WARSAW UNIVERSITY OF LIFE SCIENCES

KING MONGKUT'S INSTITUTE OF TECHNOLOGY LADKRABANG

HARBIN INSTITUTE OF TECHNOLOGY

ISBB 2023

SEPTEMBER 7-9

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

Program Schedule

Day 1: September 7, 2023	
9.00 – 10.00	Participants' registration at the registration desk in the Main Library of WULS (WULS Campus, Building 48, 161 Nowursynowska St.)
Opening session 10.00 – 10.30 Master of Ceremony: Dr. Tobiasz Druciarek	
10.00 – 10.30	Welcome address by Associate Professor Dr. Dariusz Wrona, Director of the Institute of Horticultural Sciences, WULS
	Welcome address by the representative of Harbin Institute of Technology (Online)
	Opening address by Associate Professor Dr. Anuwat Jangwanitlert, D.Eng. Executive Vice President for Academic Affairs from KMITL
Session I 10.30 – 13.10 Chairperson: Asst. Prof. Dr. Karn Wongsariya and Dr. Jatuporn Meesin	
10.30 – 11.40	Keynote speaker: **Qian Yang** (online) "**The keystone taxa were significantly correlated with the carbon source utilization of bacterial communities in *Litopenaeus vannamei* Ponds**" Qiong Zhao[1, 2], Fengxing Xie[1], Fengfeng Zhang[1], Ke Zhou[1], Yujie Zhao[1], Qian Yang[2] ([1]Tianjin Institute of Agriculture Resource and Environment, Tianjin, China; [2]Harbin Institute of Technology, Harbin, China) (A-013)
11.40 – 12.10	Presentation by **Shuang Wang** (online) "**Insights into the diversity of bacterial communities in saline-alkaline soils from songnen plain in China**" Shuang Wang, Pin-Jiao Jin, Lei Sun, Kang-Kang Wang (Heilongjiang Academy of Black Soil Conservation & Utilization, Heilongjiang Academy of Agricultural Sciences; Key Lab of Soil Environment and Plant Nutrition of Heilongjiang Province; Heilongjiang Fertilizer Engineering Research Center, Harbin, China) (A-012)
12.10 – 12.40	Presentation by **Pimpikar Kanchanadumkerng** "**Molecular cloning, identification, and expression of β-glucosidase encoding gene from *Bacillus safensis* m3**" **Pimpikar Kanchanadumkerng**[1] and Chanpen Wiwat[2] ([1]Department of Food Chemistry, Faculty of Pharmacy, Mahidol University, Bangkok, Thailand, and [2]Department of Microbiology, Faculty of Pharmacy, Mahidol University, Bangkok, Thailand) (A-010)
12.40 – 13.50	**Lunch break**
Session II 13.50 – 16.00 Chairperson: Assoc. Prof. Dr. Apiluck Eiad-ua and Assoc. Prof. Dr. Cherdsak Maneeruttanarungroj	
13.50-14.40	Keynote speaker: **Anna M. Linkiewicz** "**Genome editing for crop improvement**" (Laboratory of Molecular Biology and Genetics, Institute of Biological Sciences, Faculty of Biology and Environmental Sciences, Cardinal Stefan Wyszynski University in Warsaw, and Plant Breeding and Acclimatization Institute-NRI, Radzików, Poland) (A-020)

14.40 – 15.10	Presentation by **Teerawat Sarutayophat** "**Detection of the *Bph1* gene in twenty Indica rice cultivars using cleaved amplified polymorphic sequence (CAPS) markers**" **Teerawat Sarutayophat**[1], Pattama Nitthaisong[1], Phairat Phimsirikul[1], Yoshikazu Hoshi[2], Kaori Imamura[2], Koukei Yagi[2], Manabu Katano[2], Masaya Matsumura[3], Pakanan Jiamtae[4] ([1]Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; [2]Department of Plant Science, School of Agriculture, Tokai University, Aso, Kumamoto Japan; [3]Laboratory of Pest Management Systems, Kyushu National Agricultural Experiment Station, Kumamoto, Japan; [4]National BioResource Project, Faculty of Regional Innovation, University of Miyazaki) (A-019)
15.10 – 15.40	Presentation by **Kankanit Khwanpruk** "**Production of spray dried chili oil powder**" Samak Rakmae, Chakriya Sakunputtipaiboon, Jitpanu Jirakaittikul, Ratchakarn Engchuan and **Kankanit Khwanpruk** (Department of Food Engineering, School of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-018)
15.40 – 16.00	**Coffe break**
Poster session 16.00 – 17.50 Chairperson: Asst. Prof. Dr. Karn Wongsariya and Dr. Jatuporn Meesin	
16.00 – 16.10	Poster by **Suree Nanasombat** "**Combined effect of acid salts with clove and cinnamon oils on controlling of postharvest decay in carrot during chill storage**" **Suree Nanasombat** and Saranya Phunpruch (Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-001)
16.10 – 16.20	Poster by **Kanokrat Srikijkasemwat** "**Exploring the effects of mangosteen peel crude extract on diarrhea in pre-weaning piglets**" **Kanokrat Srikijkasemwat**[1] and Nicharee Srikijkasemwat[2] ([1]Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; [2]Department of Engineering of Science, University of Oxford, UK) (A-003)
16.20 – 16.30	Poster by **Nattaya Montri** "**Elicitation by ethephone enhanced stemona alkaloids accumulation in *Stemona curtisii* Hook. f.**" **Nattaya Montri,** Manita Kampan and Sukanya Saenpakdee (Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-004)
16.30 – 15.40	Poster by **Varee Yoosumran** "**Effect of colchicine on induced mutation of *Curcuma* hybrid cv. Sweetmemory in vitro**" **Varee Yoosumran**[1], Kanjana Saetiew[1], Soraya Ruamrungsri[2], Angsana Akarapisan[3], Montinee Teerarak[1] ([1]Department of Plant Production

	Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; [2]Department of Plant and Soil Science, Faculty of Agriculture, Chiang Mai University, Chiang Mai, Thailand; [3]Department of Entomology and Plant Pathology, Faculty of Agriculture, Chiang Mai University, Chiang Mai 0, Thailand) (A-007)
16.40 – 16.50	Poster by **Somkiat Seesanong** "**Using potassium nitrate and potassium chloride on growth and antioxidant properties of brahmi (*Bacopa monnieri*) in hydroponics**" **Somkiat Seesanong**, Piyatida Ounnahakhongkha, Uscharee Ruangdej and Nongnuch Laohavisuti (School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-008)
16.50 – 17.00	Poster by **Nongnuch Laohavisuti** "**Micropropagation of aquarium plant, *Anubias* sp. "white" using adenine sulfate and 6-benzylaminopurine**" **Nongnuch Laohavisuti**, Achara Srisawang, Buppha Jongput, and Somkiat Seesanong (School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-009)
17.00 – 17.10	Poster by **Sujitra Sukonthamut** "**Effect of Chinese rice flower leaf extract on blast disease**" Chonpisit Sanwittayakul[1], Somporn Phlaiyong[1], Ananyalak Sanmuengmoon[1], **Sujitra Sukonthamut**[2], Dusanee Thanaboripat[1], and Chamroon Laosinwattana[3] ([1]Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand; [2]Department of Statistics, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand; [3]School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Thailand) (A-014)
17.10 – 17.20	Poster by **Sittichai Charoensettasilp** "**Control of rice blast disease by marigold leaf extract**" Warittha Bonnumsirijit[1], Adisorn Srikomnuid[1], Ilada Jubunchob[1], Sujitra Sukonthamut[2], Dusanee Thanaboripat[1], Chamroon Laosinwattana[3] and **Sittichai Charoensettasilp**[2] ([1]Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand; [2]Department of Statistics, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand; [3]School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Thailand) (A-015)
17.20 – 17.30	Poster by **Kanogkan Leerojanaprapa** "**Optimal conditions for inhibition of *Aspergillus flavus* IMI 242684 by sweet acacia essential oils**" by Pawarisa Prasutsaengchan[1], Supaporn Panjarern[1], Anchisa Muaymhan[1], **Kanogkan Leerojanaprapa**[2], Dusanee Thanaboripat[1], and Sittichai Charoensettasilp[2] ([1]Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand; [2]Department of Statistics, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand; [3]School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Thailand) (A-016)

