



ICSAE-X

The 10th International Conference on
Sustainable Agriculture and Environment
17-18 October 2023 | Surakarta, Indonesia

Programme and abstract book

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- **This conferece held by:**
Research and Development Center for Biotechnology and
Biodiversity (P3BB) Universitas Sebelas Maret

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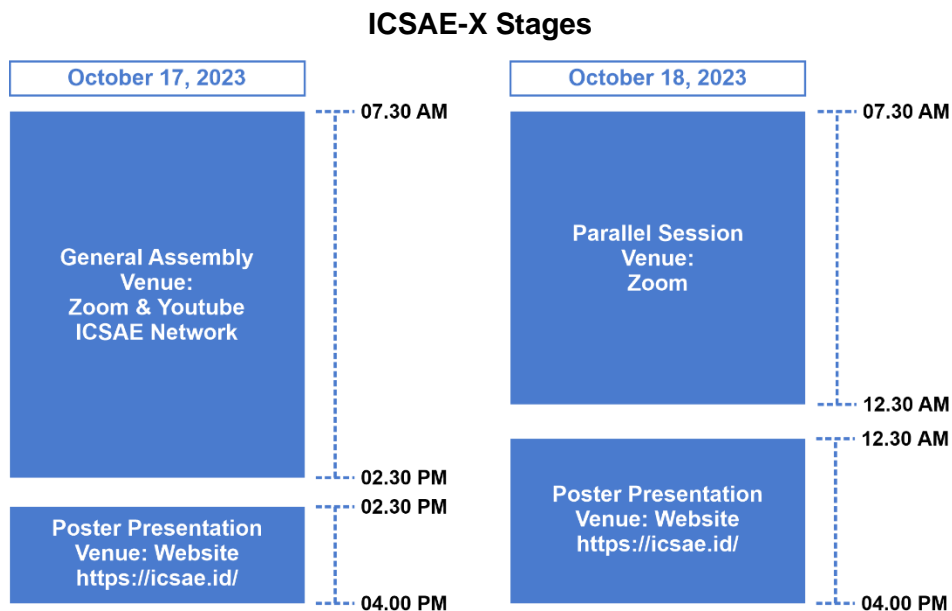
| Conference Guide

As informed, ICSAE-X will be held online. There are two different sessions in this conference, namely general assembly and parallel session.

The general assembly, invited speakers talk, will be performed through Zoom meeting and streamed via Youtube ICSAE Network. The parallel session can be accessed through Zoom for oral presentations and Website <https://icsae.id> for poster presentation.

Both stages can be enjoyed by all participants which are listed and/or invited with the following time frame:

1. General assembly : October 17, 2023
2. Parallel session : October 18, 2023



| General Assembly Session Guide

The ICSAE-X general assembly will be held on October 17, 2023. Invited speakers talk, will be performed through Zoom live meeting, all authors can join and participate in the session. General assembly rundown will be on the next page.

During the general assembly, please follow the rules below.

- All authors listed in the manuscript can freely join in the general assembly
- During Zoom meeting, Participants are required to using proper ID indicating the real name
- Please use virtual background which will be share by committee a day before conference
- The attendance form will be shared by the committee during the conference, participants must fill the form to get participant certificate
- Please mute the microphone to avoid noise distraction
- The participants are welcome to ask the question via chatroom with the following format (Name_Affiliation_To Whom_Question)

| General Assembly Rundown

Date 17 October 2023

Link : <https://uns.id/GA-ICSAEX>

Meeting ID : **940 4174 3259**

Passcode : **444380**

SESSION	TIME (GMT+7)	ACTIVITIES	PERSON IN CHARGE
Opening	07.30-08.00	Registration and preparation	Committee
	08.00-08.05	Opening	MC
	08.05-08.10	Indonesian National Anthem	Committee
	08.10-08.16	Welcome Address	Dean Faculty of Agriculture, Universitas Sebelas Maret
	08.16-08.22	Greeting to Participant	Head of the Institute of Research and Community Services, Universitas Sebelas Maret
	08.22-08.30	Opening Remarks	Vice Rector for Academic and Student Affairs, Universitas Sebelas Maret
Invited Speaker 1	08.30-08.35	Preparation and announcements	MC
	08.35-09.15	Talk of Dr. Ahmed Amin Elfeky (Cairo University, Egypt)	Moderator
	09.15-09.30	Q n A	Moderator
	09.30-09.35	Closing for Session 1 and remarks	Moderator
Invited Speaker 2	09.35-09.40	Preparation and announcements	MC
	09.40-10.20	Talk of Dr. Omar Khadeer Hussain (The University of New South Wales, Australia)	Moderator
	10.20-10.35	Q n A	Moderator
	10.35-10.40	Closing for Session 2 and remarks	Moderator
Invited Speaker 3	10.40-10.50	Preparation and announcements	MC
	10.50-11.30	Talk of Dr. rer. nat. Nurhadi (Universitas Sebelas Maret, Indonesia)	Moderator
	11.30-11.45	Q n A	Moderator
	11.45-11.50	Closing Session 3 and remarks	Moderator
Break	11.50-13.00	Announcements and break	Committee
Invited Speakers 4	13.00-13.15	Preparation and announcements	MC
	13.15-13.55	Talk of Anna-Maria Brunner, M.Sc. (Universität Innsbruck, Austria)	Moderator
	13.55-14.10	Q n A	Moderator
	14.10-14.15	Closing remarks	Moderator
Closing	14.15-14.30	Announcements and closing	MC

| Parallel Session Guide

The parallel session will be held on October 18, 2023. Author can choose preferable presentation methods, either Oral or Poster presentation.

For oral presentation, authors should prepare and submit a pre-recorded video presentation. While, for poster presentation, authors should prepare and submit digital poster. Below are the guidelines for parallel sessions.

1. Oral Presentation

Presentation schedule and Zoom Link are available on the page next page.

On the conference day, the Committee will play video presentations in parallel for every 3 presenters. It will be continued with live discussion for 5 minutes led by Room Chair. Thus, we hope that all authors join the Zoom room during parallel session. Oral presentation schedule will be provided on the next page.

Please note that a presenter certificate will be given to the presenter recorded in the video. Another author who joined the parallel session will get a participant certificate. Presented manuscript and listed author will receive a manuscript certificate.

2. Poster Presentation

Digital poster shows will be provided in the Zoom Meeting during the break time and can be accessed through the conference website (<https://icsae.id>). Discussion can be done by commenting on the web page.

Please note that a presenter certificate will be given to the presenter previously selected in the EasyChair platform. Presented manuscript and listed author will receive a manuscript certificate.

| Oral Presentation Schedule

Room 1. Agricultural Systems: Biodiversity, production and technology

Date : 18 October 2023

Place : Zoom Meeting

Link : <https://uns.id/ICSAEX-room1>

Meeting ID : 992 1409 6644

Passcode : 724269

Time (GMT+7)	Activities/ID	Title
7:30 - 8:00	Presenters and participants enter the breakout room	
8:00 - 8:10	Opening by Room Chair	
8:10 - 8:17	ID 5	Biodiversity of Medicinal Plants Utilized in Traditional Treatment for Asthenia in 8 Provinces of Indonesia <i>Nuning Rahmawati</i>
8:17 - 8:24	ID 6	Exploration and characterization of johar (<i>Cassia siamea</i>) accession as a source of raw materials for antimalaria drug <i>Yuli Widiyastuti, Dyah Subositi and Sari Haryanti</i>
8:24 - 8:31	ID 14	The Aerial Root Role in Avoiding Growth Collapse When Terrestrial Root Dysfunction on Vanilla (<i>Vanilla Planifolia</i> A.) <i>Joko Pitono, Ruhana, Desta Wirnas, Muhammad Syakir, Setiawan and Emi Sugartini</i>
8:31 - 8:36	Discussion	
8:36 - 8:43	ID 18	Induction of Genetic Diversity in the Soybean Gepak Kuning Cultivar and M.1.1.3 line using Ethyl Methane Sulfonate in M1 Generation <i>Nilahayati Nilahayati, Rd. Selvy Handayani and Nazimah N</i>
8:43 - 8:50	ID 20	Comparative growth response of three rubber (<i>Hevea brasiliensis</i> Muell. Arg) clones in somatic embryo propagation <i>Juwartina Ida Royani, Noorwitri Utami and Hayat Khairiyah</i>
8:50 - 8:57	ID 25	Genetic variability and relationship of agronomic characters of soybean lines in tidal swamp land <i>Heru Kuswantoro, Purwantoro Purwantoro, Joko Purnomo, Jumakir Jumakir, Waluyo Waluyo and Suparwoto Suparwoto</i>
8:57 - 9:02	Discussion	
9:02 - 9:09	ID 27	Detection of Jintan hitam (<i>Nigella sativa</i> L.) Adulteration using RAPD Molecular Markers in Traditional Markets in Surakarta and Yogyakarta <i>Dyah Subositi, Joice Joice, Exsyupransia Mursyanti, Harto Widodo and Yuli Widiyastuti</i>
9:09 - 9:16	ID 36	Selection Of Local Maize Resistance To Fall Armyworm (<i>Spodoptera frugiperda</i> J.E. SMITH). <i>Didik Sudiharjo, Samanhudi Samanhudi, Sholahuddin Sholahuddin, Bambang Pujiasmanto, Muji Rahayu and Andriyana Setyawati</i>
9:16 - 9:23	ID 41	Diversity of Endophytic Fungi in The Roots and Stems of <i>Baccaurea brevipes</i> Hook.F. in Protected forest Langsa, Indonesia <i>Sara Gustia Wibowo, Zidni IIman Navia and Tisna Harmawan</i>
9:23 - 9:28	Discussion	
9:28 - 9:35	ID 43	The Growth of Biofortified Mustard Green Plants with Iron and Zinc through Foliar Spray

		<i>Armelia Rezkita Setyoningsih, Samanhudi Samanhudi, Amalia Tetrani Sakya, Supriyono Supriyono and Andriyana Setyawati</i>
9:35 - 9:42	ID 56	The effect of gamma ray re-irradiation on genetic variations in black rice based on RAPD and Bph gene resistance location based on SSR markers <i>Ramadhanti Puteri Bachtari, Ari Susilowati and Sutarno</i>
9:42 - 9:49	ID 59	Morphological Characterization of Sirih Cina (<i>Peperomia pellucida</i> L.) in Three Altitudes of the Surakarta Ex-Residency <i>Hardian Ningsih and Fara Cahyawati</i>
9:49 - 9:54	Discussion	
9:54 - 10:24	Announcements and break session	
10:24 - 10:30	Opening by Room Chair	
10:30 - 10:37	ID 63	Morpho Physiological Response of T1 Rice cv. Mentik Wangi Results of Sd1 and Gn1a Gene Editing <i>Tilmiidzah Salma Fathin, Atmitri Sisharmini and Ahmad Yunus</i>
10:37 - 10:44	ID 79	Growth Response of Mustard Greens (<i>Brassica juncea</i> L) to Nutrient Formulations in Hydroponic Media <i>Emi Sugiartini, Joko Pitono, Rini Rosliani, Kiki Kusyaeri Hamdani, Setiawan Setiawan and Darwin Taulabi</i>
10:44 - 10:51	ID 81	Comparing the population, diversity, and phosphate solubilization ability between rice-root endophytic bacteria and rhizospheric-soil bacteria from organic wetland <i>Vita Ratri Cahyani, Anida Hasna Noor Fadhilah, Azriel Rahmatul Nabawi and Fidelia Putri Bellyanda Krisdhiarto</i>
10:51 - 10:56	Discussion	
10:56 - 11:03	ID 82	Incidence of viral disease mosaic symptom and vector insects presence in several soybean varieties in pine agroforestry system <i>Supyani, Dwiwiyati Septariani and Martyas Cahya</i>
11:03 - 11:10	ID 84	Low-Cost Shoot Propagation Of Pineapple (<i>Ananas comosus</i> L. Merr) CV Queen Using GANDASIL-D And AB-MIX <i>Rosmaina Rosmaina, Ali Mufadillah, Syukria Zam and Zulfahmi Zulfahmi</i>
11:10 - 11:17	ID 87	The effect of using biofertilizer on the growth of vanilla (<i>Vanilla planifolia</i> Andrews) seedlings <i>R Soelistijono and Haryuni Harryuni</i>
11:17 - 11:22	Discussion	
11:22 - 11:29	ID 89	Infection of Phakopsorapachyrhizi Rust Fungus on Seven Soybean Varieties in Pine and Mahogany Agroforestry <i>Susilo Hambeg Poromarto, Supyani and Indri Yana Yuniati</i>
11:29 - 11:36	ID 93	Genetic distance analysis of Lingnan, Arab and Kedu chicken based on mitochondria DNA <i>Galih Pambuko, Muhammad Hendi Pratama, Rahayu Kusumaningrum, Nuzul Widyas, Adi Ratriyanto, Lanjar Sumarno and Sigit Prastowo</i>
11:36 - 11:43	ID 96	Diversity and genome classification of banana (<i>Musa</i> spp.) at Kuantan Singingi District - Riau Province <i>Zulfahmi Zulfahmi, Pungki Hrmawati, Penti Suryani and Rosmaina Rosmaina</i>
11:43 - 11:48	Discussion	
11.48 - 12:03	Closing parallel session	

Room 2. Agricultural Systems: General agriculture

Date : October 18, 2023

Place : Zoom Meeting

Link : <https://uns.id/ICSAEX-room2>

Meeting ID : 924 5545 6341

Passcode : 801841

Time (GMT+7)	Activities/ID	Title
7:30 - 8:00		Presenters and participants enter the breakout room
8:00 - 8:10		Opening by Room Chair
8:10 - 8:17	ID 3	The role of Dopamine Receptor Family on cattle behaviour: an in silico study <i>Trisianto Nugroho and Sigit Prastowo</i>
8:17 - 8:24	ID 23	The Use of Biostimulant in Javanese Curcuma (<i>Curcuma xanthorrhiza</i> Roxb) Cultivation to Increase Production Competitiveness <i>Noorwitri Utami, Daru Mulyono, Akhmad Jufri and Armelia Tanjung</i>
8:24 - 8:31	ID 30	Analysis of Growth Factors and Main Inhibitors of Agropolitan Areas in Semarang Regency <i>Kristiana Widiawati, Darsono Darsono, Kusnandar Kusnandar and Sri Marwanti</i>
8:31 - 8:36		Discussion
8:36 - 8:43	ID 33	Status of soil quality in various agroforestry systems in Banyurip Jenar Sragen <i>Supriyadi Supriyadi, Purwanto Purwanto, Sri Hartati, Margaretha Maria Alacoque Retno Rosariastuti, Gadis Mona Prinandhika and Widya Aryani</i>
8:43 - 8:50	ID 34	The relation of macrofauna and soil organic carbon in Sacha Inchi cropping patterns in Sragen Regency <i>Widya Aryani, Supriyadi, Widyatmani Sih Dewi and Purwanto</i>
8:50 - 8:57	ID 40	Net assimilation rate and relative growth rate of amaranth (<i>Amaranthus tricolor</i> L.) varieties on urea fertilizer application <i>Fevi Catur Wulansari, Edi Purwanto, Muji Rahayu and Amalia Tetrani Sakya</i>
8:57 - 9:02		Discussion
9:02 - 9:09	ID 44	The evaluation of Indigofera seed production and quality in different environments <i>Elly Dianita Sari, Luki Abdullah, Nur Rochmah Kumalasari and Achmad Fanindi</i>
9:09 - 9:16	ID 47	Larvicidal Activity of the Ethyl Acetate Fraction of Ethanol Extract from Liverwort (<i>Marchantia paleacea</i>) Against <i>Athalia proxima</i> <i>Sri Mulyani, Sugiyarto and Artini Pangastuti</i>
9:16 - 9:23	ID 50	Changes of photosynthetic traits on red chili pepper (<i>Capsicum annum</i> L.) exposed by short-term waterlogging <i>Erna Siaga, Dwi Setyo Rini, Jun Ichi Sakagami, Shin Yabuta, Mei Meihana and Santa Maria Lumbantoruan</i>
9:23 - 9:28		Discussion
9:28 - 9:35	ID 57	Resource-based Typology of Agricultural Start-up Companies in ASEAN Countries <i>Kusnandar Kusnandar and Maulana Akbar</i>
9:35 - 9:42	ID 66	Genotype Variation Exploration of Growth Hormone (GH) Gene in Sonok Subpopulation Madura Cattle as a Candidate of Growth Traits Marker in Madura Cattle <i>Marsianus Ian Wilmot Mo'At Semakur, Rahyu Eka Puji Lestari, Nuzul Widyas and Sigit Prastowo</i>

9:42 - 9:49	ID 69	In pursuit of sustainability : A case of irrigated rice fields management practice by traditional farmers in Waikelosawa, Southwest Sumba <i>Carolina and Febtri Wijayanti</i>
9:49 - 9:54	Discussion	
9:54 - 10:24	Announcements and break session	
10:24 - 10:30	Opening by Room Chair	
10:30 - 10:37	ID 91	Utilization of Rhizoctonia mycorrhizae for orchid late blight control in support of sustainable agriculture at Merapi mount <i>R Soelistijono, Daryanti Daryanti, Achmad Fatchul Azies and Herry Sucahyo Utomo</i>
10:37 - 10:44	ID 94	The effect of introducing heat stress on the eating and drinking behavior of laying quail <i>Pisonia Widaya, Adi Ratriyanto and Nuzul Widyas</i>
10:44 - 10:51	ID 97	Effect of green manure on the availability of Phosphorus and Potassium nutrients in Vertisols <i>Suntoro Suntoro, Ganjar Herdiansyah, Hery Widijanto, Azhar Dimas Tjahjanto, Chelyna Puspitasari and Haikal Rafi Wardhana</i>
10:51 - 10:56	Discussion	
10:56 - 11:03	ID 98	Modification of rabbit urine-based liquid organic fertilizer (LOF) on growth, N uptake of corn and N content in sandy soil <i>Parwi Parwi, Muhammad Herlangga, Nurul Izza Taib, Niken Trisnaningrum and Umi Isnatin</i>
11:03 - 11:10	ID 105	Optimalisation of in vitro sterilisation methods for North Sumatran local garlic (<i>Allium Sativum</i> L.) <i>Asep Rodiansah, Mariati Sinuraya, Diana Sofia Hanafiah, Sya'Hraini Syahputri Butar-Butar and Alvian Fauzi Pohan</i>
11:10 - 11:17	ID 16	Study of hygromycin effect for regeneration and transformation of CRISPR/Cas9_gRNA-OsCKX2 cassette into rice genome cv. Mentik susu through Agrobacterium-mediated transformation <i>Fitria Roviqowati, Samanhudi Samanhudi, Tri Joko Santoso, Atmitri Sisharmini, Aniversari Apriana and Ahmad Yunus</i>
11:17 - 11:22	Discussion	
11:22 - 11:34	Closing parallel session	

