

ISBN 978-602-18851-9-2

# PROCEEDING

The 3rd International Conference on Multidisciplinary Research 2014

## BIOSCIENCES CHAPTER



The Conference is jointly organized by  
Universitas Islam Sumatera Utara (UISU) Medan,  
Universitas Syiah Kuala (UNSYIAH) Banda Aceh  
and the School of Distance Education,  
Universiti Sains Malaysia (USM) Penang Malaysia.



Universitas Islam Sumatera Utara (UISU) Medan  
October, 16 - 18, 2014

## EDITORIAL BOARD

### Editor-in-Chief

Prof. Dr. Ir. Nurhayati, MP (Islamic University of North Sumatera)

### Editors:

Prof. Drs. Jumino Suhadi, M.A, Ph.D (Islamic University of North Sumatera, Indonesia)

Dr. Sojah Likin (Universiti Sains Malaysia, Malaysia)

Dr Eric Winkel (USA)

Ir. Aldywaridha, MP, (Islamic University of North Sumatera)

Dr. (Mls) Sarah N. Jibril (Nigeria)

Muslin Nasatoen (Mahidol University, Thailand)

Dr. Z. A Muchlisin (Syiah Kuala University, Indonesia)

## INTERNATIONAL STEERING COMMITTEE

Dr. Ir. Mhd. Assad, MSI	(Islamic University of North Sumatera, Indonesia)
Prof. Dr. Mustafa Fadzil Farid Wajdi	(Universiti Sains Malaysia, Malaysia)
Prof. Dr. Ir. Samsul Rizal, M.Eng	(Syiah Kuala University, Indonesia)
Dmitry Shlapentokh	(Indiana University South Bend, Indiana, USA)
Purwarno, SS, MA	(Islamic University of North Sumatera, Indonesia)
Mohammad Sukeri Bin Khalid, PhD	(Universiti Sains Malaysia, Malaysia)
Mohammadmahdi Sodeghi	(Islamic Azad University, Najafabad, Iran)
Irfan Ahmad Rana	(Asian Institute of Technology, Thailand)
Julius O. Puler	(Southern Leyte State University, Philippines)
Dr. V.M. Patel	(Shankersinh Vaghela Bapu Institute of Technology, Gandhinagar, Gujarat, India)
Gautam Dadhich	(Shankersinh Vaghela Bapu Institute of Technology, Gandhinagar, Gujarat, India)
Hasnain Abbas Dharamshi	(Associate Professor, Department of Physiology, Karachi Medical and Dental College, Pakistan)
Mazlin Ghazali	(Arkitek M Ghazali, 19-1 Jalan 1/76 Desa Pandan, 55100 Kuala Lumpur, Malaysia)
Mohd Fadzil Shuhaimi bin Ramli	(Quest International University Perak)
Mohd Peter Davis	(Deep Tropical, 20-1 Jln PJS 10/2 Subang Indah, 46000 Petaling Jaya, Selangor, Malaysia)
Norazlan Hadi Yuscob	(Head Department Of Social and Citizenship, Faculty Of Human Sciences, Sultan Idris Education University, Tanjung Malim, 35900, Perak, Malaysia)

