The 4th International Conference on Integration of Science and Technology for Sustainable Development
ICIST 2015

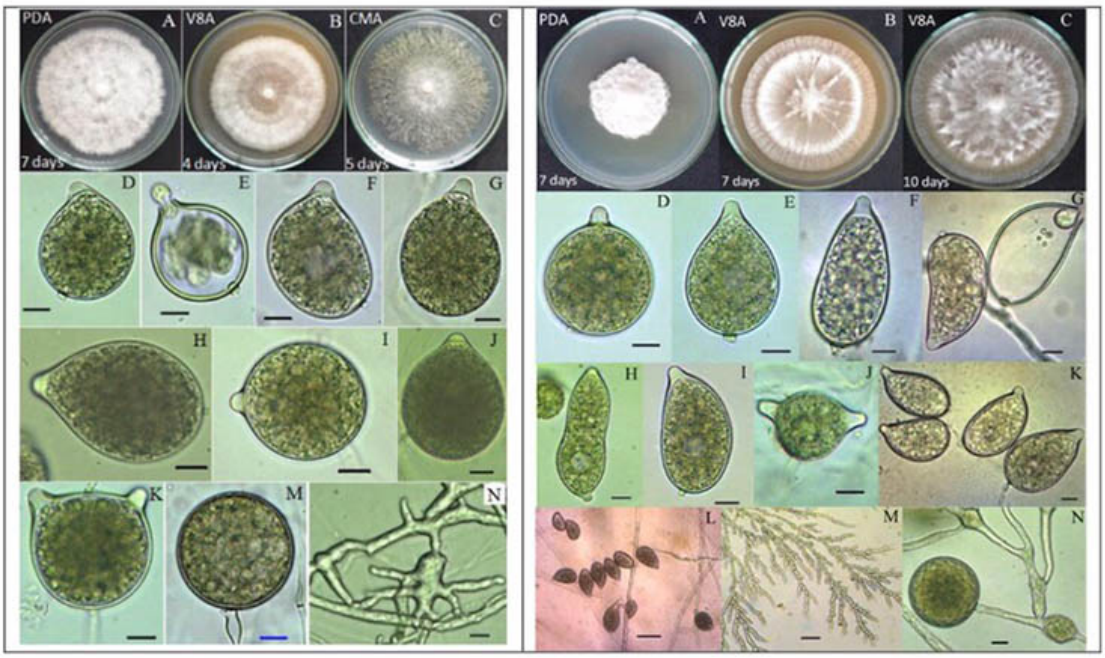
and

AATSEA Annual Meeting

SCIENTIFIC PROGRAM

and

BOOK OF ABSTRACTS



CWD Hotel, Hanoi, Vietnam
November 27 - 28, 2015

FOREWORD

The 4th International Conference on Integration of Science and Technology (ICIST 2015) provides the opportunity to discuss the recent advanced research and development in science and technology with the theme: Biological Diversity, Food and Agricultural Technology.

The theme of the conference was partly chosen to address the current needs for academic, research and farm demands for further development and improvisation. This year, we have a keynote speech, 5 plenary speakers, 10 invited speakers, 104 oral presenters and 26 posters as the total of 130 paper presentation from delegates which coming from 23 different countries around the world covering the fields of Agriculture and related fields.

Academicians, scientists, researchers, policy makers as well as extension experts contributed their expertise, experiences and research results to this conference. May the proceedings of this conference provide useful information and serve as reference for those who are interested in the specific discipline.

All full texts will be peer reviewed by our Editorial board of International Journal of Agricultural Technology (IJAT) and will be online published in IJAT in our website: www.ijat-aatsea.com.

Editors

WELCOME ADDRESS

The fourth International Conference on Integration of Science and Technology (ICIST 2015) provides the opportunity to discuss the recent advances and developments in science and technology with emphasis to biodiversity, agriculture and food security. The theme of the conference "Biological Diversity, Food and Agricultural Technology" is partly chosen to address the current needs for academic, research and farm demands for further development and improvisation. This year, there will be a keynote speech, several plenary speakers, invited speakers, oral and poster presentation from different countries around the world.

I am very much appreciated to organize ICIST 2015 conference as the main host and thanks to all Co-organizers, Agricultural Genetics Institute (AGI), Hanoi City, Vietnam; Northern Mountainous Agriculture and Forestry Science Institute (NOMAFSI), Phu Tho Province, Vietnam; Hung Vuong University, Phu Tho Province, Vietnam; King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; Rachmangala University of Technology Tawao-ok, Chantaburi campus, Thailand and CGC Laos as well as all sponsors who are supportive this conference successfully.

I welcome to all participants and wishing the organization of conference successful and nice stay in Vietnam.

Thank you

Mr. Nguen The Quyet

MD, ATQ Company, Vietnam

OPENING REMARKS

Greetings from the Association of Agricultural Technology in Southeast Asia (AATSEA), AATSEA is non-profitable legally organization, dedicated to a mission of long-term research, education and outreach related to the modern agricultural technology in Southeast Asia. The primary mission of AATSEA is to conduct seminar, conference and stimulate long-term research in relationships between members in Southeast Asia. This provides staffs and visiting scientists a unique opportunity to visit each other both sides. AATSEA has been organized the International Conference on Integration of Science and Technology for Sustainable Development (ICIST) every year since 2013 in Thailand, 2014 in Laos.

I would like to acknowledge ATQ company, Hanoi, Vietnam to organize this conference in Vietnam during 27-28 November 2015 which be held at Center for Woman and Development (CWD) Hotel , Address: 20 Thuy Khue - Tay Ho- Hanoi, Vietnam.

The main activity of our conference is to offer AATSEA awards to whom working in excellent criteria of agriculture contribution in the world and to let distinguished scientists in agriculture all over the world come to present and share their experiences to each other. This coming up conference will have participants from 23 countries and the important session will be concerned in water management and organic agriculture in Southeast Asia. All scientific paper presentation will be online published full text in an International Journal of Agricultural Technology (IJAT) where AATSEA is done for over 11 year

The Association of Agricultural Technology in Southeast Asia (AATSEA) is very much privileged to co-host the ICIST 2015 with ATQ Company, Vietnam. This conference, along with its theme “Biological Diversity, Food and Agricultural Technology” is conceived to cater to the present demands in both in the academic, research and actual fieldwork for agricultural technologies for further improvements and success.

I am so pleased to inform you that this conference will be participated in by scientists, researchers, professors and guests coming from 23 different countries worldwide. The association is also delighted to bestow “Excellence in Agricultural Leadership” and “Special Recognition” awards to deserving individuals. I hope to receive more nominations and confer awards in the future.

Finally, allow me to extend my gratitude to all members and committees who extended their time, efforts and expertise in organizing this conference. Also, I wish to acknowledge our co- hosts and sponsors for their support.

So, in behalf of Association of Agricultural Technology in Southeast Asia (AATSEA), I welcome all of you to Vietnam and hoping you will have precious memories with us. Hope to see you again in our future conferences.

I wish ICIST 2015 to be successful conference and hope all participants will have a pleasure stay in Hanoi, Vietnam.

Dr. Kasem Soytong, Associate Professor
President, AATSEA

EDITORIAL BOARD

Assoc. Prof. Dr. Bin. Mohamad Ramlan
Biotechnological Engineering, Malaysia

Prof. Dr. Okigbo, Raphael
Botany, Nigeria

Prof. Dr. Olsson, Christer H.B.
Cell and Molecular Biology, Sweden

Prof. Dr. Chachar, Qamaruddin
Cell Physiology, Pakistan

Prof. Dr. McGovern. Robert
Plant Pathology, USA

Prof. Dr. El-Mohamedy, Riad Sedki Riad
Plant Pathology, Egypt

Prof. Dr. Sridhar, Kandikere R.
Microbiology and Biotechnology, India

Assoc. Prof. Dr. Saha, Aniruddha
Molecular Plant Pathology and Fungal Biotechnology, India

Prof. Dr. Sahayaraj, K.
Advanced Zoology andBiotechnology, India

Dr. Kean, Sophea
Biotechnology in Plant Pathology, Cambodia

Assoc. Prof. Dr. Zhao, Rulin
Mycology, China

Prof. Dr. Suzuki, Akira
Biology, Japan

Prof. Dr. Korpela, Timo K.
Biotechnology, Finland

Prof. Dr. Tarakanov
Plant Biotechnology, Russia

Prof. Dr. Taylor, Paul
Plant Pathology, Australia

Assoc. Prof. Dr. To-anun, Chaiwat
Plant Pathology,Thailand

Prof. Dr. Tomohiro, Araki,
Life Science, Japan

Assoc. Prof. Dr. Trelo-ges, Vidhaya
Thailand

Dr. Zakiuddin, K.S.
Jaffar Nagar,Nagpu, India

Assoc. Prof. Verapol Jamswat
Animal Science, Thail;and

The 4th ICIST COMMITTEE

International Advisory:

Prof. Dr. Timo Korpela (Finland) - Chairman

Members:

Prof. Dr. Divina Cynthia (Philippines)
Prof. Dr. Robert McGovern (USA)
Prof. Dr. Akira Suzuki (Japan)
Prof. Dr. Somdej Kanokmedhakul (Thailand)
Prof. Dr. Kampon Sriwatanakul (Thailand)
Prof. Dr. John Moreki (Botswana)
Prof. Dr. Cao Van (Vietnam)
Prof. Dr. Suchatwe Suwansawat (Thailand)
Prof. Dr. Chachar, Qamaruddin (Pakistan)
Prof. Dr. Chkhubianishvili, Cisia (Georgia)
Prof. Dr. Melentyev, Alexander I. (Russia)
Prof. Dr. Sahayaraj, K. (India)
Prof. Dr. Jayabalan, N. (India)
Prof. Dr. Fucheng Lin (China)
Prof. Dr. Tapio, Juokslahti (Finland)
Prof.Dr. Tuomas Valtonen (Finland)
Prof. Dr. Maaret Virtanen (Finland)
Prof. Dr. Larissa Fedorova(Russia)
Prof. Dr. Choong Kyung, Kang (South Korea)
Assoc. Prof. Dr. Nguyen Van Toan (Vietnam)
Prof. Dr. Lin, Fu-Cheng (China)
Assoc. Prof. Dr. Chaiwat Toanan (Thailand)
Assoc. Prof. Dr. Rajeev Bhat (Malaysia)
Dr. Saithong Kaewchai (Thailand)
Dr. Ohnmar Myo Aung (Myanmar)
Dr. Sophea Kean (Cambodia)
Dr. Somlit vilavong (Laos)
Dr. Wulandari, Nilam (Indonesia)
Dr. Virapol Jamsawat (Thailand)
Mr. Sarayos Phongkasae (Thailand)

GeneralSecretariat: Prof. Dr. Divina, Cynthia C. (Philippines)

AATSEA Steering Committee of Permanent Representatives

Assoc. Prof. Dr. Kasem Soytong	Founder and Chairman
Assoc. Prof. Dr. Chaiwat To-anun	Vice-Chairman
Prof. Dr. Divina, Cynthia C. (Philippines)	General Secretary
Prof. Dr. Somdej Kanokmedhakul	International Cooperation
Assoc. Prof. Wichai Supalucksana	Public Relations
Assist. Prof. Dr. Wattanachai Pongnak	Registration and Membership
Dr. Chaninun Pornsuriya	Finance
Assist. Prof. Dr. Saithong Kaewchai	Records Keeper

AATSEA International Advisory Board

Dr. Aung, Ohnmar Myo (Myanmar)
Assoc. Prof. Dr. Bhat, Rajeev (Malaysia)
Prof. Dr. Chachar, Qamaruddin (Pakistan)
Assoc. Prof. Dr. Chaiwat to-anun (Thailand)
Prof. Dr. Chkhubianishvili, Cisia (Georgia)
Prof. Dr. Divina, Cynthia (Philippines)
Dr. Kean, Sophea (Cambodia)
Prof. Dr. Hong, Le Thi Anh (Vietnam)
Prof. Dr. Korpela, Timo (Finland)
Prof. Dr. Lin, Fu-Cheng (China)
Prof. Dr. McGovern, Robert (USA)
Prof. Dr. Moreki, John C. (Botswana)
Prof. Dr. Melentyev, Alexander I. (Russia)
Mr, Vilavong, Somlit (Lao, PDR)
Prof. Dr. Sahayaraj, K. (India)
Prof. Dr. Somdej Kanokmedhakul (Thailand)
Prof. Dr. Suzuki, Akira (Japan)
Prof. Dr. Tapio, Juokslahti (Finland)
Assist. Prof. Dr. Wattanachai Pongnak (Thailand)
Dr. Wulandari, Nilam(Indonesia)
Dr. Sophea Kean (Cambodia)
Assoc. Prof. Dr. Zhao, Rulin (China)

LOCAL ORGANIZING COMMITTEE

Advisory Committee

Chairman: Mr. Nguyen The Quyet, Director, ATQ, Hanoi, Vietnam

Vice-chairman:

Assoc. Prof. Dr. Le Huy Ham, the Director of Agricultural Genetics Institute, Hanoi, Vietnam

Assoc. Prof. Dr. Nguyen Van Toan, the Director of Northern Mountainous Agriculture and Forestry Science Institute (NOMAFSI), Phu Tho, Vietnam

Prof. Dr. Cao Van, the Rector of Hung Vuong University, Phu Tho, Vietnam

Prof. Dr. Suchatwe Suwansawat, the Rector of King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand

Members:

Dr. Nguyen Huu La, the Vice -Director of NOMAFSI, Phu Tho, Vietnam
Dr. Nguyen Van Thiep, NOMAFSI, Phu Tho, Vietnam
Assoc. Prof. Settasit Sangsopnjit, KMITL, Bangkok, Thailand
Assoc. Prof. Wichai Suphalucksana, KMITL, Bangkok, Thailand

Secretary: Assoc. Prof. Dr. Kasem Soytong, the President of AATSEA

Steering Committee

Chairman

Mr. Nguyen The Quyet, MD (ATQ, Vietnam)

Vice Chairman

Prof. Dr. Cynthia C. Divina (Philippines)
Asst. Prof. Dr. Wattanachai Pongnak (KMITL, Thailand)

Conference Secretary

Nguyen Huu Phong (NOMAFSI, Vietnam)

Session Chairpersons and Co-chairpersons

Session 1
Chairperson : Prof. Dr. Riad Sedki Riad El-Mohamedy (Egypt)
Co-chairperson : Dr. Saithong Kaewchai (Thailand)

Session 2
Chairperson : Prof. Dr. Robert McGovern (USA)
Co-chairperson : Prof. Dr. Somdej Kanokmedhakul (Thailand)

Session 3
Chairperson : Prof. Dr. Cynthia C. Divina (Philippines)
Co-chairperson : Dr. Ohnmar Myo Aung (Myanmar)

Session 4
Chairperson : Prof. Dr. Akira Suzuki (Japan)
Co-chairperson : Assoc. Prof. Dr. Younes Rezaee Danesh (Iran)

Session 5
Chairperson : Prof. Dr. John Moreki (Botswana)
Co-chairperson : Assoc. Prof. Dr. Virapol Jamsawat (Thailand)

Session 6:
Chairperson: : Director. Tuomas Valtonen (Finland)
Co-chairperson: : Prof. Dr. Rajeev Bhat(Malaysia)
Moderator: : Asst. Prof. Dr. Wattanachai Pongnal (Thailand)

Master of Ceremonies

Ms. Hezekiah Mirielle Aguinaldo (Philippines)
Mr. James Kennard Jacob (Philipoines)
Ms. Mai Thi Thu Ha (Vietnam)
Ms. Huyen Thanh (Vietnam)

Reception

Mr. Phung Manh Hung (Vietnam)
Mr. Somlit Vilavong (Laos)
Ms. Nguyen Quyen (Vietnam)
Miss Song Jiaojiao (china)
Miss Nguyen Thi Tham (Vietnam)
Mr. Huyly Tann (Cambodia)
Asst. Prof. Settasit Sangsopnjit (Thailand)
Miss Nguyen Thi Tham (Vietnam)
Mr. Nguyen Huu Phong (Vietnam)
Asst. Prof. Wichai Suphalucksana (Thailand)

Information Support and Co-ordinator

Mr. Huu Phong Nguyen (Vietnam)
Mr. Phung Manh Hung (Vietnam)
Ms. Nguyen Thi Tham (Vietnam)
Miss Rujira Tongon (Thailand)
Miss Song Jiaojiao (china)

Registration

Mrs. Nguyen Thi Thu Ha (Vietnam)
Mr. Vannak Sour (Cambodia)
Miss Rujira Tongon (Thailand)
Ms Truong Thi Thoa (Vietnam)
Mrs.Mai Thi Thu Ha (Vietnam)
Miss Phaophilat Phadungpran (Thailand)
Miss Nguyen Thi Tham (Vietnam)
Mrs. Dao Thi Viet Anh (Vietnam)
Miss Song Jiaojiao (China)
Dr. Ohnmar Myo Aung (Myanmar)

Financial Management

Miss May Amor Soytong (Thailand)
Miss Rungrat Vareeket (Thailand)
Miss Rujira Tongon (Thailand)
Miss Song Jiaojiao (China)

Ticket Reservation

Miss Rujira Tongon (Thailand)
Miss Nguyen Thi Tham(Vietnam)

Food & Coffee break, Reception and Welcome dinner

Mrs. Nguyen Thi Thu Ha (Vietnam)
Mrs. Pham Quynh Anh (Vietnam
Mr. Trinh Ba Huy (Vietnam)
Miss Rungrat Vareeket (Thailand)
Miss Nguyen Thi Tham (Vietnam)
Mrs. Truong Thi Hoa (Vietnam)
Mr. Somlit Vilavong (Laos)
Mr. Nguyen Van Hung (Vietnam)
Mr. Huyly Tann (Cambodia)
Mr. Vannak Sour (Cambodia
Asst. Prof. Settasit Sangsoponjit (Thailand)
Asst. Prof Wichai Suphalucksana (Thailand)
Mrs. Mai Thi Thu Ha (Vietnam)
Mr. Phung Manh Hung (Vietnam)

Reception, Hotel Reservation and Transportation,and Tour Guides

Mr. Nguyet The Quyet (Vietnam)
Mr.Nguyen Huu Phong (Vietnam)
Mr. Phung Manh Hung (Vietnam)
Miss Nguyen Thi Tham (Vietnam)

Plaques, Certificates, Flags, Kits and Corsage, Tokens and Documentation

Mr. Phung Manh Hung (Vietnam)
Miss Rujira Tongon (Thailand)
Miss Wanida Duangkongsan (Thailand)
Miss Rungrat Vareeket (Thailand)
Ms. Jiao Jiao Song (China)
Mr. Vannak Sour (Cambodia)

Photograph

Mr. Songchai Jantap (Thailand)

Proceedings

Mr.Nguyen Huu Phong (Vietnam)
Mr. Somlit Vilavong (Laos)
Mr.Vannak Sour (Cambodia)
Miss Song Jiaojiao (China)
Mr. Huyly Tann (Cambodia)
Miss Rujira Tongon (Thailand)
Mr. Phung Manh Hung (Vietnam)
Miss Phaophilat Phadungpran (Thailand)

IT Staff for Parallel Session Rooms

Session 1
Ms. Jiao Jiao Song (China)
Ms. Nguyen Thi Tham (Vietnam)

Session 2
Ms. Phaophilat Padungpran (Thailand
Mr. Phung Manh Hung (Vietnam)

Session 3
Ms. Rujira Tongon (Thailand)
Mrs. Mai Thi Thu Ha(Vietnam)

Session 4
Ms. Rungrat Vareeket (Thailand)
Ms. Nguyen Thi Quyen (Vietnam)

Sesssion 5	**Session 6**
Assoc. Prof. Wichai Suphalucksana (Thailand)	Mrs. Han Thi Hong Ngan (Vietnam)
Ms. Nguyen Thi Kim Lan (Vietnam)	Miss Mai Thi Thu Ha (Vietnam)

Hall Preparation

Room 1: Ms. Jiao Jiao Song (China)
Room 2: Ms. Phaophilat Padungpran (Thailand)
Room 3: Ms. Rujira Tongon (Thailand)
Room 4: Ms. Rungrat Vareeket (Thailand)
Room 5: Asst. Prof. Settasit Sangsoponjit (Thailand)
Room 6: Mr. Vannak Sour (Cambodia)

Oral Presentation Management: Assoc.Prof. Wichai Suphalucksana (Thailand)

Poster Presentation Management: Asst. Prof. Settasit Sangsoponjit (Thailand)

Best Paper Awards: Prof. Dr. Divina Cynthia (Philippines)
Dr. Ohnmar Myo Aung (Myanmar)
Assoc.Prof. Wichai Suphalucksana (Thailand
Asst. Prof. Settasit Sangsoponjit (Thailand)
Mr. Phung Manh Hung (Vietnam)

Audiovisual Aid and Sub-session Convenors

Mr. Nguyen Huu Phong (Vietnam	Mr. Vannak Sour (Cambodia)
Mr. Phung Manh Hung (Vietnam)	Mr. Songchai Jantap (Thailand)

The 4th International Conference on Integration of Science and Technology for Sustainable Development (ICIST 2015)

"Biological Diversity, Food and Agricultural Technology"

November 27-28, 2015

Center for Woman and Development - CWD Hotel, Hanoi, Vietnam

PROGRAM

DAY 1: **27 November 2015;** Ballroom Hall, the 2nd floor, CWD hotel

Time	**Activities**
7:30 – 8:30	**Registration**: - Handling of PowerPoint Presentations to the members of the Committee - Putting-up Posters
8:30 – 10:30	**Opening Ceremonies** **Welcome Song** (Imagine) **Welcome Address** Mr. Nguyen The Quyet, Director of ATQ **Opening Remarks** Assoc. Prof. Dr. Kasem Soytong, President of AATSEA **Message** President of Vietnam Agricultural Academy of Science **Message** Prof. Hiroyuki Konuma Visiting Professor (in Agriculture), Meiji University, Japan (Former UN FAO ADG and Regional Representative for Asia and the Pacific) **Overview of the Research Congress** Prof. Dr. Timo Korpela Chair, International Organizing Committee

Entrance Countries' Representative as Honour Guests and AATSEA Members onto the Stage

1. Belarus: **Dr. Grineva I.A.**
2. Botswana: **Prof. Dr. John Cassius Moreki**
3. Cambodia: **Mr. Huyly Tann**
4. China: **Miss Song Jiaojiao**
5. Egypt: **Prof. Dr. Riad Sedki Riad El-Mohamedy**
6. Finland: **Prof. Dr. Timo Korpela**
7. Germany: **Prof. Nowick Wolfgang**
8. India: **Prof. Dr. Thangadurai Devarajan**
9. Indonesia: **Dr. Zainal Muktamar**
10. Iran: **Assoc. Prof. Dr. Younes Rezaee Danesh**
11. Japan: **Prof. Akira Suzuki**
12. Laos: **Mr. Somlit Vilavong**
13. Malaysia: **Prof. Dr. Rajeev Bhat**
14. Moldova: **Dr. Tatiana G. Stratulat**
15. Myanmar: **Dr. Ohnmar Myo Aung**
16. Nigeria: **Prof. Dr. Raphael Okigbo**
17. Philippines: **Prof. Dr. Cynthia C. Divina**
18. Russia: **Mr. Beletskiy Sergey**
19. South Korea: **Prof. Dr. Choong K. Kang**
20. Thailand: **Assit. Prof. Dr. Wattanachai Pongnak**
21. USA: **Prof. Dr. Robert McGovern**
22. Vietnam: **Dr. Nguyen Van Thiep**
23. Agricultural Genetics Institute, Vietnam: **Dr. Le Huy Ham**, Director
24. Northern Mountainous Agriculture and Forestry Science Institute, Vietnam: **Dr. Nguyen Huu La**, Vice Director
25. Hung Vuong University, Vietnam: **Prof.Dr. Cao Van**, Rector
26. King Mongkut's Institute of Technology Ladkrabang, Thailand: **Assoc. Prof. Dr. Chamroon Laosinwattana**, Vice Rector
27. ATQ, Vietnam: **Mr. Nguyen The Quyet**, Director
28. Association of Agricultural Technology in South East Asia (AATSEA), Thailand: **Assoc. Prof. Dr. Kasem Soytong,** President
29. CGC Coffee Laos, **Mr. Young Ah Choi,** Director

Bestowing "Excellence in Agricultural Award" by the President of AATSEA

1. Mr. Antonio Herrera Cerilles (Provincial Governor, Philippines)
2. Hon U. Kyaw Swar Soe (Myanmar)
3. Mrs. Leuang Litdang (Laos)
4. Prof. Dr. Okigbo Raphael Nnajiofor (Nigeria)
5. Prof. Dr. Riad E.L.-Mohamedy (Egypt)
6. Mr. Tawat Tapingkae (Thailand)
7. Prof. Dr. Teodoro C. Mendoza (Phillipines)
8. Assoc. Prof. Dr. Younes Rezaee Danesh (Iran)

Response of Awardees

(Each Awardees will be given the speech for 3-5 min)

Awarding Plaques of Recognition to Co-organizers and Sponsors

1. Agricultural Genetics Institute (Vietnam)
2. ATQ (Vietnam)
3. CGC Coffee Laos and Sponsors
4. Hung Vuong University (Vietnam)
5. King Mongkut'sInsitute of Technology Ladkrabang (Thailand)
6. Northern Mountainous Agricultural and Forestry Science Institute (Vietnam)

Group Photo Taking

10:30-10:45 **Coffee Break**

10:45-11:15 **Keynote Speaker**

Director Tuomas Valtonen (Finland)
Global Water Challenges and Emerging Opportunities for Cooperation between Europe and Southeast Asia

11:15-11:45 **Plenary Speaker 1**:

Prof. Dr. Robert McGovern (USA)
Plant Doctors:An Emerging Profession

11:45-12:15 **Plenary Speaker 2**:

Prof. Dr. Choong K. Kang (South Korea)
World of Bioactive Compounds in Nature

12:15-13:30 **Lunch Break/Posters Viewing and Judging**

13:30-14:00 **Plenary Speaker 3** :

Prof. Hiroyuki Konuma (Japan)
Global and Regional Food Security and the Role of Agricultural Research towards Food Secured Future

14:00-14:30 **Plenary Speaker 4**:

Prof. Dr. Rajeev Bhat (Malaysia)
Sustainability Challenges in the ASEAN Region – An Insight into the Food – Energy – Water Nexus

14:30-15:00 **Plenary Speaker 5:**

Provincial Governor Antonio Herrera Cerilles (Philippines)
Gahung - Gahung Organic Cassava Farming System: A Climate Change Adaptive and Poverty-Alleviating Farming Strategy

15:00-15:40 **Coffee break/Poster Viewing and Judging**

RESEARCH FORUM

DAY 1	**27 November 2015**; the 2nd floor, CWD hotel
Session 1	**: Organic Agriculture, Biodiversity and Biotechnology** (**Room No.1** inside the Ballroom)
Chair	**: Prof. Dr. Riad Sedki Riad El-Mohamedy** (Egypt)
Co-chair	**: Dr. Saithong Kaewchai** (Thailand)
15:40-16:00	Nutraceuticals and Functional Foods Derived from Organic Agriculture **Invited speaker**: Prof. Dr. Kampon Sriwatanakul (Thailand)
16:00-16:20	Research on Agricultural Inputs for Organic Crop Production Assoc. Prof. Dr Kasem Soytong (Thailand)
16:20-16:40	Biological Products Produced by ATQ in Vietnam Nguyen The Quyet (Vietnam**)**
16:40-17:00	Increasing SRI - Organic Rice Yields through Double Rows Planting Pattern and Using Location and Season Adapted Rice Cultivar Teodoro C. Mendoza (Philippines)
17:00-17:20	Weed Based Organic Fertilizer to Reduce Application of Synthetic Fertilizer in Mustard (*Brasicca sinensis* L.) N. Setyowati (Indonesia)
17:20-17:40	Biological Preparations Developed by Belarusian State University for Environmentally Friendly Farming Grineva I.A. (Republic of Belarus)
17:40-18:00	Eco-Friendly Fungicides Alternatives to Control Soil Borne Fungal Diseases on Some Economic Crops Under Organic Farming System. **Invited Speaker**: Prof. Dr. Riad Sedki Riad El-Mohamedy (Egypt)
18:00	**Welcome Dinner**
Session 2	**: Plant Pest Management and Related Fields** (**Room No.2** inside the Ballroom)
Chair	**: Prof. Dr. Robert McGovern** (USA)
Co-chair	**: Prof. Dr. Somdej Kanokmedhakul** (Thailand)
15:40-16:00	Efficacy of Extracts of Water Yam (*Dioscorea alata*) and Aerial Yam (*Dioscorea bulbifera*) Peels in the Control of White Yam (*Dioscorea rotundata*) Rot. **Invited Speaker**: Prof. Dr. Raphael N. Okingbo (Nigeria)
16:00-16:20	Herbs and Spices: Plants Protecting Plants **Invited Speaker**: Prof. Dr. Cynthia C. Divina (Philippines)

16:20-16:40	Bioactive Secondary Metabolites from the Fungi and Mushrooms **Invited Speaker**: Prof. Dr. Somdej Kanokmedhakul (Thailand)
16:40-17:00	Fungal Inhibiting Capability of an Ethnobotanical Plant from Imugan, Nueva Vizcaya against *Fusarium oxysporum* and *Fusarium moniliforme* James K.S. Jacob (Philippines)
17:00-17:20	Suitable of Solvent System for Extraction of Allelochemicals from Melia Azedarach Pattharin Wichittrakarn (Thailand)
17:20-17:40	Bioconversion of Philippine Oil to Biologically Active Hydroxy Fatty Acid 7,10-dihydroxy-8(E)-octadecenoic acid (DOD) by *Pseudomonas aeruginosa* PR3 Joel B. Ellamar (Philippines)
17:40-18:00	Allelopathic Effect of Bidenspilosa var. Radiata and Its Utilization to Control Weed in Rice Ramida Krumsri (Thailand)
18:00	**Welcome Dinner**

Session 3	**: Agricultural Development and Related Fields** (**Room No.3** inside the Ballroom)
Chair	**: Prof. Dr. Cynthia C. Divina** (Philippines)
Co-chair	**: Dr. Ohnmar MyoAung** (Myanmar)

15:40-16:00	Commercial Development of the Ostrich Industry in Botswana **Invited Speaker**: Prof. Dr. John C. Moreki (Botswana)
16:00-16:20	Carbon Massflow and Greenhouse Gases Emission from Pork and Goat Meat Productions in Thailand: Case Study of Nakhon Ratchasima, Chon Buri and PrachinBuri Provinces Panisara Vichairattanatragul (Thailand)
16:20-16:40	RT-LAMP Test Kit: A New Generation of Molecular Quick Test Kit for Porcine Epidemic Diarrhea Virus (PEDV) Clarissa Y.J. Domingo (Philippines)
16:40-17:00	The Desires of People to Fattening Mud Crab in The Mangrove of La-ngu District, Satun Province Natpatcharakarn Kaewploy (Thailand)
17:00-17:20	Column Study of Nitrate Downward Movement and Selected Soil Chemical Properties' Changes in Mine Spoiled Soil as Influenced by Liquid Organic Fertilize Zainal Muktamar (Indonesia)
17:20-17:40	Factor Condition of Animal Science Farms in Institutes of Vocational in Agriculture of Northeastern Region, Thailand Rongsan Panyakom (Thailand)

17:40-18:00	Needs for the Development of a School Agricultural Learning Center (SALC) Model of Students' Guardians, Praibueng Wittaya School, Praibueng District, Srisaket Province Wattana Saduak (Thailand)
18:00	**Welcome Dinner**

Session 4	**: Crop Production and General Agriculture (Room No.4)**
Chair	**: Prof. Dr. Akira Suzuki** (Japan)
Co-chair	**: Assoc. Prof. Dr. Younes Rezaee Danesh** (Iran)
15:40-16:00	Mushroom Production in Japan **Invited Speaker**: Prof. Dr. Akira Suzuki (Japan)
16:00-16:20	Truffles: What We Know and What We Should Know **Invited speaker**: Assoc. Prof. Dr. Younes Rezaee Danesh (Iran)
16:20-16:40	Accounting Development for Sustainable Production of Indigenous Rice in Southern Part of Thailand Unchalee Sondee (Thailand)
16:40-17:00	The Potential of Phytohumin Compounds (PHC) as Standard Preparations to Increase Productivity of Agricultural Crops Prof. Nowick Wolfgang (Germany)
17:00-17:20	Growth, Yield Components, Agronomic Traits, Kernel Yield, Cost and Benefit of the NK48 Corn Genotype Grown in Tillage and No-Tillage Soils with Different Rice Residue Management Practices Bancha Wiangsamut (Thailand)
17:20-17:40	Monitoring and Assessment of Fatty Acid Methyl Esters from Bt and non-Bt Cotton Cultivated Soils in Northern Karnataka, India Thangadurai Devarajan (India)
17:40-18:00	**Poster Viewing**
18: 00	**Welcome Dinner**

DAY 2:	**28 November 2015**; the 2nd floor, CWD hotel
Session 1	**: Organic Agriculture, Biodiversity and Biotechnology** (**Room No.1** inside the Ballroom)
Chair	**: Prof. Dr. Riad Sedki Riad El-Mohamedy** (Egypt)
Co-chair	**: Dr. Saithong Kaewchai** (Thailand)
8:00-8:20	Utilization of Manure and Green Composts as Supplemental of Mineral Fertilizers on Cauliflowers M. Simarmata (Indonesia)
8:20-8:40	Influence of Different Type of Culture Media and Activated Charcoal on Callus Induction and Shoot Multiplication of *Cadamine lyrata* Sakularat Sanputawong (Thailand)
8:40-9:00	Evaluation of Tithonia-Enriched Liquid Organic Fertilizer for Organic Carrot Production Fahrurrozi (Indonesia)
9:00-9:20	Comparison among Chemical, GAP and Organic Methods for Tea Cultivation in Vietnam Nguyen Huu Phong (Vietnam)
9:20-9:40	Organic Agricultural Producer Strategies in Supply Chain of Sustainable Agriculture Network, Chachoengsao Province, Thailand Chanhathai Kerdsriseam (Thailand)
9:40-10:00	Nano-Particles Derived from *Chaetomium globosum* KMITL-N0805 against Leaf Spot of Rice var. Senpido in Cambodia Huyly Tann (Cambodia)
10:00-10:15	**Coffee Break/Posters Viewing and Judging**
10:15-10:35	Impact of Biofuel Production on Hydrology: A Case Study of Khlong Phlo Wateshed in Thailand Songvoot Sangchan (Thailand)
10:35-10:55	Distribution of Harpagophoridmillipedes in Different Tropical Forest Types Sirirut Sukteeka (Thailand)
10:55-11:15	Species Diversity of Benthic Macrofauna on the Intertidal Zone of Seacoasts in Krabi, Trang and Satun Provinces, Thailand Suwit Jitpukdee (Thailand)
11:15-11:35	Ectoparasites Associated with Bats in Tropical Forest of Northeastern Thailand Sarawee Aroon (Thailand)
11:35-11:55	Genetic Variability Analysis in Rice Mutant Lines from Gamma Rays Radiation Using Agromorphological and SSR Markers Nguyen T. Hong (Vietnam)
11:55-13:30	**Lunch Break/Posters Viewing and Judging**

13:30-13:50	Assessment of Genetic Diversity and Relationships among *Charadrius mongolus* and *Charadrius leschenaultii* Using AFLP Markers Supattra Poeaim (Thailand)
13:50-14:10	Study on *Chrysanthemums* Breeding by Gamma (Co60) Irradiation on Callus of 4 Exotic *Chrysanthemum* Varieties of Agricultural Genetics Institute Nguyen T. Tham (Vietnam)
14:10-14:30	Contributions for Study on Diversity of Some Medicinal Plants in Hon Ba Nature Reserve, Khanh Hoa Province Tran T.N. Diep (Vietnam)
14:30-16:30	**Coffee Break/Poster Viewing**
16:30	**Closing Ceremonies** - Awarding Best Paper and Best Poster - Closing Remarks at the Ballroom Hall: Prof. Dr. Cynthia C. Divina Assoc. Prof. Dr. Kasem Soytong - Announcement for ICIST 2016 and Imagine Song
18:00	**Dinner**

Session 2	**: Plant Pest Management and Related Fields** (**Room No.2** inside the Ballroom)
Chair	**: Prof. Dr. Robert McGovern** (USA)
Co-chair	**: Prof. Dr. Somdej Kanokmedhakul** (Thailand)
8:00-8:20	Documentation of the Practice of Entomophagy in Sekoma, Botswana **Invited Speaker**: Prof. Dr. John C. Moreki (Botswana)
8:20-8:40	Population Dynamics of Insects Associated with Dragon Fruit (*Hylocereus* sp.) Jaypee H. Estigoy (Philippines)
8:40-9:00	The Relationships between Thrips Populations and Climatic Factors, Mangosteen Development Stage in Nakhon Si Thammarat Province, Thailand Tipawan Thongjua (Thailand)
9:00-9:20	Identifications of *Phytophthora* spp. Causing Citrus Root Rots in Thailand Phung Manh Hung (Vietnam)
9:20-9:40	The Occurrence and the Approach to Control of Root and Foot Rot of Pummelo (*Citrus maxima* (Burm.) Merr.) var. Tabtimsiam in Nakhorn Si Thammarat Province Chaisit Preecha (Thailand)

9:40-10:00	Application of New Bio-formulation for Bio-Control of *Colletotrichum coffeanum* Causing Coffee Anthracnose in Arabica Variety in Laos Somlit Vilavong (Laos)
10:00-10:15	**Coffee Break/Posters Viewing and Judging**
10:15-10:35	Antifertility and Cytotoxicity Properties of *Auricularia* sp. Hezekiah Mirielle P. Aguinaldo (Philippines)
10:35-10:55	Application of Nano-particles from *Chaetomium globosum* to Control Leaf Spot of Rice Rujira Tongon (Thailand)
10:55-11:15	Bioactivity of Endophytic Fungi from Palm Trees against Chilli Anthracnose Caused by *Colletotrichum capsici* Song Jiaojiao (China)
11:15-11:35	Antifungal Activity of *Talaromyces flavus* against Coffee Anthranose Mayamor Soytong (Thailand)
11:35-11:55	Antifungal Activities of Endophytic Fungi Isolated from Orchids against *Colletotrichum* sp. Caused Anthracnose in Orchid Vannak Sour **(**Cambodia)
11:55-13:30	**Lunch Break/Posters Viewing and Judging**
13:30-13:50	Study on Application of *Chaetomium* to Control Anthracnose and Root Rot Disease on Tea (*Camellia sinensis*) in Vietnam Nguyen Van Thiep (Vietnam)
13:50-14:10	Quorum Sensing Inhibition by Philippine Ethnobotanicals Wilson R. Jacinto (Philippines)
14:10-14:30	The Development of P10 Antibody of SRBSDV Causes Rice Black-Streaked Dwarf Disease in Vietnam for Diagnosis by ELISA Approach Do Thi Hanh (Vietnam)
14:30-16:30	**Coffee Break/Posters Viewing**
16:30	**Closing Ceremonies** - Awarding Best Paper and Best Poster - Closing Remarks at the Ballroom Hall: Prof. Dr. Cynthia C. Divina Assoc. Prof. Dr. Kasem Soytong - Announcement for ICIST 2016 and Imagine song
18:00	**Dinner**

Session 3	**: Agricultural Development and Related Fields** (**Room No.3** inside the Ballroom)
Chair	**: Prof. Dr. Cynthia C. Divina** (Philippines)
Co-chair	**: Dr. Ohnmar Myo Aung** (Myanmar)
8:00-8:20	Socio-Economic Factors Influencing Rice Production in Peri-Urban Area, Bangkok, Thailand Sasima Fakkhong (Thailand)
8:20-8:40	The Model Development of Agricultural Education Management of Buriram Rajabhat University: A Case Study of the Opinion on Informal Education Araya Musika (Thailand)
8:40-9:00	Community Participation in Agro-tourism Development at Klongplu, Khaokitchakood, Chanthaburi Province Preeyanan Sittijinda (Thailand)
9:00-9:20	Hotel Businesses and Their Connection to Local Governments: A Comparative Case Study between Chao Samran Beach and Cha-am Beach Apirat Udomsup (Thailand)
9:20-9:40	Needs for Developing Sustainable Agricultural Learning Sources in Wangkwang Community, Nam Nao District, Phetchabun Province Tawit Rasee (Thailand)
9:40-10:00	Standardization and Commercialization of Chevon Products Fredisminda M. Dolojan (Philippines)
10:00-10:15	**Coffee Break/Posters Viewing and Judging**
10:15-11:55	**Poster Viewing and Judging**
11:55-13:30	**Lunch Break**
16:30	**Closing Ceremonies** - Awarding Best Papers and Best Posters - Closing Remarks at the Ballroom Hall: Prof. Dr. Cynthia C. Divina Assoc. Prof. Dr. KasemSoytong - Announcement for ICIST 2016 and imagine song
18:00	**Dinner**

Session 4	**: Crop Production and General Agriculture (Room No.4)**
Chair	**: Prof. Dr. Akira Suzuki** (Japan)
Co-chair	:**Assoc. Prof. Dr. Younes Rezaee Danesh** (Iran)
8:00-8:20	The Effect of Fertilizers Application on Growth and Tuber Quality of Jerusalem Artichoke Cha-on Juyjaeng (Thailand)
8:20-8:40	Effect of N, P, K Fertilizer Dose on the Yield and Quality of Rice Variety PB53 Hoang Minh Thao (Vietnam)
8:40-9:00	Growth Performance of Young Rubber, Soil and Leaf Nutrient as Affected by Soil Conservation Systems: A Case Study in Northern Thailand Nuttapon Khongdee (Thailand)
9:00-9:20	Study on Interplating Density of Taros (*Colocasia esculenta* (L.) Schott) in Acacia (*Acacia mangium* Willd) Plantation under the Agroforestry Model in Bac Kan Province Nguyen Huu La (Vietnam)
9:20-9:40	Screening of Allelopathic Potential of 18 Leguminous Plants on Germination and Growth of Barnyardgrass T. Poonpaiboonpipattana (Thailand)
9:40-10:00	Effect of Different Additives in Silages Made from Durian Peel Wichai Suphalucksana (Thailand)
10:00-10:15	**Coffee Break/Posters Viewing and Judging**
10:15-10:35	Development of Spawn Culture Material from Reused Spawn for Cultivation Split Gill Mushroom (*Schizophyllum commune*). Chaisit Preecha (Thailand)
10:35-10:55	Additional Finding Nutrition or Growth Regulator through the Root and Foliar for Hac Tri Persimmon in PhuTho, Vietnam Han Thi Hong Ngan (Vietnam)
10:55-11:15	Influence of High Temperature on α-Amylase Activity and Seed Germination of *Oryza sativa* Pattawee Amornpipat (Thailand)
11:15-11:35	Result of Breeding and Selecting High Amino Acid and Reduced Sugar Content-Tea Varieties for High Quality Green Tea Processing in Vietnam Nguyen Thi Minh Phuong (Vietnam)
11:35-11:55	To Study the Effect of Microbial Products on Yield and Quality of Tea and Soil Properties Ha Thi Thanh Doan (Vietnam)

11:55-13:30	**Lunch Break/Posters Viewing and Judging**
13:30-13:50	Effect of Crop Load on Fruit Development and Fruit Quality of Pummelo var. Tabtimsiam Somporn Na Nakorn (Thailand)
13:50-14:10	Preliminary Investigation of Rambutan Sugar Granule Production Process Kannikar Charoensuk (Thailand)
14:10-14:30	Effect of Blanching Process on B-Glucan Content of Native Mushrooms in Thailand N. Mongkontanawat (Thailand)
14:30-14:50	Evaluation of Tea Genetic Resource in Vietnam as the Basis to Select New Tea Clone with Drought Tolerance Nguyen Thi Thu Ha (Vietnam)
14:50-15:10	Use of Ambient Upland Rice Fermented Vinegar Vapor to Extend Shelf Life of Sweet Basil (*Ocimum basilicum* Linn.) Kanokporn Changsawake (Thailand)
15:10-15:30	The Establishment of GMO Detection Laboratory in Vietnam Luu Minh Cuc (Vietnam)
15:30-15:50	Evaluation of Photosynthesizing Bacteria for the Growth of Rice var. RD41 Rungrat Vareeket (Thailand)
15:50-16:10	Breeding for the Salinity Tolerance Rice Variety in Vietnam Luu Minh Cuc (Vietnam)
16:10-16:30	**Coffee Break/Posters Viewing**
16:30	**Closing Ceremonies** - Awarding Best Papers and Best Posters - Closing Remarks at the Ballroom Hall: Prof. Dr. Cynthia C. Divina Assoc. Prof. Dr. Kasem Soytong - Announcement for ICIST 2016 and Imagine song
18:00	**Dinner**