Room 3. Climate Change and Environment

Date : October 18, 2023

Place : Zoom Meeting

Link : <https://uns.id/ICSAEX-room3>

Meeting ID : 920 6352 1700

Passcode : 116550

Time (GMT+7)	Activities/ID	Title
7:30 - 8:00		Presenters and participants enter the breakout room
8:00 - 8:10		Opening by Room Chair
8:10 - 8:17	ID 9	Performance Of The Growth And Yields Of Some Local Varieties Of Garlic (<i>Allium sativum</i> L.) <i>Evy Latifah, Joko Mariyono, Listy Anggraeni, Lina Aisyawati, Lilia Fauziah, Zainal Arifin Arifin, Amik Krismawati, Baswarsiati Baswarsiati and Setiasih Setiasih</i>
8:17 - 8:24	ID 10	Nutrient content, phytochemical profile and anti-methanogen potential of <i>Cnidioscolus aconitifolius</i> leaf extracts <i>Setiasih Setiasih, Yenny Nur Anggraeny, Evy Latifah, Baswarsiati Baswarsiati, Antonius Antonius, Sigit Puspito, Nurul Istiqomah, Bakhtar Bakrie, Nikamatul Hidayah, Retno Indriatie, Dyah Tuwi Ramsiati, Wardi Wardi and Diding Rahmawati</i>
8:24 - 8:31	ID 12	Efficiency test of insecticide with pirimiphos-methyl and alpha-cypermethrin on <i>Musa domestica</i> using surface spraying method <i>Niken Subekti, Sania Salsabila and Anita Fadhila</i>
8:31 - 8:36		Discussion
8:36 - 8:43	ID 13	Sulfuryl fluoride safe dosage test to mortality of <i>Tribolium castaneum</i> Herbst on corn and rice flour commodities in warehouse <i>Niken Subekti, Nasiha Al Sabrina and Anita Fadhila</i>
8:43 - 8:50	ID 22	The Biochar-Enhanced Phytoextraction of Heavy-Metal-Polluted Tropical Soils by Thorny Amaranth (<i>Amaranthus spinosus</i>) <i>Nur Afni Afriyanti, Nabilah Durotussyifa, Ulfatun Nisa, Hery Novpriansyah, Ainin Niswati, Sarno Sarno and Abdul Kadir Salam</i>
8:50 - 8:57	ID 24	Characterization of microplastic degrading bacteria isolated from the Putri Cempo landfill <i>Retno Rosariastuti, Muhammad Husna and Sutami Sutami</i>
8:57 - 9:02		Discussion
9:02 - 9:09	ID 31	Potential Geographic Distribution of <i>Baccaurea parviflora</i> (Phyllanthaceae): an Underutilization Wild Fruit Plant Species in Sumatra, Indonesia <i>Zidni Ilman Navia, Adi Bejo Suwardi and Tisna Harmawan</i>
9:09 - 9:16	ID 42	Pedological Factors, Classification, Physical-Chemical Properties and Management Strategies of Inceptisols in the Boca Formation of Temanggung (Study: Horticultural Land Management) <i>Lilia Fauziah</i>
9:16 - 9:23	ID 46	Estimation of Carbon Stocks in Collection Zones KGPAAMangkunagoro I Forest Park, Karanganyar <i>Ulayya J. Nugroho, Nadya P. Ekayanti, Yuniar D. Anggraini, Icha Risdiana, Muhammad N. Zaidan, Al K. Z. Mufidah, Malihatun Nufus and Rissa Rahmadwiati</i>
9:23 - 9:28		Discussion
9:28 - 9:35	ID 65	Potential of nitrogen-fixing and phosphate solubilizing bacteria from the rhizosphere soil of dryland indigenous plants <i>Elly Maulida, Ongko Cahyono, Ahmad Yunus and Widyatmani Dewi</i>
9:35 - 9:42	ID 67	Intestinal bacterial composition in laying pullet reared in tropical climate received betaine supplementation <i>Zainudin Al Wahid, Luthfi Adya Pradista, Sigit Prastowo and Adi Ratriyanto</i>

9:42 - 9:49	ID 68	Landslide Hazard Analysis with GIS Approach in Watershed Selorejo Dam, Malang Regency <i>Moh Sholichin, Tri Budi Prayogo and As Dwi Saptati Nur Hidayati</i>
9:49 - 9:54	Discussion	
9:54 - 10:24	Announcements and break session	
10:24 - 10:30	Opening by Room Chair	
10:30 - 10:37	ID 70	Effect of Shade and Water Volume on Proline Content and Growth of Medinilla Plants <i>Intan Christin Dullah, Sulandjari Sulandjari, Edi Purwanto and Amalia Amalia Tetrani Sakya</i>
10:37 - 10:44	ID 73	Incorporating indigineous microbe and adaptive vegetation on volcanic deposits of Mt Semeru: can physical properties be improved? <i>Georona Kusma Albarki, Vannya Julie Sizilia, Sri Rahayu Utami, Zaenal Kusuma and Reni Ustiatik</i>
10:44 - 10:51	ID 80	Analysis of species composition and vegetation conditions of the mangrove ecosystem on Lepar Island <i>Henri Henri, Arthur Muhammad Farhaby and Okto Supratman</i>
10:51 - 10:56	Discussion	
10:56 - 11:03	ID 88	The Effect of Green Vegetation Density in increasing Thermal Comfort in urban environments through preventing increases in Environmental Temperature: A Study in Kapanewon, Depok, Sleman, Yogyakarta, Indonesia <i>Rembanang Anindita, Edhi Martono and Emilya Nurjani</i>
11:03 - 11:10	ID 103	The Effect Of Urban Fringe Vegetation On The Sustainable Environment In Surakarta City <i>Cynthia Permata Sari, Sigit Heru Murti Budi Santosa and Djoko Marsono</i>
11:10 - 11:15	Discussion	
11:15 - 11:30	Closing parallel session	

Room 4. Miscellaneous in Agriculture and Environment

Date : 18 October 2023

Place : Zoom Meeting

Link : <https://uns.id/ICSAEX-room4>

Meeting ID : 961 2021 5902

Passcode : 582481

Time (GMT+7)	Activities/ID	Title
7:30 - 8:00		Presenters and participants enter the breakout room
8:00 - 8:10		Opening by Room Chair
8:10 - 8:17	ID 19	Implementation of Environmentally Friendly Policies in Indonesian Crossing Ports: SLR <i>Adi Agus Setiawan, Didik Gunawan Suharto and Rina Herlina Haryanti</i>
8:17 - 8:24	ID 26	Analysis of Added Value and Market Share in Porang Value Chain in Wonogiri Regency <i>Sugiharti Mulya Handayani, Fanny Widadie, Endang Siti Rahayu, Heru Irianto, Setyowati Setyowati, Mei Tri Sundari and Ferry Rachmanto</i>
8:24 - 8:31	ID 32	Ethnobotany of wild edible vegetable species and their contribution to food security in the Aceh Tamiang region, Indonesia <i>Adnan Adnan, Zidni Ilman Navia, Muhammad Jamil and Adi Bejo Suwardi</i>
8:31 - 8:36		Discussion
8:36 - 8:43	ID 37	Utilization of Medicinal Plant Types by the Community of Wonodadi Village, Pracimantoro District, Wonogiri Regency <i>Erza Oktavi Azzahra, Ana Agustina and Galuh Masyithoh</i>
8:43 - 8:50	ID 45	Business Analysis of Black Ear Mushroom (<i>Auricularia polytricha</i> (Mont.) Sacc.) in Berjo Village, Ngargoyoso District, Karanganyar Regency <i>Ghazy Z. T. Hafizh, Ana Agustina, Yus A. B. Pertiwi, Supriyadi, Aditya W. Syahputra, Anif F. Jannah, Dita Noviyanti, Iffan Tamami, Izmi Jaatsiyah, Rasendriya H. Wicaksono and Sabiqul Marom</i>
8:50 - 8:57	ID 53	The role of entrepreneurs and firm characteristics to the innovativeness level: a study of e-commerce adoption on traditional drink SMEs <i>Nuning Setyowati, Masyhuri Masyhuri, Jangkung Handoyo Mulyo and Irham Irham</i>
8:57 - 9:02		Discussion
9:02 - 9:09	ID 54	The Last Twelve Years Relationship Between SMEs and Environmental Policies: A Bibliometric Approach and Content Analysis <i>Dwi Prasetyani and Ratna Malisa Indriawati</i>
9:09 - 9:16	ID 55	Understanding Digital Divide for Rural Development: Impacts and Drivers <i>Hanifah Ihsaniyati, Sarwititi Sarwoprasodjo, Pudji Muljono and Dyah Gandasari</i>
9:16 - 9:23	ID 62	Productivity of elephant grass pakchong (<i>Pennisetum purpureum</i> cv Pakchong) and Taiwan (<i>Pennisetum purpureum</i> cv taiwan) cultivated based on different stem cutting sizes <i>Achmad Fanindi, Endang Sutedi, Sajimin Sajimin, Iwan Herdiawan and Harmini Harmini</i>
9:23 - 9:28		Discussion
9:28 - 9:35	ID 71	Physicochemical characteristics of consumer preferences in different formulations of couverture chocolate

		<i>Sang Norma Lintang Asmara, Annie Mufyda Rahmatika, Anas Saifurrahman and Alifa Shafa Zahira</i>
9:35 - 9:42	ID 74	Challenges and Innovative Solutions for Securing the Availability and Sustainability of Feed in Maggot Cultivation <i>Liska Simamora, V. Irene Meitiniarti and Damara Dinda Nirmalasari Zebua</i>
9:42 - 9:49	ID 83	Disease Incidence Comparison of Bacterial Pustule on Soybeans in Mahogany and Pine Agroforestry Systems <i>Zahra Haqiqi, Hadiwiyo Hadiwiyo and Susilo Poromarto</i>
9:49 - 9:54	Discussion	
9:54 - 10:24	Announcements and break session	
10:24 - 10:30	Opening by Room Chair	
10:30 - 10:37	ID 85	Disease Incidence of Bacterial Pustules (<i>Xanthomonas axonopodis</i> pv. <i>glycines</i>) on some Soybean Varieties Panted in Mahogany Agroforestry System in Alas Bromo Forestry <i>Hadiwiyo, Supyani and Aprinia Laikha Yahenda Firda</i>
10:37 - 10:44	ID 86	Disease Incidence of Leaf Rust of Soybean Caused by <i>Phakopsora pachyrizi</i> Planted in Mahogany Agroforestry System <i>Susilo Hambeg Poromarto, Supyani and Fransisca Candra Dewi</i>
10:44 - 10:51	ID 90	Leaf Rust Infection <i>Phakopsora pachyrhizi</i> on seven soybean varieties in pine agroforestry system <i>Dwiwiyati Nurul Septariani, Supyani and Miftahul Jannah</i>
10:51 - 10:56	Discussion	
10:56 - 11:03	ID 92	Analysis of Factors Influencing the Profitability of Organic Rice Farming <i>Suswadi Suswadi and Murgan Adi Prabowo</i>
11:03 - 11:10	ID 95	Identification of vanilla plant diseases (<i>Vanilla planifolia</i> . L) in Karanganyar Regency <i>Haryuni Haryuni and Annisa Febi Larasati</i>
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Place : ICSAE website <https://icsae.id/>

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The role of Dopamine Receptor Family on cattle behavior: an in silico study

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Abstract. The Dopamine Receptor (DR) family, which is divided into five subtypes, is implicated in various neurological processes. This paper aimed to analyze the role of the DR family in cattle behavior through an in silico study. Several steps of analysis were carried out. Initially, the five subtypes of DR (DRD1, DRD2, DRD3, DRD4, and DRD5) were filtered from the 'Behavior' or GO:0007610 biological process annotation in the Gene Ontology database (<https://geneontology.org/>). Subsequently, the fifth DR on *Bos taurus* and *Bos indicus* × *Bos taurus* (hybrid cattle) were used as inputs for protein-to-protein interaction analysis using the STRING database (<https://string-db.org/>). Finally, a similarity check of DR nucleotides and proteins among *Bos taurus*, *Bos indicus*, and hybrid cattle was done using BLAST (<https://blast.ncbi.nlm.nih.gov/Blast.cgi>). Results showed that the DR family was associated with 29 types of 'Behavior' biological processes in various species. In *Bos taurus*, the DR protein interactions were divided into two clusters, DRD5-DRD1-DRD2 and DRD3-DRD4. However, in hybrid cattle, all DRDs interacted with each other. Four DRs (DRD2, DRD3, DRD4, DRD5) were found to interact in the 'Behavior' biological process in both *Bos taurus* and hybrid cattle. The nucleotides and proteins of the DR family in the three types of cattle showed more than 99% similarity, except for the DRD3 in hybrid cattle. It is concluded that the DR family plays an important role in cattle behavior. Further association studies are needed to proof this result.

Keyword: protein to protein interaction, biological process, gene ontology

Isolation and characterization of chitosan from black soldier fly exuviae

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Abstract. Black Soldier Fly (BSF) cultivation leaves waste in the form of exuviae which is a new source of chitin and chitosan biopolymers, which can be used for various applications. This study aims to isolate and characterize chitosan from BSF exuviae. Chitosan isolation includes demineralization, deproteination, depigmentation, and deacetylation stages. The results showed that the chitosan in this study was in powder form, odorless, brownish white in color, soluble in 2% acetic acid, 12.46% yield, 88% degree of deacetylation, and the presence of an absorption band in the wave number region of 3443 cm^{-1} indicating the presence of hydroxyl groups and absorption in the wave number region of 1637 cm^{-1} which indicates the presence of amide groups based on the FTIR spectrum. The quality of the chitosan produced meets the quality standards of chitosan according to SNI No.7949-2013.

Keyword: characterization, chitosan, black soldier fly exuviae, isolation

Biodiversity of Medicinal Plants Utilized in Traditional Treatment for Asthenia in 8 Provinces of Indonesia

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Abstract. Asthenia or fitness disorder is a symptom of certain medical conditions characterized by weakness, fatigue, and lack of energy. This ethnobotanical study addressed documenting medicinal plants used by selected traditional healers who met inclusion criteria to overcome asthenia in 21 ethnic groups of 8 Indonesia provinces namely West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, North Kalimantan, Central Sulawesi, South Sulawesi, Maluku, and North Maluku. Data collection was carried out through interviews, observation, and sample collection. This study reported 70 species belonging to 37 plant families which utilized as asthenia treatment, unfortunately, more than 65% of the species have not been cultivated. *Syzygium aromaticum* (L.) Merr. & L.M.Perry and *Zingiber officinale* Roscoe showed the highest use value as of 0.10 for each. The most cited plant family were Lamiaceae, Leguminosae, and Zingiberaceae, each with a percentage of 13.51%. Leaves (57.35%) was found out as the leading species. The results of this study can be used as a basis for further research in the field of phytochemistry and pharmacology in the development of new drugs.

Exploration and Characterization of Johar (*Cassia siamea*) Accession as a Source of Raw Materials For Antimalaria Drug

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Abstract. Johar is a medicinal plant that belongs to the Fabaceae family, and it is often planted as a roadside shade. Empirically, johar leaves are used for traditional medicine, including as a medicine for malaria, itching, scabies, diabetes, fever, wounds, and as a tonic. Many studies have been conducted on the antimalarial activity of johar leaves. The active compound from johar leaf that has antimalarial activity has been successfully isolated and identified, namely Casiarine A. This compound is found in very low levels in johar leaves, so to produce malaria drugs in the context of drug self-sufficiency, efforts need to increase production of casiarine A and also its extraction and isolation technology. Due to Casiarin A production, the availability of johar plants that have high levels of Casiarine A as the active compounds is very necessary. For this reason, exploration, and characterization of johar were carried out to provide superior accessions with high biomass production and bioactive compound content. The research was carried out in an exploratory accession of the palnts from several areas in Central and East Java. The sample plants were then characterized morphologically, and productivity tests were carried out, including the simplicia dry yield, total extract content, and phytochemical profile. The results showed that 13 johar accessions were obtained from 13 growing regions with similar morphological characters. The main difference character is shown in the size, colour and shape of the leaves. The place of growth affects the dry yield, total extract content, and phytochemical profile. Based on the parameters measured, Johar accessions can be grouped based on the location of growth, namely lowland, midland, and highland clusters.

Keywords: johar, *Cassia siamea*, accession, malaria drug.

Growth of matoa (*Pometia pinnata* JR Forst & G Forst) seedlings at various application times of chitosan

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Abstract. Matoa (*Pometia pinnata* JR Forst & G Forst) has potential as a biodiesel raw material. Chitosan can increase plant growth by stimulating the biosynthesis of auxin and tryptophan. This research aimed to get the chitosan application time and the matoa type that can increase matoa growth. The method used was a completely randomized design (CRD) with two factors. The first factor was chitosan application time (morning, afternoon, combination of morning and evening) and the second factor was matoa type (red, green and yellow). Chitosan was given at a concentration of 4%. Data analysis used analysis of variance and continued with Duncan's Multiple Range Test (DMRT) at the 5% significance level. The results showed that chitosan application in the morning time gave the best results on the photosynthetic rate, the afternoon gave the best results on the height and photosynthetic rate, and the morning and afternoon gave the best results on the stem diameter. The interaction of chitosan application time in the afternoon with green matoa species gave the best results on the plant height and in the afternoon with red matoa and in the morning with green matoa gave the best results on the photosynthetic rate.

Keyword: bioactivator, chitin, *Sapindaceae*

Investigating the potential of reducing food losses and waste within the agricultural value chain to improve food security and resource efficiency

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Abstract. Food security is still a major global challenge, with roughly one-third of all food produced for human use lost or squandered each year. The essential issue of food loss and waste throughout the agricultural value chain, as well as its effects on resource efficiency and food security, are discussed in this study. This study's goal is to investigate how reducing food losses and waste could improve food security while making the best use of available resources. The study examines the entire agricultural value chain, from growing to consuming, to identify key events and factors that cause food losses and waste. The research examines social, environmental, and nutritional issues using empirical data, case studies, and theoretical frameworks. It explores how lowering food losses and waste might boost food availability for disadvantaged groups, enhance resource allocation and lessen environmental impact. The results of this study help us better comprehend the complex interaction between food security, waste reduction, and food loss. The study emphasises the possibility of significant gains by reducing losses within the agricultural value chain, particularly in terms of boosting global food security and preserving priceless resources. This research helps policymakers, academics and stakeholders to achieve a more sustainable and secure food future by emphasizing effective measures and areas for improvement.

Keywords: Postharvest Management, Agricultural Value Chain, Resource Efficiency, Food Loss, Food Waste, and Food Security.

