

**INTERNATIONAL CONFERENCE  
ON UNDERUTILIZED CROPS (ICUC) 2021**

**“Empowering and Promoting of Neglected and Underutilized  
Crops Through Research Activity, Agro-Industry, Community  
Involvement, and Digital Technology”**

**27-28 October 2021 | WEDNESDAY - THURSDAY**

**BOOK OF ABSTRACT**



الجامعة الإسلامية العالمية ماليزيا  
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA  
بوترا برني، ملايا





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Empowering and Promoting of Neglected and Underutilized Crops Through Research Activity,  
Agro-Industry, Community Involvement, and Digital Technology

27-28 OCTOBER 2021

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## PROGRAM SCHEDULE

### Day1# Wednesday, 27 October 2021

No	Time	Duration	Agenda
1.	07.30-07.45	15'	Preparation and registration of participants enter zoom
2.	07.45-08.00	15'	UB, FP and UCRC FP Profile Video Screening
3.	08.00-08.10	10'	Introduction
4.	08.10-08.15	5'	Indonesia National Anthem "Indonesia Raya"
5.	08.15-08.20	5'	Speech from the Chairperson of UCRC FPUB
6.	08.20-08.30	10'	<i>Opening Speech</i> by Dean of Faculty Agriculture
7.	08.30-08.35	5'	Introduction of Speaker
8.	08.35-09.15	40'	<b>Speaker 1: <u>Kilala Tilaar</u></b> (CEO Martha Tilaar Group) ""Utilization of Underutilized Crop Potential as Raw Material for Herbal Agroindustry"
9.	09.15-09.55	40'	<b>Speaker 2: <u>Utami Kartika Putri</u></b> (Editor in Chief Trubus Magazine) "The Role of Media in Introducing and Promoting Underutilized Crops as a Supporter of the Community's Economy"
10.	09.55-10.35	40'	<b>Speaker 3: <u>Prof. Kuswanto</u></b> (Universitas Brawijaya) "Recent Status on Bambara Groundnut Research"
11.	10.35-11.00	25'	QnA
12.	11.00-11.40	40'	<b>Speaker 4: <u>Prof. ATUNGWU Jonathan Jeremiah Ph.D</u></b> (College of Plant Science & Crop Production, Federal University of Agriculture, Abeokuta (FUNAAB) "NUS: Engineering Food, Nutrition & Income Securities in Post Pandemic Agro-Economy of Developing Nations"
13.	11.40-12.10	40'	<b>Speaker 5: <u>Prof. Patrick Van Damme</u></b> (Prague University of Life Sciences) "Frontier Research and Development of Underutilized Crop in Europe/Africa"
14.	12.10-12.30	20'	QnA
15.	12.30-13.35	5'	Announcement
16.	12.35-13.30	55'	Break Time
17.	13.30-15.30	120'	Parallel Session



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## PARALLEL SESSION RUNDOWN

No	Name	Title	Duration	Time
1.	Pratanti Haksiwi Putri	Diversity of Agronomic Characters of Pigeon Pea ( <i>Cajanus cajan</i> (L) Millsp.) Genetic Resources	10'	13.30 – 13.40
2.	Nuril Hidayati	Promoting Foxtail Millet [ <i>Setaria italica</i> (L.) P. Beauv] in Indonesia	10'	13.40 – 13.50
3.	Yuliasti	Induction Mutation and In Vitro Selection to Improve Drought Tolerant in Soybean Local Variety	10'	13.50 – 14.00
4.	Qian Zhang	Taxonomic and Phylogenetic Studies of <i>Colletotrichum</i> on Medicinal Plants in southwest China	10'	14.00 – 14.10
5.	Qiaoli Du	Histone deacetylase SbHDT701 in <i>Sorghum bicolor</i> reveals functions in response to stress factors by enhancing acetylation	10'	14.10 – 14.20
6.	Maya Melati	Determination of K Fertilizer Rate for Young Okra Fruit Production	10'	14.20 – 14.30
<b>Q n A</b>			10'	14.30 – 14.40
7.	Siti Fatimah	Drought Tolerant Screening of Red Rice Landraces from Madura at Early Stages Using PEG 6000	10'	14.40 – 14.50
8.	Junmei Jiang	Expression Analysis Reveals that Sorghum Disease Resistance Protein SbSGT1 is Regulated by Auxin	10'	14.50 – 15.00
9.	Yuanpeng Fang	The cytochrome P450 superfamily: Evolutionary and Functional Divergence in Sorghum ( <i>Sorghum bicolor</i> ) Stress Resistance	10'	15.00 – 15.10
10.	Muhammad Farhan	Phylogeny of <i>Alternaria</i> spp. from medicinal plants in Southwest of China	10'	15.10 – 15.20
11.	Ellina Mansyah,	Bringing <i>Garcinia</i> Sp from the Forest to International Market Through Community Based-Biodiversity Management (CBM)	10'	15.20 – 15.30
12.	Hakim Kurniawan	Inventory and Ethnobotanic Study of the Eggplant-Related Species from Various Regions in Indonesia	10'	15.30 – 15.40
<b>Q n A</b>			10'	15.40 – 15.50



