Organized By :

MSAE

UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

MANCID

UNIVERSITI PUTRA MALAYSIA
43400 UPM SERDANG
SELANGOR DARUL EHSAN
MALAYSIA
Phone : +603 8946 4455
Fax : +603 8946 6425
Website : www.upm.edu.my

INWEPF

PAWEES – INWEPF

Joint International Conference 2015

Kuala Lumpur, Malaysia

19 - 21 August 2015

" Solutions For Sustainable Water And Environmental Management "

PAWEES 2015 INTERNATIONAL ADVISORY BOARD

PROFESSOR DATO DR. MOHD. FAUZI HJ RAMLAN
Universiti Putra Malaysia

PROFESSOR DATUK DR. MAD NASIR SHAMSUDIN
Universiti Putra Malaysia

PROFESSOR EMERITUS DR. YOHEI SATO
The University of Tokyo

PROFESSOR DR. MASARU MIZOGUCHI
The University of Tokyo

PROFESSOR DR. YOSHIYUKI SHINOGI
Kyushyu University, Japan

PROFESSOR DR. YUTAKA MATSUNO
Kinki University, Japan

PROFESSOR DR. SHO SHIOZAWA
The University of Tokyo Japan

DISTINGUISHED PROFESSOR FI-JOHN CHANG
National Taiwan University

PROFESSOR MING-DAW SU
National Taiwan University

PROFESSOR KE-SHENG CHANG
National Taiwan University

DISTINGUISHED PROFESSOR PAO-SHAN YU
National Cheng Kung University, Taiwan

PROFESSOR JIN SOO KIM
Chungbuk National Unversity, Korea

PROFESSOR JOONGDAE CHOI
Kangwon National University, Korea

PROFESSOR SEONG JOON KIM
Konkuk University, Korea

PROFESSOR JIN YONG CHOI
Seoul National University, Korea

PROFESSOR KYUNG SOOK CHOI
Kyungpook National University, Korea

MR. MASAO MIYAZAKI
Ministry of Agriculture, Forestry and Fisheries, Japan

PROFESSOR DR. BUDI SETIAWAN
Bogor Agriculture University, Indonesia

ASSOC. PROF DR. SUCHARIT KOONTANAKULVONG
Chulalongkorn University Thailand

PAWEES 2015 ORGANIZING COMMITTEE

CHAIRPERSON
Prof. Ir. Dr. Mohd Amin Mohd Soom

COCHAIRPERSON
Assoc. Prof. Dr. Abdul Rashid Mohamed Shariff

TREASURER I
Dr. Ahmad Fikri Abdullah

TREASURER II
Dr. Muhammad Razif Mahadi

SECRETARY I
Dr. Aimrun Wayayok

SECRETARY II
Prof. Dr. Thamer Ahmed Mohamed

TECHNICAL COMMITTEE
Assoc. Prof. Dr. Hasfalina Che Man
Assoc. Prof. Dr. Abdul Halim Ghazali
Dr. Rowshon Kamal
Dr. Syazwani Idrus
Dr. Badronnisa Yusuf
Aida Isma Mohd Idris
Nurulhuda Khairudin
Nurul Hanira Mat Lazim
Nurul Shafiqah Rosli

INFRASTRUCTURE & LOGISTIC COMMITTEE
Mr. Mohamed Azwan Mohamed Zawawi

PUBLICITY COMMITTEE
Mr. Ezrin Mohd Husin
Mr. Muhd Faizal Basir

SPONSORSHIP & EXHIBITION COMMITTEE
Ir. Mohd Yazid Abdullah

TECHNICAL VISIT COMMITTEE
Mr. Azaman Md Ali

PROMOTION COMMITTEE
Dr. Muhamad Askari

PIJIC2015-107
DEVELOPMENT OF REAL TIME SOIL NUTRIENT MAPPING SYSTEM IN PADDY FIELD

M.H. Ezrin*, W. Aimrun, M.S.M. Amin, S.K. Bejo
Smart Farming Technology Research Center
Faculty of Engineering
Universiti Putra Malaysia
43400 UPM Serdang, Selangor DE, Malaysia
*Email: ezrin@upm.edu.my

ABSTRACT

Technology application in agriculture industry becomes a trend in many countries. The use of sensor and ICT such GIS is essential for grower to improve their field management and crop yield. Effective site specific management requires strong and temporally consistent relationship among identified management zones, underlying soil physical, chemical and biological parameters, and crop yield. Those requirements are possible to be obtained through the use of specialized equipment and state-of-the art technology. A study was carried out to develop a real time system to provide map of soil nutrient such total nitrogen (N), available phosphorus (P) and exchangeable potassium (K) by using electrical conductivity sensor. The result from this study has proven the merit of the developed system in terms of its performance and its reliability. The soil nutrient map produced via this system was almost similar to a kriging map produced via ArcGIS software and it was shown to be reliable for use in the site specific application for best fertilizer management practices. This finding shows that the soil nutrient variability map was possible to be produced in real-time basis without engaging any tedious work in the field. The use of this mapping system as a basis of identifying the soil nutrient variability proved to be a good technique for the farmers to better manage their paddy fields.

Keywords: Apparent Soil Electrical Conductivity (ECa), Nitrogen (N) Fertilizer, Paddy Field, Variability Map.

LIST OF REVIEWERS

Assoc. Prof. Dr. Abdul Halim Ghazali
Universiti Putra Malaysia

Assoc. Prof. Dr. Phebe Ding
Universiti Putra Malaysia

Dr. Rajan Aggarwal
Punjab Agricultural University, Ludhiana

Prof. Dr. Thamer Ahmed Mohamed
Universiti Putra Malaysia

Mrs Rashidah Ruslan
Universiti Malaysia Perlis

Dr. Rosnizana Abd Aziz
Universiti Putra Malaysia

Dr. Muhamad Saufi Mohd Kassim
Universiti Putra Malaysia

Mrs. Nurulhuda bt. Khairudin
Universiti Putra Malaysia

Mrs. Diyana Jamaluddin
Universiti Putra Malaysia
diyana_upm@upm.edu.my

Dr. Chua @ Yeo Gek Kee
Universiti Malaysia Pahang
chua@ump.edu.my

Assoc. Prof. Dr. Hasfalina Che Man
Universiti Putra Malaysia
hasfalina@upm.edu.my

Dr. Badronnisa Yusuf
Universiti Putra Malaysia
nisa@upm.edu.my

Dr. Edlic Sathiamurthy
Universiti Malaysia Terengganu
edlic@umt.edu.my

Miss Mahirah Jahari
Universiti Putra Malaysia
mahirahjahari@gmail.com

Dr. Md Rowshon Kamal
Universiti Putra Malaysia
rowshon@upm.edu.my

Prof. Dr. Mohd. Amin b. Mohd. Soom
Universiti Putra Malaysia
aminms@upm.edu.my

Dr. Syazwani Idrus
Universiti Putra Malaysia
syazwani@upm.edu.my

Dr. Amir Izzwan Zamri
Universiti Malaysia Terengganu
amir@umt.edu.my

Dr. Nik Norsyahariati Nik Daud
Universiti Putra Malaysia
niknor@upm.edu.my

Dr. Nazmi Mat Nawi
Universiti Putra Malaysia
nazmimat@upm.edu.my

Dr. Muhammad Razif Mahadi
Universiti Putra Malaysia
razifman@upm.edu.my

Dr. Norhashila Hashim
Universiti Putra Malaysia
norhashila@upm.edu.my

LIST OF REVIEWERS

Assoc. Prof. Dr. Rimfiel Janius
Universiti Putra Malaysia
janius@upm.edu.my

Assoc. Prof. Dr. Megat Ahmad Kamal Megat Hanafiah
Universiti Teknologi Mara (Pahang)
makmh@pahang.uitm.edu.my

Miss Nor Sayzwani Binti Sukri
Universiti Malaysia Kelantan
sayzwani@umk.edu.my

Dr. Susilawati Kassim
Universiti Putra Malaysia (Bintulu)
susilawati@upm.edu.my

Assoc. Prof. Dr. Lai Sai Hin
Universiti Malaya
laish@um.edu.my

Mrs. Wan Nor Zanariah Zainol Abdullah
Universiti Putra Malaysia
wnzz@upm.edu.my

Mr. Ahmad Suhaizi Mat Su
Universiti Putra Malaysia
ahmad.matsu@mail.mcgill.ca

Dr. Aimrun Wayayok
Universiti Putra Malaysia
aimrun@upm.edu.my

Assoc. Prof. Dr. Yiu Pang Hung
Universiti Putra Malaysia (Bintulu)
yiuph@upm.edu.my

Assoc. Prof. Dr. Rosnah Shamsudin
Universiti Putra Malaysia
rosnahs@upm.edu.my

Dr. Tarmizi Ismail
Universiti Teknologi Malaysia
tarmiziismail@utm.my

Mr. Mohamed Azwan b. Mohamed Zawawi
Universiti Putra Malaysia
mohdazwan@upm.edu.my

Dr. Darius El Pebrian
Universiti Teknologi Mara (Melaka)
darius@melaka.uitm.edu.my

Dr. Amimul Ahsan
Universiti Putra Malaysia
amimul@upm.edu.my

Assoc. Prof. Dr. Helmi Zulhaidi Mohd. Shafri
Universiti Putra Malaysia
helmi@upm.edu.my

Assoc. Prof. Dr. Aweng A/l Eh Rak
Universiti Malaysia Kelantan
aweng@umk.edu.my

Assoc. Prof. Dr. Uma Rani Sinniah
Universiti Putra Malaysia
umarani@agri.upm.edu.my

Mr. Ezrin Mohd Husin
Universiti Putra Malaysia
ezrinhusin@gmail.com

Assoc. Prof. Dr. Mohammud Che Husain
Universiti Malaysia Perlis
mohammudhusain@unimap.edu.my