Performance Of The Growth And Yields Of Some Local Varieties Of Garlic (*Allium sativum* L.) In Medium Lands

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Abstract. In Indonesia, garlic is one of the horticultural crops which is an important spice for Indonesian society. Thus, the availability of garlic is an issue that must be considered. The data shows that domestic garlic products are still a cause for concern. Based on data from the Central Statistics Agency (BPS) in 2021 garlic production is only around 45.09 thousand tons. The objective of the study was to determine the growth and yield of several varieties of garlic in medium plains. This research was conducted from October 2022 to February 2023. The experiment used a simple randomized block design (RBD) with a variety of treatments consisting of several varieties including: Lumbu putih, Lumbu kuning, Sangga Sembalun, Lumbu Hijau and Tawangmangu Baru. Observational data were analyzed statistically using analysis of variance with DSAASTAT EXCEL VERSION 1.101 software. If the analysis of variance shows a significant difference, then proceed with Duncan's multiple range test at the 5% significance level. Data were analyzed using analysis of variance and if there were differences between treatments, a 5% BNT follow-up test was performed. Observations were made on plant height, number of leaves, plant diameter, plant fresh weight, plant dry weight, root weight, root length, root width, chlorophyll a content, chlorophyll b content, stomata and tuber weight of the plants. The results showed that Lumbu kuning had better growth, lower moisture content than other varieties and showed the highest tuber yield.

Keywords : Garlic, varieties, growth, yield, garlic bulbs

Nutrient content, phytochemical profile and anti-methanogen potential of *Cnidoscolus aconitifolius* leaf extracts

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Abstract. Chaya leaves (*Cnidoscolus aconitifolius*) contain many nutrients and phytochemicals that are expected to reduce methane gas emissions in ruminants . This study aims to determine the nutritional quality, phytochemical content and potential inhibitory power of Chaya leaf extract against the growth of rumen fluid methanogen bacteria. The method used to determine nutrient content were by proximate and fiber analysis, the phytochemical content tested were total phenols, tannins and flavonoids. Anti-methanogen test through inhibitory power using liquid culture selective media for methanogens. The results showed that Chaya leaves are a source of fiber feed which also contains high crude protein (23 – 29%), the highest total phenol and tannin content in ethanol extract of chaya leaves is 8.62 and 3,13 mg/g, respectively, while the highest total flavonoid content in ethyl acetate extract is 13.96 mg/g. The highest potential inhibitory power against methanogen bacteria was shown by ethanol extract (50 mg / mL) cause inhibition of 44.56%. The conclusion of this study is that Cahya leaves have the potential to be used as ruminant animal feed and as a suppressor of methanogen bacteria and further tests are recommended for methane gas production in-vitro.

Keywords: *Cnidoscolus aconitifolius*, Phytochemical, methane emissions

Effect of BAP concentration on the growth of several types of rambutan plants (*Nephelium lappaceum* L.) in vitro

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Abstract. In vitro seed propagation is needed as an alternative to providing superior rambutan planting material. The aim of this study was to examine the effect of BAP on the growth of several varieties of rambutan in vitro. The method used was a factorial completely randomized design with 2 factors, the first factor was rambutan varieties (binjai, rapih, and ace), and the second factor was BAP concentrations (0, 2, 4, and 6 ppm). There were 12 treatment combinations and 3 time replications. Variables observed was analyzed using analysis of variance followed by 5% Duncan's Multiple Range Test and other data (leaf emergence time, number of leaves, root emergence time, number of roots, and root length) were analyzed descriptively. The results showed that the combination of 0 ppm BAP and binjai variety gave the best results on shoot length, number of leaves, and number of roots. The 0 ppm BAP treatment gave the best results on the number of shoots, shoot length, number of leaves, number of roots, and root length. Binjai variety treatment gave the best results on the time of shoot emergence, shoot length, time of leaf appearance, number of leaves, time of root appearance, and number of roots.

Keyword: micropropagation, sapindaceae, shoot initiation, cytokinin

Efficiency test of insecticide with *pirimiphos-methyl* and *alpha-cypermethrin* on *Musa domestica* using surface spraying method

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Abstract. The bacteria are in human food through insects that act as disease vectors, such as flies. The housefly (*Musa domestica*) is one of the insects around human habitation that can affect human health. Therefore, controlling the *M. domestica* population must be done to prevent disease transmission, such as using insecticide. This research used the *pirimiphos-methyl* and *alpha-cypermethrin* active ingredients with different concentrations applied using the surface spraying method of the paper. Then, it was smeared with honey as an attractant. Methods used in this research include test insect preparation, active ingredient application, and data analysis. The data were analyzed statistically using the one-way ANOVA test. Innovation of the research that cooperation about active ingredients of the *pirimiphos-methyl* and *alpha-cypermethrin*. Result of the research, insecticides with the *pirimiphos-methyl* proved effective to controlling *M. domestica* with concentrations of MP2 and MP3 to 100% mortality in less than 8 hours. In comparison, for the *alpha-cypermethrin* active ingredient, the mortality of *M. domestica* is less than 90%. These results indicate that *M. domestica* in that area is resistant to the *alpha-cypermethrin*. This research can be used for pest control to control pests effectively and efficiently.

Keyword: *alpha-cypermethrin*, *Musca domestica*., *pirimiphos-methyl*.

Sulfuryl fluoride safe dosage test to mortality of *Tribolium castaneum* Herbst on corn and rice flour commodities in warehouse

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Abstract. *Tribolium castaneum* is pest that can harm the industrial economy in warehouses. Until now, fumigation is an effective method for controlling pests in warehouse. Fumigation using sulfuryl fluoride (SF) will not leave residue on the fumigated commodity. This study aims to examine the level of pest mortality of *T. castaneum* on corn flour and rice commodities using SF exposure with different concentrations. Methods used in this study include application of dose variations fumigation, identification, calculation of mortality, and data analysis. Research innovation using a variety of food safe doses of SF to make the highest mortality from *T. castaneum*. The results show that there is a significant difference, the highest mortality was in the SF doses of 21 g/m³ and 30 g/m³ on corn and rice flour commodities. The effective dose of sulfuryl fluoride is 21 g/m³ with the highest death rate. This research can be used as a recommendation for pest control using effective and efficient doses of SF in controlling *T. castaneum*.

Keyword: *T. castaneum*, sulfuryl fluoride, mortality

The Aerial Root Role in Avoiding Growth Collapse When Terrestrial Root Dysfunction on Vanilla (*Vanilla Planifolia* A.)

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Abstract. Vanilla plants are often attacked by diseases causing the terrestrial root to become disconnected, so the function of supplying water and nutrients to the leaves is stopped. This experiment aimed to evaluate the role of aerial roots in maintaining growth when vanilla plants experienced terrestrial root dysfunction. The experiment was carried out in the Indonesian Ministry of Agriculture greenhouse from July 2021 to April 2022. The study used a single factor (providing access to water uptake in aerial roots when the vanilla plant experienced terrestrial root dysfunction) in the Randomized Complete Block Design (RCBD) and was replicated 5 times. The results showed that providing access to water uptake in aerial roots significantly affected crown growth. Plants with access to water uptake in aerial roots were proven to maintain stem growth and leave well up to 8 weeks after experiencing terrestrial root dysfunction, compared to plants without access to water uptake in aerial roots, which experienced stagnation in growth at 5 weeks. On the other hand, variations in the response to changes in tissue water status were not detected throughout the experiment.

Keyword: vanilla, terrestrial root dysfunction, growth, tissue water status

Study of hygromycin effect for regeneration and transformation of CRISPR/Cas9_gRNA-OsCKX2 cassette into rice genome cv. Mentik susu through *Agrobacterium*-mediated transformation

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Abstract. The in vitro regeneration system of rice plants is known to be very well established compared to other plants. Therefore, improving and optimizing tissue culture system protocols for regenerating fertile plants is a prerequisite for the application of genome editing. The purpose of this study was to evaluate the concentration of hygromycin and its effect on regeneration response, and introduce the CRISPR/Cas9 cassette construct that carries gRNA from the OsCKX2 gene into the rice cv. Mentik susu through *A. tumefaciens*-mediated transformation. Analysis of the sensitivity level of explants derived from immature embryos of rice was conducted at different hygromycin concentrations. The results showed that the hygromycin concentration of 10 mg L⁻¹ was the suitable that could be used for callus selection during the transformation. Regeneration study of callus of rice revealed that callus regeneration without adding of hygromycin in the medium produced 81%, whereas the regeneration with hygromycin addition produced 8.7%. Molecular detection presence of the OsCKX2 gene target construct obtained 23 putative rice lines positive for the hptII gene and the Cas9 gene produced 9 lines. Further analysis of the transgenic plants are required to identify the occurrence of mutagenesis which is induced by CRISPR/Cas9 system.

Keyword: Mentik susu, regeneration, mutagenesis, genome editing, PCR

Biofilm Fungal Bacterial As Bioremediation Agent Heavy Metal Chromium Hexavalent (Cr(IV))

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Abstract. Chromium (Cr(IV)) is a heavy metal that is widely used in modern industries such as leather tanning, pharmaceuticals, metallurgy and others. Cr can be toxic to microorganisms, plants, animals and humans, because it is carcinogenic and can cause damage to ecosystems and have a negative impact on human health. Various techniques have been carried out to remediate the heavy metal Cr(IV), one of the methods that can be used is bioremediation by exploiting the potential properties of bacteria and fungi incorporated in biofilms. Biofilm is a microbial community that is mutually attached to one substrate with another through the production of EPS. Biofilm-based bioremediation is considered an efficient and profitable strategy because in this method bacterial growth has the ability to absorb and immobilize pollutants. Multispecies biofilms can be more effective in the bioremediation process, due to bacterial-fungal interactions. In this study, the biofilm consisted of 9 isolates (4 bacteria and 5 fungi) which had been found in previous studies on the western slopes of Mount Lawu. Cr(IV) reduction test was carried out at concentrations of 5ppm and 50ppm. The results showed that biofilms were able to completely reduce Cr(IV) within 6 hours.

Keyword: Cr(IV), Bioremediation, Biofilm

Induction of Genetic Diversity in the Soybean Gepak Kuning Cultivar and M.1.1.3 line using Ethyl Methane Sulfonate in M₁ Generation

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Abstract. Genetic diversity is the main determining factor in plant breeding activities. Various breeding methods can be used to induce plant variability, including mutation breeding. The chemical mutagen commonly used for mutagenesis is Ethyl Methane Sulfonate (EMS). This study explores the effects of EMS mutagen on the morphological and agronomic diversity of gepak kuning and line M.1.1.3 soybeans. The research was conducted in Tambon Tunong Village, North Aceh District, Indonesia, using a single-factor Randomized Block Completely Design (RCBD). Concentrations of 0%, 0.05%, 0.075%, and 0.1% EMS were tested on the gepak kuning and M.1.1.3 line. Treating gepak kuning soybeans with EMS had a significant impact on various variables, including harvesting age, pod number, seed weight, leaf appearance, and production. Additionally, the treatment resulted in changes in the morphology of the plant, particularly in the shape of its branches. The EMS treatment on line M.1.1.3 also had a significant effect on various variables like plant height, flowering age, harvesting age, and yield components. However, it led to sterile plants in the line.

Keyword: Ethyl Methane Sulfonate, Gepak Kuning, Soybean Line

Implementation of Environmentally Friendly Policies in Indonesian Crossing Ports: SLR

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Abstract. This research describes sustainable environmentally friendly policies of all operations that are able to adapt to world changes. This paper aims to analyze stakeholder policies in realizing an environmentally friendly port from all operations, both on crossing ships, ports, and from a management perspective. The research method is qualitative with literature review and systematic literature review, the data used is secondary data. The data search was carried out based on national journals and international journals. The results is the study show that stakeholders through the ministry of transportation have taken a number of steps to create a better environment.

Keyword: implementation, environmentally, crossing port, port of crossing

Comparative growth response of three rubber (*Hevea brasiliensis* Muell. Arg) clones in somatic embryo propagation

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Abstract. Plants have the ability to grow with different responses depending on the clones and varieties of plants. In rubber plants, each clone has specific characteristics or traits that distinguish it from other clones, whether in terms of growth, latex production, or resistance to pests and diseases. The objective of this experiment was to assess the response of three rubber (*Hevea brasiliensis*) clones to the same media conditions for the growth and development of somatic embryos. Integuments from three rubber clones, namely PB 260, PB 330, and PB 340, were used as explants to induce embryonic callus on MH media. After four weeks post-induction, the callus was subcultured to media for inducing somatic embryos on ME media. Subsequently, the sub-cultured callus was transferred to the RITA® bio-reactor for plantlets development in liquid MD media. The results revealed that the best callus response was achieved for PB 330 with 67.26%. The data indicated that not all calluses were able to induce somatic embryos. Observation of the percentage of somatic embryo development among the three clones showed that the best clone was PB 340 with 2.04%.

Keyword: clones, embryo-somatic, *Hevea brasiliensis*, response

Carbon stock stored in tree stands and sediment of Munjang Mangrove Forest in West Kurau Village, Central Bangka Regency

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Abstract. The Munjang mangrove forest in West Kurau Village is an area of 213 hectares with the potential for attractive flora and fauna. This study aims to analyze the potential of carbon stocks in tree stands and sediments in the Munjang mangrove forest, West Kurau Village, Central Bangka Regency. The non-destructive sampling method and allometric equations were employed to measure the potential carbon stock in tree stands, while the Walkey and Black method was applied for sediment analysis. The estimated carbon stock stored in Munjang mangrove is 1,298.71 tons/ha of carbon content in mangrove stands and 5,382.53 tons/ha of carbon content in sediments. Tree carbon stock is influenced by mangrove density, the number of individuals, and the size of the trunk diameter. Meanwhile, sediment carbon stocks are influenced by tides and the amount of litter in the sediments. Carbon stock is directly proportional to biomass content. The higher the biomass value, the greater the carbon stock and the higher the ability to absorb CO₂ in the air.

The Biochar-Enhanced Phytoextraction of Heavy-Metal-Polluted Tropical Soils by Thorny Amaranth (*Amaranthus spinosus*)

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Some tropical plants were suggested to be able to lower toxic heavy metals in soils. This research was to evaluate the phytoextraction potential of thorny amaranth (*Amaranthus spinosus*) in heavy-metal-polluted tropical soils treated with biochar. Polluted soil samples were taken from a 22-years old experimental field treated with industrial waste at 0-60 Mg ha⁻¹. Soil samples were planted with thorny amaranth for 4 weeks. Planting was also conducted in 0-10 Mg ha⁻¹-biochar-treated soil samples. The results show that the soil Cu and Zn increased with the increase in the industrial waste levels but were lowered by plant treatment and/or biochar application. The plant growth as well as root and shoot dry-weights were depressed by soil Cu and Zn but attenuated in the presence of biochar. The accumulation of Cu and Zn in plant roots and shoots and their translocation factors were also lowered by soil Cu and Zn but were increased by biochar. The accumulation of Cu and Zn were higher in plant shoots than those in roots in good correlations with their concentrations in soils. Thorny amaranth was a good Cu and Zn phytoextractor in heavy-metal-polluted tropical soils and performed better in the presence of biochar.

Biochar, Heavy Metals, Phytoremediation, Soil Pollution, Tropical Soils

The Use of Biostimulant in Javanese Curcuma (*Curcuma xanthorrhiza* Roxb) Cultivation to Increase Production Competitiveness

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Abstract. The objective of the research is to increase the productivity and quality of javanese curcuma. The research is a descriptive analytic by using information and data from senior agricultural experts and scientific publications. The agribusiness of javanese curcuma has bright prospects, but there is still problem where javanese curcuma cultivated traditionally so the average productivity and quality is low. According to the regulation from Agency of Food and Drug Supervisory, the production of medicinal plant is required to be high quality to ensure the efficacy and safety of medicinal herb. The efforts to increase productivity and quality in the cultivation of javanese curcuma can be done through the combination of using biostimulant and the application of Good Agriculture Practice (GAP). The use of biostimulant will provide more available nutrients for plant growth, increasing plant protection from pathogen, and increasing soil water holding capacity where it will lead to increase productivity. The combination of using biostimulant and application of GAP will lead to increase productivity and quality of javanese curcuma production where it can meet the requirement of modern medicinal herb industry. Furthermore, it is expected will increase the competitiveness of production, increase farmer income, and lead to develop farmer economy.

Keyword: biostimulant, competitiveness, cultivation, curcuma

Characterization of microplastic degrading bacteria isolated from the Putri Cempo landfill

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Abstract. Putri Cempo's landfill site accommodates waste from various areas around the city of Surakarta. This landfill accommodates more than 300 tons of plastic waste a day. The accumulation of plastic waste cannot be avoided because there is no alternative solution for handling waste in Surakarta City and the length of the plastic degradation process. Exposure to plastic in the soil causes plastic flakes to form which decompose into microplastics (plastic <5 mm in size). Microplastic pollution that occurs in ecosystems has the potential to enter the human food chain and is considered a serious threat to human health. Plastic production also triggers climate change, as it contributes 6% to global oil consumption and could reach 20% by 2050. One solution to addressing the problem of microplastic pollution is to use native bacteria as natural microplastic decomposition agents. This study aims to isolate and identify the potential of local bacteria in degrading microplastics. This study used a descriptive exploratory method with soil samples from Tandfill. Seven isolates obtained from native bacteria from Surakarta landfill with different biochemical characteristics and different colony morphology.

Keyword: Microplastic, Putri Cempo, bacteria

Genetic variability and relationship of agronomic characters of soybean lines in tidal swamp land

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Abstract. Genetic variability and the relationship between agronomic characters have an important role in the development of high-yielding soybean varieties. The aim of the research was to study the genetic diversity and the closeness of the relationship between the agronomic characters of soybean lines in tidal swamp land. The results showed that broad genetic variability was found in the number of branches and seed yield, while the other characters had narrow genetic variability. Individuals in the family are relatively evenly distributed. Based on the PCA biplot, the contribution of agronomic characters was in the similar direction as seed yield, except for maturity. However, there were no characters that are significantly correlated with seed yield. Significant phenotypic correlations were obtained among the number of filled pods, plant height, the number of branches, and the number of reproductive nodes. Almost all of the high agronomic characters belong to the Dh/Arg progenies. The highest seed yields were obtained by Dw/Arg-7 and Dw/Arg-12, namely 2.49 and 2.41 t/ha, respectively. The lines with high seed yield potential was also shown by the Gjs/Arg and Sh/Arg progenies. Dw/Arg-7 and Dw/Arg-12 can be assessed in plant breeding process to obtain high yielding soybean varieties adaptive to tidal swamp areas.