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## Day2# Thursday, 28 October 2021

No	Time	Duration	Agenda
1.	07.30-07.45	15'	Preparation and registration of participants enter zoom
2.	07.45-08.00	15'	UB, FP and UCRC FP Profile Video Screening
3.	08.00-08.10	10'	Introduction by MC
4.	08.10-08.15	5'	Moderator Spot
5.	08.15-08.20	5'	Introducing of Speaker
6.	08.20-09.00	40'	<b>Speaker 6: <u>Muhamad Fahmi Yunus Ph.D</u></b> (International Islamic University of Malaysia) "Exploring the potential of Etlingera eliator (torch ginger) as an ornamental, food and medicinal plant"
7.	09.00-09.40	40'	<b>Speaker 7: <u>Prof. Xin Xie</u></b> (College of Agriculture, Guizhou University, China) " Sorghum bicolor: An underutilized crop with high stress resistance genes for plant genetic breeding"
8.	09.40-10.20	40'	<b>Speaker 8: <u>Dr. Yong Wang</u></b> (Department of Plant Pathology, Guizhou University) "Diseases of Underutilized Crops in Guizhou Province, China"
9.	10.20-10.40	20'	QnA
10.	10.40-11.20	40'	<b>Speaker 9: <u>Dr. Prakrit Somta</u></b> (Kasetsart University) "Genetic Diversity of Winged Bean Genepool in Thailand"
11.	11.20-12.00	40'	<b>Speaker 10: <u>Dr. Nwawe Christian N.</u></b> (Nigerian Institute for Oil palm Research (NIFOR)) "Harnessing the Potentials of Shea Butter Plant (Vitellaria paradoxa C.F.Gaertn.) in the Nigerian Economy"
12.	12.00-12.20	20'	QnA
13.	12.20-12.25	5'	MC Spot
14.	12.25-12.30	5'	Announcement of Best Speaker and Closing
15.	12.30-12.40	10'	Closing Statement



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## ABSTRACT 01

### Indonesia Natural Richness & Its Contribution to the World Beauty Industries

Kilala Tilaar  
CEO Martha Tilaar Group

Nowadays back to nature trend open a wide window of opportunity for Indonesia' beauty industries since it has been blessed with the richness in biodiversity and cultural acculturation. By focusing and utilizing these two germs through research and innovation that is uniquely Indonesia has enabled the creation of beauty industries that stands out in the global market. This includes usage of efficacious underutilized crops for health and beauty purposes. Moreover, well understanding of consumers' needs, current and future trends as well as the integration of local knowledge, bio and cultural diversity with modern technologies and sciences will enable industries to create various winning products. Furthermore, well-targeted communication and campaign will improve industries' competitive advantages in the market. The trend also increases demand for better environment in where the consumers are not only concerned about the benefits of the products they purchased but also the impacts of those products to the environments. As a respond, many industries have good deeds by having policies for not only care about the profits but also the preservation and welfare of the environment. Therefore, both industries and consumers could play important roles in preserving the environment through product that well-served the trend and needs above.