TABLE OF CONTENT

COVER PAGE		
TITLE PAGE		
NOTICE OF DISCLAIMER		
CONTENTS		
<b>BIO SCIENCE</b>		
1	Toxicity Test of Sembang Rambai ( <i>Ablausa microstoma</i> Leaf Extract to <i>Cresolobionta Neocolla</i> Zell in the Laboratory. <i>Aldy Wardha</i>	1 - 7
2	The Field Study of Pening Barangan Resistance to Fusarium Wilt by Using Arbuscular Microbital Fungi and Brassicaceae. <i>Suswati, Anisah Indrawati, Rahmawati Siregar</i>	8 - 12
3	The potential of <i>Jatropha curcas</i> seed crude extract in protecting rice grain stored in woven plastic bag against <i>Strapshila scovellii</i> Motschulsky. <i>Anamihar, A. Djumali, A.R. Idro</i>	13 - 17
4	Character Analysis of Lodging Sensitive Genotype of Wheat in Karo Highland North Sumatra. <i>Dafni Maswar Tanjung, Sri Utami</i>	18 - 22
5	Comparative Clinical Efficacy Between Electro Desiccation with Curettage and Apply of 80% Phenol Solution in Treatment of Common Warts. <i>Dina Arwina Dailimawati, Keswandi Siregar, Chatriyah Tanjung</i>	23 - 27
6	Study of Thermophilic Cellulolytic Bacterium and <i>Trichoderma aurizans</i> Fungi Isolates to the Quality of Compost from Various Balance of Paddy Hay ( <i>Oryza sativa</i> L) and Material Beans. <i>Dini Muflihah and Rini Salsabiani</i>	28 - 31
7	Epidemiology of Stunting (A Review of Stunting Studies in North Sumatera). <i>Dona Nababan, Fira Chitra Dewi Saragih</i>	32 - 37
8	The Influence of Beliefs and Need of the Community of Girsang Sipangan Bolon Subdistrict on Utilization of Parapat District General Hospital. <i>Rosa Zoroqotomla Damamli</i>	38 - 44
9	Residual Effect of Organic Fertilizer and Addition Anorganik Fertilizer to Physical Characteristics of Soil at Rainfed Wetland. <i>EW Afrida, Akhal Rasyf, Hamidah Haman, Didi Hermoso</i>	45 - 48
10	Marrow Mesenchymal Stem Cell (MNSC) Transplantation for the Improvement of Reproductive Function in Rat Testis Degeneration. <i>Erma Safitri, Suzanita Utami, Thomas F. Widjanto</i>	49 - 54
11	Environmental Assessment Rice Cultivation in Organic and Conventional in Deli Serdang, North Sumatra. <i>Erniika Panglitan, Didi Dwiandewi, Edhi Marsono, Anwar Samudra</i>	55 - 59
12	The Effect of Giving Mixed of White Rice and Purple Cassava on Body Weight Change. <i>Evananty Ardiawaty, Evi Nurti, Adnan Robana</i>	60 - 64
13	Model of Sugar Industrial Waste Management Based on Cleaner Production (Case Study: Sei Sersayang Plantation and Sugar Mill). <i>Siti Maulana, Retno Muliawati, Lufman Endangpanglo</i>	65 - 70
14	The Soil Characteristic Under Palm Oil which Infected <i>Ganoderma</i> . <i>Husniyah Haruan, Lisawati, Ahmad Rafiqi Tontowi</i>	71 - 74
15	Response the Growth of Paddy Local Raman Dua to Irradiasi Gamma Rays in the Seedbed. <i>Sri Utami and Rosmayati</i>	75 - 77
16	The Growth and Yield of Two Soybean Varieties with Two Cropping Systems Under 16 Years Old Oil Palm Trees. <i>Lisa Maswani, T.Chelvan Naa, J.A. Napitupatu, Karyadi</i>	78 - 80
17	The Effect of Buas Buas ( <i>Preussia rubescens</i> Blum.) Leaves Extract to The Rat Blood Cell Total and Kidney Histology Description of White White rat ( <i>Rattus norvegicus</i> L.). <i>Martina Restuati, Syafriatun Nya, Sutomo Harubanan, Herbert Spahatar</i>	81 - 84

# Environmental Assessment Rice Cultivation In Organic and Conventional in Deli Serdang, North Sumatra

Ernitha Panjaitan<sup>1</sup>, Didik Indradewa<sup>2</sup>, Edhi Martono<sup>3</sup>, Junun Sartohadi<sup>4</sup>

<sup>1</sup>Doctoral Student of Environmental Science, Faculty of Geography, Gadjah Mada University, Indonesia; Departement of Agrotecnology Faculty of Agriculture, Methodist University of Indonesia

Tel: (08126406272), Email: ernitha2005@yahoo.co.id

<sup>2</sup>Department of Agriculture, Faculty of Agriculture, Gadjah Mada University, Indonesia

<sup>3</sup>Department of Plant Protection, Faculty of Agriculture, Gadjah Mada University, Indonesia

<sup>4</sup>Department of Soil Geography, Faculty of Geography, Gadjah Mada University, Indonesia

## ABSTRAC

A variety of attempts were made by the government to improve land productivity in order to realize the national food sovereignty. High production has been achieved widely supported by technologies that require the input of inorganic materials is high, especially agricultural chemicals such as urea, TSP / SP-36, KCl, pesticides, herbicides, and other products that are harmful to the health of chemical products with continuously high constant dose, shown to cause a lot of pollution that can contribute to environmental degradation and destruction of the function of natural resources, as well as the decline in the carrying capacity of the environment . The purpose of this study was to examine the effect of rice cultivation in organic and conventional toward chemical fertility of the soil and the soil contamination. The experiment was conducted using an ecological approach paddy rice, with a survey method in two districts and five villages in Deli Serdang, North Sumatra. The study consisted of 3 factors: the way of cultivation, the growing season, and soil layer. The results showed the tendency of changes in soil nutrient content in organic rice cultivation than paddy rice cultivation in conventional. Organic rice cultivation responded positively and negatively to soil contamination. Pesticides on soil contamination levels higher than conventional farming systems of organic farming systems.

