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ABSTRACT BOOK

Developing Countries
Pre-Conference Workshop
2023

APPS

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17 November 2023

Developing Countries
Pre-Conference Workshop
2023 PROGRAM | Friday 17 November

Sponsored by the Crawford Fund and the International Center for Tropical Agriculture (CIAT)

On behalf of the Australasian Plant Pathology Society, the Crawford Fund and the International Center for Tropical Agriculture (CIAT), we are pleased to welcome our colleagues from developing countries in the Australasian region (namely South-East Asia and the Pacific) to the 2023 Australasian Plant Pathology Society Developing Countries Pre-Conference Workshop. The workshop sessions will cover a wide range of topics including biosecurity, diagnostics and emerging diseases in developing countries and include results from projects funded by sponsors.

The purpose of the workshop is to provide a professional development opportunity to early career plant pathologists from Developing Countries. Presenters at the workshop have also been awarded a bursary which provides online registration to the APPS 2023 Conference as well as APPS membership. Bursary recipients are mentored by plant pathologists who are members of the Society and participate in pre-workshop communication sessions. Their abstracts and videos will be available on the post-conference on-demand platform.

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2:00pm ACDT **Welcome and Opening Address**
Welcome by Convenor, Professor Amanda Able
Opening Address by Associate Professor Andrew Geering, President of APPS and Vice-President of ISPP

2:15pm **Identification, characterisation and management of disease part 1**
(Chaired by Namgay Om and Nerida Donovan)

Viengvilay Vorlachith (Laos)	*Pythium deliense* associated with the rhizosphere of roots of wilting chilli plants affected by root rot in Lao PDR
Tri Joko (Indonesia)	Re-emerging of Sumatra disease of Clove in Central Java, Indonesia
Le Thi Hang (Vietnam)	The resurgence of Cassava Witches' Broom Disease (CWBD) in Vietnam: Distribution and initial diagnoses
Nguyen Manh Hung (Vietnam)	Soil-borne Diseases Management of Groundnut in Vietnam

3:00pm **Identification, characterisation and management of disease part 2**
(Chaired by Duy-Hung Do and Jay Anderson)

Hung Ngoc Nguyen (Vietnam)	Cassava Mosaic Disease in Vietnam: Detection, Spread, and Management
Boonsom Bussaban (Thailand)	Identification, characterization, and control of black spot of Chinese kale caused by a novel artillery fungus
Nguyen Van Chung (Vietnam)	Guava Root Knot Nematode - *Meloidogyne enterolobii* in Vietnam and integrated management strategies
Mark Angelo O. Balendres (Philippines)	*Neoscytalidium dimidiatum*; a destructive dragon fruit pathogen

3:45pm **BREAK**

4:00pm **Management**
(Chaired by Tri Joko and Nicole Thompson)

Namgay Om (Bhutan)	Evaluation of potassium phosphite for the control of *Phytophthora* blight in chilli
Dau Thi Vinh (Vietnam)	Technique for grafting Winter Melon onto resistant gourd rootstocks for control of Fusarium wilt of Winter Melon in Nghe An Province, Vietnam
A.N. W. Sumedha Thushari (Sri Lanka)	Identification of parents for breeding sugarcane leaf scald disease resistance from *Saccharum* germplasm
Khamla Xaiyavong (Laos)	Effect of cassava witches broom disease on the performance of popular industrial cassava genotypes in Southeast Asia

4:45pm **Disease detection and diagnosis**
(Chaired by Boonsom Bussaban and Niloofar Vaghefi)

Amit Sukal (Fiji)	Development of virus diagnostic system for taro *(Colocasia esculenta)*
Duy-Hung Do (Vietnam)	Characterization and detection of three potyviruses causing passionfruit woodiness disease in Vietnam
Pinkham Vongphachanh (Laos)	Characterization of Cassava witches' broom disease (CWBD) association with *Ceratobasidium* spp. in Lao PDR
Azza Rhaiem (Tunisia)	Plant Pathogens Culture Collections: a prerequisite for Food Security

5:30pm **Concluding Remarks**
Emeritus Professor Eileen Scott, The University of Adelaide, Fellow of APPS

5:40pm **CLOSE**

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ACKNOWLEDGEMENTS

A special thank you to our sponsors (the International Center for Tropical Agriculture and the South Australian, New South Wales and Victorian Committees of the Crawford Fund). Appreciation is also extended to the mentors of our APPS 2023 Developing Countries bursary recipients: Professor Lester Burgess; Dr Jay Anderson (Southern Cross University); Dr Cathy Todd, Dr Nicole Thompson and Dr Tara Garrard (South Australian Research Development Institute); Dr Nerida Donovan (NSW Department of Primary Industries); Professor Paul Taylor and Dr Niloofar Vaghefi (University of Melbourne). We are also privileged to have the opening and closing remarks at the workshop being provided by Associate Professor Andrew Geering and Professor Eileen Scott (please see their biographies below).