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## ABSTRACT 02

### The Role of Media in Introducing and Promoting Underutilized Crops as a Supporter of the Community's Economy

Utami Kartika Putri  
PT Trubus Swadaya Director-Trubus Magazine

Good news is good news. Good news is news that is both joyful and happy, as well as a relief. However, for most people, good news is not always accepted by the general public. Many media prefer to present bad news as news, because it is preferred. In contrast to the general media, for 52 years until now, Trubus magazine prefers good news as its content. Mainly presenting a variety of information about the world of agriculture. Starting from introducing commodities, exploring potential and business opportunities, presenting profiles of farmers and their farmer groups, bringing up issues around technology development, to cultivation innovation. As a medium, the various information presented is expected to inspire many people and circles to know, explore, and work on it. Various agricultural commodities are generally displayed regularly every month. Among them is introducing and disseminating information about Neglected and Underutilized Crops Species (NUCS). Throughout 2005 until now, information on 40 plant species belonging to the NUCS has been disseminated. Among them are **red fruit/buah merah** (*Pandanus conoideus*), **myrmecodia/sarang semut** (*Myrmecodia pendans*), **God's crown/mahkota dewa** (*Phaleria macrocarpa*), **binahong** (*Anredera cordifolia*), **keladi tikus** (*Typhonium flagelliforme*), **bilimbi/belimbing wuluh** (*Averrhoa bilimbi*), **deli hijau water apple/jambu MDH** (*Syzygium aqueum*), **dayak onion/bawang dayak** (*Eleutherine bulbosa*), **pelawan** (*Tristaniopsis merguensis*), **durian pelangi** (*Durio zibethinus*), **mangosteen** (*Garcinia mangostana*), **moringa** (*Moringa oleifera*), **sweet potato/ubi jalar cilembu** (*Ipomoea batatas*), **talas beneng** (*Xanthosoma undipes*), **saca** (*Plukentia volubilis*). These plants have been featured in the main topics that decorate the front cover of the magazine. Almost all of the magazine's main topics were received positively by the public. As a media, Trubus Magazine's role is to support economic development, community food security, and improve the welfare of farmers and other business groups. This commitment is evidenced by the presence of Trubus Magazine, which has not been absent since December 1969. Every month, Trubus displays news—including NUCS—massively. These commodities are displayed through accurate data, attractive layouts, support for attractive photos and illustrations, and popular language styles so that they are easily accepted by the public. Furthermore, commodities that were initially considered trivial, underutilized or neglected can have great potential to be developed and exploited more widely. Through active publications in the media, the public will appreciate, support, and encourage the development of an agricultural commodity. Without the presence of the media, the dissemination of information is believed to be less effective and even tends to be limited. Therefore, it is very important to involve and utilize the media for progress and development in agriculture.



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## ABSTRACT 03

**Frontier Research and Development of Underutilized Crop in Europe/Africa**

**Patrick Van Damme**  
Prague University of Life Science



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## ABSTRACT 04

**NUS: Engineering Food, Nutrition and Income Securities in Post Pandemic Agro-  
Economy of Developing Nations**

**Atungwu Jonathan Jeremiah**  
Federal University of Agriculture (FUNAAB)



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## ABSTRACT 05

### Exploring the Potential of Torch Ginger (*Etilingera elatior*) as Ornamental, Medicinal Plant and Food Products

**Muhammad Fahmi Yunus**  
International Islamic University Malaysia

Torch ginger or *Etilingera elatior* which belongs to the Zingiberaceae family is one of the most commonly known species of *Etilingera*. Torch ginger is popular in Southeast Asia where its inflorescences have various purposes in ornamental, medicinal and culinary. Due to its beautiful appearance, it is widely marketed as a promising ornamental plant. For ornamental industry, it is always necessary to produce new and different cultivars with appeal for cut flower. This could be achieved through different techniques such as intensive germplasm collection, hybridization programme and plant biotechnology. Besides, every part of torch ginger can be used as a material source in preparing traditional medicines. For instance, the extract from its stem is used to reduce swelling, the leaves are used by post-partum women and the fruits are used as treatment for earache, diarrhoea, coughs, and mouth sores. In addition, torch ginger has been reported to have high nutritional and phytochemicals properties. Findings of phytochemicals has led to the research for pharmacological activities, cosmetic products, and green nanotechnology of torch ginger. In Thailand, the flower and leaf extracts has been successfully tested for whitening cream. Interestingly, the product is biodegradable and environmentally friendly, which make it a good choice compared to the synthetic ingredients. Meanwhile, researchers in Malaysia have developed an eco-friendly and economical reducing agent from aqueous extract of torch ginger inflorescence, which can be used in green synthesis of gold nanoparticles (AuNPs). It is suggested that torch ginger can be planted into industrial scale and abundance of potentials make this plant as a perfect candidate for the plant of the future.



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## ABSTRACT 06

### Phospholipase C: Diverse functions in plant biotic stress resistance and fungal development

Prof. Xin Xie  
Guizhou University

*Background:* Signaling pathways play an important role in the innate immunity of plants and the pathogenic processes of plant pathogens. Phospholipase C (PLC) mediates phospholipid hydrolysis as well as generates and conducts various second messenger molecules. In recent years, the important roles of plant and fungal PLCs in resistance and pathogenicity, respectively, have been successfully determined. *Aim of Review:* Currently, most of the work on the role of phospholipase C in plants and fungi is unintegrated. Furthermore, the literature has not been organized, making it difficult for researchers to implement strategies aimed at in-depth germplasm improvement and fungicide design based on PLC. Thus, a comprehensive review will be a useful resource for future programs focused on resistance breeding in plants and on the design and application of pathogenic fungal pesticides. *Key Scientific Concepts of Review:* In this review, we systematically summarized the structure, classification, and phylogeny of the PLC involved in plant biotic stress resistance and fungal pathogenicity. Briefly, PLC consists of two groups NPC (non-specific PLC) and PI-PLC (phosphatidylinositol-specific phospholipase C), with obvious differences in their phylogenetic evolution. Fungal *PLC* genes play an important role in fungal physiological activity and infection processes, whereas plant *PLC* genes mediate fungal-stimulated immune activity. The information included in this review will serve as a useful resource for future strategies involving plant breeding and fungicide design.