---

Keywords: organic rice, chemical soil fertility, pesticide contamination

## INTRODUCTION

One of the challenges of development in the agricultural sector, especially food crops is the ability of agriculture to provide enough food, both quantity and quality for the growing number of residents and to improve the welfare of farmers, as well as keep the preservation of natural resources. Various attempts have been made by the government to overcome the above challenges, one of which is the use of intensive wetland with agrochemicals inputs namely fertilizers and pesticides with the aim of improving the productivity of land. Excessive use of chemical fertilizers in the soil without the offset provision of sufficient organic matter to the soil, causing damage to both soil physical, chemical and biological properties of soil. Land is becoming increasingly hard and heavy, making it hard at work processing the soil and slow water absorption resulting in greater surface run off and erosion increase, in addition to the nutrient content of the soil decreases, and the extinction of soil microbes. Damage to the soil resulted in a decrease in land productivity and therefore contributes to the productivity of the plant.

The use of chemical fertilizers continuously and in excessive doses, especially N fertilizer could reduce land production. These fertilizers increase the sensitivity of plants to drought and excess water and susceptible to pests and diseases (Xie, *et al.*, 2002). Excessive use of nitrogenous fertilizer also resulted in increased nitrate levels increased agricultural products because of the accumulation of

nitrate in plant tissue. It also will cause the nitrate content in ground water increased. The use of nitrogen fertilizer is a major factor causing pollution and environmental degradation (Adiningsih, *et al.*, 1995).

The use of chemical pesticides for control of plant pests and diseases, regardless of the complexity of the farming environment, have become a major cause of environmental damage. Often once a pest species to be controlled have become tolerant to pesticides and can no longer be controlled economically with these chemicals. Furthermore, the use of chemical pesticides that are not in accordance with the applicable rules can endanger public health and the environment, either directly or indirectly. This is due to the toxic nature and high dispersion capability of achieving 100% (Mangkoedihardja,1999).

The purpose of this study was to examine the influence of organic and conventional farming in rice paddy soil chemical toward fertility and pesticide contamination in the soil.

## METHODS

Research surveys conducted in two districts and five villages, Deli Serdang regency of North Sumatra Province, 2009/2010 years, the organic and conventional farming, in the dry and rainy season and at two soil layers (0-20 cm and 20-40 cm) . This study was descriptive. The study population using a sample. Chemical soil fertility levels and pesticide pollution is the unit of analysis in this research. The collected data were statistically analyzed using ANOVA test.

## RESULTS

### Improvement the Chemical Soil Fertility

Tabel 1 show that rice cultivation during the rainy season causes the K content in the soil layer of 20-40 cm is very low.

Table 1 The results of analysis some chemical soil fertility

Treatment	CEC (me/100 g)	C-org (%)	N total (%)	P-Bray I (ppm)	K-dd (me/100gr)
Dry season (Mt1)	21,22b	1,05 b	0,118a	5,63	0,83
Rainy season (Mt2)	15,51a	0,57 a	0,135b	5,80	0,57
Soil layer 0-20cm (J1)	18,65	0,88	0,133	6,26	0,65
Soil layer 20-40cm (J2)	18,07	0,74	0,120	5,16	0,74
Organic (S1)	18,98	0,90	0,128	5,46	0,64 a
Conventional (S2)	17,75	0,72	0,125	5,96	0,76 b
BNJ <sub>0,05</sub>	-	0,36	0,015	-	0,09
Mt1J1	22,03	1,12	0,126	5,52	0,83 b
Mt1J2	20,40	0,98	0,109	5,73	0,83 b
Mt2J1	15,28	0,65	0,139	7,01	0,48 a
Mt2J2	15,74	0,50	0,130	4,59	0,66 b

Remarks: Figures followed by the same letter in the same column means not significant at the 5% level test.

Cation exchange capacity (CEC), C org and N is affected by season, levels of P stable at all levels of state and K is affected by cultivation. In the dry season, CEC and C org higher than the rainy season, but lower N levels, whereas the organic farming causes soil K levels lower than conventional.

CEC soil at the study site was intermediate fertility rate (> 16-24 me); C organic was very low (<2%), low levels of N-total (from 0.099 to 0.146%); soil P levels was very low (4.42 to 6.77 ppm), and K levels of the soil was intermediate (K-dd soil: 0.3-0.5). Although not significantly different, organic farming will increase the C-org and CEC.

