Proceedings of International Symposium on Innovative Crop Protection for Sustainable Agriculture

2018

Date: March 7-8, 2018
Venue: 6th Floor, UGSAS Building, Gifu University, Japan

The United Graduate School of Agricultural Science, Gifu University

Organizing Committee

Gifu University

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* This symposium is supported by IC-GU12.

Daily schedule

March 7th (Wed)	9:30–10:00	Registration
	10:00–10:05	Opening remarks
		Dr. Masateru Senge (Dean of UGSAS, Gifu University)
	10:05–10:10	Welcome speech
		Dr. Fumiaki Suzuki (Executive Director and Vice President of Gifu University)
	10:10–10:30	Special guest speech
		Dr. Shirley C. Agrupis (President of Mariano Marcos State University)
	10:30–10:40	Photo session
	10:40–11:40	Poster presentation & free discussion
	11:40–12:10	Plenary lecture 1
	12:10–13:30	Lunch break & poster viewing
	13:30–14:00	Plenary lecture 2
	14:00–15:15	Oral session 1
	15:15–15:30	Coffee break& poster presentation
	15:30–17:10	Oral session 2
	17:40–19:00	Dinner meeting
March 8th (Thu)	9:30–10:00	Registration
	10:00–10:30	Plenary lecture 3
	10:30–11:45	Oral session 3
	11:45–12:45	Lunch break & poster viewing
	12:45–13:15	Plenary lecture 4
	13:15–14:55	Oral session 4
	14:55–15:10	Coffee break & poster presentation
	15:10–16:50	Oral session 5
	16:50–17:00	Closing remarks
		Dr. Kohei Nakano (Gifu University)

Plenary lectures (Main seminar room, 6th floor of UGSAS-GU Building)

PL-1 (March 7th, 11:40–12:10)

Chair: Dr. Haruhisa Suga (Gifu University)

Dr. Sotaro Chiba (Nagoya University)
"Farmer Field Schools leading to sustainable management of insect pests in Cambodian rice fields"

PL-2 (March 7th, 13:30–14:00)

Chair: Dr. Koji Kageyama (Gifu University)

Dr. Masafumi Shimizu (Gifu University)
"Endophytic *Streptomyces*: attractive biocontrol agents"

PL-3 (March 8th, 10:00–10:30)

Chair: Dr. Koji Kageyama (Gifu University)

Dr. Haruhisa Suga (Gifu University)
"Molecular characterization of *Fusarium fujikuroi* in Japan"

PL-4 (March 8th, 12:45–13:15)

Chair: Dr. Masafumi Shimizu (Gifu University)

Dr. Shigenobu Yoshida (National Agriculture and Food Research Organization)
"Perspective on the development of biopesticides applicable to both agricultural insect pests and disease"

Oral sessions –Day 1– (Main seminar room, 6th floor of UGSAS-GU Building)

OS I : Current status and management of crop diseases in Indonesia

March 7th, 14:00–15:15
Chair: Dr. Yuyun Fitriana (Lampung Univ.)

OS I-1 (14:00–14:25)	**Dr. Achmadi Priyatmojo** (Gadjah Mada University) "Current status and management of *Rhizoctonia solani,* the causal pathogen of sheath blight disease on rice and maize in Indonesia"
OS I-2 (14:25–14:50)	**Ms. Hanifah Ihsaniyati** (Sebelas Maret University) "Indonesian farmers problems in implementing integrated pest management (IPM)"
OS I-3 (14:50–15:15)	**Ms. Dwiwiyati Nurul Septariani** (Sebelas Maret University) "Taxonomical studies of blood disease bacterium of banana"

OS II : Plant probiotic bacteria

March 7th, 15:30–17:10
Chair: Dr. Md. Motaher Hossain (BSMRA Univ.)

