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Conference Report

Programme and Abstracts of the First International Virtual Exchange between African and New Zealand Researchers

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Abstract: The **First International Virtual Exchange between African and New Zealand Researchers** IVEANZR hosted by the University of Canterbury (NZ) was held via Zoom over 2 h on 15 May 2024. There was no registration fee for the conference. The purpose of the virtual conference was to provide a forum for postgraduate students and researchers to present their latest research in an international conference environment but without the burden of a registration fee and the prohibitive cost of international travel, particularly for many emerging researchers. There were 148 registered participants from several countries in the conference and nine presentations were made successfully. The successful event supports the notion that a conference held virtually is a sustainable, low carbon emission, interactive way to share knowledge across international borders.

Keywords: ethnobotany; food security; heavy metals; land use; medicinal plants; okra; oil palm; pollution; quinoa; rhizosphere temperature; riparian forests; root system architecture; selection (plant breeding); soil fertility; somatic embryogenesis; strawberry; yam tissue culture

1. The Conference Programme

Theme: Recent Research Related to Plant Science and Biotechnology
Date and Time: 15 May 2024; 8 p.m. to 10 p.m. (New Zealand Time)
Important to note-
Duration of each presentation: 10 min

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Chair	Presenter	Topic	Professional Affiliation(s)
Associate Professor David Leung		Welcome and Introduction	University of Canterbury, Christchurch, NZ
	Philomena Chidi (Mrs)	The effect of organic materials on oil palm seedling growth	Nigerian Institute for Oil Palm Research and University of Benin, Nigeria
	Ayodeji Oluwadare Adeyemi (Mrs)	Concerted hydrolytic action of some lignocellulolytic enzymes on alkali-pretreated cassava peel biomass	Joseph Ayo Babalola University and Federal University of Technology, Nigeria
Dr. Georgina Addae Boamponsem			PhD in Plant Biotechnology (Canterbury) and NZ Blood Service, Auckland, NZ
	Abiola Ojeleye (Dr.)	Quinoa: an alternative crop for food, feed and nutritional security in Nigeria	Osun State University, Nigeria
	Godswill Hygienus (Mr.)	Selection for superior root system architecture in okra (*Abelmoschus esculentus* (L.) Moench): towards breeding for efficiency in soil-resources acquisition and high yield	University of Cape Coast, Ghana
	Sirajo Salisu Jibia (Mr.)	Impact of rhizosphere temperature on transplant productivity of Akihime strawberry grown in deep-water culture system	Federal College of Agricultural Produce Technology, Nigeria and Chiang Mai University, Thailand
Dr. Ardi Ash			PhD in Plant Biotechnology (Canterbury) and Tasman District Council, Richmond, NZ
	Ruth Oluwasegun (Ms.)	Effects of silver nitrate ($AgNO_3$) on the in vitro development of yam (*Discorea rotundata* L.) plants.	International Institute of Tropical Agriculture, Nigeria
	Tolulope Borisade (Dr.)	The influences of land use change on riparian forests in Southwestern Nigeria	Bamidele Olumilua University of Education, Nigeria
	Abayomi Ayesa (Dr. Samuel Ayesa)	Effect of pollution on the physiology and biochemical activities of *Abelmoscus esculentus*	Bamidele Olumilua University of Education, Nigeria
Dr. Solomon Wante			PhD in Plant Biotechnology and Bragato Research Institute at Lincoln University, Lincoln, NZ
	Ossai Chukwunalu (Dr.)	Identification of simple sequence repeat (SSR) markers that are unique to somatic embryogenesis competent white yam genotypes	University of Ibadan and International Institute of Tropical Agriculture, Nigeria
	Bibitayo Owolabi (Dr.)	Ethnobotanical survey of some medicinal plants in Southwest Nigeria	Osun State University, Nigeria
Associate Professor David Leung		Closing remarks	University of Canterbury, Christchurch, NZ

2. Abstracts

The Abstracts were reviewed by the organiser's team before acceptance for the conference. Some Abstracts are not included as no consent was obtained at the time of completing this conference report.