**Keywords:** phospholipase C; plants; biotic stress resistance; fungal development; signaling pathways



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## ABSTRACT 07

### Diseases of Underutilized Crops in Guizhou Province, China

Yong Wang

Department of Plant Pathology, Agricultural College, Guizhou University, Guiyang, 550025

Guizhou Province is located in southwest China with a total area of 176200 square kilometers and the cultivated land is very limited. Thus, this also created their unique agricultural industrial structure, that is, paying attention to the development of underutilized crop industry. Here we introduced different types of underutilized crops of Guizhou Province. By 2022, the Sorghum planting area in the province will be 4 million mu. At present, the walnut forest area of the whole province is 3.79 million mu. As the main traditional production area of Coix, Guizhou ranks first in the planting area and output. In 2020, the planting area of buckwheat will reach 1 million mu. Besides that, different bean crops are also very important for Guizhou's agriculture industry. For millet, peanut and waxy corn, they are planted with relative small scales. After investigation, we found for sorghum the four main diseases were purple spot, smut, leaf blight and spot. There were leaf spot, leaf blight, fruit dry rot and dieback diseases in walnut. Coix plant was usually attacked by three diseases, viz. leaf blight, smut and sheath blight which can be observed the sclerotium from the stem with high humidity. Millet was mainly invaded by downy mildew and leaf spot. Buckwheat was only observed one disease, leaf spot. Bean crops were often harmed by leaf rust, stem blight, leaf spot and downy mildew. Peanut diseases included brown spot, scorch spot and sclerotium blight. For some diseases, we also identified the pathogens by morphological description and phylogenetic analyses.

**Keywords:** disease, Guizhou, identification, underutilized crops



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## ABSTRACT 08

### Harnessing the Potentials of Shea Butter Plant (*Vitellaria paradoxa* C.F. Gaertn.) in the Nigerian Economy

<sup>1</sup>Nwawe, C.N, <sup>1</sup>Garba, I.D, <sup>1</sup>Bankole, A. S, <sup>2</sup>Nwawe, A. C and <sup>1</sup>Abu, R.A

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Benin City, Edo State, Nigeria

This article reviewed the shea butter industry in Nigeria with deliberate emphasis on the major aspect of the crop which includes the production, export situation, utilization, value chain, challenges of the industry as well as government interventions. Nigeria has the largest population of shea trees among the 21 countries in Africa where the trees grow. Although this is a comparative advantage for Nigeria, the shea industry is grossly underdeveloped and yet to fully realize its potential. There has been no record of shea tree cultivation among farmers. The trees grow wild and can be found in 23 states across south west, central and northern Nigeria. The tree population is decreasing at an alarming rate due to tree cutting for charcoal and commercial agriculture. Fallow systems for natural regeneration are lost due to increasing population and pressure on the land. No doubt, the crop is grossly underutilized in Nigeria because of the low level of awareness. The shea sub sector has the potential to accelerate the pace of economic growth and development of the Nigerian economy if adequately harnessed. There is an urgent need to protect the existing trees, improve natural regeneration management and develop nurseries with improved planting materials and also create awareness on the investment opportunities in the shea butter industry.

**Keywords:** Shea butter, potentials, utilization, value chain, harnessing



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## ABSTRACT 09

### Genetic Diversity of Winged Bean Genepool in Thailand

**Kularb Laosatit<sup>1</sup>, Kitiya Amkul<sup>1</sup>, Sompong Chankaew<sup>2</sup> and Prakit Somta<sup>1</sup>**

<sup>1</sup> Department of Agronomy, Faculty of Agriculture at Kamphaeng Saen, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand

<sup>2</sup> Department of Agronomy, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand

Winged bean [*Psophocarpus tetragonolobus* (L.) DC.] is an underutilized legume crop with seeds, young pods, young leaves and tuberous root are edible. Seeds of winged bean contain high proteins (32–37%) and oil (14–25%), and thus has been referred as ‘soybean of the tropics’. Although the center of origin, diversity and domestication of winged bean are still debatable, South and Southeast Asia is the major cultivation area of this legume. In this study, we assessed genetic diversity and population structure of 457 winged bean cultivars of Thailand using simple sequence repeat (SSR) markers. In total, only 55 alleles were detected by 14 SSR markers. Observed heterozygosity was relatively high, while gene diversity was moderate, being 0.150 and 0.487, respectively. The estimated out-crossing rate was relatively high, being 16.4%. STRUCTURE analysis revealed three sub-populations of the 457 winged bean cultivars, cluster analysis revealed two major clusters of all the cultivars. Genetic groups identified by both STRUCTURE and NJ analyses were unrelated to geographical origins of the cultivars. Principal coordinate analysis showed that winged bean cultivars from different regions widely distributed and overlapping. Majority of winged bean cultivars having long pods or purple seed coats or purple young pods were grouped together, suggesting that the winged beans with long pods or with purple seed or purple young pods may have a single origin. These results demonstrated that winged bean cultivars in Thailand had a moderate diversity with high genetic admixture.