17.30 – 17.40	Poster by **Somchai Seviset** "**Factors affecting mechanical properties of thinning teak plantation**" **Somchai Seviset**[1], Dusanee Thanaboripat[2], and Sittichai Charoensettasilp[3] ([1]Department of Biology, School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Thailand; [2]Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand; [3]Department of Statistics, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand) (A-017)
17.40 – 17.50	Poster by **Montinee Teerarak** „**The effect of natural herbicide from *Fusarium equiseti* crude extract on water hyacinth (*Eichornia crassipes* (Mart.) Solms) aquatic weed**" **Montinee Teerarak**, Naphat Somala, and Chamroon Laosinwattana (School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-024)
Day 2: September 8, 2023	
Session III 9.00 – 10.40 Chairperson: Asst. Prof. Dr. Karn Wongsariya and Dr. Jatuporn Meesin	
9.00 – 9.40	Keynote speaker: **Cherdsak Maneeruttanarungroj** "**Green algal biotechnology: from basics to applications**" Department of Biology, and Bioenergy Research Unit, School of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand (A-021)
9.40 – 10.10	Presentation by **Anna Sybilska** "**Effectiveness of the entomopathogenic fungi, *Beauveria bassiana*, in control of *Aculops lycopersici* (Acariformes: Eriophyoidea)**" **Anna Sybilska**, Nina Mądry, and Ewa Puchalska (Department of Plant Protection, Institute of Horticultural Sciences, Warsaw University of Life Sciences, Warsaw, Poland) (A-022)
10.10 – 10.40	Presentation by **Tobiasz Druciarek** "**Preventing a world without roses: The mite vector is a key to combat rose rosette disease**" **Tobiasz Druciarek**[1,2], Mariusz Lewandowski[1], and Ioannis E. Tzanetakis[2] ([1]Department of Plant Protection, Institute of Horticultural Sciences, Warsaw University of Life Sciences, Warsaw, Poland; [2]Division of Agriculture, University of Arkansas, Fayetteville, AR, USA (A-023)
10.40 – 11.00	**Coffee break**
Session IV 11.00 – 12.40 Chairperson: Assoc. Prof. Dr. Apiluck Eiad-ua and Assoc. Prof. Dr. Cherdsak Maneeruttanarungroj	
11.00 – 11.40	Keynote speaker: **Stanisław Ignatowicz** "**Biological methods of urban pest management**" Department of Plant Protection, Institute of Horticultural Sciences, Warsaw University of Life Sciences, Warsawa, Poland (A-025)

11.40 – 12.10	Oral presentation by **Tanapoom Moungthipmalai** "**Ovicidal activity against housefly (*Musca domestica* L.; Muscidae: Diptera) of combinations of cymbopogon citratus, *Eucalyptus globulus*, and *Illicium verum* essential oils**" **Tanapoom Moungthipmalai,** Sirawut Sittichok, and Mayura Soonwera (Department of Plant Production Technology, School of agricultural technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-005)
12.10 – 12.40	Oral presentation by **Sirawut Sittichok** "**Strong insecticidal potency against house fly, *Musca domestica* L. from combinations of cymbopogon citratus, *Illicium verum*, and *Eucalyptus globulus* essential oils**" **Sirawut Sittichok**, Tanapoom Moungthipmalai, and Mayura Soonwera (Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand) (A-006)
12.40 – 13.50	**Lunch break**
Closing Session 13:50 – 15:10 Master of Ceremony: Dr. Tobiasz Druciarek	
13.50 – 14.10	Awards ceremony for best oral and poster presentation
14.10 – 14.20	Announcement of the host for the 20th International Symposium
14.20 – 15.10	Closing speech by Assoc. Prof. Dr. Anuwat Jangwanitlert/ Assoc. Prof. Dr. Kamronwit Thipmanee
Day 3: September 9, 2023	
9:45 – 13.45	Guide tour – Old Town in Warsaw The meeting with the guide is planned for 9.45 a.m. in front of the Tomb of the Unknown Soldier, located at Piłsudski Square. The tour will start with watching the changing guard of the Tomb of the Unknown Soldier, which takes place every full hour.

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ABSTRACTS

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

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A-001 – poster presentation

COMBINED EFFECT OF ACID SALTS WITH CLOVE AND CINNAMON OILS ON CONTROLLING OF POSTHARVEST DECAY IN CARROT DURING CHILL STORAGE

Suree Nanasombat and Saranya Phunpruch

Department of Biology, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand

suree.na@kmitl.ac.th

Abstract

Antifungal activity of cinnamon and clove oils, acids and salts against *Alternaria alternata* was studied. *A. alternata* TISTR 3282 and the mold isolate C7D7 isolated from a spoiled carrot were inhibited by cinnamon and clove oils at 0.0125-0.025% MIC, ammonium carbonate at 0.5% MIC and potassium metabisulfite at 1% MIC. The isolate C7D7 was identified by morphological and molecular methods as *Alternaria alternata*. Mostly, ammonium carbonate and potassium metabisulfite affected stronger antifungal activity as compared to lactic and ascorbic acids. Synergy testing of these two oils combined with acid salts was performed. Combined cinnamon oil and ammonium carbonate exhibited partial synergistic effects against *A. alternata* C7D7, whereas clove oil and potassium metabisulfite combination displayed strong synergistic effect against *A. alternata* TISTR 3282. Then, the effect of cinnamon or clove oils in combination with these acid salts on mycelial growth inhibition was studied. All combinations of clove and cinnamon oils (0.04–0.25%), ammonium carbonate (0.25-0.5%), potassium metabisulfite (0.25-0.5%) effectively inhibited *A. alternata* TISTR 3282 and *A. alternata* C7D7 with 100% mycelial growth inhibition. The appropriate combinations of these oils and salts were selected to formulate dipping solutions. Then, effect of combined chilled storage (5°C) and dip treatment on controlling of carrot decay was studied. The dip treatments with combined 0.25% cinnamon oil and 0.5% ammonium carbonate and the treatment with 1% ammonium carbonate alone effectively controlled black rot decay of carrot with 13.9-19.4% decay after 8-week storage at 5°C which were more effective as compared to other treatments (27.8-38.9% decay).

Keywords: Antifungal activity, *Alternaria alternata*, ammonium carbonate, potassium metabisulfite

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

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A-002 – poster presentation

SUSTAINABLE FOREST-BASED BIOFUELS FOR MARINE TRANSPORTATION

D. M. M. Yacout[1,2], M. Tysklind[1], V. K. Upadhyayula[1]

[1]Department of Chemistry, Umeå University, SE-90187 Umeå, Sweden
[2]Department of Energy and Technology, Swedish University of Agricultural Sciences (SLU), E-750 07 Uppsala Sweden

dalia.abdelfattah@slu.se

Abstract

International shipping is one of the key contributors to climate changes due to the generated emissions to air (2% of global black carbon emissions and 3% of global greenhouse gas emissions) from marine fuels combustion. Furthermore, international shipping transportation is one of the highest consuming sectors of fossil fuels, consuming approximately 4% of global oil demand or 300 Mtonne of fuel annually. Usage of forest-based biofuels as an alternative to conventional fossil fuels in marine shipping seems to be an attractive alternative. However, a system analysis perspective is needed to ensure its sustainability.