2.1. The Effect of Organic Materials on Oil Palm Seedling Growth

Chidi, P.N. [1,2,*], Oghoghodo, I.A [2], Ehigiator J.O [2], Nwaoguala, C.N.C [2] and Nkechika, A [1,2]

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Oil palm is a crucial crop for Nigeria's economy, but soil quality often limits its growth. Applying organic materials is a viable solution to improve the growth of Oil Palm seedlings in the nursery. This study investigated the effects of eggshells, empty fruit bunch ash, and their combination on oil palm seedlings' growth. Different application rates were used, and a randomized complete block design was applied. In the first year, the eggshell 4 combination stimulated the highest plant height and largest leaf area while the eggshell 2 combination stimulated the highest number of leaves and widest stem girth. In the second year, the eggshell 2 combination stimulated the highest plant height, highest number of leaves, and largest leaf area. The use of these organic materials shows excellent promise in growing oil palm seedlings in the nursery as a sustainable and effective method of improving oil palm growth and soil fertility.

2.2. Quinoa: An Alternative Crop for Food, Feed and Nutritional Security in Nigeria

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Quinoa (*Chenopodium quinoa* Wild.) is a globally emerging crop with great potential to contribute to Africa's food and nutrition sustainability. The increasing population with the simultaneous decline in arable crop production has resulted in food and nutritional insecurity, hence the need to adopt and embark on the search for alternative and sustainable food crop varieties. The FAO's effort has improved the production and utilization of quinoa to reduce food and nutrition insecurity while assisting farming communities to adapt to climate change impacts. The seeds are rich in gluten-free protein ($\geq$23%), starch (78%), and other significant essential nutrients. It vies for the status of the maize, rice, wheat and sorghum commonly consumed in Nigeria and can, therefore, be substituted with grains and flour in recipes both for humans and animals. In addition, the straws can be used as feed for ruminants and fuel. Therefore, quinoa can be adopted in Nigeria for food security and alleviating poverty among small-scale farmers.

2.3. Selection for Superior Root System Architecture in Okra (Abelmoschus Esculentus (L.) Moench): Towards Breeding for Efficiency in Soil-Resources Acquisition and High Yield

Godswill Hygienus [1,*], Paul Agu Asare [1], Mathias Neumann Andersen [2], Vincent Agyemang Opoku [1] and Michael Osei Adu [1]

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Breeding of okra (*Abelmoschus esculentus*) varieties with robust root system architecture (RSA) that optimizes soil-resources acquisition has become increasingly vital due to growing global drought events. A greenhouse study was conducted to assess variations in the RSA of sixty okra genotypes at the seedling stage. Genetic diversity was observed in all twenty-two RSA traits analysed. The genetic coefficient of variation (GCV) was high (>20%) for most traits, barring lateral root angle and primary root length, which recorded low (<10%) GCVs. High (>60%) heritability was recorded for all traits. Correlational studies revealed a significant positive relationship between total root length and all other traits. Population structure analysis through Ward's hierarchical clustering grouped the genotypes into two clusters. Cluster 2 genotypes were superior in most traits and were recommended for further assessment to develop okra varieties which are efficient in soil-

resources acquisition. This study, therefore, demonstrates the existence of genetic diversity in the RSA of okra.

2.4. Impact of Rhizosphere Temperature on Transplant Productivity of Akihime Strawberry Grown in Deep-Water Culture System

Sirajo Salisu Jibia [1,2,3,*], Kanokwan Panjama [2,4,5], Chaiartid Inkham [4,5], Chockchai Thanamatee [5] and Soraya Ruamrungsri [2,4,5]