Session 5	**: Animal and Fishers Sciences (Room No. 5)**
Chair:	**: Prof. Dr. John Moreki** (Botswana)
Co-chair	**: Assoc. Prof. Dr. Virapol Jamsawat** (Thailand)
8:00-8:20	Effects of PGF2α and GnRH on Reproductive Performance of Cattle and Buffaloes in Thailand and Philippines **Invited Speaker**: Assoc. Prof. Dr. Virapol Jamsawat (Thailand)
8:20-8:40	Effects of Steroid Glycosides - Plant Extracts on Reproduction Function in Rats Tatiana G. Stratulat (Moldova)
8:40-9:00	Post Mortem Viability of Epididymal Sperm from Philippine Native Water Buffalo (*Bubalus bubalis*) Edeneil Jerome P. Valete (Philippines)
9:00-9:20	Knowledge Management Adoption of Animal Husbandry on Broiler Farms in Western Thailand Wuttikorn Injana (Thailand)
9:20-9:40	Practical Application of Medical Plant Powders as An Alternative of Antibiotic Growth Promotor in Pig Feed Nguyen T. Nang (Vietnam)
9:40-10:00	Strategies to Improve the Developmental Competence of Water Buffalo Oocytes *In Vitro* Marlon B. Ocampo (Philippines)
10:00-10:15	**Coffee Break/Posters Viewing and Judging**
10:15-10:35	Ethnoveterinary Technology for Parasite Dewormer to Support Goat-Oil Palm Integration in Bengkulu Indonesia Tatik Suteky (Indonesia)
10:35-10:55	Carbon Emission from Energy Use in Thai Native Chicken Production in Nakhon Ratchasima Province, Thailand Panisara Vichiratanatrakul (Thailand)
10:55-11:15	A Protocol for the *In Vitro* Production of Bubaline Embryos: The Philippine Experience Lerma C. Ocampo (Philippines)
11:15-11:35	The Efficiency of Feed Additives on Silage Making for Cattle Settasit Sangsoponjit (Thailand)
11:35-11:55	Effects of Stocking Density, Feed and Hormones on Artificial Reproduction of Tire Track Ell (*Mastacembelus armatus*) Phan T. Yen (Vietnam)

11:55-13:30	**Lunch Break/Posters Viewing and Judging**
13:30-13:50	Assessment of Heavy Metals in Fish and Water in Cage Fish Culture at Loei River, Loei Province Netnapa Pongpetch (Thailand)
13:50-14:10	Non-Experimental Validation of the Effectiveness of Ethno-Veterinary Botanical Medicine (EVB-M) Materials Used in the Municipality of Echague Isabela Leah S. Guzman (Philippines)
14:10-14:30	Effects of Methyl Farnesoate on Spawning Stimulation in Blue Swimming Crab Chongko Saetung (Thailand)
14:30-14:50	Determination of 1-Hydroxyrene and 2-Napthol in Intertidal Rocky Shore Macrobenthos Following Oil Spill at Ao Prao, Samet Island Jindarha Prempramote (Thailand)
14:50-15:10	Folic Acid Supplementation for Bovine Oocyte Muturation and Fertilization *In Vitro* Karlo Tawatao (Philippines)
15:10-15:30	Sex Identification in Barn Swallows (*Hirundo rustica* Linnaeus) by Molecular Technique Thanyalak Malaitad (Thailand)
15:30-15:50	Evaluating Rotational Grazing Technology for Integrated Bali Cattle-Oil Palm System on Herbage Production to Support Sustainable Meat Production in Bengkulu Province, Indonesia Dwatmadji (Indonesia)
15:50-16:10	Abundance and Species Composition of Demersal Fish, with Descriptions of Dominance Species in Moo-KhoBulon, Satun Province, Thailand Promhom Samphan (Thailand)
16:10-16:30	**Coffee break/Poster Viewing**
16:30	**Closing Ceremonies** - Awarding Best Papers and Best Posters - Closing Remarks at the Ballroom Hall: Prof. Dr. Cynthia C. Divina Assoc. Prof. Dr. KasemSoytong - Announcement for ICIST 2016 and Imagine song
18:00	**Dinner**

Session 6	**: Sustainable Water Management Forum: Round Table Discussion (Room No.6)**
Chair	**: Director Tuomas Valtonen** (Finland)
Co-chairs	**: Prof. Dr. Rajeev Bhat** (Malaysia)
8:00-8:30	Macroinvertebrates as Bioindicators of Water Quality in Bongoy River, Odiongan, Romblon, Philippines **Invited speaker**: Alwin F. Maulion (Philippines)
8:30-9:00	A Solution for Improved Information Management – Case Study Vietnam Marjo Paavola and Tapio Leppänen / NIRAS Finland Oy (Finland)
9:00-9:30	Agriculture and Livelihood Flood Impact Assesment in Myanmar Aung Swe (Myanmar)
9:30-10:00	Water Circular Economy Mikael Seppälä / Sansox Oy (Finland)
10:00-10:15	**Coffee Break/Poster Viewing and Judging**
10:15-10:45	Environmental Projects with Finnish Partners – Case: Water Projects Peter Jahn / KaukoInternational Oy (Finland)
10:45-11:15	Long-term Management of Lake Pyhäjärvi – Field-scale Experiments in an Agricultural Catchment Teija Kirkkala / Pyhäjärvi-instituutti(Finland)
11:15-11:45	Expanding Research and Development Eco-system in South-West Finland, Case Platfrom for Water Expertise Pipa Turvanen / LOURA (Finland)
12:30-14:00	**Lunch Break and Poster Viewing and Judging**
14:00	**Panel discussion** **Moderator:** Asst. Prof. Dr. Wattanachai Pongnak(Thailand)
16:00 – 16:30	**Coffee Break /Posters Viewing**
16:30	**Closing Ceremonies** - Awarding Best Papers and Best Posters - Closing Remarks at the Ballroom Hall: Prof. Dr. Cynthia C. Divina Assoc. Prof. Dr. Kasem Soytong - Announcement for ICIST 2016 and Imagine song
18:00	**Dinner**

List of Posters

1. Advanced research on phosphorus and potassium biofertilizers used for organic crop production
   W. Pongnak, K. Soytong (Thailand)

2. Amino acid composition and nutritional value of seed proteins in some sesame (*Sesamum indicum* L.) cultivars grown in Vietnam
   Tran T.T. Huyen, Nguyen V. Mui, Cao P. Bang (Vietnam)

3. Antagonism of *Chaetomium* spp. and their ability to control citrus root rot caused by *Phytophthora parasitica* in Vietnam
   Nguyen T. Quyet, Ha V. Cuong, Le T.A. Hong, K. Soytong (Vietnam)

4. Application of gamma rays irradiation and marker assisted selection for improving of bacterial leaf blight resistant rice variety BT62.1
   Vo T.M. Tuyen, Nguyen T. Hong, Phan Q. My, Nguyen T. Hue, Le H. Ham (Vietnam)

5. Attraction effect of thrips (Thysanoptera: Thripidae) to sticky trap color on orchid greenhouse condition
   T. Thongjua, J. Thongjua, J. Sriwaree (Thailand)

6. Biological activity of preparation gliocladin-SC *in vitro* to control soy pathogens
   Scerbacova Tatiana I., Stratulat Tatiana G. (Moldova)

7. Biological activity of metabolites from *Lepiota procera* against plant pathogens
   Phaophilat Phadungpran (Thailand)

8. Biological investigation on the red cotton bug, *Dysdercus cingulatus* (F.) (Hemiptera: Pyrrhocoridae)
   Janejira Name, S. Bumroongsook, S. Tigvattananontan (Thailand)

9. Building the model of intergrated pest management (IPM) at major *Cinnamomum cassia* plantation areas of Van Yen district, Yen Bai province
   Pham T. Loan, Nguyen T.K. Thom, Ngo T. Long, Cao Van (Vietnam)

10. Callus induction and cell suspension cultures of (*Arachis glabrata*) cultivars: Arbrook
    A. Poeaim, S. Poeaim, P. Pongtongkam, J. Arananant (Thailand)

11. Characteristics of epididymal sperm recovered from slaughterhouse derived testes of nondescript/native goats in the Philippines
    J. Gautane, L.C. Ocampo, E.J. Balagan, F.V. Manaois, M.B. Ocampo (Philippines)

12. Comparison on the efficiency of estrus synchronization methods for artificial insemination in goat
    J.D. Sumeldan, L.C. Ocampo, E.P. Atabay, J.V. Lazaro, M.B. Ocampo (Philippines)

13. Cost and return of straw mushroom cultivation comparison between rice straw and oil palm bunch
    S. Preecha, P. Choovong, P. Anunon, M. Hnoosong, J. Roonglavan, W. Thongrakjan, W. Suvansee, C. Preecha (Thailand)

14. Distribution and life history of hawk moths on Noni plants in Thailand
    N. Kliangklao, S. Tigvattananont, S. Bumroongsook (Thailand)

15. Effect of emulsifiers on particle size and zeta potential of ginger essential oil in emulsion form
    W. Disiri, C. Laosinwattana, M. Teerarak (Thailand)

16. Effect of herbicides on weed control and plant growth in immature oil palm
    J. Thongjua, T. Thongjua (Thailand)

17. Effect of manure and chemical fertilizer on vegetative growth of off-season durian production
    S.N. Nakorn, C. Chalumpak (Thailand)

18. Evaluation of bioassay using *in vitro* mutured buffalo oocyte in predicting bull sperm fertility
    Lemuel Aquino (Philippines)

19. Evaluation of sequential changes on 1st meiotic division of goat oocytes *in vitro*
    R.M. Ambe, V.D. Viernes, E.F. CelestinoJr, L.C. Ocampo, M.B. Ocampo (Philippines)

20. Fungi from rubber plantation and their property to control causing agent white root disease
    Saithong Kaewchai (Thailand)

21. *In silico* identification, classification and expression analysis of genes encoding putative light - harvesting chlorophyll a/b binding protein in coffee (*Coffeacanephora* L.)
    Cao P. Bang, Tran T.T. Huyen (Vietnam)

22. Study on the prevalence of intestinal nematode in dogs in PhuTho province
    Nguyen T. Quyen, Nguyen T.K. Lan, Cao Van, Nguyen T. Nang (Vietnam)

23. Study on *Toxocariasis* in experimentally infected dogs by Toxocara canis
    Nguyen T.K. Lan, Nguyen T.Quyen, Cao Van, Nguyen T. Nang (Vietnam)

24. Testing rice tolerance of submergence stress to cope with climate change in coastal areas of Vietnamese deltas
    Le Hung Linh (Vietnam)

25. The biological control agent of water primrose: *Theretra silhetensi* (Walker) (Lepidoptera: Sphingidae)
    M. Meekhunthod, S. Bumroongsook, S. Tigvattananont (Thailand)

26. *Thyas coronata* (F.) (Lepidoptera: Noctuidae): A Fruit Piercing Mot
    N. Kamlangkla, S. Bumroongsook, S. Tigvattananont (Thailand)

TABLE OF CONTENTS

PROFILES OF AATSEA Outstanding Leadership Award 2015

Mr. ANTONIO HERRERA CERILLES

Provincial Governor (Philippines)

Statement of Achievement

Most of the farmers of Zamboanga del Sur are poor and deprived of their basic necessities. They do not have access to safe and nutritious food, as they do not produce enough food for their needs. Without enough money, many of them can only afford to build a hut. When they get sick, they can hardly afford to buy medicines and pay hospitalization cost. Lastly, they can hardly send their children to college. Thus, the farmers always need the assistance of the government to cope up with their daily needs. *In view of this sad state of the poor farmers, Governor Antonio Cerilles of Zamboanga del Sur came up with a cassava production program that has since evolved innovatively.* He conceptualized the cassava program in 2001 when he had a brief rest from politics. At the start, it was a conventional cassava production program that can be also found in other provinces and countries. By then, critics always complained that cassava absorbs so much nutrients from the soil. To address the depleting soil nutrients, farmers used to lay fallow the land planted with cassava or to rotate the crops in their farm. Governor Cerilles, however, addressed the problem completely by finding solution to the absorptive characteristics of cassava. In 2010 when he assumed the post of a provincial governor, he introduced the innovative *gahung-gahung* (hole based) method of cassava farming wherein farmers can always plant cassava on the same soil in spite of the absorptive characteristics of cassava. This innovation draws the line between the cassava production program of Zamboanga del Sur and the rest of cassava production program in the entire world. *The gahung-gahung method is the main innovation of this cassava program*. The method, fondly called the Cerilles method, is characterized by digging a square-foot hole and filling it with organic fertilizers for every hill of cassava. It also guides each farmer on how to plant cassava on his one-hectare farm by dividing it equally to ten plots and utilizing only one plot each month until he completes the whole cycle on the tenth month. This conservation tillage of one-hectare farm is enough for the farmer to attain food security and improve living conditions. In the 11th month, he will harvest cassava from his first plot with an income of around US$300, as he is assured of around US$.20 floor price of cassava chips per kilo and he has a potential yield of around 1500 kilos. By then, he starts to earn a monthly income of

this much, as his cassava crops are planted in sequence and programmed for monthly harvest, excluding his intercrops income. He again plants cassava on the first plot and begins another cycle in order to sustain his monthly income. By applying organic farming technologies, he always recovers the loss of soil nutrients and ensures the continuing productivity of his farm in spite of its continual use. With this innovation, the farmers march towards agricultural productivity without harming the planet and compromising the future harvests. *The inability of the upland subsistence farmers to wait without enough income for ten months before the harvest was the main obstacle of the re-engineered program but was solved with another innovation – the microfinance economic enterprise.* Being poor, the subsistence farmers need to have a little income monthly to meet the daily needs. It was in this context that the Governor Cerilles came up with an innovative microfinance economic enterprise in 2013. A cassava farmer is granted with US$45 consumption loan every month, and each monthly subsidy is paid after every harvest starting in the 11th month until paid-up. By then, he graduates from the microfinance, and his payment is passed on to a newly-admitted loan beneficiary. In this innovative microfinance service, the municipal mayors, the village executives, the coordinators serve as co-makers of the consumption loan. This setup prompts them to see to it that the farmers produce cassava so that the latter can pay up their loan every harvest until paid-up. With cross-sectoral shared accountability, more guidance is given and more pressure is applied to the farmers motivating them to succeed in this initiative. Because of this second innovation, the re-engineered *gahung-gahung*cassava program was able to take off in the yearend of 2013.

These twin innovations of *gahung-gahung*cassava program, initiated and led by Governor Cerilles, enable the farmers to do what they could have not possibly done in conventional cassava production. With these innovations, the farmers thru the organic cassava program pave the way out of poverty, regain trust and pride in the farming profession, and find hope and confidence to build a brighter future starting from the farm. What used to be impossible for the farmers is now possible with the twin innovations of the cassava program. The *gahung-gahung*cassava program has since matured to a level that is worth replicating in other provinces and countries.

All these came about due to the active participation of the poor subsistence farmers. *Selecting the poor subsistence farmers to participate in the gahung-gahung cassava program is a strategic move.* This kind of farmers comprises the majority of the farming population in the province, and even in the entire world, and they also belong to the most vulnerable sectors of society. Since they are most in need, addressing their needs has to be prioritized. Motivating the majority of farming population to participate in this program makes this a high impact initiative, and targeting those, who need most of help, makes this a compelling one.

About 300 poor subsistence farmers started the re-engineered gahung-gahung cassava program and they are now benefitting from their monthly harvests. From their monthly harvest, they get a monthly income of around US$300 provided that they have taken good care of their crops avoiding pests and diseases. With such a monthly income, they can no longer be called poor technically, being above the poverty threshold, pegged by the government at around US$140 monthly for a family of six. They now have money to buy for their basic necessities, and they have enough food to eat. They are now like regular wage earners but have lots of free time as a farmer. With better living conditions, they serve as models for those who want to liberate from poverty thru *gahung-gahung*cassava farming.

After two months the first batch of farmers had been shown as models, the number of farmers enrolled in the cassava program doubled from over 1000 to over 2000. Those who enrolled were so motivated to see that the first batch of farmers could show a monthly cassava harvest that is substantial enough to provide them decent monthly income. Ordinary farms are turned into demonstration farms where the farmers can see for themselves the concrete positive results of the program. 7000 more farmers will soon enroll in the *gahung-gahung*cassava program when the long dry spell due to El Nino ends. Cassava is specially chosen for this project for the poor, because it is drought resistant during which the poor farmer is very vulnerable. It is can even survive a harsh climate that is why it can be found in many regions worldwide. Cassava also has many uses, as it can be used as a staple food, a commercial or an industrial crop. Because of its versatility, it has an unlimited market demand. Cassava can substitute rice or maize as staple food, as it can also be used as snack food processed in variety of ways. Cassava can also be made into flour, starch or alcohol that can be further processed into a variety of products. It can also be used as feedstock for biofuel as an industrial crop. Thus, scaling up cassava production for whatever purpose will not lead to oversupply, since it has a variety of uses. *As the farmers earn from the scaled up cassava production, they become empowered.* With a monthly income out of their produce, they increase their purchasing power. With better purchasing power, they can buy what they need and have sufficient food to eat. Since they can already stand on their own economically, they are no longer beholden to the political elite who dangle economic resources to influence the decisions and actions of the poor. With this program, the poor can now make their own decisions. The poor may now be free to vote and voice their opinion without fear whomever they are beholden to. In short, the program gives to the poor economic power that spawns political power. Indeed, genuine democracy happens when the people are no longer hungry. All these are made possible because of the *gahung-gahung*cassava program initiated and led by Governor Cerilles

Mr. HON. KYAW SWAR SOE
(Myanmar)

Mr. U Kyaw Swar Soe was born in Yangon on 19th May 1965. His parents are U Hla Soe and Daw Saw Sein. He studied at Myit Kyee Nar Township and Lwikaw Township for Primary and Middle School. He attended High School in B.E.S.H No.1 Thingangyun, Yangon. He passed 10th Standard in and joined Hlaing University in Yangon as a Psychology major student but due to having strike and instability in Myanmar at that time, all university sites and schools gone close. So, he went to Bangkok (Thailand) and then to Tokyo (Japan). When he was in Japan, he found the different status and life style of Myanmar and Japanese farmers. He was so sorry and felt that there is a need to help and develop Myanmar farmers to improve their status and life style. In 1996, he went back to Myanmar and made commitment not to do any more politics. In 1998, he went to Australia and studied in Sydney College. In 2001, he came back from Australia and lived in Salin Township, Agway Division (The native land of his father). For his living he set up a Saw Mill and grew paddy in 95 acres. As his grandparents were landowners, he also settled down in that field. He realized very well about the very difficult life of farmers. In Myanmar there are about 60 billion people, 70% of those people are farmers and they are so poor. The country practiced the Land Law either as private landlordism (1953), absolute lardlordism (1963) or both (after 1988). All systems are not helpful for the farmers, their lives are more difficult, poorer than poor and getting a lot of debts. So some farmers left their jobs and joined to different sectors. Then U Kyaw Swar Soe has tired to attempt the election in 2010 as well as 2012. As he failed for many reasons, he decided not try again. But many farmers from up country came to him and requested to stand in front of them as a leader. They expressed their difficulties and problems. They also mentioned that without having a good leader, they won't be over come from such a very bad situation. So his dream for feeling of willingness to help for the development of Myanmar farmers' status and life style came true. He established the "Myanmar Farmers' Development Party". At the same time he planned to use the flag and logo as the same as former Farmers' leader Sayar San. He got the permission from the government for the establishment of the "Myanmar Farmers' Development Party". Farmers are very much delighted for existing this kind of party and very much proud of their flag and logo. The local leaders from Yangon, Bago, Ayarwaddy and Mandalay Division started to recruit right people under the supervision of U Kyaw Swar Soe. In 2012, the Land Laws are printed and distributed to farmers and explained them to study thoroughly for protection themselves. U Kyaw Swar Soe brought

good quality paddy seeds from Japan. He tried to get lands from the government to distribute farmers who do not have lands. Now, thousands of acres of lands were distributed. There are at least 40 entrepreneurs supporting the "Myanmar Farmers' Development Public Company" and are trying to bring lighting systems in many villages.

To gain international knowledge, children of the farmers are given a chance to attend trainings from some international NGO organizations. There are 30 branch offices in townships to solve the problems of farmers actively and attentively.

The Japanese Government and the Prime Minister invited U Kyaw Swar Soe for a visit they agreed to help for the development of Myanmar farmers and their villages as quickly as possible. Toshiba (Japan) Company also agreed to provide lighting system to villages. The Japan Agriculture Development pledged to cooperate and develop Myanmar farmers to world level.Now, there are Thai Technicians who use biotechnology to produce liquid fertilizers to be distributed to farmers for sustainable development and increase yield. Smart Cards for farmers were made wherein the personal data, health status, cultivation methods, educational attainment and other important data can be seen. In 2015, he has firstly established bank of farmer in Myanmar to help the farmers for agricultural development. The main objective of U Kyaw Swar Soe is to scarify hid life for the farmers who never come out from the basic level that will be able to have to change participate in Hluttaw for their lives. He has also decided to try the best for successfulness in his main objective to develop the country as well as Myanmar' farmers.

Mrs. LEUANG LITDANG

(Laos)

Business and Entrepreneurship

Mrs. Leuang LITDANG, Champasack Branch: 333, Ban Phonkung Mekong River Closing Bridge, Aveunue Pakse Champasack, LAO PDR; Mobile Phone: +856-02-5558555, Tel, Office: +856-31-253333, Fax: +856-31-255333, E-mail: bt.litdang@dao, Present Positions and Responsibilities: President: DOA Coffee,

She was born on 20 October 1948 at Thahine village, Pakse district, Champasack province. She received awards in 2008 as Business Women .Excellence of ASEAN, in 2015 as Business Women .Excellence of ASEAN, in 2012 as Donation for Sport Festival at Lauenprabang province 25.000 U$, in 2015 as Donation. Coffee Festival at Champasack province 40.000 U$, in 2010: Silver Jubillee award 60 years for vice Primer of LAO PDR, in 2011: Achievement award for rural development by President of LAO PDR, in 2011: Achievement award Vientiane Festival 450 years by President of LAO PDR, in 2011 Achievement award for conferment at Vientiane by President of LAO PDR. Donation 15.000 U$, in 2012: Silver Jubillee award for develop Commercial at Champasack province by President of LAO PDR, in 2012: Silver Jubillee award for help flood 6 provinces by President of LAO PDR. Donation. 27.000 U$ and in 2014: Silver Jubillee award for development rural by Vice President of LAO PDR

She established Dao-Heuang Group (DHG) in 1991. Mrs Leuang Litdang started as a small import-export company, Dao-Heuang Group (DHG) is now one of the largest and most progressive companies in Lao PDR. DHG is rapidly expanding and is known for developing high quality brands of international standard. Dao-Heuang Group are presently focusing our resources to develop the Agriculture, Industrial, Import-Export and Service industry. They has a factory that has been applying three modern machines for production of coffee beans. A

long with coffee business, Dao-Heuang Group has also established numerous businesses such as Dao-Heuang Duty Free Shops, Dao Coffee, Air Booking Services, Real Estate Rental, and Pharmaceutical Products with more coming in the near future.

Dao-Heuang Group have gained valuable insight and experience over the years and used this knowledge to manufacture a product to be exported to existing customers in neighboring countries and this first product was the 'Dao Coffee'. The company now has a coffee plantation with an area of approximately 250 hectares located in Ban Chansavang, Pakxong District, Champasack Province and the plantation area can yield harvests of 500 tons per year which is valued to be worth at least 1.1 million USD.

At the 18th Global Summit of Women, held on 5-7 June 2008 in Hanoi, Vietnam, (KPL) Mrs. Leuang Litdang, President of Dao-Heuang Company Group was accorded the award of "ASEAN Outstanding Women Entrepreneurs" 2008, Awards of Outstanding Export Company for year 2012: Processed agricultural products, Certificate of Appreciation: Outstanding Export Company for year 2012: Processed agricultural products and ASEAN Outstanding Women Entrepreneurs 2008.

Aside from these important awards, Mrs. Leuang LITDANG received various certifications from government of Lao PDR in recognitions of her successful and social and economic development contribution.

Mr. RAPHAEL NNAJIOFOR OKIGBO
Professor, Doctor (Nigeria)

Community Development

Raphael Nnajiofor Okigbo was born at Ojoto in Idemili South LGA, Anambra State, Nigeria. He attended St Odilia's Primary School Ojoto, from where he proceeded to the famous Christ the King College (CKC) Onitsha (1973-1978). He taught as an Auxiliary Teacher at Obosi for a year, and in 1980 gained admission to University of Benin. He has B. Sc. Botany (1984), M. Sc. Botany (1988), M. Sc. Microbiology (1992) and Ph. D. Microbiology (1995), all from the University of Benin, Edo State, Nigeria. In 2010, he had a Post Graduate Diploma in Education from National Teacher's Institute, Kaduna. He started his teaching career as Assistant Lecturer at Agbor College of Education (1988-1992), Delta State University, Abraka (1992 -1999), Michael Okpara University of Agriculture, Umudike, Abia State (1999-2005), NnamdiAzikiwe University, Awka, Nigeria (2005 to date).

Raphael Nnajiofor Okigbo became a Professor of Botany of Nnamdi Azikiwe University, Awka, Nigeria in 2008 and several times, the Head of the Department of Botany, the Sub Dean of Faculty of Biosciences. He is a member of many international and local organizations such as Chairman, University of Benin Alumni Association, Awka Branch; American Society for Microbiology (No.555946685); International Society for Pest information, Germany (C18157a); American Phytopathological Society (No.178683); Botanical Society of Nigeria, Nigerian Institute of Food Science and Technology etc.. His research team comprising of Prof Louisa Ha (USA) and Primus Igboaka (USA) won the African Award for Emerald Research Grants, UK for 2006 with their proposal entitled "Facilitating knowledge creation and dissemination to rural farmers in Nigeria" which was worth six thousand. They established a website for Nigerian farmers (www.nigeriaknowledgecenter.net). He also won Tertiary Education Trust Fund (TFTF) Grant (2012) for producing exotic mushroom. He has attended many International Conferences and the last being the Rotary Convention in Sao Polo, Brazil in 2015. He has supervised many Ph.D's and Masters' dissertations successfully and served as External Examiner to many universities locally and internationally. He is a member of Editorial Board of many international and local journals.
His award include: (i) Special Commendation award for research of value to the developing world by Emerald Group Publishing, UK and USA in 2009; (ii) Emerald Literari network awards for excellence in 2009; (iii) Academic Staff Union of Universities, MOUA branch, award for steadfastness and dedication to cause of ASUU in 2009; (iv) AfriHub/UNIZIK Customer Loyalty Award for frequent and unfaltering use of internet in 2009; (v) King

Mongkut's Institute of Technology, Ladkrabang, Bangkok, Thailand, award for the best oral presentation at 5th International Symposium on Biocontrol and Biotechnology in 2007; (vi) Gold Service Award of University of Benin Alumni. Raphael Nnajiofor Okigbo has many international publications in referred journals. He is listed number 25 in Ranking of scientists in Nigerian Institutions according to their GSC public profiles, http://www.webometrics.info/en/node/99 accessed July 2015. His research interest is on Environmental studies, Biological controls of rots in yam, Forensic Botany and Biotechnology of Phytomedicines.

He is the Charter President of the Rotary Club of Awka Metropolis, and he has been attending many District Governors' functions and international conferences for Rotarians. He is a recipient of six star Paul Harris Fellowship Award (PHF+6) of Rotary. He is married to Dr. Ebele Okigbo, a first class graduate of Mathematics Education and marriage is blessed with a son.

Correspondence: Professor Raphael Nnajiofor Okigbo, Department of Botany, Nnamdi Azikiwe University, PMB 5025, Awka, Anambra State, Nigeria.
Email: okigborn17@yahoo.com, rn.okigbo@unizik.edu.ng. Phone +234-8052239358

Mr. RIAD SEDKI RIAD EL-MOHAMEDY

Professor, Doctor (Egypt)

Education and Research

Prof. Dr. Riad Sedki Riad El-Mohamedy was borne in 1962 at Assuit, Egypt. He is professor of plant pathology
Present address: Plant Pathology Dept., National Research Centre, Tahrir St., Dokki, Giza, Egypt; Office Tel. : +202 –023371718 (1261 -2701); Fax.: +202- 02 3370931, E-mail: riadelmohamedy@yahoo.com, Home Tel.: +202 02 33845276, Mobile: +201 006948955

He conducted M.Sc. Thesis entitled "Studies on wilt and root rot diseases on watermelon in new cultivated lands" at Faculty of Agric., Ain Shamis Univ., Cairo, Egypt in 1993, and conducted Ph.D. Thesis entitled "Studies on wilt and root rot diseases of some citrus plants in Egypt" at Faculty of Agric., Ain Shams Univ., Cairo, Egypt. He has been done 33 research projects over 37 years since 1979. He had been collaborated in many research projects like "Application of genetic modified fungi mycorrhizae for biological control of some wilt and root-rot diseases" since 1997 to 2001, National Research Center and "Integrated Control of Sesame Pests in Middles Delta", Faculty of Agric., Ain Shams Univ., since 1997–2003 (they both funded by Ministry of Agriculture, Egypt); "Biotechnology in the integrated control of plant pests and diseases" NRC (funded by Academic Scientific Research and Technology (ASRT) of Egypt), since 1999-2002; "Evaluation of fungicide for controlling leaf spots and powdery mildew of sugar beet", Faculty of Agric., Ain Shams Univ., since 2000–2005 (funded by Ministry of Agriculture Egypt); "Integrated control of soil borne diseases of some oil seeds by transplanting" NRC, Egypt 1999-2001, an internal project funded from the National Research Center. "Biological control of toxigenic fungi producing mycotoxins NRC 2000 – 2004", an internal project funded from the National Research Center; "Production of antibiotics and enzymes from microorganisms for controlling plant diseases", NRC 2002 – 200, an internal project funded from the National Research Center; "Study of saprophytic microorganisms efficacy for antagonistic phytopathogenic microorganisms (*In vitro*)", NRC, Egypt 2002-2004, an internal project funded from the National Research Center;

"Application of new technology of integrated management of plant diseases from 2005 up to now", NRC, funded by Academic Scientific Research and Technology (ASRT) of Egypt, etc.

His present research works has conducted on several research projects, e.g. Integrated management of resistance to fungal plant infesting tomato crop under the conditions of the Egyptian and Tunisian, 2012-2014, funded by the Ministry of Scientific Research ailments. (Gary: Test dyes derived from fungi as a source of natural Dye Alaqmhma (2009- 2014)); member of project green strategy for the production of smart fibers for use in dye hand looms economic ways, 2014-2017 - academy of Scientific Research and Technology (start 12/2014); (Gary) muse and development of dye and textile printing technology using nano and bio and other top Sciences; National Research Center from 2013 to 2016 nanotechnology and plasma modern technology and other coloring in various textile; National Research Center from 2010 to 2013 integrated tool nematodes and diseases before and after the harvest of some of the important National Research Center crops 10, 120, 604 - 2013-2016. The project for safety for some vegetable crops for domestic production and export - National Research Center, from 2013 to 2016. Recently trends to benefit from the plant Moriengaoleafera with nutritional value, medicinal uses and industrial applications in Egypt Academy of Scientific Research and Technology 2014-2017. Finally - organic production for some of the major vegetable crops - National Research Center 2013-2016 and Moriengaoleafera as a model plant for cultivation in Egypt and applications use, National Research Center 2013-2016.

He has joined as professional memership as follows: Society Egyptian Phytopathology; Egyptian Society of Biological Control of Pests; Egyptian Scientific Society of Moringa (ESSM); National Research Center, Dokki, Cairo, Egypt.; Egyptian Microbiology Society, Cairo, Egypt.; International organization for biotechnology and bio engineering (IOBB), Sweden; Egyptian scientific society of Moringa, NRC, (Egypt); Biotechnology and Molecular Biology, Pest Technology, Seed Science and Biotechnology, Fruit, Vegetable and Cereal Science and Biotechnology, Middle Eastern and Russian Journal of Plant Science and Biotechnology; The African Journal of Plant Science and Biotechnology; Journal of Applied Science Research; Research Journal of the Cell and Molecular Biology and Journal of Agricultural Technology.

List of Publications by Dr. Riad Sedki Riad El-Mohamedy: 72 publications including Patents which under pending. His research focuses on fungal diseases of vegetable, fruit, ornamental and field crop plants; current research includes diagnosis, epidemiology, and treatment measures for control of fungal diseases; current research includes using alternatives of fungicides (soil amendments - bio fumigations - safe chemicals - natural products - soil solarization) for controlling plant pathogens in clean cultivations; identification of Plant Pathogenic Fungi and Bio control Techniques; also focuses on molecular and conventional approaches of fungal soil borne plant pathogens; biological control of plant diseases; induction of resistance for controlling plant diseases.

MR. TAWAT TAPINGKAE

(Thailand)

Education and Research

Mr. Tawat Tapingkae was borne in May 5, 1947. He now acts as a Volunteer, Free Lance Research Fellow, at Rural Science and Technology Development Center (RSTDC), Chiangmai, Thailand and Mushroom Research and Development Center (MRDC), Chiangmai, Thailand. His educational background: he graduated in 1969 in Horticulture Science, Kasetsart University, Bangkok, Thailand; in 1977 graduated from Agricultural Socio-Economics, South Asian Institute, Heidelberg University, Heidelberg, Germany; in 1986, graduated from Irrigation Systems, and Agricultural Extension Services, Rupin Institute, Israel.

In 2015, he honor received Da Vinci Award from the Association of British Inventors and Innovators, awarded from British Inventors Gold Award 2015 for the "Development of a Ferment or from used drinking bottle", awarded in Leading Innovation Award: 2015 from the International Intellectual Property Network Forum for excellent Invention of Ferment or from used Drinking Water Bottle, and awarded from National Research Council of Thailand (NRCT) Bronze Price in recognition of excellent and creative efforts to invent Fermenter from used Drinking Water Bottle.

He started to work in 1969 as a lecturer at Chiangmai Teacher Training College, Chiangmai. In 1972, he received a research Fellow, South Asian Institute, Heidelberg University, Germany. In 1977, he was a Consultant at Chiangmai Agricultural Consulting Center, Chiangmai, Thailand. In 1985, he positioned as Plant Nursery Manager, Urban and Rural Development Co. Ltd., Alkaj, Saudi-Arabia. In 1986, he appointed as a Field Intendant, the King's Apprizal Project on Plant Propagation and Horticultural Crops, Chiangmai, Thailand. In 1986, he turned to be a Manager, Maesa Orchids and Butterflies Farm, Chiangmai, Thailand and lecturer at Northern Technology College, Chiangmai, Thailand. In 1995, he was a Manager, Maesa Algae Farm, Chiangmai, Thailand. In1996, he was a Board Member of the

National Science and Technology Development Agency, Northern Network (NSTDA), Chiangmai, Thailand. In 2000, he became a Volunteer, Rural Science and Technology Development Center (RSTDC). In 2002, he was an Honorary Board Member of the Faculty of Agricultural Technology, Rajabhat Chiangmai Institute, Chiangmai, Thailand. In 2004, he was a Volunteer, MushWorld, Mushroom Information Center, Seoul, Korea.

He had been trained in Alternative Energy at Weisman Institute, Israel (1996); Algae Cultivation at the Science and Technology Research Institute of Thailand, Bangkok, Thailand (1998); Mushroom Cultivation at Fuchoa, China (2000); Mushroom Industry at Horst, the Netherlands (2002); and Mushroom Industry at Suwon, Korea (2003). He is now a life Member of The Mushroom Researchers and Growers Society of Thailand (MRGST).

Publications and Scientific Papers: He has more than 35 topics, especially on mushroom research e.g. Oyster Mushroom Growing in Thailand, www.mushworld.com/oversea/view.asp?cline=2&cata_id=5178&id=6598; Hericium Growing in Thailand, www.mushworld.com/oversea/view.asp?cline=2&cata_id=5178&id=6473; Outdoor, Straw Mushroom Growing in Thailand, www.mushworld.com/disease/view.asp?vid=6888&cata_id=1290&vid=729; Straw Mushroom Growing in Thailand; Pests and Diseases Control, Post harvesting, Processing, Marketing, Spawn Producing, www.mushworld.com/oversea/view.asp?cline=2&cata_id=1290&vid=7234; Indoor, Straw Mushroom Growing in Thailand, www.mushworld.com/oversea/view.asp?cline=2&cata_id=1290&vid=7230; Advanced in Cordyceps Mushroom, Ganodermaamboinense Cultivation in Hainan, Chinese Golden Grass (*Cordyceps militaris*) Cultivation, Snowflake Cordyceps or Korean Cordyceps (*Isaria japonica* or *Paecilomyces tenuipes*) Cultivation, New Method in Monkey"s Head Mushroom (*Hericium* sp.) Cultivation, using Hydrogenperoxide as sterilant.

Mr. TEODORO C. MENDOZA

Professor, Doctor (Philippines)

Education and Research

He was borne in February 25, 1954, Filipino, Tarlac, married with Bernadette Colle Mendoza, and has 3 children - Leilanna, Julian Paulo and Timothy. He graduated Ph.D in Agronomy Soil Science, Botany in University of the Philippines, Los Baños and University of Florida, Gainesville, Florida, USA in 1985.; M.S. Agronomy (Crop Physiology/Statistics) in University of the Philippines, Los Baños in 1979; B.S.A. Agronomy (Plant Breeding) in University of the Philippines, Los Banos in 1976.

He is professor 12 Crop Science Cluster, College of Agriculture, UPLB College, Laguna. April, 2009 to date, he is a full professor Crop Science Cluster, College of Agriculture, U.P. Los Baños, College, Laguna 4031, Philippines, ecofarm.mndz2011@gmail.com

Summary of Significant Works/Accomplishments/Awards: He awarded in 1983, Best Technical Paper Awardee in Agriculture, Philippine Sugar Technologist Association, Inc., 30th Annual Convention, Aug. 9-12, 1983, Cebu City; in 1991, Best Technical Paper Awardee in Agriculture, Philippine Sugar Technologist Association, Inc., 38th Annual Convention, Aug. 16-17, 1991, PICC, Manila, 1991 First Awardee, Felix Maramba Sr. Professorial Awardee on Agro-Industrial Farming Systems. Delivered the lecture "*Coupling food and energy production",* 2001 SEARCA Professorial Lecture Awardee. Delivered the lecture*" Pursuing the Debates on Sustainable Food Security in the New Millennium",* 2002 Plenary Speaker, International Federation of Organic Agriculture Movement (IFOAM) held at Victoria, Canada; 2006 Crop Science Awardee, awarded by Crop Science Society of the Phil., 2010 Fr. NeriSatur Award for Environmental Heroism.Awarded by Climate Change Commission. April 22, 2010. NCCAA, Intramuros Mla. As Scientist Consultant of the Climate Change Congress of the Philippines (CCCP), 2011 Best Technical Paper Awardee in Agriculture, Philippine Sugar Technologist Association, Inc., 58th Annual Convention, Aug. 16-17, Waterfront Hotel, Cebu City, 2012nd Best Paper Awardee , Philippine Sugar Technologist Association, Inc., 60th Annual Convention, Aug. 12-14, 2013, Waterfront Hotel, Cebu City. 2006-2015 UP Scientific Productivity Awardee-- UP Scientist 1 , Award (renewable every 3 years) conferred by the UP Board of Regents, University of the Philippines for scientific output- research projects undertaken, published papers, scientific

conferences attended, citation of published papers in journals. He is now recommended to the highest rank UP Scientist Rank III for having garnerred 104.6 while the required points is only 55.2015-2016 SEARCA Regional Professorial Chair Grantee for AY 015/2016.The title of the proposed lecture is *"Reducing the High Energy Bill and Carbonfootprint for an Energy and Climate Change-Compliant Sugarcane Production*

FIELD OF SPECIALIZATION: Agronomy (Crop Physiology and Ecology), Production and Management/ Farming Systems, Ecological Agriculture

FELLOWSHIPS/SCHOLARSHIPS AND AWARDS RECEIVED: Philippine Sugar Institute (PHILSUGIN) Scholarships (1974-1976 for BS degree), U.P. Faculty Study on reduced fee privilege (1977-1979 for M.S. program), ASSP-World Bank Scholarships (1983-1984 for Ph. D. Program), 4 Best Paper Awards - PHILSUTECH Convention (Aug. 1982, Aug. 1991, 2011,2013), Felix Maramba, Sr. Professorial Chair on Agro-Industrial Farming Systems (1990-1992), UP Scientist I – UP Scientific Productivity Award, 2006-2015, Fr. Neri Satur Award for Environmental Heroism. Climate Change Commission. April 22, 2010. NCCAA, IntramurosMla. As Scientist Consultant of the Climate Change Congress of the Philippines (CCCP), SEARCA Regional Professorial Chair awardee 2015/2016.

MEMBERSHIP IN PROFESSIONAL/HONOR SOCIETIES: Director, Philippine Sugar Technologists (PHILSUTECH), Agric. Division, 1982-83, Member, Crop Science Society of the Philippines (CSSP), Member, Agronomy Society of America (ASA), Member, Gamma Sigma Delta Honor Society of Agriculture, Member, Phi Sigma Biological Honor Society, Regular Member, National Research Council of the Philippines (NRCP), Society for Advancement of Research (SAR) and Full Member- Philippine American Association of Scientist and Engineers (PAASE). MEMBERSHIP AS BOARD of Institutions: Member Board of Trustee, PhilRice representing the Academic Community (2011 to date), Member Board of Director, Philippine Employees and Labor Partnerships, Inc. (PELSPI) (2010 to date), Director at Large, All UP Academic Employees Association, National Chair, *Higher Education for Sustainable Agriculture (HESA) and Food Security in the Philippines(July 2015 to date)*.

ACADAMIC OUTPUT/OTHER ACTIVITIES: He has written lecture syllabus and laboratory manual in Agric 111- Introduction, Farming System, Syllabus in Ecological Agriculture, Introduced and coordinated offering of Summer Short Course on Sustainable Agriculture, 1990, 1991, 1992, 1993, 1994, Adviser to more than 50 BSA- Agronomy graduates, 11 MS graduates, 9 Ph.D., Has written/published monographs on Sugarcane Production, Sugarcane Intercropping , Has published 71 papers (27 papers ISI journals and 44 papers in Non-ISI journals), Has written 3 books, 2 monographs , 5 chapters in a book , Presented over 100 scientific papers in various scientific conferences/ meetings, symposium, workshop, seminars locally and abroad.

PROFESSIONAL EXPERIENCES AND POSITIONS HELD: Acting Director, Farming Systems and Soil Resource Institute, U.P. at Los Baños in 1989; Deputy Director, Farming Systems and Soil Resources Institute, U. P. at Los Baños during 1987 – 1989; Team Leader-Sugarcane Farming systems team, Farming Systems and Soil Resources Institute, U. P. at Los Baños duting 1982 – 1989; Project Leader, Sugarcane-Based Farming Systems, Department of Agronomy, College of Agriculture, U. P. at Los Baños during 1987 – 1989; Study Leader, Farming systems for marginal hillylands Department of Agronomy, College of Agriculture,

U. P. at Los Baños during 1987- 1989; Study Leader, UPLB-PNAC Project entitled "Utilization of Sugarcane Distillery Slope in Agricultural Production" (1978-1979); Division Head- Crop Production and Management- Department of Agronomy, College of Agriculture, U. P. at Los Baños, Chairperson, Research and Extension Committee, Department of Agronomy (1991-1995)

JOURNAL/PUBLICATION MEMBERSHIPS AS BOARD OF EDITORS: Issue Editor and then *Chair, Board of Editors*, Philippine Journal of Crop Science (PJCS)- 2003 to 2009, It was during our term that PJCS became an ISI journal in 2009; Member, Editorial Advisory Board representing Asia- Biological Agriculture and Horticulture, an International Journal on Sustainable Production Systems (1990-1995); Member, Editorial Advisory Board – e-Journal on Crop Production, http://www.escijournals.net/EJCP; Issue Editor on Sustainable Agriculture, the UP Los Baños Journal (1992); Member, Editorial Advisory Board- Rice Biosystems Journal, a national referred Journal based at PhilRice, Nueva Ecija, Philippines (2014 to date); Member, Editorial Advisory Board - Wyno Academic Journal of Agricultural Science, editor@wynoacademicjournals.org, http://www.wynoacademic journals.org (2014 August 1st to date)

TECHNICAL ADVISORY SERVICES:- He has excellent experienced in technical advisory services in many Institutes and Companies since 1982, e.g., Tarlac Development Corporation, Philippine Veterans Investment and Development Corporation, Developed Operational plans (Cropping Technology), Bicol River Basin Development Project, Pili, Camarines Norte, Philippine National Oil Company, Rice Experiment aimed at ameliorating the geo-waste affected rice paddies at Tongonan, Leyte, Site Characterization and Evaluation of Prospective Project Site at Pampanga, Tarlac and Nueva Ecija. Identified farming systems and/or technology options to increase farm productivity and income on a sustainable basis, Overseas Economic Cooperation Fund (OECF) Japan, Senior Agronomist, Project Sustainability (SAPS), Tokyo, Japan, International Institute for Rural Reconstruction, Silang, Cavite, International Consultation on Sustainable Agriculture Training (SAT), Philippine Partners for Human Resource Development in the Rural Areas (PHILDHRA), Agrarian Reform Beneficiaries (ARB)/Communities, Philippine Network of Rural Development Institute (PHILNET),Foundation for Philippine Environment, Philippines to identify Consultancy Program (CP) Plan that will help promote Organic/Sustainable Agriculture, Plan International, Philippines, Evaluation of Plan Calapan Program Unit Sustainable Agriculture Projects and Related Activities in the towns of Bago and Pinamalayan.