Prof. Dr. Desa Ahmad
Universiti Putra Malaysia
desa@upm.edu.my

Dr. Puganeshwary Palaniandy
Universiti Sains Malaysia
cepuganeshwary@usm.my

Dr. Ahmad Fikri Abdullah
Universiti Putra Malaysia
ahmadfikri@upm.edu.my

Dr. Arien Heryansyah
Universiti Teknologi Malaysia
arien@utm.my

Table of Content

		using aquacrop model
26.	PIJIC-29	Modeling of rice harvested area and its impact on rice yield and production in Mekong river basin
27.	PIJIC-30	Modeling for groundwater management in the coastal area of Mekong delta, Vietnam
28.	PIJIC-32	Swat model improvement for discharge process in rice paddies
29.	PIJIC-33	Prediction of growth period for paddy rice assuming climate warming in cold snowy regions
30.	PIJIC-34	Comparison of irrigation requirements between transplanting cultivation and direct-seeding cultivation in large-sized paddy fields with groundwater level control systems
31.	PIJIC-35	Agricultural water-gate management for operational flood protection in low-lying paddies
32.	PIJIC-36	Channeling people and water, beyond technical solutions - transdisciplinary approach in practice, a case study from Indonesia
33.	PIJIC-37 (Plenary 2)	Development of movies as the teaching tool on the movement of irrigation water in paddy fields managed under various cultivation methods
34.	PIJIC-38 (Plenary 1)	Investigation of the interactive mechanisms between groundwater and surface water by using data-driven techniques for Zhuoshui River basin in Taiwan
35.	PIJIC-39	Evaluation of Makhoul reservoir in reducing flood risk in Baghdad city
36.	PIJIC-41	Water and nutrients balance in tropical highland potato field under horizontal ridge system with different fertilizers and biochars application
37.	PIJIC-42	Effects of ferrous toxicity on seedling traits and ion distribution pattern in upland and low land rice under hydroponic conditions
38.	PIJIC-45 (Poster)	Habitat preference of freshwater fish inhabiting an agricultural channel with restoration methods, western Japan
39.	PIJIC-47 (Poster)	Effectiveness of restoration areas for freshwater fish conservation during water drawdown due to farmland consolidation in a paddy field channel, western Japan
40.	PIJIC-48	A distributed soil moisture model for the irrigation factors assessment using enhanced meteorological data
41.	PIJIC-50	Nitrogen uptake of sri paddy field compare to conventional field
42.	PIJIC-52	Quantifying water balance of Subak paddy field based on continuous field monitoring
43.	PIJIC-54	Swat evaluation for non-point source pollution discharges in Haean highland agricultural catchment of South Korea
44.	PIJIC-55	Effect of ion pairs and activity on classification of ground waters for irrigation purpose in Arbil plain
45.	PIJIC-56	Swat modeling for nitrogen budget considering atmospheric deposition in a watershed
46.	PIJIC-59	A combined sensitivity analysis of seven potential evapotranspiration models
47.	PIJIC-60	Modelling of Runoff to Solve Flooding Problem in Kelantan Watershed, Malaysia
48.	PIJIC-61	A modified empirical model for estimating the wetted zone dimensions under drip irrigation

49.	PIJIC-62	Polysulfone Membrane Tests for Nutrients Reclamation of Kenaf Retted Wastewater
50.	PIJIC-63	Rainwater harvesting sites selection by using remote sensing and gis techniques; a case study of Kirkuk, Iraq
51.	PIJIC-65	Spatial analysis of farm pond landscape and bird ecology in Hsinhua, Tainan
52.	PIJIC-67	Analysis of water balance by surface-groundwater interactions using swat model for Han River basin, South Korea
53.	PIJIC-68	Evaluation of streamflow by forest restoration in rural small catchment for future climate change adaptation
54.	PIJIC-69	SRI-tray: Breakthrough in nursery management for the system of rice intensification
55.	PIJIC-70	Simulating rice yield response to water using aquacrop
56.	PIJIC-71	Roles a drainage system requires to prevent water hazards under the climate change
57.	PIJIC-72	Predicting paddy rice production under an integrated cropping system on Malaysian east coast
58.	PIJIC-73	VRT liquid fertilizer applicator for soil nutrient management
59.	PIJIC-75	Performance of UMAR-SRImat on soil water conservation and weed control in system of rice intensification
60.	PIJIC-76	The role of groundwater to mitigate the drought and as an adaptation to climate change in the Phitsanulok irrigation project, in the Nan basin, Thailand.
61.	PIJIC-77	Crop coefficient and water productivity in conventional and system of rice intensification (sri) irrigation regimes of terrace rice fields in Indonesia
62.	PIJIC-78	The influence of climate change on irrigation water requirement for corn fields in the coast region of Ecuador
63.	PIJIC-79 (Poster)	Simulation of Sediment Reduction Effect of VFS in Saemangeum Watershed
64.	PIJIC-80	Application of satellite image data to evaluate frog habitats in paddy fields of Japan
65.	PIJIC-81	Variability of rice yield with respect to crop health
66.	PIJIC-82	Survey of the impact of crude oil spillage through pipeline vandalism on environment and water quality in the Niger Delta region of Nigeria
67.	PIJIC-84	Malaysia : paddy production, 1963-2030
68.	PIJIC-85	Effects of landuse pattern change on rainfall-runoff and runoff-sediment relations: a case study in Yom river basin
69.	PIJIC-87	Methane emission from paddy soil in relation to soil temperature in tropical region
70.	PIJIC-89 (Plenary 4)	Optimizing irrigation and drainage rates in Sri paddy fields
71.	PIJIC-91	Relationship between soil moisture content in paddy field and its image texture
72.	PIJIC-92	Assessment of Agrochemicals Effect on Soil and Groundwater of Chanchaga Irrigation Scheme in Minna, North Central Nigeria
73.	PIJIC-93	Adsorption of acid orange 7 by cetylpyridinium bromide modified sugarcane bagasse
74.	PIJIC-94	Flood damage assessment in agricultural area in Selangor river basin

75.	PIJIC-95	Suitability of Capsule as a Paddy Coating Material for the System of Rice Intensification (SRI)
76.	PIJIC-96	Detection of fractured aquifer using combination of resistivity and induced polarization analysis
77.	PIJIC-97	Groundwater conceptual model for paddy irrigation
78.	PIJIC-98	Development of 3D model view of potential groundwater aquifer for irrigation using geophysical technique
79.	PIJIC-99	Initial Design of an Automated System for Paddy Seedling Placement in a Germination Tray
80.	PIJIC-100	Effects of water ponding on decreasing leaf and panicle temperature in rice paddy fields
81.	PIJIC-101	Comparison of damaged area by agricultural dam break flood wave using hec-ras and drone surveying
82.	PIJIC-102	Irrigation practices for rice cultivation and water balance in an agricultural water user's association region in south Sulawesi in the first dry season
83.	PIJIC-104	Effect of water hyacinth on water quality and macroinvertebrate diversity in a tropical reservoir
84.	PIJIC-105	Proposed wireless connection system based on zigbee technology in real time application
85.	PIJIC-106	Performance of Paddle Wheel Types in a Small Scale Tele-operated Boat Navigation
86.	PIJIC-107	Development of real time soil nutrient mapping system in paddy field

PROGRAMME

Day 1: 19th August 2015 (Wednesday)

	OPENING AND PRIZE GIVING CEREMONY
Venue	**Auditorium Jurutera, Faculty of Engineering, UPM**
08:00 – 09:00	Registration/Arrival of Guests and Participants
09:00 – 10:00	**Opening Ceremony:** Doa Recital by Dr. Aimrun Wayayok
	Welcoming Speech by Conference Chair Prof. Ir. Dr. Mohd Amin Mohd Soom
	Welcoming Remarks by President of PAWEES and Japanese Society of Irrigation, Drainage and Reclamation Engineering (JSIDRE) Prof. Dr. Tsugihiro Watanabe
	Welcoming Remarks by INWEPF Japan Representative Prof Dr Nobumasa Hatcho (Kinki University Japan)
	Welcoming Remarks by President of KSAE Dr. Ki Sung Kim (delivered by Prof Dr Seong Joon Kim, Konkuk University, Korea)
	Welcoming Remarks by President of TAES Dr. Ching-Chang Chang(Taiwan, Republic of China)
	Officiating Speech by Vice Chancellor, UPM Prof. Dato' Dr. Mohd Fauzi Hj. Ramlan
10.00 - 10.30	**COFFEE BREAK**
10.30 - 12.00	**Prize Giving Ceremony :** Prof. Dr. Yutaka Matsuno, Secretary General of PAWEES
	KEYNOTE SESSION **Chairperson: Prof. Ir. Dr. Mohd Amin Mohd Soom (INWEPF Malaysia)**
12.00 - 13.00	**Keynote Paper 1** The ABCDE+F for Rice Irrigation Sustainability for Economies in Transit Datuk Ir. Mohd Adnan Mohd Nor (MANCID Malaysia)
	Keynote Paper 2 Assessment and Optimization of the Flood Prevention Function of Paddy Field in Nara, Japan Prof. Dr. Yutaka Matsuno (Kinki University, Japan)
13.00 - 14.00	**LUNCH BREAK AND NETWORKING**

PROGRAMME

Day 1: 19th August 2015 (Wednesday)

	PLENARY SESSION I **Chairperson: Assoc. Prof. Dr. Abdul Rashid Mohamed Shariff (UPM)**
[illegible]	**Plenary Paper 1** Investigation of the Interactive Mechanisms Between Groundwater and Surface Water by Using Data-Driven Techniques for Zhuoshui River Basin in Taiwan Prof. Dr. Fi-John Chang (National Taiwan University, Taiwan)
	Plenary Paper 2 Development Of Movies As The Teaching Tool On The Movement Of Irrigation Water In Paddy Fields Managed Under Various Cultivation Methods Nakamura Kazumasa (Civil Engineering Research Institute for Cold Region, Japan)
	Plenary Paper 3 Application of Surface Cover Materials for Reduction of NPS Pollution on Field Scale Experimental Plots Prof. Dr. Joongdae Choi (Kangwon National University, Chuncheon, Gangwondo, South Korea)
16.00 - 16.00	**TEA BREAK AND NETWORKING**
16.00 - 17.30	**PLENARY SESSION II** **Chairperson: Mr Mohd Yazid Abdullah (Malaysia National Committee on Irrigation and Drainage, MANCID)**
	Plenary Paper 4 Optimizing Irrigation and Drainage Rates in SRI Paddy Fields Prof. Dr. Budi Indra Setiawan (Bogor Agricultural University Indonesia)
	Plenary Paper 5 The Two Years (2014 and 2015) Big Drought in the North Central Region of South Korea Prof. Dr. Seong Joon Kim (Konkuk University, Seoul, South Korea)
	Plenary Paper 6 Radiation Measurement in Paddy Soil Layer Buried Contaminated Topsoil in Litate Village, Fukushima Prof. Dr. Masaru Mizoguchi (University of Tokyo, Japan)
20.00 - 22.00	**OFFICIAL DINNER** Venue: Palm Garden Hotel, Putrajaya

PROGRAMME

Day 2: 20th August 2015 (Thursday)

