

## **e-ASIA Joint Research Program Final Report**

**1. Project title : 「Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies」**

**2. Joint Research period : Oct. 1, 2012 ~ Mar. 31, 2016**

**3. Research Team :**

**Country 1 (Japanese) team (up to 6 people including the Principal Investigator)**

**Funding period: Jan. 1, 2013 - Mar. 31, 2016**

**Total Funded Amount (in Local Currency): 28.8 million Japanese Yen**

	Name	Position	Affiliation	Role in the project
PI	Motoaki Seki	Team Leader	RIKEN Center for Sustainable Resource Science (CSRS)	e-ASIA project leader
Collaborator	Yoshinori Utsumi	Research Scientist	RIKEN CSRS	Key researcher in Japan
Collaborator	Tomonari Hirano	Visiting Scientist	RIKEN Nishina Center for Accelerator-Based Science	Heavy ion beam mutagenesis
Collaborator	Akihiro Matsui	Research Scientist	RIKEN CSRS	Transcriptome analysis
Collaborator	Maho Tanaka	Technical Staff	RIKEN CSRS	Transcriptome analysis
Collaborator	Chikako Utsumi	Technical Staff	RIKEN CSRS	Transformation
Total number of participants including students: 10				

**Country 2 (Vietnamese) team (up to 6 people including the Principal Investigator)**

**Funding period: Jan. 1, 2013 - Dec. 31, 2015**

**Total Funded Amount (in Local Currency): 2,590,000,000 VND**

	Name	Position	Affiliation	Role in the project
PI	Ham Huy Le	Director	Agricultural Genetics Institute (AGI)	Leader of e-ASIA project in Vietnam
Collaborator	Dong Van Nguyen	Director	National Key Laboratory, AGI	Sub-project leader in Vietnamese cassava research
Collaborator	Vu Anh Nguyen	Deputy Director	National Key Laboratory, AGI	Key researcher in Vietnam
Collaborator	Thu Anh Vu	Technical Staff	National Key Laboratory, AGI	Heavy ion beam mutagenesis

Collaborator	Huong Thi Tong	Technical Staff	National Key Laboratory, AGI	Cassava transformation
Collaborator	Quynh Ngoc Le	Technical Staff	National Key Laboratory, AGI	Cassava transformation
Total number of participants including students: 10				

**County 3 (Thai) team (up to 6 people including the Principal Investigator)****Funding period: Oct. 1, 2012 - Sep. 30, 2015****Total Funded Amount (in Local Currency): 2,000,000 Baht**

	Name	Position	Affiliation	Role in the project
PI	Jarunya Narangajavana	Associate Professor	Faculty of Science, Mahidol University	Leader of e-ASIA project in Thailand
Collaborator	Kanokporn Triwitayakorn	Associate Professor	Institute of Molecular Biosciences, Mahidol University	Cassava marker breeding
Collaborator	Punchapat Sojikul	Assistant Professor	Faculty of Science, Mahidol University	Transcriptome analysis
Collaborator	Supajit Sraphet	Research Scientist	Institute of Molecular Biosciences, Mahidol University	Cassava marker breeding
Collaborator	Sukhuman Whankew	Research Scientist	Institute of Molecular Biosciences, Mahidol University	Cassava marker breeding
Collaborator	Treenut Saithong	Lecturer	King Mongkut University of Technology at Thonburi	Transcriptome analysis
Total number of participants including students: 10				

**4. Summary of the joint research (up to 4 pages for section 4. to 6. including figures. Please note that information described in this report should only be disclosable.)**



Fig. 1. Cassava  
An important tropical crop.

Cassava (*Manihot esculenta*) is an important tropical crop for food security, income generation and industrial application in many Asian countries (Fig. 1). We have applied cutting-edge technologies, including functional genomics platform, such as cassava full-length cDNAs and a cDNA microarray containing more than 30,000 genes and heavy-ion mutagenesis, and transformation technology that Japanese groups have developed, to useful cassava plant materials from Thailand and Vietnam for advancing cassava molecular breeding (Utsumi et al. 2015, Proc. 9<sup>th</sup> Regional Workshop).

We have applied the cassava microarray analysis system to elucidate the molecular mechanisms of various biological phenomenon in cassava, such as tuberization process and disease resistance. Our microarray analysis revealed several useful cassava candidate genes (Sojikul et al., 2015, Plant Mol. Biol.; Utsumi et al. 2016, J. Plant Res.; Utsumi et al. in prep.).

We have optimized the system for induction of friable embryogenic calli in model cassava (Utsumi et al., in prep.). Using the improved transformation protocol, we have produced several transgenic cassava plants for improving cassava biomass and disease resistance. We demonstrated that overexpression of fructose-bisphosphate aldolase 3 (*FBA3*) gene increased tuber root yield in cassava by enhancement of photosynthesis (Takei et al. in prep.). We are planning to ship these transgenic plants to Vietnam for testing in the cassava biosafety greenhouse.



Fig. 2. About 1,000 heavy-ion beam mutagenized cassava lines have been developed.

More than 10,000 KU50/KM94 seeds were harvested by AGI group and shipped to RIKEN group. RIKEN group has performed the heavy ion beam irradiation to the seeds, and then shipped to AGI group. The plants were germinated and grown. About 1,000 irradiated plants were grown on the cassava field of AGI and the screening is in progress (Fig. 2).

We have published the data in peer-reviewed international journals and gave several invited talks in the international meetings. And several new papers will be published in the future. Our collaboration provided various opportunities for education of cutting-edge and global plant science to young researchers, and strengthened our cassava research network and contributed to advancement of cassava molecular breeding.

## 5. Outputs and Anticipated Outcomes of Joint Research

### 5-1 Scientific achievements and implemented activities of the joint research

We have applied cutting-edge technologies that Japanese groups have developed, to useful cassava plant materials from Thailand and Vietnam, and obtained the following academic results:

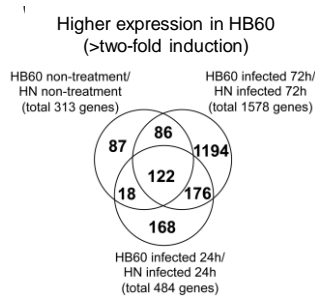


Fig. 3. Identification of the candidate genes of CAD resistance in HB60 by microarray analysis.

Bong 60 (HB60, resistant to CAD) and Hanatee (HN, sensitive to CAD) showed that the expressions of various plant defense-related genes, such as pathogenesis-related (PR) genes, cell wall-related genes, detoxification enzyme, genes related to the response to bacterium and mitogen-activated protein kinase (MAPK) were higher in HB60 compared with HN (Fig. 3). Our results indicated that the induction of PR genes in HB60 by fungal infection and the higher expressions of defense response-related genes in HB60 compared with HN are likely responsible for the fungal resistance in HB60.

Microarray analysis during tuberous root formation revealed that dynamic transcriptome changes occur during transition from fibrous roots to tuberous roots and indicated that phytohormones act in concert to regulate the onset of cassava storage root development (Sojikul et al. 2015, Plant Mol. Biol., Utsumi et al. in prep.).