Professor Amanda Able
The University of Adelaide
Convenor

BIOGRAPHIES OF GUEST SPEAKERS

A/Professor Andrew Geering is currently President of the Australasian Plant Pathology Society and Vice President-elect of the International Society for Plant Pathology, representing the Organizing Committee for the International Congress of Plant Pathology 2028. Andrew has strong connections to Adelaide, having graduated with a PhD from the Waite Institute in 1992. For nearly his entire professional career, Andrew has worked in Brisbane, initially with the Queensland Department of Agriculture and Fisheries but for the last 13 years with The University of Queensland. Andrew is primarily a plant virologist but he has dabbled in mycology, bacteriology and even entomology as part of broader biosecurity projects. Living in Queensland has provided Andrew the opportunity to work on diseases of tropical and subtropical horticultural crops such as banana, avocado, pineapple, citrus and sugarcane, and his expertise has been sought in developing nations throughout the world, particularly in southeast Asia.

Eileen Scott is Emerita Professor of Plant Pathology in the School of Agriculture, Food and Wine at the Waite Campus, University of Adelaide. She joined the University in 1987, where she taught plant pathology and microbiology, and conducted research on fungal and bacterial diseases, mainly in horticulture and viticulture. Her research group has comprised postdoctoral scientists, postgraduate and honours students investigating pathogen detection, biology, epidemiology and disease management. Since retiring in 2020, she has continued to contribute to teaching and research supervision. The supervision, mentoring and sponsorship of students and early career researchers has long been a passion. She is proud to have continuing collaborations with numerous graduates from her group. Eileen has been a member of APPS since 1987. She served as Executive Secretary (1997-99) and President (2013-15) and was awarded Fellow of the Society in 2011. She received the Australian Biosecurity Award for Education in 2022.

Abstracts & Biographies

Pythium deliense associated with the rhizosphere of roots of wilting chilli plants affected by root rot in Lao PDR

Viengvilay Vorlachith

Provincial Agriculture and Forestry Office, Champasak Province, Lao PDR (Laos)

Biography: *I grew up in Champasak Province, an important agricultural province in Lao PDR. A wide range of crops is grown in the lowlands along the Mekong River and on the Bolavan plateau of the province. I graduated B.Sc. from Champasak University in 2008, and graduated M.Sc. from Champasak University in 2023. I was appointed a Technical Officer at the Champasak Agriculture and Forestry Office (PAFO), in 2010. Since 2018 I have been working as a Technical Officer based at the Plant Protection Laboratory at PAFO. I am responsible for disease and pest surveys, providing advice to small-holder farmers, and presenting workshops for farmers on crop protection and soil health. I also collaborate with plant pathologists and entomologists from other countries and help as an interpreter in training activities.*

Abstract:

Since 2009 plant pathologists from Australia, New Zealand, and Italy have been cooperating with colleagues in the Lao PDR in crop disease surveys, diagnostic studies and research. Champasak province in southern Lao PDR has been a focus of these studies due to the wide range of crops grown along the Mekong delta at approx. 200 m ASL and at various altitudes up to approx. 1200 m ASL on the Bolaven plateau. Chilli is a popular cash crop in Champasak province for small-holder farmers for local consumption and export. A disease survey of chilli crops in Soukhouma District was undertaken in February 2023 following a request from local farmers. Bacterial wilt (*Ralstonia pseudosolanacearum*), and virus like symptoms, were observed in some plants. In addition, some plants were wilting which was attributed to root rot. Samples of rhizosphere soil containing some diseased rootlets were collected and transported to the laboratory under cool conditions. The rose petal baiting technique was used to recover putative pathogenic species of *Pythium* and *Phytophthora* if present.
An isolate of *Pythium* sp. was recovered, purified and forwarded to the International Centre for Microorganisms from Plants (ICMP) in New Zealand and the University of Sassari in Italy for preservation and identification. The isolate was identified as *Pythium deliense* Meurs using molecular and morphological markers. This is the first report of this species in Lao PDR. It is a known pathogen of a range of crops including beets, potato and black pepper. Pathogenicity tests with local chilli cultivars are planned.

Re-emerging of Sumatra disease of Clove in Central Java, Indonesia

Tri Joko[1], Bambang Trianom[2], Baiq Diniaty Islami[1], Suryanti[1], Arif Wibowo[1], Siti Subandiyah[1]

[1]Department of Plant Protection, Faculty of Agriculture, Universitas Gadjah Mada, Indonesia
[2]Indonesian Quarantine Agency

Biography: *Tri Joko has been a lecturer at the Faculty of Agriculture, Universitas Gadjah Mada, since 2008. He graduated from UGM in 1999 with a Bachelor degree in Agriculture, followed by his Master in Plant Pathology, majoring in plant bacteriology from Shizuoka University, Japan, in 2004. His PhD was received from the United Graduate School of Agriculture Sciences, Gifu University, Japan, in 2007. His interests include plant disease diagnosis, Biocontrol PGPR, and molecular plant-bacteria interactions.*

Abstract:

Sumatra disease of clove (SDC) is a major factor in the massive decline of clove plantings in Indonesia. Xylem-limited *Ralstonia syzygii* subsp. *syzygii* has been reported to be associated with the disease, which affects the plant vascular system by mechanical blockage resulting in progressive leaf fall starting in the upper crown, leading to plant death within several years. In Central Java, we found the typical symptoms of SDC occurring at clove major growing areas. So far, it is known that the spread of SDC occurs through transmission by vector insects, namely *Hindola* spp. Sequence analysis showed that the bacterial pathogen isolated from the infected clove had 100% similarity with *R. syzygii* subsp. *syzygii* R002 at the same clade as *R. solanacearum* phylotype 4. Recently, we have developed a PCR method for specific detection of *R. syzygii* subsp. *syzygii* using a sensitive pair of primers designed based on the partial DNA sequence of the endoglucanase (*egl*) gene. PCR and phylogenetic analyses revealed that all symptomatic clove plant samples (leaves, twigs, and roots) were positively infected by *R. syzygii* subsp. *syzygii*. Likewise, we found that *R. syzygii* subsp. *syzygii* could be detected in symptomatic replanting plants, rhizosphere soil layers, and infected plant debris. Artificial inoculation through root wounding was able to cause disease symptoms in clove seedlings, suggesting that the bacterial pathogen might also be transmitted through soil.