Scientific Publication in ISI journals (27 papers) and Non-ISI journals, Internationally referred Journals (49 papers), Non-Refereed journal (Main author/co-author) 16 papers, Proceedings 65 publications, Monographs: MENDOZA, T.C. and C.J. ANDAM. 1987. Sugarcane intercropping system. Paper published at Technology Resource Center Publication. National Book Store, MENDOZA, T.C. 1998. Ecological Crop Farming Guide, Dept. of Agronomy, College of Agriculture, UP Los Baños, Laguna. Books: He wrote many academic books as well as the chaperter in Optimum spatial arrangement in sugar and legume intercropping, Bio-productivity and economic evaluation of some sugarcane production alternatives, Sugarland diversification and Environment Interactions in Sugarcane production.

Finished Research and Development Projects in recent years: Organic/Sustainable Agriculture: Case Studies in the Philippines 1991-2003., Laguna Lake Shore Rehabilitation

Project 1998., Bondoc Peninsula Integrated Farming Systems Project 1998, Sugarland Productivity Improvement Program 1997.

Ongoing Research and Development Projects:- 1.Sugarcane Varietal Improvement Program For Luzon, Philippines. Institute Of Plant Breeding- Crop Science Cluster, College Of Agriculture, University Of The Philippines, Los Baños, College, Laguna. Funded By Luzon Federation, Philippines; 2. Evaluation And Identification Of Rice Cultivars To Suitability For Organic Rice Production, An Externally Funded Research- Kopia Center Philippines-Philrice. A Multi Location Trial In Ces-Ne, Isabela, Laguna, Bicol, Negros Occ. Rtr, Agusan; 3. Small- Scale Biodiverse, Integrated & Organic(Bio) Method Of Farming, A Self-Funded Research Being Implemented at Bgy. Maitim, Bay, Laguna, Philippines; and 4. Project 200: Obtaining 200 TC/Ha Sugarcane Yield, in response to the need for producing more food in less land and water resources, this project started this February 2015 in 3 rams in Negros Occ. Philippines to validate the ruefully in small plots if the same could be obtained in at least 1.0 ha or larger the yield levels of 200 TC/Ha or more. To make it replicable, it is important to establish the scientific basis and the logistic requirements of obtaining 200 TC/Ha and above. There is a need to identify the varietal attributes (low, average, length, tillering, quick germination, average stalk weight), soil quality, fertilizer/ nutritional requirements of sugarcane that will yield the coveted high yields.

Mr. YOUNES REZAEE DANESH

Assoc. Prof. Dr. (Iran)

Education and Research

Dr. Younes Rezaee Danesh, Associate Professor at Department of Plant Protection, Faculty of Agriculture, Urmia University, Iran. He has been investigated the biodiversity of Arbscularmycorrhizal fungi which are presentednin agricultural soils by using molecular approaches. The presence of the beneficial AM fungi is currently considered a quality marker of soil health and is at the basis of sustainable agriculture. He has developed his project in a very talented way. His research interest concentrated on Symbiotic fungi (Mycorrhiza and Mycorrhiza like fungi), Mushroomand edible fungi, Plant Growth Promoting Fungi (PGPFs), Taxonomy and bio control of soilborne plant pathogens, producing and applying bio-fertilizers as well as organic farming. He also has been worked on different fungi such as mycorrhizal fungi and mycorrhiza like fungus (*Pyriformosporaindica*) and *Trichoderma* as a bio fertilizer and biological fungicide. He had several international collaboration with scientists from Russia, Finland, USA, Australia, China, Austria, Italy, India, Turkey, Thailand and Hungary. He also published near 42 scientific research papers in different scientific research journals, 7 book chapters in different books published by Springer and about 120 papers presented in national and international conferences. He also had 30 M.sc and Ph.D. students as supervisor and advisor. He had very good scientific and educational backgrounds such as Assistantship in Establishment of Mushroom Production Farms of Tarbiat Modares University in Tehran-Iran (1997-1999), Invited and Part-Time Faculty Member (Department of Plant Protection, Shahed University, Tehran-Iran) (2002-2004), Obtaining First Degree Certificate and Selection Best Faculty Member in Department of Plant Protection in Shahed University and Azad Islamic University, Iran (2003, 2005), Research Vice-Chancellor and Invited Part-Time Faculty Member (Department of Plant Pathology, Islamic Azad University, Damghan-Iran) (2004-2006), Short Term Visiting on Herbal and Microbial Institute in Amity

University and Delhi University, India under Supervision of Prof. Ajit Varmaand, Prof. K. G. Mukerjii for 6 Months on Morphological Taxonomy of AM Fungi (2005), Short Term Visiting on *In vitro* culture and Molecular Identification of Arbuscular Mycorrhizal Fungiin Torino University, Italy under Supervision of Prof. Paola Bonfante for 7 Months (2005-2006), Scientific Collaboration on Research Project "Identification and Diversity of *Trichoderma* Species Causing Green Mold Disease in Mushroom Farms of Iran" with Prof. Dr. Laszlo Kredicks in Hungary (2008-2010), Research Chancellor (Faculty of Agriculture, UrmiaUniversity, Iran) (2009-2013), Member of Entrepreneurship and Cooperation with Industry Committee (Urmia University, Iran) (2009-2013), Member of Water, Agriculture and Processing Industries Research Group (West Azarbaijan Province, Iran) (2009-2013), Permanent Member of Science and Technology Park (West Azarbaijan Province, Iran) (2009-2013), Scientific Collaboration on Research Project "Identification and Diversity of *Trichoderma* Species Associated with Sunflower Rhizospheres in North West of Iran" with Prof. Dr. Monika Schmollin, Austria (2011-2013), Member of International Symbiosis Society (USA) (2007-now), Member of Asian Mycorrhizal Society (2008-now), Member of Iranian Society of Plant Pathology (2008-now), Member of Iranian Mycological Society (2008-now), Editorial Board Members in Journalof Agricultural Extension and Rural Development (2008-now), Editorial Board Members in Journal of Soil Science and Environmental Management (2008-now), Editorial Board Members in Journal of Stored Products and Postharvest Research (2008-now), Editorial Board Members in International Journal of Agricultural Technology (2009-now), Executive Editor of Research in Field Crops Journal (Faculty of Agriculture, Urmia University, Iran) (2010-now), Life Time Members of Association of Agricultural Technology in Southeast Asia (AATSA) (2013-now),The Best Oral Presentation and Paper in 3rd International Conference on Integration Science and Technology for Sustainable Development (Laos, 2014), The Best Researcher in Fields of Symbiotic Fungi from Iranian Mycological Society (2013 and 2014) and Head of Symbiotic, Fungi Research Section in Iranian Mycological Society (2014-now).

ABSTRACTS

Session: **Keynote and Plenary Speakers**

Global water challenges and emerging opportunities for cooperation between Europe and Southeast Asia

Tuomas Valtonen

Director of Unit, Technology Research Center, University of Turku, Finland

The detail information will be discussed in the conference

Plant Doctors: An emerging profession

McGovern, R. J.

Professor Emeritus, Department of Plant Pathology, and Past Director, Plant Medicine Program, University of Florida, Gainesville, FL 32611; Senior Consultant, NBD Research Co., Ltd., Lampang, Thailand, 52000
Corresponding author: rjtmcgov@gmail.com

Plant Doctors, plant health practitioners academically trained across agricultural science discipline, including both pest-related (entomology, plant pathology, nematology, weed science, and other pests) and plant-related (agronomy, horticulture, soil science, etc.) disciplines, have become key links in the sustainable production of food, fodder, fiber and plant-based biofuel for an ever-increasing world population. A number of pioneer plant pathologists, entomologists, plant scientists and crop consultants helped to develop this concept over many decades. Since 1999, this new approach to training plant health practitioners has been adopted by 11 universities in the USA and Asia [Japan, South Korea (the Republic of Korea) and Taiwan (the Republic of China)] and two are under development in Egypt and China (the People's Republic of China). To date, more than 1,800 plant doctors have been trained, many of whom have developed exceptional careers as practitioners in diverse areas including sustainable crop production, food security and safety, crop consulting, extension, associated agriculture industries, landscape plant health, invasive species management, and teaching and research. Closer communication and cooperation between institutions may help to increase the effectiveness and size of individual plant doctor programs. For example, memoranda of agreement/understanding may lead to useful student and faculty exchanges, joint/dual degree programs, and synergistic collaborations with other plant health organizations. Greater government, NGO, industry and private sector recognition and support for these programs is needed to rapidly develop, expand and increase this effort especially where food shortages are greatest such as in countries in Sub-Saharan Africa and South Asia. Plant doctors trained through existing programs are of immediate benefit to such countries. A longer term solution would be the establishment of plant doctor programs in

universities in the critical areas with linkages to other plant health-related institutions and organizations. Implementation of this plan should not be delayed.

Keywords: plant health management, plant medicine, interdisciplinary training, integrated crop management, sustainable agriculture, agricultural science, food safety, food security, food production, fiber production, biofuel production, plant health careers

World of bioactive compounds in Nature

Prof. Dr Choong Kyung, Kang

South Korea

Nature provides an incredibly rich source of biological and chemical diversity like a long history of traditional medicine. The biological or small chemical molecules provided by Nature have generally been designed by host organisms as secondary metabolites for defense system and have evolved in a selection process in Nature. Many findings so far have resulted in successful blockbusters of modern medicine and in bio-industry. As is well known, aspirin is a slightly modified from a chemical compound in willow tree. And many antibiotics are derived from fungi or microorganisms. Taxol which is used for cancer therapy originally comes from bark of yew tree, and has been commercially developed by extraction and purification process from long-lived trees. But now taxol can be produced by plant cell culture technology without destroying forest. Also antimicrobial peptides to be expected to kill super-bacteria is now being developed from Nature for example: frog, toad, sea cucumber and so on. Ice nucleating proteins (INP) which was found from plant pathogenic microbes is commercially used for snow-making enhancer at ski resorts.

Global and regional food security and the role of agricultural research towards food secured future

Prof. Hiroyuki Konuma

Visiting Professor (in Agriculture), Meiji University, Japan (Former UN FAO ADG and Regional Representative for Asia and the Pacific)

The detail information will be discussed in the conference

Sustainability challenges in the ASEAN region – An insight into the food – energy – water nexus

Dr. Rajeev Bhat

Associate Professor, Food Technology Division, School of Industrial Technology, University Sains Malaysia, Penang- 11800, Malaysia
Corresponding author: rajeevbhat1304@gmail.com**,** rajeevbhat@usm.my

Sustainability is a strategic term of the present century. Sustainability means "aiming towards safe guarding the needs of the current generation by ensuringthat thedesire of future generation remainsintact and uncompromised". In the present global scenario, sustainable development is a fundamental pre-requisite which ensures the society to derive rich benefits directly from the environment (without significant damages encountered), such that the future generations can reap the benefits of the present day efforts. Sustainable agriculture directly depends on a systemthat relies more on the welfare of humans, land and livestocks. Whereas, food sustainability embraces a multi-disciplinary approach covering various themes including those of the socio-economic 'state-of-affairs' extending from the agro-climatic conditions up to the food sector scenario. Overall, it can be stated that 'agro-food sustainability' directly depends on ensuring a sustainable food production, embracing all of those relevant to food security (quality and safety, poverty, hidden hunger, population explosion and food wastage) as well as on the successful implementation of new agro-food policies (relevant to food crisis, food governance, agri-food business practices and food trade). Above and all, the most important facet to achieve 100% sustainability in the agro-food sector depends completely on the successful handling as well as on understanding the importance of the 'food – energy – water nexus.'

Agro-food production and the supply chain (resilient) have an inherent interlink with that of water and energy. There are several incipient sustainability challenges being faced in the ASEAN region, such as improving the economic self-sufficiency and ensuring food security, appropriate land use planning, studying the impact of weather/climatic changes (e.g. haze situations, famine, etc), land and water pollution, scarcity of energy, overcoming the problems of movement of rural populations (mainly farming communities) to urban regions, sharing of knowledge (updated databases) among the dependent agro-food sector personnel, practical application of governmental policies, etc. Besides, some of the main compressions that are driving significant demands for 'food, energy, and water' in the ASEAN region include those of teeming population accompanied by economic instability, globalization, urbanization, international trade and free trade policies. Further (in the ASEAN region), some of the non-crucial technological advancements in the dependent agro-food sector, as well as the food diversification issues can have an higher impact on sustainable production and supply of food, energy and water.

According to the FAO, "Water-Energy-Food Nexus describes the complex and inter-related nature of our global resources systems and this is confined more towards balancing different resource user goals and interests – while maintaining the integrity of ecosystems". Moreover, as per the recent report of Food and Agriculture Organization of the United Nations (2014), the global energy consumption has been projected to increase by 50% by 2035, while the total global water with drawals used for irrigation purposes has been projected to increase by 10% by 2050. This type of projection can have higher impact in the ASEAN region too. Exploring various emerging issues pertaining towards the "Water-

Energy-Food Nexus' is a pre-requisite to ensure sustainability in the ASEAN region. So also, developing a complete life cycle assessment relevant to the environmental impacts on the agro-food sector is vital for successful accomplishment of sustainability.Complementing to this, identifying and implementing various decisions making pathways are required to endorse sustainability.

In the near future, significant transformations can be expected tomaterialize in the ASEAN region relevant to water, energy and food resources, which areall envisaged to become 'insufficient' unless and until a sustainability approach is implemented and practiced. All of these facts **will be deliberated in this talk.**

Keywords: consumer; globalization; regional policies; sustainable agriculture, sustainable food production

Gahung-gahung organic cassava farming system: A climate change adaptive and poverty-alleviating farming strategy

Ace William E. Cerilles

Provincial Government of Zamboanga del Sur, Philippines
Corresponding author: ancergov@gmail.com

Farming in hilly-sloping topography faces the twin challenges of evading soil erosion and drought, and they are accentuated by climate change. Long dry spell called El Nino and erratic rainfall lead to the interrelated negative impacts of low crop yields, hunger and more poverty in the severely affected rural areas. On the other hand, chemical agriculture has made most of the farmers poorer in the rural areas.The high production cost pushes them below the poverty threshold and locks them in the vicious cycle of poverty. Being poor, most of these farmers are deprived of their basic necessities.

In view of this sad state of the poor farmers, Governor Antonio Cerilles of Zamboanga del Sur province came up with an innovative farming strategy of organic cassava production program. The program has prescribed the farmers to adopt the *gahung-gahung* (pit) method coupled with organic farming technologies, that is planting cassava on a square-foot pit filled with organic fertilizers. The program also guides farmers on how to plant cassava on a one-hectare farm by dividing it equally to ten plots and utilizing only one plot each month until he completes the whole cycle on the tenth month. The sequence planting is meant to enable farmers to reap a monthly harvest. Almost 2000 farmers are now enrolled in this program; 8000 more intend to take part of it after the long dry spell caused by the El Nino phenomenon.

This study investigates whether the farmers under this program are able to reap substantial harvest monthly and earn sufficient monthly income from their one-hectare cassava farm. It seeks to know whether their income enable them to rise above the poverty threshold and improve their living conditions. This study also assesses how this innovative farming system contributes in mitigating the effects of climate change.

Data shows that, even during the long dry spell, the farmers earned from US$180-US$300 a month, far above the poverty threshold of US$140 a month. The harvest could have been better under the normal climate conditions. Meanwhile, interviews reveal that the farmers already had a substantial income from his intercrops in his organic cassava farm

before he started his monthly cassava harvest. Interviews also reveal that the continual use of the same one-hectare farm could be sustained since it is only a matter of refilling the pits with organic matter. Moreover, the initial findings of this study suggests that because of efficient land use in organic cassava farming, there is enough land for everybody. Every hectare counts, as every hectare can liberate a family from poverty. With more than enough lands for agricultural production, we can set aside more lands for vegetation to grow that would help mitigate the effects of climate change.

Keywords: poverty, smallholders, climate change, organic agriculture, farming system, cassava

Session 1: **Organic Agriculture, Biodiversity and Biotechnology**

Nutraceuticals and Functional Foods Derived from Organic Agriculture

Prof. Dr. Kampon Sriwatanakul

Professor, Doctor, Mae Faluang University Hospital, Chiengrai, Thailand
Corresponding author: drsrikul@gmail.com

The detail information will be discussed in the conference

Research on agricultural inputs for organic crop production

Kasem Soytong

Assoc. Prof. Doctor, Deapartment of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Chalongkrung Road, Bangkok 10520, Thailand
Corresponding author: ajkasem@gmail.com

Biological products have been investigated and developed as agricultural inputs for organic crop production for years. These are used to instead of chemicals in agriculture. Agricultural inputs for plant growth are released as bio fertilizers which consists effective isolates of *Arthrobotrys oligospora* AO, *Aspergillus oryzae* AsO, *Aspergillus terreus* Ast, *Chaetomium lucknowenes* CL, *Emericella nivea* EN, *Emericella rogulosa* ER, *Pseudoeurotium zonatum* EC, *Mucor plumbeus* MC, *Penicillium variabile* PV, *Pseudoeurotium ovale* EH, *Trichoderma hamatum* Thm-Bio1 and *Trichoderma harzianum* Thz-Bio2. It has been formulated either in powder or pellet forms to apply at different stages of growth at the rate of 1,250 – 2,500 kg/hectare. Bio-degrader producing cellulase, amylase, protease and ligninase to enhance fermentation processes and degrade organic matter and nutrients. Biofertilzer to induce flowering which including the effective fungi that degrading rock phosphate leading to higher P available form and biofertilizer for increasing yield that including effective fungi to degrade potassium feldspar leading to higher available forms of K. Theses biofertilizers are

formulated either in powder or pellet forms to apply at different stages of growth at the rate of 1,250 – 2,500 kg/hectare. Nutricrop as plant nutrient including photosynthesizing bacteria, *Rhodopsedomonas* sp. that formulated in the forms either powder or liquid formulations to promote plant growth. The application rate is 10 g/20 liters of water, spraying into soil and above plants. For disease control, *Chaetomium* is applied as a new broad spectrum biological fungicide in powder or suspension concentration forms that mixing 22-strains of *Chaetomium cupreum* and *C. globosum*. The mechanism of disease control is competition, antibiosis/lysis, antagonism, induced immunity in plants and hyphal interference. *Ch. cupreum* found to produce rotiorinol and *Ch. globosum* produces chaetoglobosin-c, those antibiotic substances could inhibit several plant pathogens. It has been registered as patent rights namely: *Chaetomium* as a new broad-spectrum mycofungicide: Int. cl.5 AO 1 N 25/12. The main key is to prevent soil-borne plant pathogens eg. *Phytophthora* spp., *Pythium* spp., *Colletotricum* spp. and *Fusarium* spp. etc. Successful applications in the fields have been demonstrated in several countries, e.g. Thailand, P.R. China, Costa Rica, Vietnam, Laos, Philippines, Malaysia, Bangladesh, Cambodia, Myanmar, Russia. Registration have been certified in Thailand, China, Vietnam, Laos, Cambodia etc. The research findings found that *Chaetomium* could resistant to several chemical pesticides as follows: chemical insecticides such as Dichlorvos, Chlopyrifos 40, Parathion methyl 50, Endosulfan, Cypermethyl 10, Cypermethyl 35 and DDVD 50 etc., chemical fungicides such as Mancozeb 80, Metalaxyl 25, Phosphoric Acid, Copper oxychloride, Sulphur 80, and slightly resistant to Carbendazin and Di-chloran 80, chemical herbicides such as Glyphosate, Paraquat and Alachlor. It was found that some isolates of *Chaetomium* have a resistant gene to Paraquat. Ketomium is also compatible when used with chemical fertilizers such as 9-24-24, 12-12-12 + 2MgO, 13-13-21,15-15-15 + TE, 16-11-14 + TE, 16-12-8, 16-16-8, 16-16-16 + TE, 16-20-0, 17-17-17 + TE, 18-12-6, 18-46-0, 20-10-10 + TE, 21-0-0, 24-8-8 + TE and 46-0-0. *Chaetomium* - biological fungicide can be used to apply for perennial crops as follows:- fruit trees e.g. apple, peach, citrus, lime, pamelo, black pepper, coffee, tea, guava, durian, and mango etc. that gave a good control several plant pathogens, e.g. *Magnaporthe grisea* (*Pyricularia oryzae*)*, Phytophthora parasitica, Phytophthora palmivora, Phytophthora infestans, Fusarium oxysporum, Sclerotium rolfsii, Rhizoctonia solani, Thielaviopsia paradoxa, Rigidophorus microporus, Colletotrichum gloeosporioides.* To be used for annual crops e.g. kale, Chinese cabbage, radish, cucumber, chilli, asparagus and potato, rice, corn, tomato, soybean,water melon, cantaloup, grape and tobacco etc. It applies at the rate of 3-5 kg per hectare by mixing biological hums at the rate of 10 g per 20 liters of water, and adding organic compost into the soils every 2-4 months for plant protection. The highest rate at 20 g per 20 liters of water is recommended to apply in the infested field-soils. To control anthracnose, blast, sheath blight, leaf spot, leaf blight, flower and fruit rot, spraying at the rate of 10-20 g per 20 liters of water mixed with sticker and spreader at every 15-20 days until harvest to protect the disease of upper plant parts above soil. Microbial nano-elicitor for plant immunity is now released for farmer use as a new innovation nano technology for organic crop production. This consists of the crude extracts of Chaetomium. For insect control, bioinsecticide is formulated from *Metarhizium* sp., *Beauveria* sp. and *Isaria* sp. mixture with nano-chitasan is applied to control several insect pests. The detail information will be discussed in our conference. Organic crop production has been increasingly interested in several countries. It is needed to search for new agricultural inputs to be applied in organic farms. The new biological fungicide would be released for control disease such as *Emericella* sp. To control tomato wilt. Microbial elicitors are antibiotic substances from *Chaetomium cochliodes* and *Chaetomium brasiliense* developed to induce plant immunity.

Keywords: biofertilizer, biofungicide, bioinecticide, organic agriculture

Biological products produced by ATQ in Vietnam

Nguyen The Quyet

Director, ATQ, Hanoi, Vietnam
Corresponding author: quyetatq@gmail.com

The detail information will be discussed in the conference

Increasing SRI-organic rice yields through double rows planting pattern and using location and season adapted rice cultivar

Teodoro C. Mendoza

College of Agriculture, UP Los Baños, Laguna, Philippinces
Corressponding author: ecofarm.mndz2011@gmail.com

Systems of Rice Intensification (SRI) is a dynamic system and not as a package of technology (POT). When someone adopts SRI-organic, 2 questions are asked: a) Which planting pattern is best for SRI-organic? b) What cultivar type or genotype (inbred, or hybrid) yields well under SRI- organic? Three (3) planting patterns (first study) and 20 varieties (second study) to evaluate their performance under SRI-organic were conducted at Maitim, Bay Laguna, Philippines during the dry season of Crop year 2014 to answer these questions. Test plots were laid out in randomized complete block design (RCBD) and replicated 3 times. Of the 3 planting patterns, highest grain yield was obtained in the double row at 8.4 t ha^{-1}. This high yield was due to high panicles per ha (3.49 million), percent filled (%) grains per panicle (93.6%) and weight of 1000 grains (22.3 grams while only 21.1 gm and 21.4 gm for the single row and 20cm x 20cm spacing, respectively). When compared with the yield of conventionally established and managed, the yield was only 4.49 t ha^{-1} (1.87 times higher). The proportion of unfilled grain was high at 17% in conventional rice cultivation but only 7.7% in the organic SRI-double row. For the 20 cultivars, highest grain yields was obtained among the inbreds (Milyang 23 at 7.49 t ha^{-1}, PSB RC 240 at 6.99 t ha^{-1}, PSB RC 222 at 6.81 t ha-1). Of the 3 hybrids, NSICRc 202H yielded the highest at 6.78 t ha-1. The farmer-bred cultivar Masipag 10-1 yielded 6.38 t ha^{-1}. The yield differences are not statistically significant. A 0.5 t ha-1 difference may not be significant statistically but this amount to PhP 10,000 (227 USD, 1USD=PhP44). SRi-Organic rice yields of up to 8.4 t/ha had been realized during the dry season - January to April cropping of 2014 in double row planting pattern using the locally adapted rice cultivar Rc 18. This showed the prospects of increasing rice yield using low cost method and locally available materials. Adopting organic method is also climate change adaptive, oil energy bill and carbon emission reducing.

Keywords: organic rice, planting pattern, double rows, system of rice intensification (SRI)

Weed based organic fertilizer to reduce application of synthetic fertilizer in mustard (*Brasiccasinensis* L.)

N. Setyowati*, Z. Muktamar and I. Puspitasari

Agronomy Departement, University of Bengkulu, Bengkulu, Indonesia
*Corressponding author: nanik_srg@yahoo.com

Conventional agriculture has put the use of synthetic fertilizer as an important agrochemical input to increase plant productivity since such fertilizer provides fast release of plant nutrients. However, for a long period of time, continuous application of such agrochemical depletes soil fertility. On the other hand, organic fertilizer such as weed based compost has benefit to improve soil properties eventhough nutrient release from such organic fertilizer is slower than that of synthetic fertilizer. Combination of both fertilizers will provide advantages to soil and plant. The objective of the experiment was to compare the growth and yield of mustard as influenced by wedelia compost and its combination with N, P, K fertilizer. The greenhouse experiment was carried out using completely randomized design. Treatments consisted of 100 kg N, P, K fertilizer ha^{-1}; 15 ton wedelia compost ha^{-1} combined with 0, 25, 50 and 75 kg N, P, K fertilizer ha^{-1} respectively; 20 ton wedelia compost ha^{-1} combined with 0, 25. 50 and 75 kg N, P, K fertilizer ha^{-1} respectively. Treatment was replicated 4 times. The experiment indicated that wedelia compost and its combination with N, P, K fertilizer had no significant effect on most variable observed in this experiment. Application of wedelia compost at rate of 15 and 20 ton ha^{-1} and its combination with N, P, K fertilizer significantly increase mustard yield (shoot fresh weight) as compared to that of 100 kg N, P, K fertilizer ha^{-1}. This result indicated that application of wedelia compost could substitute N, P, K fertilizer for growth and yield of mustard.

Keywords: *Wedelia trilobata*, wedelia, mustard, compost

Biological preparations developed by Belarusian State University for environmentally friendly farming

Grineva I.A.*, Maslak D.V., Feklistova I.N., Skakun T.L., Sadovskaya L.E., Maximova N.P.

Belarusian State University, 4, Nezavisimosti avenue, Minsk, Republic of Belarus, 220030
*Corresponding author: grineva_ia@mail.ru

Due to the environmental deterioration it become urgent in the world to develop and apply effective biological preparations able to regulate plant growth and protect crops from diseases, as an alternative of chemical fertilizers and pesticides applying. Advantages of microbiological preparations derived from bacteria are well known: they are environmentally friendly, do not break the biological balance in natural communities, are safe for warm-blooded, not phytotoxic and does not affect the harvesting time, while significantly promote the plant growth, have a long protective effect, increase productivity and improve the

condition of the soil. The Research Laboratory of Molecular Genetics and Biotechnology of the Belarusian State University developed a range of biological products derived from *Bacillus* and *Pseudomonas* with all the above characteristics intended for ecologically friendly farming in greenhouses and open ground: Baktogen, Aurin, Nemacid, Stimul and Zhytsen.

Keywords: biological preparations, plant protection, growth promotion, environmentally friendly farming, greenhouses, Bactogen, Aurin, Nemacid, Stimul, Zhytsen, *Bacillus* sp., *Pseudomonas* sp.

Eco-friendly fungicides alternatives to control soil borne fungal diseases on some economic crops under organic farming system

Dr. Riad Sedki Riad El-Mohamedy

Plant Pathology Department, National Research Center, Dokki, Cairo, Egypt
Corresponding author: riadelmohamedy@yahoo.com

Plant diseases caused by soil borne pathogens cause greet losses in yield and products of agricultural crops. Controlling these pathogens manly depends on bromide methyl and chemical fungicides treatments that cause hazards to human health and increase environmental pollution. The modern agricultural systems aimed to reduce and/or eliminate fungicide and chemicals usages, through eco-friendly safely controlling systems and expansion in bioorganic farming plantation. These systems leads to produce products free from any chemicals and fungicides (organic products) for exportation, moreover avoid environmental pollution. In this study, Compost and /or composts fortified with bio control agent (bio compost) were applied as soil amendments to reduce pathogens propagules density and protected plants from soil borne plant pathogens Manipulation soil with bio compost agricultural wastes BCAW (composted of sugarcane bagasse, rice straw and soybean straw inoculated with spore suspension $5x10^6$ cfu/ml of *T. harzianum* or *T. viride* (spore suspension $5x10^6$ cfu /ml) successfully controlled *F. solani* the main pathogen of dry root rot disease on citrus, *F. solani*, *F. oxysporium* and *Macrophomina phaseolinae* on grapevine, Fusarium dry rot and Rhizoctonia scurf rot on potatoes, *F. solani, Rhizcotina solani* the main pathogens of root rot on bean and cowpea. Population density of *Fusarium* spp. were highly decreased, where population density of *Trichoderma* spp. were increased in rhizosphere soil of treated plants by bio compost (BCAW). The highest percentages of increasing in quantity and quality of yield were recorded on plants treated with bio-compost compared with untreated plants. It could be concluded that application of bio composed agricultural wastes could be safely used commercially as substitute of bromide methyl and fungicides for controlling soil borne plant pathogens and avoid health hazards and environmental pollution.

Keywords: bio compost; citrus; potatoes; bean; cowpea; soil born fungi; control

Utilization of manure and green organic composts as alternative fertilizers for cauliflower production

M. Simarmata*, L. Susanti and N. Setyowati

Department of Agroecotechnology, Agricultural Faculty, the University of Bengkulu, Bengkulu 38371, Indonesia
*Corresponding author: marulak_simarmata@yahoo.com

Cauliflower (*Brassica oleracea* var. *botrytis*) is a vegetable crop which is grown over the world. Cultural practices of vegetables production are always dealing with fertilization technologies either using mineral fertilizers, organic fertilizers, or a combination of mineral and organic fertilizers. This study was aimed to determine the effect of reduced the dose of mineral fertilizers and substituted by organic fertilizers from compost of cow manure and compost of trailing-daisy weeds (*Wedelia trilobata*). A single factor evaluated was arranged in a completely randomized design (CRD) as follows: treatment of a mineral fertilizer with nitrogen, phosphate, and potassium applied at 10, 20 and 30 days after planting at a recommended dose (T_1), compost of trailing-daisy weeds at 20 ton ha^{-1} (T_2), compost of cow manure at 20 ton ha^{-1} (T_3), 50% of T_1 + compost of trailing-daisy weeds at 20 ton ha^{-1} (T_4), 50% of T_1 + compost of trailing - daisy weeds at 10 ton ha^{-1} (T_5), 50% of T_1 + compost of cow manure at 20 ton ha^{-1} (T_6), 50% of T_1 + compost of cow manure of 10 ton ha^{-1} (T_7), and without fertilizer as a control (T_0). Each treatment was repeated five times so that overall there were 40 plants in 40 polybags. The results showed that the fertilizer combinations were significantly affected plant height, shoot fresh weight, dry weight of total plant biomass, and curd yield of cauliflower. The highest plant height and shoot fresh weight were observed in the treatment of 50% of mineral fertilizers combined with compost of trailing-daisy weeds at 10 ton ha^{-1} (T_5), the highest of total dry weight of plants were observed in the treatment of cow manure compost (T_3), and the highest curd yield of cauliflowers was observed in the treatment of 50% of mineral fertilizers combined with cow manure compost at 20 ton ha^{-1} (T_6). In conclusion, organic fertilizers from compost of trailing-daisy weeds (*Wedelia trilobata*) and from cow manure can be used as an alternative fertilizer to substitute mineral fertilizers on the cauliflower production.

Keywords: cauliflower, compost, manure, mineral fertilizer, *Wedelia trilobata*

Influence of different type of culture media and activated charcoal on callus induction and shoot multiplication of *Cadamine lyrata*

Sakularat Sanputawong[1], Tiwa Raknim[2] and Sorapong Benchasri[3]

[1,2] Faculty of Agriculture, Rajamangala University of Technology SrivijayaNakorn Sri ThammaratSaiyai Campus, Nakorn Sri Thammarat Province
[3]Southern Tropical Plants Research Unit, Faculty of Technology and Community Development, Thaksin University, Phatthalung, Thailand, 93110
*Corresponding author: sakulrat_s@hotmail.co.th

Cadamine lyrata, aquatic plant, is use for decoration on a small aquarium. The present study was to increase the number of them by tissue culture. Shoot explant were excised and cultured on solid, liquid and semi-solid Murashige and Skoog (MS) medium supplemented with 0.5 mg/l NAA (α-naphthaleneacetic acid) and 2 mg/l BA (N_6-benzyladenine) with or without 0.2% activated charcoal (AC). The cultures were placed under light conditions at 14 h photoperiod, 27±1 ^oC to initiate callus induction and plant regeneration for 3 months. The result revealed that semi-solid MS medium supplemented with 0.5 mg/l NAA and 2 mg/l BA without 0.2% AC gave the callus induction (100%) and size of callus at 1.06 centimeter better than another type of culture media. Liquid MS medium supplemented with 0.5 mg/l NAA and 2 mg/l BA with or without 0.2% AC, gave the highest average number of shoot at 68.80/explant and shoot length at 10.69 centimeter, significant different with another type of culture media. This result showed that AC and type of culture media is improper for callus induction and shoot number.

Keywords: *Cadaminelyrata*, type of culture media, shoot multiplication

Evaluation of tithonia-enriched liquid organic fertilizer for organic carrot production

Fahrurrozi*, Zainal Muktamar, Nanik Setyowati, Sigit Sudjatmiko, Mohammad Chozin

Faculty of Agriculture, University of Bengkulu, Jalan WR Supratman, Bengkulu, 38125, Indonesia
*Corresponding author: fahrurrozi@unib.ac.id

In organic vegetable production, foliar fertilizer is often applied in conjunction with soil amended fertilizer to provide sufficient nutrients for the plant growth and development. Liquid organic fertilizer (LOF) was locally produced using *Tithonia diversifolia* to improve organically grown of carrot (*Daucus carota* L.). This experiment aimed to determine the effectiveness of tithonia-enriched LOF on organic carrot production was arranged in completely randomized block design with three replicates. Treatments comprised five levels (0, 25, 50, 75, and 100 ppm) of tithonia-enriched LOF concentrations. Results indicated that tithonia-enriched LOF did not significantly affect tuber length, tuber diameter, tuber fresh

weight, shoot-tuber ratio, and number of tuber per plot. Future research should be focussed on the use of higher dosages of solid organic fertilizer and on application techniques of tithonia-enriched LOF.

Keywords: *Tithonia diversifolia*' *Daucus carota* L., liquid organic fertilizer, carrot yields

Comparison among Chemical, GAP and Organic methods for tea cultivation in Vietnam

Nguyen Huu Phong[1,3*], Wattanachai Pongnak[1], Kasem Soytong[1], Nguyen The Quyet[2], Dang Van Thu[3], Nguyen Xuan Cuong[3] and Luong Thi Ngoc Van[3]

[1] Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[2]Agricultural Bio-Technology Limited Company, Northern Mountainous Agriculture and Forestry Science Institute, Phu Tho, Vietnam
[3] Tea Research and Development Center, Northern Mountainous Agriculture and Forestry Science Institute, Phu Tho, Vietnam
[*]Corresponding author: nhp0702@yahoo.com.vn

This study aimed to compare the Chemical, GAP and Organic production method on tea cultivation in Vietnam. The results showed that all the treated methods were better effect on increasing tea production as compared to the non-treated control. The yield increasing percentages in compared to the non-treated control given by the chemical and GAP method were higher than that given by the organic method, with the values ranged of 52.86- 63.96, 46.03- 67.87 and 36.98- 52.10 %, respectively. In most the cases, all the treated application methods were significantly effective or tended to give higher efficiency on the insect and disease control than the non-treated control. The efficiency for insect and disease control of the GAP method was not significantly different from the chemical and organic method. It seems to be that the GAP method is more friendly and safer to the environment and the consumer's health than the chemical method because of its reducing of amount of chemical inputs as compared to the chemical one. On the other hand, the GAP method tended to give higher sensory evaluation score of green tea than that given by the chemical and organic method. In conclusion for the present study, the GAP method could be better used for safe tea production as compared to the chemical and organic method in Vietnam.

Key words: tea cultivation, chemical, GAP, organic, comparison

Organic agricultural producer strategies in supply chain of sustainable agriculture network, Chachoengsao Province, Thailand

Chanhathai Kerdsriseam* and Suneeporn Suwanmaneepong

Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang. Bangkok 10520, Thailand
*Corresponding author: kerdsriserm@hotmail.com

Organic agricultural market in Thailand has incessantly grown from organic consumers, whilst organic agricultural areas in Thailand are merely 213,183 Rai or 7% of total agricultural areas nowadays. Thai government has undertaken policy to enhance the strengthening for the organic agricultural producer. However, most of organic agricultural producers in the country are members of sustainable agricultural networks. Therefore, this study aimed to 1) investigate organic agricultural product supply chains of farmers who are members of sustainable agricultural network, and 2) study the strategies of organic agricultural producer in supply chain of sustainable agriculture network. The study selected organic agricultural producers under the sustainable agricultural network in Sanam Chai Khet District, Chachoengsao Province. Organic agricultural areas in the study area contributed approximately 1,500 Rai with 130 farmers as sustainable agricultural network members. Data were collected from survey and in-depth interview, and focus group discussion was conducted among selected farmers in major organic agricultural product in sustainable agricultural network to identify the strengths, weaknesses, opportunities, and threats related to organic agricultural farming activities. SWOT Analysis was used to evaluate the internal and external aspects impacting organic agricultural production in the study area from which organic agricultural producer strategies were developed. On the basis of the analysis, the relevant suggestions on facilitating the interests of producers in the supply chain of sustainable agricultural products are improving the technology for production; increasing the agricultural production yield; establishing the promotional strategies to expand production area and members, and improving the quality of organic agricultural products to satisfy the safety quality product standard and consumer needs.

Keywords: organic agricultural product, organic agricultural producer, organic farming; organic agricultural network; sustainable agricultural network, organic supply chain

Nano-particles derived from *Chaetomium globosum* KMITL-N0805 against leaf spot of rice var. Senpido in Cambodia

Huyly Tann[*] and Kasem Soytong

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Chalongkrung Road, Ladkrabang, Bangkok 10520, Thailand
[*]Corresponding author: huyly_tann@yahoo.com

Nano-CGH, nano-CGE and nano-CGM from *Chaetomium globosum* KMITL- N0802 expressed antifungal activity against *Curvularia lunata* causing leaf spot of rice var Senpido at ED50 values of 1.21, 1.19 and 1.93 ppm, respectively. It demonstrated that nano particles affected the pathogen cells to be broken and abnormal cells leading to loss of pathogenicity. Testing nano-products to control leaf spot of rice var Senpido causing by *Curvularia lunata* was investigated in pot experiment showed that nano-CGH, nano-CGE and nano-CGM from *Chaetomium globosum* KMITL-N0802 gave significantly controlled leaf spot of rice var Senpido. The disease severity index (DSI) at 60 days after treatment, nano-CGH and nano-CGM gave the higher disease reduction (61.54 %) than nono-CGE (53.83 %). It concluded that nano-CGH, nano-CGE and nano-CGM from *Chaetomium globosum* KMITL-N0802 could decrease leaf spot of rice var Senpido causing by *Curvularia lunata*. Moreover, it showed that nano-CGH, nano-CGE and nano-CGM significantly increased in plant height and number of tillers when compared to the non-treated control.

Impact of biofuel production on Hydrology: A case study of Khlong Phlo watershed in Thailand

Songvoot Sangchan[1*] and Duangthip Rukanee[2]

[1]Agricultural Engineering Program, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[2]Farm Machinery Technology, Faculty of Agricultural Technology and Agro-Industry, Rajamangala University of Technology Suvarnabhumi, Ayutthaya 13000, Thailand
[*]Corresponding author: svsangchan@yahoo.com

This study evaluates the impact of biofuel production on the water resources and hydrology of a small watershed, Khlong Phlo in the Rayong province of eastern Thailand. Water footprint of bioenergy was estimated to identify the most water-efficient crop to produce biofuel in the watershed and Soil and Water Assessment Tool (SWAT) model was used to evaluate the impact of land use change for biofuel production on water balance and water quality. Several land use change scenarios consisting of oil palm, cassava and sugarcane expansion were evaluated. Water footprint results indicate that cassava is the most water-efficient feedstock to produce biofuel and will have less impact on water resources of the watershed as compared to sugarcane and oil palm. Modeling results reveal that expansion of cassava and sugarcane

coverage will decrease annual evapotranspiration and baseflow but increase annual surface runoff and water yield which lead to increased sediment, nitrate and total phosphorus yield from the watershed. Study results further indicate that biofuel production will have negative impact on the environment of the Khlong Phlo watershed.

Keywords: biofuel, water footprint, hydrology, watershed

Distribution of harpagophoridmillipedes in differenttropical forest types

Sirirut Sukteeka[1], Nathawut Thanee[1*], Somsak Punha[2], Suwit Jitpukdee[3] and Samai Sewakhonburi[4]

[1]School of Biology, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima, 30000, Thailand
[2]Department of Biology, Faculty of Science, Chulalongkorn University, 10330 Thailand
[3]Faculty of Science and Fisheries Technology, Rajamangala University of Technology, Trang, 92150, Thailand, [4]Sakaerat Environmental Research Station, Nakhon Ratchasima 30370
[*]Corressponding author: nathawut@sut.ac.th

The distributions of harpagophoridmillipedes were examined in different forest types in Sakaerat Environmental Research Station (SERS), Nakhon Ratchasima, Thailand. All millipedes were collected between June 2010 to May 2011 from each permanent plot of 20 m x 20 m (400 m^2). For each plot, the millipedes were collected in a small plot of 30×30×30 cm^3 within four forest types: dry evergreen forest (DEF); dry dipterocarp forest (DDF); plantation forest (PTF); and ecotone (ECO). The results revealed that the highest index of diversity (Shannon - Wiener index) was 1.67 and the highest species richness (6) was found in the ecotone of dry evergreen forest and the dry dipterocarp forest (ECO). The most abundance of this family was found in DEF during raining season ($p \leq 0.05$). This work suggested that the DEF had a good factor for supporting the distribution of harpagophorid millipedes in Sakaerat Environmental Research Station. Harpagophoridmillipedes diversity was negatively correlated with light intensity, soil pH, soil temperature, soil moisture and litter moisture, while organic matter showed the highest positive correlation ($p \leq 0.05$).