Decrease in K-dd on organic farming due to the needs of the plants is still higher than the availability of K from the soil and organic fertilizer than conventional agriculture. In the conventional farming inputs KCl was twice, resulting in increased nutrient K in conventional cultivation. Besides that, organic rice grain yield higher grain yield than conventional, which shows a higher transport of K in the way of organic farming compared to conventional farming way.

Organic rice cultivation by farmers in the study area has been started over less than ten years, but based on a combination of soil chemical fertility (fertility potential), wetland area of research is on low nutrient status (Soepraptohardjo, 1981). The use of NPK fertilizer is continuously applied to the conventional way of cultivating mass before conversion, in paddy fields, causing a change in the balance of other nutrients. According Djojowito (2000), that the level of use of NPK were higher and continuously, causing depletion of the availability of essential nutrients. It became the cause of the balance of soil chemical fertility in the study area. Future changes are believed to be even greater with the application of organic farming means.

### Pesticide Contamination in Soil

Pyrethroid pesticides were analyzed in this study were  $\alpha$ -sipermetrin The results showed that the levels of pesticides in paddy soil increased with the inside layer of the soil. Pesticide leached by water entering into the deeper soil layers.

Table 2. Increased levels of pesticides

Growing season	Cultivation	Soil layer	Pesticide levels (ppm)	Increased pesticide levels (ppm)
Dry season	Organic	The upper part	0,13	0,41
		The lower part	0,54	
	Conventional	The upper part	0,18	1,37
		The lower part	1,55	
Rainy season	Organic	The upper part	0,07	0,26
		The lower part	0,33	
	Conventional	The upper part	0,15	0,64
		The lower part	0,79	

Table 2 shows although it not significant, the levels of pesticides in organic rice field is always lower than in conventional paddy fields especially in the rainy season. Increased levels of pesticides were highest in conventional rice fields planted in the dry season. High levels of soil pesticides on conventionally cultivated land in the dry season, compared to organic cultivated land caused, the use of chemical fertilizers and pesticides in the cultivation of the soil organic conventional. Organic fraction in the soil was potential to reduce levels of pesticide in not biological, that is by adsorbing pesticides in soil. (Stevenson, 1982 in Sugiharto, 2007).

Found some organic rice fields in the study area alongside the wetland conventional borderless land of roads, trench or higher plant around the area of organic farming . This situation is indicated to be one of the causes are still finding pesticide levels in organic rice cultivated land, due to contamination by chemicals either from irrigation water or wind.

## CONCLUSION

1. Organic farming system on rice crops have a tendency can increase C organic and CEC (C organic correlated positively and significantly with CEC:  $r = 0.92$  but organic farming systems can not be increasing N, P, and K in the soil.
2. Organic farming system on rice crops respond positively and negatively to soil contamination. Pesticides on soil contamination levels higher than conventional farming systems of organic farming systems.

## ACKNOWLEDGEMENTS

Thank you very deep to Prof.Dr.Didik Indradewa, Dip.Agr.St., Prof.. Dr. Ir. Edhi Martono, MSc., and Prof.Dr.rer.nat.Junun Sartohadi, MSc., which led the authors to complete the doctoral program in Environmental Science ,Fakultas of Geography ,Gadjah Mada University,Indonesia.