Keywords: clove, detection, *Ralstonia syzygii* subsp. *syzygii*, soilborne, Sumatra disease

The resurgence of Cassava Witches' Broom Disease (CWBD) in Vietnam: Distribution and initial diagnoses

Le Thi Hang, Nguyen Van Liem, Trinh Xuan Hoat, Nguyen Manh Hung, Ngo Quang Huy, Le Quang Man, Mai Van Quan, Jonathan C. Newby, Wilmer J. Cuellar

Plant Protection Research Institute, Vietnam

Biography: *Hang Le graduated with a specialization in plant protection from the Vietnam National University of Agriculture (VNUA). With over 6 years of experience, she has participated in various projects in the field of plant pathology. Her research primarily focuses on identifying agents causing plant diseases, such as fungi, bacteria, viruses, phytoplasma, and nematodes, in key crops such as rice, maize, sweet potato, cassava, medicinal plants, and vegetables; she has experience in isolating and selecting beneficial microorganisms for use in agriculture. Hang Le has expertise in traditional and molecular biological techniques for pathogen isolation and identification, studying biological characteristics of pathogens, studying genetic diversity of pathogens, developing rapid diagnostic tools based on molecular and serology-based methods, and selecting beneficial microorganisms for crop disease management.*

Abstract:

Cassava (*Manihot esculenta* Crantz) ranks as the third most important carbohydrate food crop in the tropics, following rice and maize. In Vietnam, cassava holds the same position in terms of production area. The starchy root is processed into various products, including animal feed, bioethanol, and native and modified starch items, which support a billion-dollar export industry. The productivity and economic competitiveness of Vietnam's cassava sector face threats from the emergence and rapid spread of current diseases such as Cassava mosaic disease (CMD) and root rot diseases. Recent studies have documented the resurgence of Cassava Witches' Broom Disease (CWBD) in cassava production regions throughout the country, raising concerns about a potential second wave of the disease after several years of absence. Field surveillance conducted in eight major cassava-growing provinces, including Tay Ninh, Kon Tum, Gia Lai, Dong Nai, Dak Lak, Nghe An, Hoa Binh, and Yen Bai, has revealed symptoms of CWBD at a high incidence, particularly affecting numerous cassava varieties cultivated in Vietnam. The symptoms of the disease are not entirely uniform across different varieties; infected plants exhibit new shoots, small leaves turning yellow, short internodes, and vascular discoloration. Initial research on the pathogenic agents has identified a correlation with *Ceratobasidium* spp. These findings will serve for future research aimed at understanding the agent, its characteristics and transmission to inform the development of strategies for disease monitoring and management.

Soil-borne Diseases Management of Groundnut in Vietnam

Nguyen Manh Hung

Diagnosis and Assessment of Pest and Natural Enemies, Plant Protection Research Institute

Biography: *Nguyen Manh Hung has worked for nineteen years at PPRI. He has completed his Ph.D. degree at the Chinese Academy of Agricultural Science. He is working at the division of pest and natural enemy identification now. His study focuses on the identification of causal pathogens. He has a good background in the integrated management of plant diseases and insect pests. His interests include pest and disease diagnosis, disease isolation and microscope viewing, nematode extraction, isolation and viewing, and molecular analysis.*

Abstract:

Recently, several soilborne diseases that affect peanuts have become important and focused on in Vietnam. They often cause symptoms of root rot, damping-off, stem rot, and fruit, and are especially complicated to manage due to the difficulty of dispersing fungicides through the peanut canopy to the soil profile. Among them, bacterial wilt (caused by *R. solanacearum* Smith) is one of dangerous diseases on peanuts. Surveys indicated that bacterial wilt breaks out when the rain stopped, but the sun is strongly shining in the areas, where peanut is planted on sandy soil and gravel. Bacterial wilt tends to increase the rate of morbidity and disease index when warming climate change under unfavorable weather. The key peanut-growing provinces such as NgheAn (NA), ThanhHoa (TH), and BacGiang (BG) are severely damaged areas (10-20% of dead trees), some other places such as NgheAn, BacGiang, a percentage of infected trees up to 50-70%. So far, the use of pesticides has not been effective, the use of resistant varieties is considered to be the appropriate method to prevent this disease. In addition, these data were further useful to molecular-based analysis of the pathogen *R. solanacearum* to adopt a proper management strategy suitable for integrated disease management and breeding programs as well. However, the management strategies are still not developed due to a lack of identification of the causal organism together with disease management methods. Moreover, a few cultivars are resistant to *R. solanacearum* and fungus diseases from the soil in Vietnam. Then, resistant variety and proper management strategies suitable for integrated soilborne disease need to be exploited further.