**Keywords:** winged bean; *Psophocarpus tetragonolobus*; underutilized crop; diversity

\*Note: A version of this work has been previously published in the Horticultural Plant Journal (<https://doi.org/10.1016/j.hpj.2021.05.001>)





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## ABSTRACT 10

### Resent Status on Bambara Groundnut Research in Brawijaya University

**Kuswanto**  
Universitas Brawijaya

Bambara groundnut is underutilized crop in Indonesia. It usually derived from marginal lands and had drought tolerant. Formally, the potential unknown and rarely used as an object of research, although local community was already well known. As genetic material, bambara groundnut is future food crops and sources of nutrition, so it contributes to better food diversity and nutrition. Research of Bambara groundnut in University of Brawijaya since held 2000s. Germplasm exploration and selection had gotten 189 accessions and selected to get 50 potential lines that have distinct characters and enough seeds. All line goes to segregates, so purification must be continued. There were 5 groups relationship among selected lines base on morphological and molecular character. Clustering based on morphological characters produced a dendrogram with similarity coefficients of 0.33 to 1.00. At a similarity coefficient of 0.52 there were two main clusters. RAPD data have a low justification for their genetic relationship, but it is appropriate to find variability to determine the candidates for superior parents. These lines have genetic variability, on morphological characters include seed color and stomata density. The first purification, indicate variability within lines still more than 25%, and continued second step. Single seed descent method improves uniformity within lines and get high similarity. All 30 lines be evaluated to get varieties have drought tolerant, early flowering, tolerant to pest and disease, high nutrition and preference consumer and market. The 10% PEG was the most suitable concentration to select Bambara groundnut lines for drought tolerance and got 5 varieties candidates. Evaluation in dry and rainy season had gotten information about adaptation and full description.



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## ABSTRACT 11

### Diversity of Agronomic Characters of Pigeon Pea (*Cajanus cajan* (L) Millsp.) Genetic Resources

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Genetic resources have an important role in breeding activities. Characterization is needed to classify genetic resources collection based on special characters such as days to maturity, number of pods per plant and yield. The objective of this study was to classify 60 accessions of pigeon pea genetic resources collection from Indonesian Legume and Tuber Crops Research Institute (ILETRI) using principal component and cluster analysis. Sixty accessions of pigeonpea were planted in Muneng Research Station, East Java during dry season in 2018. Each accession was planted in two rows of 4 m length with 100 cm x 20 cm of row spacing, 1 plant per hole. The observed characters included 13 quantitative characters and 12 qualitative characters based on the descriptor. Results showed that sixty pigeonpea accessions of ILETRI germplasm collection were divided into four groups, each consist of 1, 3, 5, and 51 accessions. The total variety of observation variables was 76,7% which was explained by 8 factors, namely flowering age, maturity age, number of flowers in racheme, length of pods, number of seeds per pod, 100 seed weight, weight per plot and plant height.

**Keywords:** Diversity, cluster analysis, genetic resources, pigeon pea



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## ABSTRACT 12

### Promoting Foxtail Millet [*Setaria italica* (L.) P. Beauv] in Indonesia

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Foxtail millet [*Setaria italica* (L.) P. Beauv] is a highly potential cereal crop that can be developed as a source of carbohydrate in marginal areas. In some parts of Indonesia, foxtail millet has been consumed daily as complement of traditional food and determined as a local-base dietary diversity that is stated in Government Regulation No. 22 2009 about food diversification. This research project was a sequel research on Foxtail millet as a potentially healthy cereal and potentially adaptable to climate change. The purpose of this study is to evaluate the potency of Foxtail Millet and to promote its development for supporting food security in marginal lands. The research project covering 1) Exploring *Setaria* resources from some parts of Indonesia, where they still be consumed by local people, 2) Understanding the morphological, physiological, agronomical characteristics to improve yields and its adaptability to sub optimum environments 3) Analysing the nutritional quality as food 4) Providing a wider genetic variation by creating mutation and 5) Promoting its cultivation and marketable products creations to local communities. The results concluded that Foxtail millet is a promising underutilized cereal that can be promoted for supporting food security in marginal areas considering the high quality of food nutritions, high adaptability to sub-optimal conditions, relatively simple requirements for its cultivation, adequate availability of genetic resources as local-base agricultural biodiversity, and the good acceptability of local communities to this crop.