OS II-1 (15:30–15:55)	**Dr. Tri Joko** (Gadjah Mada University) "Bacterial endophytes isolated from orchids and their influence on plant health"
OS II-2 (15:55–16:20)	**Dr. Radix Suharjo** (Lampung University) "Potential of endophytic bacteria as plant growth promoter and antagonist against pineapple-fungal plant pathogen in Indonesia"
OS II-3 (16:20–16:45)	**Dr. Hadiwiyono** (Sebelas Maret University) "Endophytic Bacillus as biological control agent of banana wilt"
OS II-4 (16:45–17:10)	**Dr. Md. Rashidul Islam** (Bangladesh Agricultural University) "Molecular based identification and formulation of cyanogenic *Pseudomonas* spp. controlling *Phytophthora infestans*"

Oral sessions –Day 2– (Main seminar room, 6th floor of UGSAS-GU Building)

OS III : Natural product-based pesticides and physical control measures

March 8th, 10:30–11:45
Chair: Dr. Tri Joko (Gadjah Mada Univ.)

OS III-1 (10:30–10:55)
Dr. Siti Subandiyah (Gadjah Mada University)
"Utilization of chitosan and glukomanan for fruit coating of chili againts antrachnose disease"

OS III-2 (10:55–11:20)
Dr. Pongphen Jitreerat (King Mongkut's University of Technology Thonburi)
"Antifungal effects of ethanolic shellac - Modified coconut oil (ES-MCO) combined with physical treatments against postharvest diseases of mango and mangosteen"

OS III-3 (11:20–11:45)
Dr. Kanlaya Sripong (King Mongkut's University of Technology Thonburi)
"Enhancing plant defense in mango fruit by hot water and UV-C treatments"

OS IV : Plant probiotic fungi

March 8th, 13:15–14:55
Chair: Dr. Achmadi Priyatmojo (Gadjah Mada Univ.)

OS IV-1 (13:15–13:40)
Dr. Moslama Aktar Maya (British American Tobacco Bangladesh Limited)
"Management of fusarium wilt in cyclamen plants using multiple soil microbes (AMF and *Piriformospora indica*)"

OS IV-2 (13:40–14:05)
Dr. Maria Viva Rini (Lampung University)
"Mycorrhizal oil palms seedlings response to different sources of *Ganoderma boninense* as the causal agent of basal stem rot disease"

OS IV-3 (14:05–14:30)
Dr. Purnomo (Lampung University)
"Potency of watery extract compost plus *Beauveria* sp. after storage for controlling planthopper and rice bug"

OS IV-4 (14:30–14:55)
Dr. Yuyun Fitriana (Lampung University)
"Low pH-tolerant mutant of *Trichoderma* spp. induced by EMS, gamma rays and UV irradiation"

Oral sessions –Day 2– (Main seminar room, 6th floor of UGSAS-GU Building)

OS V : Resistant cultivars

March 8th, 15:10–16:50

Chair: Dr. Pongphen Jitareerat (KMUTT)

OS V-1 (15:10–15:35)	**Dr. Abu Shamim Mohammad Nahiyan** (Advanced Seed Research & Biotech Centre) "Management of rice and wheat blast pathogen in Bangladesh"
OS V-2 (15:35–16:00)	**Dr. Triwidodo Arwiyanto** (Gadjah Mada University) "Control of eggplant and tomato bacterial wilt by grafting in Indonesia"
OS V-3 (16:00–16:25)	**Dr. Md. Motaher Hossain** (Bangabandhu Sheikh Mujibur Rahman Agricultural University) "Detection and characterization of Asia soybean rust in Bangladesh"
OS V-4 (16:25–16:50)	**Dr. Nandariyah** (Sebelas Maret University) "In vitro selection of sugarcane (*Saccharum officinarum* L) for Fusarium-pokah bung (Pb) resistance"

Potency of watery extract compost plus *Beauveria* sp. after storage for controlling planthopper and rice bug

PURNOMO, Radix SUHARJO, Ainin NISWATI, Yuyun FITRIANA, and Siti JARLINA

(Faculty of Agriculture, University of Lampung)