Keywords: harpagophorid millipedes, ecological factors, forest types

Species diversity of benthic macrofauna on the intertidal zone of seacoasts in Krabi, Trang and Satun Provinces, Thailand

Suwit Jitpukdee[1*], Khwanta Tantikamton[2], Nathawut Thanee [2], and Watcharaporn Tantipanatip[3]

[1] Faculty of Science and Fisheries Technology, Rajamangala University of Technology, Trang, 92150, Thailand
[2] School of Biology, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima, 30000, Thailand
[3] Faculty of Science and Technology, Phranakhon Si Ayutthaya Rajabhat University, Phranakhon Si Ayutthaya, 13000, Thailand
[*] Corressponding author: suwitjit@hotmail.com

The objectives of this study were to assess species diversity of benthic macrofauna on the intertidal zone of seacoasts in Krabi, Trang and Satun provinces, Thailand. The survey included 30 sampling stations of 8 beaches. It was carried out in Nopparatthara, Ao-nang and Nam Mao beaches along Krabi coast, Pak Meng, Chao Mai and Yong Ling beaches in Trang coast and Pak Bara and Pak Bang beaches in Satun coast. Benthic macrofauna were collected by quadrate sampling technique at the intertidal zones. The results showed that, overall, 116 species were accounted belonging to 51 families, 20 orders, 5 classes of 4 phyla. The phyla were Polychaeta, Mollusca, Arthropoda and Brachiopoda in order of species number. Of these, the numbers of benthic macrofauna species found in Krabi, Trang and Satun provinces were 65, 72 and 64 species, respectively. Cluster analysis and multidimensional scaling (MDS) were used to compare similarity of all sampling stations based on benthic macrofauna species. The results exhibited moderate similarity at 21% and the sampling stations were separated into 3 groups at 35% similarity. The benthic macrofauna communities of sampling stations in Satun province were homogeneity whereas in Krabi and Trang provinces were clustered into the same group. All sampled stations from Yong Ling beach and a station from Pak Meng beach were separated from those 2 groups. Sampling stations in Satun province had different types of species to Krabi and Trang sampling stations. Satun province had 41 benthic macrofauna species that also found in Krabi or Trang provinces whereas the species found in both Krabi and Trang provinces were 58 species. The 26 species of benthic macrofauna were found in all three provinces including 11 species of polychaetes, 9 species of mollusks and 6 species of crustaceans.

Keywords: benthic macrofauna, species diversity, intertidal zone

Ectoparasites associated with bats in tropical forest of northeastern Thailand

Sarawee Aroon[1*], Jacques G. Hill III[2], Taksin Artchawakom[3], Sitthisak Pinmongkholgul[4], Sajeera Kupittayanant[1] and Nathawut Thanee[1]

[1] School of Biology, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand
[2] Biology Department, University of Arkansas, Fayetteville, Arkansas 72701, USA
[3] Sakaerat Environmental Research Station, Nakhon Ratchasima 30370, Thailand
[4] School of Science, University of Phayao, Phayao 56000, Thailand
[*]Corressponding author: sarawee_777@hotmail.com

The ectoparasites of bats in Sakaerat Biosphere Reserve, northeastern Thailand were studied during June 2013 to May 2014. Altogether, 66 bats were captured using mist nets and investigated for their ectoparasites. Of these, 21 individuals of 4 bat species were infested with ectoparasites (31.82%) i.e. *Hipposideros larvatus*, *Rhinolophus affinis*, *Myotis muricola* and *Cynopterus sphinx*. A total of 64 ectoparasites were collected from bats belonging to 4 families, 7 genera and 7 species i.e. *Brachytarsina* sp. (n = 28), *Raymondia* sp. (n = 21), *Nycteribia* sp. (n = 2), *Phthiridium* sp. (n =4), *Cyclopodia* sp. (n = 2), *Spinturnix myoti* (n = 6) and *Ixodes simplex* (n = 1). Number of parasite loads among bat species was not different (H = 1.45, df = 3, p = 0.69). Mean intensity of infestation of ectoparasites on bats ranged from 1 to 4.2. The highest Sorenson's similarity index of ectoparasites was found between *Hipposideros larvatus* and *Rhinolophus affinis* (0.67). The Brillouin diversity index of ectoparasites on bats ranged from 0 to 0.56 whereas the Brillouin evenness index ranged from 0.71 to 1.

Keywords: ectoparasite, bat, tropical, Sakaerat Biosphere Reserve, Thailand

Genetic variability analysis in rice mutant lines from Gamma rays radiation using agromophological and SSR markers

Nguyen Thi Hong, Vo T.M. Tuyen, Nguyen Thi Hue, Tran Thi Thu Trang, Le Huy Ham

Institute of Agricultural Genetics, Pham Van Dong St., Bac Tu liem, Hanoi, Vietnam
Corressponding author: nguyenhongdhnn@gmail.com

In this work, genitic variability of rice mutant lines from gamma rays radiation was surveyed based on agromorphological and SSR markers. Seed of original variety HC62.2 with low yield was irradiated by gamma rays (Cobal 60) for improvement. Fourteen mutant lines maintaining good chacracteritics and having better productions were selected and analyzed. Twenty-six agromorphological traits (maturity, plant height, flag leaf angle, awning, yield...) were evaluated and then data were transformed into the binary system. Thirty-one SSR markers, located on twelve chromosomes, were considered for genetic diversity analyses in order to estimate the extent of diversity generated by gamma rays radiation in rice. The

similarity between genotypes was obtained based on Dice's Coefficient. The UPGMA defined three main clusters. Results indicated that polymorphism based on SSR markers is not far diffirent from variation based on agromorphological traits. On the other hand, gamma rays radiation was effective not only to improve yielding but also to create variation materials for rice breeding.

Keywords: genetic variability analysis, agromorphological, SSR marker, mutation, gamma rays.

Assessment of genetic diversity and relationships among *Charadrius mongolus* and *Charadrius leschenaultii* using AFLP markers

---

Supattra Poeaim[1*], Nichapat Chobarporn[1] and Krairat Eiamampai[2]

[1] Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[2]Wildlife Research Division, Wildlife Conservation Office, Department of National Parks, Wildlife and Plant Conservation, Bangkok, Thailand
[*]Corressponding author: poeaim@hotmail.com

Charadrius mongolus and *Charadrius leschenaultia* are migratory shorebirds in Thailand during the non-breeding season in which adult plumages are not clearly expressed sexually dimorphic. Eighty-six samples were trapped by cannon net from Trang and Samut Sakhon province. To determine the gender, *chromo-helicase-DNA-binding* (*CHD*) genes were amplified with 2550F/2718R primer. Gender identification was attempted in 46 *C. mongolus* and 40 *C. leschenaultii*. For *C. mongolus*, the male gender in Samut Sakhon province revealed the number more than in Trang province. Amplified fragment length polymorphisms (AFLP) technique was used to study genetic diversity and relationships among 11 *C. mongolus* and *C. leschenaultii*. Forty primers were screened and ten primers were able to amplify DNA fragments. Five primers were produced reproducible fragments with easily recordable bands which were selected for analysis. In total 323 bands were scored, the result showed 193 polymorphic bands (59.75%). Dendrogram constructed with the unweighted pair-group method with arithmetic mean (UPGMA) of genetic relationships based on simple matching coefficients varied from 0.75 to 0.92. The cluster analysis was classified the plovers into two major groups which is related to the species. Including, the plovers can be separated by sampling area. Result showed the AFLP markers for assessing genetic relationship among *C. mongolus* and *C. leschenaultia* that corresponded to the geographic distribution.

Keywords: gender identification, genetic diversity, AFLP markers, *Charadrius leschenaultii*, *Charadrius mongolus*

Study on *Chrysanthemums* breeding by gamma (Co^{60}) irradiation on callus of 4 exotic *Chrysanthemum* varieties of Agricultural Genetic Institute

Le Duc Thao, Nguyen Viet Dung and Nguyen Thi Tham*

Department of Mutation and Heterosis Breeding, Agricultural Genetics Institute (AGI), Pham Van Dong road, Tu Liem, Hanoi
*Corressponding author: ngthamcnsh52@gmail.com

Four *Chrysanthemum* varieties CN93, CN01, CN98 and CN20 were selected by Agricultural Genetics Institute (AGI), put into production and have been grown popularity in our country. However, they were cultivated during a long time, therefore these four varieties have already showed many limitations in the production and consumption process. In order to improve and overcome these limitations as well as change morphology of original varieties in accordance with the requirements of the current market, AGI used gamma irradiation (Co^{60}) on callus of 4 *Chrysanthemum* varieties with radiation doses were 0 (original varieties), 5, 10, 20 and 30 Gy. To evaluate the initial results, we obtained 110 beneficial mutation lines with the morphologies such as: lower stem, shortener growth process, smaller leaf angle, changing the flower color, larger blooms and larger stem diameter than four original varieties. After observing and evaluating 110 mutation lines in comparison with original varieties by standard indicators of biological agriculture in the field, we selected 13 promising lines.

Keywords: *Chrysanthemum*, mutation line, gamma irradiation, selection.

Study on diversity of some medicinal plants in Hon Ba Nature Reserve, Khanh Hoa Province

Tran Thi Ngoc Diep[1*], Tran The Bach[2], Ninh Khac Ban[3] and Pham Thanh Loan[1]

[1]Hung Vuong University, Phu Tho, Vietnam
[2] Institute of Ecology and Biological Resources, VAST, Vietnam
[3] Institute of Marine Biochemistry, VAST, Vietnam
*Corressponding author: ngocdiep1979@gmail.com

This paper presents a variety of medicinal plants in the Hon Ba nature reserve, Khanh Hoa province. Based on the results of site surveys and published documents, we have listed the medicinal plants in the area, they are included 03 branches, 120 families, 360 genera (s) and 515 species. Among of them 03 species can be used as tranquillizer, 24 species can be used to treat leucorrhoea, 2 species can be used to treat paralytic, 1 species can be used to treat obese disease, 12 species can be used to treat influenza, 12 species can be used to treat eyeache, 22 species can be used to treat toothache, 24 species can be used to detoxicate, 4 species can be used to treat syphilis, 15 species can be used to treat asthma, 11 species can be used to treat gonorrhea, 96 species can be used to treat dysentery, 9 species can be used as galactopoietics, 33 species can be used as diuretic, 90 species can be used to treat bited- snack, 8 species can be used to treat urinary gravel, 31 species can be used to treat malaria, 89 species can be used

to treat rheumatism, 15 species can be used to treat diabetes, 25 species can be used to treat diseases of heart, pulse & blood pressure, 17 species can be used to treat haemorrhoids, 31 species can be used to treat hepatitis, 1 species can be used to treat encephalitis, 7 species can be used to treat gastritis, 4 species can be used to treat inflammation of cornea, 20 species can be used to treat angina, 16 species can be used to treat nephritis, 4 species can be used to treat sinusitis, 4 species can be used to treat sterile, 7 species can be used to treat cirrhosis, 1 species can be used to treat brain haemorrhage. Twelve (12) species are recorded in Vietnam Red Data Book (part2. Plants. 2007) including 1 species in critically endangered situation (CR), 2 species in endangered situation (EN) and 9 species in vulnerable situation (VU). The data in the article confirms Hon Ba nature reserve potentially great medicinal plants. This is a new and important data to contribute to research into the conservation and sustainable development of medicinal plant resources in Natural Reserve Hon Ba, Khanh Hoa province.

Keyword: medicinal plants, Hon Ba, flowering plants

Session 2: **Plant Pest Management and Related Fields**

Efficacy of extracts of water yam (*Dioscorea alata*) and aerial yam (*Dioscorea bulbifera)* peels in the control of white yam (*Dioscorea rotundata*) rot.

Okigbo R.N.*, Opara P.U. and Anuagasi, C.L.

Department of Botany, Faculty of Biosciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria
*Corresponding author: okigborn17@yaho.com

The efficacy of ethanol and aqueous extracts of the peels of *Dioscorea alata* and *Dioscorea bulbifera* on the growth of pathogenic fungi of rotten white yam (*Dioscorea rotundata)* were investigated. Pathogenicity test revealed that *Sclerotia rolfsii, Botryodiplodia theobromae* and *Fusarium oxysporum* induced rot in healthy white yams after seven days of inoculation with *Botryodiplodia theobromae* being the most virulent. All the extracts showed varying degrees of antifungal effect, ethanol extract proved to be more potent. *Dioscorea alata* extracts had slightly, moderate and effective inhibition on mycelial growth of all the test fungi ranging from 13.04% to 94.44% while the extracts of *Dioscorea bulbifera* showed slightly, moderate and effective inhibition on the mycelia of the test fungi ranging from 6.66% to 88.88%. The most fungitoxic of all the extracts was observed with the 10% ethanol extract of *Dioscorea alata* which showed significant ($P<0.01$) inhibition on all the test fungal pathogens. Phytochemical screening of the extracts revealed the presence of saponins, alkaloids, tannins, phenols and flavonoids in both extracts but at different concentrations. The fungitoxic potentials of these extracts on white yam rots can proffer the need for genetically modification of the white yam which is more prone to rot and can also provide an alternative to synthetic fungicides since it is less expensive, environmental friendly and easy to prepare.

Keywords: phytochemical compound, yam fungal pathogen

Herbs and Spices: Plants Protecting Plants

Cynthia Cervero Divina

Department of Biological Sciences, College of Arts and Sciences, Central Luzon State University, Science City of Munoz, Philippines
Corressponding author: cynthiacdivina@yahoo.com

Sustainable agriculture ushers the utilization of herbs and spices for protecting crops in the fields for safer food and environment. Plants produce active ingredients that can also protect other plants and can be used for organic agriculture. This paper reviews the utilization of commercial herbs and spices as green biopesticides, their phytochemical profile and modes of actions as well as their formulations as biocontrol in the Philippines. Meta-analysis revealed that most studies worked on essential oils, crude extracts and aqueous solutions of spices, and assays for flavanoids alkaloids, cardiac glycosides, saponins, tannins, and terpenoids. Results of studies accounted for the biopesticidal properties to their phenolic content. Most of the focus of researches are on the antimicrobial properties of spices against foodborne bacteria for food preservation and human pathogens for medicine. Review also revealed that studies found that modes of actions associated with antimicrobial actions of these spices are loss of cytoplasmic components due to leakage associated with disruption of cell walls and membranes and changes in the chemical composition and metabolism of fats and nucleic acids. There are limited investigation on influence of herbs on their effect on plant pathogens and pests. However, the limited studies revealed that the spices and herbs are effective biopesticides. Moreover, synergy in herb and spice extracts have been reported that mixture of extracts have stronger inhibitory activities. In organic agricultural practices in the Philippines, the more common indigenous formulations use garlic, ginger root, chili and onions. These are used in forms of crude extracts and prepared as oil and spray emulsions.

Keywords: herbs and spices, antimicrobial; essential oils, biopesticides, phytochemicals

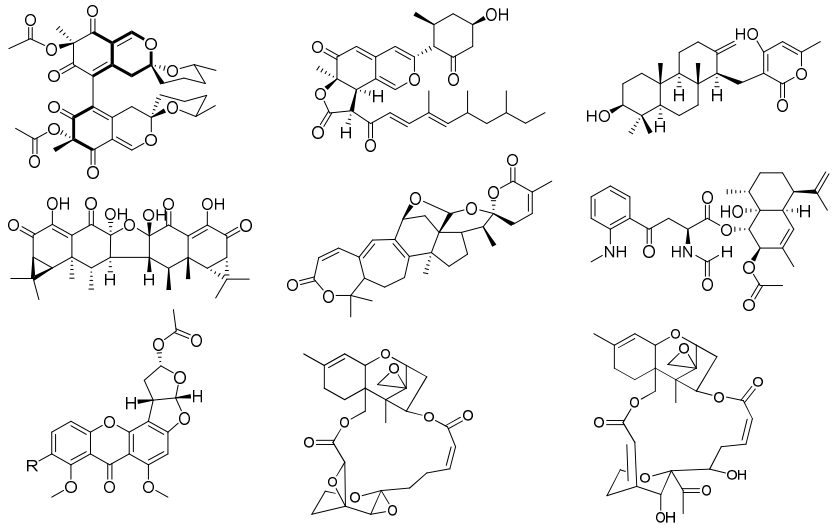
Bioactive secondary metabolites from the fungi and mushrooms

Somdej Kanokmedhakul[1], Kwanjai Kanomedhakul[1], Kasem Soytong[2] and Weerasak Saksirirat[3]

[1] Natural Products Research Unit, Department of Chemistry and Center for Innovation in Chemistry, Faculty of Science, KhonKaen University, KhonKaen 40002, Thailand
[2] Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Bangkok 10520, Thailand
[3] Department of Plant Science and Agricultural Resources, Faculty of Agriculture, KhonKaen University, KhonKaen 40002, Thailand
[*]Corressponding author: somdej@kku.ac.th

Investigation on fungi isolated from Thai soil genus *Chaetomuim* spp., *Eurotuim chevalieri*, *Botryotrichum piluliferum, Myrothecium roridum* and mushrooms, *Neonothopanusnambi* and *Ganoderma* sp. resulted in the isolation of numerous types of compounds for example

cytochalasans, xanthones, xanthoquinodins, azaphilones, depsidones, alkaloids and terpenoids. The isolated compounds were evaluated for their bioactivities such as antimalarial activity against *Plasmodium falciparum*, antimycobacterial activity against *Mycobacterium tuberculosis*, as well as cytotoxicity against KB, BC1, NCI-H187 and cholangiocarcinoma cell lines. In addition, some of the isolated compounds were tested for a bio-control agent against plant diseases. This presentation will highlight our work on chemical and biological aspects of these isolated compounds.



Keywords: *Chaetomuim*, *Botryotrichum piluliferum*, *Myrothecium roridum, Neonothopanusnambi*, zaphilone, terpenoid, antimalarial, anti-TB, cytotoxic

---

Fungal Inhibiting Capability of an Ethnobotanical Plant from Imugan, Nueva Vizcaya against *Fusarium oxysporum* and *Fusarium moniliforme*

James Kennard S. Jacob[1*], Eden S. David, Ph.D[2] and Jerwin R. Undan, Ph.D[2]

[1] Master of Science in Biology Student, Department of Biological Sciences, College of Arts and Sciences, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines 3120
[2] Faculty, Department of Biological Sciences, College of Arts and Sciences, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines 3120
[*]Corressponding author: james.jacobmsc@gmail.com

Ethnobotany pertains to the scientific association between people and plants. In the Philippines, many researchers have been upraised to review the current ethnobotanical state and pharmacological properties of plants thriving for many indigenous tribes. One specific plant used by the *Kalanguya* tribe of the Northeastern Philippines is *Derris elliptica*, locally known as *Opay,* used as a fish poison, and only minor information was known about this

indigenous plant's taxonomy. This research was undertaken to evaluate the fungal-inhibiting capability of *Derris elliptica* against two fungal plant pathogens *Fusarium oxysporum* and *Fusarium moniliforme*. Hot water extracts of *Derris elliptica* exhibited fungal inhibition to *F. oxysporum* as indicated by a retarded mycelial growth response (26.35 mm) compared to its negative control (70.07 mm) after five (5) days of incubation. The same observation was also exuded against *F. moniliforme* which also exhibited slow mycelial growth (28.28 mm) compared to the negative control (70.86 mm). Furthermore, hotwater extracts of *D. elliptica* can be considered as a fungal-inhibitor against these common plant pathogens comparable to commercially available fungal-inhibitory drugs and chemicals.

Keywords: *Derris elliptica*, ethnobotany, *Fusarium,* Kalanguya

Suitable of solvent system for extraction of allelochemicals from *Melia azedarach* L.

Pattharin Wichittrakarn, Montinee Teerarak and Chamroon Laosinwattana*

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang Bangkok 10520, Thailand
*Coressponding author: laosinwattana@hotmail.com

Comparative inhibition potential of aqueous extracts from dried leaf of different leaf growth stages of *Melia azedarach* L. (young leaves, mature leaves and old leaves) at concentrations of 1.5625, 3.125, 6.25 and 12.5 mg/ml on seed germination and seedling growth of *Phaseolus lathyroides* weeds were investigated under laboratory conditions. The distilled water was used as the control. The results indicated that aqueous extracts at the concentration of 6.25 mg/ml from young leaves, mature leaves and old leaves caused *P. lathyroides* germinated 56.25, 73.75 and 80.00%, respectively. At concentration of 12.5 mg/ml of aqueous extract completely inhibited seedling growth of *P. lathyroides*. The sequential solvent extraction of *M. azedarach* leaves was performed using hexane, dichloromethane, ethyl acetate and aqueous, respectively. These crude extracts at concentrations of 1.25, 2.5, 5 and 10 mg/ml were assayed for their inhibitory potential on *P. lathyroides* seed germination and seedling growth. The results found that the dichloromethane crude extract had the highest inhibitory effect on *P. lathyroides* at the concentration of 5 mg/ml which completely inhibited germination and seedling growth, followed by ethylacetate, aqueous and hexane crude extract, respectively.

Keywords: *Melia azedarach* L., aqueous extracts, sequential solvent extraction

Bioconversion of philippine oil to biologically active Hydroxy fatty acid 7,10-dihydroxy-8(*E*)-octadecnoic acid (DOD) by *Pseudomonas aeruginosa* PR3

Joel B. Ellamar[1*], HakRyul Kim[2], Renato G. Reyes[3]

[1] Department of Animal Science, Institute of Agriculture and Forestry,TarlacCollege of Agriculture,Philippines
[2] Schools of AppliedBiosciences, College of Agriculture, KyungpookNationalUniversity, South Korea 702-701
[3] College of Arts and Sciences, Central LuzonStateUniversity, Science City of Muñoz, Nueva Ecija, Philippines
[*]Corressponding author: ellamarjoel@gmail.com

Hydroxy fatty acids (HFAs) are multifunctional compounds with promising agricultural, biomedical and industrial applications. HFAs are produced from free fatty acids via microbial bioconversion and one of which is the 7,10-dihydroxy-8(*E*)-octadecenoic acid (DOD). DOD is produced from oleic acid by a bacterial isolate *Pseudomonas aeruginosa* PR3 through hydroxylation and isomerization. DOD possess broad spectrum antimicrobial activity against foodborne and plant pathogenic microorganisms. In recent study, DOD was utilized as substrate for the one-step synthesis of 7, 10 epoxyoctadeca - 7, 9 dieonoic acid (EODA), a novel furan fatty acid (FFA). Biological characterization of this FFA revealed that it has antioxidant activity and antimicrobial properties. In continuing screening programs for new industrial chemicals produced from vegetable oil through microbial biotechnology, the future of Philippine oil for the production of value added-hydroxy fatty acids offer promise, hence this research. Results of the present study showed that oil from the Philippines contains significant amounts of free fatty acid. Gas Chromatography and GC-Mass Spectroscopy analyses showed that the major free fatty acid in pili nut oil (PNO) and palm oil (PO) was oleic acid and lauric acid was in virgin coconut oil (VCO). Results of the bioconversion studies revealed that *P. aeruginosa* PR3 could successfully utilized PNO and PO as substrates for DOD production. Time-coursed studies also revealed that PR3 could utilize PNO efficiently and optimum production at 48 hour. Extracellular lipase activity and DOD production using PNO by PR3 revealed that it was time-dependent and varied on the type of medium. Results from this study demonstrated that PNO could also be used as substrate for the production of value-added hydroxy fatty acids by microbial bioconversion.

Keywords: microbial bioconversion, 7, 10 - dihydroxy-8(*E*)-octadecenoic acid (DOD), hydroxyl fatty acids (HFAs), *Pseudomonas aeruginosa* PR3, pili nut oil

Allelopathic effects of *Bidens pilosa* var. *radiata* and its preliminary utilization to control weeds in rice

Ramida Krumsri[1], U. Suwunnamek[1], W. Homhaul[1], C. Laosinwattana[2] and T. Poonpaiboonpipattana[1*]

[1]Department of Agricultural Science, Faculty of Agriculture, Natural resources and Environment, Naresuan University, Phitsanulok 65000, Thailand.
[2]Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 10520, Thailand
[*]Corressponding author: thanatchasanhap@nu.ac.th

Bidens pilosa L. var. *radiata* Sch.Biq. is an invasive weed generally distributed in Thailand. This study was carried out to investigate the phytotoxic effects of *B. pilosa* and its utilization on controlling paddy weeds, along with reports on allelopathic activities for the use of a weed control tool. A comparison between fresh and dry plants of *B. pilosa* was assessed by germination tests of *Echinochloa crus-galli* (L.) Beauv. 70% ethanol extract of the fresh whole plant showed to be more phytotoxic than dry plants. Different stages at 30, 45, 60 and 75 days after planting (DAP) process were tested against phytotoxic effects on *E. crus-galli*. The results showed that at 60 DAP had the highest effects followed by 45, 30 and 75 DAP, respectively. Soil mulching and soil incorporation with fresh *B. pilosa* were preliminarily tested on natural paddy soil in pot scale. Both mulching and incorporation had significantly reduced weed density. However, there was no-significance between the mulching and incorporation stage. The percentage of weed control was about 45%, 60%, 70% and 85% with the rate of 20, 30, 40 and 50 t fresh weight (f.w.)/ha, respectively. Another experiment was utilized the *B. pilosa* by a directed cut fresh plant integrated with irrigation at an early stage of rice and paddy weeds in pot conditions. *B. pilosa* applied within this method could reduce total weeds at all rates. The total weed density were inhibited by 39.57%, 43.60%, 79.44% and 100% with the rates of 1, 2, 4 and 6 t f.w./ha, respectively, while the rice seedling had no toxicity. This study demonstrated that the application of *B. pilosa* integrated with irrigation at an early growth stage of rice was highly possible to utilize the *B. pilosa* on the weed control tool with non-chemical methods. Future studies should focus on field trials on weed control and rice yields.

Keywords: allelopathy, *Bidens pilosa* L. var. *radiata* Sch. Biq., weed control, paddy weed

Documentation of the practice of entomophagy in Sekoma, Botswana

John Cassius Moreki[*] and Tshepiso Petere

Department of Animal Science and Production, Botswana College of Agriculture, Private Bag 0027, Gaborone, Botswana
[*]Corresponding author: jcmoreki@gmail.com

Throughout the world, a large proportion of the human population consumes insects as a regular part of their diet. A study was undertaken to document edible insects in Sekoma in

Southern District of Botswana. Thirty-five respondents were randomly selected and interviewed using a structured questionnaire. A total of 12 insect species was identified from four orders: Lepidoptera, Coleoptera, Isoptera and Hemiptera. The four most consumed insects were *Lophostethus dumolini* Angus (91.4%) followed by *Agrius convolvuli* L (74.3%), *Sternocera orrisa* (71.4%) and *Heniocha* spp. (51.4%). This showed that insects are available for human consumption immediately after the rainy season, indicating that their availability is seasonal. The present results showed that entomophagy plays an important role in human nutrition and poverty alleviation.

Key word: edible insects, entomophagy, nutrition, poverty, Sekoma

Population dynamics of insects associated with Dragon fruit (*Hylocereus* sp.)

Jaypee H. Estigoy[1], Maria Adrielle S. Estigoy[2*]

[1] Instructor, Agricultural Science and Technology School; Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines;
[2] Instructor, Research Office; Central Luzon State University,Science City of Muñoz, Nueva Ecija, Philippines;
[*]Corressponding author: mariaadrielleestigoy@gmail.com

Population dynamics include seasonal occurrence of the insects, insect diversity index, and correlation of insect population with weather factors and estimated damage assessment of major insect pests. Insect monitoring methods used were visual count, use of yellow and blue sticky boards and commercial methyl eugenol sprayed on PET bottles. In particular, insects associated with dragon fruit production indicated predominance of Tachinid fly, all three species of ants (*Paratrechina* sp*., Solenopsis* sp*. and Tapinoma* sp.) and aphids during the vegetative stage; only three species of ants and fruitfly (*Bactrocera* sp.) were observed during the flowering stage and ants again at the fruiting stage. Insect diversity index on dragon fruit was low attributable to only a few insect species noted and was only for one site in Batac City, Ilocos Norte. Similarly, diversity index was low when superficially taken at the three crop stages. Correlation analysis showed that the population of Rutelinae is affected by rainfall (RF). The increasing population of the Stratiomyidae and Tephritidae was positively correlated by increasing relative humidity (RH) while seven species of families Labiduridae, Stratiomyidae, two species of Nitidulidae, Tephritidae, Rutelinae and Scelionidae were significantly affected by wind speed (WS). The maximum air temperature (MAT) did not affect any of the insect species. The three species of ant were not affected by any of the weather factors. An *in-vivo* experiment showed that the rate of damage of fruit fly on the fruit was 25% and described as having numerous exit holes, very soft to touch and with oozing saps from the holes. The injury caused by the red ants was 30% of the total number of collected fruits described as having numerous white, pin-sized pricks on the skin with few coalescing scab-like lesions.

Keywords: population dynamics, diversity index, damage assessment

The relationships between thrips populations and climatic factors, Mangosteen development stage in Nakhon Si Thammarat Province, Thailand

Tipawan Thongjua* and Jarun Thongjua

Faculty of Agriculture, Rajamangala University of Technology Srivijaya, RMUTSV, Nakhon Si Thammarat, Thailand, 80110
*Corressponding author: kai_thipawan@hotmail.com

Thrips population was studied from 4 mangosteen farmers'orchards in Thungsong, Cha Oad, Ronphiboon and Lanska district, Nakhon Si Thammarat province during January and December 2014. *Scirtothrips dorsalis* Hoods and *S. oligochaetus* Karny were predominantly found. Thrips abundance was peaked maximum in April at the flowering and young fruit stages. An average number of thrips/shoot was 0.10. The relationship between thrips populations and climatic factors such as temperatures, relative humidity, wind speed, rainfall and the stage of in-season and off-season mangosteen development was studied. The results of correlation coefficient value (r) at 0.30 -0.50 -0.18 -0.33 0.43 and 0.65 were illustrated, respectively which statistical significance (p) at 0.32, 0.10, 0.41, 0.28, 0.25 and 0.14 respectively, were not significantly different ($p>0.05$). The relationship between climate factors and a population of thrips found that relative humidity was moderate correlation ($r = -0.50$) with a negative relationship and fruit development stage of the season, the relationship was moderate ($r = 0.65$) with a possitive relationship. For other factors, the correlation coefficient value (r) was the low level ($r <0.50$), and the analysis of the statistical significance value (p) found that all climatic factors were not significantly ($p> 0.05$) with a population of thrips.

Keywords: population, thrips, climate, correlation coefficient

Identifications of *Phytophthora* spp. causing citrus root rots in Thailand

Phung Manh Hung[1, 2*], Pongnak Wattanachai[1], Soytong Kasem[1] and Supattra Poeaim[3]

[1]Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[2]Northern Mountainous Agriculture and Forestry Science Institute, Phu Tho 293840, Vietnam
[3]Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
*Corresponding author: manhhungnomafsi@gmail.com

Thailand is one of the largest citrus producers in Southeast Asia. Pathogenic infection by *Phytophthora*, however, has become one of major impediments to production. This study presents the isolations, descriptions and pathogenicity of *Phytophthora* from citrus Thailand. Six oomycetes, which divided into two groups slow-growth and fast-growth isolates, were found in infected root and soil samples. All obtained isolates produced caducous sporangia and show highly virulent for pomelo seedlings in pathogenicity test. Then the slow-growth and fast-growth isolates were identified as *Phytophthora palmivora* and *Phytophthora nicotianae*, respectively, by the internal transcribed spacer ribosomal DNA sequence analysis.

The occurrence and the approach to control of root and foot rot of Pummelo (*Citrus maxima* (Burm.) Merr.) var. Tabtimsiam in Nakhorn Si Thammarat province

Chaisit Preecha*, Wethi Wisutthiphaet and Pornsil Seephueak

Department of Plant Science, Faculty of Agriculture,Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat, Thailand 80110
*Correspondence author email: skpreecha@yahoo.co.uk

Pummelo (*Citrus maxima* (Burm.) Merr.) var. Tabtimsiam growing in PakPanang, Nakhon Si Thammarat was severe damaged by root and foot rot caused by *Phytophthora parasitica* Dastur. These surveys found that disease severity increasing was related to developing stage from young to mature leaf, flowering, young fruit and mature fruit stage. Symptom began at young leaf stage, leaf turned to brown rot cover all leaf and fall down. At fruit stage, symptom of brown rot appeared from young fruit to mature stage, brown rot extended and fruit also fall dawn. Infectious plant showed stunting, pale and yellow leaf. Main root and stem rotted and gummosis, bark broke out. Severe infect plant, shoot dieback, poor healthy plant with thin canopy appeared, at final stage plant decline most leaf fall down and plant died. Antagonistic bacterial against *P.parasitica* was isolate PNTS06-5, one out of 123 isolates. It inhibited 95.56 % mycelium growth of *P. parasitica*. Fungal antagonist isolate PNTS 02-1, one of 8 isolates inhibited mycelium growth of 75.93 %. Control efficacy against pathogen of antagonistic bacterium and fungus, and fungicides were done in *vitro* and orchard. The result shown that fosetyl-aluminum was the highest efficacy control *P. parasiticain* in *vitro* with 100% mycelium growth inhibition. In orchard, fosetyl-aluminum also shows the best control efficacy. It reduced disease severity of 59.80 %. While, antagonistic bacterial isolate PNTS 06-5, antagonistic fungal isolate PNTS02-1 and conventional fungicide (famer application), carbendazim were lower control efficacy of 36.27, 26.47 and 18.62% respectively.

Keywords: root and foot rot, antagonist

Application of new bio-formulation for bio-control of *Colletotrichum coffeanum* causing coffee anthracnose in Arabica variety in Laos

Somlit Vilavong and Kasem Soytong*

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Chalongkrung Road, Ladkrabang, Bangkok 10520, Thailand
*Corressponding author: ajkasem@gmail.com

Coffee anthracnose pathogen was isolated from leaves and coffee beans and identified as *Colletotrichum coffeanum*, then proved for pathogenicity. Bioactive substances as crude hexane, crude ethyl acetate and crude methanol from *Chaetomium cupreum* CC3003 showed good efficacy to inhibited *C. coffeanum* which the ED_{50} values were 13, 11 and 28 ppm. Bio-fomulation in powder of *Ch. cupreum* gave the highest disease reduction of 54.77 %, and followed by nano-Chaetomium, nano- trichotoxin and spore suspension of *Ch. cupreum* which disease reduction were 46.23, 42.71 and 18.59 %, respectively when compared with

the inoculated control. It is the first report on bio-control of coffee anthracnose in Lao PDR using bio-formulation and nano-materials of *Ch.cupreum* to control *C. coffeanum* causing coffee anthracnose in Arabica variety.

Keywords: coffee anthracnose, Arabica variety

Antifertility and cytotoxicity properties of *Auricularia* sp.

Beniece B. Limos, Hezekiah Mirielle P. Aguinaldo* and Cynthia C. Divina

Department of Biological Sciences, Central Luzon State University, Science City of Munoz, Philippines
Corresponding author: hmpaguinaldo@gmail.com

Auricularia sp. is a common mushroom in Asia and well-known for its potential nutraceutical properties. This study determined if *Auricularia* sp. of the Philippines have antifertility, cytotoxicity and teratogenicity properties. The phytochemical profile of *Auriculuria* was determined using standard protocols. Antifertility assay was conducted by finding out the influence of feeding *Auriculuria* sp. in the estrous cycle of albino mice for 15 days. The surviving mice were divided into two groups with one continuously fed with the replacement diet and the other was reverted back to normal diet. The mice were fed diet of 10 and 20 percent mushroom replacements. The cycle was monitored through vaginal cytology. Cytotoxicity of the ethanolic extract of the *Auricularia* sp. was tested in brine shrimp assay. The brine shrimps were exposed to different concentrations of extract and survival were observed and analyzed. Results of the phytochemical profiling revealed that wild *Auricularia* sp. fruiting bodies contained saponins, alkaloids, and tannins but tested negative for flavonoids, phobatannins and cardiac glycosides. The estrous cycle of the mice fed with mushroom feed replacements had irregular patterns of cycling with prolonged diestrus stages. Administering *Auricularia* sp. can lengthen estrous cycle during feeding and maybe reversed when feeding was withdrawn. *Auricularia* ethanolic extract showed to have cytotoxicity properties.

Keywords: *Auriculria* sp. antifertility, cytotoxicity, phytochemicals, brine shrimp assay, estrous cycle

Application of nano-particles from *Chaetomium globosum* to control leaf spot of rice

Rujira Tang-on and Kasem Soytong

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
* Corresponding author:

Result showed that nano-CGH, nano-CGE and nano-CGM from *Chaetomium globosum* strain KMITL 0802 significantly inhibited *Curvularia lunata* causing leaf spots of rice, which the ED_{50} values were 1.12, 1.19 and 1.93 $\mu g.ml^{-1}$, respectively within 7 days. It is the first report of nano-particles from *Chaetomium globosum* to control *Curvularia lunata* causing leaf spot of rice. Further investigation is being done in the field trials.

Biological activity of endophytic fungi from palm trees against Chilli anthracnose caused by *Colletotrichum capsici*

Song Jiaojiao*, Pongnak Wattanachai and Soytong Kasem

Faculty of Agricultural Technology, King Mongkut's Institute of Technology Lakrabang, Bangkok 10520, Thailand
Corressponding author: misssongjiaojiao@163.com

Endophytic fungi are those living inside the host plant without causing any apparent negative effect on host plant. Isolated endophytic fungi from palm trees in King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand, and identified by morphology. Crude extracts of *Fusarium* spp., and *Nigrospora* spp. were yielded and examined for bioactivity test against *Colletotrichum capsici* from chili anthracnose including crude hexane, crude ethyl acetate and crude methanol. The results showed that crude methanol from *Nigrospora* spp., and *Fusarium* spp. gived highest inhibition percentage of colony growth of *C. capsici*, which were 48.75% and 34.50% at concertration of 1000 ppm. Crude methanol from *Nigrospora* spp. gived significantly highest inhibition percentage of spore production of *C. capsici* as 87.26% at concentration of 500 ppm and crude methanol from *Fusarium* spp. showed highest inhibition percentage of spore production as 74.52% at concentration of 1000 ppm. The methanol crude extract from *Nigrospora* spp. expressed the ED_{50} value of 41.51 ppm and ethyl acetate crude extract from *Fusarium* spp. expressed the ED_{50} of 42.40 ppm to inhibit *C. capsici*. The research findings are reported that the metabolites from *Nigrospora* spp. and *Fusarium* spp. inhibited *C. capsici* and *Nigrospora* spp. showed higher inhibition.

Key words: endophytic fungi; palm trees; bioactivity test; chili; *Colletotrichum capsici*

Antifungal activity of *Talaromyces flavus* against coffee anthranose

Mayamor Soytong and Supattra Poeaim*

Department of Biology, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
*Coresponding author: poeaim@hotmail.com

Colletotrichum coffeanum causing anthranose is proved for pathogenicity to coffee var. Arabica. *Talaromyces flavus* EU18 is taxonomic confirmed by morphological characters and molecular phylogeny based on ß-tubulin region. The crude ethyl acetate and crude methanol extracted from *T. flavus* EU18 showed significantly antifungal activity against *C. coffeanum* which the median effective dose (ED_{50}) values for colony growth inhibition of 580.00 and 420.00 ppm, respectively. Crude hexane, ethyl acetate and methanol extracts at 1,000 ppm suppressed the colony growth of 43.00, 60.75 and 76.25 %, respectively and sporulation of 61.76, 73.02 and 80.00 %, respectively. It is clearly demonstrated that metabolites from *T.flavus* EU18 acts as a new antagonist against *C. coffeanum* causing coffee anthracnose. The chemical elucidation of bioactive compound to prove control mechanism is being done and characterized.

Keywords: *Talaromycesflavus*, fungal metabolites, coffee anthracnose

Antifungal activities of 3 endophytic fungi isolated from orchids against *Colletotrichum* sp. caused anthracnose in orchids

Vannak Sour*, Sarayut Phonpho and Kasem Soytong

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
*Coresponding author:

Crude extract from 3 endophytic fungi, *Daldiniaesch scholtzii*, *Chaetomium cochliodes* and *Chaetomium cupreum*, were isolated from orchids showed ability to inhibit the mycelia growth and spore production of *Collectotrichum* sp. caused antracnose in orchids. Crude hexane, ethyl acetate and methanol from *Daldiniaesch scholtzii* at the concentrations 1,000 µg/ml showed the ability to inhibit mycelia growth of *Colletotrichum* sp. which was 75.5 %, 61.75 % and 41.75 % respectively, inhibited spore productions which were 65.5 %, 69.45 % and 33.09 % respectively and have ED50 value as 220.9214, 104.7066 and 2971.033 respectively. Crude extract from *Chaetomium cochliodes* at the concentrations 1,000 µg/ml can inhibit the mycelia growth of *Colletotrichum* sp. which was 53.75 %, 35.5 % and 60.25 % respectively, inhibited spore productions which were 46.12 %, 51.77 % and 60.87 % respectively and have ED50 value as 1754.045, 1879.879 and 712.0882 respectively. Crude extract from *Chaetomium cupreum* also have ability to inhibit *Colletotrichum* sp., at the concentrations 1,000 µg/ml showed that can inhibited the growth of mycilia which was 40.5 %, 67.25 % and 37.75 %, inhibited spore productions which were 51.35 %, 51.27 % and 58.65 % respectively and have ED50 value 794.8441, 624.2459 and 879.0221 respectively.

Keywords: endophytic fungi, orchid, *Daldiniaesh scholtzii*, *Chaetomium cochliodes*, *Chaetomium cupreum, Colletotrichum* sp.

Study on appication of *Chaetomium* to control anthracnose and root rot disease on tea (*Camellia sinensis)* in Vietnam

Nguyen Van Thiep*, Nguyen Huu La

Biotechnology and Plant Protection Department, Northern Moutainous Agriculture and Forestry Science Institute, Vietnam
* Corresponding author: nvthiep30@hotmail.com

Currently anthracnose and root rot are very important diseases on tea plants in Vietnam. Using chemical fungicides not only gives low efficiency of controlling disease, but also pollute the environment. With the desire of minimizing the heavy use of toxic chemicals pesticide in tea production, study on using antagonistic fungi to control tea diseases has only been conducted in recent years in Vietnam. *Chaetomium bostrychodes* CPT1 and *Chaetomium globosum* CPT1, which were isolated from tea soil in Vietnam, were evaluated for their antagonistic activity against *Colletotrichum theae-sinensis* causing anthracnose and *Fusarium roseum* causing root rot disease of tea (*Camellia sinensis*). Bi-culture antagonistic tests proved that *C. bostrychodes* CPT1 inhibited 59.88% and 62.74% colony growth of *C.*

theae-sinensis and *F. Roseum*, respectively; were while *C. globosum* CPT1 respectively inhibited 65.33% and 68.24% colony growth of these diseases. Simultaneously these *Chaetomium* strains strongly inhibited the spore production of the two tested tea pathogens. Accordingly, the inhibitory effect on the sporulation of *C. bostrychodes* CPT1 against *C. theae-sinensis* was 90.08% and against *F. roseum* was 92.84%. Greenhouse test for comparing control effect of bio-products formulated from the tested *Chaetomium* strains in solution form and chemical fungicide namely Daconil against the tested tea pathogens was conducted. The results showed that the mixtures of *C. bostrychodes* CPT1 and *C. globosum* CPT1 in a solution as biological fungicide completely prevented the growth of *C. theae-sinensis* on the infested tea leave and reduced the disease incidence of tea cuttings infested with *F. roseum*, and also reduced the inoculum of *F.roseum* . After three months, the controlling effect of the mixed-chaetomium solution control against the tea pathogens reached 80.41% for *C. theae-sinensis* and 84.62%. for *F. Roseum.* ; while those of Daconil reached 62.42% for *C. theae-sinensis* and 46.92% for *F. roseum*. In conclusion, *C. bostrychodes* CPT1 and *C. globosum* CPT1 could be used to control *Colletotrichum theae-sinensis* causing anthracnose and *Fusarium roseum* causing root rot disease of tea both *in vitro* and *in vivo* tets. The results of this study open the way applications of Chaetomium such as biological fungicides safety for tea products.

Key words: tea, *Colletotrichum theae-sinensis, Fusarium roseum,* antagonistic test, *Chaetomium bostrychodes, Chaetomium globosum*

Quorum Sensing Inhibition by Philippine Ethnobotanicals

Wilson R. Jacinto[1*], Khristina J. Cruz[2] , Karmina N. Barrogo[2], Gene Beniece A. Benito[2], Krystel Grace V. Padilla[2], Jessica Joyce L. Jimenez[2], James Ryan G. Vias[2], Jherick John C. Gatchalian[2]

[1] Biological Sciences Department, College of Science and Computer Studies, De La Salle University-Dasmariñas, City of Dasmariñas Cavite, Philippines
[2] Department of Biological Sciences, College of Arts and Sciences, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines
[*] Corresponding author: wrjacinto599@gmail.com

Ten ethnobotanicals from Mount Imanduyan, Barangay Imugan, Sta. Fe, Nueva Vizcaya, Philippines were evaluated of their anti-quorum sensing activities against representative opportunistic pathogens, specifically detecting which quorum-sensed virulence factors are inhibited in their expression. The ethnobotanicals, which include *Bidens pilosa* L. (Anwad), *Cestrum nocturnum* L. (Dama de Noche), *Sarcandra glabra* (Thunb.) Nakai (Hag-ob), *Oreocnide trinervis* (Wedd.) Miq. (Lal-latan), *Pittosporum pentandrum* (Blanco) Merr. (Lahwik), Lipang Daga, *Derris elliptica* Benth. (Opay), *Alstonia scholaris* (L.) R. Br. (Palay), *Ageratina adenophora* (Spreng.) R. M. King & H. Rob. (Panawel) and *Ayapana triplinervis* (Vahl.) R. M. King & H. Rob. (Pantallion) were extracted using leaves with solvents 80% ethanol, methanol and n-hexane (non-polar) separately.

