the outbreak ended.

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The State of a Training System for the Re-employment of Previously Employed Nurses

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ABSTRACT

In recent years, national university hospitals have increasingly been hiring previously employed nurses in addition to newly graduated nurses. We surveyed the state of training systems for previously employed nurses at national university hospitals in Western Japan. Findings suggest that personalized assessment of previously employed nurses is important, their assessment can guide effective training systems for previously employed nurses.

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Validity Study of the Pressure Biofeedback Unit for Detection of Transversus Abdominis Activation During Upright Standing Position

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ABSTRACT

Pressure biofeedback unit (PBU) is commonly used as a feedback tool for determining strength of core muscle in supine or prone position. However, there have no studies to validate the PBU in the functional anti-gravity position. This study purposed to examine the validity of using PBU for detection of the transversus abdominis muscle (TrA) activation during upright standing position compared with the real-time ultrasound. Twenty participants (7 males and 13 females) participated in the study (aged 24.1 \pm 6.8 years). The PBUs were applied at the front and the back of trunk using lumbar support to position the PBUs. The front and the back PBUs were inflated up to 70 and 40 mmHg, respectively. Subjects performed abdominal hollowing (AH) until the front PBU reached the target levels (68, 66, and 64 mmHg). The back PBU pressure has to maintain at 40 mmHg for standardized a neutral spinal position. The ultrasound images of TrA were simultaneously collected at each level of the target pressures. The relationship between the level of PBU and the TrA thickness was analyzed using Pearson's correlation coefficients. There was strong correlation between the pressure levels of PBU and the TrA thickness (r = -0.793, p < 0.001). The resting thickness of TrA was 2.99 ± 0.52 millimeters (mm.) and the AH thickness at the PBU level of 68, 66 and 64 mmHg were 4.81 ± 0.97 , 5.67 ± 0.98 , 6.27 ± 0.89 mm, respectively. The strong correlation between PBU and TrA thickness suggests that PBU is a valid and acceptable tool to detect an activation of TrA muscle during standing position. It may be a useful bio-feedback tool for core muscle activation during functional upright position.



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