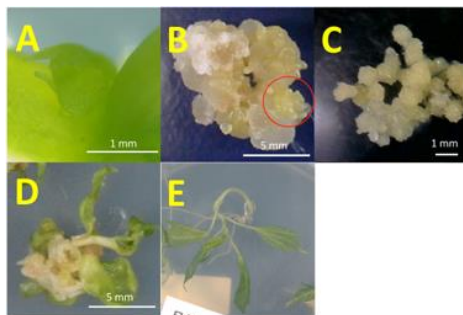


Fig.4. *Agrobacterium*-mediated cassava transformation. (A) Axillary bud in cassava. (B) Somatic embryo (SE, shown in red circle) is formed after transfer of the axillary bud on MS medium including picloram. (C) Friable embryogenic calli (FEC) is formed after culturing the SE. (D) After co-cultivating the FEC and *Agrobacterium* on MS medium including BAP, shoots regenerate. (E) Regenerated transgenic cassava plantlets.

#### 1) Cassava transcriptome analysis using microarray.

We have applied the cassava microarray system to elucidate the molecular mechanisms of disease resistance, such as cassava anthracnose disease (CAD) and tuberous root formation.

CAD caused by the fungus *Colletotrichum gloeosporioides* f. sp. *Manihotis*, is a serious disease of cassava worldwide. Microarray analysis in two cassava cultivars, Huay

Bong 60 (HB60, resistant to CAD) and Hanatee (HN, sensitive to CAD) showed that the expressions of various plant defense-related genes, such as pathogenesis-related (PR) genes, cell wall-related genes, detoxification enzyme, genes related to the response to bacterium and mitogen-activated protein kinase (MAPK) were higher in HB60 compared with HN (Fig. 3). Our results indicated that the induction of PR genes in HB60 by fungal infection and the higher expressions of defense response-related genes in HB60 compared with HN are likely responsible for the fungal resistance in HB60.

#### 2) Cassava Transformation.

We have optimized the system for induction of FEC in model cassava, TMS60444 (Fig. 4; Utsumi et al., in prep.). Using the improved transformation protocol, we have produced several transgenic cassava plants, such as overexpressor of FBA3 for improving the photosynthesis and cassava biomass, and overexpressor of a disease resistance candidate gene set, *RRS1-RPS4* genes from *Arabidopsis* that

function as a Dual Resistance gene system against the *Colletotrichum* fungal

pathogen (Collaboration with Dr. Narusaka, RIBS OKAYAMA and Dr. Shirasu, RIKEN CSRS). In this project, we showed that overexpression of *FBA3* gene increased tuber root yield in cassava (Takei et al. in prep.). We are planning to ship these transgenic plants to Vietnam for testing in the cassava biosafety screenhouse. Analysis of other transgenic cassava plants is in progress. We also tried to develop the system for reproducible induction of the FEC and transformation system in Vietnamese varieties. The screening is in progress.

### 3) Heavy-ion beam mutagenesis

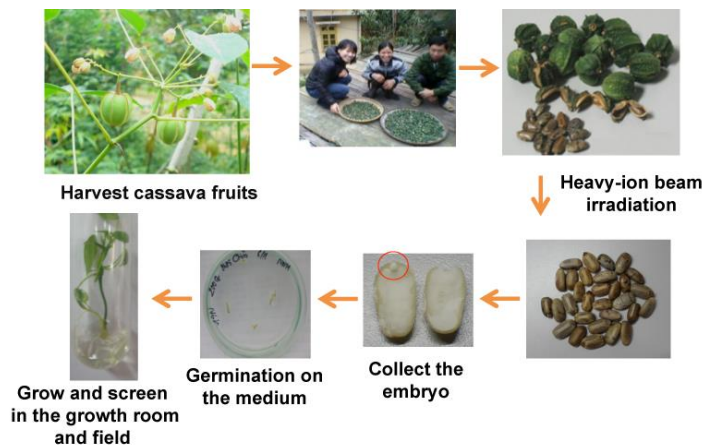


Fig. 5. Heavy-ion-beam mutagenesis in cassava KU50/KM94

More than 10,000 KU50/KM94 seeds were harvested by AGI group and shipped to RIKEN group. RIKEN group has performed the heavy ion beam irradiation to the seeds, which were then shipped to AGI group. AGI group has performed the embryo rescue of the seeds and then the plants were germinated and grown in the growth room of AGI. About 1,000 irradiated plants were grown on the cassava field of AGI and the phenotype screening is on going (Fig. 5). Several putative candidate lines with valuable traits have been identified, such as early flowering, high yield and no branching.

### 5-2 Synergistic effects of the international joint research



Fig. 6. Education of cassava tissue culture and transformation technology to Vietnamese Researchers (by Dr. Utsumi, RIKEN)

We could achieve research objectives of this e-ASIA project by utilizing the expertise and research environment. We have trained Vietnamese and Thai young researchers cutting-edge technologies and could strengthen Asian cassava research network (Fig. 6). The information and research resources that have been

obtained from the e-ASIA project would contribute to industrial application and sustainability of human life in East Asia. Many cassava researchers had much interests in our invited talks (in International Meetings) that present our cassava collaborative research results.

### 5-3 Broader impacts including contribution to society

We have advanced Asian cassava molecular breeding by utilizing cutting-edge technologies (Japan), knowledge and breeding technologies in

cassava (Thailand) and cassava breeding technology. AGI and International Center for Tropical Agriculture (CIAT) have established the International Laboratory for Cassava Molecular Breeding (ILCMB) at AGI in 2012. RIKEN group has joined ILCMB since 2012 as a core member. AGI, CIAT and RIKEN groups have advanced Asian cassava molecular breeding. Vietnamese government has great interests in advancement of cassava collaboration between AGI and RIKEN. On May 22, 2013, Vietnamese Deputy Prime Minister (Dr. Nguyen Thien Nhan) visited RIKEN Yokohama Campus to attend a signing ceremony for a memorandum of agreement on cassava research collaboration between AGI and RIKEN CSRS (Please see Annex page 14-15: [http://www.riken.jp/en/pr/topics/2013/20130523\\_2/](http://www.riken.jp/en/pr/topics/2013/20130523_2/)). By following this event, on June 19, AGI researchers including Dr. Le Huy Ham, Director General and Dr. Kenji Oeda, RIKEN Executive Director have attended the Celebration Meeting on the 40th Anniversary of Vietnam-Japan Diplomatic Relations, Scientific and Technological Cooperation in Hanoi as invited guests (Please see Annex page 16-17). These events clearly indicate great interest in cassava development at governmental and institutional level.

#### **5-4 Development and sustainability of the cooperation**

New JST/JICA Cassava SATREPS Project (Research Title: Development and Dissemination of Sustainable Production System based on Invasive Pest Management of Cassava in Vietnam, Cambodia and Thailand; PI: Keiji Takasu, Kyushu Univ.) was launched in Apr. of 2016 towards technology transfer from basic science to applied science. Further continuous and/or new international cassava collaboration with research institutes and universities of Asian countries including other ones, such as China, Indonesia and India etc. will be expected for contribution to food and energy security and industrial development in the future.