Antibacterial activities in *Pseudomonas aeruginosa* BIOTECH 1335 and *Staphylococcus aureus* BIOTECH 1582 were, first, determined among the extracts followed by standard anti-quorum sensing detection with biosensor *Chromobacterium violaceum*

ATCC 12472. Sans antibacterial, the extracts were incorporated in the culture media to detect suppression of pyocyanin production and swarming motility in *P. aeruginosa*; and DNase and α-hemolysin for *S. aureus*.

The following ethnobotanicals were antibacterial to *S. aureus* BIOTECH 1582: *Bidens pilosa* ethanolic and methanolic, *Cestrum nocturnum* methanolic, and *Pittosporum pentandrum* ethanolic and methanolic extracts. However, only *Pittosporum pentandrum* ethanolic extracts were antibacterial to *P. aeruginosa* BIOTECH 1335.

Six (6) ethanolic and seven (7) methanolic extracts exhibited anti-quorum sensing activities in *C. violaceum* ATCC 12472. These were *Cestrum nocturnum* L. (Dama de Noche), Sarcandra glabra (Thunb.) Nakai (Hag-ob), *Derris elliptica* Benth.(Opay), *Alstonia scholaris* (L.) R. Br. (Palay), *Ageratina adenophora* (Spreng.) R. M. King & H. Rob. (Panawel) and *Ayapana triplinervis* (Vahl.) R.M. King & H. Rob. (Pantallion) and *Bidens pilosa* L. (Anwad), *Sarcandra glabra* (Thunb.) Nakai (Hag-ob), *Oreocnide trinervis* (Wedd.) Miq. (Lal-latan), *Pittosporum pentandrum* (Blanco) Merr. (Lahwik), *Derris elliptica* Benth.(Opay), *Ageratina adenophora* (Spreng.) R. M. King & H. Rob. (Panawel) and *Ayapana triplinervis* (Vahl.) R. M. King & H. Rob. (Pantallion), respectively.

In pyocyanin assay, only ethanolic extracts of *Cestrum nocturnum*, *Oreocnide trinervis*, and *Ayapana triplinervis* were anti-quorum sensing; while nine ethanolic (except for *Pittosporum pentandrum* ethanolic, which is antibacterial) and all ethnobotanical methanolic and n-hexane extracts inhibited quorum-sensed swarming motility of the test bacteria.

Both ethanolic and methanolic extracts of *Oreocnide trinervis*, *Cestrum nocturnum, Ayapana triplinervis* ethanolic, and *Derris elliptica* methanolic extracts were anti-quorum sensing against DNase production in *S. aureus* BIOTECH 1582. All eight (8) ethanolic, and ten (10) n-hexane extracts inhibited α- hemolysin production, while seven (7) methanolic extracts showed no anti-quorum sensing activities.

The results show a considerable potential of the ethnobotanicals as sources of anti-quorum sensing compounds for this new therapeutic direction. It is highly recommended to verify results through molecular methods.

Keywords: ethanobotnicals, extracts, anti-quorum sensing, virulence, *Pseudomonas aeruginosa* BIOTECH 1335, *Staphylococcus aureus* BIOTECH 1582

The development of P10 antibody of SRBSDV causes rice black-streaked dwarf disease in Vietnam for diagnosis by ELISA approach

Do Thi Hanh[1], Dam Quang Hieu[2], Pham Thanh Tam[2], Pham Thi Van[2], Nguyen Duy Phuong[2] and Pham Xuan Hoi[2*]

[1] Phuong Dong University, Hanoi, Vietnam
[2] Department of Plant Molecular Pathology and Abiotic stress, Institute of Agricultural Genetic, Hanoi, Vietnam
[*]Corresponding author:

Southern rice black-streaked dwarf virus (SRBSDV) – a novel member in Fijivirus genus of Reoviridae family appeared in Vietnam first time in 2009, caused a serious outbreak in 2010. This virus is difficult to diagnose in the early stages of infection, and is very destructive at the late stage. At present, the RT-PCR is a common method to identify virus, however, due to

its characteristics, RT-PCR is costly, complex, and unable to conducton the field. Thus, ELISA approach has been being developed for rapid diagnosis of SRBSDV. In this study, coding sequence of outer-capsid protein (P10) was cloned into pET28a vector and overexpressed in *E. coli* Rosetta. P10 recombinant protein was induced in 1mM IPTG, at 28ºC overnight and purified by Ni-NTA agarose system. The purified recombinant protein was injected in mice and polyclonal antibody was purified by protein A system. The polyclonal antibody was used to recognize both P10 recombinant protein and diseased sample that originated from artificial transmission rice and maize by Dot-ELISA. Our results demonstrate that polyclonal antibody was able to detect all diseased samples in rice and maize at the titer of 1:6000 and 1:8000, respectively. At titer of 1:5000, the antibody absolutely detected the diseased sample at 1:1000 dilution. Our data open a new option for arapid, accurate and inexpensive method to detect SRBSDV.

Keywords: SRBSDV, diagnosis, outer-capsid protein, polyclonal antibodies, dot-ELISA.

Session 3: **Agricultural Development and Related Fields**

Commercial Development of the Ostrich industry in Botswana

John Cassius Morekia* and Boitumelo Kgakole

Department of Animal Science and Production, Botswana College of Agriculture, Private Bag 0027, Gaborone, Botswana
Corresponding author: jcmoreki@gmail.com

This paper gives an overview of commercial ostrich farming in Botswana, which started in the mid 1980s but is still in its infancy. Botswana boasts the largest number of wild ostriches estimated to be approximately 60000, probably indicating that the country's hot and dry climate is ideal for ostrich production. Generally, ostrich population has declined over time. The number of farmed ostriches declined from 6000 in 2010 to approximately 2200 in 2015. This decline occurred despite government support in the form of grants and highly subsidized loans, as well as, availability of the state of the art export abattoir and Dibete Ostrich Multiplication Unit (DOMU). Some major challenges faced by the industry include high input costs especially feed costs, prolonged closure of the abattoir, lack of access to finance and inadequate extension service. For the industry to grow, it appears that additional government support in the form of feed subsidies, provision of additional transport resources and training of technical staff in ostrich production are required. Despite the challenges, the industry seems to have a bright future given the high demand of ostrich meat and products in the EU and untapped local market.

Keywords: Botswana, DOMU, European Union, local market, ostrich farming, ostrich meat

Carbon massflow and greenhouse gases emission from pork and goat meat productions in Thailand: case study of Nakhon Ratchasima, Chon Buri and Prachin Buri provinces

Panisara Vichairattanatragul[1], Nathawut Thanee[1*] and Prayong Keeratiurai[2]

[1] School of Biology, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima, 30000, Thailand
[2] School of Civil Engineering, Faculty of Engineering, Vongchavalitkul University, Nakhon Ratchasima, 30000, Thailand
[*]Coressponding author: nathawut@sut.ac.th

One of the environmental threats that our world has faced today is the greenhouse effect. The important greenhouse gases including carbon dioxide (CO_2), nitrogen oxide (NO_x), methane (CH_4) and chlorofluorocarbon (CFC) cause global warming. Livestock production also releases CO_2 and CH_4 to the atmosphere. Swine (monogastric animals) and goats (small ruminant animals) that are raised for their meat and all produce the emissions of both CO_2 and CH_4. Therefore, the purposes of this study were to determine carbon emission factors, to investigate the rate of carbon massflow from animal feed to swine and goats, and to study the carbon emission from energy used in meat production from these farms and slaughterhouses. The research was conducted in 26 districts and 6 sub-communes in Nakhon Ratchasima, 11 districts in Chon Buri and 7 districts in Prachin Buri porvinces during October 2010 to September 2011. Samples of grass and animal feed for feeding in meat production, and the faeces of animals were collected and transferred to the laboratory for analysis. The results revealed that the carbon emitted per living weight from swine and goats were 2.81×10^{-3} and 12.44×10^{-3} kg.C/kg.livestock animal/day, respectively. The rate of carbon massflow from grass and animal feed (C-input) from swine (0.942±0.04 kg.C/swine/day) was lower than from goats (1.130±1.68 kg.C/goat/day). Carbon emission (C-emission) from swine (0.278±0.58 kg.C/swine/day) was lower than from goats (0.443±1.46 kg.C/goat/day). Carbon fixation (C-fixation) in swine and goats were 0.664±0.08 and 0.687±1.06 kg.C/kg.livestock animal/day, respectively. The carbon emitted from pork production was lower than goat meat productions. The result also showed that the performance comparison of C-fixation [(C-input – C-emission)/C-input] of swine and goats were 70.49% and 60.80%, respectively.

Keywords: carbon emission, carbon massflow, carbon footprint, swine and goat productions

RT-LAMP Test Kit: A New Generation of Molecular Quick Test Kit for Porcine Epidemic Diarrhea Virus (PEDV)

Clarissa Yvonne J. Domingo

Rubigilda Paraguison-Alili College of Veterinary Medicine, Central Luzon State University
Science City of Muñoz, Nueva Ecija
Corressponding author: cyjd1793@gmail.com

The current invention is an RT-LAMP test kit that is exceptionally simplified and economically designed for detecting porcine epidemic diarrhea virus (PEDV), a number one threat causing an infectious acute enteritis and diarrhea in pigs, severely in piglets. The test is based on the principle of Loopmediated Isothermal Amplification method (LAMP) which is recognized by the World Assembly of Delegates of the OIE in May 2012 as an alternative technique to PCR. The RT-LAMP test kit is a closedtube system designed with built-in less than a minute procedure nucleic acid extraction procedure devoid of using commercial kit done in less than a minute and the economically formulated components of the RT-LAMP premixes which are both assembled in one kit. The kit specifically contains originally designed oligonucleotides, locally engineered plasmid DNA as positive control, LAMP reagent premix and the simplest nucleic acid extraction process. The study designed new LAMP primers and optimized the reverse transcription LAMP protocol; validated the RT-LAMP protocol using field samples for surveillance data of PED; determined the prevalence of PED infections among hog farms in two provinces of the country using the developed RTLAMP assay; established the sensitivity and specificity of the developed RT-LAMP protocol with RTPCR; constructed DNA plasmid harboring the target DNA region of the S gene of the virus for reference template or positive control to be incorporated in the kit; and finally, had the PED LAMP test kits validated by other diagnostic laboratories. The optimized PED RT-LAMP protocol could amplify at 65^{o} C for 30 minutes using a heat block. The analytical sensitivity of RT-LAMP which can detect the lowest PED virus concentration was at 0.00031 ng/µl concentration or 10-6 dilution. The outer forward and reverse primers of RT-LAMP used in qPCR are specific for PED virus amplification through the unified peaks at melting temperature above 80.0^{o} C. Analytical specificity showed that RT-LAMP was specific for the spike glycoprotein target gene of PED virus only and could not amplify other swine gastrointestinal genes. Using the cloned cDNA as reference template in RT-PCR, a PCR product with an amplicon size of 188 bp was visualized in the gel and the DNA sequence found it to be 99% homologous to the target gene. PED prevalence in the two provinces using the RT-LAMP assay was 65.3% (95% CI: 60.0-70.5). Diagnostic sensitivity, with RTPCR as the gold standard, RT-LAMP was 100% whereas specificity was 63.64 up to 75.0%. This is because the RT-PCR assay could not detect the virus in samples that were positive in the RT-LAMP assay. The RT-LAMP premix can still efficiently amplify even up to 80 days of cold storage (-20^{o} C). Field validation of the RT-LAMP test kit was conducted and PED prevalence was 62% using fecal samples. The test kit was also used for intestines of infected piglets, swabbing from empty feed sacks, soiled floors and farrowing crates. Two evaluators who came from independent animal diagnostic laboratories indicated their satisfaction towards the LAMP after they were allowed to conduct the RTLAMP assays themselves.

The desires of people to fattening mud crab in the mangrove of La-ngu District, Satun province

Natpatcharakarn Kaewploy[1], Ratchadakorn Phonpakdee[2], Nopakoon Siriwan[3], Pakkapong Poungsuk[4], Marlowe Ubaldo Aquino[5]

[1] Ph.D. Candidate, Department of Agricultural Education, Faculty of Industrial Education King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand;
[2] Assistant Professor, Department of Agricultural Education, Faculty of Industrial Education King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand;
[3]Associate Professor, Department of Agricultural Education, Faculty of Industrial Education King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[4] Associate Professor, Department of Agricultural Education, Faculty of Industrial Education King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[5] Adjunct Professor and Visiting Lecturer, Benguet State University – Open University, Philippines and King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[*] Corressponding author: nknatpat@gmail.com.

This study aimed to explore needs for the domestication of fattening mud crabs again of farmers who used to domesticate fattening mud crabs at the mangrove forest in La-Ngu district, Satun province. The target group consisted of 268 farmers who used to domesticate fattening mud crabs and 67.16 percent of them wanted to domesticate it again but the rest (32.84%) did not. The following were reasons why they wanted to domesticate fattening mud crabs: 1) there were more tools and equipment supporting the domestication which helped an increased in yields than before 2) the farmers perceived that previous experience could help them in the domestication of fattening mud crabs and 3) the pattern for fattening mud crab domestication again was the domestication in an earthen pond with the integration of wisdoms. Capital, domestication place, knowledge, and equipment were needed for the assistance. The following were reasons why some farmers did not want to domesticate fattening mud crabs again: 1) uncertainty in continual receiving mud crab mega lots for domestication 2) having other supplementary occupations 3) high production costs and 4) topographical change of the mangrove forest which was not suitable for the domestication of fattening mud crabs.

Keywords: fattening, mud crab, mangrove

Column study of nitrate downward movement and selected soil chemical properties' changes in mine spoiled soil as influenced by liquid organic fertilizer

Zainal Muktamar*, S.Y.K. Hasibuan, D. Suryati and N. Setyowati

Soil Science Department, University of Bengkulu, Bengkulu 38371, Indonesia
*Corressponding author: muktamar1959@yahoo.com

Open pit coal mining is common practice to extract coal from lithosphere. This system, however, will bring about soil degradation. Organic fertilization is an alternative to recover fertility of the degraded soil. The objectives of the experiment were to determine nitrate downward movement and change of selected chemical properties in the soil column and to compare the growth of lamtoro (*Leucaena leucocephala*) as affected by local based liquid organic fertilizer. Column experiment was conducted using mine spoiled soil from Taba Penanjung Sub-District, Central of Bengkulu District, Bengkulu, Indonesia located at approximately 364.5 m above sea level. The experimental design was Completely Randomized Design with 3 treatments consisting of control, 75 and 150 ppm of local based liquid organic fertilizer (LOF). The treatment was replicated 3 times. Soil column was prepared using PVC pipe with diameter of 12.5 cm and length of 40 cm. Soil sample was put into the column and compacted by knocking the base of the column until the soil height achieved 35 cm. Lamtoro was raised in the column for 11 weeks. At the end of experiment, lamtoro shoot was cut and the PVC column was cleaved horizontally and soil was pushed out from the column. Soil sample was, then, sliced into 6 fractions, representing depth of 0-5, 5-10, 10-15, 15-20, 20-25, and > 25 cm. Fresh soil sample from each depth was extracted by distillated water and analyzed for NO_3-N. Remaining of soil samples was air-dried for 72 hours, grinded with 0.5 mm screen, and analyzed for available P, exchangeable K, soil pH and exchangeable Al. The experiment indicated that local based liquid fertilizer significantly increased soil NO_3-N, available P, exchangeable K, soil pH and reduced exchangeable Al. Higher rates of LOF caused increase in selected soil chemical properties but exchangeable Al. However, NO_3-N was potential to move downward to deeper depth of the soil profile. Change of exchangeable Al, soil pH and exchangeable K was observed until 20-25 m depth of soil profile, but change of available P was detected only to 10-15 cm depth. Better soil chemical properties were followed by enhancement of lamtoro growth.

Keywords: nitrate, column study, liquid organic fertilizer, mine spoiled soil

Factor condition of animal science farms in institutes of vocational in agriculture of Northeastern region, Thailand

Rongsan Panyakom[1]*, Pakkapong Poungsuk[2] and Sarawut Intorrathed[2]

[1]Ph.D. Candidate, Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[2]Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
*Corresponding author: e-mail: rangsankop@hotmail.com

This study aimed to explore general conditions of teachers taking care of Animal Science farms, Faculty of animal Science in 10 Colleges of Agriculture and Technology in northeastern Thailand which were under the supervision of Institute of Vocational in Agriculture. These teachers were obtained by purposive sampling consisting of 42 out of 86 persons. A set of questionnaires was used for data collection administered with the sample group. Obtained data were analyzed by using percentage, mean, and standard deviation. Besides, Scheffe test and t-test were employed in this study. Results of the study were as follows:

1. Most of the respondents (69.05%) were males, more than 50 years old (42.86%) and 20 years of service (54.76%). More than one-half of the respondents (54.76%) had a specialist position with an average salary of 34,893.09 baht together with other income for 7,066.66 baht on average. The highest educational attainment was bachelor's degree (71.43%). Their normal teaching load was 19.50 hours/week and their extra class was 9.90 hours per week on average.

2. Based on factor condition of Animal Science farms in 10 Colleges of Agriculture and Technology in northern Thailand based on 9 aspects, as a whole, it was found at a moderate level ($\overline{X}$ = 2.91). Based on it details, 7 aspects were found at a moderate level: 1) water source and irrigational system on the ($\overline{X}$ = 3.28) 2) farm managerial administration ($\overline{X}$ = 3.18) 3) area and soil ($\overline{X}$ = 3.12) 4) marketing and yield selling ($\overline{X}$ = 3.09) 5) personnel and workforce ($\overline{X}$ = 3.03); structures ($\overline{X}$ = 2.90) and 7) animal breeds ($\overline{X}$ = 2.73). However, financial investment ($\overline{X}$ = 2.59) and tools/farm equipment ($\overline{X}$ = 2.31) were found at a low level.

3. Regarding the comparison of factor conditions of the Animal Science farms and general conditions of the respondents, the following were found:

3.1 As a whole, there was no statistically significant difference between age of the respondent and the level of their opinions about factor conditions of the Animal Science farms. Based on its details, it was found that there was statistically significant difference at 0.05 between age of the respondents and factor condition on capital and budget. Based on Scheffe test, it was found that the respondents who were less than 41 years old had different opinions about factor conditions for those who were 41-50 years old.

3.2 As a whole, there was no statistically significant difference between teaching experience of the respondents and their level of opinions about facto conditions. Based on its details, it was found that there was statistically significant difference at 0.05 between teaching experience and factor conditions. Based on Scheffe test, it was found that the respondents who had less than 11 years of teaching experience had different opinions from these who had teaching experience between 11-20 years. Besides, there were different opinions in terms of factor conditions and personnel/workforce.

3.3 As a whole, there was no statistically significant difference between teaching load of the respondents and the level of opinions about factor conditions of the Animal Science farms. Based on its details, it was found that there was statistically significant difference at 0.05 between teaching load of the respondents and factor conditions of the farm on water source and the irrigational system on the farms. Regarding on Scheffe test based on age interval, it was found that there was difference the respondents having extra teaching load for less than 11 hours per week and there having teaching load for 11 hours and above per week.

Key words: problem conditions of Animal Science farm, teachers taking care of the farm, College of agriculture and technology, Institute of Vocational Agriculture

Needs for the development of a school agricultural learning center (SALC) model of students' guardians, Praibueng Wittaya School, Praibueng District, Srisaket Province

Wattana Saduak[1]*, Pakkapong Poungsuk [2], Ratchadakorn Phonpakdee[2] and Sataporn Deeying[3]

[1]Ph.D. Candidate, Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[2]Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[3] Program in Agricultural Technology, Rajabhat Rajanagarindra University
*Corresponding author: watana.kmitl@gmail.com

This study aimed to: 1) explore needs for the development of SALC model of students' guardians, Praibueng Wittaya school, Praibueng district, Srisaket province and 2) compare needs for the development of SALC model based on different class levels of the students. A set of questionnaires was used for data collection administered with 413 breadwinners of the students' families, school year 2015. Obtained data were analyzed by using the statistical package for finding percentage, mean, and standard deviation. Scheffe test and t-test were used for the comparison.

Results of the study revealed that most of the respondents (73.12%) were female and their main occupation was agriculture (66.83%). More than one-half of respondents (62.23%) needed for 5 aspects of the development of a SALC model; 2) style of the SALC model; 3) content used for the teaching/learning facilitation; 4) managerial administration; and 5) media/equipment which all of these were found at a high level ($\overline{X}$ = 4.20, S.D. = 0.49). It was found that there was difference in needs for the development of a SALC model at .01 in 2 aspects: managerial administration and media/equipment.

Regarding the Scheffe test, it was found that there was difference in need for managerial administration between the informants who had high educational attainment (higher than bachelor's degree and those who were bachelor's degree holders. Besides, the respondents who had high educational attainment (higher than bachelor's degree had different needs for managerial administration from those whose educational attainment was lower than bachelor's degree). Based on media/equipment, it was found that there was difference between the informants whose educational attainment was higher than bachelor's degree. Besides, there was difference between the respondents whose educational attainment was

higher than bachelor's degree and those whose educational attainment was lower than bachelor's degree.

Keywords: guardians, needs for the development, a school agricultural learning center (SALC) model, teaching/learning facilitation

Socio-Economic Factors Influencing Rice Production in Peri-Urban Area, Bangkok, Thailand

Sasima Fakkhong* and Suneeporn Suwanmaneepong

Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang. Bangkok 10520, Thailand.
*CoresspondingAuthor: sasimaf@gmail.com

The economic growth and rapidly increasing population in Bangkok metropolitan region contribute to expansion of urbanization to peri-urban area. This expansion has an effect to the alteration of agriculture land use to industrial utilization. However, the City Planning Regulation imposed on rural conservation and agricultural land, which are green areas, in order to prevent the over expansion of a city area. Ladkrabang District is a peri-urban area which was designated to be an agricultural land. This area is suitable for rice production of Bangkok consisting of 16,619 Rai of rice production area, which is the third largest rice production in Bangkok. Therefore, the objectives of this study are 1) to investigate the socio-economic factors of rice farmer in peri-urban area, Bangkok, Thailand, 2) to examine the effects of some socio-economic factors of rice production in peri-urban area, Bangkok, Thailand. The study was carried out in Ladkrabang districts, a peri-urban area of Bangkok. A simple random technique was adopted for sample selection, while semi-structured questionnaires were employed for data collection. A total of 60 rice farmers were used for the study. Descriptive and multiple regression statistics were used to analyze the data. The results from this study reveal socio-economic factors of rice production farmers, and socio-economic factors of rice production in peri-urban area. These findings are greatly beneficial for relevant agencies in order to apply to rice farmer extension in peri-urban area.

Keywords: rice production in peri urban, peri-urban rice farming, farm size, peri-urban farmer, Ladkrabang

The model development of agricultural education management of Buriram Rajabhat University: A case study of the opinion on informal education

Araya Musika[1]*, Pakkapong Poungsuk [2], Nopakoon Siriwan[2] and Sarawut Intorrathed[2]

[1] Ph.D. Candidate, Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[2] Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
* Corresponding author: musika123330@gmail.com

This study aimed to explore condition of agricultural education management and opinions about its model development. In-depth interview was used for data collection administered with 3 groups of respondents (56 persons) obtained by purposive sampling: 1) 50 farmers in 23 districts of Burirum province; 2) 4 local scholars who were admired in Burirum province, 2010-2014; and 3) 2 agricultural businessmen. Content analysis was conducted and frequency/percentage, were also used for the statistical treatment. Results of the study revealed the following:

1. More than one-half of the respondents (57.1%) were females, ordinary persons (78.6%), 41-5 years old (53.6%), and their income range was 3,000-6,000 baht per month (41.1%).

2. Respondents of the 3 groups understood about agricultural education management most in terms of flexible education without curricular program and certain learning time span. The teaching/learning facilitation was based on experiential-based and it was experience in daily life activities (35.92%). The respondents joined teaching/learning activities with specialists in agricultural, local scholars, community leaders, and agricultural academics most (42.86%). Besides, 21.43 percent learned through actual practice and discussion among friends and 28.5 percent learned through the principle of sufficiency economy and mixed farming.

3. Respondents of the 3 groups suggested about the model development of agricultural education management on the application of new technology to existing local wisdoms most (57.14%).

Keywords: the model development of agricultural education management, local wisdoms, opinions of the respondents

Community participation in agro-tourism development at Klongplu, Khaokitchakood, Chanthaburi province

Preeyanan Sittijinda[1*], Pakkapong Poungsuk[2] and Duanrung Benjamas[1]

[1] Faculty of Agricultural Technology, Rambhi barni Rajabhat University, Thailand
[2] Department of Agricultural Education, King Mongkut Institute of Technolody Latkrabang, Bangkok 10520, Thailand
[*]Corresponding author: e-mail: preeyanan.sit@gmail.com

The objectives of this study were to: 1) explore costs and potential of the community contributing to the managerial administration of community-based agro-tourism; and 3) employ the condition of agro-tourism for the construction of learning process on the management of resources and wisdoms leading to strength of the community. This study employed participatory action research instruments in this study included learning exchange venue, survey, interview, focus group discussion, and experiment on tourism program. Participants in this study consisted of 30 persons who were Chong Moohaeng organic farming group members, teachers, students, community leaders, and housewife group member. Results of the study revealed the following: 1) there was the occurrence of a tourism group; 2) community-based tourism had program, tourism routes, and the system of managerial administration which could be practice in the actual situations; 3) there was the creation of pride of ethnics group; 4) body of knowledge and data obtained from the study could be connected with formal education system; and 5) participants of the study joined community-based tourism networks of Chanthaburi province and eastern region of Thailand.

Keywords: development, agro-tourism, alternative tourism, community participation, participatory action research

Hotel Businesses and Their Connection to Local Governments: A Comparative Case Study between Chao Samran Beach and Cha-am Beach

Apirat Udomsup[1*] and Ake Tangsupvattana[2]

[1] Division of Community Development, Facuty of Humanities and Social Sciences, Phetchaburi Rajabhat University, 38 Moo 8, Haad Chao Samran, Na Wung, Muang, Phetchaburi 76000, Thailand,
[2] Dean and Associate Professor, Faculty of Political Science, Chulalongkorn University, Bangkok 10330 ,Thailand
[*] Corressponding author: dj.aptudo@gmail.com

This study aimed to investigate the relationships between local hotel businesses and Thai Hotels Association (Western Region Group) and Cha am Municipality and Had Chao Samran Municipality on the construction permission of embankment dam. The qualitative method was used. The assumption was set that the local hotel business-people proposed the Thai

Hotel Association (Western Region Group) to influence related municipalities to permit the construction. The study found that there was no relationship between hotel businesses and the Thai Hotel Association (Western Region Group) in such construction permission. The hotel businesses did not request to construct the dam through Thai Hotel Association. Local hotel businesses did not formally request the construction permission through the related authorities including offices of district, province and municipality too. In fact, embankment dam could be constructed because of inter-personal interest of local hotel business-people and municipalities' staff. There was no relationship between hotel businesses and the Thai Hotel Association regarding the continue existing of this illegal dam. Presently, the dam still exists because of the hotel business-people's individual power. Moreover, since hotel businesses brought about community's economic development, they could persuade key officials in provincial administration and local governments to hold back some essential rule application.

Keywords: local hotel business, local government, community's economic development

Needs for Developing Sustainable Agricultural Learning Sources in Wangkwang Community, Nam Nao District, Phetchabun Province

Tawit Rasee[1]*, and Pakkapong Poungsuk [2]

[1] Baan Huay Hin Lab School, Wangkwang sub-district, Nam Nao district, Phetchabun province, Thailand
[2] Department of Agricultural Education, King Mongkut Institute of Technolody Latkrabang, Bankok 10520, Thailand
*Corresponding author: rangsankop@hotmail.com

This study aimed to explore general conditions of informants and needs for developing sustainable Agricultural learning sources in Wangkwang community, Nam Nao district, Phetchabun province. The informants were obtained through purposive sampling and they were school administrator, staff of local administrative organization, community leaders, farmers, and teachers (90 persons). Structured interview schedule was used for data collection and analyzed by using percentage, mean, and standard deviation. Besides, one way Anova and Scheffe test were employed in this study. Results of the study revealed the following:

1. More than one-half (55.56%) of the informants were male and less than one-half (33.33%) of the respondents were 51-60 years old. Less than one-half of the informants were elementary school graduates (28.89%) and their occupation was agriculture (43.33%). One-half (50.00%) of the informants had been working in the community for less than 11 years and their annual income was more than 30,000 baht (37.78%). Most of the informants (68.89%) used to attend training or join activities related to agriculture.

2. The informants had a high level of needs for developing sustainable agricultural learning sources in Wangkwang community of all aspects ($\overline{X}$ = 4.12). This was based on the following: learning content offered in the learning center ($\overline{X}$ = 4.20); managerial administration ($\overline{X}$ = 4.18); media/equipment used for knowledge transfer and public relations on agricultural knowledge transfer and public relations on agricultural knowledge ($\overline{X}$ = 4.12); style of the agricultural learning center ($\overline{X}$ = 4.05); and form of the agricultural learning center ($\overline{X}$ = 4.03).

3. Regarding the comparison of general conditions of the informants, the following were found:

3.1 There was statistically significant difference at 0.05 in terms of their educational attainment and needs for developing agricultural learning sources. That was, educational attainment had statistically significant difference form style and form of the agricultural learning center at 0.05. Based on Scheffe test, however, there was no difference in all aspects.

3.2 As a whole, occupation of the informants and the level of their needs for developing agricultural learning sources had statistically significant difference at 0.05. It was found that their occupation had statistically significant difference form needs for developing agricultural learning sources. Based on Scheffe test, however, there was no difference in all aspects.

3.3 Years of service in the community of the informants and needs for developing agricultural learning sources had statistically significant difference at 0.05. It was found that years of service in the community had statistically significant difference from needs for developing agricultural learning sources of all aspects. Based on Scheffe test, the following were found:

3.3.1 Based on style and learning content of the agricultural learning center, the informants whose years of service in the community was less than 11 years were different from those whose year of services was between 11-20 years and 20 years and above.

3.3.2 Based on style of the agricultural learning centre, there was difference between the informants whose years of service was less than 11 years and those whose years of service was more than 20 years.

3.3.3 Based on managerial administration and media/equipment, the informants whose years of service was more than 20 years were different from those whose years of service was less than 11 year and between 11-20 years.

3.4 As a whole, incomes of the informants and their level of needs for developing agricultural learning sources had statistically significant different at 0.05. It was found that there was statistically significant difference at 0.05 in all aspects. Based on Schefffe test, however, it was that there was no difference in all aspects.

3.5 There was no statistically significant difference between the informants who used to join activities and those who did not.

Keywords: needs, community agricultural learning sources, sustainable development, participation

Standardization and commercialization of chevon products

Fredisminda M. Dolojan

Quirino State University
Corresponding author: fredisdolojan@yahoo.com

Prior to product development, researches were done to check different formulations of the three non-traditional chevon-based recipes that Filipinos have come to love. These are the grilled chevon with satay sauce, goat curry, and goat mini kebabs. The screening of recipes were conducted to establish healthy ingredients and procedures. Based on the initial small

research on recipes and ingredients, cooking protocols for each of the recipes were established and sample products were cooked. These products were then subjected to sensory evaluation by a trained panel, who assessed overall acceptability using flavor, meat color and sauce, thickness of sauce, tenderness, general acceptability and other sensory qualities. The most acceptable recipes were utilized for production. The products were subjected to consumer testing. Hedonic Test of nine-point scale were used to determine the acceptability of the products in terms of color, taste and general acceptability. A five-point scale were used for tenderness, juiciness, spiciness and other attributes.Result showed that all the three introduced "variants" recipe received a fully acceptable descriptive result of evaluation with an average weighted mean of 4.25 for chevon curry, 4.36 for chevon satay and 4.25 for chevonminikebab. Across all ages, they rated the three recipes as fully acceptable. The three recipes are found to be profitable. All the three recipes gave a positive return of cash expenses of 36.22% for the curry, 30.82% for the goat satay and 17.92% for the goat minikebab.

Keywords: chevon, curry, satay, kebab, standardization, hedonic

Session 4: **Crop Production and General Agriculture**

Mushroom Production in Japan

Akira Suzuki

Department of Natural Sciences, Faculty of Knowledge Engineering, Tokyo City University,1-28-1 Tamazutumi, Setagaya-ku, Tokyo 158-8557, Japan
Corresponding author: asmush@faculty.chiba-u.jp

Most Japanese people buy mushrooms at markets and do not collect mushrooms for their food in the forests. In Japan, mushroom cultivation originated from the inoculation of wood chip spawn (Tanegoma) in *Lentinuraedodes* (shiitake mushroom) on the hard wood logs of several broad-leaved trees such as beech and oaks, etc. in 1943. More than ten species of mushrooms have been produced mainly by companies and farmers, and partly by side job of people engaging forestry and/or agriculture. Most mushroom spawns have been produced by several Japanese spawn companies.The quality of spawns has been improved by mating and selection breeding and the original isolates are stored by different methods for keeping their fruiting abilities. After the second war, the mushroom production by different constituents of sawdust mediapacked in wooden-boxes, plastic bags, or glass bottles used semi- and full-controlled conditions increased. Gradually, most of those productions shifted to plastic bottle cultures since it was suitable for introduction of automatic production. Inoculation for bottle and bag cultures have been done by solid (sawdust) spawns in Japan, but not by liquid spawns as in Korea. Spawn-run room (culture room) of each mushroom is adjusted at 2-3 degrees Celsius blow to its optimum temperature for the vegetative growth avoiding temperature elevation of culture themselves derived from heating associated with mycelial respiration. The inoculation and spawn-run processes are done under aseptic conditions. After the mycelia grew whole

media, the top surfaces of cultures in most mushrooms such as *Pleurotus ostreatus* and *Hypsizygus marmoreus* etc. are treated with Kinkaki (scratching by different kinds of metal blades) for synchronized fruiting. Thereafter, the cultures are transferred to fruiting rooms adjusted at lower temperature for fruit body induction. Environmental factors such as temperature, humidity, light exposure, and ventilation in each culture process are controlled by computers adjusting them to each optimum. Harvesting and sorting including weighing of the fruit body cluster are done mostly by hand subsequent to the automatic wrapping of the crops as occasion demands. These processes are done under semi-aseptic condition. The wasted solid media are scratched out by machines, and most of them are used either for compost or litter for caw breeding. Light exposure introduced both for fruit body induction and controlling the shape of fruit bodies has been done by plant growth lumps which are now gradually replaced to LED lumps for energy-saving. In contrast, shiitake mushroom are still produced by bag cultivation mainly for fresh mushrooms as well as wood log cultivation in the raising yard (Hodaba; mostly in the forest floor) for dry foods.

Truffles: What we know and what should we know

Younes Rezaee Danesh

Department of Plant Protection, Faculty of Agriculture, Urmia University, Urmia-Iran
Corressponding author: y.rdanesh@yahoo.com and y.rdanesh@urmia.ac.ir

Truffles are a polyphyletic group of fungi that produce fruiting bodies below ground or at the soil surface with spores sequestered inside. The majority of edible truffle species are ascomycetes, and they establish mutualistic relationships with plant roots through the formation of ectomycorrhizas (EMs), benefiting the nutrition and health of their host plant. Of all the truffle species, the European black truffle *Tuber melanosporum* is the best studied, both in terms of its ecology and genetics. The market price for truffles varies, depending on species, geographic origin, size, quality, and the quantity harvested during the season. The high market value and symbiotic nature of truffles make them attractive as a centerpiece of sustainability. The cultivation of EEMMs has made considerable progress over the past 200 years. This research has concentrated on the truffles, the most expensive of the EEMMs. A few species of truffles, mostly in the genus *Tuber*, have been cultivated commercially. Some new technologies have been developed for the management of EMM plantations, in order to maximize their production. Some useful findings have come from recent molecular studies of EM fungi, including sequencing the *T. melanosporum* genome. This genome sequence will serve as a valuable resource for future studies regarding the biology and ecology of *Tuber*. Modem technologies involving the use of molecular approaches for truffle genome studies have provided better understanding of the biology and plant-fungus symbioses of EMMs. Cultivation and management of EMMs is in progress although cultivation on some mycorrhizal mushrooms remains challenging.

Accounting Development for Sustainable Production of Indigenous Rice in Southern Part of Thailand

Unchalee Sondee*, Sugalya Preecha, Punwajee Junnim, Chaloemkiat ranglek, Phatcharee Prasong

Department of Accounting, Faculty of Management Technology, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat Campus, 80110 Thailand
*Coressponding author: u_sondee@hotmail.com

The southern part of Thailand is plenty of indigenous rice varieties. Several farmers produced and set the local community enterprises to promote their rice produce. The objective of this study is to evaluate the potentiality of financial discipline, saving and financial management after developing the fit family record frame and transfer to farmers who grow indigenous rice in the southern part of Thailand. The samples used in the study were 80 families of farmers growing indigenous rice. Questionnaires were generated to interview for data collection at pre - and post - transfer household account frame. Descriptive statistics (percentage, mean and standard deviation) and t-test were used in this research. The result showed that emphasis on financial discipline of famers after transfer household account frame was higher than pre-transfer; however, their debt still did not decrease. For saving behaviors, farmers usually do both timing and amount increasing, but the total saving was lower than one third of their monthly income. It is suggested that farmers should increase income and expense recording. Consequences to transfer household account lead to increase in their expense planning frame.

Keywords: household accounting, indigenous rice, sustainable production

The Potential of Phytohumid Compounds (PHC) as Standard Preparations to Increa Productivity of Agricultural Crops

Nowick Wolfgang

daRostim Private Institute of Applied Biotechnology, D-09350, Lichtenstein/Sa., Am Eichenwald 15, Germany
Corressponding author: e-mail: info@darostim.de

Under the intensive growing conditions in Germany experiments with combinations of natural plant hormone preparations (Emistim C, Agrostimulin, Biolan) and humic acid preparations (Humisol, Lignohumat) - the so called PhytoHuminCompounds (PHC) - were carried out over a period of 10 years. Depending on the Soil-Index, yield increases of 0.1-10 dt/ha (0.2 to 12.5%) at the same level of mineral nitrogen fertilization observed. Excluding changes in the yield, savings of 10-40kg N/ha (10-40%) and more, depending on the Soil-Index, are realistic.

Growth, yield components, agronomic traits, kernel yield, cost and benefit of the NK48 corn genotype grown in tillage and no-tillage soils with different rice residue management practices

B. Wiangsamut[1*], P. Umnat[2] and M. Koolpluksee[1]

[1]Division of Crop Production and Landscape Technology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok at Chanthaburi Campus, Khao Kitchakut, Chanthaburi 22210 Thailand
[2] Department of Agroforestry, Maejo University-Phrae Campus, Rong Kwang, Phrae 54140 Thailand
[*] Corresponding author: timbancha@yahoo.com

The objective of the study was to assess growth, yield components, agronomic traits, kernel yield, cost and benefit of the NK48 corn genotype grown in no-tillage with the uncut rice ratoon covered with rice straw (T1), no-tillage with the cut rice ratoon covering (T2), no-tillage with the uncut rice ratoon (T3), and tillage without any covering (T4). The significantly highest total plant dry weight in T1 was attributed to leaf dry weight, stalk dry weight, tassel plus peduncle dry weight, cob dry weight, husk dry weight, and kernel dry weight compared to the rest of the treatments. Plant growth under T1 was better than those under T2, T3, and T4 in terms of stalk length, tassel plus peduncle length, plant height, and ear height. The amount of the total plant water accumulation in T1 was significantly higher than those in T2, T3, and T4, mainly due to its greater water accumulation in all the stalks, leaves, kernels, cobs, and husks. The % total plant water accumulation was similar in all the 4 treatments (T1, T2, T3, and T4) ranging from 57.1-60.6%. Overall, the % water accumulation in the stalks in all the 4 treatments was the highest followed by the % leaf water accumulation, the % kernel water accumulation, the % cob water accumulation, and the % husk water accumulation, respectively. T1 gave significantly the highest kernel yield compared with those of the rest treatments, mainly due to the more kernel number per row and kernel number per ear, and heavy 1,000-kernel weight. No-tillage with the uncut rice ratoon covered with rice straw (T1) increased the corn kernel yield by 35.2% as compared to tillage without any covering (T4, the control treatment). Sink strength index (SSI) is more applicable value used to describe the translocation of assimilates from the source or storage organs or source and storage organs into the ear than harvest index (HI) value. The highest cost of production was under T1. This could compensate with the highest benefit, resulting in the highest net profit (36,369 baht/ha) due to the significantly highest kernel yield (10.37 t/ha) under T1. The lowest net profit (8,523 baht/ha) was under T4 due to the high production cost and the lowest kernel yield (6.72 t/ha). Therefore, the production of the NK48 corn genotype under T1 was the most feasible for investment indicated by the highest value of benefit-cost ratio (1.54), followed by T3 (1.38), T2 (1.30), and T1 (1.14), respectively. It was suggested that the no-tillage soils covered with rice residues, especially in T1, were more economical relative to the tillage soil without any covering in T4 (the control treatment).

Keywords: NK48, no-tillage, rice residue, sink strength index, net profit, benefit-cost ratio

Monitoring and assessment of fatty acid methyl esters from Bt and non-Bt cotton cultivated soils in northern Karnataka, India

Thangadurai Devarajan[1,*], Hanamantray Pawar[1], Sangeetha Jeyabalan[2], Swapna Kishor Deshpande[1] and Muniswamy David[2]

[1]Department of Botany, Karnatak University, Dharwad, Karnataka, 580003, India
[2]Department of Zoology, Karnatak University, Dharwad, Karnataka, 580003, India
*Corresponding author: drthanga.kud@gmail.com

Soil microorganisms are helpful in performing many metabolic activities such as nitrogen fixation, phosphate solubilisation, and chemical degradation; in this regard, there are unique features occurring in soil and said to be the natural fertilizers. Applications of modern technologies like cultivating transgenic crops in the field of agriculture cause alterations in the soil microbial communities. These changes may include genetic, mutational and other molecular changes, which can be demonstrated with the help of many molecular approaches. Fatty acid methyl ester (FAME) analysis is one of the recent techniques applied to evaluate microbial community in soil and it is a rapid approach to interpret the possible impact of transgenic crops on soil microbial diversity. With the objective to assess the impact of transgenic Bt cotton on soil bacterial community, FAME analysis was performed by taking soils from Bt and non-Bt cotton cultivated fields in three districts of Northern Karnataka, India. FAME analysis was carried out by following saponification, methylation, FAME extraction and FAME profile clean up. The prepared sample was subjected to GC-MS analysis, where number of peaks was obtained corresponding to the type of FAME analyte present in the soil samples. Results obtained shows less number of fatty acids in Bt cotton cultivated soil samples than in non-Bt cotton cultivated ones. Interpretation of this work shows obstructive impression by the transgenic Bt cotton plants on soil microbial communities.

Keywords: Bt cotton, impact assessment, fatty acid methyl ester, saponification, methylation, GC-MS

The effect of fertilizers application on growth and tuber quality of Jerusalem artichoke

Cha-on Juyjaeng[*], Lampan Khurnpoon, Turethin Cheylek and Sirote Jinawong

Phetchaburi Rajabhat University 38 moo 8 Nawung subdistrict, Mueang Phetchaburi District, Phetchaburi Province 76000, Thailand
[*]Coressponding author: Cha-on1@hotmail.com

Jerusalem artichoke is a temperate plant native but can grow and adapt well in tropical regions including Thailand. Nowaday, the planting area is widely in the Northeastern for its root tuber for fresh or processing consumption. This plant is easy to cultivate, crop yields are very high, typically 16-20 tonnes/ha for tuber. Our aimed of this study were to determine the

effect of fertilizers application by foliar spray and soil fertilizer on physiological responses, growth and yield of Jerusalem artichoke. The experiment was divided into 3 treatment: foliar fertilizer of 4-18-18, soil fertilizer of 15-15-15 and combination between foliar and soil fertilizer. Plant height, stem diameter, leaf number and color, canopy size, number of flower per plant, leave chlorophyll content were record every week. Fresh and dry weight, width and length, total soluble solid contents and firmness of tuber were record after harvest.The research results showed that soil fertilizer (15-15-15) enhanced plant height, number of leaves, canopy size, chlorophyll content, leaf color, fresh and dry weight, width and total soluble solids content of tuber. However, stem diameter, number of flower and tuber length could enhanced by foliar fertilizer. Application both foliar and soil fertilizer could enhanced tuber firmness.