Analysis of Added Value and Market Share in Porang Value Chain in Wonogiri Regency

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Abstract. Porang is an agricultural commodity with high economic value recently. However, the high economic value does not have much impact on farmers due to low added value and market share. This study aimed to analyse the added value and market share of the porang value chain in Wonogiri regency. Cost, profit, and marketing margin were examined to determine each actor's added value and market share in the chains of Porang in Wonogiri. Data were collected through interviews with all chain actors, such as farmers, rural collectors at the village and district level, wholesalers, and processors. The results show that the highest added value and market share of Porang is in a processor, with 97.88% and 95.14%, respectively. While the lowest one is in farmers, there are no added value activities, and the market share is 5.84%. There is a big gap in added value and market share among actors in the Porang value chains.

Keywords: added value, market share, porang value chain, and wonogiri

Detection of Jintan hitam (*Nigella sativa* L.) Adulteration using RAPD Molecular Markers in Traditional Markets in Surakarta and Yogyakarta

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Abstract. Black cummin (*Nigella sativa*) is a popular medicinal plant that has been used for various purposes in pharmaceuticals, cosmetics, and food-beverage industries. In Indonesia, this plant, known as Jintan hitam, is imported from its producing country to meet market demands. However, there is potential for adulteration with *Corchorus* sp. due to its morphological similarity and local names. The authentication of Jintan hitam using an effective method is important for detecting adulteration. The previous study shows that A total of 4 selected RAPD primers were able to differentiate jintan hitam from its adulterants. This research objective was to assess the effectiveness of the RAPD technique for jintan hitam authentication sold in traditional markets in Surakarta and Yogyakarta. Sampling was conducted in 3 main traditional markets in Surakarta and Yogyakarta; samples were collected from 3 traders in each market. Genomic DNA from all samples was extracted and amplified using four selected RAPD primers (OPC-12, OPM-3, OPL-5, and OPK-4). The results show that jintan hitam adulteration was detected in the main traditional market in Surakarta and Yogyakarta using the RAPD molecular marker. The percentage of adulteration in Surakarta (55.5 %) is higher than in Yogyakarta (22.2%). Selected RAPD primers were able to detect adulteration and effective for jintan hitam authentication.

Keywords: *Nigella sativa*, RAPD, authentication, adulteration

Assessment of Coffee Husk Gasification for Drying Operations: A Case Study of a Cooperative in the Philippines

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Abstract. Recent efforts to promote sustainability and specialty coffee have rejuvenated the industry, making it a significant player in both domestic consumption and international markets. The study was conducted to assess the viability of coffee husk gasification as a heat generation technology for the drying process in terms of profitability, efficiency, reliability, social acceptability, and environmental sustainability. Gasification was compared to similar technologies employed in the industry, such as coffee husk furnaces and liquefied petroleum gas furnaces. The analytical hierarchy process (AHP) was used to evaluate the selection criteria with the alternatives using pairwise comparison. The conversion efficiency for the gasifier, biomass, and LPG furnace was determined to be 72%, 65%, and 68%, respectively. Coffee husk gasifiers and furnaces were found to be more reliable and environmentally sustainable than the fossil-fired option due to the utilization of coffee waste for heating, making them less sensitive to the volatility of fuel imports from other countries. Gasifier technology was perceived as safer than the furnace, considering fire and health risks. Coffee husk furnaces perform best when using AHP, but gasifiers outperform them in terms of reliability and efficiency. LPG furnaces score lowest in the majority of the criteria considered, especially in environmental sustainability.

Keyword: Analytic Hierarchy Process, Waste to Energy, Coffee Husk Gasification, Multi-Attribute Decision Making

Assessment of a Thermoelectric Cooling Bed System for Enhancing Strawberry Growth in Warm Climate Environments

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Abstract. Strawberry cultivation in the Philippines has experienced remarkable growth due to increasing demand for this high-value crop. Efforts to cultivate strawberries in warm climates have faced specific challenges. This paper assessed a strawberry bed that utilizes thermoelectric cooling to grow strawberries. There were 18 thermoelectric plates employed in order to maintain the temperature of the system within the range of 16.00°C to 26.00°C. The system under consideration underwent evaluation for a duration of 103 days, commencing at an initial temperature of 23.00°C. Based on the results, the system demonstrates an accuracy of 94.17%. The recorded temperature was observed within the range of 22.70°C to 26.37°C. The average temperature of the proposed system was measured to be approximately 24.83 °C, but the average ambient temperature recorded during the study was 33.87°C, resulting in an average temperature differential of 9.04°C. Considering the system's notable reliability, it is imperative to take into account additional elements, including the assessment of soil quality and the utilization of seeds during the testing process. Further studies must be carried out on using other materials that have faster rate of temperature transfer and evaluating energy consumption to ensure the sustainability of the proposed system.

Keywords: Thermoelectric Cooling, Strawberry Cultivation, Temperature Control

Analysis of Growth Factors and Main Inhibitors of Agropolitan Areas in Semarang Regency

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Abstract. The agropolitan program is a national government program implemented in many regions in Indonesia, including Central Java, with 17 agropolitan locations. It has received serious attention from the government, as evidenced by budgetary support for agropolitan activities from both the central and regional governments. According to the Provincial Medium-Term Development Plan (RPJMD) for Central Java 2018-2023, Semarang Regency is one of the agropolitan development locations as per Central Java's agropolitan development policy. The development of agropolitan areas in these regions is expected to have a multiplier effect on these areas. With the allocated budget for agropolitan implementation, it is expected that there will be economic improvements in rural communities within the designated areas, in line with the objectives of agropolitan development in a given region. Economic development in the region through the agropolitan concept is expected to involve the agricultural sector according to the region's potential, contributing to the improvement of the local economy. As an agribusiness system, the development of agropolitan areas is influenced by multiple factors and involves multiple sectors, necessitating synergy among various components from on-farm to off-farm. The synergy of stakeholders in agropolitan development, including government entities, communities, and the private sector, is essential because agropolitan is a program supported by multiple components from on-farm to off-farm. The aim of this research is to provide an overview of the development of agropolitan areas in Semarang Regency and to identify the factors within agropolitan development that influence the development of these areas. This research is quantitative in nature, employing a survey approach, and data requirements include both primary and secondary data. The analyses used in this research include Quadrant Analysis to assess the degree of success in agropolitan area development and Path Regression Analysis (Path Analysis) to identify influencing factors. The analysis results show that agropolitan development has a positive impact on the income of the local population, and the Path Regression Analysis results indicate that the influencing factors on agropolitan development include flagship commodities, farmer human resources, infrastructure in the area, and government policies.

Keywords: agropolitan, factors, areas

Potential Geographic Distribution of *Baccaurea parviflora* (Phyllantaceae): a unrecorded Wild Fruit Plant Species in Sumatra, Indonesia

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Abstract. *Baccaurea parviflora* (Mull.Arg.) Mull.Arg. is an undocumented species native to Southeast Asia, specifically Borneo and Sumatra. Climate change is predicted to have a considerable impact on *B. parviflora* in the future. The goals of this study were to (1) assess the potential distribution of *B. parviflora* in Sumatra, (2) determine the main variables influencing *B. parviflora* distribution and suitable range, and (3) simulate the changing trend of *B. parviflora* suitable habitat under climate change scenarios. We used three sample concentration routes (SSP1-2.6, SSP2-4.5, and SSP5-8.5) to estimate *B. parviflora*'s current and future distributions. The results show that the AUC values of all simulations were greater than 0.912. The primary environmental variables determining the probable spread of *B. parviflora* were mean coldest quarter temperature (24-28°C), elevation (100-800 m), temperature seasonality (50-60%), and coldest quarter precipitation (500-750 mm). The very appropriate habitat encompassed 1,023.56 acres, the majority of which was located in two provinces, Aceh and Sumatera Barat. Under the three climate change scenarios, the overall acreage of *B. parviflora*'s appropriate habitat decreased, and the geometric center of the highly suitable habitat relocated west, south of Sumatra. Our findings can be used as a scientific foundation for *B. parviflora* conservation, planting, and sustainable management.

Keywords: *Baccaurea*, potential geographic, wild fruit plant, Sumatra

Ethnobotany of wild edible vegetable species and their contribution to food security in the Aceh Tamiang region, Indonesia

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Abstract. Wild vegetable species are native and naturalized plants that grow in their natural environment. The purpose of this study is to investigate local wisdom regarding the usage of plants as vegetables and their contribution to food security and food diversity for local communities in the Aceh Tamiang region. Plant material was collected at random from three sub-districts in Aceh Tamiang, Indonesia. Survey methods and semi-structured interviews were used to obtain ethnobotanical data. A total of 60 people were polled using a questionnaire chosen using simple random selection. The informant context approach and group discussion were used to cross-check and verify data. The data was analyzed using descriptive statistics as well as quantitative ethnobotanical approaches. We discovered 42 species of wild veggies. Most of these herbs are collected from nature by local customers. These results indicate that a number of plants can be eaten wild, this can be a resource during times of food insecurity by the local community.

Keywords: wild vegetable, ethnobotany, food security, food diversity, Aceh Tamiang

Status of soil quality in various agroforestry systems in Banyurip Jenar Sragen

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Abstract. Agroforestry consists of various land covers that produce litter which results in the addition of organic matter in the soil and improves soil quality. This study aims to determine the status of soil quality in various agroforestry systems by calculating the soil quality index in various agroforestry systems. This research was conducted in Banyurip Village, Jenar District, Sragen Regency, Indonesia. This research was conducted on various agroforestry systems, namely teak agroforestry, teak-sacha inchi agroforestry, and sacha inchi monoculture as land that does not apply agroforestry systems. A total of 9 indicators were used, then the indicators were tested with Principal Component Analysis using Minitab 18 to select the Minimum Data Set. The indicators were chosen as the soil humidity, bulk density, porosity, CEC, soil total N, soil organic C, and microbial biomass C. The highest soil quality indexes in teak agroforestry and teak-sacha inchi agroforestry were 0.22. The soil quality index in Sacha inchi monoculture is 0.20. The third soil quality class of agroforestry systems belongs to the class of low soil quality since the soil quality index ranges from 0.20-0.39.

Keyword: minimum data set, soil quality index, teak agroforestry, teak-sacha inchi agroforestry, and sacha inchi monoculture

The relation of macrofauna and soil organic carbon in Sacha Inchi cropping patterns in Sragen Regency

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Abstract. Soil macrofauna plays an important role in the soil ecosystem. Through various biological activities, macrofauna provide various ecosystem services such as provision and regulation of nutrients and carbon through litter decomposition, increasing water holding capacity, and improving soil structure. Diversity of soil macrofauna is strongly influenced by the litter produced. The more diverse types of plants, the more diverse macrofauna will be found. The purpose of this study was to determine the relationship between macrofauna and soil organic carbon in various cropping patterns of sacha inchi in Sragen, Central Java. The research was conducted on teak-sacha inchi, teak monoculture, mixed agroforestry, and sacha inchi monoculture. Based on the results, there were total 6 orders of macrofauna in four types of cropping patterns. The highest total number of individuals was found on the sacha inchi monoculture. Macrofauna diversity index was found the highest in teak-sacha inchi with Shannon-Wiener index 1.207, and the lowest in sacha inchi monoculture with Shannon-Wiener index 0.76. Based on the correlation analysis, it is known that soil organic carbon content has a negative correlation with the number of macrofauna and a positive correlation with macrofauna diversity.

Keyword: cropping pattern, diversity, litter fall, *plukenetia volubilis*

Selection Of Local Maize Resistance To Fall Armyworm (*Spodoptera frugiperda* J.E. SMITH).

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Abstract. One of the obstacles in increasing corn production is the attack of *Spodoptera frugiperda*. The resistance of each corn variety to this pest attack varies greatly. This research aims to obtain local types of corn that are resistant to attacks by corn armyworms. The research was conducted in Kediri, East Java. The research used a Complete Randomized Block Design with treatment of various corn varieties local and with rivers. The varieties tried consisted of Kebo Bima, Lameran-Latim, Madura Kuning, Madura Putih, Manik Liu, Seraye-Bali and Sumbawa. The results showed that there was no difference in plant height between all the local corn varieties tested, while the highest number of leaves was produced in the Madura-kuning and Madura-putih varieties. The Manik-Liu variety produces the smallest leaf length and leaf angle compared to other varieties, while the widest leaves are produced by the Sumbawa variety. The flowering period and harvest time were the longest for the Manik-Liu variety, while the fastest for the Kebo Bima variety. The highest shoot root ratio was produced in the Seraye-Bali variety. Based on the corn seed yield per hectare obtained, the Sumbawa and Seraye-Bali varieties are the most resistant varieties compared to the others and able to provide the highest corn seed yield per hectare.

Keywords: local corn, yield, resistance, *Spodoptera frugiperda*

Utilization of Medicinal Plant Species by the Community of Wonodadi Village, Pracimantoro District, Wonogiri Regency

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Abstract. Plants with beneficial active substances are known as medicinal plants. Using local knowledge of plant usage can be an alternative to chemical drugs, which often have side effects. To learn about the use of medicinal plants in Wonodadi Village, this research was conducted using qualitative and quantitative methods to identify the species of plants, the parts used, the source or acquisition location, and the processing methods. The data was collected through observation and interviews with 40 informants selected using the snowball sampling technique. The research revealed that there were 40 types of medicinal plants used by the community, with ginger had the highest percentage of use (95%). Furthermore, the 7 parts of the plants being utilized, namely roots, rhizomes, stem, leaves, flower, fruits, and resin with leaves being the most commonly used part (54%). Medicinal plants are mostly obtained from fields and yards, and were processed through various methods. Medicinal plants were typically sourced from both fields and yards (62%), and boiling was the most common processing method (36%).

Keyword: medicinal plants, non-wood forest products, traditional medicine, village communities

Qualitative morphological similarities among hybrid Phalaenopsis in Indonesia

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Abstract. *Phalaenopsis* spp. is one of the most popular orchid species in Indonesia and abroad. Various plant breeding efforts have been made to increase the economic value and aesthetics of orchids. This research was conducted to study the similarity of morphological characters between orchids in eight hybrid *Phalaenopsis* species, namely *Dtps. Shu Long King x Shu Long Purple Queen*, *Dtps. Fuller's Sunset*, *Dtps. Shu Long Purple Queen x OX King 3545*, *P. Golden Tree*, *Dtps. OX X-Ray*, *P. Shu Long Romantic*, *Dtps. Fuller's C-Plus 3790*, *Shu Long TS2904*. Observation data were analyzed using NTSys 2.02i software application. The results showed that there were two large clusters at a similarity coefficient of 0.77. Cluster 1 includes *Dtps. Shu Long Purple Queen x OX King 3545*, *Dtps. Shu Long King x Shu Long Purple Queen*, *P. Shu Long TS2904*, and *P. Shu Long Romantic*. Cluster 2 includes *Dtps. Fuller's Sunset*, *P. Golden Tree*, *Dtps. Fuller's C-Plus 3790*, *Dtps. OX X-Ray*. At a similarity coefficient of 0.93 there are orchids *Dtps. Shu Long Purple Queen x OX King 3545* with *Dtps. Shu Long King x Shu Long Purple Queen* and *Dtps. Fuller's Sunset* with *P. Golden Tree*.

Keyword: morphology, orchid, *Phalaenopsis*, qualitative

Chromosome Analysis of *Dendrobium stockelbuschii* and *Dendrobium sylvanum* Orchids

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Abstract. *Dendrobium stockelbuschii* and *Dendrobium sylvanum* are great demand orchids in Indonesia because of their uniqueness. Plant breeders keep trying to breed this orchid to maintain its uniqueness. Cytological information of *D. stockelbuschii* and *D. sylvanum* helps plant breeders in the breeding process. This study aims to determine the cytological characters including the number, size, and shape of chromosomes and karyotype. The research was conducted at the Plant Breeding Laboratory, Faculty of Agriculture, Sebelas Maret University. Data analysis was done descriptively based on the results of chromosome observations. The average length of *D. stockelbuschii*'s chromosome was $1.84 \pm 0.52 \mu\text{m}$ to $2.05 \pm 0.54 \mu\text{m}$ and *D. sylvanum* was $2.32 \pm 0.64 \mu\text{m}$ to $2.60 \pm 0.68 \mu\text{m}$. *D. stockelbuschii* and *D. sylvanum* have an average karyotype pattern of $2n=2x=38=18m+1sm$. The value of the intrachromosomal asymmetry index (A1) in both species tends to lead to metacentric, while the value of the interchromosomal asymmetry index (A2) in all species shows a deviation in chromosome size is quite small.

Keyword: chromosome, *Dendrobium*, karyotype

Net assimilation rate and relative growth rate of amaranth (*Amaranthus tricolor* L.) varieties on urea fertilizer application

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Abstract. Net assimilation and relative growth rate are important plant growth and productivity parameters that can be influenced by factors such as nutrient availability. Nitrogen is one of the macronutrients important for plant growth. Amaranth is among the widely cultivated vegetable crops that require nitrogen during their growth, which is met through fertilization. The most commonly used nitrogen fertilizer is urea. The research objective was to find out more about the effect of urea fertilizer on the net assimilation rate and relative growth rate of amaranth growth. This research was conducted in Sukosari village, Jumantono, Karanganyar in July-August 2023. The experiment used a completely randomized design with two factors: varieties of amaranth (green and red) and dose of urea fertilizer (0, 50, 100, 150, 200, 250, and 300 kg/ha). The data were analyzed using analysis of variance (ANOVA) and Duncan Multiple Range Test (DMRT) at a 5% confidence level. The results showed that there was no interaction between urea dose and amaranth varieties. Plant height, leaf area, and number of leaves were highest at the 300 kg/ha urea dose. Dry weight, net assimilation rate, and relative growth rate were highest at 250 kg/ha urea dose. Net assimilation rate is positively correlated with relative growth rate, but not with other growth parameters.

Keywords: amaranth, urea, net assimilation rate, relative growth rate

Diversity of Endophytic Fungi in The Roots and Stems of *Baccaurea brevipes* Hook.F. in Protected forest Langsa, Indonesia

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Abstract. The *Baccaurea brevipes* Hook.F. plant has been studied in the past and has the potential to be a therapeutic herb. The tampoi plant (*B. brevipes*) has been used as a medication by the Acehnese to regulate menstruation and make urinating easier. In nature, endophytic fungi are widespread and can be easily found in plant tissue. Without infecting the host plant, the endophytes colonize the inter and intracellular spaces of the tissue. Endophytic fungi can create bioactive chemicals that may be similar to or distinct from those of their host plants and have pharmacological effects. However, no studies have been done on its endophytic fungus as a potential source for novel medication development. This study was done to look into endophytic fungi in *Baccaurea*'s stems and roots. The techniques employed in this study were endophytic fungi purification, identification of macroscopic and microscopic endophytic fungi, and endophytic fungi isolation. Three isolates were identified as a result of isolation and purification; they were designated as isolates BVA1, BVA2, and BVR1. The genera *Aspergillus* sp, *Fusarium* sp, and *Batryosphaeria* sp are assumed to be the kind of endophytic fungal isolates BVA1, BVR1, and BVA2.