In the present study life cycle assessment was employed to estimate the environmental impacts of production and use of two forest-based biofuels from pulp and paper mills for marine shipping "biodiesel and bioethanol" and compare it to the currently used fossil fuels in the marine shipping industry "Marine gas oil (MGO) and heavy fuel oil". Future projection scenarios in 2030 and 2050 for estimating the environmental impacts of a transition from fossil fuels to biofuels in Arctic shipping were studied as well.

The results indicated that a holistic view is very important for biofuels utilization. Production and use of forest-based bioethanol had significantly lower impacts in climate change potential, but had higher impacts on the rest of the categories. Utilization of blinded mixes of bioethanol with MGO is recommended as it has better overall environmental performance.

Keywords: Forest-based biofuels, Life cycle assessment, Marine shipping

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

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A-003 – poster presentation

EXPLORING THE EFFECTS OF MANGOSTEEN PEEL CRUDE EXTRACT ON DIARRHEA IN PRE-WEANING PIGLETS

Kanokrat Srikijkasemwat[1] and Nicharee Srikijkasemwat[2]

[1]Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok 10520, Thailand

[2]Department of Engineering of Science, University of Oxford, UK

kanokrat.sr@kmitl.ac.th

Abstract

The aim of this study was to investigate the impact of different concentrations of mangosteen peel crude extract compared to antibiotics on the treatment of diarrhea in pre-weaning piglets, with the goal of reducing the risk of antimicrobial resistance. A total of 120 female piglets, aged 7 days and weighing between 2.10 and 2.20 kg, were divided into four groups in a completely randomized design. Each group consisted of three replications with 10 piglets in each replication. The groups included an antibiotic control group receiving daily colistin doses, a group receiving mangosteen peel crude extract at a concentration of 1:1, a group receiving the extract at a concentration of 1:2, and a group receiving the extract at a concentration of 1:3. The experiment spanned 15 days and treatment began when piglets exhibited diarrhea symptoms. Mangosteen peel crude extract was administered twice daily using a syringe. Results revealed that piglets treated with the 1:1 concentration extract showed significantly faster recovery from diarrhea (3.44±0.34 days) compared to the antibiotic control group (6.94±2.28 days). The 1:1 concentration group also displayed significantly higher body weight gain (3450.00±96.44 g/piglet) over the 15-day period compared to the control group (2076.67±842.40 g/piglet). Additionally, the cost of treatment until recovery was highest in the control group (0.41 USD per piglet) while the cost for the mangosteen peel crude extract treatment ranged from 0.027 to 0.028 USD per piglet.

Keywords: antimicrobial resistance, Diarrhea treatment, antibiotic, antimicrobial resistance risk reduction, tannin

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ISBB 2023
SEPTEMBER 7-9

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A-004 – poster presentation

ELICITATION BY ETHEPHONE ENHANCED STEMONA ALKALOIDS ACCUMULATION IN *STEMONA CURTISII* HOOK. F.

Nattaya Montri, Manita Kampan and Sukanya Saenpakdee

Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

nattaya.mo@kmitl.ac.th

Abstract

Stemona curtisii Hook. f. is widely outspread in the southern part of Thailand. The most important alkaloids in *S. curtisii* roots are Stemona alkaloids, i.e. stemocurtisine, stemocurtisinol and stemofoline which possess interesting bio-insecticidal properties. To improve Stemona alkaloids contents, ethephon were applied as elicitor by spraying at the different concentrations and periods before harvesting. The experiment was conducted in 4 x 5 factorial in completely randomized design with 10 replications. The 0, 200, 400 and 600 mg/l of ethephon were sprayed at 0, 1, 2, 3 and 30 days before harvesting. Stemona roots were harvested at 7 months – old plants. Roots were dried in hot air oven at 45ºC. Dried root was blended and the powder were extracted in 95% methanol. The methanolic extract were analysed for the contents of Stemona alkaloids. The results found that, the combinations of ethephon concentrations and periods before harvesting were not affected on total stemona alkaloids, stemocurtisine, stemocurtisinol and oxystemokerrine contents but influenced on stemofoline accumulation ($P>0.05$) in roots. The highest contents of stemofoline accumulation were achieved in 400 mg/l ethephon before harvesting for 3 days treatment at 31.83 µg/gDW.

Keywords: ethylene, elicitor, secondary compounds, stemocurtisine, preharvest

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ISBB 2023
SEPTEMBER 7-9

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A-005 – oral presentation

OVICIDAL ACTIVITY AGAINST HOUSEFLY (*MUSCA DOMESTICA* L.; MUSCIDAE: DIPTERA) OF COMBINATIONS OF *CYMBOPOGON CITRATUS, EUCALYPTUS GLOBULUS,* AND *ILLICIUM VERUM* ESSENTIAL OILS

Tanapoom Moungthipmalai, Sirawut Sittichok, and Mayura Soonwera

Department of Plant Production Technology, School of agricultural technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand

mayura.so@kmitl.ac.th

Abstract

The ovicidal activities of combinations of *Cymbopogon citratus*, *Eucalyptus globulus*, and *Illicium verum* against houseflies (*Musca domestica* L.) were evaluated and compared to that of α-cypermethrin. The inhibition rates were determined by a topical application. The formulations of these essential oils were 5% EO + 5% EO + 90% ethyl acetate and 10% EO + 10% EO + 80% ethyl acetate. The highest efficacy was provided by 10 % *I. verum* + 10% *E. globulus* + 80% ethyl acetate, with an inhibition rate of 100%. The other formulations were 5% *I. verum* + 5% *E. globulus* + 90% ethyl acetate, which provided a strong inhibition rate of 92.67%, 10% *E. globulus* + 10% *C. citratus* + 80% ethyl acetate, which provided a weaker inhibition rate of 39.33%, and 5% *E. globulus* + 5% *C. citratus* + 90% ethyl acetate, which provided a weaker inhibition rate of 36%. Most importantly, the 10 % *I. verum* + 10% *E. globulus* + 80% ethyl acetate provided as high an inhibition rate as that of 10% α-cypermethrin. Therefore, this formulation has the full potential to be a safe and effective replacement for α-cypermethrin.

Keywords: *Cymbopogon citratus*; *Eucalyptus globulus*; *Illicium verum*; *Musca domestica*; ovicide

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ISBB 2023
SEPTEMBER 7-9

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A-006 – oral presentation

STRONG INSECTICIDAL POTENCY AGAINST HOUSE FLY, *MUSCA DOMESTICA* L. FROM COMBINATIONS OF *CYMBOPOGON CITRATUS*, *ILLICIUM VERUM*, AND *EUCALYPTUS GLOBULUS* ESSENTIAL OILS

Sirawut Sittichok, Tanapoom Moungthipmalai, and Mayura Soonwera

Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand

mayura.so@kmitl.ac.th

Abstract

Knockdown and adulticidal activities against house fly (*Musca domestica* (L.)) of plant essential oils (EOs) from *Cymbopogon citratus*, *Illicium verum*, and *Eucalyptus globulus*—5% *C. citratus* EO + 5% *E. globulus* EO, 10% *C. citratus* EO + 10% *E. globulus* EO, 5% *I. verum* EO + 5% *E. globulus* EO, and 10% *I. verum* EO + 10% *E. globulus* EO—were evaluated with a standard WHO susceptibility test. The efficacy of each formulation was compared to that of 10% (*w/v*) cypermethrin, a synthetic insecticide (positive control), and 70% (*w/w*) ethyl alcohol (negative control). The highest insecticidal activity among EOs was achieved by the combinations of 10% *C. citratus* EO + 10% *E. globulus* EO and 10% *I. verum* EO + 10% *E. globulus* EO, with a knockdown and a mortality rate of 100%, a KT_{50} of 4.7 min, and an LT_{50} of 4.5 min. However, 10% (*w/v*) α-cypermethrin still provided a higher insecticidal activity, a complete 100% knockdown and mortality rate and an LT_{50} less than 1 min. Nevertheless, α-cypermethrin is much more toxic to humans than essential oils. Therefore, *C. citratus* EO + *E. globulus* EO and *I. verum* EO + *E. globulus* EO have a high potential as safe and effective replacement for synthetic insecticides, for a comprehensive *M. domestica* control program.