**Keyword:** Promoting, Foxtail millet, food, adaptability, marginal areas



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## ABSTRACT 13

### Induction Mutation and In Vitro Selection to Improve Drought Tolerant in Soybean Local Variety

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Drought stresses negatively affecting soybean, drought is considered as the most limiting factor in terms of yield losses encountered. It is an important strategy to overcome the drought associated problem by selecting and developing drought tolerant varieties soybean (*Glycine max* (L) through induction mutation and *in vitro* selection. The objectives of this research were to evaluate the response of somatic embryo mutant lines under *in vitro* culture using 0% and 20 % Polyethylene Glycol (PEG). Grobogan local variety was used as parent in this study. Somatic embryo of soybean mutant lines were produced from soybean Grobogan local variety by gamma irradiation on seed treatments with dose 0 and 300 GY. These mature embryo of seeds mutant lines involved two control : drought tolerant of Dering variety, and parent control of Grobogan variety that were cultured on MS medium liquid with growth regulators combination (2,4-D 3mg, NAA 3mg, and TDZ 1mg) and with two treatments, PEG 0% and PEG 20%. The explant was grown for 4 weeks then was sub-cultured on MS media with a combination of growth regulators (NAA 1mg, BAP 2mg, and TDZ 1mg) and observed to form plantlet. The result showed that the mutant lines of 3GB had the highest somatik embryo under 20 % PEG (MW 6000) condition. Mutant Grobogan 300 Gy produced higher plantlet under PEG 20% stress condition compare than control national variety Dering.

**Keywords:** Soybean mutant Grobogan; Mutagenesis; embryo somatic; Growth regulators; drought tolerant.



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## ABSTRACT 14

### Taxonomic and Phylogenetic Studies of *Colletotrichum* on Medicinal Plants in southwest China

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During 2017 to 2019, 152 *Colletotrichum* isolates associated with symptomatic tissues of Medicinal Plants were isolated from southwest China (Guangxi, Guizhou, Sichuan and Yunnan). Morphological, multi-locus phylogenetic analyses (*ACT*, *ApMat*, *CAL*, *CHS-I*, *HIS3*, *GAPDH*, *GS*, *ITS* and *TUB2*) and pairwise homoplasy index (PHI) test revealed 19 species belonging to six *Colletotrichum* species complexes, including Acutatum (*C. rosaceae*), Boninense (*C. boninense*, *C. celtidis* and *C. karstii*), Destructivum (*C. tabacum*), Gloeosporioides (*C. cordylinicola*, *C. fructicola*, *C. gardenia*, *C. gloeosporioides*, *C. grossum*, *C. hostae*, *C. ligustrumae*, *C. siamense*, *C. nanningensisi* and *C. yangzhouense*), Orchidearum (*C. pipper-sarmentosuma*, *C. plurivorum* and *C. vittalense*), and Truncatum (*C. truncatum*), while more than 50% were in *C. gloeosporioides* species complex. More importantly, this study differentiated seven new species, namely *C. rosaceae*, *C. gardenia*, *C. hostae*, *C. ligustrumae*, *C. nanningensisi*, *C. yangzhouense* and *C. pipper-sarmentosumae*.

**Key words:** *Colletotrichum*; Medicinal plant; Multi-loci phylogeny; Taxonomy



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## ABSTRACT 15

### **Histone deacetylase *SbHDT701* in *Sorghum bicolor* reveals functions in response to stress factors by enhancing acetylation**

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Histone acetylation plays important roles in eukaryotic chromatin modification and gene expression regulation. Acetylation levels are modulated by histone deacetylases (HDACs), which function as key epigenetic factors that regulate gene expression in response to various stresses. *HDT701*, a member of the HD2 subfamily of HDACs, plays crucial roles in plant responses to abiotic stress and pathogen infection. Here, we analysed the expression pattern of *SbHDT701* in sorghum. Real-time fluorescence quantitative PCR (RT-qPCR) results showed that expression of *SbHDT701* was tissue-specific, and up-regulated under drought (D-mannitol) and salt (NaCl) stresses. We also determined the optimal expression conditions for *SbHDT701* protein accumulation, and successfully expressed and purified *SbHDT701* protein. Besides, overexpression of *SbHDT701* in *Escherichia coli* could promote the growth of recombinant cells under abiotic stress. *SbHDT701* expression in *E. coli* also increased acetylation modification levels following treatment with 750 mM NaCl, and 100 mM or 300 mM D-mannitol. In summary, the sorghum *SbHDT701* mediates stress responses by enhancing acetylation modification levels.