Keywords: peanut, soilborne diseases, *R. solanacearum*

Cassava Mosaic Disease in Vietnam: Detection, Spread, and Management

Hung Ngoc Nguyen[1]

[1]Hungloc Agricultural Research Center, Institute of Agricultural Science for Southern Viet Nam, Dongnai, Viet Nam

Biography: *Hung Ngoc Nguyen has worked as a researcher at Hungloc Agricultural Research Center since 2017. He has participated in many research projects on cassava including pathology, entomology, and breeding funded by the Australian Centre for International Agricultural Research through CIAT. He graduated with a major in advanced crop science at the Vietnam Academy of Agriculture, Hanoi. In 2021, he completed a master's course in bioresource and bioenvironmental sciences at Kyushu University, Fukuoka, Japan. Currently, Hung has developed a particular fascination for the intricate interplay between insects and plant diseases.*

Abstract:

Cassava (*Manihot esculenta* Crantz) is a significant staple food crop and the third major source of dietary calories worldwide, after rice and maize. In Vietnam, cassava was introduced during the 19th century and has gained popularity over the years. Presently, cassava cultivation covers 551,300 hectares, with a yield of 10.2 million tons (General Statistics Office, 2014), positioning Vietnam as the fourth-largest exporter of cassava products globally. Cassava Mosaic Disease (CMD) represents a formidable challenge to cassava cultivation, resulting in substantial yield losses. The disease is characterized by chlorotic mosaic, rugosity, distortion of leaves, and stunning growth of the plant. In Africa where CMD is the most predominant cassava disease, it is caused by 11 different strains of viruses belonging to the genus *Begomovirus*. In Southeast Asia, CMD is transmitted by 1 strain-Sri Lankan cassava mosaic virus. All *Begomoviruses* causing CMD were reportedly transmitted, plant-to-plant, exclusively by whitefly species *Bemisia tabaci.* In Viet Nam, CMD was initially reported in 2017, in Tay Ninh province, the largest cassava-producing area, but has since spread to 15 provinces across the Central and Southern regions of Vietnam. Chemical and cultural control measures to prevent the spread of CMD have proven ineffective. This report offers a comprehensive examination of CMD, encompassing its detection, spread, consequences, and proposed management strategies within the Vietnamese agricultural context.

Keywords: Cassava, CMD, Whitefly, Mosaic, control

Identification, characterization, and control of black spot of Chinese kale caused by a novel artillery fungus

Boonsom Bussaban[1]

[1]Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand

Biography: *Boonsom has been a lecturer in Biology since 2011. She obtained her BSc degree in Agriculture (Plant Pathology) from Chiang Mai University, Thailand, and later completed her Ph.D. in Biology at the same institution. Her doctoral research focused on investigating the diversity of endophytic and saprobic fungi on both wild and cultivated zingiberaceous plants. Her research interests encompass various aspects, including the diversity of fungi in different habitats and their biotechnological applications, the cultivation of novel or known wild edible mushrooms for their potential as functional food, and the development of environmentally friendly agents for controlling phytopathogens in vegetables and tree plants.*

Abstract:

Chinese kale (*Brassica alboglabra*) holds significant agricultural and culinary importance across Asia. Traditional cultivation often involves the use of chemical pesticides to combat pests and diseases. In response to environmental concerns and the need for sustainable practices, Thailand introduced Public Standards, Good Agricultural Practice (GAP), and International Federation of Organic Agriculture Movement (IFOAM) programs to promote chemical-free cultivation of Chinese kale. However, the emergence of black spot disease caused by the artillery fungus has presented a persistent challenge for Chinese kale growers adhering to IFOAM standards in Chiang Mai, Thailand. This disease manifests as strongly adhering glebal spore masses on leaf and stem surfaces, severely impacting postharvest management and product quality. Morphological and phylogenetic (combined ITS, mtSSU, and EF 1-α datasets) studies confirmed a novel species, *Sphaerobolu cuprophilus.* Pathogenicity tests, involving non-wound and mulch inoculation bioassays, have conclusively demonstrated that *S. cuprophilus* is responsible for the observed symptoms of black spot. Efforts to mitigate this fungal disease have unveiled promising strategies. Antagonistic bacteria and chemical fungicides, permitted under either IFOAM or GAP standards, were assessed for their efficacy. *Bacillus amyloliquefaciens* strains (PBT2 and YMB7), chlorothalonil (20 and 500 ppm), and thiophanate-methyl (500 and 1500 ppm) were identified as the most effective agents, effectively reducing *S. cuprophilus* growth by 83 to 93%. Interestingly, copper oxychloride (5 to 20 ppm), a recommended chemical for downy mildew control in Chinese kale, exhibited hormetic effects, paradoxically promoting the growth and sporulation of *S. cuprophilus*. This study sheds light on the intricate relationship between *S. cuprophilus* and Chinese kale. The findings provide essential insights into managing fungal diseases in Chinese kale cultivation, offering guidance for sustainable and chemical-free practices in the future.

Keywords: *Brassica alboglabra*, black spot, Sphaerobolaceae, hormesis, antagonistic bacteria

Guava Root Knot Nematode - *Meloidogyne enterolobii* in Vietnam and integrated management strategies

Nguyen Van Chung

Plant Protection Research Institute, Vietnam

Biography: My name is Nguyen Van Chung, I am a nematologist. I completed my Ph.D in France in 2018 in the field of nematology at Côte d'Azur University. I am now working in the Plant Protection Research Institute, Hanoi, Vietnam. I am the Deputy Head of Science and International Cooperation, and my field of interest is Phytopathology and Plant Parasitic Nematodes. I am managing 2 projects (province level) on Nematodes associated with Guava and Medicinal plants. I have experience working in the laboratory as well as working in the field and greenhouse.