Keywords: Insecticidal activity, *Cymbopogon citratus* EO, *Illicium verum* EO, *Eucalyptus globulus* EO, *Musca domestica* L.

King Mongkut's Institute of Technology Ladkrabang, Thailand Harbin Institute of Technology, China Warsaw University of Life Sciences, Poland

ISBB 2023
SEPTEMBER 7-9

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A-007 – poster presentation

EFFECT OF COLCHICINE ON INDUCED MUTATION OF *Curcuma* hybrid cv. sweetmemory IN VITRO

Varee Yoosumran[1], Kanjana Saetiew[1], Soraya Ruamrungsri[2], Angsana Akarapisan[3], Montinee Teerarak[1]

[1]Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

[2]Department of Plant and Soil Science, Faculty of Agriculture, Chiang Mai University, Chiang Mai 50200, Thailand

[3]Department of Entomology and Plant Pathology, Faculty of Agriculture, Chiang Mai University, Chiang Mai 50200, Thailand

kanjana.sa@kmitl.ac.th

Abstract

The objective of this research was to use colchicine to induce mutation in Curcuma hybrid cv. sweetmemory. CRD design was utilized with two factors, i.e. colchicine concentrations of 0, 1 and 3% and immersion durations of 12 and 24 hours. One-centimeter-long shoots were selected and immersed in colchicine solutions, as designed, then cultured in MS medium supplemented with 2 mg/l N6-Benzyladenine (BA) for plantlet induction. After 8 weeks of culture, treated shoots responded to the treatments differently. It was observed that the shoots soaked in 0% colchicine solution for either 12 or 24 hours survived 100% while none of those soaked in 3% colchicine for 24 hours survived. Thereafter, living plantlets from all treatments were inoculated with *Ralstonia solanacearum*, a pathogenic bacterium causing wilting in plants, to check the plantlet resistance towards this pathogen. Results showed that more than 50% of all the plantlets resisted to the pathogen while treated Patumma (*Curcuma* hybrid cv. pornpisith), as comparing samples, could not survive at all. Existing plantlets were potted and growth was observed. It turned out that the plants receiving 1% colchicine for 12 hours gave 60% survival. Plants treated with 1% colchicine for 24 hours produced highest parameters of growth, i.e. plant height of 21.55 cm, inflorescence length of 16.64 cm, flower circumference of 16.76 cm and bulb circumference of 7.66 cm. Moreover, the determination of chlorophyll a, b and carotenoid, stomatal size and chloroplast number was carried on. Results showed that control plants receiving 0% colchicine for 12 hours gave highest content of chlorophyll a as 3.41 µg/cm^2, chlorophyll b of 1.70 µg/cm^2 and carotenoid of 2.15 µg/cm^2. Plants treated with 1% colchicine for 24 hours obtained maximum width (27.02 µm) and length (41.82 µm) of stomata with 35.24 chloroplast number per cell.

Keywords: *Cucurma* hybrid, colchicine, mutation, *R. solanacearum*

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-008 – poster presentation

USING POTASSIUM NITRATE AND POTASSIUM CHOLRIDE ON GROWTH AND ANTIOXIDANT PROPERTIES OF BRAHMI (*BACOPA MONNIERI*) IN HYDROPONICS

Somkiat Seesanong[1], Piyatida Ounnahakhongkha[2] , Uscharee Ruangdej[2] and Nongnuch Laohavisuti[2]

School of Agricultural Technology,
King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

somkiat.se@kmitl.ac.th

Abstract

Brahmi (*Bacopa monnieri*) is an aquatic plant and used for medical purposes, such as enhancing human memory and brain function. To achive the aims of this study, which are increasing yield and antioxidant activity, two experiments were designed. The first experiment focused on the effect of potassium nitrate (KNO_3) concentration on growth and antioxidant properties of hydroponically grown Brahmi with the nutrition solution, KMITL2 containing different KNO_3 concentrations (3.4, 3.9, 4.4, 4.9 and 5.4 meq/L). The study showed that there were no any statistically significant difference in growth between the treatment ($p>0.05$). As an antioxidant property, the plant grown in the KMITL2 solution with the concentration of KNO_3 of 3.4 meq/L for 8 weeks presented the highest value of total phenolic content (TPC) and greatest results of 2,2-Diphenyl-1-picrylhydrazyl (DPPH) and 2,2'azinobiz (3- ethylbenzothiazoline-6-sulfonate) (ABTS), including the highest value of total saponin content (TSC, 1154.07 mg saponin/g). The second experiment emphasized growth and antioxidant properties in Brahmi grown in hydroponic system with the nutrition solutions, KMITL2 added containing different potassium chloride (KCl) concentrations (0, 0.5, 1.0 and 1.5 meq/L). The result showed no statistically significant difference in growth among the treatments ($p>0.05$). Besides, for antioxidant properties, KMITL2 solutions with KCl of 1.5 meq/L gave the highest value of TPC, excellent result of DPPH, as well as the highest value of TSC (1017.73 mg saponin/g) after 8 weeks. According to above mentioned experiments, two solutions for high values of antioxidant found in hydroponically grown Brahmi were the KMITL2 solution with 3.4 meq/L KNO_3 and KMITL2 solution with 4.4 meq/L KNO_3 and 1.5 meq/L KCl.

Keywords: Aquatic plant; *Bacopa monnieri*; Antioxidant properties

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-009 – poster presentation

MICROPROPAGATION OF AQUARIUM PLANT, ANUBIAS SP. "WHITE" USING ADENINE SULFATE AND 6-BENZYLAMINOPURINE

Nongnuch Laohavisuti, Achara Srisawang Buppha Jongput and Somkiat Seesanong

School of Agricultural Technology,
King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

nongnuch.la@kmitl.ac.th

Abstract

Anubias sp. "White" is distinguished from other *Anubias* species, caused by mutation.The leaves are white and green, which is popular and has great market demand. The growth of this aquarium plant is slow, so tissue culture techque is an alternative tool for increase productivity. An experiment with 4x4 factorial in CRD was conducted. The combination of Adenine sulfate (Ads) at the concentration of 0, 25, 50 and 75 mg/L and 6-Benzyl aminopurine (BAP) at the concentration of 0, 0.5, 1.0 and 1.5 mg/L were supplemented into Murashige and Skoog (MS) medium. After 6 weeks, it was found that Ads and BAP had combination effects on plantlet, leaves and roots of apical bud ($P<0.05$). The treatment with only BAP at 0.5 mg/L in MS medium obtained 7.40 ±0.35 shoots/explant ($P<0.05$). The increment of BAP supplemented in the medium tended to decrease root number ($P<0.01$). There is interaction between 25 mg/L Ads and 1-1.5 mg/L BAP to induced callus. Comparison of three substrate materials, i.e., coarse sponge pad (CSP), husk ash granules (HAG) and rockwool (RW) were used as planting media for the *ex vitro* acclimatization of *Anubias* sp. "White" plantlets. After 4 weeks, the results showed that the treatments with HAG was better than the other planting materials in growth performance ($P<0.05$). HAG yielded the best growth, (fresh weight of 0.74±0.07 g/plant) and it was better than RW and CSP, respectively and also showed significant ($P<0.05$) difference in term of root number and plant height except root length.