**Keywords:** Histone deacetylase, *SbHDT701*, *Sorghum bicolor*, stress response, acetylation modification



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## ABSTRACT 16

### Determination of K Fertilizer Rate for Young Okra Fruit Production

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Okra is a nutrient-rich vegetable crop but it is still limited known and consumed by Indonesian people. Okra can be considered as functional food/vegetable because it contains high concentration of soluble dietary fiber in the form of mucilage. Okra is also known has the function to control high blood sugar. The plant is easy to grow, therefore the cultivation technology can be disseminated to wider community. Production of young okra fruit can be improved through fertilizing. The aim of the study is to evaluate the effect of K fertilizer for production and quality of young okra fruit and to determine the optimum rate of K fertilizer. The experiment was conducted in November 2019 to March 2020 at IPB experimental field at Cikarawang, Dramaga, Bogor. The experiment used randomized complete block design with 1 factor and 4 K doses (0, 75, 150, and 225 kg KCl ha<sup>-1</sup>) with 4 replications. Zahira variety with red color of pod was used. The result showed that rates of fertilizer did not affect plant morphological characters, fruit production and fruit quality, except plant height at 13 weeks after planting. The linear regression analysis showed that fruit production increased with increasing rates of KCl with strong correlation between KCl rates and fruit production ( $r=0.9741$ ). The optimum rate of K fertilizer cannot be determined yet.

**Keywords:** *Abelmoschus esculentus* (L.) Moench, red okra, fruit nutrients



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## ABSTRACT 17

### Drought Tolerant Screening of Red Rice Landraces from Madura at Early Stages Using PEG 6000

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Rice is an of important stable food consumed by more than half of the world population. In Madura most farmer still using their local varieties called landraces for many different types of rice. Since most of the growing season is depend on the rainfall, those landraces are expected to become valuable candidates to provide some useful genes related to drought tolerant. The aim of this research is to select drought tolerant accessions candidates of red rice derived from pure lines selection at early stages using PEG 6000. Randomized complete block design (RCBD) was used with two factors and three replications, the first factor was genotypes used and the second factor was two levels of PEG 6000 concentration (0% and 25%). The results showed that there were different responses in all genotypes used in term of their response to PEG 6000 screening. Sprouts length, seminal root length, shoot length, seminal root dry weight, and shoot dry weight reduced by the application of PEG 6000 compared to non-PEG 6000 media. Two genotypes have better response to PEG 6000 treatment compared to check tolerant (Salumpikit), and those two genotypes are expected to become our valuable resources to provide some useful genes related to drought tolerant for further breeding activities.

**Keywords:** Early screening, local varieties, red pericarp





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## ABSTRACT 18

### Expression Analysis Reveals that Sorghum Disease Resistance Protein *SbSGT1* is Regulated by Auxin

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SGT1 (suppressor of the *skp1 G2* allele) is an important plant disease resistance-related protein, which plays an important role in plant resistance to pathogens and regulates signal transduction during the process of plant disease resistance. In this study, we analyzed the expression profile of *SbSGT1* in sorghum under phytohormones treatment. Quantitative real-time PCR results showed that *SbSGT1* was most expressed in sorghum leaves, and could respond to plant hormones such as auxin, abscisic acid, salicylic acid, and brassinolide. Subsequently, we determined the optimal soluble prokaryotic expression conditions for *SbSGT1* and purified it using a protein purification system in order to evaluate its potential interactions with plant hormones. Microscale thermophoretic analysis showed that *SbSGT1* exhibited significant interactions with indole-3-acetic acid, IAA, with a  $K_d$  value of 1.5934. Furthermore, the transient expression of *SbSGT1* in *Nicotiana benthamiana* indicated that exogenous treatment with auxin could inhibit *SbSGT1* expression both at the transcriptional and translational level, showing that there exists an interaction between *SbSGT1* and auxin.

**Keywords:** *SbSGT1*, auxin, interaction, expression, plant hormones



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## ABSTRACT 19

### The cytochrome P450 superfamily: Evolutionary and Functional Divergence in *Sorghum (Sorghum bicolor)* Stress Resistance

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Cytochrome P450 (*CYP*) genes encode enzymes that catalyse various growth-, development- and stress-related reactions. *Sorghum (Sorghum bicolor)* is a type of C4 plant and an important cash crop. However, systematic identification and analysis of functional differentiation and evolution of *CYP* genes has not been carried out in this species. In the present study, we revealed that the sorghum genome contains 351 *CYP* genes, which can be divided into nine classes. These genes are from ancestors and repeated segments, rather than tandem repeats. Based on collinearity results, a large number of *CYPs* were extended before cotyledon differentiation, during the emergence of Gramineae, suggesting that genome-wide duplication events and stress adaptation processes were important for the expansion of *CYP* genes. Their gene structure and motifs contain conserved regions and included various changes and loci. The expression characteristics and functional annotation of *CYP* genes indicated tissue specificity and selective expression. Overall, we identified all *CYP* genes in the sorghum genome, and preliminarily explored their naming, structure, evolution, expression, and functional differentiation. The results advanced our understanding of plant gene family evolution and functional differentiation.