09:00 - 10:00	**Parallel Technical Sessions**
	Venue: Auditorium Jurutera, Galeri 2, Bilik Gunasama, Bilik Seminar
10:00 - 10:30	**TEA BREAK AND NETWORKING**
10.30 - 12.30	**Parallel Technical Sessions**
	Venue: Auditorium Jurutera, Galeri 2, Bilik Gunasama, Bilik Seminar
	PAWEES Annual Meeting (by invitation)
	Venue: Dewan Taklimat, Tower Block
12.30 - 14.00	**LUNCH BREAK**
14.00 - 16.15	**Parallel Technical Sessions**
	Venue: Auditorium Jurutera, Galeri 2, Bilik Gunasama, Bilik Seminar
	INWEPF Working Groups Meeting (by invitation)
	Venue: Dewan Taklimat, Tower Block
16.30 - 17.00	**CLOSING REMARKS BY CHAIRMAN**
	Venue: Auditorium Jurutera, Faculty of Engineering, UPM
	TEA BREAK AND NETWORKING

PROGRAMME

Day 3: 21st August 2015 (Friday)

08:00	**Depart from Faculty of Engineering, UPM**
10:00 - 23.00	**Technical Visit at Integrated Agricultural Development Area Northwest, Selangor.**
	Seaside Lunch
	Visit Paddy Fields
	Sunset Dinner
	Visit Firefly Park

PARALLEL TECHNICAL SESSIONS	
Session IA **Technology for Sustainable Water and Environmental Management**	Session IB **Technology for Sustainable Water Use and Agricultural Development**
Venue : Auditorium Jurutera	**Venue :** Dewan Seminar, Level 2
Chairperson: Dr. Ahmad Fikri Abdullah	**Chairperson :** Dr. Aimrun Wayayok
09:00 - 09:15	09:00 - 09:15
PIJIC2015-63 Rainwater Harvesting Sites Selection By Using Remote Sensing And Gis Techniques; A Case Study Of Kirkuk, Iraq	**PIJIC2015-84** Malaysia Paddy Production, 1963 – 2030
Faez Hussein Buraihi, Abdul Rashid b. Mohamed Shariff (Malaysia)	**Yogambigai Rajamoorthy, Subramaniam Munusamy (Malaysia)**

PARALLEL TECHNICAL SESSIONS	
Session IC **Establishment of Sustainable Paddy Farming for Food Security and Poverty Alleviation**	Session ID **Modernization of Irrigation and drainage schemes**
Venue : Galeri 2	**Venue :** Bilik Gunasama
Chairperson : Dr. Rowshon Kamal	**Chairperson :** Prof. Dr. Thamer Ahmed Mohamed
09:00 - 09:15	09:00 - 09:15
PIJIC2015-69 SRI-Tray: Breakthrough in Nursery Management for the System of Rice Intensification	**PIJIC2015-01** Irrigation Pattern Analysis Using Wavelet Transform in Agricultural Reservoir
Zubairu Usman Bashar, Aimrun Wayayok, Amin M.S.M, Mohammad Razif Mahadi, Bande Y.M (Malaysia)	**Sung-Hack Lee, Sang-Hyun Lee, Jin-Yong Choi**

PARALLEL TECHNICAL SESSIONS

Session IA	Session IB
Technology for Sustainable Water and Environmental Management	**Technology for Sustainable Water Use and Agricultural Development**
Venue : Auditorium Jurutera	**Venue :** Dewan Seminar, Level 2
Chairperson: Dr. Ahmad Fikri Abdullah	**Chairperson :** Dr. Aimrun Wayayok
09:15 - 09:30	09:15 - 09:30
PIJIC2015-7 Homogeneity Analysis of Rainfall in Malaysia	**PIJIC2015-81** Variability of Rice Yield with Respect to Crop Health
Ng Jing Lin, Samsuzana Abd Aziz, Huang Yuk Feng, Aimrun Wayayok, Md Rowshon Kamal (Malaysia)	**Renny Eka Putri, Azmi Yahya, Nor Maria Adam and Samsuzana Abd Aziz (Malaysia)**

PARALLEL TECHNICAL SESSIONS

Session IC	Session ID
Establishment of Sustainable Paddy Farming for Food Security and Poverty Alleviation	**Modernization of Irrigation and drainage schemes**
Venue : Galeri 2	**Venue :** Bilik Gunasama
Chairperson : Dr. Rowshon Kamal	**Chairperson :** Prof. Dr. Thamer Ahmed Mohamed
09:15 - 09:30	09:15 - 09:30
PIJIC2015-75 Performance of UMAR-SRImat on Soil Water Conservation and Weed Control in System of Rice Intensification	**PIJIC2015-26** Water And Mass Balance Analysis In Pump Irrigated Lowland Paddy Fields
Umar Mohammed, Aimrun Wayayok, Mohd Amin Mohd Soom, Khalina Abdan (Malaysia)	**Tasuku Kato, Satoko Omno, Ryota Tsuchiya, Satomi Tabata (Japan)**

PARALLEL TECHNICAL SESSIONS

Session IA	Session IB	Session IC	Session ID
Technology for Sustainable Water and Environmental Management	Technology for Sustainable Water Use and Agricultural Development	Establishment of Sustainable Paddy Farming for Food Security and Poverty Alleviation	Modernization Of Irrigation And Drainage Schemes
Venue : Auditorium Jurutera	Venue : Dewan Seminar, Level 2	Venue : Galeri 2	Venue : Bilik Gunasama
Chairperson : Dr. Ahmad Fikri Abdullah	Chairperson : Dr. Aimrun Wayayok	Chairperson : Dr. Rowshon Kamal	Chairperson : Prof. Dr. Thamer Ahmed Mohamed
09:30 - 09:45			
PIJIC2015-22 Developing and Calibrating a Stochastic Rainfall Generator Model for Irrigation Scheduling	**PIJIC2015-28** Simulation of Rice Yield Under Water and Salinity Stress in Rasht Area Using Aquacrop Model	**PIJIC2015-41** Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application	**PIJIC2015-01** A Modified Empirical Model for Estimating the Wetted Zone Dimensions Under Drip Irrigation
N.S. Dlamini, M.K. Rowshon, A. Fikhri, S.H. Lai, Ujjwal Saha (Malaysia)	**Ebrahim Amiri, Hamidreza Ahmadzadeh Araji, Aimrun Wayayok, Mojtaba Rezaei (Malaysia)**	**Krissandi Wijaya, Ardiansyah, Eni Sumarni, Condro Wibowo, Ahadiyat Yugi Rahayu, Taku Nishimura, Budi Indra Setiawan (Indonesia)**	**Ahmed A. M. Al-Ogaidi, Aimrun Wayayok, Md Rowshon Kamal, Ahmed Fikri Abdullah (Malaysia)**
09:45 - 10:00			
PIJIC2015-97 Groundwater Conceptual Model for Paddy Irrigation	**PIJIC2015-70** Simulating Yield Response to Water Using Aquacrop	**PIJIC2015-50** Nitrogen Uptake of SRI Paddy Field compare to Conventional Field	**PIJIC2015-3** Low Flow Duration Frequency Relationships of Selected Catchments in the Blue Nile Basin
Ahmad Fikri Abdullah, Wan Amirul Wan Mustapa (Malaysia)	**Ebrahim Jahanshiri, Sue Walker, Aimrun Wayayok, Mohd Amin M. Soom, Azmi Yahya, Yuveena Gopalan, S.G.P. Virdis (Malaysia)**	**Ardiansyah, Chusnul Arif, Krissandi Wijaya (Indonesia)**	**Jeremy P. Mondejar & Patrick William (Philippines)**

PIJIC2015-39
EVALUATION OF MAKHOUL RESERVOIR IN REDUCING FLOOD RISK IN BAGHDAD CITY

Yousif H. Al-Aqeeli[2, 1, *], Dr. Samsuzana Abd Aziz[1], Dr. Badronnisa Yusuf[3], Dr. Aimrun Wayayok[1]

[1]Department of Biological and Agricultural Engineering,
Faculty of Engineering, Universiti Putra Malaysia
[2]Department of Dams and Water Resources Engineering,
Faculty of Engineering, Mosul University, Iraq
[3]Department of Civil Engineering
Faculty of Engineering, Universiti Putra Malaysia
*Email: ysifokaily@gmail.com

ABSTRACT

In the present study, a simulation model was developed to evaluate the operation of Makhoul reservoir that still in the stage of planning and designing for reducing flood risk in Baghdad city. The site of this reservoir located on the Tigris river near of Fatha station at the upstream of Baghdad city about 180 km. This model uses the monthly water requirements as initial outflows. The total outflow includes this water requirements and the excess water on the capacity of the reservoir, in the case of its existence. The performance of this reservoir was evaluated in confronting the flood risk using recorded flood waves in two years, firstly, without the existence the reservoir, secondly, with the existence of the reservoir. The results indicated that the reservoir is ineffective in reducing the flood risk, but it has ability to provide good hydroelectric power that can support the national network of electricity. In addition it can be used for irrigation, fish wealth development and recreation.

Keywords: simulation model, Makhoul reservoir, flood risk, Baghdad city, Tharthar

PIJIC2015-41
WATER AND NUTRIENTS BALANCE IN TROPICAL-HIGHLAND POTATO FIELD UNDER HORIZONTAL RIDGE SYSTEM WITH DIFFERENT FERTILIZERS AND BIOCHARS APPLICATION

Krisnandi Wijaya[1], *, Ardiansyah[1], Eni Sumarni[1], Condro Wibowo[1], Ahadiyat Yugi Rahayu[1], Taku Nishimura[2], Budi Indra Setiawan[3]

[1]Faculty of Agriculture, Jenderal Soedirman University (UNSOED), Purwokerto, Indonesia
[2]Graduate School of Agriculture and Life Sciences (UTokyo),
The University of Tokyo, Japan
[3]Department of Civil and Environmental Engineering,
Bogor Agricultural University (IPB), Bogor, Indonesia
*Email: Kwijaya77@yahoo.com

ABSTRACT

The horizontal-ridge system, which is effective in reducing erosion over the conventional vertical-ridge system, hasn't been sustainably implemented. This research was aimed to assess water and nutrients balance in potato fields under horizontal-ridge system with different fertilizers and biochars application during a cultivation period. Field monitoring was carried out at totally 10 potato-horizontal-ridge fields (3mx3m large) involving organic (compost: 20 ton/ha with 0.73% N; 1.55% P2O5; 1.44% K2O) and inorganic fertilizer (N: 146 kg/ha, P2O5: 310 kg/ha; K2O: 288 kg/ha), combined with rice-husk and wood charcoal of 5 and 10 ton/ha each. Volumetric-water content of each field at 15 cm depth was daily monitored by using EC-5 moisture sensor. Changes in soil hydraulic conductivity, N and P content at the same depth were monthly sampled by using 100-cc core samplers, while crop N and P content were measured at harvesting time. Runoff and soil loss were monitored at every rainfall events, and evapotranspiration was calculated based on the daily climate data. The results showed that soil volumetric-water contents, hydraulic conductivities, and available N in the fields with organic fertilizer-biochars combination were 3-18%, 50-100%, and 6-21% higher than those with inorganic fertilizer-biochars combination, respectively. Although the available P in the former combination wasn't as higher as the latter one, it remained constant until the final growth stage. Concerning the material balance, it was identified that the total water, N, and P storage in the former combination were 20%, 45%, and 9% higher than those in the latter combination, respectively.