Keywords: *Anubias* sp. "White", Micropropagation, Adenine sulfate, 6–Benzyl aminopurine

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-010 – oral presentation

MOLECULAR CLONING, IDENTIFICATION, AND EXPRESSION OF B-GLUCOSIDASE ENCODING GENE FROM *BACILLUS SAFENSIS* M3

Pimpikar Kanchanadumkerng[1] and Chanpen Wiwat[2]

[1] Department of Food Chemistry, Faculty of Pharmacy, Mahidol University, Bangkok 10400, Thailand

[2] Department of Microbiology, Faculty of Pharmacy, Mahidol University, Bangkok 10400, Thailand

pimpikar.kan@mahidol.ac.th

Abstract

The cellulolytic bacteria, namely *Bacillus safensis* M3, was previously isolated from soil of freshwater swamp forest in Thailand. Microbial soil communities are considered for their biodiversity and directly articulated with enzyme activities. Current issues about energy crisis brought the plant biomass degrading enzymes are extensive studied due to their various applications especially bioethanol production from cellulosic biomass. *B. safensis* M3 showed the activities of three major cellulolytic enzymes including β-glucosidase, endoglucanase, and exoglucanase. β-Glucosidase or cellobiase act to release D-glucose from cellobiose after the successive cleavage of cellulose by endoglucanase and exoglucanase. β-Glucosidase influences both cellulase induction and cellulose hydrolysis. This study aims to isolate, clone, and heterologous express the β-glucosidase encoding gene from *B. safensis* M3. For this study, degenerate primer designed from β-glucosidase genes (E.C.3.2.1.21 (β-glucosidase) and E.C. 3.2.1.86 (6-phospho-β-glucosidase)) of soil bacteria was used to screen and detect the target genes. The β-glucosidase gene of *B. safensis* M3, designated as *bgm3* was successfully cloned and indicated. The *bgm3* gene had an open reading frame of 1,464 bp encoding for 488 amino acids. By homology and phylogenetic analysis, Bgm3 belongs to glycoside hydrolase family 1. The recombinant β - glucosidase, Bgm3, was heterologous expressed in *Escherichia coli* and showed activity against esculin and p-nitrophenyl-β-D-glucopyranoside (pNPG). Maximum activity on pNPG was 63.81 U/mg at 70°C and pH 4.0. This pilot characterization and overexpression have promoted the idea to further investigations for improvement of cellulose hydrolysis based on the synergistic reaction of β-glucosidase and endoglucanase.

Keywords: beta-glucosidase, cellulolytic bacteria, *Bacillus safensis* M3, Bgm3, glycoside hydrolase family 1

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-012 – oral presentation

INSIGHTS INTO THE DIVERSITY OF BACTERIAL COMMUNITIES IN SALINE-ALKALINE SOILS FROM SONGNEN PLAIN IN CHINA

Shuang Wang, Pin-Jiao Jin, Lei Sun, Kang-Kang Wang

Heilongjiang Academy of Black Soil Conservation & Utilization, Heilongjiang Academy of Agricultural Sciences/Key Lab of Soil Environment and Plant Nutrition of Heilongjiang Province/Heilongjiang Fertilizer Engineering Research Center, Harbin 150086, PR China

yangq@hit.edu.cn

Abstract

Songnen Plain is originally one of the three major glasslands in China and has now become one of the three most concentrated distribution areas of sodic-saline soil worldwide. The soil is continuously degraded by natural and anthropogenic processes, which has a negative impact on agricultural production. The investigation of microbial diversity in this degraded ecosystem is fundamental for comprehending biological and ecological processes and harnessing the potential of microbial resources. The diversity and composition of bacteria in saline-alkali soil were investigated by Illumina MiSeq sequencing method combined with traditional isolation and culture. The sequencing results showed that the dominant bacteria groups in different salinity soils were *Plantomycates*, *Proteobacteria* and *Bacteroidetes*. With the increase of salt concentration, the indices changed from *Phytobacteroides* and *Bacteroides* to *Proteobacteria* and *Firmicutes*. The results showed that *Proteobacteria* and *Firmicutes* were the main indicator species reflecting the changes of major microflora in saline-alkali soil in Songnen Plain. More than 600 halophilic and alkaliphilic strains from *Bacteria* and *Archaea* domain were obtained by traditional microbial isolation and culture technology, from which 8 new microbial species were classified and named. They were *Halomonas alkalitolerans, Haloterrigena daqingensis, Bacillus daqingensis, Nesterenkonia haasae, Alteribacter salitolerans, Oceanobacillus alkalisoli, Oceanobacillus saliphilus,* and *Isoptericola croceus.*

Keywords: bacterial diversity, saline-alkali soils, Songnen Plain, classification

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-013 – Keynote speaker (oral presentation)

THE KEYSTONE TAXA WERE SIGNIFICANTLY CORRELATED WITH THE CARBON SOURCE UTILIZATION OF BACTERIAL COMMUNITIES IN *LITOPENAEUS VANNAMEI* PONDS

Qiong Zhao[1, 2], Fengxing Xie[1], Fengfeng Zhang[1], Ke Zhou[1], Yujie Zhao[1], **Qian Yang**[2]

[1]Tianjin Institute of Agriculture Resource and Environment, Tianjin 300384, China

[2]Harbin Institute of Technology, Harbin 150001,China

yangq@hit.edu.cn

Abstract

Key species in bacterial communities are considered drivers of community structure and function. However, we still know very little about the key species and metabolic functions of the microbial community in the pond of Litopenaeus vannamei. Therefore, this study selected Litopenaeus vannamei aquaculture ponds in Tianjin area as the research object. Through 16S rRNA gene sequencing technology, network analysis, and Biolog Eco board, the key species of shrimp pond microbial community and their correlation with community carbon metabolism ability were explored. The results showed that the core species of the bacterial community in the water body were *Candidatus Aquiluna, Acinetobacter, unidentified Nostoc, unidentified Balneolaceae, Tropicomonas, Brevibacillus, Flavobacterium, Dinghuibacter, unidentified Solimonaceae Porphyrobacter, Paenibacillus, the unnamed few Campylobacterales, the unnamed Rhodospirillales, Bacillus and Pseudohongiella.* The core species of the sediment bacterial community include *Polynucleobacter, Leptolinea, Longilinea, Anaerolinea, Dechloromonas, Bellilinea, Pelolinea, Saccharofermentans and Methanofollis.* Except for the core species of the sediment bacterial community *Anaerolinea*, the key species of the shrimp pond water and sediment bacterial community were significantly correlated with the carbon source utilization capacity of the community.