**KEY WORDS:** Cytochrome P450; genome-wide; evolution analysis; functional analysis;  
*Sorghum bicolor*



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ABSTRACT 20

## Phylogeny of *Alternaria* spp. from medicinal plants in Southwest of China

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The genus *Alternaria* can cause diseases on a wide range of important plants. As *Alternaria* have significant negative effects on plants. Correct identification of *Alternaria* species would be a great task to mycologists and plant pathologists. To get a good understanding of *Alternaria* diversity in Southwest China, five hundred specimens of medicinal diseased samples were collected from Sichuan, Guizhou, Yunnan, and Guangxi provinces. A total of 68 *Alternaria* isolates were obtained during 2018-2020. We used seven gene regions for phylogenetic studies, and their amplification rates and parsimony-informative characters are higher than in previous studies. The analysis of nucleotide sequences of the ITS region revealed 61 isolates isolated from medicinal plants, followed by LSU (59), SSU (57), *gapdh* (60), *tef1* (59), *rpb2* (53), and *At-I-a* (61). After morphological studies and phylogenetic analysis eight new, three reported, and 20 suspected species were identified. The newly identified species are as follows: *A. paraalstroemeriae* (GUCC21586.3), *A. paraarborescens* (GUCC21600.1), *A. paratenuissima* (GUCC21601.4), *A. paraburnsii* (GUCC21519.11), *A. pseudoarborescens* (GUCC21103.2), *A. pseudoagaisen* (GUCC21126.4), *A. disarborescens* (GUCC2179.5), and *A. pseudoalstroemeriae* (GUCC21593.6). Three species, *A. arborescens*, *A. limoniasperae*, and *A. burnsii*, are known species. This study detailed the diversity of *Alternaria* species in the Southwest China and the relationship between these fungi and host plants, which should provide important references in disease control and resource application.

**Keywords:** *Alternaria*; ITS; SSU; LSU; identification, multi-gene phylogeny; taxonomy; medicinal plants.



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## ABSTRACT 21

### Bringing *Garcinia Sp* from the Forest to International Market Through Community Based-Biodiversity Management (CBM)

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This paper is part of the activities on "Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity, concern on *Garcinia* species in Indonesia. This underutilized species grow on buffer zone in the forest of Sijunjung district-West Sumatra, not well maintained and in danger of extinction by rapid genetic erosion due to habitat destruction, agricultural expansion, conversion of land for settlement, and uncontrolled exploitation. The objectives of the activities are to conserve and use the *Garcinia* for sustainable Livelihoods, Food Security and Ecosystem Services. The main activity is managing *Garcinia* genetic resources through conservation and utilisation by implementation of Community Based-Biodiversity Management (CBM). The activities including: 1. Document the agreed procedures for managing local genetic resources among key stakeholders, 2. Identify local community-based organization (CBOs) for implementing farmers information database, 3. Recognizing and promoting local genetic resources through diversity fair, 4. Nursery community development, 5. Community Based Register (CBR), 6. Seedlings distribution and planting *Garcinia sp* in the field, 7. The sustainable use *Garcinia sp*, and 8. Linking farmers to the market. At the third year of activities the local community has produced Garci-tea, the unique product of *Garcinia atroviridis*. The CBM successful in creating new job in rural areas and bringing the local genetic resources, *Garcinia atroviridis*, from the forest to international market. The implementation of CBM in Sijunjung, West Sumatra could be used as a pilot project on management of local genetic resources.

**Keywords:** *Garcinia sp*, CBM, conservation, utilisation, sustainable



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## ABSTRACT 22

### Inventory and Ethnobotanic Study of the Eggplant-Related Species from Various Regions in Indonesia

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Abstract. Species of *Solanum* subgenus *Leptostemonum* are present in Indonesia, and eggplant in particular, belonging to this group, is a popular vegetable on Indonesian markets. We have initiated an inventory of *Solanum* species of the subgenus *Leptostemonum* on twelve sites in this country. Here we describe this collected species and give a short description of the species we identified in the field. Main morpho-agronomical characteristics and the ethnobotanic uses of 12 different species of this subgenus are presented in this paper.