Keywords: Water and nutrients balance, potato crop, horizontal ridge system, fertilizers, biochars

Full Paper

WATER AND NUTRIENTS BALANCE IN TROPICAL-HIGHLAND POTATO FIELD UNDER HORIZONTAL RIDGE SYSTEM WITH DIFFERENT FERTILIZERS AND BIOCHARS APPLICATION

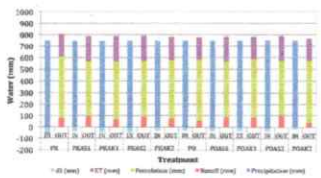
Krissandi Wijaya[1*], Ardiansyah[1], Eni Sumarni[1], Condro Wibowo[1], Ahadiyat Yugi Rahayu[1], Taku Nishimura[2], Budi Indra Setiawan[3]

[1]Faculty of Agriculture, Jenderal Soedirman University (UNSOED), Purwokerto, Indonesia
[2]Graduate School of Agriculture and Life Sciences, The University of Tokyo (UTokyo), Tokyo, Japan
[3]Department of Civil and Environmental Engineering, Bogor Agricultural University (IPB), Bogor, Indonesia

*Corresponding author
kwijaya77@yahoo.com

P/p Atirah
Assoc. Prof. Dr. Rosnah Shamsudin
President
Malaysian Society of Agricultural Engineers

Graphical abstract



Abstract

The horizontal-ridge system, which is considerably effective in reducing erosion over the conventional vertical-ridge system, hasn't been sustainably implemented. This research was aimed to assess water and nutrients balance in potato fields under horizontal-ridge system with different fertilizers and biochars application during a cultivation period. Field monitoring was carried out at totally 10 potato-horizontal-ridge fields (3mx3m large) involving organic (compost: 20 ton/ha with 0.73% N; 1.55% P_2O_5; 1.44% K_2O) and inorganic fertilizer (N: 146 kg/ha, P_2O_5: 310 kg/ha; K_2O: 288 kg/ha), combined with rice-husk and wood-charcoal of 5 and 10 ton/ha each. Volumetric-water content of each field at 15 cm depth was daily monitored by using EC-5 moisture sensor. Changes in soil hydraulic conductivity, N and P content at the same depth were monthly sampled by using 100-cc core samplers, while crop N and P content were measured at harvesting time. Runoff and soil loss were monitored at every rainfall events, and evapotranspiration was calculated based on the daily climate data. The results showed that soil volumetric-water contents, hydraulic conductivities, and available N in the fields with organic fertilizer-biochars combination were 3-18, 50-100, and 6-21% higher than those with inorganic fertilizer-biochars combination, respectively. Although the available P in the former combination wasn't as higher as the latter combination, it remained constant until the final growth stage. Concerning the material balance, it was identified that the total water, N, and P storage in the former combination were 20, 45, and 9% higher than those in the latter combination, respectively.

Keywords: Water and nutrients balance, potato crop, horizontal ridge system, fertilizers, biochars

1.0 INTRODUCTION

Potato is one of the horticultural commodities having prospective economic values, since the demand for this product is enormously increasing year by year. For instance, the domestic demand of the potato in Indonesia was increased up to 8.9 million ton per year of 2009, but the production was about 1.2 million [1], which covered about 20% of the total requirement for processing industry, and the remaining was still imported.

An intensive cultivation of potato crop to the tropical highland areas with conventional farming system, i.e., long-term use of vertical-ridge (slopping-

ridge) system and chemical fertilizers/pesticides has been becoming widely adopted by farmer [2] to meet the above requirement. However, the system in fact could accelerate land and environment degradation, either at cultivation sites or its surrounding areas [3, 4], More detail, [5] reported that the application of the vertical-ridge system in potato cultivation at the upper stream of Serayu watershed, Central Java caused severe runoff and soil loss raged from about 1,358–1,435 m^3/ha/year and 56.24–145.75 ton/ha/year, respectively. Furthermore, it produced severe sedimentation at Serayu river of about 4.3 million m^3/year, and contaminated the water up to 100 mg/L COD and 16.50 mg/L BOD [6].

The use of the horizontal-ridge (contour-ridge) system in potato cultivation at several highland areas in Indonesia has been introduced and evaluated. For instance, [2] introduced the system in highland agriculture area of East Java having slope of 35%, and found that it could reduce runoff and soil loss up to 31.44 and 37.97%, respectively. More specifically in Serang village, Central Java, [5] evaluated the applicably of the horizontal-ridge system with slope of 15%, and reported that it could reduce soil loss up to 73.21%. Furthermore, [7] found that the runoff and soil loss in the horizontal-ridge system with the slope of 10.5% were about 33.70 and 62.50% lower than those in the vertical-ridge system, respectively. Even those could be more effective reduced up to 17 and 67% in the field with slope of 56.5%. Nonetheless, the horizontal-ridge system was yet insufficient to support the optimal production of the crop, since it tended to lower the growth/yield up to 12.4%. This problem might be due to waterlogged condition in the ridge encouraging the activity of soil pathogen ([8].

Biochar is nowadays becoming popular to be used in the horticultural commodities cultivation. It is a powerful agent for improving soil quality as well as for long-term bio-remediating soil from pollutants. More detail, the biochars can enhance aeration, water holding capacity, and cation exchange capacity (CEC) of soil [9, 10, 11, 12, 13]. The material can also neutralize acid soils, and the vinegar of its making process can be used as botanical control for crop pests and diseases [11, 14]. For instance, [15] reported that the combination of the rice-husk charcoal and compost in the potato-growing pot could improve the physical (i.e., water content, dry bulk density, hydraulic conductivity) and biochemical properties (pH and electrical conductivity) of soil, thus could enhance the growth and yield.

According to the above matters, there should be a need to develop the sustainable farming system for potato crop for not only conserving the soil/land and surrounding environment from erosion, but also for maintaining the optimal crop production. For this purpose, we conducted the research focusing on the identification of water and nutrient dynamics as well as balance in potato-cropping field under the horizontal-ridge system in combination with different fertilizers and biochars application.

2.0 EXPERIMENTAL

The experiment was carried out in Serang highland agriculture, Purbalingga regency, Central Java province, Indonesia (Figure 1) with typically Andisol soil (Table 1). The totally 10 potato-cropping plots (3 m x 3 m large) involving the horizontal-ridges (0.8 m interval) with 2 different types of fertilizers, namely inorganic (NPK: 146 kg/ha N, 310 kg/ha P_2O_5, 288 kg/ha K_2O) and organic fertilizer (equalized to NPK rate or about 20 ton/ha) combined 3 different types of biochars, namely control (without biochar), rice-husk and wood charcoals of 5 and 10 ton/ha each, were prepared (Figure 2 and 3). The crop was then sowed in the ridges within 0.5 m interval.

Figure 1. Map of Serang highland agriculture, Purbalingga regency, Central Java province, Indonesia as the main location of the experiment

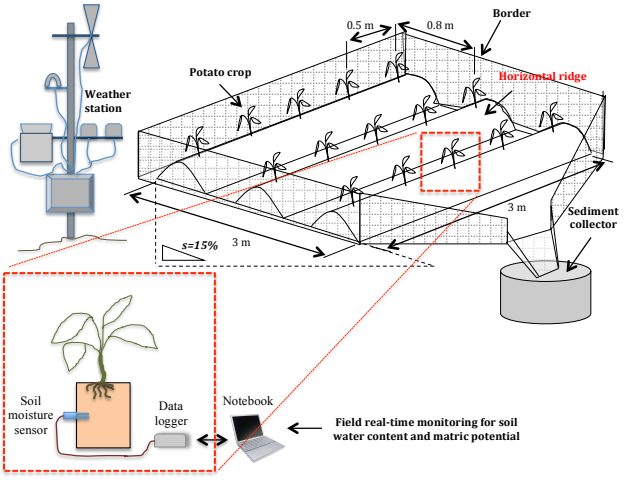


Figure 2. Schematic diagram of the field monitoring for water and nutrient balance in potato-cropping field

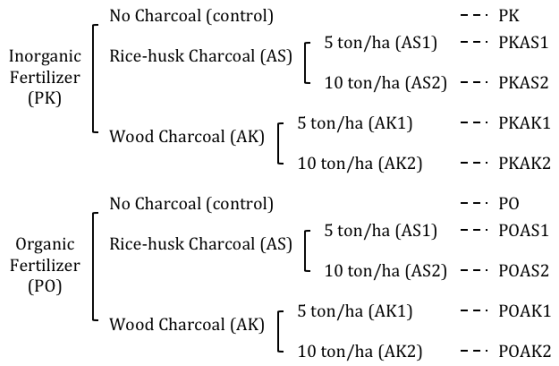


Figure 3. Combination of the field experimental treatment for water and nutrient balance in potato-cropping field

Soil volumetric-water content of the plots at the depth of 0.15 m was daily monitored by using EC-5 moisture sensor (Decagon Device Inc.). Other soil physical properties including dry bulk density and hydraulic conductivity were monthly sampled by using 100-cc core sampler. Soil nitrogen (N) and phosphorus (P) contents of the plots were monthly analyzed, while crop N and P storages were determined at harvesting time. Runoff and soil loss from the plots were measured at every rainfall events by using sediment collectors, and N and P loss from those two erosion processes were analyzed at laboratory. Rainfall and other microclimate data including solar radiation, aerial temperature, relative humidity (RH), and wind speed were daily measured by using mini-weather station (Davis Instrument Corp.).

The above collected data were then analyzed and modeled to provide the basic parameters of material balance by using certain methods as follows:

- Soil water content and bulk density were determined by using gravimetric method.
- Soil hydraulic conductivity were measured by using falling head method.
- N and P content of each compartement or process (soil, erosion, and crop) were analyzed by using Kjeldahl and Calorimetric method,
- Evapotranspiration (ET) was calculated based on the microclimate data by using Penman-Monteith method.
- Water and nutrient balance calculation using Equation 1 and 2.

$$\Delta S_w = P_w + I_w - R_w - Pc_w - ET_w \quad (1)$$
$$\Delta S_n = P_n + I_n + F_n - R_n - Pc_n - Up_n \quad (2)$$

where, P_w, I_w, R_w, Pc_w, and ET_w is the added or depleted water by the rainfall, irrigation, runoff, percolation, and evapotranspiration, respectively, while P_n, I_n, F_n, R_n, Pc_n, and Up_n is the loaded nutrient by the rainfall, irrigation, fertilizer, runoff, percolation, and crop, respectively.