Keywords: bacterial community, keystone taxa, carbon source utilization, Biolog EcoPlates, *Litopenaeus vannamei* , water, sediment , high-throughput sequencing

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-014 – poster presentation

EFFECT OF CHINESE RICE FLOWER LEAF EXTRACT ON BLAST DISEASE

Chonpisit Sanwittayakul[1], Somporn Phlaiyong[1], Ananyalak Sanmuengmoon[1], **Sujitra Sukonthamut**[2], Dusanee Thanaboripat[1] and Chamroon Laosinwattana[3]

[1]Department of Biology, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Thailand

[2]Department of Statistics, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Thailand

[3]School of Agricultural Technology,
King Mongkut's Institute of Technology Ladkrabang, Thailand

sujitra.su@kmitl.ac.th

Abstract

Effects of crude extracts from Chinese rice flower (*Aglaia odorata* Lour.) leaf at concentrations of 4,000, 8,000 and 16,000 ppm on the growth of *Pyricularia grisea*, a causal agent of blast disease in rice was examined. Rice (*Oryza sativa* Linn.), RD41 variety inoculated with spore of *Pyricularia grisea* and leaf extracts was grown in a demonstration field at KMITL, Bangkok, Thailand. Carbendazim was used as a positive control. Three stages of experimental rice, i.e. seedling stage, tillering stage and grain development stage, were evaluated. From the results, it was found that Chinese rice flower leaf extract significantly inhibited the growth of *Pyricularia grisea* more than carbendazim at seedling and tillering stages. For seedling stage, the extract at 8,000 ppm was the best concentration for controlling blast disease with the inhibition of 64.51%. In tillering stage, the extracts at 4,000 and 8,000 ppm gave better inhibition than at 16,000 ppm with the inhibition of 59.19% and 50.84%, respectively. However, carbendazim significantly inhibited the pathogen (44.35%) at grain development stage. When the effect of Chinese rice flower leaf on rice production was studied, it was found that the highest rice production of 2.5433 g/pot was obtained when carbendazim was applied; however, there was no significant difference from Chinese rice flower leaf extract at 8,000 ppm which gave the rice production at 2.4300 g/pot.

Keywords: *Pyricularia grisea*, rice blast disease, Chinese rice flower, rice

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-015 – poster presentation

CONTROL OF RICE BLAST DISEASE BY MARIGOLD LEAF EXTRACT

Warittha Bonnumsirijit[1], Adisorn Srikomnuid[1], Ilada Jubunchob[1], Sujitra Sukonthamut[2], Dusanee Thanaboripat[1], Chamroon Laosinwattana[3] and **Sittichai Charoensettasilp**[2]

[1]Department of Biology, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Thailand

[2]Department of Statistics, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Thailand

[3]School of Agricultural Technology,
King Mongkut's Institute of Technology Ladkrabang, Thailand

sittichai.ch@kmitl.ac.th

Abstract

Marigold (*Tagetes erecta* L.) leaf extracts at concentrations of 2,000, 4,000 and 8,000 ppm were tested for inhibitory activities on the growth of *Pyricularia grisea*, a causal agent of blast disease on rice. Rice variety RD 41 (*Oryza sativa* Linn.) was grown in demonstration field at KMITL, Bangkok, Thailand. The experimental rice with inoculated spore of *Pyricularia grisea* and crude extracts of marigold leaves was evaluated at 3 stages, i.e. seedling stage, tillering stage and grain development stage. Carbendazim was used as a positive control. From the evaluation, it was found that marigold leaf extract at 4,000 ppm was the best concentration for controlling blast disease with the percentage inhibition of 71.95, 50.42 and 52.83 at these 3 stages when compared to other concentrations and carbendazim. However, there was no significant difference among 2,000, 4,000 and 8,000 ppm in tillering stage. When the effect of marigold leaf extract on rice production was studied, the high rice production of 3.00 g/pot was obtained when marigold leaf extract at 4,000 ppm was applied.

Keywords: *Pyricularia grisea*, rice blast disease, rice, marigold

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-016 – poster presentation

OPTIMAL CONDITIONS FOR INHIBITION OF *ASPERGILLUS FLAVUS* IMI 242684 BY SWEET ACACIA ESSENTIAL OILS

Pawarisa Prasutsaengchan[1], Supaporn Panjarern[1], Anchisa Muaymhan[1], **Kanogkan Leerojanaprapa[2]**, Dusanee Thanaboripat[1], and Sittichai Charoensettasilp[2]

[1]Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand
[2]Department of Statistics, School of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand

sittichai.ch@kmitl.ac.th

Abstract

According to the research of Pawarisara et al. who studied the effect of five essential oils on inhibiting the growth of *Aspergillus flavus* IMI 242684, it was found that the essential oil of fragrant acacia has the best inhibit activity on the growth of fungi. Therefore, this researcher has selected the essential oil of aromatic native pepper in the study to identify the optimal conditions to inhibit the fungus *A. flavus* IMI 242684 by using Response surface and contour plot. Two factors are defined as concentration of essential oil (10, 20, 30, 40 and 50 mg/ml) and incubation period (3 and 7 days). The result of statistical analysis for inhibiting fungal growth showed that the optimum concentration of essential oil is 41.5152 mg/ml and the optimal incubation period is 3 days. At these conditions, the growth of *A. flavus* IMI 242684 was inhibited with an inhibition zone of 16.0202 mm.

Keyword: *Aspergillus flavus IMI 242684*, Response surface, contour plot, sweet acacia

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-017 – poster presentation

FACTORS AFFECTING MECHANICAL PROPERTIES OF THINNING TEAK PLANTATION

Somchai Seviset[1], Dusanee Thanaboripat[2], and Sittichai Charoensettasilp[3]

[1]Department of Biology, School of Industrial Education and Technology,
King Mongkut's Institute of Technology Ladkrabang, Thailand

[2]Department of Biology, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Thailand

[3]Department of Statistics, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Thailand

somchai.se@kmitl.ac.th

Abstract

Teak (*Tectona grandis* Linn. F.) occurs naturally only in a certain region including Thailand. Teak is one of the most important tropical hardwood tree species. It is famous for its fine grain, mellow color, and durability due to its resistance to fungal deterioration. Teak ranks as the prime hardwood to be used in extreme conditions as well as in the production of fine furniture. Therefore, mechanical properties of thinning teak harvested at 8-13 years were investigated in this study. Eight factors: moisture, specific gravity, density, modulus of rupture (MOR), modulus of elasticity (MOE), hardness (N), compressive stress perpendicular to grain, and compressive stress parallel to grain were examined. These factors were statistically analyzed by one way ANOVA and by the comparison of effect sizes using Eta Square (η^2). The results showed that thinning teaks at all ages had significantly different mechanical properties (p value < 0.05). The most significant properties by the comparison of effect sizes on the duration of thinning teak plantation were hardness and MOE. This is followed by compressive stress parallel to grain, MOR, compressive stress perpendicular to grain, moisture (%), density (g/cm^3) and specific gravity, respectively. From these findings, these properties should be considered when thinning teaks (short rotation teak) are utilized in some wood-processing technologies including furniture production.

Keywords: Teak, *Tectona grandis*, plantation, thinning, properties

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-018 – oral presentation

PRODUCTION OF SPRAY DRIED CHILI OIL POWDER

Samak Rakmae, Chakriya Sakunputtipaiboon, Jitpanu Jirakaittikul, Ratchakarn Engchuan and **Kankanit Khwanpruk**

Department of Food Engineering, School of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand 10520

kankanit.kh@kmitl.ac.th

Abstract

Spiciness and flavor of chili are distinct features and uniqueness of Thai food. The major flavor compounds of chili are highly soluble in non-polar solutions. Hence, oil is used to extract the flavor of roasted chili and the product is obtained in the form of chili oil. In order to prolong the shelf life of chili oil storage and versatile applications, this research study aimed to produce chili oil powder using a spray dryer. Various factors such as inlet hot air temperature/outlet hot air temperature at 3 levels (170/70, 200/80, and 230/90 °C) are investigated. In addition, the effects of chili oil types from soybean oil and rice bran oil were examined. From the results of physical and chemical properties analysis: moisture, water activity (a_w), and peroxide value (PV), it was found that the products at all conditions had a_w in the range of 0.12 – 0.25, moisture content of 1.26 – 4.15% and the PV of 3.6 – 7.7 meq/kg oil, which wase not above the standard for powder products. From the study of the yield percentage, chili oil powder obtained from soybean oil gave the high yield of 77%, which was higher than that of chili oil powder from rice bran oil which was only 40%. Therefore, the optimum condition for chili oil powder production was from soybean oil and the condition of the hot air spray dryer of 200/80 °C due to the highest percentage of production and the product quality according to the powder food standard criteria.