## REFERENCES

- Adiningsih.2005. Role of Soil Organic Matter in Improving Quality and Productivity of Agricultural Land. Material Workshoop II Society and the National Congress in December 2005 Indonesia.Jakarta.21-22 Organic Farming
- Ardiwinata, A.N., E.S. Harsanti, Jatmiko and J.Soejitno 2002 Residual Insecticides, Microbial and Makrozoobentis in Rice Ecosystems in Central Java in Soelitno, JIJ Sasa, Herman (eds), Building Systems Environmental Food Crop Production. Food Crops Research and Development Centre. Bogor.pp.109-116 Tanah.2005 Research Institute. Technical Guidelines for Chemical Analysis of Soil, Plant, Water and Fertilizer. Soil Research Institute. Agency for Agricultural Research and Development. Department of Agriculture. Jakarta.pp.121-136
- IRRI. 1994 Soil and Plant Sampling and Measurements, Part 1 - Soil Sampling and Mesurements. International Rice Research Institute. Los Banos, Philippines.
- BPS. 2014 Statistics of Indonesia in 2014, the Central Bureau of Statistics. Jakarta.
- Boer IJM. 2003. Environmental impact assessment of conventional and organic milk production. Livestock Produc Sci 80:69-77
- Chaerun Siti K, et al. 2008 Environmental Impact paa Charging Using Urea N and N content in rice field loss. Journal of Agricultural Volume VI No. 7
- Dabbert S. 2003 Organic agriculture and sustainability: environmental aspects. In Organic agriculture, sustainability Markets and policies, CABI, Oxford, pp 51-64
- Gomez, K.A. and A.A. Gomez, 1995. Statistical Procedures for Research Pertanian.ed.2.UI Press. Jakarta.
- Hafsah, M.D. 2005 Potential Opportunities and Strategies Achieving Self-Sufficiency of Rice and Food Self-Reliance National. Proceedings of the National Seminar on Rice II National Rice Week 15-19July2004
- Hossain, TS, S. Hideki, Hideto, U., and Sheikh MR , 2007.Adoption of Organic Rice For Sustainable Development In Bangladesh. Journal of Organic Systems, Vol 2 No2, retrieved January 18, 2007 from<http://www.elsevier.com/locate/agee>.,5October2008
- IRRI. 1988 Wet Topsoil sampling. International Rice Research Institute.LosBanos, Laguna, Philippines.14p
- Mangkoedihardjo S. 1999. Technicality Ecotoxicology New York: Department of Environmental Engineering-FTSP, ITS.



- Ohsawa, K., Hartati, S., Nugrahati, S., Sastrohamidjoyo, H., Fortunately, K., Arya, N., Sumiarta, K. and Kuwatsuka, S., 1985, Residue Analysis of Organochlorine Pesticides and Organophosphorus in Soil, Water, and Vegetables from Central Java and Bali, *Ecol. / impact of IPM in Indonesia*, 59-70.
- Rachmawati, N. 2003. Gain Function Analysis of Organic Rice Farming In Bantul. Thesis S2. UGM, Yogyakarta
- Rosmarkam, A. And Nasih W.Y. .2009. Fertility of Soil Science. Publisher Kanisius. Yogyakarta
- Sarkar, S., Singh, S.R. and Singh, RP, 2003, The Effect of Organic and Inorganic Fertilizers on Soil Physical Condition and the Productivity of a Rice-Lentil Cropping Sequence in India. *Journal of Agricultural Science* 140, 419-425
- Soeprattohardjo, 1983, A Way Regional Capability Assessment, PUSPICS, Yogyakarta
- Sugiharto, Eko, 2007. Studi Analisis Dampak Residu Pestisida pada Komoditas Pertanian di Propinsi Daerah Istimewa Yogyakarta dalam kemajuan Terkini Penelitian. *Klaster Agro. Yogyakarta.*: 222-237
- Tarumingkeng, R.C. 1992 *Insecticides: The used, Properties, Mechanism of Action and Impact.* Publisher Ukrida, Jakarta
- Xie, Wang Xiarong, Ding Zhuhang and Yang Yaping. 2002. Critical Impact Assessment of Organic Agriculture. *Journal of Agricultural and Environmental Ethics.* (16). 297-311



*Certificate of Appreciation*

Presented to

**ERNITHA PANJAITAN**

in recognition and appreciation of being a

**PRESENTER**

at the


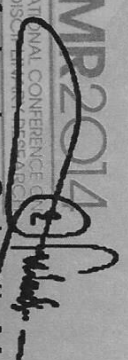
**The 3<sup>rd</sup> International Conference on Multidisciplinary Research 2014  
( ICMR 2014 )**

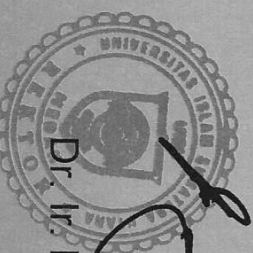
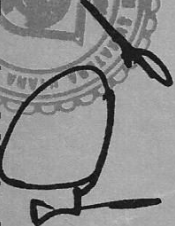
in 16<sup>th</sup> -18<sup>th</sup> October 2014

Universitas Islam Sumatera Utara (UISU) Medan,



The Conference is jointly organized by  
Universitas Islam Sumatera Utara (UISU) Medan,  
the School of Distance Education,  
Universiti Sains Malaysia (USM) Penang Malaysia,  
and Universitas Syiah Kuala (UNSYIAH) Banda Aceh

  
INTERNATIONAL CONFERENCE ON  
MULTIDISCIPLINARY RESEARCH  
16 - 18 October 2014  
  
**Prof. Jumino Suhadi, M.A., Ph.D.**  
Chairman

  
  
**Dr. Ir. Mhd. Asaad, M.Si.**  
Rector