### **6. Recommendations and Comments to the Program**

Thank you very much for kind and great support to our cassava collaboration.

As you know, cassava is an important tropical crop in many Asian countries, providing food security, income generation for small-scale farmers, and a source of starch for industrial processing. It takes very long time to advance cassava molecular breeding and establish green innovation using cassava, because its generation time is about 1 year and only a few seeds are obtained, resulting in difficulty of genetic analysis and molecular breeding in short period. We would appreciate it very much if you could consider the continuous support for our cassava collaborative research. It will also provide more opportunities for education of cutting-edge plant science to young Asian researchers and strengthen the research network among young researchers.



## ***Annex: List of Scientific Achievements and Implemented Activities of the Joint Research***

### **1 Original Publications (All Authors' Names, Title, Journal Name, Volume, Page, Year, DOI) :**

#### **1.1 Co-authored among research teams:**

1. Yoshinori Utsumi, Maho Tanaka, Atsushi Kurotani, Takuhiro Yoshida, Keiichi Mochida, Akihiro Matsui, Manabu Ishitani, Supajit Sraphet, Sukhuman Whankaew, Jarunya Narangajavana, Kanokporn Triwitayakorn, Tetsuya Sakurai, Motoaki Seki: "Cassava transcriptome analysis in response to infection of the fungus *Colletotrichum gloeosporioides* using an oligo-DNA microarray", Journal of Plant Research, 2016 (in press). doi: 10.1007/s10265-016-0828-x
2. Puchapat Sojikul, Treenut Saithong, Saowalak Kalapanulak, Nuttapat Pisuttinusart, Siripan Limsirichaikul, Maho Tanaka, Yoshinori Utsumi, Tetsuya Sakurai, Motoaki Seki, Jarunya Narangajavana: "Genome-wide analysis reveals phytohormone action during cassava storage root initiation", Plant Molecular Biology, Vol.88, 531-543, 2015. doi: 10.1007/s11103-015-0340-z
3. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Ha The Vu, Yoshio Takei, Akihiro Matsui, Tomonari Hirano, Tomoko Abe, Angela E.J. Fernando, Julio Eduardo, León Sánchez, Hernan D. Lopez, Jorge Duitama, Sahra Ayling, Manabu Ishitani, Dong Van Nguyen, Vu Anh Nguyen, Le Dung Tien, Kanokporn Triwitayakorn, Puchapat Sojikul, Jarunya Narangajavana, Ham Huy Le and Motoaki Seki: "An Integrated Platform for the Advancement of Molecular Breeding of Cassava". Proceedings of the 9th Regional Workshop "Sustainable Cassava Production in Asia for Multiple Uses and for Multiple Markets" held in Nanning, Guangxi, China PR, pp. 116-123, 2015.
4. Dong Van Nguyen, Vu Anh Nguyen, Dung Tien Le, Huong Thi Tong, Quynh Ngoc Thi Le, Ly Thi Le, Hong Ngoc Nguyen, Thu Anh Vu, Nam Hoang Vu, Chikako Utsumi, Yoshinori Utsumi, Motoaki Seki and Ham Huy Le: "EMBRYOGENIC CALLUS INDUCTION AND IMPROVE A PROTOCOL FOR GENE TRANSFORMATION ON CASSAVA PLANT", Science and Technology Journal of Agriculture and Rural Development, Vol.15, 29-35, 2014.
5. Vu Anh Nguyen, Dong Van Nguyen, Yoshinori Utsumi, Motoaki Seki, Tomonari Hirano, Tomoko Abe and Ham Huy Le: "APPLICATION OF HEAVY-ION BEAM IRRADIATION IN COMBINATION WITH PLANT TISSUE CULTURE FOR CREATING KM94 CASSAVA MUTANT LINES", Science and Technology Journal of Agriculture and Rural Development, Vol. 5, 26-30, 2013.

#### **1.2 Published by single team:**

1. Tetsuya Sakurai, Keiichi Mochida, Takuhiro Yoshida, Kenji Akiyama, Manabu Ishitani, Motoaki Seki and Kazuo Shinozaki: "Genome-wide discovery and information resource development of DNA polymorphisms in cassava", PLOS ONE Vol. 8(9) e74056, 2013. doi: 10.1371/journal.pone.0074056.
2. Athipong Boonchanawiwat, Supajit Sraphet, Sukhuman Whankew, Opas Boonseng, Duncan R. Smith, and Kanokporn Triwitayakorn: "Mapping of quantitative trait loci underlying resistance to cassava anthracnose disease in cassava", The Journal of Agriculture Science, 2015. doi: <http://dx.doi.org/10.1017/S0021859615001057>
3. Ratchadaporn Thaikert, Supajit Sraphet, Athipong Boonchanawiwat, Opas Boonseng, Duncan R. Smith, Sittiruk Roytrakul and Kanokporn Triwitayakorn: "Identification of differentially expressed proteins in cassava infected with *Colletotrichum gloeosporioides* f. sp. *Manihotis*", Journal of Crop Improvement. 29(6): 728-746, 2015.

4. Kuldanai Pathompitaknukul, A. Kidjaideaw, Rungsi Charaensatapon, Chuenchit Boonchird, Jarunya Narangajavana and Thipa Asvarak : “ Antifungal activity of fungal endophytes and rhizosphere fungi of cassava against causal agent of cassava anthracnose disease”, In: Proceedings of the 39th Congress on Science & Technology “Innovative Sciences for a Better Life”, Thailand (STT39), Bangkok International Trade & Exhibition Centre (BITEC), Bangkok, Thailand, October 21-23, 2013. pp. 842-846.