Keywords: Chili Powder, Soybean Oil, Rice Bran Oil, Seasoning Powder, Spray Drying

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ISBB 2023 SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-019 – oral presentation

DETECTION OF THE *Bph1* GENE IN TWENTY INDICA RICE CULTIVARS USING CLEAVED AMPLIFIED POLYMORPHIC SEQUENCE (CAPS) MARKERS

Teerawat Sarutayophat[1], Pattama Nitthaisong[1], Phairat Phimsirikul[1], Yoshikazu Hoshi[2], Kaori Imamura[2], Koukei Yagi[2], Manabu Katano[2], Masaya Matsumura[3], Pakanan Jiamtae[4]

[1]Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520 Thailand

[2]Department of Plant Science, School of Agriculture, Tokai University, Aso, Kumamoto 869-1404 Japan

[3]Laboratory of Pest Management Systems, Kyushu National Agricultural Experiment Station, Kumamoto 861-1192 Japan

[4]National BioResource Project, Faculty of Regional Innovation, University of Miyazaki

teerawat.sa@kmitl.ac.th

Abstract

One of the more serious problems of rice (*Oryza sativa* L.) production, especially in South and Southeast Asia, is yield loss caused by the brown planthopper (BPH) (*Nilaparvata lugens*). Over recent years, studies have identified a gene, named the *Bph1* gene, which is associated with resistance to the biotype 1 of this pest. This experiment was conducted to search for the presence of the *Bph1* gene in some Indica rice cultivars at the molecular level. DNA samples of 20 most popular indica rice cultivars found within Thailand, the most important rice exporter, were amplified using a gene-specific primers set. The PCR products were subsequently digested with the *SphI* restriction enzyme and size-fractionated by gel electrophoresis. Mudgo, a standard cultivar known to carry the *Bph1* gene was used as a positive control, while Rikuha no. 132 and ASD7 were used as negative controls. The *Bph1* gene carrying cultivars displayed a single marker of 323 bp and the non-*Bph1* cultivars displayed two markers of 212 and 111 bp. Results showed that 15 cultivars of the 20 trial cultivars carry the *Bph1* gene. Some resistant cultivars recommended have no *Bph1* gene while some susceptible cultivars were founded carrying the *Bph1* gene, suggested that the main population of BPH change and outbreaks of new biotype of BPH population in Thailand.

Keywords: Indica rice, *Bph1* gene, Gene specific primer set, *SphI* Restriction enzyme, CAPS markers

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-020 – Keynote speaker (oral presentation)

GENOME EDITING FOR CROP IMPROVEMENT

Anna M. Linkiewicz[1,2]

[1]Laboratory of Molecular Biology and Genetics, Institute of Biological Sciences, Faculty of Biology and Environmental Sciences, Cardinal Stefan Wyszynski University in Warsaw, Wóycickiego 1/3, 01-938 Warsaw, Poland

[2]Plant Breeding and Acclimatization Institute-NRI, Radzików, 05-870 Błonie, Poland

a.linkiewicz@uksw.edu.plepartment

Abstract

The objective of this research was to use colchicine to induce mutation in Curcuma hybrid cv. sweetmemory. CRD design was utilized with two factors, i.e. colchicine concentrations of 0, 1 and 3% and immersion durations of 12 and 24 hours. One-centimeter-long shoots were selected and immersed in colchicine solutions, as designed, then cultured in MS medium supplemented with 2 mg/l N6-Benzyladenine (BA) for plantlet induction. After 8 weeks of culture, treated shoots responded to the treatments differently. It was observed that the shoots soaked in 0% colchicine solution for either 12 or 24 hours survived 100% while none of those soaked in 3% colchicine for 24 hours survived. Thereafter, living plantlets from all treatments were inoculated with *Ralstonia solanacearum*, a pathogenic bacterium causing wilting in plants, to check the plantlet resistance towards this pathogen. Results showed that more than 50% of all the plantlets resisted to the pathogen while treated Patumma (*Curcuma* hybrid cv. pornpisith), as comparing samples, could not survive at all. Existing plantlets were potted and growth was observed. It turned out that the plants receiving 1% colchicine for 12 hours gave 60% survival. Plants treated with 1% colchicine for 24 hours produced highest parameters of growth, i.e. plant height of 21.55 cm, inflorescence length of 16.64 cm, flower circumference of 16.76 cm and bulb circumference of 7.66 cm. Moreover, the determination of chlorophyll a, b and carotenoid, stomatal size and chloroplast number was carried on. Results showed that control plants receiving 0% colchicine for 12 hours gave highest content of chlorophyll a as 3.41 µg/cm^2, chlorophyll b of 1.70 µg/cm^2 and carotenoid of 2.15 µg/cm^2. Plants treated with 1% colchicine for 24 hours obtained maximum width (27.02 µm) and length (41.82 µm) of stomata with 35.24 chloroplast number per cell.

Keywords: *Cucurma* hybrid, colchicine, mutation, *R. solanacearum*

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ISBB 2023
SEPTEMBER 7-9

19th International Symposium on Biocontrol and Biotechnology

Warsaw, September 7-9, 2023

A-021 – Keynote speaker (oral presentation)

GREEN ALGAL BIOTECHNOLOGY: FROM BASICS TO APPLICATIONS

Cherdsak Maneeruttanarungroj

Department of Biology, and Bioenergy Research Unit, School of Science,
King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
Tel +6684-662-6149

E-mail address: cherdsak.ma@kmitl.ac.th

Abstract

As is well known, green organisms, such as plants and algae, are able to capture sunlight as a source of energy and atmospheric carbon dioxide as a carbon supply. They also release the molecular oxygen gas for the animal kingdom. Thus, another method of environmental control is to increase the biomass of these cells. The use of green algae isolated from Thailand will be highlighted in the session together with other research projects from my research team. Protons and electrons can combine through hydrogenase catalysis to create a molecular hydrogen gas. Several strains, *Tetraspora* sp. CU2551, *Chlorella* sp. KLSc59, and *Chlorella* sp. KLSc61, demonstrated strong efficacy in inncreasing for gas generation. Cell immobilization by calcium alginate also enhanced the production yield. The proteins involved in the gas production enhancement, that can be exploited as a strategy for mutant creation in the next chapter, were revealed by the proteome analysis. After the gas production, the cells can also be used to produce pigments, such as neochrome, leuthin, canthaxanthine, and β-carotenoid. Additionally, we reported that the freshwater green alga *Chlorella* sp. KLSc59 was capable of producing all omega-3 oils, including ALA, EPA, and DHA. In the extensive works, the pepsin-hydrolyzed *Tetraspora* sp. CU2551 proteins remarkably demonstrated the antibacterial activity against gram-positive and gram-netagive bacteria. Additionally, the algal extract demonstrated the inhibition the formation of advanced glycation end products (AGEs), using N^{ε}-(Carboxymethyl)lysine:CML and N^{ω} -(Carboxymethyl)arginine:CMA as models. In addition to helping in environmental control, green algae have shown a variety of applications in biotechnology. Several locations across the world have made attempts to produce the algal cells at a pilot scale.