SUMMARY

Watery Extract Compost (WEC) is a liquid fertilizer that has been reported can be used as a biological control of plant pests and diseases. One of the entomopathogen which was widely used is *Beauveria* sp. This research was aimed to investigate survival and virulence of *Beauveria* sp. that was added into WEC after storage to planthopper and rice bug. The compost used in this study was made using *Trichoderma* sp. as a starter. The fungus *Beauveria* sp. used in this study was obtained from corn rhizosfer. The fungus was added into WEC before storage. The treatment were WEC suspension which were keep for 1, 2, 3, 4, 5 and 6 months. Each of experimental unit consist of 20 planthopper or rice bug, with ratio 1 : 1 for male and female. The result showed that after 6 months storage, the fungus *Beauveria* sp. which was added into WEC was still had capability to infect and cause mortality of planthopper and rice bug. After 6 months storage, the mortality of planthopper caused by WEC-Beauveria application reach > 50%. Meanwhile, the mortality of rice bug reach 45%.

Introduction

Soil quality degradation as well as pest and plant diseases are two important issues in crop productivity in Indonesia. Therefore, several effort have been done to find environmentally friendly technology. The combination of watery extracts of composted materials and entomopathogenic fungi are one of alternative for solved that problem in which it need to be developed.

Watery Extract Compost (WEC) or commonly call compost tea are fermented watery extracts of composted materials that are used for improving plant nutrition and crop yield including antimicrobial activities (Dionne *et al.*, 2012). Compost tea as a liquid fertilizer were made by mixing compost and water for 2-8 days by adding materials that can increase the microbial population in it (Scheuerell, 2004). Variuous number of stake holder using biofertilizers and biocontrol agents (biopesticide) in an effort to increase crop productivity are a very good step in terms of ecological aspects related to the many bad consequences of using chemical fertilizers continuously (Swastika, 2007) and using chemical pesticides without good control (Untung, 2001). Application of WEC, that were liquid biofertilizer integrated with entomopathogen *Beauveria* sp. fungi, were reported by (Purnomo *et al*., 2017) increased paddy field productivity. The problem is how long entomopathogen *Beauveria* sp. fungi can survive during storage in WEC without lose its capability?.

The purpose of the reaerch were to study ability to survival and virulence of entomopathogen *Beauveria* sp. fungi which is added to the WEC after storage against the planthopper and rice bug. Rice planthopper and rice bug are an important pest of rice plants.

Material and Method

The experiment were conducted at February until October 2017. Compost were made by rice straw mixed with 10% cow dung with starter was *Trichoderma* sp fungi. Preparation and production of WEC were performed at Laboratory of Biotechnology, Faculty of Agriculture, University of Lampung. Rearing and biopesticide (WEC + *Beauveria* sp.) suspension application for rice planthopper and rice bug were held at Crop Protection Laboratory, Trimurjo, Central Lampung. *Beauveria* sp. fungi used were collection of Laboratory of Biotechnology that were isolated from corn rhizosphere. *Beauveria* sp. fungi with density of 10^9 ml^{-1} watery compost were storaged before application with duration of 1, 2, 3, 4, 5 and 6 month in room temperature.

The experiment were arranged with Completely Randomized Design. There were two packages of experiment, one for rice planthopper and one for rice bug. Six replications were used for every treatment. Every experimental unit were given with 20 individual (10 males and 10 females) of rice planthopper and rice bug, respectively. Observation were conducted on rice

planthopper and rice bug mortality attacked by *Beauveria* sp. Infection and emerged of planthopper nymph.

Result and Discussions

The results showed that compost tea is a good medium for the growth of insect pathogenic fungi. It was showed by after stored 6 months in compost tea it still keep continued high capability to kill insects. Table 1 showed that *Beauveria* sp. had ability to kill rice planthopper more that 50% after storage 6 months in compost tea with room temperature. This high virulence was seen at 14 days after application. At 7 days after application, the ability to kill 50% or more is only for storage of 4 months or less.