## 2 Presentations at conferences (Speaker, Title, Conference Name, Location, Date, Type of Presentation, etc.) :

### 2.1 Co-authored among research teams :

1. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Ha The Vu, Yoshio Takei, Tomonari Hirano, Tomoko Abe, Manabu Ishitani, Joe Tohme, Dong Van Nguyen, Vu Anh Nguyen, Kanokporn Triwitayakorn, Puchapat Sojikul, Jarunya Naranjavana, Ham Huy Le, Motoaki Seki : “Integrated Omic Analysis Towards Advancement of Cassava Molecular Breeding” , World Congress on Root and Tuber Crops, Nanning, 2016/1/18-22 (Invited Talk).
2. Onsaya Patanun, Minoru Ueda, Yoshinori Utsumi, Akihiro Matsui, Maho Tanaka, Chikako Utsumi, Minoru Yoshida, Jarunya Narangajavana, Motoaki Seki: “ Molecular analysis of enhanced tolerance to high salinity stress by a HDAC-inhibitor treatment in cassava” , World Congress on Root and Tuber Crops, Nanning, 2016/1/18-22 (Invited Talk).
3. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Ha The Vu, Yoshio Takei, Tomonari Hirano, Tomoko Abe, Manabu Ishitani, Dong Van Nguyen, Vu Anh Nguyen, Kanokporn Triwitayakorn, Jarunya Narangajavana, Ham Huy Le, Motoaki Seki: “Towards Cassava Molecular Breeding of Improved Biomass Productivity and Quality in Collaboration with ASEAN Countries” , World Congress on Root and Tuber Crops, Nanning, 2016/1/18-22 (Invited Talk).
4. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Ha The Vu, Yoshio Takei, Tomonari Hirano, Tomoko Abe, Manabu Ishitani, Dong Van Nguyen, Vu Anh Nguyen, Kanokporn Triwitayakorn, Jarunya Narangajavana, Ham Huy Le, Motoaki Seki: “Towards Cassava Molecular Breeding of Improved Biomass Productivity and Quality in Collaboration with ASEAN Countries” , Invited Seminar at Fukuyama Univ., Fukuyama, 2015/12/28 (Invited Talk).
5. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Ha The Vu, Yoshio Takei, Tomonari Hirano, Tomoko Abe, Manabu Ishitani, Dong Van Nguyen, Vu Anh Nguyen, Kanokporn Triwitayakorn, Jarunya Narangajavana, Ham Huy Le, Motoaki Seki: “Towards Cassava Molecular Breeding of Improved Biomass Productivity and Quality in Collaboration with ASEAN Countries” , CREST International Symposium “Towards Increased Plant Productivity through Understanding of Environmental Responses and Epigenetic Regulation” , Yokohama, 2015/11/24-25 (Invited Talk).
6. Motoaki Seki, Ham Huy Le, Jarunya Narangajavana : “Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies” , INNOVATION JAPAN 2015~UNIVERSITY EXHIBITION · BUSINESS MACHING, Tokyo, 2015/8/27-28 (Invited Poster Presentation).
7. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Yoshio Takei, Manabu Ishitani, Ham Huy Le, Dong Van Nguyen, Vu Anh Nguyen, Jarunya Narangajavana, Kanokporn Triwitayakorn, Motoaki Seki: “Advancement of Cassava Molecular Breeding in Collaboration with ASEAN Countries” , Symposium at Tokyo Univ. of Sci. “Science and Technology Approach in AGRIBO” , Tokyo, 2015/7/17 (Invited Talk).
8. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Yoshio Takei, Tomoko Abe,



- Tomonari Hirano, Ham Huy Le, Dong Van Nguyen, Jarunya Narangajavana, Manabu Ishitani, Motoaki Seki: “Towards Cassava Molecular Breeding of Improved Biomass Productivity and Quality by International Collaboration” , The symposium “How to maximize plant production level” at the 56th Annual Meeting of Japanese Society of Plant Physiologists, Tokyo Univ. of Agriculture, Tokyo, Mar. 16, 2015 (Invited Talk).
9. Motoaki Seki, Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Yoshio Takei, Tomoko Abe, Tomonari Hirano, Manabu Ishitani, Dong Van Nguyen, Vu Anh Nguyen, Dung Tien Le, Jarunya Narangajavana, Kanokporn Triwitayakorn, Ham Huy Le i: “Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies” , International Symposium "Collaboration between Japan and Vietnam for the sustainable future-Plant science, agriculture and biorefinery-", AGI (Hanoi), Dec. 8, 2014 (Invited Talk).
  10. Yoshinori Utsumi, Tetsuya Sakurai, Chikako Utsumi, Yoshio Takei, Manabu Ishitani, Ham Huy Le, Dong Van Nguyen, Jarunya Narangajavana, Kanokporn Triwitayakorn , Motoaki Seki : Manabu Ishitani, Motoaki Seki: “Towards Cassava Molecular Breeding of Improved Biomass Productivity and Quality in Collaboration with ASEAN Countries” , The symposium “Towards Increased Plant Productivity through Understanding of Plant Biomass” at the 78th Annual Meeting of the Botanical Society of Japan, Meiji Univ., Kawasaki, Sep. 13, 2014 (Invited Talk).
  11. Motoaki Seki, Ham Huy Le, Jarunya Narangajavana : “Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies”, INNOVATION JAPAN 2014~UNIVERSITY EXHIBITION・BUSINESS MACHING, Tokyo, 2014/9/11-12 (Invited Poster Presentation).

## 2.2 Published by single team :

1. Ham Huy Le, “Cassava revolution in Vietnam” , World Congress on Root and Tuber Crops, Nanning, 2016/1/18-22 (Invited Talk).
2. Yoshio Takei, Yoshinori Utsumi, Chikako Utsumi, Maho Tanaka, Yoshie Okamoto, Erika Moriya, Miyako Kusano, Kenichi Ogawa and Motoaki Seki, “Effect of overexpressing fructose 1,6-bisphosphate aldolase on cassava biomass” , World Congress on Root and Tuber Crops, Nanning, 2016/1/18-22 (Invited Talk).
3. Manassawe Lertpanyasampantha, Porawee Pramoolkit, Supanath Kanjanawattanawong, Onsaya Patanun, Pawittra Phookaew, Nattaya Pinweha, Unchera Viboonjun, Panida Kongsawadworakul, Herve Chrestin, Xuemei Chen, Jarunya Narangajavana, “MicroRNAs and their regulatory roles in Euphorbia plants: Learning from rubber tree and cassava” , CREST International Symposium “Towards Increased Plant Productivity through Understanding of Environmental Responses and Epigenetic Regulation” , Kanagawa, 2015/11-24-25 (Invited Talk).
4. Motoaki Seki, “Overview of the e-ASIA cassava project 2012-2015” , The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk).
5. Yoshinori Utsumi, “Japanese approaches towards molecular breeding of cassava in collaboration with Thailand and Vietnam” , The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk)
6. Nguyen Anh Vu, Tong Thi Huong, Vu Anh Thu, Nguyen Van Dong, Le Huy Ham, “Development of new cassava varieties via mutation breeding and genetic engineering” , The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop. NECTEC, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk).
7. Ham Huy Le, “Overview of the Vietnamese activity in e-ASIA cassava project” , The