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The productivity of strawberry plants depends on various factors such as the atmospheric and the rhizospheric temperature. This study investigated the effects of four root zone temperature RZT levels (T1; 10 ± 2 °C, T2; 15 ± 2 °C, T3; 20 ± 2 °C, and T4; 25 ± 2 °C) on growth, runnering, and physiology of Akihime strawberries grown in a water-culture medium. Strawberry plants were raised in an evaporative greenhouse that was maintained at 25 ± 2 °C air temperature, 70–80% relative humidity, and a photosynthetic photon flux density (PPFD) of ≈241 μmol m^{-2} s^{-1}. The nutrient recipe was based on CMU-S2 strawberry formula, with a pH of 5.8–6.00 and an electrical conductivity of 1.5 dS/m. The results indicated that maintaining the RZT at 15 ± 2 °C (T2) resulted in the highest number of stolons per plant, runners per stolon, leaves per runner, tallest runners, and overall runner yield. This treatment also produced the highest number of leaves, total plant fresh weight, longest roots, and the widest leaves in mother plants, while it did not significantly differ from T1 and T3 in terms of total plant dry weight. Conversely, plants exposed to 25 ± 2 °C demonstrated the lowest performance in all observed growth parameters, albeit with a higher leaf chlorophyll index. No significant differences were observed in photosynthetic attributes across the RZT treatments. In conclusion, our findings suggest that maintaining RZT at 15 ± 2 °C was the most effective for enhancing growth and transplant yield of Akihime strawberries grown in deep-water culture systems.

2.5. The Influences of Land Use Change on Riparian Forests in Southwestern Nigeria

Tolulope Victor Borisade [1,*], Anthony Ifechukwude Odiwe [2], Akinola Shola Akinwumiju [3], Nelson Obinna Uwalaka [4], Ayodele Adelusi Oyedeji [5], Victor Idowu Ojo [6] and Isaac Iseoluwa Ajayi [1]

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The presence of riparian forests is critically susceptible to land uses in Nigeria, and such information on the historical management of land use influencing its vegetation

dynamics is crucial to the conservation of plant species. This study therefore assessed the areas covered by riparian forests in Osun State, Southwestern Nigeria, in order to identify the main drivers of its decline using optical remote sensing data. It also assessed the availability and distribution of the riparian forests over three decades (1986–2016) using Landsat Enhanced Thematic Mapper (ETM). Results showed that, three decades later, areas covered by riparian forests showed a decline of about 69%, predicted to result in a rapid transition to disturbed lands. Anthropogenic activities such as logging, farming, grazing, and construction have greatly diminished the riparian vegetation cover in extent, distribution, and quality. This decline is faster than the level of Nigerian riparian forest loss projected by 2040.

2.6. Effect of Pollution on the Physiology and Biochemical Activities of Abelmoscus Esculentus

Ayesa A. S [1,*], Ajewole T. O [2], Kolawole O. S. [3] and Ajoorin F. P. [2]

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Heavy metal contamination of agricultural soil is a serious risk and a global concern. This study was designed to determine the effect of pollution on the growth and some chemical contents of *Abelmoscus esculentus* (okra). Soil samples obtained from polluted and non-polluted sites were grouped into three categories; each represented a treatment and was replicated three times. Category one (1) soil was obtained from a non-polluted site, which was the control. Category two (2) was soil obtained from a waste-polluted site, and Category three (3) was soil obtained from an oil-polluted site. Growth of *A. esculentus* (plant height, root girth, leaf area, and stem girth) was best in the soil sample obtained from the waste-polluted site (Category 2). There was an accumulation of heavy metals such as Cu. Planting of *A. esculentus* in polluted farmlands should be discouraged because it poses risks to human health.

2.7. Ethnobotanical Survey of Some Medicinal Plants in Southwest Nigeria

Bibitayo Ayobami Owolabi [1], Abiola Elizabeth Ojeleye [2], Adedamola Oyinade Sanuade [1] and Uthman Ayoku Oyebamiji [3]

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For millennia, some plants have been reported medicinal, hence called herbs. However, these plant species have become regionally extinct, leading to a dwindling knowledge of their pharmacological potency. Therefore, this current study focused on compiling the herbs in the southwestern states of Nigeria to prevent extinction and disclose potential solutions to emanating and deadly diseases, for further research studies. A semi-structured questionnaire was administered to 450 respondents: 51% were farmers, and 22.8% and 22.4% were traditionalists and traders, respectively. Most (91%) of the respondents acknowledged the potency of over 100 medicinal plants, while 88% of the respondents stated that improper harvesting methods, ignorance and climate change were to blame for their eventual extinction. Though 70% of the respondents said that knowledge of using herbs was inherited, 75% of the respondents affirmed the usage of herbs was not extended. It

is crucial that we implement policies that will ensure the preservation of these plants to improve biodiversity and potency and encourage the extension of information.

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Conflicts of Interest: The author declares no conflicts of interest.