King Mongkut's Institute of Technology Ladkrabang, Thailand Harbin Institute of Technology, China Warsaw University of Life Sciences, Poland

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Warsaw, September 7-9, 2023

A-022 – oral presentation

EFFECTIVENESS OF THE ENTOMOPATHOGENIC FUNGI, *BEAUVERIA BASSIANA*, IN CONTROL OF *ACULOPS LYCOPERSICI* (ACARIFORMES: ERIOPHYOIDEA)

Anna Sybilska, Nina Mądry, Ewa Puchalska

Department of Plant Protection, Institute of Horticultural Sciences, Warsaw University of Life Sciences, Warsawa, Poland

anna_sybilska@sggw.edu.pl

Abstract

The tomato russet mite (*Aculops lycopersici* (Tryon)) (Acariformes: Eriophyoidea) is a globally distributed species commonly found wherever solanaceous plants are cultivated. In Poland, this pest has been documented since 2004 in tomato crops under the covers. Year by year, its geographical range expands, resulting in substantial reductions in plant yields. However, as of now, there are no pesticides registered against this herbivorous mite. In addition, no effective method of its biological control has been developed so far. Although many species of predatory mites from Phytoseiidae family have been tested as potential biocontrol agents, none has been shown to be an effective natural enemy of *A. lycopersici* under tomato growing conditions. Opportunities for efficient protection of plants against *A. lycopersici* are seen in microbiological preparations. Therefore this study aimed to assess the pathogenicity of the ATCC 74040 strain of *Beauveria bassiana* against *A. lycopersici* females. The experiments were conducted using two methods: direct application of the fungal suspension onto the pest and application of the pathogen to the plants 24 hours before introducing *A. lycopersici* (known as the residual test). Four different concentrations of the preparation were tested: 10^4, 10^5 (the concentration recommended by the manufacturer for spider mite control), 10^6 and 10^7 (referred to as the laboratory concentration).

During the initial two days after direct treatment, pest mortality was minimal, with only the highest dose surpassing a 10% mortality rate. When using the manufacturer-recommended concentration of 10^5, the survival rate of treated females was 57% on the fifth day post-application, and it dropped below 50% on the sixth day. Simultaneously, in the residual test, up to 80% of the tested individuals remained alive. Probit analysis demonstrated that when directly sprayed with the *B. bassiana* strain, the lethal time required to cause mortality in half of the tested individuals (LT_{50}) was 5.9 days. The concentration of fungal spores necessary to result in the death of 50% of the tested population (LC_{50}) through direct spraying was 106,657.15 spor/ml. However, in the residual test, three times the concentration of spores (LC_{50}=290,283.88) was required to achieve the same mortality rate.

Keywords: Tomato russet mit, biological control, Eriophyoidea, *Beauveria bassiana*

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A-023 – oral presentation

PREVENTING A WORLD WITHOUT ROSES: THE MITE VECTOR IS A KEY TO COMBAT ROSE ROSETTE DISEASE

Tobiasz Druciarek[1,2], Mariusz Lewandowski[1] and Ioannis E. Tzanetakis[2]

[1]Section of Applied Entomology, Department of Plant Protection, Institute of Horticultural Sciences, Warsaw University of Life Sciences, Warsaw, POLAND

[2]University of Arkansas System, Division of Agriculture, Fayetteville, AR, UNITED STATES

tobiasz_druciarek@sggw.edu.pl

Abstract

Rose rosette disease (RRD) devastated rose gardens in the United States, is reported in Canada and India, and threatens global rose production. The disease is caused by rose rosette emaravirus (RRV), a negative-sense ssRNA virus in the family *Fimoviridae*. Infected plants cannot be cured, and more than 99% of commercially grown varieties are susceptible to RRV. As with all arthropod-vectored diseases, the cornerstone of effective control is the in-depth knowledge and elimination of the vector. However, our understanding of the interaction between RRV and its vector, an eriophyoid mite, is limited. To combat this, we have developed a comprehensive approach, including (a) surveying the rose-associated mite fauna across the United States, (b) identifying which eriophyoid species are responsible for transmitting RRV, (c) determining the mode of transmission, (d) identifying predatory mite fauna associated with vectoring mites, and (e) evaluating the potential of entomopathogenic fungi as biopesticides to control vectoring mites.

Keywords: RRV, eriophyoid mites, virus, *Phyllocoptes*, biological control

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A-024 – poster presentation

THE EFFECT OF NATURAL HERBICIDE FROM *FUSARIUM EQUISETI* CRUDE EXTRACT ON WATER HYACINTH (*EICHORNIA CRASSIPES* (MART.) SOLMS) AQUATIC WEED

Montinee Teerarak, Naphat Somala, and Chamroon Laosinwattana

School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

naphat.so@kmitl.ac.th

Abstract

Natural herbicides from microorganisms are important applied for weed control due to their friendly environmental and human health. In this study, *Fusarium equiseti* culture was isolated from *Tridax procumbens* L. weed plant in an agricultural field and produced into crude extract with 75% Ethanol for use as active ingredient material for developing natural herbicides. The herbicidal effect of *F. equiseti* extract was tested on water hyacinth (*Eichornia crassipes* (Mart.) Solms) aquatic weed by leaf disc test with concentrations of 0.05, 0.1, and 0.2% w/v of the crude extract. Visual toxicity symptoms of the tested plant exhibited that leaves of the highest concentration of *F. equiseti* extract showed the highest visual toxicity score with chlorosis symptoms, yellow leaves surrounded by dark brown rings after 3 days of treatment. Then, photosynthesis pigments (chlorophyll a, b, and carotenoid) and membrane integrity of water hyacinth leaves were evaluated after the leaf disc test. Three days after treatment, photosynthesis pigment contents decreased with increasing the concentration of *F. equiseti* extract. Moreover, electrolyte leakage and malondialdehyde content, which was used for the evaluation of membrane integrity, increased when the concentration of the extract increased. *F. equiseti* crude-based natural herbicide could promote as a sustainable alternative in the agriculture field.

Keywords: Allelopathy, Fungal extract, Aquatic weed, Weed control

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A-025 – Keynote speaker (oral presentation)

BIOLOGICAL METHODS OF URBAN PEST MANAGEMENT

Stanislaw Ignatowicz

Department of Plant Protection, Institute of Horticultural Sciences,
Warsaw University of Life Sciences, Warszawa, Poland

stanislaw.ignatowicz@gmail.com

Abstract

Biological control is the use of living organisms to suppress pest populations, making them less damaging or nuisance than they would otherwise be. Biological control can be used against all types of pests, including some urban pests. The main forms of biological control of urban pest control that have been investigated are parasitoids, entomopathogenic fungi, and entomophilic nematodes. Some research has also been done on entomopathogenic protozoa, viruses, and predators of pests in human environments. Of all strategies for biological control, the inductive strategy (augmentation), in which a large population of natural enemies are administered for quick pest control (mass rearing of natural enemies for release), seems to be the most promising. One of the complicating aspects of the biological control of urban pests is that they are often being controlled in domestic environments such as houses, restaurants, hotels or hospitals. The use of predators, parasites or other biological control strategies against urban pests in these situations must take into account the attitudes of the people living or working there towards the presence of additional organisms indoors. For example, the release of hymenopterous parasitoids of cockroach egg-cases such as *Prosevania punctata* against *Blatta orientalis* and *Periplaneta americana*, that seems to be efficacious, may not be acceptable if the wasps are as unwelcome as the cockroaches. Similar skepticism has occurred with the use of nematodes and fungi to control urban pests indoors like silverfish (*Lepisma saccharinum*) or bed bugs (*Cimex lectularius*). The beneficial aspects of reducing or eliminating the use of traditional insecticides indoors may also be considered less important than the intentional introduction of another organism to the living environment.

Keywords: Biological control, urban pests, parasitoid, predator, pathogen, entomopathogenic fungi, entomophilic nematodes, augmentation