- e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop. NECTEC, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk).
8. Treenut Saithong, “Linking genotype to phenotype through cassava modeling” , The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop. NECTEC, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk).
  9. Kanokporn Triwittayakorn, “Molecular breeding for improving disease-resistant cassava” , The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop. NECTEC, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk).
  10. Jarunya Narangajavana, “Overview of the Thai activity in e-ASIA cassava project” , The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop. NECTEC, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk).
  11. Puchapat Sojikul, “ Genome-wide analysis: unraveling the puzzle of phytohormones acting in concert during storage root initiation of cassava” , The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop. NECTEC, Thailand Science Park, Thailand, 2015/10/12 (Invited Talk).
  12. Motoaki Seki, “Advancement of Cassava Molecular Breeding in Collaboration with ASEAN Countries” , The 3rd Meeting of Biomass Innovation for Young Researchers, Univ. of Tokyo , Tokyo, Sep. 25, 2015 (Invited Talk).
  13. Motoaki Seki, “Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies” , The 23th Workshop (Towards Collaboration between Industry, University and Government) , The Japan Society for Bioscience, Biotechnology, and Agrochemistry (JSBBA), Tokyo Univ. of Agr. and Technol., Fuchu, Tokyo, Jan. 28, 2015 (Invited Talk).
  14. Yoshio Takei, Yoshinori Utsumi, Chikako Utsumi, Maho Tanaka, Ken'ichi Ogawa, Motoaki Seki, “Overexpression of fructose 1,6-bisphosphate aldolase (FBA) enhances tuber yield in cassava” , The oversea meeting to present their research for Japanese Plant Biomass Students, Vietnam National University of Agriculture (Hanoi), Dec. 9, 2014 (Invited Talk).
  15. Yoshinori Utsumi and Motoaki Seki, “Cassava Molecular Breeding ” , Agribusiness Creation Fair 2014, Tokyo, Nov. 12-14, 2014 (Poster Presentation).
  16. Motoaki Seki and Yoshinori Utsumi, “Towards Cassava Molecular Breeding of Improved Biomass Productivity and Quality by International Collaboration” , The 4th CSJ Chemistry Festa 2014, Tokyo, Oct. 15, 2014 (Invited Talk).
  17. Motoaki Seki, “ Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies ” , The 4th ASEAN Conference on Science and Technology 2014 (ASEAN CoSaT 2014), Bogor, Indonesia, Aug. 18, 2014 (Invited Talk).
  18. Yoshinori Utsumi, “Molecular breeding of an important tropical crop, Cassava (Manihot esculenta) with East-Asian contries” , The meeting to present their research for Super Science High School Students, Pacifico Yokohama, Yokohama, Aug. 7, 2014 (Invited Talk).
  19. Motoaki Seki and Yoshinori Utsumi, , “Towards Cassava Molecular Breeding of Improved Biomass Productivity and Quality by International Collaboration” , The 54th Starch Round Table, Ito, Shizuoka, Jun. 7, 2014 (Invited Talk).
  20. Motoaki Seki, “Towards Development of Stress-tolerant Crops with Increased Plant Biomass” , The Extension Lecture at Yokohama City University, Yokohama, Jan. 18, 2014 (Invited Talk).
  21. Motoaki Seki, “Cassava Japanese Initiative and Overview of e-ASIA Project in Japan” , The 1st e-ASIA International Symposium, AGI, Hanoi, Jan. 8, 2013 (Invited Talk).
  22. Yoshinori Utsumi, “MolecularBreeding of Useful Cassava using Cutting-edge

Technologies” , The 1st e-ASIA International Symposium, AGI, Hanoi, Jan. 8, 2013 (Invited Talk).

23. Tomonari Hirano, “Heavy-ion beam mutagenesis: fundamentals and applications” , The 1st e-ASIA International Symposium, AGI, Hanoi, Jan. 8, 2013 (Invited Talk).

### **3 Organization of workshops, seminars, symposia, etc. (Organizer, Title of Event, Date, Location, Number of Participants, etc.):**

1. Motoaki Seki (an International Organizing Committee Member), The International Congress "World Congress on Root & Tuber Crops - WCRTC", Jan. 18 to 22, 2016, Nanning, China, About 700 participants.
2. Motoaki Seki and Moto Ashikari, International Symposium “Towards Increased Plant Productivity through Understanding of Environmental Responses and Epigenetic Regulation”, Nov. 24 and 25, 2015, Yokohama, 130 participants.
3. Jarunya Narangajavana and Motoaki Seki, The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop, Oct. 12, 2015, Thailand Science Park, Thailand, 70 participants.
4. Ham Huy Le, Hiroo Fukuda, Motoaki Seki, The International Symposium, “Collaboration between Japan and Vietnam for the sustainable future-Plant science, agriculture and biorefinery-” , Dec. 8, 2014, AGI, Hanoi, 80 participants.
5. Motoaki Seki and Moto Ashikari, The symposium “Towards Increased Plant Productivity through Understanding of Plant Biomass” at the 78th Annual Meeting of the Botanical Society of Japan, Sep. 13, 2014, Meiji Univ., Kawasaki, 60 participants.
6. MOST, CELEBRATION MEETING of the 40th ANNIVERSARY OF VIETNAM-JAPAN S&T COOPERATION, Jun. 19, 2013, Hanoi, 300 participants.
7. RIKEN, International Symposium to advance cassava collaboration between RIKEN CSRS and AGI, May 22, 2013, Yokohama, 50 participants.
8. Ham Huy Le and Motoaki Seki, The 1st e-ASIA International Symposium “ Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies ” , Jan. 8, 2013, AGI, Hanoi, 30 participants.

### **4 Researcher exchanges including students (Description of Exchange, Destination, Duration, etc.):**

#### **Visits by the Japanese Side to Partner Institutions:**

1. Motoaki Seki (Jan. 7 to 10, 2013), AGI (Hanoi), International Symposium and Discussion about collaboration.
2. Yoshinori Utsumi (Jan. 7 to 13, 2013), AGI (Hanoi), International Symposium and Discussion about collaboration.
3. Tomonari Hirano (Jan. 7 to 10, 2013), AGI (Hanoi), International Symposium and Discussion about collaboration.
4. Yoshinori Utsumi (Jul. 29 to Aug. 2, 2013), AGI (Hanoi), Discussion about collaboration.
5. Motoaki Seki (Sep. 9 to 15, 2013), AGI (Hanoi), Hung Loc Agricultural Research Center (Ho Chi Minh), Mahidol Univ. (Bangkok), Discussion about collaboration and survey at cassava field.
6. Yoshinori Utsumi (Sep. 9 to 15, 2013), AGI (Hanoi), Hung Long Agricultural Research Center (Ho Chi Minh), Mahidol Univ. (Bangkok), Discussion about collaboration and survey at cassava field.
7. Yoshinori Utsumi (Dec. 15 to 18, 2013), Hung Long Agricultural Research Center (Ho Chi Minh), Survey at cassava field.
8. Yoshinori Utsumi (May 12 to 17, 2014), AGI (Hanoi), Discussion about collaboration.

9. Yoshinori Utsumi (Jul. 13 to 19, 2014), AGI (Hanoi), Discussion about collaboration.
10. Motoaki Seki (Sep. 14 to 20, 2014), AGI (Hanoi), Mahidol Univ. (Bangkok), Discussion about collaboration.
11. Yoshinori Utsumi (Sep. 14 to 20, 2014), AGI (Hanoi), Mahidol Univ. (Bangkok), Discussion about collaboration.
12. Motoaki Seki (Dec. 7 to 13, 2014), AGI and VAAS Sericulture Center (Hanoi), Hung Loc Agricultural Research Center and AJINOMOTO VIETNAM CO., LTD (Ho Chi Minh), International Symposium, Discussion about (future) collaboration.
13. Yoshinori Utsumi (Dec. 7 to 13, 2014), AGI and VAAS Sericulture Center (Hanoi), Hung Loc Agricultural Research Center and AJINOMOTO VIETNAM CO., LTD (Ho Chi Minh), International Symposium, Discussion about (future) collaboration.
14. Yoshio Takei (Dec. 7 to 13, 2014), AGI and VAAS Sericulture Center (Hanoi), Hung Loc Agricultural Research Center and AJINOMOTO VIETNAM CO., LTD (Ho Chi Minh), International Symposium, Discussion about (future) collaboration.
15. Motoaki Seki (May 24 to 27, 2015), AGI (Hanoi), Discussion about collaboration.
16. Yoshinori Utsumi (May 24 to 27, 2015), AGI (Hanoi), Discussion about collaboration.
17. Motoaki Seki (Oct. 11 to 13, 2015), International Workshop, Thailand Science Park (Bangkok), Discussion about collaboration.
18. Yoshinori Utsumi (Oct. 11 to 13, 2015), International Workshop, Thailand Science Park (Bangkok), Discussion about collaboration.
19. Motoaki Seki (Jan. 17 to 23, 2016), Nanning (China), International Congress and Discussion about collaboration.
20. Yoshinori Utsumi (Jan. 17 to 23, 2016), Nanning (China), International Congress and Discussion about collaboration.
21. Yoshio Takei (Jan. 17 to 23, 2016), Nanning (China), International Congress and Discussion about collaboration.