Keywords: *Baccaurea*, diversity, isolation, endophytic fungi, Aceh

Pedological Factors, Classification, Physical-Chemical Properties and Management Strategies of Inceptisols in the Boca Formation of Temanggung (Study: Horticultural Land Management)

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Abstract. The objective of this study was to observe the landforms, morphology, parent material, topography, vegetation, classification, genesis, physical properties, chemistry and soil management of the boca hills in Temanggung, Central Java. The boca range in Temanggung are hills located in Danurejo, Kedu, Temanggung, Central Java, which are part of the old Sumbing formation (Qos). This area is thought to be an intrusion area of cracks from the old Sumbing mountain, located at the foot of the mountain between Sumbing and Sindoro mountains. The boca formation is located at 705.9 meters above sea level, although with the same parent material as old Sumbing but due to differences in altitude and temperature so that the development that occurs is different from old Sumbing, in general the Boca formation consists of breccia, andesite, conglomerate and tuff. Vegetation that grows in the boca range includes bamboo, frangipani, cotton. Soil genesis in the boca range has not yet reached an advanced stage of development characterized by the formation of an argillic horizon. The observed soil shows a diagnostic horizon, the cambic horizon. The soil acidity level (pH 5-6.5), falls into the slightly acidic class, with a texture dominated by geluhan. Based on the data obtained through field survey and laboratory analysis, the soils in the boca range are classified into Inceptisols based on USDA, Cambisols based on PPT and Cambisols based on WRB with ustic regime.

Keyword: inceptisols, Boca formation, vulkanik.

The Growth of Biofortified Mustard Green Plants with Iron and Zinc through Foliar Spray

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Abstract. Stunting is one of the problems facing the world and it is caused by a lack of iron and zinc nutrients in the body. So, to meet nutritional needs for iron and zinc, important to consume foods that contain iron and zinc. Mustard greens contain iron and zinc, but the amounts are still too small to meet iron and zinc needs. Agronomically biofortification of iron and zinc is one solution for the stunting problem. However, the growth must be evaluated to determine the right concentration of iron and zinc biofortification in mustard greens. This study aims to evaluate the growth of mustard plants undergoing iron and zinc biofortification through foliar spray. The study was conducted in the Karanganyar screen house using a randomized block design with 2 factors (Fe-EDTA and Zn-EDTA, each concentration 0; 0.2; 0.4; and 0.6 g/l). Based on the result, there was an interaction between Fe and Zn concentrations in the number of leaves and leaf area, which also showed a positive correlation between all growth parameters. Overall, the biofortification of iron and zinc at a concentration of 0.2–0.4 g/l has a positive effect on increasing the growth of mustard green plants.

Keywords: biofortification, iron, zinc, mustard greens

The evaluation of *Indigofera* seed production and quality in different environments

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Abstract. Seed production and quality are pivotal factors in the success of *Indigofera* cultivation as forage crop for livestock. This study aims to evaluate the production and seed quality of *Indigofera* in different environments of Seed Production Unit (SPU). Seven distinct SPU's, namely BPPIB-TSP Bunikasih, BBIB Singosari, BPTU-HPT Denpasar, BPTU-HPT Pelaihari, BPTU-HPT Sembawa, BBPTU-HPT Baturraden, and CV Cahaya Baru Semarang selected as the observed locations. Environmental data pertaining to elevation (m a.s.l.), annual rainfall (mm/year), temperature (°C), humidity (%), and light intensity (Lumen-hour) were collected for each unit. Seed production parameters were seed yield (g) and seed weight (g per 1,000 seeds). Seed quality parameters encompassed water content (%), purity (%), and viability (%). The analysis in this study involved assessing the mean differences in these parameters through the application of analysis of variance (ANOVA). The result showed the seed production and quality were diverse across SPUs, with BPTU-HPT Sembawa and CV Cahaya Baru Semarang demonstrating outstanding seed production, while BPTU-HPT Pelaihari maintains high-quality standards. The highest positive correlation emerged between elevation and water content ($r = 0.72$), highlighting the influence of altitude on the moisture content of seeds. The strongest negative correlation was observed between temperature and water content ($r = -0.76$), emphasizing the role of temperature in drying seeds.

Keyword: *Indigofera*, seed production, seed quality, microclimatic conditions

Business Analysis of Black Ear Mushroom (*Auricularia polytricha* (Mont.) Sacc.) in Berjo Village, Ngargoyoso District, Karanganyar Regency

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Abstract. Black ear mushroom (*Auricularia polytricha* (Mont.) Sacc.) are edible mushroom that has been widely processed into food and medicine. Thus, due to its high demand, the black ear mushroom has been widely cultivated. The aims of the present study was to determine the feasibility of mushroom cultivation businesses in Berjo Village, Ngargoyoso District, Karanganyar Regency, Central Java. An interview was conducted to three black ear mushroom cultivation business owners. Business performance analysis was carried out. Furthermore, revenue analysis, business efficiency, benefit-cost (B/C) ratio, break-even point (BEP), payback period, and depreciation cost were determined. The average area of mushroom house was 776 m² with capacity of 18,000 baglogs. Business owners managed their business in the traditional way. For example, for watering and pest control was conducted manually. The average revenue of black ear mushroom cultivation was Rp49.555.667,00/harvesting. In addition, the business efficiency, B/C ratio, BEP unit and price were 1.93, 0.93, 4644.4 kg, and Rp5.294,00/kg, respectively. Meanwhile, the payback period and depreciation costs were 0.687 years and Rp1.098.401,00. Therefore, based on the results obtained in the present study, black ear mushroom was feasible to develop into a business as an alternative economic source for the community.

Keywords: black ear mushroom, break-event point, business performance analysis, cultivation, payback period

Estimation of Carbon Stocks in Collection Zones KGPAA Mangkunagoro I Forest Park, Karanganyar

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Abstract. Mangkunagoro I Forest Park (Tahura) is a nature conservation area for plant collection purposes and preserving biodiversity. Moreover, Tahura as a forest also can absorb and store carbon as biomass. It makes Tahura play a role in the mitigation of climate change. This research aimed to determine the amount of carbon stock from various species of trees in the Tahura collection zone. There are 35 plots in total with 20 x 20 m in size taken using systematic sampling. A non-destructive method with allometric equations was used to estimate total biomass and carbon stocks. In the Tahura collection zone, 11 species of trees and 3 species of bamboo were found with a total density of 24,575 trees/ha. Estimated biomass, carbon stocks, and carbon sequestration in the Tahura collection zone were respectively 173.72 ton/ha, 83.402 ton/ha, and 306.1 tonC/ha, respectively.

Keyword: carbon stock, climate change, forest park

Larvicidal Activity of the Ethyl Acetate Fraction of Ethanol Extract from Liverwort (*Marchantia paleacea*) Against *Athalia proxima*

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Abstract. Indonesia is an agrarian country with extensive agricultural land and a variety of crop types. One of the challenges faced by farmers when cultivating crops is pest infestation. The larval stage of *Athalia proxima* attacks cruciferous plants, leading to a 65–80% decrease in productivity. Continuous use of synthetic larvicides has negative impacts such as pest resistance, harm to natural plant enemies, and environmental pollution. This research aims to investigate the larvicidal activity of the ethyl acetate fraction of ethanol extract from liverwort (*Marchantia paleacea*) against *A. proxima*. Compound groups in the fraction were identified through phytochemical screening. The treatment factors in this study included fraction concentrations of 0.4%, 0.6%, 0.8%, and 1%, as well as a negative control using distilled water. Larval mortality was observed 24 hours after application and analyzed using probit analysis. Phytochemical screening results indicated that the ethyl acetate fraction tested positive for alkaloids, phenolics, flavonoids, terpenoids, and steroids. Probit analysis results showed an LC₅₀ value of 0.33%. Therefore, the ethyl acetate fraction of the ethanol extract from *M. paleacea* exhibits high larvicidal activity against *A. proxima*.

Keywords : *Athalia proxima*, ethyl acetate fraction, larvicide, *Marchantia paleacea*

The relationship between financial development and agricultural production in Indonesia: an ARDL approach

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Abstract. Financial development plays a crucial role in shaping the economic landscape of a nation, particularly in the context of developing countries like Indonesia. This study examines the intricate relationship between financial development and agricultural production in Indonesia using the Autoregressive Distributed Lag (ARDL) method. The research employs a comprehensive dataset spanning 1980-2020, incorporating key financial indicators and agricultural production data. Through ARDL cointegration analysis, this study aims to discern whether there exists a long-run equilibrium relationship between financial development and agricultural production. The findings of this study hold significant implications for policymakers and stakeholders in Indonesia's agricultural sector. A negative correlation may indicate that the financial sector's focus on other industries may hinder agricultural development. By better understanding the dynamics between financial development and agricultural production, this research aims to inform policies that can foster sustainable economic growth and food security in Indonesia.

Keyword: Financial Development, Agricultural Production, ARDL

Human Resource Capacity and Social Capital of Micro, Small and Medium Enterprises of Processed Agricultural Products in Surakarta

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Abstract. Micro, Small and Medium Enterprises (MSME) plays a strategic role in supporting Indonesia's national economy through employment and contribution to gross domestic product. In the case of processed agricultural product MSMEs, there are still challenges for this business to improve their performances, namely in terms of human resources, capital, technology, financial or technical aspects. In this case, appropriate efforts are needed to empower MSME actors that involves synergies from various parties. This study aims to analyze (1) the capacity of human resources and (2) the social capital capacity of MSME actors in Surakarta. The research was conducted in Laweyan District through a descriptive quantitative approach. Data were collected through survey techniques from 42 MSME actors, observations and interviews with informants and Focus Group Discussions. The results show that the human resource capacity of MSME actors is in the medium category, social capital is in the high category and many empowerment programs have been carried out. Nevertheless, assistance and synergy from various parties are still needed so that the empowerment of MSME actors can be managed better from various aspects as needed.

Keyword : MSME, agricultural products, social capital, human resource

Changes of photosynthetic traits on red chili pepper (*Capsicum annum* L.) exposed by short-term waterlogging

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Abstract. Riparian tropical wetland known as non-tidal lowland is potential land for agriculture, especially for vegetables cultivation such red chili pepper (*Capsicum annum* L.) Transition period (dry to rainy season) has a chance to for red chili pepper cultivation in the field (at low tide conditions), but has risk of experiencing dynamic water table to waterlogging in early rainy season. The aim of this research was to determine effects of physiological traits of red chili pepper exposure on short-term (4 days) waterlogging. This research was conducted at Tropical Crop Science Laboratory, Kagoshima University, Japan. Results of this study revealed that there were changes in photosynthetic characters among in before stress, the end of stress and the end of recovery, among field capacity and waterlogging, and also among Laris (resistant variety) and Romario (susceptible variety). Photosynthetic and transpiration rates sharply decreased under waterlogging in end of stress, but increased in the end of recovery on Laris, opposite on Romario. Changes occur was associated with decline in stomatal conductance and chlorophyll fluorescence as response to waterlogging stress. Laris as resistant variety has the ability to recover under short-term stress conditions so it needs to be developed further for cultivation at riparian tropical wetland.

Keyword: chlorophyll fluorescence, stomatal conductance, tropical wetland, water stress

Effectiveness of NPK compound (15-15-6) fertilizer to improve maize performance in inceptisol soil

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Abstract. The purpose of this study was to determine the effect of NPK compound (15-15-6) fertilizer to improve maize performance. The study was conducted in Keling Village, Kepung Subdistrict, Kediri Regency, East Java in January - April 2019. The study used a Randomized Block Design with a combination of 7 treatments with four replications, consisting of (1) A = control, (2) B = (300 kg Urea ha⁻¹ + 100 kg SP-36 ha⁻¹ + 200 kg NPK 15-15-15 ha⁻¹), C = (300 kg Urea ha⁻¹ + 50 kg SP-36 ha⁻¹ + 200 kg NPK NPK 15-15-6 ha⁻¹), (4) D = (300 kg Urea ha⁻¹ + 50 kg SP-36 ha⁻¹ + 300 kg NPK 15-15-6 ha⁻¹), (5) E = (250 Urea ha⁻¹ + 400 kg NPK 15-15-6 ha⁻¹), and (6) F = (200 Urea ha⁻¹ + 500 kg NPK 15-15-6 ha⁻¹). The results showed that NPK compound 15-15-6) fertilizer was giving 200 Urea ha⁻¹ + 500 kg NPK 15-15-6 ha⁻¹ (treatment of F) obtained the highest yield than other of 8.35 ton ha⁻¹ dry seeds yield with R/C-ratio = 2,65, RAE value 137.38%, and the profite of maize farming IDR. 21,850,000 per hectare.

Key words : NPK compound, performance, maize

Use of biochar and NPK fertilizer in soybean cultivation in Alfisol to improve soil physical properties and plant growth

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Abstract. The decrease in soil properties due to the use of artificial fertilizers requires finding a solution, one of which is the use of biochar. This research aims to obtain data on the effect of using rice husk biochar and NPK compound fertilizer on the physical properties of Alfisols and soybean growth. The research was carried out from February 2022 to May 2023 on Alfisol land in Kwangsam Village, Jumapolo, using a Randomized Complete Block Design (RAKL) with 10 treatments and 3 replications. The research results showed that the combination of rice husk biochar and NPK compound fertilizer improved soil physical properties, that are soil C-Organic levels, field capacity, soil porosity, and soil water retention levels and reducing soil bulk weight. The treatments also increased soybean growth, that are plant height, number of leaves and number of branches. Application of 25% NPK compound fertilizer (75kg ha^{-1}) and 100% rice husk biochar (10 ton ha^{-1}) is recommended to improve soil physical properties and soybean plant growth in Alfisols.

Keywords: Alfisol, Biochar, NPK compound fertilizer,

The role of entrepreneurs and firm characteristics to the innovativeness level: a study of e-commerce adoption on traditional drink SMEs

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Abstract. This study aims to analyze the influence of entrepreneur and business characteristics on the level of innovativeness in e-commerce adoption in traditional drink SMEs. The study used a quantitative approach with survey techniques. The study sample was 330 owners of traditional drink SMEs taken proportionally in Yogyakarta Province. Data analysis using descriptive statistics with multiple linear regression and SPSS as tool analysis. The results show that simultaneously, all of the variables affect the level of innovation in e-commerce adoption. Partially, business scale, education, and the number of IT staff have a positive effect on the level of innovativeness in e-commerce adoption. The age of business has a negative and significant effect on the level of innovativeness. Meanwhile, the age of the entrepreneur did not have a significant effect on the level of innovativeness. Stakeholder collaboration is needed to improve both formal and non-formal education for traditional drink SMEs. The development of e-commerce skills, knowledge, and investment in the number of IT staff is needed to accelerate the adoption and e-commerce usage management continuously. Increasing business scale is also needed for the optimization and efficiency of e-commerce utilization to improve business performance.

Keywords: e-commerce adoption, traditional drink, level of innovativeness, SMEs, entrepreneur characteristics

The Last Twelve Years Relationship Between SMEs and Environmental Policies: A Bibliometric Approach and Content Analysis

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Abstract. This study seeks to present a better global knowledge mapping about SMEs' connection with environmental policy, referring to the literature reviews from the Scopus Database from 2000 to 2022. This study provides an overview of the bibliometric approach: time analysis, journal analysis, keyword analysis, co-authorship analysis, citation analysis, countries analysis, and institutional analysis. This article explores the complementarity between the literature on sustainability in SMEs and on family-owned businesses and the influence of environmental policy on SMEs' engagement with sustainability. Contributions in the economic literature in relation to the special characteristics of the management of environmental innovation in SMEs. The keywords SMEs, Small and Medium-sized Enterprises, and Innovation were the main focal points of the research. The United Kingdom delivers the highest contribution to literature. The bibliometric approach reveals the causality's direction between SMEs and environmental policy over the last 12 years. The results revealed practices, strategies, policies, and models promoting Green IT compliance in SMEs, reducing costs in companies by optimizing technological resources for environmental sustainability. This paper offers insights to academia, practitioners, and *policymakers* to help *SMEs* engage with sustainability and may also assist the latter in developing strategies to improve *SMEs*' social and *environmental* reporting.

Keyword: SMEs, Environmental, Policy, Bibliometric, Review

Understanding Digital Divide for Rural Development: Impacts and Drivers

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Abstract. Rural development is a priority for many developing countries in the world because it meets the world's food needs. Rural development requires the internet and digital technology for development sustainability. There is ample evidence that rural communities have lower internet and digital technology access than urban societies. This digital divide will impede development and promote village exclusivity. Village exclusivity will support rural sustainable development. Therefore, efforts to bridge the digital divide are critical. Many studies have been conducted to investigate the digital divide between rural and urban societies, but studies on the impact of the digital divide and the contributing factors that cause it remains unexplored. This study aims to describe the impacts and factors that cause the digital divide in the context of rural development. This study is a narrative review of 16 articles selected from reliable sources such as scopus.com. The results of the literature review are summarized to answer research questions. The impacts and drivers of the digital divide described in this study contribute to some of our efforts to bridge the digital divide while also providing some insight for future research.

Keywords: digital divide, impacts, drivers, rural development, technology

The effect of gamma ray re-irradiation on genetic variations in black rice based on RAPD and *Bph* gene resistance location based on SSR markers

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Abstract. The black rice variety Cempo Ireng M8 generation already has morphologically uniform characteristics and good productivity values. However, the black rice M8 generation is still susceptible to planthopper pests. Therefore, a re-irradiation process was carried out on M8 using 200 Gy gamma rays to obtain a black rice variety resistant to planthopper pests. This re-radiation treatment has produced the M2 generation. To determine the genetic variations between M8 black rice plants and M2 generation that are formed, this research conducted molecular methods using RAPD and SSR markers to determine genes in the sample related to the *Bph* resistance gene. The sequenced SSR amplicons were analyzed using BLAST. The results of the RAPD marker showed genetic variation in the seven black rice samples with an average polymorphism percentage of 92.85% and the Polymorphic Information Content (PIC) value for the six primers was between 0.25-0.5, which means the RAPD primers is informative. The analysis and sequence results of the RM5953 primer show that the primer is located in the *Bph* resistance gene and produced amplicon at a band size of 129 bp.