Abstract:

More than 4,100 species of plant parasitic nematodes have been studied and they cause an estimated annual economic loss of $80-157 billion world-wide. The most economically important genus is the root knot nematode - *Meloidogyne*. Among them the four most important species are *Meloidogyne incognita*, *M. arenaria*, *M. javanica* and *M. hapla*, together with the recently emerged species worldwide, *Meloidogyne enterolobii*. *Meloidogyne enterolobii* is particularly important because i) it has a wide host range; ii) it is currently recognized to have surpassed many widely commercialized nematode resistance genes such as: Mi-1, Mh, Mir1, N genes in tomatoes, potatoes, soybeans, and pepper. In 2009, it was reported from southern Vietnam, and in 2019 it was recorded on guava trees in Kon Tum, Vietnam. In the guava growing area of Hai Duong, Hung Yen, Quang Ninh in the northern region of Vietnam, severe damage by nematodes including *Meloidogyne* has been recorded. *Meloidogyne enterolobii* species was identified using basic morphological features combined with specific results of two primer pairs Mk7-F/R and Me-F/R. We then studied some strategies to control *M. enterolobii* by adding lime, using organic fertilizers combined with *Trichoderma* after first using some nematicides to reduce the nematode population in the soil and root system. We have obtained some promising results which need to be verified before application on a large scale. To conclude, the Guava Root Knot Nematode poses a significant threat to guava cultivation and other crops, necessitating integrated management strategies for its control. Understanding the biology, host range, and management options is essential for safeguarding guava production and ensuring food security.

Keywords: Guava, Root-knot nematode, *Meloidogyne enterolobii*, *Psidium guajava*

Neoscytalidium dimidiatum; a destructive dragon fruit pathogen

Mark Angelo O. Balendres

Department of Biology, College of Science, De La Salle University, Manila, Philippines

Biography: *Mark Balendres is a Professor at the De La Salle University in the Philippines. Mark teaches botany and research plant and tree pathology. Research outcomes from Mark's group include elucidation of the etiology, epidemiology, and management of plant diseases. He hopes to translate the knowledge into value that will benefit the society. His extension activities include raising awareness of the importance and impact of plant diseases, connecting the public to experts through webinars and talks, and promoting scientific writing to students, researchers, and faculty. He obtained his PhD from the University of Tasmania, Australia.*

Abstract: The genus *Neoscytalidium* accommodates an important group of phytopathogenic fungi that globally affect a wide range of plant species. Diseases caused by *N. dimidiatum* have increased in the last two decades, and two new species, *N. novaehollandiae* and *N. orchidacearum*, have been described. Hosts are no longer concentrated on trees and woody plants. In 2020, we first scientifically reported *N. dimidiatum* as the causative agent of dragon fruit stem canker in the Philippines. The pathogen was present in almost all the areas surveyed and was pathogenic to the three commonly cultivated species of dragon fruits (*Selenicereus monacanthus, S. undatus, S. megalanthus*). None of the three cultivated species and dragon fruit collections showed resistance or tolerance to the pathogen under controlled experiments. Several fungicides showed promising control of the pathogen in *vitro* trials but were not found effective in some screen house experiments. Since the pathogen thrives well in hot and humid conditions, climate change would be an important factor in the rapid spread of the pathogen and severe symptom development in host crops. Effective plant disease management strategies at a field or commercial farm level are yet to be implemented, but recent studies have promising results. Nevertheless, identifying and developing sustainable disease control measures remain important. This paper presents the current past and current research on *N. dimidiatum* in the Philippines.

Keywords: Stem canker, *Selenicereus* species, fungal pathogen, *Hylocereus* species

Evaluation of potassium phosphite for the control of *Phytophthora* blight in chilli

Namgay Om[1], Ugyen Dendup[1], Pema Tshoki[1], Sangay Chophel[1], Pema Tobgay[1],

[1]National Plant Protection Centre, Department of Agriculture, Ministry of Agriculture and Livestock

Biography: Namgay Om received the John Allwright Fellowship of the ACIAR to undertake PhD studies in agriculture from Western Sydney University, NSW, Australia in 2012. She works in Bhutan as a plant protection specialist at the National Plant Protection Centre under the Department of Agriculture, Ministry of Agriculture and Livestock. Her area of expertise includes biology and ecology of plant pathogens, plant disease diagnosis and management, surveillance, and plant quarantine and pest risk analysis. She is responsible to plan, develop, coordinate and conduct plant disease research and development activities.