#### **Visits by the Partner Research Team to Japan:**

1. Ham Huy Le (AGI) (May 20 to 23, 2013), RIKEN Yokohama (Japan), International Symposium to advance cassava collaboration between RIKEN CSRS and AGI, and Discussion about collaboration
2. Treenut Saithong (King Mongkut's Univ. of Technology Thonburi) (Oct., 2013), RIKEN Yokohama (Japan), Seminar and discussion about collaboration.
3. Saowalak Kalapanulak (King Mongkut's Univ. of Technology Thonburi) (Oct., 2013), RIKEN Yokohama (Japan), Seminar and discussion about collaboration.
4. Hoat Xuan Trinh (Plant Protection Research Institute)(Nov., 2013), Univ. of Tokyo, Discussion about collaboration.
5. Thu Anh Vu (AGI) (Oct. 5 to Nov. 7, 2014), RIKEN Yokohama (Japan), Education of cassava tissue culture and transformation.
6. Huong Thi Tong (AGI) (Sep. 5 to 30, 2015), RIKEN Yokohama (Japan), Education of cassava tissue culture, transformation and molecular biology.

#### **5 Number of patent applications : 0**

#### **6 Awards:**

1. Motoaki Seki and Yoshinori Utsumi, The 54<sup>th</sup> SRT (Starch Round Table) Prize, Jun. 6, 2014.
2. Motoaki Seki, Highly Cited Researchers 2014 (Thomson Reuters), Jun. 17, 2014.
3. Motoaki Seki, Highly Cited Researchers 2015 (Thomson Reuters), Sep. 9, 2015.

#### **7 Others (Including agenda of workshop, photos of research teams, meetings, and**

etc.)

1. The 1st e-ASIA International Symposium “Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies”, Jan. 8, 2013, AGI, Hanoi



**Fig. 7. The 1st e-ASIA International Symposium (Jan. 8, 2013, AGI, Hanoi)**

#### AGENDA

Time	Topic	Person responsible
<b>Tuesday Jan. 8th</b>		
	<b>Opening and Introduction</b>	Chairman: Dr. Motoaki Seki
8:30 8:35	Introduction of guests and participants	Dr. Nguyen Anh Vu - AGI
8:35 9:00	Opening remark	Dr. Motoaki Seki - RIKEN PSC
	Cassava Japanese Initiative and Overview of e-ASIA Project in Japan	Dr. Motoaki Seki - RIKEN PSC
9:00 9:20	Cassava production in Vietnam - Challenges and perspectives	Dr. Le Huy Ham - AGI
9:20 9:40	Overview of Cassava Molecular Biotechnology Research Consortium in Thailand	Dr. Jarunya Narangajavana - MU
9:40 9:50	Short remark	Dr. Eriko Kishida - JST
9:50 10:00	Short remark	Ms. Hoang Ngan Giang - MOST
10:00 10:10	Short remark	NSTDA
	<b>Presentation of Vietnamese side</b>	Chairman: Dr. Jarunya Narangajavana & Dr. Motoaki Seki
10:10 10:30	Molecular characterization of a phytoplasma associated with cassava witches broom disease in Vietnam	Dr. Trinh Xuan Hoat - PPRI
10:30 10:45	<b>Coffee Break</b>	
10:45 11:05	Vietnam Cassava Breeding Overview: The Broad Perspective	Dr. Hoang Kim - NLU
11:05 11:25	Embryo rescue, micropropagation and transformation in cassava	Dr. Nguyen Van Dong/ Dr. Nguyen Anh Vu - AGI
11:25 11:45	<b>Group Photo</b>	
11:45 13:45	<b>Lunch</b>	Chairman: Dr. Le Huy Ham & Dr. Hoang Kim
	<b>Presentation of Japanese side</b>	
13:45 13:55	Molecular Breeding of Useful Cassava using Cutting-edge Technologies	Dr. Yoshinori Utsumi - RIKEN PSC
13:55 14:05	Heavy-ion beam mutagenesis: fundamentals and applications	Dr. Hirano - RIKEN Nishina
	<b>Presentation of Thailand side</b>	
14:10 14:30	Update on QTL Analysis of Cassava in Thailand	Dr. Sukhman Whankaew - MU

2. International Symposium to advance cassava collaboration between RIKEN CSRS and AGI, May 22, 2013, Yokohama

### 2013 RIKEN VISIT (Yokohama Branch)

by

**Dr. Nguyen Thien Nhan, Deputy Prime Minister, Vietnam**

**Visitors:** Dr. Nguyen Thien Nhan, Deputy Prime Minister  
 Mr. Nguyen Khac Dinh, Deputy Chief, Cabinet Office  
 Ms. Nguyen Phuong Nga, Deputy Minister, MOFA (Ministry of Foreign Affairs)  
 Mr. Tran Quang Quy, Deputy Minister, MOET (Ministry of Education & Training)  
 Mr. Tran Viet Thanh, Deputy Minister, MOST (Ministry of Science and Technology)  
 Mr. Nguyen Ngoc Phi, Deputy Minister, MOLISA (Ministry of Labor, War Invalids and Social Affairs)

Mr. Nguyen The Phuong, Deputy Minister, MPI (Ministry of Planning and Investment)

Mr. Doan Xuan Hung, Ambassador of Vietnam to Japan

Ms. Le Thi Viet Lam, Deputy Chief, Department of International Cooperation, MOST

Dr. Le Huy Ham, Director General, AGI (Agricultural Genetics Institute)

**May 22, Wednesday**

- 15:30 Arrive at RIKEN Yokohama
- 15:35-15:40 Welcome speech (Dr. Kenji Oeda, Executive Director, RIKEN)  
Dr. Kenji Oeda, Executive Director, RIKEN  
Dr. Kazuo Shinozaki, Director of RIKEN Center for Sustainable Resource Science (CSRS)  
Mr. Takao Kato, Director of Yokohama Branch  
Mr. Toshinari Anzo, Director of Sustainable Resource Science Planning Office  
Mr. Soh Osuka, Manager, Global Relations and Research Coordination Office (GRRCO)  
Dr. Motoaki Seki, Team Leader of RIKEN CSRS  
Dr. Lam-Son Phan Tran, Unit Leader of RIKEN CSRS  
Venue: Main Lecture Hall, 1F Main Office Bldg.
- 15:40-15:45 Speech by Dr. Le huy Ham, Director General, AGI
- 15:45-15:50 Overview of RIKEN CSRS (Dr. Kazuo Shinozaki, Director, CSRS)
- 15:50-16:00 International Cassava Collaborative Research between RIKEN and AGI (Dr. Motoaki Seki, Team Leader, RIKEN CSRS)
- 16:00-16:20 Signing Ceremony  
Dr. Le huy Ham, Director General, AGI  
Dr. Kazuo Shinozaki, Director, RIKEN CSRS
- 16:00-16:05 Signing
- 16:05-16:10 Remarks by Dr. Nguyen Thien Nhan, Deputy Prime Minister