Keyword : black rice, *Bph* resistance gene, gamma radiation, genetic diversity, re-radiation

Resource-based Typology of Agricultural Start-up Companies in ASEAN Countries

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Abstract. Using the k-means clustering technique, this study examines the characteristics of agricultural startup businesses in ASEAN nations. This study utilizes Crunchbase data on 506 agricultural startup companies in ASEAN countries, with two primary variables, which are tangible and intangible sources. The findings of this study indicate that Indonesia is the nation with the most agricultural startup companies. Aside from that, startup companies can be divided into three primary categories based on age, total funding, labor utilization, and revenue. The median age for startups that have recently emerged is established after 2018, with low employee utilization (11-50 employees) but high revenue (5 million). This shows that there are several tendencies where many companies (both old and new) have developed and gained a place in the agricultural system in several ASEAN countries.

Keywords: Agriculture Startup, Startup Typology, Resource Based, Cluster Analysis

Analysis Of Arrowroot Farming In Yogyakarta

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Abstract. Arrowroot is one of the food commodities that have excellent and promising business opportunities. The need for arrowroot continues to increase every year in line with the increasing population and the development of industries that require arrowroot raw materials. This study aimed to determine the costs, revenues, incomes, profits, and efficiency of arrowroot farming in Yogyakarta. The basic research method used in this research is descriptive and analytical. This study was carried out by using survey techniques with a simple random sampling method. The study was located in Yogyakarta with a sample of 92 farmers. The method of analysis used is the analysis of costs, revenues, income, farming profits, and R/C ratio. The results showed that the average farming costs in one growing season consisted of explicit costs of IDR 1,843,759.81/ha and implicit costs of IDR 30,059,457.41/ha. The average farm revenue was IDR 13,491,298.19/ha. The average farm income was IDR 11,647,538.37/ha. The average farm profit was -IDR 18,411,919.04/ha. The average R/C ratio on cash costs was 7.31, meaning the farm is efficient, and the average R/C ratio on total costs was 0.42, meaning the farm is inefficient.

Keyword: Arrowroot, Farming Cost, Revenue, Efficient

Morphological Characterization of Sirih Cina (*Peperomia pellucida* L.) in Three Altitudes of the Surakarta Ex-Residency

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Abstract. The sirih cina is a plant from the Piperaceae family that can grow in damp places such as the edge of a ditch or under shady plants. The sirih cina plant contains several chemical compounds, such as alkaloids, tannins, saponins, flavonoids, calcium oxalate, fats, polyphenyl essential oils, cardenolides, steroids, triterpenoids and carbohydrates which make it a herbal plant. This research was conducted to characterize sirih cina plants at three different altitudes. This research was conducted from 22 June 2023 to 31 November 2023 with research samples of 36 flowering Sirih Cina plants. This research was conducted using an exploratory descriptive method. Sirih Cina plants were analyzed for morphology and vegetation level. Observation results are described using the plant descriptor, namely IBPGRI. The research results show that there are differences in the characteristics of sirih cina plants that live in the lowlands, medium plains and highlands which can be seen from their morphology.

Keyword: Sirih Cina, herbal plants, plant morphology, characterization

Growing Young Generation's Interest in Agriculture through the Synergy of Tourism and Organic Agriculture

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Abstract. Sustainable agriculture is becoming increasingly important in the context of global population growth and climate change. However, young people's interest in agriculture often declines due to urbanization and shifts in career preferences. In facing this challenge, the synergy between tourism and organic farming emerges as an interesting and potential solution. This article explores how these synergies can play an important role in growing young people's interest in agriculture. This research method is qualitative with a phenomenological approach. The research was conducted at an organic farming center in Karanganyar Regency, Central Java. The results show that organic farming combines elements of education, sustainability and social interaction in the tourism experience, has a positive impact on the local economy, environmental awareness, and strengthens connectedness with nature and local communities. By tapping into the potential synergies between tourism and organic farming, young people can be inspired to engage in sustainable agriculture, create positive changes in future agricultural practices, and promote a more environmentally conscious and sustainable society.

Keywords: organic, social interaction, sustainable, tourism

Information Exposure to National Strategic Projects of Toll Road in Central Java

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Abstract. The farmer's assessment of the intensity of the information and the source of information will inevitably affect his behavior. This paper takes part of the research title on the response of affected farmers to National Strategic Projects; this article reviews the information exposure side. The aim is to examine how farmers assess the frequency of exposure, the credibility of information sources, and the strength of reference groups in constructing the Solo-Yogyakarta trace toll road in Klaten Regency. The results stated that how often the frequency of information from the government, the largest share of farmers (42.25%) rated sometimes, for the frequency of information from offline (neighbors) on the assessment criteria never (37.21%) and the frequency of information from online (media) the majority never rated (81.78%). Meanwhile, if examined from the credibility of information sources for the government, the trust aspect, most farmers rated trust (61.63%). For the expertise aspect, the majority also mentioned trust (53.49%). Aspects While the reference strength of offline reference groups, the most considerable part rated doubts (43.41%), and the strength of online group references, as many as 41.09% of farmers rated not trust.

Keywords: information exposure, intensity, trustworthy, expertness

Productivity of elephant grass pakchong (*Pennisetum purpureum* cv Pakchong) and Taiwan (*Pennisetum purpureum* cv taiwan) cultivated based on different stem cutting sizes

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Abstract. Currently, there is no standard for the cuttings used to produce high-productivity elephant grass. Therefore, research was conducted to determine the optimal size of cuttings for achieving good productivity. The study was conducted in the field station area of Rancamaya, Bogor. A factorial group randomized design with 5 replications was employed for the research. The first factor was the type of elephant grass, consisting of 1) Pakchong and 2) Taiwan, while the second factor was the size of the cuttings, consisting of 1) 5 cm, 2) 10 cm, 3) 15 cm and 4) control. The research indicated that there was an interaction between the type grass and the size of cuttings for leaf length, fresh and dry leaf weight, dry stem weight, and total dry weight. The 5 cm cuttings of Pakchong had the highest fresh and dry leaf weights ($P < 0.05$). The highest dry stem and total weight were obtained with the control size cuttings of Pakchong. The number of tillers was influenced by the size of cuttings, with the control size cuttings having the highest number of tillers. This study indicated that 5 cm cuttings can be used as cutting material to produce Pakchong and Taiwan with optimal forage production.

Keywords. Seed, forage, vegetative, production

Morpho Physiological Response of T1 Rice cv. Mentik Wangi Results of Sd1 and Gn1a Gene Editing

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Abstract. Mentik Wangi is one of the local aromatic rice varieties that has potential to be developed. Mentik wangi has a fairly tall plant posture so it is susceptible to falling which results in a loss of yield. In previous research, semi-dwarf mentik wangi lines with high productivity have been obtained. This study aims to identify the morphological and physiological characteristics of T1 generation Mentik Wangi resulting from genome editing. This is an experimental study that involves editing the sd1 and gn1a genes as a 1-factor treatment design. Each pot contains one plant, and T1 Mentik Wangi seeds are planted in these pots. The treatment of sd1 and gn1a edited genes in Mentik Wangi affecting the age at the flowering time.

Keyword: CRISPR/Cas9, genome editing, phenotype

Designing Supply-Chain in Agricultural Commodities using Herfindahl Index in Soloraya

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Abstract. Herfindahl index is a statistical measure of concentration level of gross production values among agricultural products in Soloraya. The aim of this research is to determine the level of market concentration for agricultural products which are basic necessities. The high concentration of various agricultural product commodities will lead to single price taker determination so that prices of basic necessities become uncompetitive. Apart from that, it is hoped that with a supply chain approach for agricultural commodities in Soloraya, a supply chain mechanism can be obtained from the producer to the market. Through two analysis mechanisms, both the Herfindahl index and Supply-chain, price regulation patterns will be obtained which can be used as a tool to control market prices for basic commodity products. The results are that the supply chain design for agricultural products in Soloraya is available and can be used to control prices of basic goods, which can cause changes in goods inflation.

Keyword: Herfindahl index, Supply-Chain, Agricultural commodities

Potential of nitrogen-fixing and phosphate solubilizing bacteria from the rhizosphere soil of dryland indigenous plants

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Abstract. Rhizosphere bacteria inhabit the root area of plants and are known to have roles: protecting plants from pathogens, producing growth hormones, phosphate solubilizers, and nitrogen fixers. This research aims to isolate and characterize the rhizosphere bacteria of indigenous dry land plants which can obtain nutrients, especially as potential Nitrogen Fixing Bacteria (NFB) and Phosphate Solubilizing Bacteria (PSB). These bacteria were isolated from the rhizosphere of dry land rice and the rhizosphere of dry land wild grass understorey. The results showed that 2 NFB isolates were obtained from the rhizosphere of dryland rice and the understorey rhizosphere of dryland wild grasses, while PSB isolates from the rhizosphere of dryland rice and the understorey rhizosphere of dryland wild grasses were 3 each. The population density of NFB and PSB was the highest. from the isolation of the understorey rhizosphere of dry land wild grass with isolate code T1J2 of 0.003 CFU/g. The results of this research show that even under conditions of drought, the presence and diversity of nitrogen-fixing and phosphate-solubilizing rhizosphere bacteria remain. Further research needs to be carried out on target plants.

Keyword: rhizosphere, rice, understorey, isolation, morphological.

Genotype Variation Exploration of Growth Hormone (GH) Gene in Sonok Subpopulation Madura Cattle as a Candidate of Growth Traits Marker in Madura Cattle

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Abstract. Sonok is a specific breed of Madura cattle used specifically for beauty contests. The Growth Hormone (GH) gene is responsible for cattle growth. The research objective is to analyze the genotype variations of the GH gene and body conformation distribution in the Sonok subpopulation. Sixty blood samples from cattle were used, consisting of three subpopulations: Sonok, Taccek, and Sayur. Genotyping of the GH gene was conducted using the PCR-RFLP method with *MspI* as the restriction enzyme and sequencing. The Hardy-Weinberg Equilibrium (HWE) analysis was performed using the chi-square method. The research revealed two alleles, A and B, with three genotypes: AA, AB, and BB. The allele and genotype frequencies were as follows: for Sonok, allele A (0.85) and B (0.15); genotypes AA (0.75), AB (0.20), BB (0.05). The alleles and genotype frequencies of Taccek and Sayur were the same: A (0.92) and B (0.07); genotype AA (0.85), AB (0.15). The HWE analysis indicated that all subpopulations were in equilibrium ($P > 0.05$). This study concluded that two alleles (A, B) and three genotypes (AA, AB, BB) were found, with the AA genotype being superior in all three Sonok subpopulations. Sonok cattle had the highest body conformation among others.

Keyword: GH Gene, Sonok cattle, Madura Cattle, Variation

Intestinal bacterial composition in laying pullet reared in tropical climate received betaine supplementation

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Abstract. Intestinal bacterial composition is one of the markers that can be observed in poultry under heat-stress conditions. This study investigated the effects of dietary betaine on the intestinal bacterial composition of growing pullets reared in a tropical climate. In total, 96 laying hens strain Lohmann aged three weeks were assigned to two dietary treatments, each consisting of six replicates of eight birds. Dietary treatments included a basal diet (T0) and a basal diet supplemented with betaine at 1.2 g.kg⁻¹ (T1). The next-generation sequencing method of the 16S rRNA gene region V3–V4 was applied to view the taxonomy profile. Bacteria from the genus *Faecalibacterium*, *Akkermansia*, *Desulfovibrio*, and *Lachnospiraceae UCG-002* were reported as markers in the heat stress condition. A t-test was applied using R software to evaluate the effect of each treatment. Relative abundance from the genus *Akkermansia* as marker heat stress response in T0 treatment showed significantly higher compared to T1 ($p < 0.05$). Based on this result, we concluded that the lower population of the genus *Akkermansia* indicated that betaine supplementation could alleviate heat stress conditions in growing pullets.

Keyword: betain, bacterial compotition, tropical climate

Landslide Hazard Analysis with GIS Approach in Watershed Selorejo Dam Malang Regency

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Abstract. Malang Regency, especially in Ngantang District, has the potential for landslides because the natural conditions are quite steep. The large potential for landslides requires efforts to assess the risk of landslides as a whole so that it can be used as a disaster management effort to reduce the negative impacts of landslides. The aim of this research is to conduct a landslide risk analysis, obtain a landslide hazard map, and propose landslide prevention patterns. The Geographic Information System (GIS) program was used in the study by overlaying various map data on the Selorejo Dam watershed. The results of this research are that the potential for landslides in the Selorejo Dam watershed consists of not vulnerable at 1.16% or an area of 2.50 Km², somewhat vulnerable at 6.64% or an area of 15.62 Km², moderate category at 89.24% covering an area of 209.90 Km², and vulnerable of 3.06% or an area of 7.20 Km². Landslide control efforts are divided into short-term handling using mechanical methods according to the level of vulnerability and long-term handling using vegetative methods according to the function of the area and level of vulnerability.

Keywords: Landslide hazard, GIS Approach, Watershed, Malang Regency

In pursuit of sustainability : A case of irrigated rice fields management practice by traditional farmers in Waikelosawa, Southwest Sumba

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Abstract. Fulfillment of subsistence need is the main motivation for farmers in Southwest Sumba to implement intensification of irrigated rice growing system. Being traditional farmers do not deter them from practicing intensification technique, motivated mainly by water abundance and the availability of irrigation infrastructure. However, practicing intensification into action to achieve economically viable and environmentally sustainable management system is not without contestation. Highlighting challenge encountered by the farmers in practicing intensive rice fields management, a qualitative study was conducted in Waikelosawa, Southwest Sumba. Data and information collection were performed through semi structured interview to key informants representing farmers, extension workers, and policy makers. The study found that achievement of sustainable rice fields intensification system is contested by lack of quality agricultural production facilities, potential social conflicts over water provision, and limited access to appropriate technological knowledge. Recognizing the significance of their role as local food producers, supportive policy should be designated to enhance traditional farmers capacity and capability in implementing sustainable rice fields management system.

Keyword: intensification, rice fields management, Sumba, sustainable agriculture, traditional farmers

Effect of Shade and Water Volume on Proline Content and Growth of *Medinilla* Plants

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Abstract. *Medinilla* is a cultivated wild plant because it has medicinal properties. The research was carried out in April 2022 – April 2023 in Pakem District, Sleman Regency. Analysis of proline and chlorophyll content was carried out at the Gadjah Mada University Laboratory.

This research aims to determine the level of resistance and growth of *Medinilla speciosa* and *Medinilla verrucosa* plants in drought and shade conditions. This study used a nested complete factorial randomized block design, with the types of *Medinilla speciosa*, *Medinilla verrucosa* and the volume of water given, 1750 ml, 1500 ml, 1250 ml per polybag nested in 25%, 50% and 75% shade. Each treatment was repeated three times, resulting in a total sample of 54 plants. The results of the study showed that the volume of water provided in the shade suppressed growth, that is number of leaves, leaf area, root volume, fresh weight of stover, chlorophyll except plant height, dry weight of stover and proline content.

Keyword: *Medinilla*, drought, shade, proline

Physicochemical characteristics of consumer preferences in different formulations of couverture chocolate

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Abstract. Consumers in each region tend to prefer different products. Chocolate products have a characteristic bitter and sour taste, but most chocolate products are developed with sweeteners, producing a predominantly sweet taste. This research aims to determine the physicochemical characteristics of couverture chocolate based on consumer preferences for various formulations. The physicochemical characteristics observed were pH, viscosity and texture. Consumers will determine their preference level for the chocolate formula with differences in nib composition of 30%, 35%, 40%, 50%, 60% and 70%. As many as 500 consumers from various regions in the Special Region of Yogyakarta Province carried out sensory tests on the six samples with the attributes of bitterness, sweetness, and acidity. Consumers prefer chocolate with a composition formula of 35% nib, 12.4% butter, 28% sugar, 24% milk, 0.5% lecithin and 0.1% vanilla. The test results for chocolate's most favorable physicochemical characteristics are pH 6.63, viscosity 5140, and hardness 50.523 N.

Keyword: consumer preference, couverture chocolate, physicochemical

Farmer Behavior Towards The Risk of Jasmine White Flower Production in Depok Village

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Abstract. In Indonesia, one of the ornamental plants that is in great demand by consumers is the white jasmine flower which is known as the nation's puspa. Depok Village, Kandeman District, Batang Regency is one of the white jasmine flower production centers in Central Java. This research aims to determine farmers' behavior regarding the risks of white jasmine flower farming production. Respondents are farmers who are members of the Barokah farmer group and have cultivated white jasmine flower plants with a total of 30 people. Analysis techniques in research on Moscardi and de Janvry's theoretical approach regarding the classification of risk aversion. The results of the research show that the majority of white jasmine flower farmers in Depok Village, Kandeman District, Batang Regency are neutral towards risk, namely 26 farmers (86.67%), while 4 farmers (13.33%) like risk and there are no farmers who avoid it.

Keyword: farmer behavior, production risks, white jasmine flowers

Incorporating indigineous microbe and adaptive vegetation on volcanic deposits of Mt Semeru: can physical properties be improved?

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Abstract. Volcanic deposits from Mount Semeru, East Java, contain high levels of silica and aluminum, which cause compaction and declining permeability. Adaptive vegetation and indigenous microbes may improve these physical properties of deposits, but research is limited. Therefore, this study aimed to investigate the effects of incorporating indigenous microbes and adaptive vegetation to enhance the properties of volcanic deposits. The research used a Factorial Randomized Complete Block Design (FRCBD) consisting of two factors: (1) vegetation level (i.e., elephant grass (V1), vetiver grass (V2), *Centrosema* sp. (V3), and *Indigofera* sp. (V4)), and (2) microbial level (i.e., non-microbes (M1) and indigenous microbes (M2)). Data analysis was performed using ANOVA, followed by Tukey's test at the 5 % level. After six months, the combination of V1 to V4 with M2 significantly increased the C-organic content from 0.12 % to 0.42 % and reduced bulk density from 1.71 g/cm³ to 1.53 g/cm³, leading to an increase in plant growth and biomass production. Furthermore, the available water content and total porosity increased by 16.95 % and 10.67 % respectively. Our study revealed that elephant grass combined with indigenous microbes is the most effective in reducing compaction due to massive root systems and enhancing microbial activity.

Keyword: Adaptive Vegetation, Indigenous Microbes, Mount Semeru, Volcanic Deposits

Challenges and Innovative Solutions for Securing the Availability and Sustainability of Feed in Maggot Cultivation

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Abstract. Maggot cultivation has emerged as a sustainable and versatile solution with applications in diverse industries, from animal feed production to waste management. However, a critical challenge lies in securing an adequate and consistent supply of raw materials, primarily organic waste, to sustain this thriving industry. This study explores the raw material challenges maggot cultivation businesses face and highlights potential opportunities and innovative solutions. This study explores the phenomenon thr three maggot cultivation enterprises namely Bank Sampah Induk (BSI) Kota Salatiga, KPTT, and Gubuk Maggot, located in Klaten. The research results from the interviews emphasize the significance of maintaining a dependable source of top-notch organic waste as a critical element for enabling prosperous maggot cultivation. Navigating the raw material challenge in maggot cultivation requires a multi-pronged approach that combines innovation, collaboration, and sustainable practices. As the industry continues to evolve, businesses that can effectively address this challenge will be better positioned to capitalize on the economic and environmental benefits of maggot cultivation while contributing to the broader goals of waste reduction and sustainable resource utilization.