Keywords: fertilizers application, growth, tuber Jerusalem artichoke

Study on the effect of some of N, P, K fertilizer compounds on the yield and quality of BP53 rice variety

Hoang Mai Thao[1*], Nguyen Huu Hong[2], Nguyen Thanh Tuyen[3], Nguyen Van Toan[3], Luu Ngoc Quyen[3]

[1] Hung Vuong University, Phu Tho province, Vietnam
[2]Thai Nguyen University of Agriculture and Forestry, Thai Nguyen province, Vietnam
[3] Northern mountainous Agriculture and Forestry Science Institute, Phu Tho province, Vietnam
[*]Coressponding author: hmthao235@gmail.com

An experiment to evaluate the effect of nitrogen, phosphorous and potassium fetilizer doses on yield and quality of PB53 rice variety was conducted in Phu Tho province during Spring crop in 2015, with four different levels of nitrogen 80 kgN ha^{-1} (N1), 100 kgN ha^{-1} (N2), 120 kgN ha^{-1} (N4), 140 kgN ha^{-1} (N4), together with four different levels of phosphorous were 60kg P_2O_5 ha^{-1} (P1), 80kg P_2O_5 ha^{-1} (P2), 100kg P_2O_5 ha^{-1} (P3), 120kg P_2O_5 ha^{-1} (P4), and four different levels of potassium were 60kg K_2O ha^{-1} (K1), 80kg K_2O ha^{-1} (K2), 100kg K_2O ha^{-1} (K3), 120kg K_2O ha^{-1} (K4). The results showed that, when level of nitrogen, phosphorous and potassium were increased, the grain yield increased, too. Application of nitrogen inproved protein content of processing rice, decreased amylose content and gel consisteency, but had not significantly affected gelatinization temperature. Application of potassium decreased gel consistency and increased grain protein content but had not significantly effected gelatinization temperature. This research result showed that applying phosphorous fertilizer cause less effect to quality of rice. However, when level of nitrogen was increased up to 140kg N ha^{-1}, the grain yield and quality of rice decreased. when it increased up to 120kgP_2O_5 ha^{-1} and 120kgK_2O ha^{-1}, the rice yield didn't increase. It is also found that N3P3K3 compound produced highest yield and quality of rice.

Keywords: quality of rice, rice yield, compound of fetilizer

Growth performance of young rubber, soil and leaf nutrient as affected by soil conservation systems: A case study in Northern Thailand

Nuttapon Khongdee[1], Wanwisa Pansak[1*] and Thomas Hilger[2]

[1]Department of agricultural science, Faculty of agriculture natural resources and environment, Naresuan University, Phisanulok, Thailand
[2]Institute of Plant Production and Agroecology in the Tropics and Subtropics, University of Hohenheim, 70593 Stuttgart, Germany
[*]Corresponding author: wpunsak@yahoo.com

Plant nutrient plays an important role on a growth performance of rubber. So, this study aimed to assess the rubber tree growth performance and interactions among different crops under various soil conservation systems and to assess the changes of soil and leaf nutrient contents in rubber plantations with various soil and water conservation systems in RRIM 600 rubber plantation which have been cultivated for 3 years under intercropping systems on the area of Ban Huai Phai, Wang Thong District, Phitsanulok Province.The geography is a rolling slope about 12-30 %, in addition, average level is about 190 m above the mean sea level. The climate on site is tropical savannah climate. Annual rainfall is about 1300 mm/year. The average maximum temperature is 33 ^{o}C with an average minimum of 23 ^{o}C. Relative humidity is ranging from 64-95%.The experimental design was a randomized complete block design (RCBD) for 4 treatments and 3 replicates. In total, twelve plots were established. Each plot size was 9 by 10 m (90 m^2), and the number of rubber trees in each treatment was six rubber trees in two rows with three plants each. The treatments were 1) rubber monocrop (control); 2) rubber tree intercropped with maize; 3) rubber tree intercropped with maize and soy crops in dry season; and 4) rubber tree intercropped with maize and vetiver grass strips. Soil and plant samples and rubber growth measurements were collected during cool season to rainy season (January, May and August). The results showed that rubber growth performances of all treatments were sharply developed in August (rainy season) about 15% of height and 30% of girth. Rubber intercropping with maize and vetiver grass increased rubber girth development significantly. This may due to application of vetiver grass and harvest residue to the soil. The developments of rubber height and girth were significantly correlated at 59%. Soil moisture content was in the range of 3-9% depending on season and was no singnificant difference between each treatment. For plant nutrient in soil of rubber monocropping and rubber intercropping treatments, P (1-4 mg/kg) and Ca (50-70 mg/kg) were low when values compared to rubber soil standard. Soil moisture, K, Ca, and Mg significantly correlated with the rubber girth development at the confidential levels of 80%, 85%, 82%, and 79%, respectively. Meanwhile, soil nutrients and soil moisture were no significant different between rubber monocropping and rubber intercropping treatments. In addition, deficiencies of plant nutrients in rubber leaves were found for N, P, K and Ca. There were no significantly correction between leaves nutrients and the rubber girth development. The benefits of soil conservations founded that rubber intercropping with maize provided the highest maize grain yield. However, rubber among other tree crops is a means of reducing competition for land and cash flow constraints in the period until latex production begins. On the other hand, rubber intercropping can be used for soil and water conservation on hillside rubber plantation as well.

Keywords: growth performance, leaf nutrients, soil conservation systems, soil nutrients, young rubber

Study on Interplating Density of Taros (*Colocasia esculenta* (L.) Schott) in an Acacia (*Acacia mangium*Willd) Plantation under the Agroforestry Model in BacKan Province

Nguyen Huu La*, Ha Manh Phong

Northern Mountainous Agriculture and Forestry Science Institute, Phutho 290000, Vietnam
*Corresponding author: nguyenhuula@gmail.com

Planting of forestry trees in Bac Kan province, Vietnam has been conducted by intercropping with annual crops at the early stage after planting of the forestry trees when they are still immature, from which an agroforestry systems (AF) that has both efficiencies of economy and protecting the ecological environment will be created. However, intercropping practices applied by the local people are spontaneous, and not advanced technical processes, therefore economic efficiency resulted from those has not been high. This study aimed to study on interplanting density of Taro plants (*Colocasia esculenta* (L.) Schott), an annual crop which can grow well under the dense canopy of the tropical forestry trees, in an existing plantation of Acacia (*Acacia mangium* Willd), a typical forestry tree grown in the province. With this regards, effects of planting density of Taro plants interpcropped in the Acacia plantation (1- 2 years old) on the yield of the Taro plant and the growth of Acacia trees were assessed, from which an suitable density of the Taro, which not affect to the growth of the Acacia, and also bring economic efficiency from the Taro output, was determined. The result showed that the Taro plant exposed its capable for growing and developing well when intercropped with the Acacia at the first 2 years after planting. The planting density of the Taro quite remarkably affected to its yield, and the highest planting density of 24000 clusters/ha increased the productivity of Taro by 30 %, and increased income from Taro output by 112 % which raised from 962.275 to 2042.275 USD/ha as compared to the control. Comparison in the yield of the Taro intercropped in the Acacia plantation between the first and the second year-old stage of the Acacia showed that the Taro yield given at the first year reached 5.9 - 7.2 tones/ha, higher than those given at the second year, which reached from 4.7 to 5.4 tones/ha. It denoted that the density of 24,000 cluster Taros/ha intercropped in the Acacia plantation at the stage of 1-2 years old brought the highest economic benefits as compared to the other in the condition of Bac Kan province. In conclusion, the density of 24,000 clusters of Taros/ha could be used for intercropping in a 1-2 yeas-old Acacia plantation as an agroforestry model in Bac Kan province, Vietnam.

Keywords: acacia (*Acacia mangium* Willd), density, economic efficiency, intercropping, taro [*Colocasia esculenta* (L.) Schott].

Screening on allelopathic potential of 12 leguminous plants on germination and growth of barnyardgrass

T. Poonpaiboonpipattana[1*], U. Suwunnamek[1] and C. Laosinwattana[2]

[1]Department of Agricultural Science, Faculty of Agriculture, Natural resources and Environment, Naresuan University, Phitsanulok 65000, Thailand.
[2]Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[*]Coressponding author: thanatchasanhap@nu.ac.th

A preparatory study of leguminous plants on allelopathic potential was completed from January to June 2015. In laboratory conditions, entire plants of 12 leguminous plants at the blossoming stage were collected and ground into residue powder. The powders were measured by phytotoxicity on germination and development of barnyard grass (*Echinochloa crus-galli* (L.) Beauv.) by direct application in a Petri dish at the rate of 250 and 500 mg/Petri dish. *Centrosema pascuorum* cv. *Cavalcade*, *Clitoria ternatea* and *Stylosanthes guianensis* demonstrated the most phytotoxic impact on germination and seedling development of barnyard grass. The level of hindrance on germination at 500 mg/Petri dish was 86%, 98% and 98% respectfully. *Macroptillium atropurpureum* and *Phaseolus lathyroides* powders demonstrated the slightest phytotoxicity. Another trial was directed to test the powders on weed control in pot scale. Directed wet seeds were sowed in the pot for 10 days. Utilization of powder integrated with a water irrigation was included into the pot at the proportion of 250 and 500 kg./ha. The outcome interestingly demonstrated all powders could smother weed density and weed biomass when compared with the control pot. *Canavalia ensiformis*, *Crotalaria pallida*, *C. pascuorum* cv. *Cavalcade*, *C. ternatea* and *S. guianensis* indicated totally diminishing weed density at the rate of 500 kg/ha, while the rice seedlings had no-harmful impact. Then again, mechanisms on restraining weeds were not understanding. The future works were centered on segregation and the distinguishing proof of dynamic mixes of chosen species, and the possibility of use in the field.

Keywords: leguminous plant, weed suppression, residue integrated with irrigation, paddy weeds

Effect of different additives in silages made from durian peel

Wichai Suphalucksana[*], S. Sangsoponjit and K. Soytong

Faculty of Agricultural Technology, King Mongkut's Institute of Technology, Ladkrabang, Bangkok10520, Thailand
[*]Corresponding author: wichais@hotmail.com

The effect of different additives in silage made from durian peel was investigated. Three different additives were used: sodium chloride, sodium nitrite and yeast. The Completely Randomized Design (CRD) with four replications each was used in this experiment. The samples were tightly sealed in plastic containers and stored at room temperature for 21 days.

The physical characteristic, chemical composition and fiber analysis of durian peel silage were evaluated. The results showed that the color appearance of durian peel was yellowish green for sodium chloride, a green brown color for sodium nitrite and a red green color for yeast. The aroma of durian peel silage mixed with three different additives was aromatic and acidic like pickled fruit. The aroma of durian peel silage mixed with sodium chloride was sweeter than durian peel silage from sodium nitrite and yeast. The analysis of the chemical composition of non-fermented fresh durian peel for dry matter, protein, fat, fiber, ash, NDF, ADF, ADL, calcium, phosphorus and energy were 92.39%, 6.83%, 0.54%, 33.83%, 4.77%, 42.08%, 51.06%, 7.04%, 0.15%, 0.19% and 3,843.85 Kcal., respectively. The durian peel silage with different additives had a highly significant difference in dry matter, fiber, ash, NDF, ADF, ADL and energy ($P<0.01$). However the protein, fat, calcium and phosphorus were not significantly different among treatments.

Keywords: durian peel, silage, additive

Development of Spawn Culture Material from Reused Spawn for Cultivation Split Gill Mushroom (*Schizophyllum commune*)

Chaisit Preecha*, Wethi Wisutthiphaet, Pornsil Seephueak, and Siriwan Thongliumnak

Department of Plant Science, Faculty of Agriculture, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat 80110, Thailand
Correspondence author email: skpreecha@yahoo.co.uk

Sawdust was used at main substrate for mushroom cultivation in Thailand. Waste from cultivation was the huge amount at farmer farm. This research trialed to reuse this waste in mushroom cultivation. Split gill mushroom (*Schizophyllum commune*) was mushroom bringing to test for reusing of waste from mushroom cultivation. The ratio of new sawdust: waste material at 100: 0, 75: 25, 50:50, 25: 75, and 0: 100 (w/w) and adding rice bran varied at 0, 5, 10, and 15% were set to compare the split gill mushroom produce. The result revealed that the formula of spawn which new sawdust only (100: 0) adding 10% of rice bran and the ratio of new sawdust: waste material at 75: 25 and 50: 50 adding rice bran 15% were the highest produce with total yield 82.85, 81.35 and 80.04 g/bag, respectively. The both new sawdust: waste material at 75: 25 and 50: 50 adding 15% rice bran did not give produce different from new sawdust. Cost of production of those was 30.78, 31.35 and 30.36 Baht/kg and gross benefit was 119.22, 118.65 and 119.64 Baht/kg. The result convinced that waste material can be reused as spawn preparation for split gill mushroom production.

Keywords: spawn culture, reuse, split gill mushroom, waste

Additional findings nutrition or growth regulator through the root and foliar for Hac Tri permission in Phu Tho, Vietnam

Ha Quang Thuong, Han Thi Hong Ngan, *et al*

Northern Mountainous Agriculture and Forestry Science Institute, Phu Tho, Vietnam
Corresponding author: thuongnomafsi@gmail.com

Hac Tri persimmon is one of the precious indigenous genetic resources of Phu Tho province. Its features: tall trees, grow well, seedless fruit, good design, while nine have reddish yellow, dark yellow flesh, eating crunchy, sweet cool, bland. Large fruit size, fruit average 85 - 95g, the rate was 82.73% servings, dry matter percentage 19.6%, ratio of sugar 13,9%, acid levels of 0.17%, the rate of carotene 21.95 mg % dry matter. Long economic cycle, some centenarians trees for harvest. However, Hac Tri persimmon are eroded and degraded, which causes mainly due to cultivation techniques. Findings fertilizer combinations appropriate for the age of 8-10 with four formula: the formula applied in the local population (control); formula fertilizer 50 kg of manure + 0.5 kg N + 0,3 kg P2O5 + 0,5 kg K2O per one tree; formula fertilizer 50 kg manure + 0.2 kg N + 0,12 kg P2O5 + 0,16 kg K2O per one tree; and add 30 kg fertilizer formula compost per one tree. Results showed that nutritional supplementation has a positive effect on yield and yield components of Hac Tri. In that formula fertilizer of 50 kg of manure + 0.5 kg N + 0.3 kg P2O5 + 0.5 kg K2O per one tree differ markedly and significantly compared to control; Brix degrees, dry matter content, sugar content is higher; income reached 200 million per ha and profits increased over 10% compared to controls. Findings of nutritional supplements, growth regulator foliar 5 formula: formula spray water (control); Formula spray GA3 40 ppm concentration; NAA spray formulations, the concentration of 10 ppm; Super Calcium spray formulations 20S concentration of 0.5%; and spray formulations ecological garden SP concentration of 0.55%. The results indicate that additional formulations of foliar fertilizers and growth regulators have a positive influence to help curb fruit abscission, increase harvesting fruit. In particular, the formula spraying GA3 40 ppm concentrations for most evident effect, net profit increased by 20% compared to controls.
In studies of nutritional supplements, growth regulators through the roots and foliar, concluded two best results to recommend the production of: Dose root fertilizing: 50 kg of manure + 0.5 kg N + 0,3 kg P2O5 + 0,5 kg K2O per one tree. Spraying GA3 concentration 40 ppm twice: first spray after blooming, the second time after the first 7-10 days.

Keywords: persimmon, fertilizers, growth regulator, productivity, quality, efficiency

Influence of high temperature on α–amylase activity and seed germination of Rice (*Oryza sativa* L.)

Pattawee Amornpipat, Montinee Teerarak and Chamroon Laosinwattana*

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
*Corresponding author: laosinwattana@hotmail.com

Temperature is one of the most important environmental factors that significant affects seed germination. In present study was carried out to determine the influence of high temperature on seed germination and α-amylase activity during germination of Jasmine rice (*Oryza sativa* L.) cv. Khao DawkMali 105. The experimental design was completely randomized design (CRD) with 4 replications. The seed were germinated on wet filter paper at various days and night temperatures (30/25, 35/28, 40/33 and 45/37 ºC) and a 16 hour light period in growth chamber. Germinated seeds of rice were daily counted every day until 10 days after planting. The germination percentage (GP), germination index (GI), survival percentage (SP), shoot and root length, and seedling vigor index (SVI) were measured. The results showed that the high temperature had negative effects on seed germination. Jasmine rice seed germination decreased with increasing temperature and no germination at the highest temperature of 45/37 ºC. Germination index, shoot and root lengths were also decreased with increasing temperature. Further experiments were required to determine the effect of temperature on seed imbibition and α-amylase activity of Jasmine rice seeds at 12, 24, 36 and 48 hour after soaking. The results indicated that seed imbibition and α-amylase activity was increased when prolong soaking periods at all temperatures, except at 45/37 ºC which seed imbibition percentage and α-amylase activity was rather unchanged.

Keywords: high temperature, imbibition, α-amylase, germination, seedling growth, rice

Result of Breeding and Selecting High Amino Acid and Reduced Sugar Content-Tea Varieties for High Quality Green Tea Processing in Vietnam

Nguyen Van Toan*, Nguyen Thi Minh Phuong, Phung Le Quyen

Northern Mountainous Agriculture and Forestry Science Institute, Phu Tho, Vietnam
*Corresponding author: toanmnpb@gmail.com

Green tea quality mainly depends on internal quality of tea leaves, in which the most important criteria are amino acid and sugar content. The tea varieties that used for green tea processing in Japan, China and Taiwan have higher content of amino acids, and reduced sugars, and lower content of tannin than those used for green tea processing in Vietnam. Basing on the amino acid, reduced sugar and tannin content of parental couples, some tea-hybrid combinations were identified and the crossing between Vietnam originated tea varieties with the tea group of Japan, China and Taiwan, respectively, were conducted. From the F1 hybrid populations, three lines e.g. 209, 218 and 224, which had high content of amino acids (more than 3%), low content of tannin (less than 30%) and good sensory evaluation

score of green tea, were identified; 3 lines e.g. 210, 218 and 224 were determined as tea genotypes which denoted high reduced sugar content (more than 3%), low tannin content (less than 30%), and giving good sensory evaluation score of green tea, in which the line 224 was the special one, with very high reduced sugar content (4.13%). Among the F1 hybrid population, line 212 was determine as the most prominent tea genotype, with strong growth (yielded 4.1 ton/ha/year at the second age), high content of amino acid (3.67%), rather high content of reduced sugar (2.93%), low content of tannin (27.69%) and giving good result of green tea sensory evaluation (18.2 scores).

Keywords: selection, hybrid combinations, green tea, high quality, amino acid, reduced sugar content, tannin.

To study the effect of microbial products on yield and quality of tea and soil properties

Ha Thi Thanh Đoan[1], Nguyen Van Toan[2]

[1]Hung Vuong University, Phu Tho, Vietnam
[2] Northern Mountainous Agriculture and Forestry Science Institute, Phu Tho, Vietnam
[*]Corresponding author: tuandoan682009@gmail.com

Microbiological productions have a role in supplying microorganism types and are utilized from the agricultural waste by-products to create the local organic fertilizer sources supplied for tea plants. The study on the use of the 4 microbiological products suggest that the cellulose decomposing product supported the highest tea productivity (13.71 quintals/ha). Besides, teas with class A+B reached the highest proportion (8.37% higher than the controlled treatment). The use of microbiological products for the pruned tea branch and leaf, which was equivalent to 30% of inorganic nitrogen, increased the organic content and number of soil microorganisms. The use of the cellulose decomposing product created the highest content of organic matter (3.75%).

Keywords: microbiological, tea plants, prune tea plant, productivity

Effect of crop load on fruit development and fruit quality of pummelo var. Tabtimsiam

Somporn Na Nakorn[*], Chaiporn Chalumpak , and Kriangsak Sangwiroonton

Department of Plant Science, Faculty of Agriculture, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat, Thailand 80110
[*]Corresponding author: nanakornsp@yahoo.com

Effect of crop load (number of fruit per tree) on fruit development and quality of 5-year-old of pummelo var. Tabtimsiam. The experiment was conducted at the local orchards of Mr. Wirat Soksang, located in the Klongnoi sub-district, Pakpanang district, Nakhon Si Thammarat province, Thailand from June, 2013 to July, 2014. The difference of fruit growth and development was shown at 4th months after fruit set. The crop load at 50 and 60 fruits per tree could develop as indicated fruit weight (g), peel weight (g), pummelo fresh (g), diameter

of fruit (cm) and circumference (cm) was advanced significant difference compared to the crop load at 70 fruit per tree. The crop load at 50, 60 and 70 fruits per tree did not affect to the peel thickness, and fruit quality as indicated of total soluble solid (^{o}Brix) and titratable acidity (%) of pummelo var. Tabtimsiam.

Keywords: crop load, fruit development, fruit quality, pummelo

Investigation of rambutan sugar granule production process and its sensory quality

Kannikar Charoensuk[1,*], Tongjaun Vipatjarernlap[1] and Priyaporn Anartngam[2]

[1]Department of Product Development and Management Technology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Thailand
[2]Department of Applied Science and Biotechnology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Thailand
[*] Corresponding author: cc_kannikar@hotmail.com

Rambutan (*N. lappaceum* Linn.) is originated in the Malayan archipelago, which includes Indonesia, Malaysia and Southern Thailand. The fruit is relatively rich in sugar, vitamin and mineral contents. In order to develop rambutan sugar granule, firstly, the juice was separated from the aril (edible portion) through the screw press conveyer. The obtained juice had the soluble solid and pH level of 18.5+0.5 °Brix and 4-5, respectively. The honey like rambutan syrup was made by dehydrated the rambutan juice in the open saucepan at 90-100 °C, which was until the soluble solid content reached 65-70 °Brix, then, granulation of rambutan syrup was performed by the addition of 0.5-1 kg of the fine granules sucrose as seed per 1 kg of rambutan juice at 70 °C. Sucrose seeding could induce rambutan sugar granule formation. Drying process of rambutan sugar granule was done in the oven at 50°C for 24 h. The moisture content and water activity (*Aw*) of the rambutan sugar was 2.35-4.45 %w/w and 0.53-0.65, respectively. Sugar contents of rambutan sugar also have been analyzed, which revealed that it contained fructose: glucose and sucrose of 6.6: 3.7: 85.7%w/w, respectively. The color of rambutan sugar was yellow-brown with its light (L*), redness (a*) and yellow (b*) value of 77.69, 2.33 and 17.28, respectively. Consumer rated this product to very much like as similar as whole cane sugar (7.28-7.55 from 9- point Hedonic scale), and, significantly higher than sucrose. Since, the price of fresh rambutan approximated 20 baht (0.8 USD) per 1 kg, thus the fix cost of 1 kg of rambutan sugar would be in the range of 130-230 baht (4-6.5USD), which depended on the amount of seed granule.

Keywords: rambutan sugar, rambutan syrup, sugar granule

Effect of blanching on B-glucan content of native mushrooms in Thailand

N. Mongkontanawat* and L. Wongekalak

Department of Product development and Management Technology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand 22210
* Corresponding author: jeabn2009@gmail.com

β-Glucans are a group of polysaccharide which composed of glucose units linked with beta-glycosidic bonds. They have been found in several natural sources including mushrooms. From previous reported, this compound showed interesting properties such as immune response stimulation in human and animal, anti-tumor, reduction of cholesterol and others. Therefore, mushrooms have been used as medicinal food for a long time. Thailand is rich of several resources including the strains of local mushrooms. However, no studied on the affected of blanching on β-glucan content of those mushrooms were observed. So, the objective of this studied was to compare β-glucan content of eleven local mushrooms between blanching and un-blanching process. The result shown that three groups of β-glucan content were exhibited. The first group; β-glucan content of most local blanching mushrooms species (*Schizophyllum commune*: Hed Krang, *Pleurotus ostrearus*: Hed Pao Hea*, Auricularia fuscosuccinea:* Hed Hunu Dum*, Lentinus polychrous:* Ked Kon*, Flammulina velutipes*: Ked Kem Thong*, Hypsizygus marmoreus*: Hon-Shimeji: Hed Shimeji Dum and *Lentinus edodes*: Hed Hom) were found higher than un-blanching samples. However, only four mushrooms species (*Pleurotus ostrearus*: Hed Pao Hea*, Hypsizygus marmoreus*: Hon-Shimeji: Hed Shimeji Dum*, Flammulina velutipes:* Ked Kem Thong *and Lentinus edodes*: Hed Hom) were showed significantly higher than un-blanching samples. The percent increasing of β-glucan were 28.43, 40.44, 14.26 and 6.23 %, respectively ($p \leq 0.05$). The second group, β-glucan content of un-blanching of two local mushrooms species (*Hypsizygus tessellates:* Hed Nang Rom Hanggari *and Hypsizygus marmoreus:* Buna-Shimeji: Hed Shimeji Kaw) were found higher than blanching samples. The third group; the amount of β-glucan content were found similarity between blanching and un-blanching process. On the other hand, non significantly differences ($p \leq 0.05$) were demonstrated in the last two groups. In conclusion, in blanching process could be affecting to decrease amount of α-glucans and tend to be increasing the amount of β-glucan.

Keywords: β-glucan, blanching, polysaccharide, native mushrooms

Evaluation of tea genetic resource in Vietnam as the basis to select new tea clone with drought resistance

Nguyen Van Thiep*, Nguyen Thi Thu Ha, Trinh Thi Kim My

Biotechnology and Plant Protection Department, Northern Moutainous Agriculture and Forestry Science Institute, Phu Tho, Vietnam
*Corresponding author: nvthiep@gmail.com

Vietnam is one of contries which have been considered to be severely affected by climate change. Tea plant (*Camellia sinensis*) is often grown in hill and mountain lands in Vietnam, where are frequently sustained drought condition, leading to depress productivity of tea. To improve the productivity of tea, one of solutions should be done is that selecting and breeding new tea varieties which have ability to tolerate drought conditions. This research focused on evaluating the characteristics associated with drought resistance of tea plants such as withered of tea leaves, root length and content of polyphenol of the tea leaf. Sixty (60) tea varieties were successively evaluated basing on wilt index in drought conditions, which were scaled from 0 to 46.59%, for 4 weeks. There were 32 out of 60 tea varieties denoting the wilt index of leaves from 0-5%. They are local varieties and some new tea clones such as CNS84, CNS85, and CNS86. Tea cuttings from 60 tea varieties were put into an artificially drought-causing condition in greenhouse for 12 weeks. The evaluate results showed the root-growing depth and the polyphenol content of tea leaves influenced drought resistance of the tested tea varieties. The tested tea clones with characteristic of shallow growing of roots were susceptible to drought condition, and conversely, the tested tea clones with characteristic of deep-growing of roots were more resistant to drought. The tested tea clones, which had high polyphenol content, were susceptible to drought and deep rooted clones resistant. The drought-tolerant tea varieties were determined as Trung du, Gay NA, CNS76, CNS84, CNS85 and CNS86. These varieties will be used as the material for breeding drought-resistant tea varieties in future researches, and some of them will be further evaluated with the desire for drought tolerance and high yield, good quality for tea production.

Key words: drought tolerance, tea (*Camellia sinensis*), varieties, rooting depth, polyphenol, wilt index

Use of ambient upland rice fermented vinegar vapor to extend shelf life of sweet basil (*Ocimum basilicum* Linn.)

Kanokporn Changsawake[1], Warawut Krusong[2], Chamroon Laosinwattana[1] and Montinee Teerarak[1]*

[1] Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.
[2] Division of Fermentation Technology, Faculty of Agro-Industry, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.
* Corresponding author: ktmontin@kmitl.ac.th

The effectiveness of ambient upland rice fermented vinegar vapor containing 4% acetic acid to extend shelf life of sweet basil (*Ocimum basilicum* Linn.) was evaluated. Fresh leaves of sweet basil were fumigated with upland rice fermented vinegar vapor for 0 (control), 2, 5, 10 and 15 min and packed in PE bags with 8 holes of diameter 0.7 cm at storage of 10 °C. The leaf weight loss, chilling injury symptom and shelf life were recorded. The results show that use of ambient upland rice fermented vinegar vapor for 10 min was most effective to extend shelf life of sweet basil (19.5 days), compare to control (14.5 days). After 19 days of storage sweet basil fumigated with upland rice fermented vinegar vapor for 10 min also showed the least leaf weight loss recorded were 26.59 % whereas control recorded were 35.69 %. Quality evaluations of sweet basil of all treatments retained good to excellent quality (rating = 5) when stored up to 5 days. However, after 7 days sweet basil for all postharvest treatments overall quality decreased by formation of brown specks and due to chilling injury symptoms. The obtained results suggest that sweet basil on extended shelf life by using upland rice fermented vinegar vapor for 10 min was most effective.

Keywords: shelf life, sweet basil (*Ocimum basilicum Linn*.), upland rice vinegar, weight loss

The establishment of MGO detection laboratory in Vietnam

Luu Minh Cuc[1], Le Huy Ham[1], Nguyen Thi Thanh Thuy[2]

[1]Agricultural Genetics Institute – Vietnam Academy of Agricultural Sciences, Hanoi, Vietnam
[2] Ministry of Agricultural and Rural Development, Hanoi, Vietnam
* Corresponding author: cucchi04@gmail.com

The management of biosafety genetically modified plants and its products effecting on environment and biodiversity conservation plays a very importance role to apply successfully the great achievement of biotechnology for maintain the agriculture in a stable way, bring long term benefit on socio-economic for the agriculture of the country. For that reason, Ministry of Agricultural and Rural Development has been invested to establish the GMO Detection Laboratory at Agricultural Genetics Institute belong to Vietnam Academy of Agricultural Sciences. For controling the genetically modified plants and its products as well as carrying out the labeling law in Vietnam, the GMO detection laboratory is designed and

working under ISO/IEC 17025 standard. Up to now, there are 10 quantitative and qualitative detection methods, which validated from Joint Research Center, were verified and applied in our laboratory. Together with Ministry of Natural Resources and Environment, we had collected 276 maize samples in the North, the Center and the South of Vietnam in order to evaluate the present and scatering of genetically modified events in the environment, period before the year 2015. The method for detection of genetically modified organism and derived products - Qualitative nucleic acid based methods by the use of promoter CaMV-35S and Terminator T-NOS (according to TCVN7605:2007 (ISO21569:2005)), and Reference method from EU- Joint Research Center (JRC QT-ELE-00-004 and JRC-QL- ELE-00-011) was applied to analyse the present of genetically modified organisms in the collected maize samples. As a results, all the samples collected were negative with CaMV-35S and Terminator T-NOS. Therefore, during the limited and large scale of experiment processes, the genetically modified maizes varieties had excelent controled, there isn't any scattering of genetically modified maizes into the environment.

Keywords: biosafety, GMO, labeling, qualitative, quantitative, realtime PCR

Evaluation of photosynthesizing bacteria for the growth of rice var. RD41

Rungrat Vareeket*, Kasem Soytong

Faculty of agricultural Technology, King Mongkut's Institute of Technology Chaokuntaharn Ladkrabang, Bangkok, Thailand 10520
*Corresponding author: ratty56@hotmail.com

Photosynthesizing bacteria LB01 and LB02 was tested for the growth of rice var.RD41 to examine the plant growth promotion ability in pot experiments. The results indicated that the application of liquid organic fertilizers with the photosynthesizing bacteria. Results showed significantly enhanced the plant height, tiller numbers, fresh weight and dry weight of plant and grain yield over the un-inoculated control. The experiment is being repeated.

Keywords: photosynthesizing bacteria, bacteria, rice, growth of rice

Breeding for the salinity tolerance rice variety in Vietnam

Luu Minh Cuc[1*], Phung Ton Quyen[2], Luu Thi Ngoc Huyen[1] and Le Huy Ham[1]

[1]Agricultural Genetics Institute, Hanoi, Vietnam
[2] Phuong Dong University, Hanoi, Vietnam
*Coresspoding author: cucchi04@gmail.com

This study focused on developing new rice varieties which are salt tolerant combining with high yield potentials, high quality using Molecular Markers and convensional breeding. The Saltol QTL introgresion lines were developed and selected through generations from Vietnam popular rice variety AS996 using markers assisted backrossing (MABC). After three backcross generations, the selfing generations were developed. Conventional breeding were used to select the high yield, high quality lines. Screening for salinity tolerant was carried out

to evaluate all the selected lines in the salt affected field and in greenhouse. The important agronomical traits evaluations concerning to high yield and resistances to biotic and abiotic stress (salt tolerance) were applied on the BC3F3- BC_3F_6 generations for breeding purpose in several areas. A promissing new salt tolerant rice line with high yield potentials and high quality was received. This new variety was sent to the National Variety Trial and Testing Centre" for Value-for-Cultivation-and-Use (VCU) and Distinctness-Uniformity-Stability (DUS) tests and trials at different ecological zones.

Keywords: AS996, MABC, rice, salinity tolerant, Saltol.

Session 5: **Animal and Fishers Sciences**

Effects of PGF2α and GnRH on reproductive performance of cattle and buffaloes in Thailand and Philippines

Virapol Jamsawat, Felovino V. Mamuad and Emma V. Venturina

Faculty of Agriculture and Natural Resources, Rajamangala University of Technology Tawan - ok, Chonburi 20110, Thailand
Corresponding author:

Effects of using GnRH and $PGF2_\alpha$ on reproductive performance of dairy cattle's (cows and heifer) in Northeastern part of Thailand and on cattle (Beef cattle) and buffaloes (dual purpose) breed in the Philippines were made. Cloprostenol ($PGF2_\alpha$) are used in both countries. The improvements are observed on all animals. The reproduction in cows and heifer in Thailand and buffaloes in Beef cattle in the Philippines were observed. The estrous signs, conception rate and pregnancy rates and the cost were determined. The first study was in Thailand. A total of 390 heads were used. There were 82 cows and 62 heads of cattle in Thailand and 160 buffaloes and 36 cattle with lutalyze and 45 buffaloes and 5 cattle in the Philippines for cloprostenol. Base on the results of the two studies, dairy cows and heifers responded positively to the GnRH and $PGF2_\alpha$ injection, resulting in higher incidence of estrus. Synchronization of estrus and ovulation by obsync protocols could improve percent non-return to estrus and conception rate of dairy cattle. The hormone ensured the onset of estrus and ovulation in lactating dairy cows and mature heifers. The pregnancy rate of dairy cows and heifer was increased by synchronization of estrus and ovulation. These findings may encourage farm holders to practice synchronized estrus and ovulation in the small farm level. The result showed that there was no significant change in the reproductive performance of buffaloes using lutalyze or cloprostenol, similarly, dairy cows and heifer in Thailand do not showed significant differences in their estrus and conception rate. The use of $PGF2_\alpha$ and GnRH in Thailand are almost the same. Prostagland in $F2_\alpha$ is just enough and necessary to get the reproductive performance of cattle and buffaloes in the Philippines and in Thailand. Environmental condition does not affect their performance. The cost is likely to be used by the AI technicians in the fields. For Artificial Insemination, it is thus recommended to apply the hormone using the $PGF2_\alpha$. It is noteworthy to know that the price is cheaper. It is easier to apply under field conditions; however, the technical knowledge of the AI technician in ovarian palpation is necessary.

Effects of steroid glycosides – plant extracts on reproduction function in rats

Tatiana G. Stratulat*, Pavel K. Cintea, Nataly E. Mashenco

Institute of Genetics, Physiology and Plant Protection (IGPPP), Academy of Science of Moldova
*Corresponding author: tgs.05@mail.ru

Steroid glycoside compounds are found in a variety of plants. Plants steroid glycosides are the low weight molecular compounds. Depending on the chemical structure, they exhibit a wide range of physiological, medical and biological action. It is known that depending on the dose, steroid glycosides can cause the opposite effect: to inhibit or stimulate the growth of the animals to exercise contraceptive activity or improve fertility, etc. Administration to female rats of the steroid glycosides in any of the tested doses did not result any signs of intoxication and death of animals. There were no toxic effects of P. and T. treatments on any maternal reproduction, gestation or lactation indices. Normal results were noted for all embryotoxic and teratogenic indices at all three dose levels. We should mention that in all experimental groups treated by P. the post-implantation losses were significantly reduced (4.35, 6.94 and 8.86%) in comparison with those of control rats (12.87%). In addition, the lowest dose of P. revealed statistically significant increased number in live offspring per female. For study the effect of P. and T. on post-natal development of the offspring, the test material was administrated during the gestation and lactation period (up to 4 weeks). The animals dosed of both compounds showed a statistically significant increasing in the mean offspring body weight and body weight gain at all doses. However, the most pronounced stimulatory effect on the growth and development of the offspring have the lowest tested doses - 5 and 25 mg / kg b.w. of P. and T., respectively. The increase in body weight on day 21 of lactation was: for the P. - 16,3 - 25,9, T. - 20, 2 - 20,9 g in comparison with control - 13.1 - 13.4 g. This way, animals treated by P. and T. at dose levels of 5 and 25 mg/kg b.w. showed pronounced stimulatory effect on offspring weight gain, especially when administered before gestation

Post mortem viability of epididymal sperm from Philippine native water buffalo (*Bubalusbubalis)*

Edeneil Jerome P. Valete[2*], Excel Rio S. Maylem[1], Marlon B. Ocampo[1], Evaristo A. Abella[2]and Lerma C. Ocampo[1]

[1]Reproductive Bitechnology Unit, Philippine Water buffalo Center, National Headquarters and Gene pool, Science City of Munoz 3120, Nueva Ecija, Philippines
[2]Central Luzon State University, Science City of Munoz 3120, Nueva Ecija, Philippines
*Corresponding author: edeneilvalete@gmail.com

Post-mortem spermatozoa recovery is an important method to obtain germplasm reserves from genetically valuable animals or endangered species. The objective of the study was to determine the viability of water buffalo epididymal spermatozoa from excised testicles stored at two temperature conditions either at 5 to 8 °C or at 18 to 22 °C which is maintained for 10 to 12 hours and 15 to 17 hours. Six pairs of water buffalo paired testicles were collected after slaughter and transported to the laboratory. The testicles were placed in a styropore box

previously calibrated with the target storage temperature. Epididymal sperm from one testicle was recovered after 10 to 12 hours while the other testicle at 15 to 17 hours post-mortem. Epididymal spermatozoa recovery was by slicing and swim up method in Tris-citric acid-egg yolk extender with fructose and raffinose. Sperm viability was assessed by determining the percentage sperm motility using conventional method. Total motility and progressive motility were determined using an automated sperm analyzer CASA IVOS II (Hamilton Thorne). Percentage live sperm was determined after eosin nigrosin staining of smeared sperm slide preparations. Morphological observation for the presence of abnormal spermatozoa and cytoplasmic droplets was similarly performed. Based on our findings, two way ANOVA revealed that the main effect of storage temperature and its interaction with storage time did not affect the viability of epididymal spermatozoa. However, a significant decline on the quality of spermatozoa was notable in the prolonged post mortem storage duration ($p < 0.05$). On the other hand, acceptable percentage of abnormal spermatozoa of less than 20% was obtained and was not influenced by storage temperature and storage time ($p > 0.05$). Therefore, viable water buffalo epididymal sperm can be recovered after 10-12 hours of animal death from testicles maintained at storage temperature of either 18-22°C and 5-8°C.

Keywords: water buffalo, post mortem epididymal sperm, motility, liveability

Knowledge management adoption of animal husbandry on broiler farms in Western Thailand

Wuttikorn Injana[1*], Sarawut Intrarathet[2], Ratchadakorn Phonpakdee[2] and Pakkapong Poungsuk[2]

[1]Ph.D. Candidate, Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[2]Department of Agricultural Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
[*]Corresponding author: e-mail: wuttikorn_2007@msn.com

This study aimed to explore knowledge management adoption and factors effecting the adoption of knowledge management in broiler domestication in western Thailand. The populations in this study were 87 animal husbandry officer concerning with broiler domestication in western Thailand. A highest and a lowest average mean score, percentage, mean, standard deviation, and Chi-square were used for the statistical treatment. Results of the study revealed the following: 1) most of the animal husbandry officer understood the knowledge management at a moderate level (11-15 out of 20 scores); 2) the animal husbandry officer participated in the knowledge management at a moderate level ($\overline{X}$ = 3.32); 3) the animal husbandry officer had attitudes towards the knowledge management at moderate level ($\overline{X}$ = 3.57); and 4) the animal husbandry officer adopted the knowledge management at a high level ($\overline{X}$ = 4.03). The following were factors effecting the adoption of the knowledge management in broilers: understanding in the knowledge management; participation in the knowledge management; and attitudes toward the knowledge management.

Keywords: broilers, understanding, participation, attitudes, knowledge management

Practical application of medical plant powders as an alternative of antibiotic growth promoter in pig feed

Nguyen Tai Nang*, Nguyen Thi Quyen

Hung Vuong University, Phu Tho, Viet Nam
*Corresponding author: nguyentainang@hvu.edu.vn

A study on adding some medical plants with antibacterial activity to the feed of hogs from post-weaning (21 days old) to slaughter (130 days old) was carried out on 121 LY x PiDu piglets. Powder of *Alpinia officinarum* Hance or *Euphorbia thymifolia* Burm, or *Achyranthes aspera* L. plants was added by 0,5% to the diet. Hogs in the groups which were given a diet with 0.5% powder of the plants showed a better weight gain than those not supplemented and an equal weight gain as compared to those offered a ration added with 50ppm chlotetracyline antibiotics. Hogs fed with medical plants-added feed demonstrated remarkable reduction in food consumption rates, diarrhea and respiratory symptoms and treament periods. The hematology indexes observed in experimental groups which were supplemented with medical plants and in controlled groups were within the normal. The quantity of carcass in all diet groups had no statistical difference. The percentage of carcass reached 78%, that of splited pork was approximately 70%. The color, taste, and toughness of the meat in diets added with medical plant powders were significantly improved as compared to those measured in controlled groups.

Keywords: growth promoter, pig, plant antibiotic, *Alpinia officinarum*, *Belamcanda chinensis*, *Euphorbia thymifolia*

Strategies to improve the developmental competence of water buffalo oocytes *in vitro*

Marlon B. Ocampo[1,2]* and Lerma C. Ocampo[2]

[1] College of Veterinary Science and Medicine, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines 3120
[2] Reproductive Biotechnology Unit, Philippine Carabao Center, Science City of Munoz, Nueva Ecija, Philippines 3120
*Corresponding author: ocampomarlon29@yahoo.com

Mammalian oocytes undergo spontaneous maturation when isolated from the ovarian follicles and cultured *in vitro*. Use of these oocytes in the production of embryos for eventual transfer to recipients to produce youngs have been widespread, but only to a limited extent especially in bubaline species. Apparently, understanding of the mechanisms governing the bubaline oocytes acquisition of developmental competence *in vitro* remained a challenge, especially on the role of various supplemental compounds/substances being incorporated in the maturation medium and the role of ovarian follicular environment surrounding the oocyte. This review

focuses on the dynamics of these compounds/substances with particular emphasis on how it interact with the metabolic needs of the oocytes and the nature and diversity of compounds that transfer between cumulus cells and the oocyte and its impact on the process of developmental acquisition. In one particular case, we have demonstrated that IVM supplementation with cysteamine improved the developmental potential of swamp buffalo oocytes to developed up to the blastocyst stage following fertilization *in vitro*.

Keywords: oocyte maturation, developmental competence, embryo production, *in vitro*

Ethnoveterinary technology for parasite dewormer to support goat-oil palm integration in Bengkulu, Indonesia

Tatik Suteky* and Dwatmadji

Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Indonesia.
*Corresponding author: tatiksuteky.2008@yahoo.com

The effects of ethnoveterinary (medicinal dewormer) *Melastoma malabatricum* on clinical observations, liveweight change following infestation mix-gastro-intestinal worm was investigated experimentally in localgoats. 25 female local goat were experimentally infected naturally via grazing in infected area from 08.00-16.00, for 15 days dan followed infected by orally with1000 infective larvae. 15 goats were chosen and allocated to 3 treatments consist of 5 goats per treatments, natural dewormer used is *Melastoma malabatricum*. T1: Aqueous extract *Melastoma malabatricum* 250 mg/kg LW/3 week, T2: Aqueous extract *Melastoma malabatricum* 250mg/kg LW/2 week and T3: single dose of Ivermectine (control). Parameter measured were clinical assesment, live weight, rectal temperature, respiratory rate, heart rate. Clinical assesment showed anorexia, emaciated, rough hair coat, anaemia, watery faeces bottle jaws, and decreasing live weight up to 13%, and following by death started in week 3 post infection. There were normal rectal temperature, normal respiratory rate, and normal heart rate. In general, anthelmintic effect of aqueous extract *Melastoma malabatricum* 250mg/kg LW/2 week is better that that of given every 3 week.