Abstract:

Phytophthora capsici is a major pathogen of chilli in Bhutan. Management of the disease is mainly through cultural practices. Use of fungicide is limited due to the risk of resistance development. The ability of potassium phosphite to control *P. capsici* was evaluated under laboratory and greenhouse conditions. Amendment of carrot agar medium with 0.2%, 0.3%, 0.4% and 0.5% of potassium phosphite led to complete inhibition of growth of *P. capsici*. Two separate greenhouse experiments were conducted to evaluate disease severity of plants sprayed weekly with different concentrations of potassium phosphite. One experiment evaluated the treatments of 0.2%, 0.3%, 0.4%, and 0.5% potassium phosphite on plants inoculated with 2% (w/w) *P. capsici*. Uninoculated plants not treated with potassium phosphite and inoculated plants sprayed with water served as controls. The second experiment included all treatments from experiment one plus addition ridomil and control treatments. In both the experiments, significant differences between treatments were observed. In the first experiment, inoculated controls exhibited 21.62% disease severity compared with 0.00% to 7.35% disease severity of the plants treated with potassium phosphite. Similarly, in the second experiment, inoculated controls showed the highest disease severity (65.85%) while plants treated with different concentrations of potassium phosphite remained below 1.19% which was comparable to plants treated with fungicide (0.00%) and uninoculated controls (0.00% - 3.02%). The results indicate that potassium phosphite can suppress *P. capsici* under controlled conditions. Disease suppression using 0.2% of potassium phosphite was not significantly different from 0.5%, hence the lower level may be used. Field trials are needed to evaluate the full potential of potassium phosphite for control of *P. capsici* in chilli.

Key words: inhibition, severity, ridomil, concentration

Technique for grafting Winter Melon onto resistant gourd rootstocks for control of Fusarium wilt of Winter Melon in Nghe An Province, Vietnam

Dau Thi Vinh

Nghe An Provincial Cultivation and Plant Protection Sub-Department, Vietnam

Biography: I grew up in a rural community in Nghe An province of Vietnam gaining a keen interest in agriculture. Subsequently I trained at Hanoi National Agricultural University, graduating with a BSc (Plant Protection) in 2003, and was appointed to the Nghe An Plant Protection Sub-Department in 2005. Further training was undertaken in plant disease diagnostics and IDM in ACIAR Project (CP/2002/115) Diseases of crops in the central provinces of Vietnam: diagnosis, extension and control (2005-2008). I attended workshops in Quang Nam province, and Lam Dong province in the southern highlands. I later completed a Master's degree on '*Neocosmospora vasinfecta* on peanuts' in Vinh University in 2013. I have extensive experience in crop disease diagnostics in the laboratory and field in vegetable, field and fruit crops, and in extension to small-holder farmers in IDM and IPM, and train district staff. I have published research papers in APDN and in Vietnamese journals.

Abstract:

Fusarium wilt of winter melon caused by *Fusarium oxysporum* was responsible for serious losses in winter melon crops in Nghe An Province, Vietnam. Resistant gourd rootstocks provided an effective control measure for Fusarium wilt of winter melon. The local Bau trang cultivar (gourd) (L. siceraria) was adopted by farmers as the preferred rootstock on the basis of the low-cost seed. The grafting process is described as follows:

The rootstock seedlings were grown in pathogen-free forest soil in small plastic bags, one seed per bag. Winter melon seeds are sown densely on clean river sand in large plastic dishes or similar containers after a week. The grafting process involves excising the stem of the rootstock seedling immediately above the cotyledons, at the first true leaf stage using a mini-scalpel. A narrow cone shaped hole, ~6–8 mm deep, is then made in the stem of the rootstock. The upper part of the stem,10–15 mm long (scion) of a winter melon seedling at the cotyledon stage, is then removed with a razor blade, making an oblique transverse cut. The scion is then inserted into the hole in the rootstock stem. The grafted seedlings are first kept under cool shady conditions for several days, and then hardened outdoors in an area sheltered from the wind and excessive sun, or in a screen house. They are transplanted to the field after three to four leaves have developed.

The use of winter melon seedlings grafted onto resistant gourd rootstocks was identified as the only feasible control measure with the potential to prevent infection of susceptible winter melon in soils with high levels of inoculum of the pathogen.

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V. T. Dau, L. W. Burgess, L. T. Pham, H. T. Phan, H. D. Nguyen, T. V. Le and D. H. Nguyen (2009) First report of Fusarium wilt of watermelon in Vietnam Australasian Plant Disease Notes, 2009, 4, 1–3

Identification of parents for breeding sugarcane leaf scald disease resistance from *Saccharum* germplasm

A. N. W. Sumedha Thushari[1], A. Wijesuriya[1], A. M. M. S. Perera[1] and B. W. Wijesuriya[2]

[1]Sugarcane Research Institute, Uda Walawe, Sri Lanka. [2] Rubber Research Institute, Agalawatta, Sri Lanka

Biography: *Sumedha has been working in sugarcane pathology in Sugarcane Research Institute in Sri Lanka for 14 years. She graduated from University of Sri Jayewarnepura in Sri Lanka with a Bachelor's degree specialized in Botany and currently following her Ph.D in Molecular and Applied Microbiology at the Postgraduate Institute of Agriculture, University of Peradeniya Sri Lanka. Sumedha's interests are host pathogen interactions, development and identification of resistant varieties for sugarcane diseases, development of molecular based disease detection methods and disease diagnosis based on microbial cultures and molecular biology.*

Abstract:

Leaf scald disease (LSD) of sugarcane is a serious sugarcane disease reported in many sugarcane growing countries including Sri Lanka. The causal agent of the disease is bacterium; *Xanthomonas albilineans*. Use of resistant varieties play the foremost role in managing this disease in commercial plantations. Identification of parents for breeding varieties with resistance to LSD and other commercial attributes is essential in sugarcane crop improvement. A subset of 429 accessions of *Saccharum* and related germplasm containing a wide range of variability in commercial attributes was assessed for LSD resistance in a field experiment in 2016-2017 at the Sugarcane Research Institute, Uda Walawe, Sri Lanka. A Completely Randomized Design was used with two replicates. Seven standard varieties with established LSD resistance ratings were included to assign disease ratings for the tested accessions. Four-month-old sugarcane plants in 1-m plots were artificially inoculated with broth culture of *X. albilineans* in accordance with the standard Aluminium cap technique. Disease incidence and the area under disease progression curve (AUDPC) were quantified for each accession in one-month intervals after inoculation. Regression equations derived from average disease incidences of the standard varieties *versus* their established ratings were used for assigning the resistance ratings to the tested accessions. There were no deviations of the standard varieties from their normal disease symptom expression and they have shown correct disease rating for LSD. The results revealed 141 accessions are highly resistant to LSD in terms of disease incidence with 0 AUDPC during the entire crop cycle. Accordingly, 14 *Saccharum spontaneum*, 23 *Erianthus arundinaceus*, 9 *Saccharum officinarum* accessions and 95 *Saccharum* spp. hybrids are selected for the parental core-collection for breeding for LSD resistance.

Keywords: AUDPC, germplasm, leaf scald disease, Sugarcane, *Xanthomonas albilineans*

Effect of cassava witches broom disease on the performance of popular industrial cassava genotypes in Southeast Asia

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Biography: *Khamla is a Research Associate working with the International Centre for Tropical Agriculture-CIAT. He supports research activities in pests and disease identification, and screening of infectious pathogens in controlled and open environments. He is currently involved in the characterization of cassava witches broom disease and mosaic disease, both new cassava diseases in Southeast Asia. He graduated from The National University of Laos in 2021 with a Bachelor of Science in Biology.*

Abstract:

Cassava is a vital crop for many farmers in Southeast Asia, serving as a major source of food and income. Cassava yields in SEA are sharply declining, primarily due to two diseases, cassava witches broom disease (CWBD) and cassava mosaic disease, whose effects are exacerbated by climate-associated stressors. Witches broom disease is a major hindrance to cassava production and its effects on cassava performance are unexplored. This study aimed to quantitatively define the impact of CWBD on major agronomic traits of two cassava varieties KU50 and Rayong11. The study also evaluated the effect of planting time and growth stage on CWBD spread under field conditions and how the disease affects cassava yield and starch accumulation in irrigated and non-irrigated fields. Several traits including plant height, internode length, petiole length, terminal leaf length and width, and leaf area were measured in the screen house. To determine the effect of planting time and growth stage on CWBD progression, experiments were conducted in the field, and disease incidences were monitored and recorded at different time intervals until cassava harvest. Yield and starch content were measured at the end of the season. It was found that CWBD infection significantly halved most of the agronomic traits and that planting time and growth stage influence disease incidence in a varietal-specific manner. Findings also indicate that the rate of disease spread is exponentially high in irrigated plots compared to non-irrigated plots during the early stages of the production cycle. Fresh root yield and starch accumulation varied between varieties depending on the planting time, with the least performance observed in late-planted plots irrespective of irrigation. Finally, it was observed that CWBD infection diminishes starch accumulation by more than 25%. This is the first study quantifying the effect of CWBD on the performance of cassava.

Keywords: Cassava witches broom disease, cassava, variety, fresh root yield, starch content.

Development of virus diagnostic system for taro (*Colocasia esculenta*)

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Biography: Amit Sukal (PhD in plant pathology) is the mangers the germplasm health unit at the Centre for Pacific Crops and trees. He has 10 years' experience in plant tissue culture, germplasm conservation, molecular techniques/technologies, bioinformatics, genomics, crop phenotyping for stress and plant virology. He has various peer-reviewed publication in the field of crop conservation, biotechnology, virology, and diagnostics. He has a strong interest to support the conservation and safe exchange of germplasm for utilization in the Pacific for improvement of food, nutrition, and health security for the Pacific and globally.

Abstract:

The Centre for Pacific Crops and Trees (CePaCT) is recognised for hosting the largest global collection of taro conserved *in vitro*. To support the safe exchange of taro germplasm CePaCT germplasm health unit have partnered with Manaaki Whenua Landcare Research (Lincoln, NZ) to develop and validate protocols for the health testing of taro. Next generation sequencing has been used to characterise the diversity of viruses. Protocols have been developed and validated for six different viruses known to infect taro. These protocols were validated and are currently being used for the heath testing of taro at the centre. Small RNA sequencing and assembly (sRSA) is also being evaluated as a method for future testing. The development of virus diagnostic system will help to safeguard and keep available disease-free crop varieties and make a positive impact in the consumption of diverse and nutritious domestic food that will guarantee healthy diets and sustainable livelihoods of Pacific communities.

Keywords: taro, CePaCT, diagnostic, NGS, sRSA.