Keyword: Availability, Feed, Maggot, Sustainability

Impact of Domestication of Red Jungle Fowl on Individual Characteristics of Chickens

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Abstract. The The research was carried out for 3 months in North Bengkulu Regency and Central Bengkulu Regency with the aim of knowing the changes that occurred in individual red jungle fowl. Ninety-nine breeders were selected using the snowball sampling method, then a sample of chickens was selected. The selected female chickens were 42, and the selected roosters were 69. Data was collected by interviews, filling out questionnaires, and observation; including breed purity, changes in feed, adult chicken body weight, egg production, and egg weight. The results of the research showed that RJF experienced changes in feed and habitat, the RJF kept by the community were not pure RJF, but chickens resulting from crossing male red jungle fowl and female village chickens. In Central Bengkulu the average weight of hens was 982.69 ± 265.64 g, from 1480g to 708g, egg production was 8.35 ± 2.37 and egg weight was 34.64 ± 7.21 g, and the weight of roosters was 1085.79 ± 210.7 g. In North Bengkulu the average weight of hens was 815.50 ± 85.32 g, the highest was 970g and the lowest was 675g (N=10 hens), egg production was 9.17 ± 1.75 and egg weight was 27.91 ± 8.43 g, and roosters weight was 1197.56 ± 173.74 g. In conclusion, there have been changes in habitat, food, growth and increased production compared to pure RJF.

Keywords: characteristics, domestication, red jungle fowl

The role of women in tourism village development: gender analysis (case study of Ngargoyoso sub-district)

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Abstract. The development of tourism villages in Ngargoyoso District requires optimizing the role of women in its operation. Especially in 3 villages, namely Berjo, Kemuning, and Jatirejo, women's involvement in tourism can reduce gender inequality in development. Therefore, researchers want to study more about the role and involvement of women in developing tourism-based villages in Ngargoyoso District. The research method used is a case study with a qualitative approach. Data collection techniques are Focus Group Discussion, interviews, documentation, and field observation. Data sources are obtained from books, scientific journals, theses, and other documents following the topic of tourism village development in Ngargoyoso District. The results showed that women in the Ngargoyoso sub-district, especially in Berjo, Jatirejo, and Kemuning villages, play an active role in developing tourism villages through their participation in managing MSMEs, photography, women's farmer groups, agrotourism managers, tourism promotion, maintaining ticket counters, and joining ojek and jeep communities. Women in the Ngargoyoso sub-district, especially in the 3 villages, participate in village tourism management for economic reasons and want to be independent without depending on others. However, there has yet to be any assistance from the village. It is hoped that there will be further assistance for women in efforts to develop tourism villages in Ngargoyoso District.

Keyword: Women's Role, Gender, Agrotourism

Sustainable Tourism for Rural Livelihood Sustainability (Case Study of Agrotourism in Karanganyar Regency, Central Java)

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Abstract. Sustainable tourism development is an emerging concept to overcome the negative impacts of tourism development. This study analyzes sustainable tourism development to achieve economic, socio-cultural, and environmental sustainability goals in Ngargoyoso District. The research method used in this study is a descriptive qualitative method with data collection techniques through FGD, direct interviews, documentation, and field observation. Tourism villages in Ngargoyoso District, especially in Jatirejo Village, Kemuning Village, and Berjo Village, are supported by the government, private parties, and the community, who synergize to achieve community welfare. Based on the study's results, it was found that the positive impacts of the existence of tourism villages include increasing economic levels, increasing knowledge by the public, and reducing unemployment. In contrast, the negative impacts are the increasing accumulation of garbage, infrastructure damage, and congestion.

Keyword: sustainable agrotourism

The Role of Urban Agriculture in Facing the Food Crisis

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Abstract. The food crisis is characterized by unpredictable climate conditions, extreme rainy and dry seasons, natural disasters, etc. This situation impacts the agricultural business system, particularly leading to crop failures. To address the food crisis, special efforts are required to increase crop production. Land conversion for other purposes has resulted in a reduction of available agricultural land. Developing urban agriculture is one of solution to the food crisis. The characteristics of urban agriculture involve limited agricultural resources, including land, water, planting media, human resources, and fertilizers. Numerous technologies have been developed to support the growth of urban agriculture. Urban agricultural technology, which has seen widespread development, is also bolstered by advanced systems, such as hydroponic cultivation based on Internet of Things (IoT) technology. Plants that can be introduced into urban agriculture encompass various types of vegetables, food crops, fruit-bearing trees, medicinal plants, and spices. Regarding the limitations of fertilizers in urban agriculture, the management of organic waste from agricultural products and other urban waste plays a vital role in addressing the shortage of much-needed fertilizers. Organic waste management aligns with the principles of a circular economy: refuse, reduce, reuse, recycle, and recover. Following these principles ensures that waste generated from economic activities continuously re-enters the cycle, becoming raw material for other processes.

Keyword: food crisis, urban farming, technology

Growth Response of Mustard Greens (*Brassica juncea* L) to Nutrient Formulations in Hydroponic Media

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Abstract. The production of mustard greens (*Brassica juncea* L) using a hydroponic system has been widely carried out by vegetable producers in urban areas. One of the inhibiting factors is the high price of AB Mix nutrition. The aim of this research was to test the effectiveness of NPK and AB Mix inorganic fertilizers on mustard greens. The research was conducted at BPTP Jakarta, from February to April 2021. There are five levels of combination of NPK and AB Mix inorganic fertilizer, namely: 100% AB Mix (H0/control), 75% AB Mix - 25% NPK (H1), 50% AB Blend - 50% NPK (H2), 25% AB Blend - 75% NPK (H3), 100% NPK (H4). The test used a Completely Randomized Design (CRD), with 4 repetitions. The research results show that the AB Mix 100% hydroponic nutrient solution (H0) can be substituted by NPK fertilizer up to 75%.

Keyword: Growth Response, Nutrient Formulations, Hydroponic , Mustard Greens

Analysis of species composition and vegetation conditions of the mangrove ecosystem on Lepar Island

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Abstract. Mangrove forests are an important natural resource in providing ecosystem and ecological services as a nature-based solution for coastal protection, including on Lepar Island. This research aims to analyze the composition of mangrove species and the mangrove health index on Lepar Island. The field data collection method uses a systematic sampling method. Analysis of mangrove community structure uses the Shannon-Weiner index, while analysis of mangrove density and canopy cover uses the hemispherical photography method. The research results show 11 species from 5 mangrove families are found on Lepar Island. The Importance Value Index at the four stations varied sequentially, namely *Sonneratia alba* (158.84%), *Bruguiera gymnorrhiza* (202.88%), *Ceriops tagal* (110.42%), and *Rhizophora apiculata* (300%). Density is generally in the sparse category, and canopy cover is in the good category. The mangrove health index at station 1 (51.83%) is in the medium category, while other stations show the MHI value of <33.33% or in the poor category. Mangroves have some benefits for humans and the surrounding ecosystem, such as preventing ecosystem degradation and climate change. Therefore, mangroves need to be preserved and monitored.

Comparing the population, diversity, and phosphate solubilization ability between rice-root endophytic bacteria and rhizospheric-soil bacteria from organic wetland

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Abstract. Phosphate solubilizing bacteria play important roles in agricultural systems. The present study aims to compare the population, diversity, and phosphate solubilization ability between rice root endophytic bacteria (RREB) and rhizospheric-soil bacteria (RSB) from organic wetland. By spread plate method, bacteria were isolated directly using Pikovskaya's Agar and indirectly through other media, namely Nutrient Agar (NA), Starch Casein Agar (SCA), Jensen, Yeast Manitol Agar (YEMA). Each colony type on each media was screened for phosphate solubilization ability by sub-culturing the isolates on Pikovskaya's agar. The phosphate solubilizing index (PSI) was measured from the halo zone formation. The results showed that by direct cultivation, it was obtained 6 phosphate solubilizing rice-root endophytic bacteria (PSREB) and 5 phosphate solubilizing rhizospheric-soil bacteria (PSRSB) isolates. On the other hand, by indirect cultivation from NA, SCA, Jensen, and YEMA, it was obtained 2, 3, 1, and 3, isolates of PSREB and 4, 3, 1, and 3 isolates of PSRSB. The population and the diversity of RSB that capable in phosphate solubilization were higher than those of RREB. However, RREB showed higher PSI than RSB. The isolates of P1R5 and J1R1 showed the highest PSI among all isolates obtained by direct and indirect cultivation, respectively, which were 1.90 and 3.53.

Keyword: phosphate solubilization ability, rice-root endophytic bacteria, rhizospheric-soil bacteria, pikovskaya's medium, isolation method

Incidence of viral disease mosaic symptom and vector insects presence in several soybean varieties in pine agroforestry system

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Abstract. Pine dan soybean agroforestry represents an initiative to enhance land productivity and yield. Nevertheless, various viruses could infect soybeans in agroforestry. Mosaic disease is a predominant viral disease affecting soybeans. This research was conducted at KHDTK Forestry Alas Bromo in Karanganyar Regency, Central Java, Indonesia. The study aimed to observe the disease incidence and vector presence in some soybean varieties in the pine agroforestry system. A Randomized Block Design was used for the experiment, encompassing seven treatments of varieties. The varieties were Anjasmoro, Argomulyo, Dena-1, Dena-2, Denasa-1, Denasa-2, and Devon-1. Planted at 2.4 x 3.6 m and replicated three times. The incidence of mosaic disease is observed based on symptoms. Results indicated that the disease incidence was different for each variety. Viral vectors visited the soybean varieties: *Aphis glycine*, *Phenacoccus* sp., thrips, and *Bemisia tabaci*.

Keywords: *Glycine max*, agroforestry, vector insect

Disease Incidence Comparison of Bacterial Pustule on Soybeans in Mahogany and Pine Agroforestry Systems

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Abstract. Soybeans are an essential commodity for Indonesian people, who still rely on imports to meet national needs. Agroforestry is one of the solutions to increase soybean production. Agroforestry systems have different conditions from agricultural land in general. Trees such as pine and mahogany can influence the presence of other organisms that can potentially interfere with crop growth. Bacterial pustule is an important disease of soybeans caused by *Xanthomonas axonopodis*. The research aimed to observe disease incidence in soybeans in pine and mahogany agroforestry systems. This research was conducted at KHDTK Forestry-Alas Bromo in Karanganyar, Central Java, Indonesia. The study used a completely randomized block design with seven varieties of soybeans planted in an agroforestry system with mahogany and pine fields. The varieties were Argomulyo, Dena-1, Dena-2, Denasa-1, Denasa-2, and Devon. The research showed that no pustule bacteria were observed in the agroforestry system with pine. However, soybeans in agroforestry systems with mahogany were infected by pustule bacteria with an incidence of up to 40%. No infection on agroforestry soybeans in pines is presumably related to the microclimate condition. The microclimate conditions in pine agroforestry are more open and hot, while in mahogany, agroforestry conditions are more humid and less exposed to sunlight.

Keyword: *Glycine max*, Agroforestry, microclimate, *Xanthomonas axonopodis*

LOW-COST SHOOT PROPAGATION OF PINEAPPLE (*Ananas comosus* L. Merr) CV QUEEN USING GANDASIL-D AND AB-MIX

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ABSTRACT. Media composition is the main factor in the success of plant tissue culture. This study aims to find alternative media formulas using AB-Mix and Gandasil-D for shoot propagation of pineapple. The study used a factorial completely randomized design (CRD). The first factor was the AB-Mix concentration consisting of: 2.5 ml/L, 5.0 ml/L, and 7.5 ml/L. The second factor was the concentration of Gandasil-D consisting of 1.0 g/l, 1.5 g/l, and 2.0 g/l. Each treatment medium added 2 ppm BAP and 0.5 ppm NAA as plant regulator. Parameters observed included the time of shoot emergence, the number of shoots, the number of roots, and leaves number. The results showed that the concentration of AB-Mix affected all observed parameters, while Gandasil-D and the interaction between Gandasil-D and AB-Mix had no significant. AB-Mix 7.5 ml/l was the best treatment because it resulted in shoot emergence time (30.55 days after induction), number of shoots (3.55 shoots/explant), number of roots (2.05 roots/explant) and number of leaves (14 .66 leaves/explant) was not significantly from MS media. Based on the regression analysis carried out, it is still possible to increase the concentration of AB-Mix to increase the number of shoots produced.

Keywords: low-cost medium, in vitro culture, complete fertilizer, shoot propagation

Disease Incidence of Bacterial Pustules (*Xanthomonas axonopodis* pv. *glycines*) on some Soybean Varieties Panted in Mahogany Agroforestry System in Alas Bromo Forestry

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Abstract. Soybean production in Indonesia hasn't sufficiently supplied for domestic needs. One of the things that influence is the reduction of soybean harvest areas in Indonesia. One of the solutions to the problem is through extensification by utilizing land under shade, which is called an agroforestry system. Agroforestry systems will change intercrop environmental conditions such as reducing light intensity, temperature, and increasing humidity. The condition will affect disease development in soybean plants, especially bacterial pustule disease caused by *Xanthomonas axonopodis* pv. *glycines*. *X. axonopodis* bacteria can reduce soybean productivity by up to 57.61% in susceptible hosts and favorable environmental conditions. In this research, observations were made regarding the symptoms and incidence of bacterial pustules infection on seven varieties under the shade of mahogany. The varieties used were Anjasmoro, Agromulyo, Dena-1, Dena-2, Denasa-1, Denasa-2, and Devon-1. The research was conducted for three months at KHDTK Forestry-Alas Bromo, Karanganyar, Central Java, Indonesia. The research results showed that the lowest incidence of bacterial pustule occurred on the Anjasmoro varieties, with an incidence value of 0%. In comparison, the highest incidence of attacks occurred on the Denasa-1 variety, up to 23.3%.

Keywords: Glycine max, bacterial pustule attack, agroforestry

Disease Incidence of Leaf Rust of Soybean Caused by *Phakopsora pachyrhizi* Planted in Mahogany Agroforestry System

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Abstract. Soybean (*Glycine max* L.) is one of the agricultural commodities needed in high quantities in Indonesia. The utilization of agroforestry systems for soybean cultivation can be a solution to the domestic fulfillment of soybean needs. The moist environmental conditions of agroforestry plantings due to shading make soybeans susceptible to leaf rust disease. The pathogen *Phakopsora pachyrhizi* causes leaves to fall off early, inhibiting soybean seed pod growth. Research on the incidence of leaf rust disease in several soybean varieties is essential to optimize soybean production in agroforestry systems. The research was conducted from June to October 2023 in the Special Purpose Forest Area (KHDTK) of Alas Bromo, Karanganyar, Central Java, Indonesia. The experiment used a randomized experimental design (RAK) with seven soybean varieties: Anjasmoro, Agromulyo, Dena-1, Dena-2, Denasa-1, Denasa-2, and Devon-1. Disease incidence observation was based on visual symptoms. The disease incidence was in the range of 3.33-26.67%. The highest incidence occurred in the Denasa-1 and Dena-2 varieties, while the lowest was in the Anjasmoro variety.

Keyword: *Glycine max*; leaf rust; Agroforestry; variety

The effect of using biofertilizer on the growth of vanilla (*Vanilla planifolia* Andrews) seedlings

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Abstract. Vanilla is a group of orchid plants that are widely consumed and difficult to cultivate due to the lack of nutrients absorbed from soil experiencing drought stress. One way to overcome this is to use *Rhizoctonia mycorrhiza* (BNR) as a biological agent combined with the composition of Moringa leaves as the raw material. This research aims to determine the effectiveness of using BNR and Moringa leaves as biological fertilizer for vanilla seedling. The method used was CRBD with 2 treatments, namely 3 doses of BNR and 4 concentrations of Moringa leaves with 20 replications. The results of the research showed that BNR had a very significant effect on the parameters of root length, fresh root weight, root dry weight, while the concentrations of Moringa leaves had a real influence on the parameters of root length and fresh root weight, plants and plant dry weight. The best results in vanilla plants were induced with 15g BNR and 40% Moringa leaves which were resistant to drought stress and formed proline on day 2 as a material that was resistant to drought stress. It is hoped that this method can be practiced on other vanilla plants in Indonesia when facing drought stress.

Keyword: Drought stress, Moringa leaves, *Rhizoctonia mycorrhizae* (BNR).

The Effect of Green Vegetation Density in increasing Thermal Comfort in urban environments through preventing increases in Environmental Temperature: A Study in Kapanewon, Depok, Sleman, Yogyakarta, Indonesia

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Abstract. Green vegetation has many benefits in balancing nature. This research aims to see the relationship pattern between Green Vegetation Density (NDVI) and Urban Heat, and to see the Effect of Green Vegetation on Human Thermal Comfort. The research was carried out in 3 sub-districts in Depok, Sleman, Yogyakarta using the Remote Sensing method using Landsat-8 Satellite Imagery which is equipped with measurements of microclimate elements in the field for calculating Thermal Comfort and also completed with Correlation-Regression analysis. Based on the results, a pattern was obtained that locations that have a high level of Vegetation Density will have a low Urban Temperature, whereas locations that have a low level of Vegetation Density or non-Vegetation will have High urban temperatures, and it was found that all correlations were positive with the highest order being the Caturtunggal Zone with an r value of 0.7 with a correlation level of 0.4901 (49.01%), then in second place namely the Condongcatur Zone, namely with The r value is 0.6998 with a correlation level of 0.4897 (48.97%) and the last is the Maguwoharjo Zone, namely with an r value of 0.1555 with a correlation level of 0.0242 (2.42%). It is concluded that Green Vegetation is anti-urban heat and protects Thermal Comfort. NDVI prevents Temperature increase.

Keywords: Vegetation Density (NDVI), Remote Sensing, Urban Heat Temperature, Thermal Comfort.

Infection of *Phakopsorapachyrhizi* Rust Fungus on Seven Soybean Varieties in Pine and Mahogany Agroforestry

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Abstract. Pine and mahogany agroforestry systems are a couple of alternatives to increase soybean production. However, soybeans in agroforestry systems have problems with disease infection. One of the most important diseases is leaf rust caused by *Phakopsorapachyrhizi*. The study aims to compare the infection index and rate of *Phakopsorapachyrhizi* on seven soybean varieties in pine and mahogany agroforestry. The research was conducted at KHDTK Alas Bromo in Karanganyar, Central Java, Indonesia, using a Randomized Block Design System and seven soybean varieties (Anjasmoro, Argomulyo, Dena-1, Dena-2, Denasa-1, Denasa-2, and Devon-1) with three repetitions. The results represented that infection of *Phakopsorapachyrhizi* rust fungus in the mahogany agroforestry system had a higher index and faster infection rate.