Keywords: *Melastoma malabatricum*, goat, mix-gastrointestinal parasite

Carbon emission from energy use in Thai native chicken production in Nakhon Ratchasima province, Thailand

Panisara Vichiratanatrakul[1], Nathawut Thanee[1*], Natthakittiya Paiboon[1], Watcharaporn Tantipanatip[2] and Thanapan Thanee[3]

[1]School of Biology, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand,
[2]Faculty of Science and Technology, Phranakhon Si Ayuttaya Rajabhat University, Phranakhon Si Ayuttaya 13000, Thailand
[3]Department of Social Science, Faculty of Liberal Arts, Ubon Ratchathani University, Ubon Ratchathani 34000, Thailand
[*]Coressponding author: nathawut@sut.ac.th

The chicken production usually has impacts on the environment such as soil, water and air quality. The purposes of this research were to evaluate total carbon emission and to compare carbon emission between traditional and manufactural rairing systems in Thai native chicken production in Nakhon Ratchasima province during January to June 2015. Survey and questionnaire were made and data were collected at 400 farms in districts of study area. The results showed that the highest total carbon emission was from transportation of animal feed to farms at 10.062 ± 4.832 kg.C/kg.Thai native chicken/day followed by from transportation of chicken to slaughter houses and from chicken incubation at 0.467 ± 0.460 and 0.0003 ± 0.0004 kg.C/kg.Thai native chicken/day. For raising systems, the traditional system emitted higher carbon (11.777 ± 4.252 kg.C/kg.Thai native chicken/day) than the manufactural system (7.720 ± 4.954 kg.C/kg.Thai native chicken/day). It can be concluded that most of carbon emission in energy use was from the transportation of both chicken feed and of chicken to slaughter houses and small farm also emitted higher carbon than large farm ($P \leq 0.05$).

Keywords: carbon emission, energy use, Thai native chicken, Nakhon Ratchasima province

A protocol for the *in vitro* production of bubaline embryos: The Philippine experience

Marlon B. Ocampo[1,2]* and Lerma C. Ocampo[1]

[1] Reproductive Biotechnology Unit, Philippine Carabao Center, Science City of Munoz, Nueva Ecija, Philippines 3120
[2] College of Veterinary Science and Medicine, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines 3120
*Corresponding author: ocampomarlon29@yahoo.com

This study was designed to evaluate the effect of some factors in the *in vitro* production of bubaline embryos. In Experiment 1, aspiration, slicing and the combination of both methods had a mean oocyte recovery of 2.9, 3.2, 3.3 with rank A and B oocytes of 0.95, 1.1 and 1.2 per ovary, respectively. The fertilization rate of COCs recovered from either methods had no

significant differences (52.6% - 58.3%). In Experiment 2, COCs cultured for 17-19 hr, 20-22 hr and 23-24 hr had a maturation rate of 57.0%, 80.3% and 86.7%, respectively. Cleavage rate post insemination have no difference but the blastocyst formation rate was higher in COCs matured for 20-24 hr (21.1 % - 23.3%) than 17-19 hr (12.7%). Total cell count was highest in blastocyst derived from COCs matured for 23-24 hr (102.2±3.5) than those matured for 20-22 hr (97.4±8.3) and 17-19 hr (89.9±6.4). In Experiment 3, COCs derived *in vivo* and *in vitro* had a maturation (53.0% and 77.1%), cleavage (39.6% and 57.5%) and blastocyst formation rate of 32.1% and 22.5%, respectively. In Experiment 4, COCs cultured in TCM-199 and mSOF medium had a maturation (81.3% and 78.3%), cleavage (55.4% and 70.7%), and blastocyst formation rate of 21.9% and 25.2%, respectively. The total cell count showed no difference. In summary, the factors considered and the techniques described in this study are consistent and reproducible in terms of achieving oocyte maturation, its fertilization and in the production of blastocyst stage embryos.

Keywords: oocyte, maturation, fertilization, culture, embryos

The efficiency of feed additives on silage making for cattle

S. Sangsoponjit*, W. Suphalucksana, K. Soytong

Faculty of Agricultural Technology, King Mongkut's Institute of Technology, Ladkrabang, Bangkok10520, Thailand
*Corresponding author: settasits@gmail.com

This research was conducted to evaluate the efficiency of feed additives and the kinds of forage on silage making for cattles. The two kinds of feed additive were 1% of sodium chloride and 4% of molasses. The five kinds of forages were *Brachiaria mutica, Miscanthus sinensis, Paspalum atratum, Leucena glauca* and *Arachis hypogaea*. The results indicated that the color appearance of silages was olive yellow for sodium chloride which was better than the golden brown color from molasses. However, the smelling of molasses silage was better than sodium chloride silage. The sodium chloride silage had ash and a pH higher than the molasses silage.They were 13.07: 10.13 and 5.76: 4.48, respectively ($p<0.01$), while the molasses silage had a EE and ADL higher than sodium chloride silages. These were 3.99: 3.79 and 6.72: 6.23, respectively ($p<0.01$). However, the value of CF, ADF and NDF did not have a significant difference among treatments. The *Leucena glauca* and *Arachis hypogaea* were higher in CP and EE than *Brachiaria mutica, Miscanthus sinensis, Paspalum atratum* ($p<0.01$). However, they had a lower palatability than forage grasses and should be supplemented in the silage grasses making. The *Brachiaria mutica, Miscanthus sinensis, Paspalum atratum* had higher ADF, NDF and ADL levels than *Leucena glauca* and *Arachis hypogaea* ($p<0.01$).

Keywords: feed additive

Effects of stocking density, feed and hormones on artificial reproduction of Tire track eel *(Mastacembelus armatus)*

Phan Thi Yen*, Cao Van

Hung Vuong University, Phu Tho province, Vietnam
* Corresponding author: phanyen2510@gmail.com

The tire track eel (*Mastacembelus armatus*) is a species of ray-finned, spiny eels belonging to the genus Mastacembelus (Scopoli, 1777) of the family Mastacembelidae, and is native to the riverine fauna of India, Pakistan, Sumatra, Sri Lanka, Thailand, Viet Nam, Indonesia and other parts of South East Asia. In Vietnam, this species is found commonly in Red river system and several other rivers in Northern and South Central Vietnam. It is reported to be a very good food-fish, and high commercial value. Because of its high value, the tire track eel is being overfished, lead this species resource to a serious decline. The study on effects of stocking density, feed and hormones on artificial reproduction of Tire track ell (*Mastacembelus armatus*) is necessary to actively breeding, restoration of natural resources, conservation of biodiversity. Our study consisted of 4 experiments. In experiment 1, the fish were randomly stocked at densities 1 kg/m^3, 2 kg/m^3 and 3kg/m^3, which were coded as MĐ1, MĐ2, MĐ3, respectively. The results showed that survival rate was lowest with MĐ3, but maturity rate and maturity index were equivalent to MĐ 1, MĐ2 ($\alpha = 0.05$). In experiment 2, the fish were fed with three diets of worm, commercial pellet, trash fish, which were coded as CT1, CT2, CT3, respectively. In the second experiment, the survival rate, maturity rate and maturity index of the CT1 were the highest, followed by CT3, and CT2, respectively. Experiment 3, fish were divided into 6 treatments of different hormonic injections. The results showed that the treatment of CT6 with 2000UI of HCG) was the best treatment. 64.29% female broodfish were ovulated after 38.58 h from the last injection at the temperature of 23-28^{0}C. Last experiment, we used 3 different methods of fertilization. The results indicated that fertilization rate and hatching rates were the best at 68.0% and 55.17%, respectively when the dry fertilization method was applied. In conditions, the temperature was 27^{0}C.

Key words: Tire track eel, artificial reproduction, hormone, maturity rate, maturity index, ovulated, fertilization rate, hatching rates

Assessment of heavy metals in fish and water in cage fish culture at Loei river, Loei Province

Netnapa Pongpetch[1], Niti Amchuen[2]

[1] Environmetal Science Program, Faculty of Science and Technology, LoeiRajabhat University 42000, Thailand
[2] Geographic Information Science Program, School of Information and Communication Technology, University of Phayao 56000, Thailand
*Coressponding author: netnapa_sut@hotmail.co.th

The concentrations of heavy metals including Arsenic, Zinc, Lead, Cadmium, Iron, Cromium and Copper (As, Zn, Pb, Cd, Fe, Cr and Cu) in fish and water in cage fish culture at Loei river (Ban Kam Nerd Pet, Ban ThaManao and Ban That) were investigated. Fish and water samples were collected twenty-four sites and three stations (upper and lower of cage fish culture), respectively. Heavy metal concentrations were analyzed by using ICP-OES. The results showed that mean concentrations of heavy metal in fish were higher than water. The average concentrations in fish were seen as Zn > Fe > As > Cu > Cr > Pb > Cd at Ban Kam Nerd Pet. Meanwhile the mean concentrations of Ban ThaManao and Ban That were found to be Fe > Zn > Cu > As > Cr >Pb > Cd which As and Cr at Ban That were exceeded the standard of FDA and IAEA-407, respectively. Furthermore, As and Pb of all sites were exceeded National Standard in China and IAEA-407, respectively. On the other hand, average concentrations in water were recorded to be Fe > Zn > Cu > Pb > Cr > Cd = As which were lower than the National surface Water Quality Standard and WHO. However, the heavy metal load is the need for regular monitoring in aquatic organisms, sediment and water because of the long term effects.

Keywords: aquaculture, aquatic organism, cage fish, contamination, heavy metals

Non-experimental validation of the effectiveness of ethno-veterinary botanical medicine (EVB-M) materials used in the municipality of Echague Isabela

Leah S. Guzman*

Isabela State University, Echague Campus, Isabela, Philippines
*Corresponding author: namzughaels@yahoo.com

This research was conducted to determine the extent and perception of the effectiveness of the Ethno - Veterinary Botanical Medicine (EVB-M) material use of the Yogad people at Echague Isabela and validate its efficacy in treating animal ailments. To determine the extent and people's perception of the effectiveness of the EVB-M materials, a formulated questionnaire was distributed to 399 (95% CI) purposively selected animal raiser respondents. Potential efficacy of the materials was then validated based on a non-experimental method of validation. Four levels of confidence were then established as minimal, low, mid and high

level of efficacy. Out of the 26 EVB-M materials identified, guava (30.32%), banana (10.64%) and lima bean (6.13%) was found out to be the most widely used remedies for animal ailments in the municipality. Based on the peoples' perception, 20/26 (76.92%) of the plants identified were found out to be 100% effective as claimed by majority (149/310 or 48%) of the respondents. Non-experimental validation of the effectiveness of the different EVB-M materials resulted to a high degree of efficacy for almost all of the plant materials identified. Few materials with its specified treatment indications however, to include banana for vomiting, chili and black pepper for chicken pox, guyabano for vomiting, ipil-ipil for diarrhea, samania, and tangerine orange for skin disease and pomelo for skin disease and vomiting were identified to be under the minimal and low levels of efficacy signifying inactiveness of the plant materials in the said conditions. As a result, some of the claimed effective EVB-M materials are lacking information upon validation proving inactiveness of the plant materials yet, are continuously used by the people. Some materials have specific beneficial properties hence, could be adapted while others needs yet to be investigated further through experimental methods.

Keywords: ethno-veterinary botanical medicine (EVB-M), effectiveness, non-experimental validation

Effects of methyl farnesoate on spawning stimulation in blue swimming crab

Chongko Saetung

Department of Fisheries, Faculty of Agriculture and Natural Resources, Rajamangala University of Technology Tawan - ok, Chonburi 20110, Thailand
Corresponding author: chongko_s@yahoo.com

This study aimed to compare the gonadosomatic index, spawning rate, and survival rate of female blue swimming crabs (*Portunus pelagicus*) which were injected with methyl farnesoate (MF) in marine crustacean saline at the concentrate of 0, 48.6 and 54.0 ng. per 100 g. body weight. Thirty female crabs per group were injected once a week for three weeks. After the last injectionfor one week, gonad of each crab was collected for calculate the gonadosomatic index as well as survival rate. The results showed that crabs were injected with MF at 0, 48.6 and 54.0 ng. had released eggs after the first injection at the rate of 33.33, 90.00 and 76.67%, respectively while the survival rates at the end of the experiment were 23.33, 0.00 and 20.00%. After spawning, all crabs were died in a few days later. Crabs were injected with MF at 0 and 54.0 ng. hadgonadosomatic index at the end of the experiment as 4.18 and 13.39 %, respectively.

Keywords: methyl farnesoate, spawning stimulation, blue swimming crab, *Portunus pelagicus*

Determination of 1-Hydroxyrene and 2-Napthol in intertidal rocky shore macrobenthos following oil spill at Ao Prao, Samed Island

Jindarha Prempramote*, Chayanid Meepoka, Sujitra Samakraman and Monthon Ganmanee

Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
* Corresponding author: j_aoei@hotmail.com

Biological monitoring of exposure to Polycyclic Aromatic Hydrocarbon (PAH) by determination of PAH metabolite products (1-hydroxypyrene (1-HOP) and naphthalene metabolite 2-napthol (2-NAP)) in three species of intertidal rocky shore molluscs; coiled snail (*Planaxis sulcatus*), whelk (*Morula* sp.) and rock oyster (*Saccosstrea cucullata*) by Gas Chromatography Mass Spectrophotometry were carried out. Specimens were collected in October, December 2013 and March 2014 at Ao Phrao beach, Samed Island where a PTTGC heavy oil spill accident was seriously impact to the beach in July 2013 compared with specimens from control site (Lam yaa beach). 2-NAP was detected in all molluscs species with the mean range from 0.048-0.972 μg kg^{-1}wet weight. However, 1-HOP was not detected in the present study. The concentration of 2-NAP in grazer, coiled snail, was highest and increased through time. Concentration of 2-NAP in whelk (*Morula* sp.) which is one of predator in rocky shore was lower possibly due to they got 2-NAP from their prey whereas the concentration was decreased in rock oyster. This finding suggests that 2-NAP might be an important biomarker in intertidal rocky shore macrobenthos contaminated with crude oil.

Keywords: biomarker, gas chromatography mass spectrophotometry, 1-hydroxypyrene, Intertidal rocky shore, macrobenthos, oil spill, polycyclic aromatic hydrocarbon, 2-napthol

Folic acid supplementation for bovine oocyte maturation and fertilization *in vitro*

Karlo M. Tawatao[1], Fely V. Manaois II[1], Lerma C. Ocampo[2] and Marlon B. Ocampo [1,2*]

[1] College of Veterinary Science and Medicine, Central Luzon State University, Science city of Munoz, Nueva Ecija, Philippines 3120
[2] Reproductive Biotechnology Unit, Philippine Carabao Center, Science City of Munoz, Nueva Ecija, Philippines 3120
*Corresponding author: ocampomarlon29@yahoo.com

The study aimed to evaluate the effect of folic acid supplementation on the maturation and development of bovine oocytes and embryos in vitro, respectively. In Experiment 1, oocytes were matured in mSOF or TCM-199 medium with/without FA supplementation. No significant difference was observed in the nuclear maturation rates but the cytoplasmic maturation (MPN formation) was higher significantly in TCM-199 groups. In Experiment 2, cleaved embryos were cultured in mSOF with/without FA supplementation. Significantly higher blastocyst formation rate was observed in treatment without FA (47.33±8.44). In Experiment 3, LC addition significantly improved the blastocyst formation rate of bovine

embryos than with the presence of FA. Overall, the results showed that FA supplementation is not beneficial in the acquisition of developmental competence of bovine oocytes and embryos in vitro.

Key words: Folic acid, maturation, fertilization, oocyte, male pronucleus formation, embryos

Sex identification in Barn swallows (*Hirundorustica* Linnaeus) by molecular technique

Thanyalak Malaitad[1], Supattra Poeaim[1*] and Krairat Eiamampai[2]

[1] Department of Biology, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520, Thailand
[2] Wildlife Research Division, Wildlife Conservation Office, Department of National Parks, Wildlife and Plant Conservation, Chatuchak, Bangkok, 10900, Thailand
*Coressponding author: poeaim@hotmail.com

Sex-ratio of birds is an important understanding behavior, population structure, patterns of migration and estimating extinction risk. However, it is difficult to understand in some birds because their external features are sexually monomorphic. In Thailand, the barn swallows (*Hirundorustica* Linnaeus) as a migratory bird that the female is similar in appearance to the male. So, the polymerase chain reaction (PCR) technique for determination of the sex was investigated. Birds sexing can be identified based on *chromo-helicase-DNA-binding* (CHD) gene located on sex chromosomes. Male birds are homogametic sex (ZZ sex chromosomes) while female birds are heterogametic sex (Z and W sex chromosomes). To selection a suitable primer for gender identification, the PCR reactions wereusedthree primer sets, including P2/P8, 1237L/1272H and 2550F/2718R primers. As results, P2/P8 primers were clearly differed between CHD-Z and CHD-W allele by agarose gel electrophoresis analysis. Therefore, sexing identification was attempted in 61 samples of *H. rustica* using P2/P8 primers. The sample consisted of 41 males (67.21%) and 17 females (27.87%): however, three samples (4.92%) could not amplify.The results of molecular sexing would also have implications for sex-ratio data of barn swallowsin Thailand.

Keywords: sexing identification, *chromo-helicase DNA binding* (CHD), barn swallows

Evaluating rotational grazing technology for integrated Bali cattle - oil palm system on herbage production to support sustainable meat production in Bengkulu province, Indonesia

Dwatmadji*, Tatik Suteky, and Edi Soetrisno

Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Indonesia.
*Corresponding author: dwatmadji.2008@yahoo.com

This study aimed to evaluate the production and the natural forage species that grow in the area of oil palm plantations on rotational grazing system with Bali cattle. Twelve Bali cows with an average weight of 100 kg and aged 1-1.5 years were used in this study. Twelve cows

were divided into 3 treatment, namely 1 AUE/ 1 ha, 1 AUE/1.5 ha, and 1 AUE/2 ha. Paddock area built adapted to the calculation of AUE (Animal Unit Equivalent). Each paddock consisted of four sub-paddock used for implementing grazing rotation. Grazing rotation is conducted by putting the cows in the paddock for 7 days grazing period and 21 days of resting period. Four samples for the production parameters (total weight, leaf, stem, live and dead material) were taken for each sub-paddock with quadrat (0,5 x 0.5 m^2) square. The samplings were conducted one day before every cows entering into their respective sub-paddock. The results obtained were analyzed using ANOVA followed by DMRT to test the difference between the means. The results showed that different AUE has no effect on the total production, leaf weight, stem weight, leaf:stem ratio, and live:dead ratio. Forage production for the first month was significantly ($P < 0.05$) higher than those of the second and third month.

Keywords: oil palm, rotational grazing, production

Population dynamics of *Metapenaeus ensis* in the Songkhla lake, Songkhla province, Thailand

Promhom Samphan[1*], Hajisamae Sukree[2] and Tansakul Reunchai3

[1] Department of Fishery, Faculty of Agriculture, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat Campus,80110 Thailand; Marine and Coastal Resources Institute, Faculty of Graduated school, Prince of Songkla University, Hat Yai, Songkhla, 90112, Thailand.
[2] Faculty of Science and Technology, Prince of Songkla University, Muang, Pattani, Thailand.
[3] Department of Biology, Faculty of Science, Prince of SongklaUniversity, Hat Yai, Songkhla, Thailand.
[*]Corresponding author: nsamphan@yahoo.com

The coastal waters of Songkhla Lake in Thailand constitute an important habitat for penaeid shrimps. Despite the high economic value attached to this resource, the biological information necessary for its sustainable exploitation is scanty and fragmented. The dynamic mathematical models (e.g., Beverton and Holt 1957, 1966), useful for predicting future yields and stock biomass at different levels of fishing strategies, are extensively used for defining management strategies. The knowledge about growth and mortality of fish populations is an essential pre-requisite for the derivation of these models. In tropical and sub- tropical waters, despite the difficulty in determining age of fish and shrimps, the dynamic pool models have, unfortunately, been under-utilized for defining management strategies in fisheries. The present study was therefore designed to investigate the population dynamics of *Metapenaeus ensis* in Songkhla Lake. Samples were obtained monthly for (during January 2010 to Janauary, 2011) a period of thirteen month from Outer Songkhla lake, samples were identified to the species level. The samples were collected using trap nets. The population dynamics of *Metapenaeus ensis* from the Songkhla lake was investigated based on catch/effort and length frequency data, using FiSAT software. Asymptotic size ($L\infty$), growth coefficient (K), total (Z) and natural (M) mortality, exploitation rate (E), recruitment pattern, current probability of capture and selectivity of the fishing gears. The result showed

population dynamics of *Metapenaeus ensis* was divided into two groups. The result in group C was showed. The asymptotic length ($L\infty$) and the growth rate constant (K) were estimated to be 16.74 cm and 1.80 yr^{-1}. The fishing mortality coefficients were 2.50. The natural mortality was estimated at 3.16 yr^{-1}. The instantaneous total mortality (Z) was 5.66 yr^{-1}. The exploitation ratio (E) was 0.44. The result in group H was showed. The asymptotic length ($L\infty$) and the growth rate constant (K) were estimated to be 14.57 cm and 2.30 yr^{-1}. The fishing mortality coefficients were 2.05. The natural mortality was estimated at 3.86 yr^{-1}. The instantaneous total mortality (Z) was 5.91 yr^{-1}. The exploitation ratio (E) was 0.35.

Keywords: penaeidae, marine shrimp, population dynamics, *Metapenaeus ensis*, Songkhla lake

Session 6: **Sustainable Water Management Forum: Round Table Discussion**

Macroinvertebrates as boindicators of water quality in Bongoy river, Odiongan, Romblon, Philippines

Alwin F. Maulion

Biology Department, College of Arts and Sciences, Romblon State University
Corresponding author: maulion_alwin@yahoo.com

The objective of this study was to assess the water quality of Bongoy river in Odiongan, Romblon using the presence of the macroinvertebrates as bioincators. Macroinvertebrates were assessed during the month of August until September 2015. Samples were collected using D-frame and kick nets in upstream, midstream, and downstream stations of the river. The collection of samples was conducted in five collection sites of the river with 500 meters interval every site. The collected samples were counted and identified according to their taxa. A total 164 macroinvertebrates found in five (5) collection sites of the river belonging to 11 species namely; water striders, stoneflies, snails, caddisfly (net-spinning), scuds, back swimmers, dragonflies, shrimps, clams, water penny, and aquatic worms (oligochaeta). Biotic Index Card *(Center for Watershed Stewardship, Pennsylvania State University)* was used to categorize the macroinverbrates collected based on its tolerance to water pollution. This index uses three (3) classes of taxa: Class I (Pollution-Sensitive Taxa), Class II (Moderately-Tolerant Taxa), and Class III (Pollution-Tolerant Taxa). Based on the recorded results, the most abundant macroinvertebrates found in the river are the Class II (Moderately-Tolerant Taxa), followed by Class I (Pollution-Sensitive Taxa) and Class III (Pollution-Tolerant Taxa). The data were analyzed using Biological Monitoring Working Party (BMWP) Scoring System and based on this system, the category of the dominant macroinvertebrates found were Moderately-Tolerant Taxa with a score of 57 points. Comparing the results of the Biotic Index Card and BMWP Scoring System, it was found out that both of these methods used, Bongoy river is categorized as Moderately-Polluted River. It is thus concluded that in assessing of water quality of river, macroinvertebrates can be a good indicators of water pollution.

Keywords: water quality, macroinvertebrates, bioindicators

A solution for improved information management – Case study Vietnam

Marjo Paavola and Tapio Leppänen

NIRAS Finland Oy, Finland

The detail information will be discussed in the conference.

Agriculture and livelihood flood impact assessment in Myanmar

Aung Swe

Myanmar

On 30 July 2015, Cyclone Komen made landfall in Bangladesh bringing strong winds and additional heavy rains to Myanmar, resulting in floods and landslides. According to the National Natural Disaster Management Committee, 122 people lost their lives and up to1 624,000 people were displaced. In addition, 525 330 ha (1 306 791 acres) of farmland were inundated with reports of a significant impact on crop production, particularly rice which is considered the staple commodity in the country. This Agriculture and Livelihood Flood Impact Assessment requested by the Ministry of Agriculture and Irrigation and the Ministry of Livestock, Fisheries and Rural Development focused on assessing the disaster impact of the cyclone on agriculture and rural-based livelihoods of affected populations. The assessment was conducted in the six most-affected regions/states of Ayeyarwady, Bago, Chin, Magway, Rakhine and Sagaing. It was co-led by FAO and WFP.

The key findings of the assessment show that the disaster had a severe impact on the livelihoods of families that rely on agriculture. Most villages in the six regions/states reported that large parts of their agricultural land was affected by the floods, particularly in Ayeyarwady, Bago and Rakhine, where almost 400,000 ha of land were flooded, resulting in severe damage to cultivated crops, particularly rice. This important staple crop was the most affected, with an expected reduction in production of up to 89 percent in damaged paddy fields, compared to the same time last year. The anticipated high production losses could expose an already vulnerable population to greater food insecurity and possibly malnutrition. Chin state was particularly affected by landslides which destroyed around 2500 ha of agricultural land. Overall, there was also a significant accumulation of sediment and debris on agricultural land due to the disaster. Heavy machineries are needed to rehabilitate the land. Additional findings show that job opportunities such as agricultural casual labour, which is considered one of the most important income-generating activities for the rural population, have already diminished and will probably decrease even further during the upcoming monsoon harvest season. Women are expected to be more severely affected by this situation and the lack of work opportunities will have a significant impact on the livelihoods of many vulnerable women. Affected women's wages are already almost 20 percent lower than those of men, as reported in the results of the assessment.

Seeds, fertilizers and tools were also lost in the disaster. With additional damage to irrigation systems, many farmers risk missing the start of the upcoming winter and summer

agriculture seasons starting in October and January respectively. The replacement of agricultural inputs and tools as well as the rehabilitation of irrigation schemes is crucial to ensure that affected populations can continue agricultural activities in the coming seasons.

The livestock sector was also severely impacted with the loss of more than 250 000 animals particularly poultry, cows, buffalo and pigs. Sagaing and Rakhine registered the highest number of losses. Restocking of small livestock such as poultry should occur as soon as 7 possible to avoid a fall in animal protein intake and allow farmers to have animal draught power for the upcoming winter season. This should be followed by the provision of animal feed and vaccines to support the survival of animals and prevent the spread of disease. Fisheries and aquaculture have also reportedly been significantly disrupted by the disaster. Fishermen lost boats, nets and other fishing materials and more than 30 000 ha of fish and shrimp were affected resulting in losses of production, particularly in Rakhine and Ayeyarwady. River water levels are still high and fishing activities on open water have been considerably hampered. The incomes of people relying on fishing and aquaculture have been generally diminished with people now searching for other job opportunities. There is an immediate need to replace fishing gear and boats and rehabilitate fish ponds.

Additional findings of the assessment show that affected populations have begun to engage in distress coping mechanisms such as borrowing money and selling productive assets in order to access food. Levels of debt are escalating and affected populations will need to access cash as soon as possible in order to repay their debts. Cash-for-work programmes are considered critical to rehabilitate affected areas (e.g. drain irrigation systems, repair roads, remove debris from agricultural land, etc.) and allow for income-generation.

Although markets are performing as usual, prices of food commodities and agricultural input shave generally increased due to rising transportation costs. On the other hand, demand or food commodities has generally decreased due to food assistance received in most of the affected regions/states. Market monitoring is critical and the results of the upcoming monsoon harvest season are very important to determine the availability and accessibility of both food commodities and agricultural inputs. Currently, food assistance is ongoing in the most- affected districts and additional funds are required to continue this support as well as to provide the required agricultural livelihood rehabilitation support for the upcoming winter and summer agriculture season. The assessment results reinforce the need to rapidly respond to this emergency situation. The support of the donor community is key to help provide relief and support recovery to build back better and strengthen the resilience of the affected populations. The findings of this Agriculture and Livelihood Flood Impact Assessment are being complemented by a Post Flood and Landslide Needs Assessment (PFLNA), which will estimate the cost by sector and quantify the response needs in more detail. Furthermore, a joint Government, FAO and WFP-led Crop and Food Security Assessment Mission (CFSAM) is recommended to estimate the performance of agriculture for the upcoming market year and recommend measures to address the food security and nutrition implications.

Water circular economy

Mikael Seppälä

Sansox Oy, Itälahdenkatu 23B, 00210 Helsinki, Finland
Corresponding author:

Fresh water is probably the most important natural resource for the life. Over 30 percent of the world's population suffers lack of fresh water or poor and unhealthy water quality according to Pentagon's document 2004. The present water cycle starts from nature and ends to nature on the way from rain to the seas and oceans which are overloaded from agricultural, industrial and municipal waste already. The seas and oceans are the largest protein sources and necessity for the life on earth. To treat waste waterin the seas and oceans late after the use is most expensive and energy consuming.

Decentralized treatment of the used water at the place where it is used is well reasoned as follows:

- Content and concentration of the used water are best known at the place of use
- Recycling opportunities of the used water ingredients are best known in use
- Treatment and recycling boundary condition of the used water are best known by the process owner
- Quick treatment of the used water saves energy in the most cases
- Transportation costs of raw and used water are minimized
- The quick treatment of the used water saves environment

Waste in general and waste water are not problems but opportunities. Nitrogen processed from the waste water costs a half of which produced by a conventional process. Phosphorus production costs can be reduced by 10 to 50 percent. Waste carbon is competitive inheat and power generation. Further, the used process waters with the ingredients, e.g. fibres used in the process can be recycled over 90 percent.

SansOx Oy provides energy efficientsolutions for the decentralized and centralized treatment of raw water, and municipal, agricultural and industrial water, and the most of sewages and sludge. The key modules are the following:

- OxTube Dissolver and Aerator
- SaoxFuge Centrifuge Separator
- GasRemover
- Milston Screw Separator provided by RannanTeollisuuskone Oy
- Water Filters provided by Akvafilter Oy

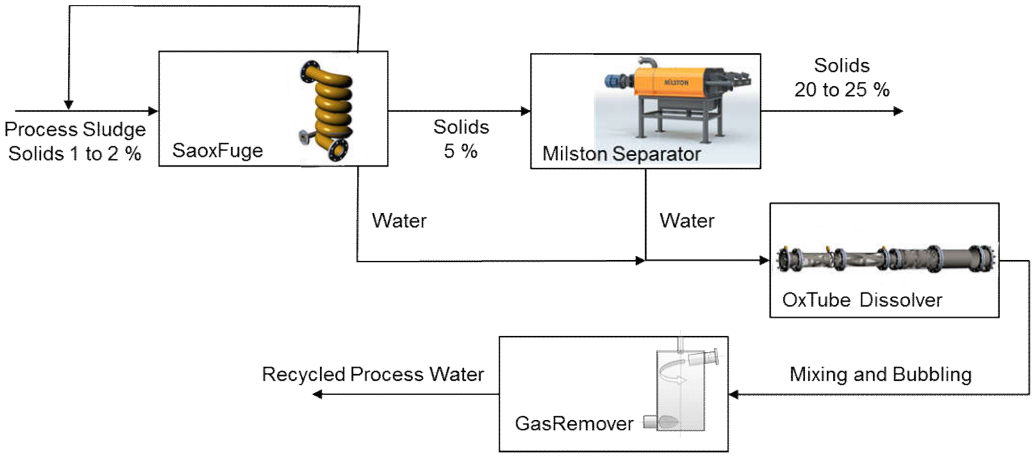


Fig. 1 Solution of Process Sludge Treatment

Environmental projects with Finnish partners – Case: water projects

Peter Jahn

KaukoInternational Oy, Finland

The detail information will be discussed in the conference

Long-term management of Lake Pyhäjärvi - field-scale experiments in an agricultural catchment

Teija Kirkkala

PhD, Executive Director, Pyhäjärvi Institute, Sepäntie 7, 27500 Kauttua, Finland
Corresponding author:

Pyhäjärvi, located in the center of an intensive agricultural area in SW Finland, is an example of a large (154 sq. km) and shallow (mean 5.4 m) lake suffering from eutrophication. The Pyhäjärvi catchment is an example of an area with high agricultural nutrient load. The lake is used for recreational activities, commercial fishery, crayfishery and for local industrial processes. There are important natural habitats and birds, which are recognized as “Natura 2000” nature conservation areas. Pyhäjärvi has been the target of an intensive restoration programme since 1995 when the Pyhäjärvi Protection Fund (PPF) was created by local municipalities, private industries and local associations to act in collaboration with regional environmental and agricultural authorities. The lake has been thoroughly studied for decades and large variety of water protection measures like wetlands, sedimentation ponds and filtering systems have been implemented in the catchment area in order to reduce external

nutrient load. Another important tool for Pyhäjärvi restoration is biomanipulation, done by local commercial fishermen in winter. This long research history and the applied methods and strategies will be available to be exploited for solving related problems in other parts of the world. Since 1995, nearly all farmers in the catchment have committed to the Finnish agri-environmental program to implement basic water protection measures. The Pyhajarvi Protection Fund has also been active in promoting wastewater treatment in the rural catchment. In addition, catchment management practices such as buffer zones, sedimentation ponds, and wetlands have been introduced. The main goal of the catchment work is to reduce the amount of P, the limiting nutrient, in the lake. New, innovative treatment methods, such as filtering ditches and lime and other reactive materials in sand filters, together with and in addition to buffer zones and wetlands, have been developed and tested for their ability to remove P from runoff. We see that this type of filters have the potential to be further developed into useful tools for nutrient circulation, and development work should be focused on the treatment of waters with high concentrations of dissolved nutrients, in particular. Nowadays the management of the lake is challenged by climate change.

Expanding research and development eco-system in South-West Finland, case platfrom for water expertise

Pipa Turvanen

LOURA, Finland

The detail information will be discussed in the conference

Session: **Posters**

Advanced research on phosphorus and potassium biofertilizers used for organic crop production

Wattanachai Pongnak and Kasem Soytong*

Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand
*Corresponding author: ajkasem@gmail.com

Microorganism involved in degrading rock phosphate and potassium feldspar were isolated namely: *Aspergillus niger*, *Pennicillium* sp., *Chaetomium lucknowense*, *Actinomycetes* C4-8, *Actinomycetes* T1-V, *Actinomycetes* T2-4, *Actinomycetes* T2-10 and *Actinomycetes* T2-Y. These isolates were individually mixed into sterilized rockphosphate and potassium feldspar powder forms. Result showed that the sterilized rock phosphate powder incubated with *Penicillium* sp. gave significantly differed to release available phosphorus at the rate of 166 ppm which higher than the non-treated one which releasing the available phosphorus (P) at the rate of 8 ppm. Moreover, the sterilized potassium feldspar powder was mixed with *Actinomycetes* T2-4 gave significantly released in available potassium at the rate of 20 ppm which higher than the non-treated one that releasing the available potassium (K) at the rate of 9.50 ppm. High phosphorus biofertilizer and high potassium biofertilizer are formulated for applying in organic crop production that being evaluation and trended to give a good results in the field trial in tomato and cucumber.

Keywords: biofertilizer, microorganism

Amino acid composition and nutritional value of seed proteins in some seasame (*Sesamum indicum* L.) cultivars grown in Vietnam

Tran Thi Thanh Huyen[1*], Nguyen Van Mui[2], Cao Phi Bang[3]

[1] Deparment of Plant Physiology and Applications, Faculty of Biology, Hanoi National University of Education, Hanoi, Vietnam
[2] Deparment of Plant Physiology and Biochemistry, Faculty of Biology, University of Natural Sciences, Vietnam National University, Hanoi, Vietnam
[3] Biotechnology Research Center, Faculty of Natural Sciences, Hung Vuong University, Phu Tho, Vietnam
*Corresponding author: tranthanhhuyen@hnue.edu.vn

Seeds of six sesame cultivars collected from different provinces of Vietnam were used for the research. The sesame seeds were selected, dehydrated, ground and stored at 4^oC for analyses. The samples were hydrolyzed. The analysis of total amino acid contents and amino acid composition were carried out with precolumn derivatization technique (in HP - Amino Quant Series II, Hewlett Packard) using ortho-phthadialdehyd (OPA) for primary amino acids and 9-

fluorenyl methyl chloroformat (FMOC) for secondary amino acids. The results showed that the total seed amino acid contents of the six cultivars ranged from 17.25 to 21.98%. Among six cultivars, the highest total amino acid contents were observed in seed of two cultivars, V5 (21.98%) and V14 (21.60%). The seeds of V8 cultivar contained the smallest total amino acid contents (17.25%). All essential amino acids were found in the seeds of six examined sesame cultivars. The contents of these amino acids in seed proteins were approximate or higher in compared to FAO standard protein. The seed proteins of these six sesame cultivars had good nutritional values based on the high content of essential amino acids, lysine and leucine especially.

Keywords: total amino acid contents, essential amino acids, sesame (*Sesamum indicum* L.), local cultivars

Antagonism of *Chaetomium* spp and their ability to control Citrus root rot caused by *Phytophthora parasitica* in Vietnam

Nguyen The Quyet[1*], Ha Viet Cuong[1], Le Thi Anh Hong[2] and Kasem Soytong[3]

[1] Hanoi University of Agriculture, Hanoi, Vietnam
[2] Agricultural Genetics Institute, Hanoi, Vietnam
[3] King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[*]Corresponding author: quyetatq@gmail.com

Phytophthora parasitica was isolated from root rot of citrus trees in the fields in Hung Yen and BacGiang provinces in Vietnam. It proved to be virulent isolate caused root rot of citrus seedling using root-dipped method. Many isolates of *Chaetomium* spp. were isolated by baiting technique. It was morphological identified as *Chaetomium cupreum* (CC) and *Chaetomium globosum* (CG). The ED_{50} values of CG- methanol to inhibit *P. parasitica* was 16 ppm, and followed by CC-hexane 88 ppm, CC-ethyl acetate 97 ppm, CC-methanol 165 ppm, CG-hexane 185 ppm and CG-ethyl acetate 4487 ppm. It is proved the control mechanism as antibiosis. Further investigation would formulate as biological fungicide and test in the field is being studied.

Application of gamma rays irradiation and marker assisted selection for improving of bacterial leaf blight resistant rice variety, BT62.1

Vo Thi Minh Tuyen[*], Nguyen Thi Hong, Phan Quoc My, Nguyen Thi Hue, Le Huy Ham

Institute of Agricultural Genetics, Pham Van Dong St., Bac Tu Liem, Hanoi, Vietnam
[*]Corresponding author: tuyenvtm@yahoo.com

Climate change creates adverse conditions for rice production in rice growing regions. For adaptation to mentioned challenges, cultivation of resistant varieties to biotic and abiotic stresses is required. Mutation technique is very effective for improving main agronomic characteristics such as yield, quality and resistance to diseases and pests. It is well-known not

only in worldwide but also in Vietnam. In recent years, the marker - assisted selection (MAS) strategy have been used for selection of traits that are difficult and costly performed measurement and score. In this article, we present the works on the application of gamma ray irradiation and MAS technique for improving of Bacterial Leaf Blight (BLB) resistant rice variety BT62.1. This variety is short growth duration, high quality, easily cultivation and bacterial leaf blight resistance (carrying *Xa7* and *Xa21* genes), but low yield and needs to be improved. BT62.1 dry seeds were treated with 300 grey of Cobalt-60 gamma rays. Irradiated seeds were grown in experiment field of Mutation and Heterosis Division, Agriculture Genetics Institute. All M1 individuals were harvested separately for next season. From M2 to M4, mutant lines were also collected and planted in family. In M5, all mutant lines were breeded by MAS. Then they were inoculated for resistance to bacterial leaf blight and evaluated of main agronomic traits. The mutant lines, with resistant genes and good traits were kept breeding for stable and diversity analysis. The results of evaluation of genetic similarity and cluster analysis showed that genetic diversity in 40 mutant lines and original variety; Eight promising mutant lines of M_5 generation retained as short duration, good quality, bacterial leaf blight resistance as original varieties but they have the higher yield than the original ones. Out of which, 2 mutant lines, M24 and M33, have the highest yield (more than 7 tons/ha). These promising mutant lines are selected for further evaluation.

Keywords: mutation, gamma rays, marker, bacterial leaf blight, rice

---

Attraction effect of Thrips (Thysanoptera: Thripidae) to sticky trap color on orchid greenhouse condition

---

Tipawan Thongjua*, Jarun Thongjua, Jantapa Sriwareen and Jirawan Khumpairun

Faculty of Agriculture, Rajamangala University of Technology Srivijaya , RMUTSV, Nakhon Si Thammarat , Thailand 80110
*Corresponding author: kai_thipawan@hotmail.com

Various sticky trap color were evaluated for attraction and catching thrips, *Thrips palmi* Karny, (Thysanoptera: Thripidae) and other insect on orchid greenhouse of RMUTSV in Thungsong district, Nakhon Si Thammarat Province, Thailand from January 2015 to March 2015. The experimental design was using RCBD with 4 replications and 7 methods (trap color) were: 1) yellow 2) purple 3) white 4) green 5) black. 6) blue and 7) orange. To determined and counted the number of thrips and other insect from color traps every 2 week (14 days) for 4 times. Four species of insect that found on trap were thrips (Thysanoptera: Thripidae), pomace fly (Diptera: Drosophilidae), ant (Hymenoptera: Formicidae) and mosquito (Diptera: Culicidae) with the ratio of 43:30:15:12, respectively. The most effectiveness of sticky trap color for catching thrips were yellow traps, with the average numbers at 18.19 thrips /trap/14 days, followed by blue, green, orange, white and black traps with the average numbers at 10.81, 9.69, 9.43, 9.25 and 8.25 thrips/trap/14 days, respectively and the lowest effectiveness trap color was purple, with the average number at 7.38 thrips/trap/14 days.

Keywords: orchid, sticky color trap, *Thrips palmi* Karny

Biological activity of preparation Gliocladin-SC *in vitro* to control soy pathogens

Scerbacova Tatiana I., Stratulat Tatiana G.*

Department of Plant Protection, Institute of Genetics, Physiology and Plant Protection of Academy of Science of Moldova, Chisinau 2002, Moldova
*Corresponding author: tgs.05@mail.ru

Particularly dangerous pathogens of crops are fungus of the genus *Sclerotinia* and *Fusarium*. They are known as causal agents of fungal diseases that affect a wide range of cultivated plants: cereals, legumes, beans, vegetables, soy, sunflower, corn, etc. Pathogens cause various pathological phenomena - rot diseases of the roots, stems, seeds, fruits, and general depression and premature aging. Biological control methods that reduce the population of pathogen in the soil appear to be the most practical method. Fungus *Trichoderma virens* Miller, Giddens and Foster is a haploid, filamentous hyphomycete (a subclass of fungi). This fungus is present in most soils throughout the world. The antagonistic activity of *T.virens* showed that it is parasitic on many soil-borne and foliage pathogens. Recent discoveries show that the fungi not only act as biocontrol agents, but also stimulate plant resistance, and plant growth and development resulting in an increase in crop production. The biocontrol activity involving mycoparasitism, antibiotics and competition for nutrients, also induces defense responses or systemic resistance responses in plants. This paper reviews confirmed the antagonistic potential and antifungal ability of biopesticide Gliocladin-SC (active microorganism *Trichoderma virens* strain 3X) against pathogens - agents of white rot and root rot *Fusarium* complex of crops. Gliocladin-SC is recommended as biological product on soy for control the basal and root rot by preplans seed-treatment.

Key words: *Trichoderma virens* strain 3X, biopesticide Gliocladin-SC, soy, root rot diseases

Biological activity of metabolites from *Lepiota procera* against plant pathogens

Phaophilat Phadungpran*, Wattanachai Pongnak and Kasem Soytong

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang , Bangkok 10520, Thailand
*Corresponding author:

Bioactivity tests of crude extracts against *Colletotrichum capsici* causing anthracnose of chilli, *Fusarium oxysporum* f.sp. *lycopersici* causing tomato wilt, *Pestalotia* sp. causing grey blight disease of tea and *Phytophthora* sp. causing root rot disease of pomelo. Result showed that crude MeHO of *Lepiota procera* at the concentration of 1,000 ppm gave the highest inhibitory percentage of colony growth of *C. capsici* causing anthracnose of chilli, *F. oxysporum* f. sp. *lycopersici* causing fusarium wilt, *Pestalotia* sp. causing tea and *Phytophthora* sp. causing pomelo which 18.75, 21.67, 19.94 and 15.78 present, respectively with this, persent inhibition of spore production were 26.61, 27.71, 25.61 and 24.09 percent respectively.