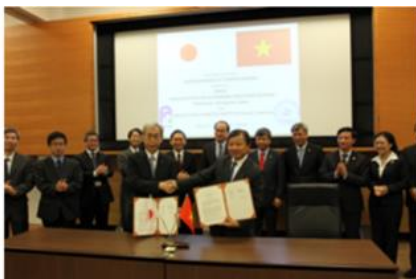


Fig. 8. MOU signing ceremony for cassava collaboration between RIKEN CSRS and AGI (May 22, 2013).

Signer:  
Dr. Shinozaki (CSRS Director) and  
Dr. Ham (AGI Director)



Fig. 9. Speech by Vietnamese Vice Prime Minister (Dr. Nguyen Thien Nhan)

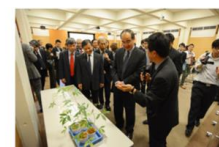


Fig. 10. Explanation of Cassava Research to Vice Prime Minister (by Dr. Motoaki Seki)



Fig. 11. Group Photo (RIKEN Yokohama)



3. CELEBRATION MEETING of the 40th ANNIVERSARY OF VIETNAM-JAPAN S&T COOPERATION, Jun. 19, 2013, Hanoi

**CELEBRATION MEETING**

**40th ANNIVERSARY OF VIETNAM-JAPAN S&T COOPERATION**

June 19<sup>th</sup>, 2013

**Vietnam-Japan S&T cooperation-Achievements and Prospects**

<b>Time</b>	<b>Contents</b>	<b>Remarks</b>
08:00-08:30	Registration	ICD
08:30-08:35	Introduction of program, invitees and participants	ICD
08:35-08:45	Opening speech	H.E. Mr. Nguyen Quan, Minister of MOST
08:45-08:55	Welcoming speech	Representative from Japan Embassy
08:55-09:05	Greetings	Mr. Yukio Hatoyama – Former Prime Minister of Japan
09:05-09:25	Review of Vietnam-Japan S&T cooperation and development orientation.	MOST-ICD
09:25-09:45	Japan's comprehensive S&T strategy in its socio-economic development process and its implication for Vietnam	Prof. Yakushiji Taizo, GRIPS, Japan
09:45-10:00	Tea-break Poster and Exhibition	ICD Presenters
10:00-10:45	Typical cooperation projects	<ul style="list-style-type: none"> <li>- Dr. Le Huy Ham, Agriculture Genetics Institute, Vietnam;</li> <li>- Prof. Hiroshi Ichimura, Kanazawa University, Japan;</li> <li>- Mr. Norio Owada, President of ABI Co. Ltd, Japan.</li> </ul>
10:45-11:00	Signing ceremony	<ul style="list-style-type: none"> <li>- Haiphong Medical University (VN) &amp; Kanazawa University (JP)</li> <li>- Institute of Regional Research and Development (VN) and ABI Co.Ltd. (JP)</li> </ul>
11:00-13:00	Courtesy buffet	MOST-ICD

<b>Time</b>	<b>Contents</b>	<b>Remarks</b>
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13:30-14:00	Registration	MOST-ICD
14:00-14:05	Introduction of program, invitees and participants	MOST-ICD
14:05-14:10	Opening speech	MOST Ministerial Leader
14:10-14:30	Japan's S&T policies and strategies (tentative)	Prof. Yakushiji Taizo, GRIPS, Japan
14:30-14: 50	Vietnam S&T promotion policies	National Council for S&T Policy, Vietnam
14: 50 -15:10	Basic S&T policy and plan of the Government and funding mechanisms to promote government-industry collaboration	Prof. Arimoto Tateo, GRIPS
15:10-15:30	Strategy for science and technology development in the 2011-2020 period	Dr. Ta Doan Trinh, NISTPASS, Vietnam
15:30-15:50	Tea break Poster and Exhibition	DIC Presenters
14: 50 -16:10	Inter ministerial S&T policy coordination mechanism and roles of the Diet and parties	Prof. Sumamia Atsushi, GRIPS
16:10-16:30	Japanese experiences in promotion of S&T cooperation and current JST programs and activities with Vietnam	Mr. Kobayashi Osamu, JST-Japan
16:30-17:30	Discussion	Moderator: MOST-ICD
17:30-17:35	Closing remarks	MOST Ministerial Leader



Fig. 12. Celebration Meeting on the 40th Anniv. of Vietnam-Japan Dipl. Rela., Sci. Technol. Coop. (Hanoi, June 19).

4. The International Symposium, “Collaboration between Japan and Vietnam for the sustainable future-Plant science, agriculture and biorefinery-” , Dec. 8, 2014, AGI, Hanoi

**Time table:**

09:00-09:05 am	<b>Opening address:</b> Dr. Hiroo Fukuda (The University of Tokyo)
09:05-09:25 am	<b>Congratulatory speeches:</b> Dr. Trinh Khac Quang (President, VAAS) Mr. Atsuki Tomoyose (Second Secretary, Embassy of Japan in Vietnam)
09:25-09:55 am	<b>Dr. Hiroo Fukuda</b> (The University of Tokyo) “Results and Perspectives of NC-CARP (Network of Centers of Carbon Dioxide Resource Studies in Plants) program”
09:55-10:25 am	<b>Dr. Le Huy Ham</b> (AGI) “Development of biotechnology for sustainable food security in Vietnam”
10:25-10:40 am	Group photo, Break
10:40-11:10 am	<b>Dr. Motoaki Seki and Dr. Yoshinori Utsumi</b> (RIKEN) “Advancement of Asian Cassava Molecular Breeding by Cutting-edge Technologies”
11:10-11:40 am	<b>Dr. Hoang Kim</b> (Nong Lam University) “Cassava in Vietnam: save and grow Recent progress of sustainable cultivation techniques for cassava in Vietnam”
11:45-01:00 pm	General discussion for the collaboration between Japan and Vietnam over lunch
01:00-01:30 pm	<b>Dr. Toru Fujiwara</b> (The University of Tokyo) “Strategies to reduce fertilizer usage without loss of yields for sustainable agriculture”
01:30-02:00 pm	<b>Dr. Pham Van Cu</b> (Vietnam National University) “Contribution of remote sensing to sustainable land use in the context of climate change”
02:00-02:30 pm	<b>Dr. Hiroshi Ezura</b> (University of Tsukuba) “Current state of genetic engineering technologies for soft-biomass plants”
02:30-02:45 pm	Break
02:45-03:15 pm	<b>Dr. Akihiko Kondo</b> (Kobe University) “Assessment of biomass property and its application to biorefinery”
03:15-03:45 pm	<b>Dr. Pham Van Cuong</b> (Vietnam National University of Agriculture) “Enhancing cooperation in Research, Training and Universities Management between Vietnam National University of Agriculture and Japanese Universities”
03:45 pm -	<b>Closing remark:</b> Dr. Le Huy Ham (AGI)