The symptom of infected planthopper and rice bug by *Beuveria* sp. could be seen two days after application. Four to five days after application, almost the whole body of insect had already covered by white muscardine (Fig. 1)

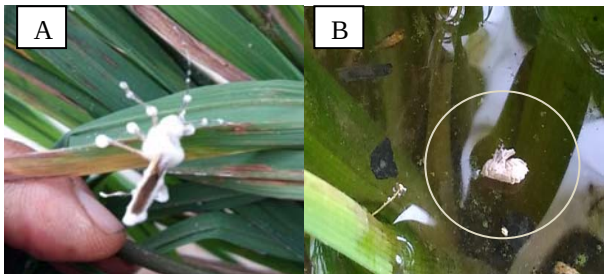

Fig. 1 Rice bug (A), rice planthopper (B) infected by *Beauveria* sp.

Table 1. Percentage of mortality of rice planthopper (%) by application of WEC plus *Beauveria* sp. with different storage duration.

Treatments	*Beauveria* sp.	
	7 days after application	14 days after application
Control	0	0
1 month	71.7	82.50
2 months	67.5	80.00
3 months	58.3	70.83
4 months	60.0	68.33
5 months	41.7	50.83
6 months	40.8	52.50

Table 2. Percentage of mortality of rice bug (%) by application of WEC plus *Beauveria* sp with different storage duration.

Treatments	*Beauveria* sp.	
	7 days after application	14 days after application
Control	0	0
1 month	68.3	85.00
2 months	62.5	78.33
3 months	51.7	70.83
4 months	41.7	55.83
5 months	42.5	56.67
6 months	33.3	45.00

Table 2 showed that storage of *Beauveria* sp. for 5 month in compost tea was be able to kill more than 50% rice bug tested after 14 days application. At the 7 days after application, 50% mortality of rice bug that killed by *Beauveria* sp. which storage less that 3 months.

Entomopathogen fungi that have virulence more than 50% commonly assumed as a potential source for bioinsecticides. Therefore, some researcher worked many effort to increase the virulence of entomopathogen fungi by manipulation of medium for fungi growth (Nuryanti *et al.* 2012; Fan *et al.* 2007; Herlinda *et al.* 2006).

Beside *Beauveria* sp. after storage in tea compost had high virulence infected adult of rice planthopper and rice bug, it also could suppress nymph of rice planthopper that emerge from the egg. Fig. 2 showed that practically storage of *Beauveria* sp. in tea compost for 6 months were not able to suppress emergence nymph of rice planthopper. However, the storage 5 month or less, *Beauveria* sp. could suppress better the emergence nymph of rice planthopper.

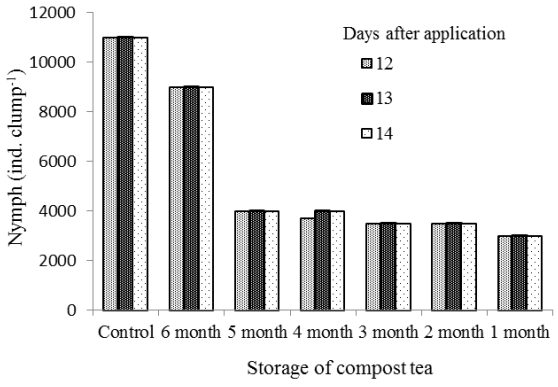

Fig. 2 Population of nymph of rice planthopper emerging after *Beauveria* sp application.

Conclusion

WEC or compost tea can be a good host for insect pathogenic fungi *Beauveria* sp. Application of compost tea has contain *Beauveria* sp. is able to suppress the population of rice planthopper and rice bug, even though the compost tea has been stored for 5 months at room temperature.

It is needed to continous research focused on WEC as a liquid biofertilizer which combined with biocontrol agent for controling plant pest and diseases, for example research of microbial content in compost tea.

Acknowledgement

We thank the staff at Crop Protection Laboratory, Trimurjo, Central Lampung for permitting this study and supporting the green house for experiment. Our study was supported by Product Applied Research Grant *(Penelitian Produk Terapan*), Ministry of Research Technology and Higher Education Republic of Indonesia with contract number 1638/UN26.21/KU/2017.

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