Table 1 Physical properties of Serang's Andisol soil ▫

Parameter	Unit	Value
Texture (sand ; silt : clay)	g/g	0.37 : 0.48 : 0.15 (silt loam)
Particle density, ρ_s	g/cm^3	2.42
Dry bulk density, ρ_b	g/cm^3	0.69
Volumetric water content at saturation. θ_s	cm^3/cm^3	0.53
Volumetric water content at near wilting point, θ_{wp}	cm^3/cm^3	0.14
Soil organic matter (*SOM*)	g/kg	0.094

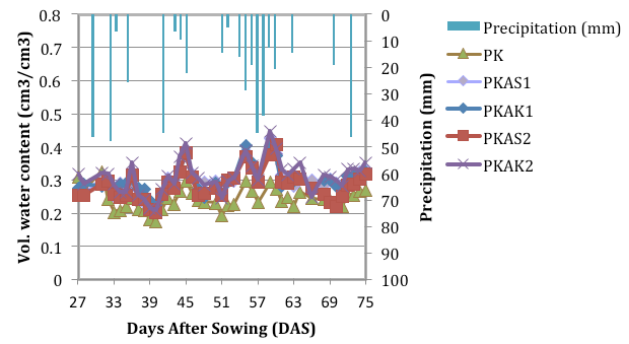
3.0 RESULTS AND DISCUSSION

3.1 Soil Water Dynamics

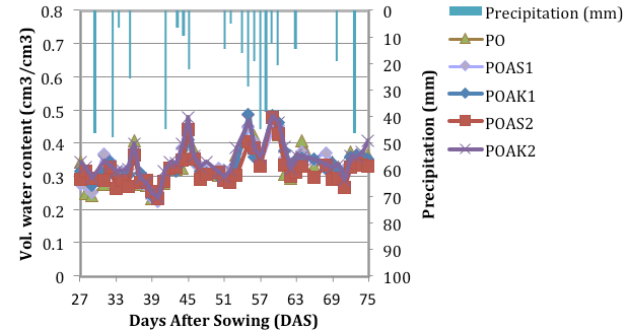
Figure 4 shows the dynamics of soil water (in volumetric base, Θ) in potato-cropping field under the horizontal-ridge system with inorganic (A) and organic fertilizer (B) in combination with different types and rates of biochars. In general, the combination of inorganic fertilizer with biochars was about 20% less effective in maintaining soil water compared to the combination of inorganic fertilizer with biochars. Among the types and rate of biochars applied, wood charcoal of 10 ton/ha was the best amendment to store water in soil, in which it was able to enhance volumetric water content 24 – 39% higher than the control (without biochars).

The difference capability among the above treated field-soils in storing water depended on the change in soil physical properties, especially saturated hydraulic conductivity (K_s), which was affected by the treatments. According to Figure 5, the saturated hydraulic conductivity of the soil with

organic fertilizer – biochars combination was in average about 40% higher than that with inorganic fertilizer – biochars combination. Furthermore, the soils with biochars (rice-husk and wood charcoal) of 5 ton/ha resulted in better saturated hydraulic conductivity than those of 10 ton/ha.



(A) Inorganic fertilizer – biochars combination



(B) Organic fertilizer – biochars combination

Figure 4. Soil-water dynamics in potato-cropping field under the horizontal-ridge system with: (A) Inorganic and (B) Organic fertilizer in combination with different types and rates of biochars

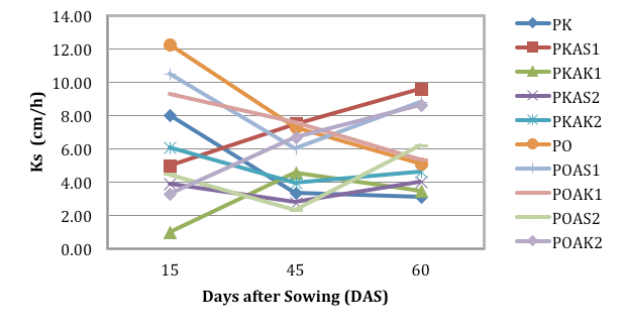
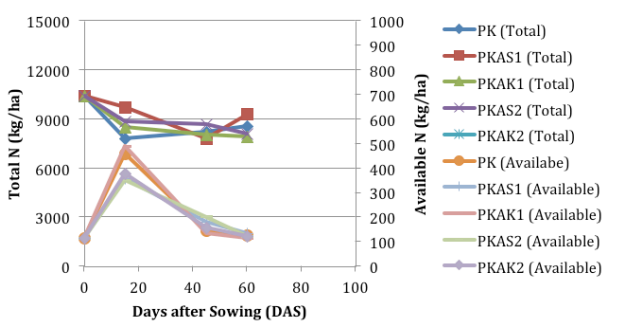


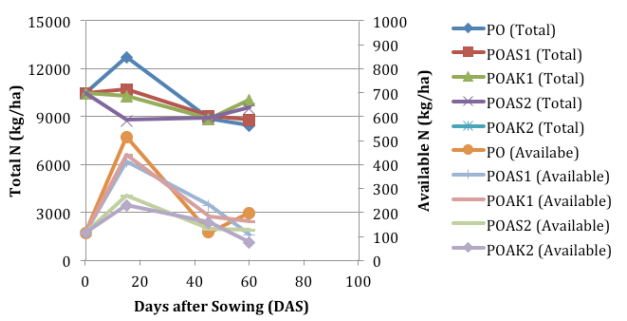
Figure 5. Soil-saturated hydraulic conductivity of the potato-cropping field under horizontal-ridge system with different types/rates fertilizer and biochars

3.2 Soil Nutrients Dynamics

The dynamics of nitrogen (N) in potato-cropping field under the horizontal-ridge system with inorganic (A) and organic fertilizer (B) in combination with different types and rates of biochars is shown in Figure 6. The N content for most the treatments, except total N in inorganic fertilizer – biochars combination, increased up to 20 days after sowing (DAS), and then decreased until harvesting time, which was might be due to the increase in decomposition rate and crop uptake, respectively. Specificallly, the availability of N in organic fertilizer – biochars combination was higher than that in inorganic fertilizer – biochars combination. Increasing the rate of biochars from 5 to 10 ton/ha might reduce the storage capability of N, either in the former or latter combination. Futhermore, the application of wood charcoal was 5-8% more effective in enhancing the available N, especially in the latter combination.



(A) Inorganic fertilizer – biochars combination

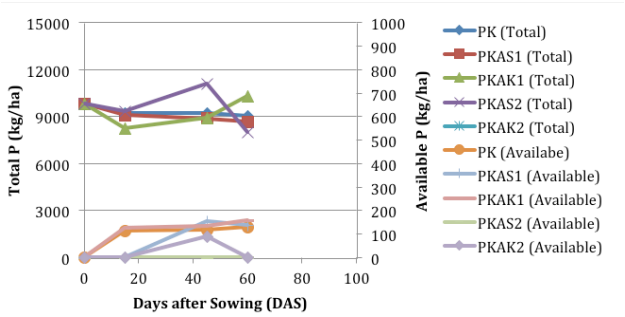


(B) Organic fertilizer – biochars combination

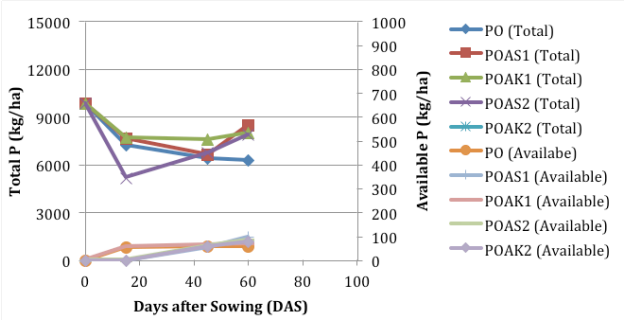
Figure 6. Soil-N dynamics in potato-cropping field under the horizontal-ridge system with: (A) Inorganic and (B) Organic fertilizer in combination with different types and rates of biochars

Figure 7 shows the dynamics of phosphorus (P) in potato-cropping field under the horizontal-ridge system with inorganic (A) and organic fertilizer (B) in combination with different types and rates of biochars. In contrary to N, the total and available P in organic fertilizer – biochars combination was lower than the inorganic fertilizer – biochars combination. However, as compared to rice-husk charcoal, the application of wood charcoal was still better in maintaining P for both combinations.

The above results indicated that the application of biochars in a cultivation field was important to maintain and store soil water [10, 13]. Furthermore, those might also enhance and maintain the availability of soil nutrients [11, 12] as well as to increase crop productivity [9].



(A) Inorganic fertilizer – biochars combination



(B) Organic fertilizer – biochars combination

Figure 7. Soil-P dynamics in potato-cropping field under the horizontal-ridge system with: (A) Inorganic and (B) Organic fertilizer in combination with different types and rates of biochars

3.3 Soil Water and Nutrients Balance

The water balance in potato-cropping field under the horizontal-ridge system with inorganic and organic fertilizer in combination with different types and rates of biochars is shown in Figure 8. The water storage capability of the organic fertilizer – biochars field was better than that in the inorganic fertilizer – biochars field, in which the former was able to maintaining water about 20% higher than the latter.

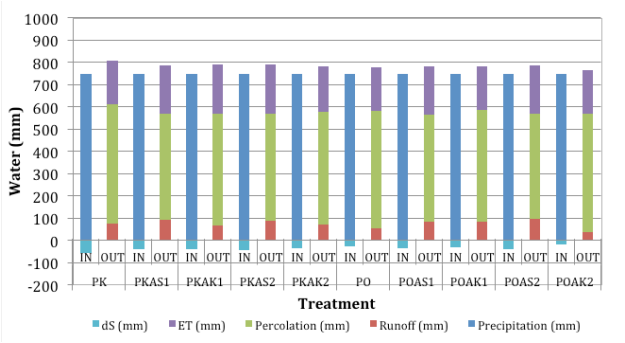


Figure 8. Soil-water balance in the potato-cropping field under horizontal-ridge system with different types and rates fertilizer and biochars

Figure 9 and 10 shows the nitrogen (N) and phosphorus (P) balance in in potato-cropping field under the horizontal-ridge system with different types/rates of biochars, respectively. Loss of N and P by percolation (or subsurface flow) was dominantly occurred in both inorganic fertilizer - biochars and organic fertilizer – biochars fields, and those agreed with the results of [16, 17]. The loss of N and P by erosion process in the latter fields was higher than those in the former field. Furthermore, the N and P storage in the latter field was in average about 45% and 9% higher than those in the former field, respectively.