Key words: metabolites, crude extracts, *Lepiota procera*

Biological investigation on the red Cotton Bug, *Dysdercuscingulatus* (F.) (Hemiptera: Pyrrhocoridae)

Janejira Name[1*], Suvarin Bumroongsook[1] and Saen Tigvattananontand[2]

[1] Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut Institute of Technology, Bangkok 10520, Thailand
[2]17 Ngamwongvan Rd., Thasai Subdistrict, Muang District, Nonthaburi 11000, Thailand
[*]Corresponding author: janez_8888@hotmail.com

The red cotton bug (RCB), *Dysdercuscingulatus* (F.) is an important pest of cotton as well as various malvaceous and bombacaceous plants in Thailand. Nymps and adults of RCB were collected from fields and reared in the rearing containers. Copulation of males and females occurred on the second day after adult emergence. The females laid eggs in groups on the soil surface averaged 135.87 ± 6.16 eggs, ranging from 76 to 274 eggs. Egg incubation period was 5.79 ± 0.71(range, 5.15 - 7.60 days). Nymphs were carried out individually. The duration time of five nymphal instars of RCB were 4.47 ± 0.24, 4.43±0.25, 4.53 ± 0.20, 4.66 ± 0.17, and 12.23 ± 0.80 days, respectively. The total nymphal period averaged 30.32 ± 1.60days (range, 28.38-32.36days).Newly emerged adults in pair were released in plastic containers for mating and egg collection and observations of adult longevity were also recorded. The results showed that the duration time of the male and female was 20.53 ±3.81 and 23.73 ±3.67 days, respectively. Host plants of RCB in Thailand: *Abelmochus esculentus* (L.), *A. moschatus* Medik, *Gossypium hirsutum* (L), *G.arboreum*, *Hibiscus cannabinus* (L), *H. sabdariffa* (L), *Sidarhom bifolia* (L), *Thespesia populnea* (L.) (Malvaceae), *Bomba xceiba* (L) and *Ceibapen tandra* Gaertn (Bombacaceae).

Keywords: biology, host plants, red cotton bug (*Dysdercuscingulatus* (F.))

Building the models of intergrated pest management (IPM) for *Cinnamomum cassia* in Van Yen district, Yen Bai province

Pham Thanh Loan*, Ngo The Long, Cao Van, Nguyen T. Kim Thom, Nguyen Đac Trien

Faculty of Agro-forestry and Aquaculture, Hung Vuong University, Phu Tho, Vietnam
[*]Corresponding author: loadhhv@gmail.com

Cinnamomum cassia Blume is planted in 27/27 communes and towns of Van Yen district with an area of over 15,000 ha. Recently, *Synanthedon* sp. and *Phalera flavescens* have strongly developed, harming large areas of cinnamon plantations and influencing productivity and quality of the cinnamon trees in Van Yen. We determined four main insect species (*Synanthedon* sp., *Zeuzera* sp., *Arbela baibarana*, *Phalera flavescens*) and one main disease species (*Pestalotiopsis funerae*) on cinnamon trees, and built three effective models of Intergrated Pest Management (IPM) for age classes and main pest species of cinnamon. Cleaning bushes, thinning trees, prunning dead branches, maintaining proper densities (age 1 to 3 years: 3,300 trees/ha, 4 to 6: 1,100 trees/ha, and 7 to 9: 800 trees/ha) and adding microorganism organic fertilizer (2kg/tree) in combination with using the Oncol 25 WP and

the Kasuran 47 WP have effectively prevented and controlled the main insect and disease pests on cinnamon trees in Van Yen district.

Keywords: *Cinnamomum cassia,* intergrated pest management, Van Yen

Callus induction and cell suspension cultures of (*Arachis glabrata*) cultivars: Arbrook

Anurug Poeaim[1*], Supattar Poeaim[1], Pradit Pongtongkam[2], and JantakarnArananant[3]

[1] Department of Biology, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[2] ThepstriRajabhat University, 321 Naraimaharat Road, Tambon Talaychubsorn, Amphur Muang, Lopburi, 15000, Thailand
[3] Feed and Forage Analysis Section. Animal Nautrition Division. Department of Livestock Development. Pathumthani Province 12000, Thailand
[*]Corresponding author: anurug@hotmail.com

Callus induction from leaflet explants of rhizome peanut (*Arachis glabrata*) cultivar: Arbrook were cultured on solid MS media (Murashige and Skoog 1962) supplemented with plant growth regulator 0.5, 1, 3 and 5 mg/l 2,4-D, 30 g/l sucrose and 2.6 g/l phytagel. The leaflet explants were cultured in the dark condition for 42 days. The results concluded that the highest frequency of callus induction was formed leaflet at 62.5 percent at 3 mg/l 2,4-D. Callus amount of 0.15 g fresh weight were cultured in liquid MS medium supplemented with 3 mg/l 2,4-D and 30 g/l sucrose, for 30 days, with shaking speed at 120 rpm. Cell growth was determined by measuring the fresh weight and dry weight of the cell. The results showed that fresh weight and dry weight of cell suspension with the best growth for 24 days at 0.4396 g/10 and 0.0324 g/10 ml repetitively. Cell suspension has grown rapidly during the period of 6-24 days. Viability of suspension cells were determined by the method of fluorescein diacetate for 30 days. Suspension cell were life of cells green fluorescence for living cells. This work has developed an optimized protocol for plant breeding.

Keywords: legume, callus, suspension, *Arachis glabrata*, Arbrook

Characteristics of epididymal sperm recovered from slaughterhouse derived testes of non descript/native goats in the Philippines

Joram Gautane[2], Errol Jay Balagan[2], Fely V. Manaois[2], Marlon B. Ocampo[1], and Lerma C. Ocampo[1]*

[1] Philippine CarabaoCenter-Reproductive Biotechnology Unit, Science City of Munoz, Nueva Ecija, Philippines 3120
[2] Central Luzon State University, College of Veterinary Science and Medicine, Science City of Munoz, Nueva Ecija, Philippines 3120
*Corresponding author: ocampolerma040661@gmail.com

Nondescript/native goats are a common sight in the countryside because of their ability to thrive well in harsh environmental conditions and their ability to reproduce easily despite their small size (20-30kg). In order to supply the food chain, they usually end up in the slaughterhouse shortly before or after they have reached sexual maturity. With the intensification of live importation of foreign goat breeds, there is a pressing need to conserve local native goats in the country. However native bucks are not usually trained for ejaculated semen collection therefore epididymal sperm collection from post mortem is one option. In this study, scrotal intact testes (n=6) were collected within 1-2 hour after slaughter from matured native bucks. The objective of this study is to optimize a method of sperm collection from post mortem testes and determine the sperm characteristics using basic parameters such as motility, viability, sperm concentration, and sperm volume. The slice + swim-up (Method 1) or Mince + flushing (Method 2) were performed to isolate epididymal sperm. In both methods the obtained percentage sperm motility ranged between 60-75% by conventional method of assessment. The average sperm concentration per mL was higher in Method 2 with $1.89 \pm 0.36 \times 10^9$ sperms compared to Method 1 with $1.23 \pm 0.29 \times 10^9$ but did not differ significantly by Student's T- test ($p>0.05$). In terms of sperm volume, an average of 770±200 microliters (μL) was recovered in Method 2 compared with 500±110 microliters (μL) in Method 1are not significantly different ($p>0.05$). In terms of percentage live sperm at the time of collection, Method 1 registered a higher mean percentage of 88.9±2.65 as compared with Method 2 with a mean percentage of 81.67±2.81 (Student's T-test$p>0.05$). The proportion of normal sperm was 76.9±8.48 and 69.4±5.34 in Methods 1 and 2, respectively. The presence of proximal (16-18%) and distal droplet (69-71%) was a common find which is indicative of a sub population of maturing sperms in the epididymis. We therefore conclude that using the two recovery methods a considerable population of viable epididymal sperm can be isolated from post mortem gonads of matured nondescript bucks.

Keywords: post mortem testes, goat epididymal sperm viability and motility characteristics

Comparison on the efficiency of estrus synchronization methods for artificial insemination in goats

J.D. Sumeldan[2], L.C. Ocampo[1], E.P. Atabay[1], E.F. Celestino[2], J.V. Lazaro[2] and M.B. Ocampo [1,2*]

[1] Reproductive Biotechnology Unit, Philippine Carabao Center, Science City of Munoz, Nueva Ecija, Philippines 3120
[2] College of Veterinary Science and Medicine, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines 3120
*****Corresponding author: ocampomarlon29@yahoo.com

Nowadays, estrus synchronization combined with artificial insemination has routinely been used in the breeding management of our livestock to increase/improve the genetic merit of offsprings. In this study, various methods of ES in goats were evaluated for estrus induction followed by AI using frozen-thawed semen during the non-breeding summer season. Apparently healthy, normal cycling does (n=40) of either Anglo-Nubian, Saanen and/or Boer breed that had kidded at least once, with body condition score of 3 or better, weight of 24 kg or more and 1 – 3 yrs of age were used. The does were randomly assigned to either, a) HCM b) HCM + GnRH c) Ov Synch and, d) CIDR method. Locally processed frozen-thawed semen from AN or Boer buck of known fertility were used for AI (2x; AM-PM). Among treatment groups, overt manifestation of heat showed no significant differences. The pregnancy rate was evaluated 60 days post-insemination based on changes in the body conformation of the does and confirmed by using transabdominal ultrasonography (5MHz frequency). The observed pregnancy rate for HCM, HCM + GnRH, Ov Synch and CIDR methods were 30.0%, 20.0%, 0.0% and 40.0%, respectively. Overall, the ES methods used were equally efficient in terms of estrus induction resulting to pregnancies except for OV Synch method. However for long term application, HCM method appeared most practical in terms of cost-efficiency.

Key words: estrus synchronization, artificial insemination, pregnancy, goat

Cost and return of straw mushroom cultivation comparison between rice straw and oil palm bunch

Sugalya Preecha[1], Pornsuda Choovong[1], Peerada Anunon[1], Malivan Hnoosong[1], Janpet Roonglavan[1], Wassana Thongrakjan[1], Wassana Suvansee[1] and Chaisit Preecha[2]

[1] Department of Accounting, Faculty of Management Technology, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat Campus, 80110 Thailand.
[2] Department of Plant Science, Faculty of Agriculture, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat Campus, 80110 Thailand.
[*]Correspondence Author email: skpreecha@yahoo.co.uk

Rice straw and oil palm bunch were substrates used in straw mushroom cultured in Thailand. This research was carried out to compare cost and return of both substrates using in straw mushroom cultured at Suanhluang sub district, Chalermprahiat district, and at Hintok sub

district, Ronphiboon district, Nakhon Si Thammarat province. Ten of each group of farmers whom cultured on each material was sampled to interview with questionnaire in 2017. Survey result showed that the cost of cultivation of both rice straw and oil palm bunch were 2,604.09 and 6,231.68 Baht/crop respectively, price of produces were 90.00 and 80.00 Baht/kg, return of each were 11,358.90 and 20.408.00 baht/crop respectively. For financial analysis of different material, the gross profit of straw mushroom cultivation on rice straw and oil palm bunch were 8,754.35 (77.07%) and 14,176.02 (69.46 %) Baht, the operation profit were 5,984.74 (52.69 %) and 11,573.87 (56.71%) Baht, and net profit were 5,962.86 (52.50%) and 11, 565.74 (56.67%), respectively. The analysis was indicated that total cost were 42.75 and 24.66 Baht/kg, production cost were 20.63 and 34.43 Baht/kg, net profit were 47.25 and 45.34 Baht/kg, and return on asset (ROA) were 11.37 and 24.14 %, respectively. The result showed that ROA of mushroom producing on oil palm bunch higher than culture on rice straw. This research analysis enhanced the farmer to determine the substrate using on straw mushroom culture.

Keywords: cost, return, profit, straw mushroom, rice straw, palm bunch

Distribution and life history of hawk moths on Noni plants in Thailand

Nattha Kliangklao[1], Saen Tigvattananont[2] and Suvarin Bumroongsook[1]

[1]Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[2]17 Ngamwongvan Rd., ThasaiSubdistrict, Muang District, Nonthaburi 11000, Thailand
*Coressponding author: kbsuvari@kmitl.ac.t

Noni plants are commonly grown in all parts of Thailand and it is known for various use. There were four species of hawk moths found infested and damaged to the noni leaves: *Macroglossum gyrans*, *M. prometheus*, *M. sitiene* Walker and Neogurelca *hyas*. Nymphs and egg clusters of these hawk moths were collected from Pathumthani, Nakhonnayok, Ayutthaya, Bangkok, Khonkaen, Chaiyaphum, Uttaradit, Prachinburi, Chachoengsao, Rayong, Trat, Tak, Ratchaburi, Phetchaburi, Sakaeo, Nan, Prachuapkhirikhan, Ranong and Chumporn province. The insect rearing was carried out in the entomological laboratory (27-35^{o}C), King Mongkut's Institute of Technology Ladkrabang. Fresh young leaves of noni plants was used as food and changed every day. Developmental and morphological characteristics of eggs, nymphs and adults of the moths were recorded, measured and photographed (n=30). Host plants were identified and recorded including their distribution. The studies showed that *Macroglossum gyrans*, *M. prometheus*, *M. sitiene* and Neogurelca *hyas* belonged to family Shingidae and to become adult moths these insects have go through 4 stages: egg, 5 successive larval instars, pupa and adults, respectively. The young larval instar prefered young noni leaves and the 4-5th larval instar consumed both young and mature leaves. The life cycle process took 37.09, 34.04, 31.97 and 32.80 days, respectively. Compared by using averaged body length, *M. prometheus* is the largest moths (30.12 mm) among these moth hawks and *M. hyas* (18.18 mm) is the smallest one whereas the sizes of *M. gyrans* and *M. sitiene* were not much different (26.00 and 27.25 mm, respectively). Adults of *M. prometheus*, *M. sitiene*and *N. hyas* were diurnal moth of which mating behavior and egg

laying were carried by the adults occurred mostly during the daytime. Number of eggs laid was more than 120eggs/female insect. Eggs of *M. gyrans* were found parasitized by wasps and the final instar was frequently attacked by Tachinid flies. *Trichogramma* sp was as an egg parasitoids of *N. hyas*. Normally, the female are larger than the male counterpart. Three morphological difference between male and female hawk moths: 1) antenna; 2) lunulate fantail for a female and trilobite fantail for a male; 3) a frenulum for a male and frenula for a female. The principal host plant was *Morindacitri folia* in family Rubiaceae and *M. sitiene* had more various host plants. It was a common insect and could be found during April-June and September-November. Spatial distribution of these hawk moths in Thailand was as follows: *M. sitiene* in Ayutthaya, Bangkok, Chachoengsao, ChumpornKhonkaen, Nakhonnayok, Nonthaburi, *P*athumthani, Phetchaburi, Prachinburi, Prachuapkhirikhan, Ranong, Ratchaburi, Rayong, Tak, and Trat; *M. gyrans*in Chaiyaphum, Uttaradit and Bangkok; *M. prometheus* in Sakaeo, Uttaradit, Nan and Prachinburi and *Neogurelcahyas* in Bangkok.

Keywords: distribution, hawk moths, life history, noni plants

Effect of emulsifiers on particle size and zeta potential of ginger essential oil in emulsion form

Woot Dissiri, Chamroon Laosinwattana and Montinee teerarak*

Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520 Thailand
*Corresponding author: noomonmon@hotmail.com

In our previous study, ginger essential oil displayed interesting extended vase life of cut leaf fern. The objective of the study was to determine the effect of various emulsifier additive agents on particle size and high zeta potential of ginger essential oil in emulsion formulation. The emulsifier additive agents, Span 20, Tween 20, Tween 40 and Tween 60 were selected for this study. Ginger essential oil were mixed with each emulsifier additive agents in various ratios to obtaining emulsion forms which were evaluated for particle sizes, zeta potential and other physical stabilities. Particle size and zeta potential of each mixture which passed all the tests was measured by a Nano plus Zeta/Nano Particle Analyzer. Some formulation containing ginger essential oil showed coalescence and some formulation showed creaming or sedimentation after storage. Especially the emulsion from mixing ratio of Ginger essential oil: tween 40 at 1:1 (W/W) was obtained as smallest nanoparticle size of 94.1 nm and zeta potential of 14.87 nm. The formulation containing ginger essential oil and tween 40 (1:1 v/v) was also evaluated for extending vase life of fern in the future.

Keywords: ginger, essential oil, emulsifier, particle size, zeta potential

Effect of herbicides on weed control and plant growth in immature oil palm (2-year old oil palm plantation)

Jarun Thongjua* and Tipawan Thongjua

Faculty of Agriculture, Rajamangala University of TechnologySrivijaya, NakhonSi Thammarat 80110, Thailand
* Corresponding author: jarun.rmutsv@gmail.com

The experiment on the effects of herbicides on weed control and plant growth in immature oil palm (2-year old oil palm plantation) was conducted at Pakpoonsubdistrict, Chalermprakiat district, Nakhon Si Thammarat, Thailand, from February to May 2015. The experiment was designed using RCBD with 4 replications and 9 treatments: brush cutter, paraquat at the rate of 690 and 794 g/ha, glyphosate at the rate of 513,769 and 1,000 g/ha, glufosinate-ammonium at the rate of 375, 563 and 938 g/ha. Spraying of weeds was carried out using knapsack sprayer with 450 l/ha of volume application rate. The results showed that all treatments were effective weed control on the total mixed weed population for 8 weeks after application with no significant difference in the percentage of weed control (62.50-80.00 %). At the 10-week period after application glyphosate at the rate of 1,000 g/ha was the highest percentage of the weed control at 80 % with no significant differences from glufosinate–ammonium at the rate of 938 and 563 g/ha and glyphosate at the rate of 769 and 513 g/ha giving 78.75, 73.75, 72.25 and 71.15 % respectively, followed by paraquat at the rate of 794 and 690 g/ha with no significant differences in the percentage of the weed control at 60 and 57.50 % respectively, while brush cutter and glufosinate–ammonium at the rate of 375 g/ha gave the lowest in the percentage of weed control (40 %). The duration of effective weed control range from after application to 14- week period were produced by glyphosate at the rate of 1,000 g/ha and glufosinate–ammonium at the rate of 938 and 563 g/ha and glyphosate at the rate of 769 g/ha with no significant differences in the percentage of the weed control giving 66.25, 58.75, 66.25 and 50 %, respectively. Brush cutter and herbicide treatments were not significantly differences on growth of 2-year old oil palm such as plant height, number of fronds per plant, rachis length, increasing of number fruit bunches/plant and increasing of number female inflorescenes/plant during 16-week period after application.

Keywords: paraquat, glufosinate-ammonium, glyphosate, brush cutter, oil palm growth

Effect of manure and chemical fertilizer on vegetative growth of off-season durian production

Somporn Na Nakorn*, Chaiporn Chalumpak

Department of Plant Science, Faculty of Agriculture, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat, Thailand 80110
* Corresponding author: nanakornsp@yahoo.com

The effect of manure and chemical fertilizer on vegetative growth of off-season durian production had been studied in the experimental plots in local orchards of Mr. Prapan

Dangphom, located in the Krungching sub-district, Noppitum district, Nakhon Si Thammarat province, Thailand. Ten-year–old field-grown durian trees were used in this study during January, 2014 to June, 2014. A completely randomized design (CRD) with single tree plots replicated five times, a total of 45 durian trees was used as experimental units where one tree represent a replicate of the different treatments as follows: 1) untreated trees; 2) chemical fertilizer 15-15-15 (NPK) at the rate of 4 kg/tree; 3) chemical fertilizer 15-0-0 (NPK) at the rate of 4 kg/tree; 4) cow manure at the rate of 50 kg/tree; 5) chicken manure at the rate of 30 kg/tree 6); chemical fertilizer 15-15-15 (NPK) at the rate of 2 kg/tree + cow manure at the rate of 25 kg/tree; 7) chemical fertilizer 15-15-15 (NPK) at the rate 2 kg/tree + chicken manure at the rate 15 kg/tree; 8) chemical fertilizer 15-0-0 (NPK) at the rate 2 kg/tree + cow manure at the rate 25 kg/tree; and 9) chemical fertilizer 15-0-0 (NPK) at the rate 2 kg/tree + chicken manure at the rate 15 kg/tree. The results showed that the number of days after treated to leaf flushing were not a significant difference. The percentage of leaf flushing after treated were significant difference ($P \leq 0.05$), the treatment 7: chemical fertilizer 15-15-15 at the rate of 2 kg/tree + chicken manure at the rate 15 kg/tree was shown the highest percentage of leaf flushing by 85.80 percent and follow by treatment 6: chemical fertilizer 15-15-15 at the rate 2 kg/tree + cow manure at the rate 25 kg/tree had been the percentage of leaf flushing by 83.00 percent, the untreated tree had the percentage of leaf flushing is the lowest by 33.40 percent. The number of days from leaf flushing to leaf maturing were significant difference ($P \leq 0.05$), treatment 7: chemical fertilizer 15-15-15 at the rate of 2 kg/tree + chicken manure at the rate of 15 kg/tree and treatment 9: chemical fertilizer 15-0-0 at the rate of 2 kg/tree + chicken manure at the rate of 15 kg/tree was shown the least number of days from leaf flushing to leaf maturing average 40.40 and 41.00 days, respectively. The untreated trees were showed the leaf flushing to leaf maturing is the longest number of days average 45.40 days. The number of times of leaf flushing of all treatments were not significant difference had been showed average 2-3 times.

Keywords: chemical fertilizer, chicken manure, cow manure, durian

Evaluation of bioassay using in vitro matured water buffalo oocytes in predicting bull sperm fertility

Lemuel M. Aquino[1], Fely V. Manaois II[1], Lerma C. Ocampo[2] and Marlon B. Ocampo[1,2*]

[1] College of Veterinary Science and Medicine, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines 3120
[2] Reproductive Biotechnology Unit, Philippine Carabao Center, Science City of Munoz, Nueva Ecija, Philippines 3120
*Corresponding author: ocampomarlon29@yahoo.com

The ability to penetrate zona-intact oocyte has been a very useful test of sperm fertility. In this study, the accuracy of bioassay in predicting sperm fertility using water buffalo oocytes matured in vitro have been evaluated. In Experiment 1, length of sperm-oocyte co-incubation was evaluated based on percentage penetration. The observed mean penetration rate using 10 hr and 24 hr co-incubation time had no difference, including monospermic fertilization rate.

In Experiment 2, the effect of caffeine, theophylline alone or in combination was evaluated based on percentage penetration rate. Neither conditions with capacitating agents used showed no significant differences in the mean penetration rates (but was higher significantly against the control ($P<0.05$). In Experiment 3, 5 bulls were evaluated on their fertilizing capability. The mean penetration rates observed among the bulls evaluated had no significant differences (34.44 ± 8.68 to 48.61 ± 2.32). The results of this study suggest that the *in vitro* matured oocyte bioassay may be a useful tool in assessing bull sperm fertility.

Key words: assay test, bulls, sperm, capacitation, oocytes, co-incubation

Evaluation of sequential changes on 1st meiotic division of goat oocytes in vitro

Riza M. Ambe[2], Virgilio D. Viernes[2], Elfren F. Celestino Jr[2], Lerma C. Ocampo[1] and Marlon B. Ocampo*[1,2]

[1]Reproductive Biotechnology Unit, Philippine Carabao Center, Science City of Munoz, Nueva Ecija, Philippines 3120
[2]College of Veterinary Science and Medicine, Central Luzon state University, Science City of Munoz, Nueva Ecija, Philippines 3120
*Corresponding author: ocampomarlon29@yahoo.com

In this study, the nuclear events of 1st meiosis of goat oocytes in vitro was determined. Immature COCs were cultured in two maturation medium (eg., TCM-199 medium; mSOF medium) at different time points with 3 hr interval of up to 30 hr. Sequential changes observed in the chromosome configurations were evaluated and described. In both maturation conditions, 95.4% ofoocytes were at GV stage at 0 hr. GVBD was occasionally seen starting at 3 hr (19.1%) of culture but most prominent at 6 hr (81.9%). From 9 hr -15 hr of culture, most of the oocytes were at M-1 stage. In mSOF, A-1 toT-1 stage oocytes were occasionally seen at 15 – 18 hr whereas in TCM-199, A-1 to T-1 stage oocytes presence extend up to 21 hr of culture. From 18 hr to 24 hr of culture, oocytes that completed the 1st meiosis (M-2 stage) increased progressively butthe proportion of M-2 oocytes were higher in mSOF medium (85.7 %) than in TCM-199 medium (68.9 %). The completion of 1st meiosis in both maturation conditions reached its peak at 27 hr of culture. The results provided basic informations on the completion of goat oocytes 1st meiotic division in vitro, thus facilitating the needed timing of insemination for successful fertilization of in vitro matured oocytes to occur.

Key words: oocytes, 1st meiosis, goat, maturation, in vitro

Fungi from rubber plantation and their property to control causing agent white root disease

Saithong Kaewchai

Faculty of Agriculture, Princess of Naradhiwas University, Narathiwat, Thailand
Corresponding author: kaewchaii@yahoo.com

This research aimed to study fungi from soil from rubber plantation in Narathiwat Province and to test the antagonistic property of fungi to control white root disease causing agent fungus. The soil samples were collected from rubber plantation in Narathiwat Province. The fungi were isolated by soil plate technique and baiting technique. These isolates were test for their ability to inhibit the growth of white root disease causing agent fungus by bi-culture. The results found that there were 280 isolates and 127 isolates were isolated by soil plate technique and 151 isolates were isolated by baiting technique. The highest number of isolates was *Trichoderma* spp. follow by *Penicillium* spp. *Chaetomium* spp. *Aspergillus* spp., respectively. The isolates that gave the highest percent inhibition were BMU89 (92.22%), BMU07 (91.11%), SBC07 (86.00%), BCR03 (85.00%), BBC04 (84.16%), SBC06 (84.16%), SKL18 (81.94%), BMU52 (81.39%), and SKL04 (80.00%). These isolates were identified as *Trichoderma* sp.

Keywords: rubber plantation, fungi, antagonistic property

In silico identification, classification and expression analysis of genes encoding putative light - harvesting chlorophyll a/b binding protein in coffee (*Coffeacanephora* L.)

Cao Phi Bang[1*], Tran Thi Thanh Huyen[2]

[1]Biotechnology Research Center, Faculty of Natural Sciences, Hung Vuong University
[2]Deparment of Plant Physiology and Application, Faculty of Biology, Hanoi National University of Education
[*]Corresponding author: phibang.cao@hvu.edu.vn

The light-harvesting proteins bind to chlorophyll a/b and transfer light energy to photosynthetic reaction centre. These proteins also play a major role in photoprotection and abiotic stress tolerance in many plants. By using *in silico* methods, a total of 28 genes encoding putative light harvesting complex (LHC) have been identified in coffee (*Coffea cenaphora*) genome. Most of putative LHC deduced proteins possess the *Chloroa_b-bind* (PF00504) conserved domain. Based on phylogeny analysis, these coffee *LHC* genes have been classified into many groups, including photosystem (PSI, PSII), LHC-related and light-inducible genes. Both PSI and PSII groups were divided into six subgroups, respectively (A1-A6) and (B1-B6). All the subgroups contain one member each, except B1and B3 subgroup which contain multiple genomic loci (five members). The B2 and B4 are single locus

subgroups in *C. cenaphora* but they are multiple genomic loci in both *A. thaliana* and rice. In contrast, B3 subgroup contains four genes in *C. cenaphora* but only one member in *A. thaliana*. In general, the transcripts of most of coffee putative LHC genes are abundant in leaves and perisperm but weakly or not detectable in roots. In addition, most of the genes are expressed in pistil. The coffee early light-inducible protein encoding genes are strongly expressed in all the investigated tissues.

Keywords: coffee, chlorophyll a/b binding protein, light-harvesting complex proteins, gene identification, gene classification, gene expression, *in silico* analysis.

A study on prevalence of intestinal nematodes in dogs in Phu Tho province

N.T. Quyen[1*], N.T.K. Lan[2], C. Van[1] and N.T. Nang[1]

[1] Hung Vuong Unirversity, Phu Tho province, Vietnam
[2]Thai Nguyen University of Agriculture and Forsetry, Vietnam
[*]Corresponding author: quyendhhv@gmail.com

The investigation of the prevalence of gastrointestinal parasitic nematodes of dogs in Phu Tho, Vietnam from 2014-2015 using various methods: Skrjabin's method (1928), Fulleborn's method with the classification system of Schulz and Gvozdev (1970). The results showed that: Three species of nematoda were found in the digestive system of dogs: *Spirocerca lupi* (Rudolphi, 1809), *Toxocara canis* (Werner, 1782), *Ancylostoma caninum* (Ercolani, 1859); the prevalence of infection of each species was 6.03%, 29.65% and 44.22%, respectively. There was 19.10% of dogs infected with three species. The infection of nematoda in dogs was high: An autopsy was performed on 342 dogs in Phu Tho province (Yen Lap district, Thanh Thuy district, Viet Tri city) for finding nematoda, the infection rate was 58.19%; the intensity of infection fluctuated from 1 – 54 roundworms/dog. An examination of fecal samples from 542 dogs indicated that, the prevalence of nematoda infection in Yen Lap district, Thanh Thuy district, and Viet Tri city was 63.68%, 44.44% and 47.09%, respectively; the average infection rate was 52.03%. The infection rate of nematoda was different between dog species. It was highest in local dogs (66.87%), followed by hybrid dogs (45.93%) and lowest in exotic dogs (22.95%). This infection rate decreased with age. It was highest in dogs at the age of under 2 months old (72.09%); over 2 – 6 and over 6 – 12 months old (61.45% and 43.75 %, respectively) and lowest at over 12 months old (22.54%). The infection rate of nematoda was different between modalitys: highest in wandering dog 66.82% and lowest in dogs held in captivity (25%). The infection rate of nematoda was different between seasons of a year: it was higher in rainy season (60.29%) and lower in the dry season (43.70%).

Keywords: dog, fecal samples, infection rate, intensity of infection, intestinal roundworms, Phu Tho, Vietnam

Study on *Toxocara canis* in experimental infected dogs by *Toxocara canis*

N.T.K. Lan[1*], N.T. Quyen[2], C. Van[2], N.T. Nang[2]

[1] Thai Nguyen University of Agriculture and forsetry, VietNam
[2] Hung Vuong Unirversity, Phu Tho province, Vietnam
[*] Coressponding author: lanquang19@gmail.com

Studying on clinical and pathological characteristics in dogs of 2 months of age which were experimentally infected by *Toxocara canis* eggs: five dogs were swallowed with 10.000 eggs per dog in group 1, five 5 dogs were swallowed with 15.000 eggs per dogs in group 2 and five dogs were pertained to control group. Symptoms of experimental dogs were determined by clinical diagnostic methods. Macroscopic lesions were determined by necropsy method described by Skjrabin (1928) in dogs of 2 months post- infection. Identifying microscopic lesions by histological template method, staining Hematoxilin - Eosin, observing under Olympus CX 221 microscope. The hematological indicators were determined on BC5800 machine. The result showed that: Symptoms in experimental dogs manifiested as emaciation, low appetite, fuzzy, vomiting, diarrhea, digestive disorder, roundworms in feces and neurological clinical signs. In group 1, there was from 3 to 13 roundworm individuals per dog; in group 2, there was encountered from 8 to 14 roundworm individuals per dog. There was from 2 to 13 roundworm individuals in small intestine per dog, from 0 to 3 roundworm individuals in the stomach per dog. Experimental dogs have lesions mainly concentrated in small intestine as follows: haemorrhagic, congestive, inflammatory intestinal mucosa; there was 7/14 templates (50%) which had intestinal mucosa desquamation and 42.86% of templates had cellular infiltration in inferior intestinal mucosa. Livers had abscesses and the tissue was destroyed, appeared neutrophils and eosinophils in abscesses. Lungs were inflamatory, alveolar wall was thick, inflammatory liquid condensed into alveolus. Beside that, experimental dogs showed changes in hematological parameters were significantly different in comparison with control dogs, such as: red blood cell, hemoglobin concentration, proportion between hematocrit and platelet count in comparison with dogs of control group ($P < 0.05$). Meanwhite, leukocytes and the formula of granulocytes also were increased in comparison with dogs of control group ($P < 0.05$). This experiment was carried out in 2015 in Phu Tho - Viet Nam.

Keywords: dog, clinical symptoms, macroscopic lesions, microscopic lesions, hematological indicator, nematode.

Testing rice tolerance of submergence stress to cope with climate change in coastal areas of Vietnamese deltas

Le-Hung Linh[1], Than-Thi Thanh[1], Dao-Van Khoi[1] and Le - Huy Ham[1*]

[1]Agricultural Genetics Institute, Tu Liem, Hanoi, Vietnam
[2] National Center for Plant Testing, No.6, Nguyen Cong Tru, Ha Noi, Vietnam
[*]Corresponding author:

Vietnam is one of the countries hardest hit by climate changes in Asia. By the end of the 21st century, temperature would rise by about 2.3 ^{o}C and sea level will rise by 75 cm relative to the average of 1980-1999. Vast portions of the food producing regions in the country will be inundated by sea water, expected at about 19-37.8% of the Mekong River Delta (MRD) and about 1.5-11.2% of the Red River Delta (RRD). With sea level rise by 1 m, approximately 40,000 km^2 will be inundated, and salinity intrusion is expected to cover about 71% of the MRD and RRD, together with other coastal regions. Rice is the most important food crop for over half of the world's population and is the most important crop in Vietnam, as the world's second-largest rice exporter after Thailand, where the two countries currently account for about 50% of the world rice trade. Molecular breeding provides powerful tools for the development of stress tolerant varieties that can cope with these devastating changes. QTLs identified before, provided opportunities to apply marker assisted selection (MAS) to develop stress tolerant rice varieties within short time. In this study, we reported a result of testing SHPT3 confer submergence tolerance for agronomic, yield component traits at several provinces. SHPT3 variety expressed good resistance to some major pests and diseases in the field, such as brown plant hopper, blast, blight sheath, steam borer, and *Xanthomonas oryzea.* Especially, results obtained from the experiments conducted in 2014 and 2015 showed that SHPT3 could become a new rice variety with submergence tolerance and high yield.

Keywords: marker-assisted selection (MAS), submergence tolerance

The biological control agent of water primrose: *Theretra silhetensi* (Walker) (Lepidoptera: Sphingidae)

Maneerat Meekhunthod[1*], Suvarin Bumroongsook[2] and Saen Tigvattananont[3]

[1,2] Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut Institute of Technology Ladkrabang, Bangkok 10520,Thailand
[3]17 Ngamwongvan Rd., ThasaiSubdistrict, Muang District, Nonthaburi 11000, Thailand

The water primrose is one of a widespread and damaging invasive plant species. The control of this weed is primarily depend on chemical control. No record has been reported on biological control agents. The water primrose hawk moth (WPH), *Theretra silhetensis* (Walker) and known as brown-banded hunter haw kmoth, consumes water primrose leaves during it larval stage. Therefore, the biology of this insect was studied. The morphologyand

life history of the water primrose hawk moth (WPH), *Theretrasilhetensis* (Walker) was carried out both under laboratory and field conditions. The morphological characters of this insect was described and illustrated in this paper. The life cycle of WPH was studied under the laboratory conditions. In this experiment, larvae were fed with the leaves of the water primrose (WP). The adults consumed 20% of diluted honey solution. The WPH adults were found more active at night and oviposition activity took placeafter dark. The eggs were deposited singly on the underside of WP foliage. The average number of eggs laid per female was 94.13 eggs (range 60-135 eggs). The average egg incubation period was 3.18 days (range 3.00-3.33 days). The larvae of WPH underwent 5 moults and the developmental time for the larval instar in it successive stages was 2.68±0.40, 2.10±0.14, 2.35±0.44, 2.90±0.78 and 5.02±0.52 days, respectively. The mean for the whole larval life including the prepupal period was 15.05±1.07 days. The pupal stage was 9.37±0.60 days. The longevity of mated males and females was 7.60±1.60 and 8.07±1.83 days, respectively. The head capsule width was 0.60±0.02, 1.01±0.01, 1.50±0.19, 2.23±0.11 and 3.14±0.14 mm. for the first to fifth of larval instars, respectively. Approximate length of larval dorsal horn were 1.41±0.10, 1.98±0.17, 2.75±0.25, 3.33±0.41 and 3.16±0.29 mm, respectively.The larvae of this species fed on the foliage of *Ludwigiahyssopifolia* weed (Onagraceae) and *Colocasiaesculenta* (Araceae).

Keywords: hawk moth, sphingidae, *Theretrasilhetensis* (Walker), water primrose

Thyascoronata (F.) (Lepidoptera: Noctuidae): A fruit piercing moth

Nichapat Kamlangkla[1], Suvarin Bumroongsook[1] and Saen Tigvattananont[2]

[1] Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut Institute of Technology Ladkrabang, Bangkok 10520, Thailand
[2]17 Ngamwongvan Rd., ThasaiSubdistrict, Muang District, Nonthaburi 11000, Thailand
[*] Coressponding author: sb19831986@gmail.com

Adults of fruit piercing moth (FPM), *Thyascoronata* (F.) (Lepidoptera: Noctuidae) are known as a key pest of numerous commercial and wild fruit. They used their strongly sclerotized proboscises along with *Pulpingmaceration* to pierce ripening fruits and suck the juice up. The larval host plant is leaves of Rangoon creeper (RC) (*Quisqualis indica* L.) RC is a vine found in Asia and many other parts of the world in either as a cultivated wild species that has red flower clusters. FPM rearing was conducted to investigate morphological characteristics, growth and development of this insect speciesc at the entomological laboratory, King Mongkut's Institute of Technology Ladkrabang under room temperature (27-35^{o}C). The studies showed that eggs had subspherical shape with a diameter of 1.0 –1.2 mm. Their larvae were looper caterpillars, having the first pair of abdominal proleg rudiments (on the third abdominal segment), and possessing two yellow dorsal tubercles on the 8th abdominal segment. A ventral side of the 3rd and 4th abdominal segment had a large median black spot on each segment. The pupa is dark brown to black, with smooth cremaster bearing 8 cremastral hooks. The length of adualt proboscis was 19 – 21 mm (average of 19.93 ± 0.45

mm) with a large number of sensilla styloconica on distal region of the proboscis. The dorsal forewing markings were extremely variable. Eggs and larvae of FPM were collected from Rangoon creepers growing areas in the Bangkok methopolitan region. Leaves of RC were used as food for FPM larvae. The results showed that the egg stage lasted for 3 – 4 days. Larvae normally displayed six instars**.** The mean head capsule width of the successive larval instars 1 – 6 was 0.54±0.09, 1.24±0.09, 2.03±0.31, 2.79±0.45, 3.86±0.62and5.04±0.35 mm, respectively. The total larval period including prepual stage was 19 – 23 days (average of 20.93±1.33 days). The mean for pupal stage was 11.48±0.88 days. The diluted honey solution was applied to the adult moth and it survived for 15 – 20 days.

Keywords: fruit piercing moth*,* rangoon creeper, *Thyas coronate*, noctuidae

AUTHOR INDEX

APPENDIX

Association of Agricultural Technology in Southeast Asia (AATSEA)
Main Office: 2064 Sinthorn On-nuch, On-nuch Ladkrabang Road, Ladkrabang, Bangkok 10520, Thailand, e-mail: ajkasem@gmail.com ijat.aatsea@gmail.com , www.ijat-aatsea.com

AATSEA is dedicated to a mission of long-term research, education and outreach related to the modern agricultural technology in Southeast Asia.

Mission. The primary mission of AATSEA is to conduct and stimulate long-term research on the relationships between members in Southeast Asia.

Operation. The ranch is managed at full production levels to collaborate for research purposes. Revenues from modern agricultural technology support research activities. This provides staff and visiting scientists a unique opportunity to visit each other both sides

Research. Research at AATSEA has provided the research programs in advanced agricultural technology and has addressed various aspects of agriculture concern in environmental friendly. Researchers include the on-site and visiting scientists among members' laboratory and field work. Current projects include environmental friendly research for Organic Agriculture to meet world standard.

Cooperative Projects

AATSEA would appreciate to set up co-operative research laboratory among life member and honour members to do collaboration.

Background

•AATSEA was performed in 9 March 2011 and officially approval on 17 April 2012. We are in a group of Scientists in Southeast Asia which leading by Associate Professor Dr. Kasem Soytong who works at Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok, Thailand.
•ATTSEA organizes internationally recognized research journal in all aspects of Agricultural Technology and related fields.
•ATTSEA is active in a variety of training programs for Agricultural Technology, especially Organic Agriculture and Bio-energy.
•ATTSEA will help the members for technology transfer that will be facilitated through cooperative research programs and interactions with business local companies.

Associate Membership Policy

The purposes are as follows:

- To promote collaborative and interdisciplinary interactions;
- To enhance the community support base of faculty expertise and involvement for the Center;
- To serve as a hub for advancing agricultural technology;
- To organize the International Journal of Agricultural Technology (IJAT) in Southeast Asia (AATSEA) which meet high quality contribution of published research paper;
- To build up the young scientists and researchers get experience in writing their research papers;
- To be awarded the Excellent Scientists or Outstanding Researcher;

Criteria for Membership include:

- To create scientific interests which appropriate among members of AATSEA;
- To establish vigorous ongoing possible collaborative research program;

Benefits to the Members include:

- access to facilities and equipment in co-lab among the members;
- Supporting published scientific papers in agricultural technology through www.ijat-aatsea.com;
- information distribution from AATSEA;
- participation in National, Regional and International Seminar, Workshop, National and International Conference which will organize by AATSEA in Southeast Asia Countries;

Benefits to AATSEA:

- Broader base of community support with respect to the members and involvement a larger scientific community in Southeast Asia;

Requirements for Members:

- Requested research collaboration project that would be submitted through the AATSEA to couple with our co-lab;

Plant Protection Program 2013 - 2015

AATSEA has set up the training program on plant protection in Southeast Asia to let the peoples know advanced technology for new strategy of plant protection to avoid or decrease the toxic chemical pesticides (chemical fungicide, chemical insecticide and chemical herbicide) that leading to destroy our agro-ecosystem in surrounding environment and the toxic synthetic chemicals residue or deposit in vegetables, fruits, animal products and toward food for consumers then it cause hazardous to human to be short life due to the diseases involved eg heart disease and cancer etc. AATSEA will then aim to contribute the new knowledge for plant protection to the society to promote food safety.

AATSEA have expert team in plant protection (plant pathology, entomology and weed science) and ready to scarify new knowledge to young scientists, technician, agriculturists , farmers as well as student who are studying in the field of plant projection major in college or university throughout southeast asia.

AATSEA will provide the new knowledge and technology and help to set up plant protection curriculum in any university upon request. AATSEA will use the own budget to run for contribution knowledge in this field of specialization with our experts and also volunteer to scarify for this opinion. We have experts on many courses as basic plant pathology,

mycology, plant resistant improvement, biological control of plant disease, insect pest and weeds, safety food for phytosanitation etc.

AATSEA procedure to help in two ways as follows:

1. AATSEA can let our expert going to give lecture and practical teaching in plant protection at the institutes, college or university who admire to build up the new concept and knowledge of plant protection by using our own budgetary for travel and accommodation for our experts.
2. AATSEA can accept anyone who interesting go for short course training program (3-6 months) in plant protection at Biocontrol Research Center, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520, Thailand. This way will depend on collaboration to each institute.

How to apply

Please directly contact to AATSEA secretary office in Bangkok to Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL)
Ladkrabang, Bangkok 10520, Thailand

Association of Agricultural Technology in Southeast Asia (AATSEA)
Main Office: 2064 Sinthorn On-nuch, On-nuch Ladkrabang Road, Ladkrabang, Bangkok 10520, Thailand, e-mail: ajkasem@gmail.com ijat.aatsea@gmail.com , www.ijat-aatsea.com

Application for membership

Name:……

Date of Birth:……

Permanent address……..….

E-mail:……..Tel……..

Working Address……

I hereby is needed to apply to be a member of Association of Agricultural Technology in Southeast Asia (AATSEA) as follows:-

Check (/)	Membership status	Payment (USD)
	Institution	200
	Life member	100
	Annual due	20

Please kindly make payment directly into any of our accounts below:

Bank Name: **Bangkok Bank Co.Ltd. , Thailand**

Address: 999 Tambol Bangpree Yai

Savings Account No: **862-013355-6**, Amphur Bangpree, Samutprakarn province 10540, Thailand

Swift Code: **BKKBTHBK**

Account Name: **AATSEA**

OR

Contact us if you prefer to use Western Union through to Miss. MayAmor Soytong, Citizen ID Card No:1-1027- 00022-99-5 and send transfer copy to email: ijat.finances@gmail.com

Applicant signature

(_____)

Approval by

_____

Assoc. Prof. Dr. Kasem Soytong
President of AATSEA