Characterization and detection of three potyviruses causing passionfruit woodiness disease in Vietnam

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Biography: *Duy-Hung Do comes from Plant Protection Research Institute Vietnam. I graduated Bachelor and Master at Vietnam National University of Agriculture. I graduated Ph.D. at National Chung Hsing University, Taiwan. My major research interests are viruses infecting passionfruit in Vietnam, and how to control them by cross-protection. I also study Huanglongbing disease infecting citrus in Vietnam.*

Abstract:

Passionfruit plantations in Vietnam increased to 10,000 ha in 2022. However, the outbreaks of passionfruit woodiness disease (PWD) have become a serious threat to production. In this study, five virus isolates, DN1, DN4, NA1, GL1, and GL2, were collected from different areas of Vietnam. Their causal roles for PWD were verified by back inoculation to passionfruit. Analyses of coat protein (CP) and genomic sequences revealed that GL1 isolate is closely related to East Asia Passiflora virus (EAPV) AO strain of Japan (polyprotein nt/aa identities of 98.1% / 98.2%), while GL2 isolate is related to Telosma mosaic virus (TelMV) isolate PasFru, China (polyprotein nt/aa identities of 87.1% / 90.9%). CP comparison indicated that DN1, DN4, and NA1 are potyviruses but different from EAPV and TelMV. Phylogenetic analyses of their CP and genome sequences indicated that these three isolates and passionfruit severe mottle-associated virus Fujian isolate of China belong to a distinct clade, which does not satisfy the threshold (76% nt identity of polyprotein) to be regarded as any of potyviral species. Thus, a new species name of “Passiflora mottle virus” has been proposed by ICTV. Field surveys of 132 samples by RT-PCR disclosed that PWD in Vietnam is mainly caused by PaMoV, followed by EAPV, mixed-infection of PaMoV/EAPV, and rare cases of TelMV.

Characterization of Cassava witches' broom disease (CWBD) association with *Ceratobasidium* spp. in Lao PDR

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Biography: *Pinkham has been working at the Plant Protection Center and She joined on ACIAR-CIAT projects for 3 years. She graduated from National University of Laos in 2007 with a Bachelor of Science in Biology. In 2016, she graduated with her Master of Science in Agriculture, majoring in plant pathology, from Khon Kaen University in Thailand. Her interests include pest and disease diagnosis, disease isolation and microscopic examination, nematode extraction, and molecular analysis.*

Abstract:

Cassava witches' broom disease (CWBD) is a devastating disease of cassava that can cause significant yield losses. The disease is characterized by the formation of witches' brooms, which are clusters of abnormal shoots that arise from the main stem of the plant and reduced internodal length and brown vascular tissue, and proliferation of leaves. The latest fungus suggested to have a strong association with CWBD is *Ceratobasidium theobromae*, which also causes cacao vascular streak disease. This study describes a diagnostic method for CWBD in Laos. The method involves isolating petioles from infected plants and transferring them to potato dextrose agar (PDA) media and incubating at 25°C for 5 days, and then the mycelium growth is observed under light microscope (Leica ICC50 HD, Germany) at 400x magnification. The DNA of the fungus is extracted from samples from the top youngest leaves, root vascular tissue, stem vascular issue and petioles using CTAB method. We identified a fungus belonging to the *Ceratobasidium* genus, sharing more than 98.3-99.7% nucleotide identity at the Internal Transcribed Spacer (ITS), with *Ceratobasidium theobromae* a pathogen causing similar symptoms in cacao. The results of this study show that the diagnostic method is able to accurately identify CWBD in Laos. The method is simple and cost-effective, and it can be used to diagnose CWBD in other countries in SEA.

Keywords: Cassava witches' broom disease, Cassava, Diagnostic method, *Ceratobasidium* spp., Internal Transcribed Spacer (ITS)

Plant Pathogens Culture Collections: a prerequisite for Food Security and Food Safety

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Biography: Azza Rhaiem is Assistant Professor/ Research Associate in Plant Pathology; She is working at the National Gene Bank of Tunisia as researcher since 2009. She worked on Culture Collections, microbial genetic diversity and taxonomy of plant pathogenic fungi, their population structure and mating system. She obtained her PhD in Population Biology in 2008 from the National Institute of Agronomy of Tunis (INAT). She has held internships in School of Biology, Nottingham, UK, and in the Department of Plant Pathology, Pullman, US.

Abstract:

Food Security is considered to be fulfilled when all people at all times have physical and economic access to sufficient, safe and nutritious food. Biosecurity encompasses all strategic approaches related to policies and regulatory frameworks that analyze, predict and manage the risk in food safety, animal and plant life and health. At a level of each country, effective implementation of biosecurity measures depends upon a minimum of structures and administrative units with clear lines of responsibilities and efficient communication. This is becoming a priority with the establishment of the WTO (World Trade Organisation) and the requirements of trading rules set out in many international agreements including the application of Sanitary and Phytosanitary measures (SPS). Plant Pathologists have a responsibility to make decision-makers and community aware of putative risks related to plant diseases which constitute a real threat in reducing crops yield and affecting products quality resulting in industrial and economic losses. Intrusive non identified plant pathogens may threaten an entire ecosystem and many are likely to affect human and animal health through mycotoxins production. Control and eradication of these plant diseases is dependent on an enhanced capability of disease detection and diagnosis. In this context, Plant Pathogens Culture Collections became essential resources in the fight against plant diseases and in connecting past, present and future research endeavours. Such collections are being developed in many countries throughout the world in the last decades and include viable specimens associated with genotypic and phenotypic libraries. With the advent of DNA-based systematics and the adoption of “DNA barcodes”, cultures collections are being supported by reference DNA libraries.

Key words: Culture Collections, Plant Pathogens, risk assessment, Food Security