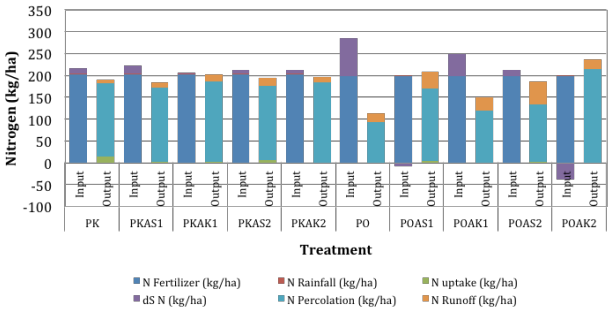


Figure 9. Soil-N balance in the potato-cropping field under horizontal-ridge system with different types/rates fertilizer and biochars

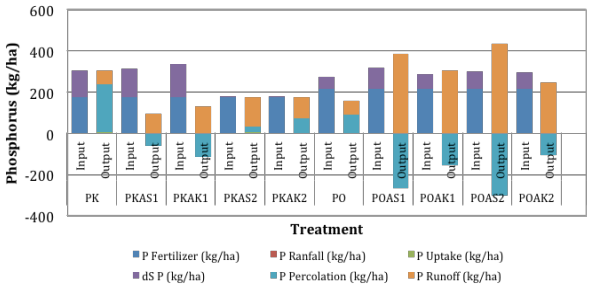


Figure 10. Soil-P balance in the potato-cropping field under horizontal-ridge system with different types/rates fertilizer and biochars

4.0 CONCLUSION

1. Soil-water balance in potato-cropping field under horizontal-ridge with different types/rates of fertilizers and biochars has been successfully assessed, in which the combination of organic fertilizer – biochars had more effective water storage than that of inorganic fertilizer – biochars.
2. Soil-nutrients balance in potato-cropping field under horizontal-ridge with different types/rates of fertilizers and biochars has been successfully quantified, in which the combination of organic fertilizer – biochars gave higher nutrient storage than that of inorganic fertilizer – biochars.

Acknowledgement

This research was supported by the International Research Collaboration (IRC) Grant, Research and Public Service Institute, Jenderal Soedirman University (UNSOED), Indonesia. The authors also would like to thank to Mr. Nur Fuadi for his help in conducting field monitoring and laboratory analysis.

References

[1] Badan Pusat Statistik (BPS). 2009. *Horticulture Statistics: Harvest Area, Production and Yield of Potato* (in Indonesian).

[2] Soleh, M., Arifin, Z., Pratomo, G., Santoso, P., and Nitiawirawan, I.G. 2002. *Sistem Usahatani Tanaman Sayuran untuk Konservasi di Lahan Kering Dataran Tinggi Berlereng*. BPPT Jatim. pp. 1-13 (in Indonesian).

[3] Gangcai, L, Zhang, J., Tian, G., and Wei, C. 2005. The effects of land uses on purplish soil erosion in hilly area of Sichuan Province, China. *Journal of Mountain Science*. 2(1): 68-75.

[4] Auerswald, K., Gerl, G., and Kainz, M. 2006. Influence of cropping system on harvest erosion under potato. *Soil and Tillage Research*. 89: 22-34.

[5] Wijaya, K., Setiawan, B.I., and Kato, T. 2010. Spatio-temporal Variability of Soil Physical Properties in Different Potato Ridges Designs in Relation to Soil Erosion and Crop Production. *Proceeding of 2010 INWEPF-PAWEES Intl. Joint Symposium, Jeju-South Korea,* 27-29 October 2010

[6] Kantor Lingkungan Hidup (KLH) Banjarnegara. 2012. *DAS Serayu dan Permasalahannya* (in Indonesian).

[7] Umedi, Wijaya, K., and Masrukhi. 2010. Kajian Erosi Tanah pada Lahan Kentang dengan Variasi Tipe Guludan, Kemiringan Lahan, dan Varietas Tanaman. *Prosiding Seminar Nasional PERTETA 2010 "Revitalisasi Mekanisasi Pertanian dalam Mendukung Ketahanan Pangan dan Energi"*. Purwokerto, 10 Juli 2010, pp. 650-660 (in Indonesian).

[8] Soesanto, L., Mugiastuti, E., and Rahayunita, R.F. 2011. Inventarisasi dan Identitifikasi Patogen Tular-tanah pada Pertanaman Kentang di Kabupaten Purbalingga. *J. Hort.* 21(3): 254-264 (in Indonesian).

[9] Oguntunde, P.G., Fosu, M., Ajayi, A.E., and de-Geisen, N.V. 2004. Effect of charcoal production on maize yield, chemical properties and texture of soil. *Biology and Fertility of Soils*. 39(4): 295-299.

[10] Gundale, M.J. and Deluca, T.H. 2007. Charcoal effect on soil solution chemistry and growth of Koeleria machanta in the pedrosa pine/Douglas-fir ecosystem. *Virology and Fertility of Soils*. 43(3): 303-311.

[11] Steiner, C., Gracia, M., and Zech, W.. 2009. Effect of charcoal as slow release nutrient carrier on N-P-K dynamics and soil microbial population: pot experiment with ferralsol substrate. *Amazonian Dark Earths*: Wim Sombroek's Vission, pp. 325-338.

[12] Makoto K., Shibata, H., Kim, Y.S., Satomura, T., Takagi, K., Nomura, M., Sath, F., and Koike, T. 2011. Contribution of charcoal to short-term nutrient dynamics after surface fire in humus layer of a dwarf bamboo-dominated forest. *Biologi and Fertility of Soils*. 48(5): 569-577.

[13] Gao, H., Zhang, Z., and Wan, X. 2012. Influence of charcoal and bamboo charcoal amendment on soil-fluoride fraction and bioaccumulation of fluoride in tea plants. *Environ. Geochemistry and Health*. 34(5): 551-562.

[14] Yao, H., Campbell, C.D., and Qiao, X. 2011 Soil pH controls nitrification and carbon substrate utilization more than urea or charcoal in some highly acidic soils. *Biology and Fertility of Soils*. 47(5): 515-522.

[15] Tini, E.W. and Wijaya, K. 2010. Composition of Organic Fertilizer and Optimum Compactness to Increase Growth and Yield of Potato at Highland of Serang. *J. Inovasi*. 4(2): 101-112 (in Indonesian).

[16] Holscher, D., Moller, R.F., Denich, M., and Foster H. 1996. Nutrient input-output budget of shifting agriculture in Eastern Amazonia. *Nutrient Cycl. in Agroecosystem*. 47(1): 49-57.

[17] Sommer, R., de Sa, T.D.A., Vielhauer, K., Viek, P.L.G., and Foster, H. 2002. Water and nutrient balance under slash- and –burn agriculture in the Eastern Amazone, Brazil-The role of a deep rooting fallow vegetation. *Plant Nutrition*. 92: 1014-1015.

Subject: PIJIC 2015 - Abstract Submission PIJIC2015-41

From: PAWEES-INWEPF Joint International Conference 2015 (pijic2015@confbay.com)

To: kwijaya77@yahoo.com;

Date: Thursday, April 30, 2015 5:35 PM

Dear Dr. WIJAYA, Krissandi,

Thank you for submitting your abstract entitled "Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application". Your reference number for this submission is **PIJIC2015-41**. The abstract will be reviewed and result will be notified soonest possible.

As a reminder, the PAWEES-INWEPF Joint International Conference 2015 will be held on 19-21 August, 2015 at Kuala Lumpur, Malaysia.

Please remember to quote the conference name and reference number (ID) in any form of communications with us.

Yours sincerely,

PIJIC 2015 Secretariat
Tel: +603-89464339
Fax: +603-89486425
Email: pijic2015@confbay.com
Website:

PAWEES-INWEPF Joint International Conference 2015

19-21 August, 2015, Kuala Lumpur, Malaysia

Paper abstract succesfully submitted. ID for your recent submitted paper is PIJIC2015-41, abstract file has been uploaded
An email has been sent to you as a notification

Abstract Submission

You have 1 abstract submitted

Submit New

1. Submission ID PIJIC2015-41

Conference: PAWEES-INWEPF Joint International Conference 2015

Title: Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application

Main Author: Krissandi Wijaya

Affiliation: Department of Agricultural Engineering, Faculty of Agriculture, Jenderal Soedirman University (UNSOED)

Co-Author(s): Ardiansyah (ardi.plj@gmail.com); Eni Sumarni (eni.sumarni@gmail.com); Condro Wibowo (condro.wibowo@gmail.com); Ahadiyat Yugi Rahayu (ahadiyat_yugi@yahoo.com); Taku Nishimura (takun@soil.en.a.u-tokyo.ac.jp); Budi Indra Setiawan (budindra@ipb.ac.id)

Presenter(s): Krissandi Wijaya

Abstract: Conventional farming (vertical-ridge) system of potato crop has been leading up to critical land and environmental problems in most tropical countries including Indonesia. On the other hand, implementation of the conservation-based (horizontal-ridge) system still encounters many obstacles, especially in the crop production, due to soil waterlogged condition. This research was aimed to assess water and nutrients balance in Serang-highland potato field, Purbalingga regency, Indonesia under horizontal-ridge system with different fertilizers and biochars application during a cultivation period. The field monitoring was carried out at totally 10 potato-cropping fields (3m x 3m large) involving the horizontal-ridge system with organic (compost: 20x103 kg/ha with 0.73% N; 1.55% P2O5; 1.44% K2O) and inorganic fertilizer (N: 146 kg/ha, P2O5: 310 kg/ha; K2O: 288 kg/ha), combined with rice-husk and wood charcoal of 5x103 and 10x103 kg/ha, respectively. Volumetric-water content of each field at 0.15 m depth was daily monitored by using EC-5 moisture sensor. Changes in soil N and P content at the same depth were monthly sampled by using 100-cc core samplers, while crop N and P content were measured at harvesting time. Other core samples were also taken for laboratory measurement of soil hydraulic conductivities. Runoff and soil loss were monitored at every rainfall events, and evapotranspiration was calculated based on the daily climate data. The results showed that soil volumetric-water contents, hydraulic conductivities, and available N in the field with organic fertilizer-biochars combination were 3-18%, 50-100%, and 6-21% higher than those with inorganic fertilizer-biochars combination, respectively. Although the available P in the former combination wasn't as higher as the latter one, it remained constant until the final growth stage. Concerning the material balance, it was identified that the total water, N, and P storage in the former combination were 25%, 45%, and 9% higher than those in the latter combination, respectively.