Keywords: Glycine max; Agroforestry; Soybean; *Phakopsorapachyrhizi*; Variety

Leaf Rust Infection *Phakopsora pachyrhizi* on seven soybean varieties in pine agroforestry system

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Abstract. The agroforestry farming system is an alternative to increasing soybean production in Indonesia. However, in its cultivation, there are obstacles in the form of attacks by leaf rust pathogens. Leaf rust caused by the fungus *Phakopsora pachyrhizi* can reduce soybean production, depending on the variety and environmental conditions. This research was conducted from June to September 2023 on the KHDTK Alas Bromo, Karanganyar, Central Java, Indonesia, to explore the leaf rust incidence in soybean varieties. This research used a randomized block design (RAL) consisting of seven soybean variety treatments: Anjasmoro, Argomulyo, Dena-1, Dena-2, Denasa-1, Denasa-2, and Devon-1, and repeated three times. The results showed that all soybean varieties tested could be infected with the leaf rust pathogen. The lowest leaf rust infection was found in the Devon-1 variety (6.0%), and the highest infection occurred in the Dena-1 variety (20.0%).

Keyword: *Glycine max*; disease infection; leaf rust; variety

Utilization of *Rhizoctonia mycorrhizae* for orchid late blight control in support of sustainable agriculture at Merapi mount

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Abstract. *Vanda tricolor* is a protected orchid species because its presence in the wild is decreasing due to orchid leaf blight caused by *Fusarium sp.* pathogenic fungi. Orchid blight control methods generally involve the use of chemical fungicides and are risky for growers and the environment. The aim of this research was to test *Rhizoctonia mycorrhizae* (BNR) in inducing resistance to *Fusarium sp.*, in *Vanda tricolor* plants. The study used CRBD with two treatments and six replications. BNR was isolated and identified according to Bayman. BNR pre-inoculation was carried out on the roots of *V. tricolor* seedlings originating from tissue culture. The existence of a peloton structure at the root according to Nakano. The Saravanan method was used to measure peroxidase activity. The results showed that *V. tricolor* induced by BNR showed resistance to *Fusarium sp.* In addition, the induced orchids showed the formation of peroxidase enzymes, peloton structures, and lignification. An increase in peroxidase enzymes was observed on the second day in the leaves. In contrast, uninduced orchids experienced significant damage to the leaf epidermal tissue, did not show an increase in peroxidase enzymes, and failed to form peloton or lignified structures. This method has the potential to be applied to other orchid species, providing hope for conservation efforts.

Keyword: *Fusarium sp.*, induced resistance, *Rhizoctonia mycorrhizae*, sustainable agricultural.

Analysis of Factors Influencing the Profitability of Organic Rice Farming

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Abstract. This study aims to determine the Factors Influencing the Profitability of Organic Rice Farming (*Oryza Sativa*) in the Glonggong Village, Nogosari Subdistrict, Boyolali Regency. Sampling was carried out using random sampling with 30 farmers. Based on the research findings, it can be concluded that the average data analysis results in the income per farming business amounting to Rp. 13,606,667 and per hectare of farming amounting to Rp. 37,796,296. The average expenditure per farming business is Rp. 4,966,483, and per hectare of farming is Rp. 13,795,787. Income is the difference between revenue and total expenses or total costs. The average income received by farmers per farming business is Rp. 8,640,183, and the income per hectare of farming is Rp. 24,000,509. Significant factors affecting the income of organic rice farming include land area and seeds, while organic fertilizers, pesticides, and labor have no significant impact on the income of organic rice farming.

Keywords: Farm Income, Land Area, Seeds, Fertilizers, Pesticides, Labor Costs

Genetic distance analysis of Lingnan, Arab and Kedu chicken based on mitochondria DNA

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Abstract. Lingnan, Arab and Kedu chicken are the main breed to the development of Maron chickens which have ability as local egg and meat producer. The genetic distance of the Maron chicken elders is important to achieve the heterosis of the Maron Chicken. The Hypervariable 1 (HV1) region of D-Loop Mitochondria is the marker for genetic distance. The aim in this study to analyze the genetic distance of the Maron chicken elders using mitochondria HV-1 marker. Total of 90 blood samples were obtained from Lingnan, Arab and Kedu chicken. Polymerase Chain Reaction method was used to amplify D-loop HV-1 region mitochondria following by DNA sequencing. Maximum-likelihood (ML) method was used to generate phylogenetic reconstruction. 14 haplotypes were identified with haplotype H001 as the highest haplotype (n=20) and the lowest haplotype was H011-H014 (n=1). Differentiation between population revealed great differentiation between Lingnan and Arab ($F_{st}=0.203$) and very great differentiation between Lingnan and Kedu ($F_{st}=0.448$). PCA analysis showed the Lingnan, Arab and Kedu population were different each other. This study concludes the Lingnan, Arab and Kedu chicken have high genetic distance. The high genetic distance in Maron elders give the higher chance the heterosis occur to the Maron Chicken.

Keyword: differentiation, genetic distance, haplotype, HV1 mtDNA, maron chicken elder

The effect of introducing heat stress on the eating and drinking behavior of laying quail

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Abstract. The high environmental temperature will affect the quail's physiology and performance and can be indicated by their behavior. This study aimed to see how introducing heat stress in different floor spaces affects laying quail's behavior. The study was designed to be completely randomized, consisting of two floor spaces, namely 225 and 164 cm²/bird, and represented by 16 and 22 birds per cage. There were six replications per treatment, resulting in 228 birds that were used in this study. Ethogram is used to analyze behavioral patterns. The eating and drinking behavior of quail were recorded by CCTV for 24 hours and repeated thrice. The record was analyzed by sampling the first minute every hour. The data shown as a graph of eating and drinking behaviour for 24 hours. The result revealed that the drinking behavior of the low floor space (164 cm²/bird) from 00:00 - 23:00 was higher ($p < 0.05$) than the high floor space (225 cm²/bird). The eating behavior of quails from 00:00 - 23:00 was not different in the two conditions. Based on this study, we conclude that lowering floor space per bird in the cage may introduce heat stress conditions as indicated by a high drinking behavior pattern.

Key words: behavior, ethogram, heat stress, laying quails

Identification of vanilla plant diseases (vanilla planifolia. l) in karanganyar regency

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Abstract. Glycine The vanilla plant is one of Indonesia's spice plants which has high economic value but is very vulnerable to attacks by plant pests, especially plant diseases which result in reduced production and even plant death. The aim of this research is to determine the various diseases that attack vanilla plants in Karanganyar Regency. The research was carried out in Karanganyar Regency from August to December 2022, using observational, descriptive methods based on signs and symptoms and isolation to identify microscopically, research data was obtained by random sampling. The research results showed that vanilla plants experienced various diseases such as stem rot caused by the pathogen *Fusarium oxysporum* f. sp. vanilla and leaf rust by *Chephaleuros* sp. Anthracnose by *Colletotrichum* spp, *Aspergillus* sp.

Diversity and genome classification of banana (*Musa spp.*) at Kuantan Singingi District - Riau Province

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Abstract. The objective of this research was to determine the genome group, to observe the genetic relationship between banana cultivars in the Kuantan Singingi District, Riau Province, and to investigate specific traits to distinguish among banana cultivars. Twenty-five local banana cultivars were observed and characterized morphologically by following of IPGRI standard, genome classification was determined according to the Simmond and Shepherd method, and UPGMA clustering and PCA analysis were conducted. Twenty-five banana cultivars observed is classified into two genome group, namely AA/AAA genomes, and AAB genome. The coefficient similarity value of twenty-five banana cultivars based on morphological markers ranged from 0.23 to 1.00. Several banana cultivars showed the coefficient similarity value of 1.00, indicating that they are similar morphologically but different in naming in the community. UPGMA dendrogram clustered twenty-five banana cultivars into three groups, The first cluster consists of Kepok, Batu, Tanduk, Nangka, Godang, Ambon, Kapas, and Kolek Siam banana. The second cluster included banana cultivars of Abu, Talun, Godok, Pinang, Kapal, Raja, Sawak, and Serai banana. The third cluster consisted of Lidi, Tunjuk, Rotan, 40Hari, Lomak Manih, Somanih, Emas, Ome, and Bantan banana. PCA analysis was successful in identifying seventeen characters to differentiate among banana cultivars, and it can be utilized for banana characterization in future.

Keywords: Morphology, genome, diversity, banana

Effect of green manure on the availability of Phosphorus and Potassium nutrients in Vertisols

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Abstract. The need for rice as a staple food continues to increase, increasing the demand for land. However, the soil's availability of nutrients is decreasing due to inappropriate and excessive use of chemical fertilizers, causing soil degradation. Green fertilizer is an effective effort to reduce excessive use of chemical fertilizers. The research aims to determine the use of green manure in influencing the availability of phosphorus and potassium nutrients. The research was conducted on Vertisols in Weru District, Sukoharjo Regency. The research was carried out using experimental methods. There were 10 treatments with 3 replications (A: Control; B: NPK Fertilizer 200 kg/ha; C: Straw 10 Tons/ha; D: Kirinyuh 10 Tons/ha; E: Water spinach 10 Tons/ha; F: Water Hyacinth 10 Tons/ha; G: NPK 100 kg/ha + Straw 5 Tons/ha; H: NPK 100 kg/ha + Kirinyuh 5 Tons/ha; I: NPK 100 kg/ha + Water spinach 5 Tons/ha; J: NPK 100 kg/ha + Water Hyacinth 5 Tons/ha). The results show that green manure affects the availability of phosphorus and potassium nutrients. Kirinyuh fertilizer (5-10 tons/ha) gives the highest results in providing phosphorus and potassium nutrients in Vertisols. Using green fertilizers can offset chemical fertilizers by increasing the availability of phosphorus and potassium nutrients.

Keywords: Green manure, Phosphorus, Potassium, Rice, Vertisols

Modification of Rabbit Urine-based Liquid Organic Fertilizer (LOF) on Growth, N uptake of Corn and N Content in Sandy Soil

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Abstract. The purpose of this research was to determine the effect of modification of rabbit urine-based liquid organic fertilizer (LOF) on growth, N uptake of corn and N content in sandy soil. The experiment was conducted using a completely randomized design (CRD) with four replications. The treatments were rabbit urine (A1), rabbit urine + gold snail (A2), rabbit urine + gold snail + pineapple (A3), and rabbit urine + gold snail + papaya leaves (A4). Parameters used included plant height, number of leaves, stem diameter, leaf area, dry weight of stover, N uptake and soil N content. The results showed that the treatment gave a significant effect on the parameters of leaf area and N uptake, but had no significant effect on plant height, number of leaves, stem diameter, dry weight of stover and soil N content. The provision of rabbit urine LOF (A1) gave the highest results on N uptake of 218 g/plant, while the highest leaf area was caused by the combination of rabbit urine + gold snail (A2) of 28 cm²/plant. The provision of pineapple and papaya leaves in the combined LOF of rabbit urine + gold snail had no effect on all parameters.

Keyword: LOF, Rabbit urine, corn

Creep feeding supplementation improve pre-weaning growth of thin-tailed sheep under individual pen condition

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Abstract. This study aimed to observe the effect of creep feeding on the pre-weaning growth of thin-tailed sheep. Eight lambs were divided into two groups, each consisting of four lambs. The first group was provided with creep feed (CF), while the second group was not given creep feed (NCF). These lambs were raised alongside their dams in individual pens for 90 days. Body measurements and body weights were recorded, including body length (BL), heart girth (HG), wither height (WH), hip height (HH), chest width (CW), hip width (HW), and chest depth (CD). Data were analyzed using an Independent Sample T-test. Result showed significant differences in the growth parameters between the CF and NCF groups. Specifically, the monthly gains for BL, HG, WH, HH, CW, HW, and CD in the CF group were 7.99 ± 0.66 cm, 10.91 ± 0.95 cm, 6.83 ± 0.33 cm, 6.91 ± 0.31 cm, 4.66 ± 0.27 cm, 2.58 ± 0.32 cm, and 4.08 ± 0.57 cm, respectively. In contrast, the NCF group showed lower monthly gains: 6.50 ± 0.79 cm, 8.75 ± 0.78 cm, 5.91 ± 0.87 cm, 5.91 ± 0.62 cm, 4.00 ± 0.54 cm, 2.16 ± 0.32 cm, and 3.08 ± 0.16 cm. Furthermore, the average daily gain in the CF group was 0.11 ± 0.09 kg/day, whereas it was 0.07 ± 0.05 kg/day in the NCF group. It is concluded that creep feeding significantly enhances the pre-weaning growth of thin-tailed sheep under individual pen.

Keyword: Indonesian local sheep, morphometric, gain

Benefits of knowledge sharing by farmers to encourage implementation of robusta coffee production standard

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Abstract. Knowledge is a valuable asset in today's digital age. Knowledge sharing plays an important role in building understanding, creating creative ideas, and developing innovations that are of great benefit. Agriculture is an important sector of the world economy including coffee. Coffee that is cultivated and processed according to quality standards will have high quality, good taste, and be more competitive both in national and international markets. On the other hand, the practice of robusta coffee production quality standards by farmers is still not as expected. Knowledge sharing by coffee farmers will expand the range of dissemination, not only knowledge but also enthusiasm in implementing quality standards. This study aims to explore the benefits of knowledge sharing from a farmer's perspective for the implementation of robusta coffee production quality standards. This research method is qualitative (case study strategy) and NVivo12 Plus application for analysis. The research found that the benefits of knowledge sharing felt by farmers include benefits for personal lives, social lives, coffee standard operating procedure practices, and coffee farm development. This research will add new facts about knowledge sharing by farmers and increase understanding of the impact of knowledge sharing on the implementation of robusta coffee production quality standards.

Keywords: knowledge sharing, farmers, robusta coffee, benefits, quality standards

Relationship between Chlorophyll and Yield of Two Rice Varieties under Different Farming Systems

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ABSTRACT. Rice is the main food for the people of Indonesia which continues to increase due to rapid population growth. This must be supported by high rice production, one of which is by conducting adequate management. Currently, there are 3 farming systems in rice cultivation, namely organic, semi-organic, and conventional, which will give differences in plant productivity. Chlorophyll in plants plays an important role in photosynthesis and determines plant yield. This study was conducted to examine the relationship between chlorophyll and the yield of two rice varieties with various farming systems. There were six experimental plots with four replications, namely organic IR 64 and Mentik Wangi, semi-organic IR 64 and Mentik Wangi, and conventional IR 64 and Mentik Wangi. Crop yield consisted of harvested dry grain weight and milled dry grain weight. The results obtained showed that the organic rice field management system with IR 64 variety gave higher chlorophyll A levels than semi-organic and conventional rice field management systems by 0.39 mg/g tissue, while Mentik Wangi variety cultivated with organic rice field management system gave higher chlorophyll B levels than semi-organic and conventional rice field management systems by 0.26 mg/g tissue, and there was a positive relationship between chlorophyll and yield of two rice varieties with various farming systems.

Keywords: Paddy field management, Chlorophyll content, Rice yield

The Effect Of Urban Fringe Vegetation On The Sustainable Environment In Surakarta City

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Abstract. Surakarta is a complex MICE city. The city of Surakarta is the center of activity for the surrounding cities. Development and development are running dynamically and quickly. The consequence of this is a decrease in environmental quality. Biodiversity as the main component in supporting the sustainability of urban life needs to be maintained. Vegetation is the main focus in urban environmental studies. The role of vegetation in dealing with climate change is mainly related to optimizing urban temperatures. The aim of this research is to assess the condition and influence of vegetation density in relation to temperature and soil organic matter. The method in this research uses sentinel 2A image interpretation to determine the vegetation density index value and qualitatively assess the condition of vegetation, temperature, soil organic matter on the stability of environmental conditions. The research results show that the vegetation density is at an NDVI value of 0.13 - 0.61, indicating a low to high density. Biophysical conditions related to temperature are between 28.62 - 32.05 °C while the soil organic matter content is between 1.25 - 6.74.

Keyword: vegetation density, sustainable, environment

Carbon Trading and Its Role in Shaping Indonesia's Environmental Resilience to Climate Change

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Abstract. In Indonesia, considerable environmental issues originate from industrial and agricultural activity, peatland fires, and deforestation. The government of Indonesia is legally required to adopt efforts to address these challenges. One feasible alternative under discussion is the formation of a carbon market, whereby firms are issued permits to release particular amounts of greenhouse gases. This notion has attracted support from both the European Union (EU) and numerous Asian nations. This paper investigates the function and importance of carbon emission trading systems in attaining carbon reduction targets. Leveraging global data envelope analysis (DEA), it formulates performance indicators for energy consumption and carbon emissions via a two-stage procedure. Furthermore, the study assesses the policy effect of carbon trading by developing counterfactual trajectories using the synthetic control technique. The study presents the notion of carbon markets and analyzes its potential to become a vital aspect of Indonesia's climate mitigation plans. It indicates that carbon markets contain the ability to dramatically boost carbon and energy-carbon performance, mostly owing to technical restrictions and stakeholder participation.

Keywords: climate mitigation, carbon trading, regulatory environment, environmental challenges, greenhouse gas emissions

Optimalisation of in vitro sterilisation methods for North Sumatran local garlic (*Allium Sativum* L.)

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Abstract. The establishment stage is critical to the success of plant tissue culture. Each plant tissue has unique tissue surface characteristics that interact with various natural microbes. The goal of this study was to find a sterilisation method that is effective at removing contamination while not damaging or inhibiting explant regeneration. In this study, Completely Randomized Design (CRD) factorial with 2 factors was used. The first factor was the disinfectant, namely T1 (Benzalkonium chloride 0.5%), T2 (Nordox 6 g/L 0.6%), and T3 (Clorox 10%). The second factor is the type of media, consisting of M1 (BDS supplemented with 1.8 µM/L 2,4-D and 9.2 µM/L Kinetin), M2 (BDS supplemented with 9 µM/L 2,4-D and 9.2 µM/L Kinetin), M3 (MS supplemented with 9 µM/L 2,4-D and 4.6 µM/L Kinetin), and M4 (MS media supplemented with 1.3 µM/L L 2,4-D and 9.2 µM/L Kinetin). The observed parameters were the percentage of contamination, the survival rate, the type of contamination, percentage of callus growing, weight and diameter. The T2 treatment was the most effective in reducing contamination and highest survival rate. T3 treatment resulted in the highest callus regeneration percentage, callus weight, and callus diameter, but also the highest level of contamination.

Keyword: garlic, in vitro, sterilisation



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