**Fig. 13. International Symposium "Collaboration between Japan and Vietnam for the sustainable future-Plant science, agriculture and biorefinery-" (Dec. 8, 2014, AGI, Hanoi)**

5. The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop, Oct. 12, 2015, Thailand Science Park, Thailand

08.30-09.00	<b>Registration</b>
	<b>Cassava Project Final Report Session</b>

09.00-09.15	Welcome and Overview of Cassava R&D Support Activities in Thailand <i>Prof. Dr. Morakot Tanticharoen, Senior Advisor to the President, National Science and Technology Development Agency (NSTDA)</i>
09.15-09.25	Overview of the e-ASIA cassava project 2012-2015 <i>Dr. Motoaki Seki, RIKEN, Japan</i>
09.25-09.45	Japanese approaches towards molecular breeding of cassava in collaboration with Thailand and Vietnam <i>Dr. Yoshinori Utsumi, RIKEN, Japan</i>
09.45-09.55	Overview of the Vietnamese activity in e-ASIA cassava project <i>Dr. Ham Huy Le, Agricultural Genetics Institute (AGI), Vietnam</i>
09.55-10.15	Development of new cassava varieties via mutation breeding and genetic engineering <i>Dr. Vu Anh Nguyen, Agricultural Genetics Institute (AGI), Vietnam</i>
10.15-10.25	Overview of the Thai activity in e-ASIA cassava project <i>Dr. Jarunya Narangajavana, Mahidol University, Thailand</i>
10.25-10.45	Molecular breeding for improving disease-resistant cassava <i>Dr. Kanokporn Triwittayakorn, Mahidol University, Thailand</i>
10.45-10.55	Discussion on e-ASIA project
10.55-11.10	<b>Coffee Break</b>
11.10-11.20	Single Nucleotide Polymorphism Genotyping by Sequencing <i>Dr. Sithichoke Tangphatsornruang, National Science and Technology Development Agency (NSTDA), Thailand</i>
11.20-11.30	Genome-wide analysis: unraveling the puzzle of phytohormones acting in concert during storage root initiation of cassava <i>Dr. Puchapat Sojikul, Mahidol University, Thailand</i>
11.30-11.40	Linking genotype to phenotype through cassava modeling <i>Dr. Treenut Saithong, King Mongkut's University of Technology Thonburi (KMUTT), Thailand</i>
11.40-11.50	Cassava Breeding in Thailand for Food Products <i>Dr. Pasajee Kongsil, Kasetsart University, Thailand</i>
11.50-12.00	Discussion on new collaboration
12.00-12.10	Closing Remarks of Morning Session <i>Dr. Motoaki Seki, RIKEN</i>



Fig. 14. The e-ASIA Joint Research Program (e-ASIA JRP) Project Workshop (Oct. 12, 2015, Thailand Science Park, Thailand)

6. CREST International Symposium “Towards Increased Plant Productivity through Understanding of Environmental Responses and Epigenetic Regulation”, Nov. 24

and 25, 2015, Yokohama

## Tuesday, November 24, 2015

**9:00-9:05**

*Welcome and introduction* to the symposium: Motoaki Seki (RIKEN CSRS)

**9:05-9:10**

Opening remark: Dr. Kazuo Shinozaki (Director, RIKEN CSRS)

### Session 1: Plant epigenetics (Chair: Motoaki Seki)

**9:10-9:40**

Title: Protein interactions in histone deacetylase complexes.

Anna Amtmann (University of Glasgow /UK)

**9:40-10:10**

Title: Novel epigenetic control of drought tolerance in plants

Jong-Myong Kim (RIKEN CSRS, Japan)

**10:10-10:30 Coffee break**

**10:30-11:00**

Title: Epigenetic memory configures siRNA biogenesis and ecotype hybrid incompatibility in *Arabidopsis*.

Todd Blevins (CNRS, France)

**11:00-11:30**

Title: Epigenetic regulation of gene expression by histone deacetylases in plants

Keqiang Wu (National Taiwan University, Taiwan)

**11:30-13:00: Lunch**

### Session 2: Plant vegetative reproduction (Chair: Moto Ashikari)

**13:00-13:30**

Title: The secrets of an underground life - Development of *Olyza longistaminata* rhizome

Junko Kyojuka (Tohoku University, Japan)

**13:30-13:50**

Title: Physiological Analyses of the development of rhizome of *Oryza longistaminata*, a wild rice species from Africa

Kanako Uehara (Nagoya University, Japan)

**13:50-14:10**

Title: Exploring rhizome formation loci in Rice

Tomoyuki Furuta (Nagoya University, Japan)

**14:10-14:30 Coffee break**

**14:30-15:00**

Title: An ancient regulatory mechanism for secondary meristem formation in land plants

Kimitsune Ishizaki (Kobe University, Japan)

**15:00-15:30**

Title: Florigen function beyond flowering: florigen Hd3a protein acts as a mobile branching signal in rice

Hiroyuki Tsuji (Yokohama City University, Japan)

**15:30-16:00**

Title: Day length pathway for potato storage organ formation.

Salome Prat (CNB /Spain)

**16:00-16:20 Coffee break**

**16:20-17:50 Poster session**

**18:00-20:00 Party (RIKEN Cafeteria)**

## Wednesday, November 25, 2015

### Session 3: Tuber root productivity (Chair: Motoaki Seki)



**9:00-9:30**

Title: MicroRNAs and their regulatory roles in *Euphorbia* plants: Learning from rubber tree and cassava.

Jarunya Narangajavana (Mahidol University, Thailand)

**9:30-10:00**

Title: Towards cassava molecular breeding of improved biomass productivity and quality in collaboration with ASEAN countries.

Yoshinori Utsumi (RIKEN CSRS, Japan)

**10:00-10:30**

Title: Back to the roots: molecular characterization of cassava root responses. during drought and post-harvest stresses

Herve Vanderschuren (ETH, Switzerland)

**10:30-10:50 Coffee break**

**10:50-11:20**

Title: Storage root development and regulation in root crops.

Peng Zhang (Shanghai Inst. Biol. Sci., China)

**11:20-11:50**

Title: Genetic engineering in sweet potato for the improvement of productivity and stress tolerance.

Noriaki Tanabe (Kinki University, Japan)

**11:50-11:55**

Closing remark: Moto Ashikari (Nagoya Univ.)



**Fig. 15. International Symposium (Nov. 24 and 25, 2015)**

7. The International Congress "World Congress on Root & Tuber Crops - WCRTC", Jan. 18 to 22, 2016, Nanning, China (<http://www.gcp21.org/wcrtc/index.html>)