Abstract File: PAWEES-INWEPF Joint International Conference 2015-Krissandi WIJAYA (abstract).docx

Keyword(s): and nutrients balance, potato crop, horizontal ridge system, fertilizers, biochars

Sub-theme: Technology for sustainable water use and agricultural development

Abstract Status: Pending Review

Edit Drop

PAWEES-INWEPF Joint International Conference 2015
tel: +603-89464339, fax: +603-89486425

Name	: Dr. Krissandi
Institution	: Jenderal Soedirman University (UNSOED)
Address	: Jl. dr. Soeparno No. 61 Karangwangkal PO BOX 125, Purwokerto Central Java 53123 Indonesia
Paper ID	: PIJIC2015-41
Author	: Krissandi Wijaya
Co-Author	: Ardiansyah (ardi.plj@gmail.com); Eni Sumarni (eni.sumarni@gmail.com); Condro Wibowo (condro.wibowo@gmail.com); Ahadiyat Yugi Rahayu (ahadiyat_yugi@yahoo.com); Taku Nishimura (takun@soil.en.a.u-tokyo.ac.jp); Budi Indra Setiawan (budindra@ipb.ac.id)
Paper Title	: Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application
Date	: May 18th, 2015

NOTIFICATION OF ABSTRACT ACCEPTANCE

Dear Dr. WIJAYA, Krissandi,

Wednesday, July 15th, 2015.

Submit full paper now.

You are strictly advised to adhere to the conference template which can be downloaded from the conference website.

We look forward to receive your full paper very soon.

Again, thank you very much for your submission.

Yours sincerely,

PIJIC 2015 Secretariat
Tel: +603-89464339
Fax: +603-89486425
Email: pijic2015@confbay.com
Website:

PAWEES-INWEPF Joint International Conference 2015

19-21 August, 2015, Kuala Lumpur, Malaysia

Status

You have 1 paper submitted

Submit Another Paper

1. Paper PIJIC2015-41

Conference: PAWEES-INWEPF Joint International Conference 2015

Title: Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application

Main Author: Krissandi Wijaya

Affiliation: Department of Agricultural Engineering, Faculty of Agriculture, Jenderal Soedirman University (UNSOED)

Co-Author(s): Ardiansyah (ardi.plj@gmail.com); Eni Sumarni (eni.sumarni@gmail.com); Condro Wibowo (condro.wibowo@gmail.com); Ahadiyat Yugi Rahayu (ahadiyat_yugi@yahoo.com); Taku Nishimura (takun@soil.en.a.u-tokyo.ac.jp); Budi Indra Setiawan (budindra@ipb.ac.id)

Presenter(s): Krissandi Wijaya

Sub-theme: Technology for sustainable water use and agricultural development

File Name: PIJIC2015_41_8mkSyXMG5j-rev.docx

File Type: Microsoft Office Word 2007 Document

Size: 4467 KB

Total Pages: 6

Paper Status: Pending Review

PAWEES-INWEPF JOINT INTERNATIONAL CONFERENCE
KUALA LUMPUR, MALAYSIA
19-21 AUGUST 2015

29 July 2015

Paper ID: PIJIC 2015-41

Title: Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application

Authors: Krissandi Wijaya, Ardiansyah, Eni Sumarni , Condro Wibowo, Ahadiyat Yugi Rahayu, Taku Nishimura, Budi Indra Setiawan

---

Dear Krissandi Wijaya

Congratulation. We are pleased to inform you that your paper submitted for Pawees-INWEPF International Joint Conference 2015 (PIJIC2015) with the theme "*Solutions for sustainable water and environmental management*", to be held in University Putra Malaysia, Selangor on 19th – 21th August 2015 has been accepted for oral presentation.

We would like to remind you that the **Conference Fee shall be paid before 31st July 2015**. Failing to do so will result in ineligibility to have your paper selected and published. As attached is a form as to confirm your attendance for presentation, dinner (inclusive in the conference fee) and technical trip (with additional cost of RM 120.00). Please e-mail the completed form to pijic2015@confbay.com before 1st August 2015.

I look forward to seeing you in PIJIC2015 conference. Thank you for your cooperation and attention.

Yours sincerely,

Assoc. Prof. Dr. Hasfalina Che Man.
Chair of Technical PIJIC2015.

Organized by:

PAWEES-INWEPF Joint International Conference 2015

tel: +603-89464339, fax: +603-89486425

Name	: Dr. Krissandi
Institution	: Jenderal Soedirman University (UNSOED)
Address	: Jl. dr. Soeparno No. 61 Karangwangkal PO BOX 125, Purwokerto Central Java 53123 Indonesia
Paper ID	: PIJIC2015-41
Author	: Krissandi Wijaya
Co-Author	: Ardiansyah (ardi.plj@gmail.com); Eni Sumarni (eni.sumarni@gmail.com); Condro Wibowo (condro.wibowo@gmail.com); Ahadiyat Yugi Rahayu (ahadiyat_yugi@yahoo.com); Taku Nishimura (takun@soil.en.a.u-tokyo.ac.jp); Budi Indra Setiawan (budindra@ipb.ac.id)
Paper Title	: Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application
Date	: August 06th, 2015

NOTIFICATION OF PAPER ACCEPTANCE

Dear Dr. WIJAYA, Krissandi,

On behalf of the PIJIC 2015 Committee, we are pleased to inform you that your submitted full paper (PIJIC2015-41) entitled "Water and Nutrients Balance in Tropical-Highland Potato Field under Horizontal Ridge System with Different Fertilizers and Biochars Application", has been reviewed by professional reviewers and **ACCEPTED** for the conference. Congratulation!

You are therefore requested to submit "Camera-ready paper" **not exceeding 6 pages**before **Friday, August 07th, 2015**. When submitting the camera-ready paper, make sure that the authors' names and affiliations are stated the way they should appear in the conference proceedings. Refer the submission guidelines. The reviewers' comments below, if any, are provided to assist you in preparing your camera-ready paper.

Submit Camera Ready Now

You may wish to update you Presenter Name. Simply Login > My Submission > Paper Submission > Click on "EDIT".

Please be informed that Conference Fee shall be paid 4 weeks before the conference date. (Login > My Payment)

As a reminder, the PAWEES-INWEPF Joint International Conference 2015 will be held on 19-21 August, 2015 at Kuala Lumpur, Malaysia. We look forward to seeing you at the conference.

Again, thank you very much for your submission.

Secretariat PIJIC 2015
Tel: +603-89464339
Fax: +603-89486425
Email: pijic2015@confbay.com
Website:

Reviewer's Comment:

REVIEWER 1:
None

REVIEWER 2:
Enhance the problem statement.

Certificate of Participation

This is to certify that

KRISSANDI WIJAYA

has participated in

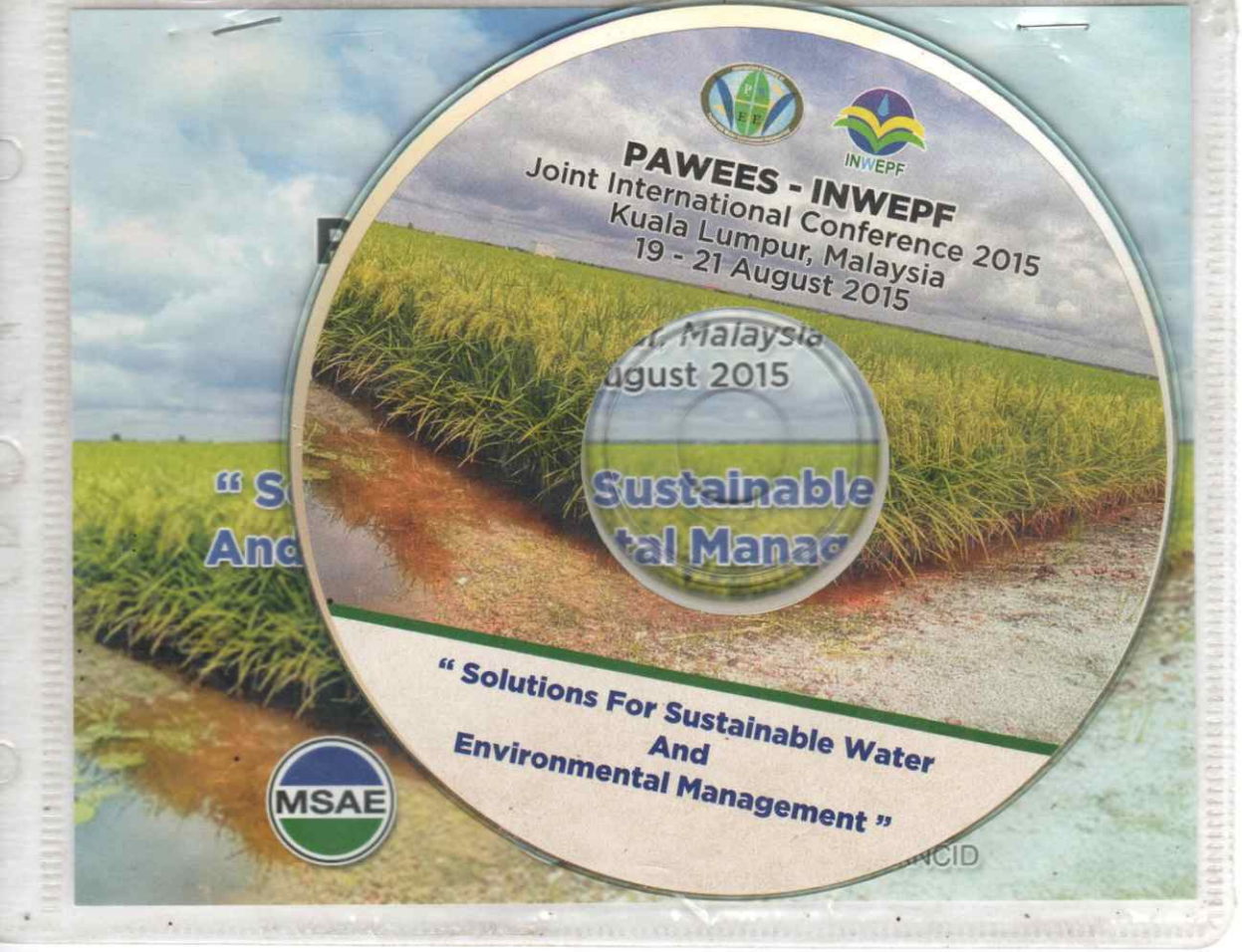
PAWEES-INWEPF JOINT INTERNATIONAL CONFERENCE
KUALA LUMPUR, MALAYSIA
19-21 AUGUST 2015

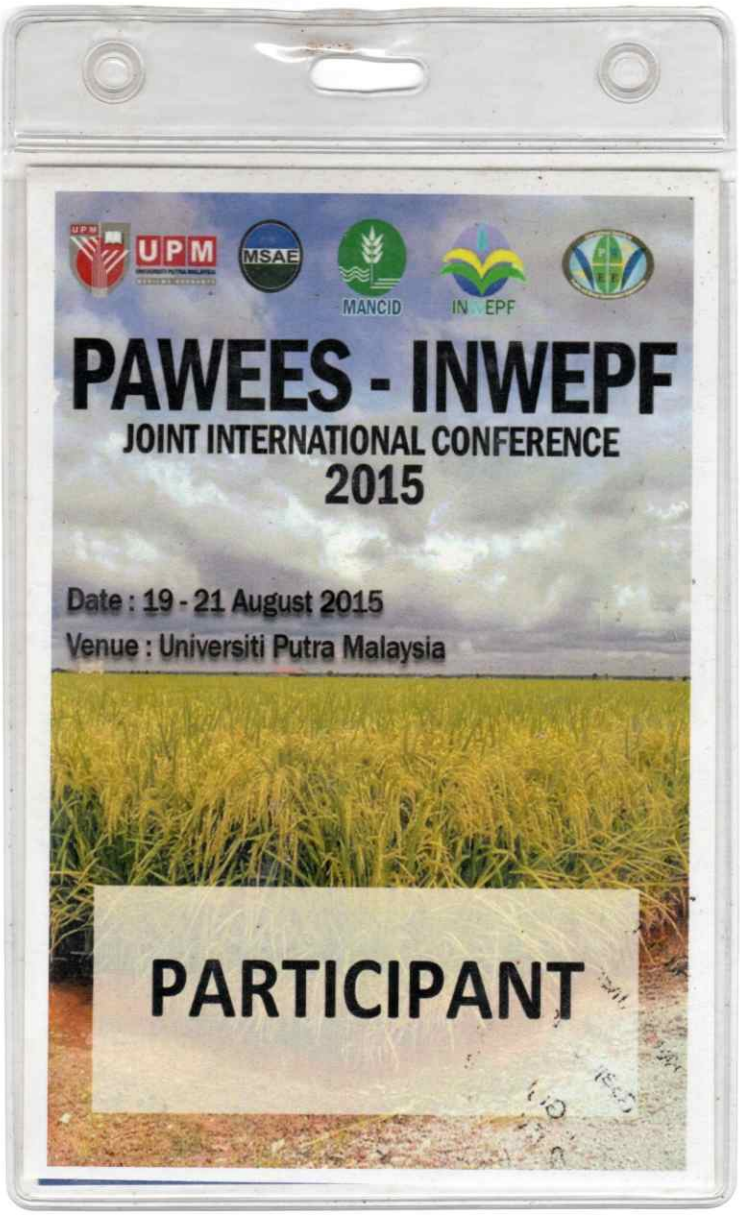
As a

PRESENTER

IR DR MOHD AMIN MOHD SOOM

CHAIRPERSON
PAWEES-INWEPF JOINT INTERNATIONAL CONFERENCE 2015


PAWEES - INWEPF
Joint International Conference 2015
Kuala Lumpur, Malaysia
19 - 21 August 2015
INWEPF
MSAE
" Solutions For Sustainable Water
And
Environmental Management "


UPM
MSAE
MANCID
INWEPF
PAWEES - INWEPF
JOINT INTERNATIONAL CONFERENCE
2015
Date : 19 - 21 August 2015
Venue : Universiti Putra Malaysia
PARTICIPANT

KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI
UNIVERSITAS JENDERAL SOEDIRMAN
FAKULTAS PERTANIAN
Jl. dr. Soeparno Telp. (0281) 638791 Purwokerto 53123
Website : www.faperta.unsoed.ac.id

SURAT TUGAS

Nomor : 4353/UN23.01/DL.07/2015

Berdasarkan : Surat undangan Presentasi Makalah tanggal 29 Juli 2015, Perihal Permohonan Surat Tugas, maka perlu dibuatkan Surat Tugas.

Dekan Fakultas Pertanian Unsoed memberikan tugas kepada :

N a m a	:	Krissandi Wijaya, S.TP., M.Agr.Ph.D.
N I P	:	19771009 200604 1 001
Pangkat / Gol.	:	Penata TK. I/IIId
Jabatan	:	Lektor
Instansi	:	Program Studi Teknik Pertanian Jurusan TP Fakultas Pertanian UNSOED

Untuk : Mempresentasikan makalah dengan judul : "Water and Nutrients Balance in Tropical-Highland Potato Field Under Horizontal Ridge System wit Different Fertilizers and Biochars Application" Pada PAWEES-INWEPF Joint International Conference 2015, yang diselenggarakan tanggal 18 s.d. 21 Agustus 2015 di Kuala Lumpur Malaysia.

Surat Tugas ini dibuat untuk dilaksanakan dengan penuh tanggung jawab.

Tanggal : 18 Agustus 2015

Dekan,

Dr. Ir. Anisur Rosyad, M.S.
NIP. 19581027 198511 1 001

PAWEES – INWEPF JOINT INTERNATIONAL CONFERENCE 2015

Kuala Lumpur, Malaysia
19 - 21 AUGUST 2015

ORGANIZED BY:

UNIVERSITI PUTRA MALAYSIA (UPM)
MALAYSIAN SOCIETY OF AGRICULTURAL ENGINEERS (MSAE)
MALAYSIAN NATIONAL COMMITTEE ON IRRIGATION AND DRAINAGE (MANCID)

1. INTRODUCTION

As a follow-up to the Kaohsiung Declaration during the PAWEES 2014 conference held in Taiwan from 30th-31st October 2014 and INWEPF 11th Steering Committee Meeting held in Hanoi Vietnam from 4th-6th November 2014, INWEPF Malaysia and Universiti Putra Malaysia are happy to announce the PAWEES-INWEPF Joint International Conference to be held in Kuala Lumpur from 19th to 21st August 2015.

2. AIMS AND SCOPES

The conference objective is to create an interactive platform for paddy and water environment related researchers, scientists, practitioners, policy makers and other professionals from Asia-Pacific Region and around the world to share and present their new advances, research findings, perspectives and experiences in response to, but not limited to, sustainable water and environmental management.

3. CONFERENCE THEME

The conference focuses on the general theme "**Solutions for Sustainable Water and Environmental Management**" accompanied with the following topics:

Topic 1: Technology for sustainable water use and agricultural development.
Topic 2: Modernization of irrigation and drainage schemes.
Topic 3: Establishment of sustainable paddy farming for food security and poverty alleviation.
Topic 4: Water quality management for agriculture and environment.
Topic 5: Integrated watershed management.
Topic 6: Droughts and flood disaster risk management.

Theme of student sessions: Technology for sustainable water and environmental management.

4. CALL FOR PAPERS

Authors are invited to submit abstracts and/or papers to a scientific committee of the conference who will be responsible for evaluating the submitted abstracts and papers. The notification of acceptance will be sent after the decision by the scientific committee. Authors of accepted abstract and/or papers are then requested to submit their full papers.

Only accepted papers will be published in the proceedings. Student sessions will be operated separately. The organizing committee will consider few selected full papers to be published after peer-review in the International Journal of PADDY AND WATER ENVIRONMENT (ISSN print edition: 1611-2490; ISSN electronic edition: 1611-2504). The conference proceedings can be collected at the registration desk.

Instruction for authors

Authors are requested to submit abstracts of their papers in Microsoft Word version. The e-mail address for registration and paper submission is pijic2015@confbay.com. Abstract should be written in English within 250 words excluding the title of the paper.

Author's name(s), affiliation(s), and keyword(s) should be displayed at the top of the page. Indicate the type of presentation (oral or poster) and session (general or student) above the title of the paper at the top left corner. Refer to the author's guide in a separate file (PAWEES-INWEPF2015-author's guide (abstract)).

5. LANGUAGE

The official language of the conference will be English. All abstracts, papers and posters should be submitted in English.

Important dates

- Abstract Submission: 30 April, 2015
- Notification of Acceptance: 15 May, 2015
- Full Paper Submission: 15 July, 2015
- Registration: 1 June - 19 August, 2015

6. REGISTRATION FEES

The registration fees are USD 300 for international participants and MYR 900 for local participants; and USD 100 (MYR 350) for students and accompanying persons. Registered delegates and participants shall be provided with a conference bag (program book and proceedings), snacks, lunches and reception dinner, attendance in the opening program, and a field trip. Payments should be made payable to: Malaysian Society of Agricultural Engineers, CIMB Bank Acct. No. 8002150497, SWIFT Code CIBBMYKL. Issuance of receipts will be made during registration.

7. VENUE

Universiti Putra Malaysia (UPM)

- Address: Faculty of Engineering, Universiti Putra Malaysia,
  43400 UPM Serdang, Selangor Darul Ehsan, Malaysia.
- Tel: +603-89466427
  Fax: +603-89486425
  Website: www.eng.upm.edu.my
- Transportation: Kuala Lumpur International Airport (KLIA) to UPM;
  Travel Time: about 45 minutes; Distance from Airport: 40 km

8. ACCOMMODATIONS

Please select the hotel you would like to stay during the conference. The rooms will be reserved on a first come, first served basis.

Available hotel near the UPM:

1) Palm Garden Hotel. www.palmgarden.com.my

2) Marriot Putrajaya Hotel. www.marriott.com/hotels/travel/kulpg-putrajaya-marriott-hotel/

3) Golden Horse Hotel. www.palaceofthegoldenhorses.com.my

4) Nouvelle Hotel. www.nouvellehotel.com

Fees: Please refer to Hotel Reservation Form provided by your chosen hotels.

9. PROGRAMS

Date	Description
18 August 2015	Arrival
19 August 2015	PAWEES-INWEPF Joint International Conference 2015
21 August 2015	Technical Tour: Integrated Agricultural Development Area Northwest, Selangor
22 August 2015	Departure

10. ORGANIZERS

International Society of Paddy and Water Environment Engineering (PAWEES)
International Network for Water and Ecosystem in Paddy Fields (INWEPF)
Universiti Putra Malaysia (UPM)
Malaysian Society of Agricultural Engineers (MSAE)
Malaysian National Committee on Irrigation and Drainage (MANCID)
Japanese Society of Irrigation, Drainage and Reclamation Engineering (JSIDRE)
Korean Society of Agricultural Engineers (KSAE)
Taiwan Agricultural Engineers Society (TAES)