



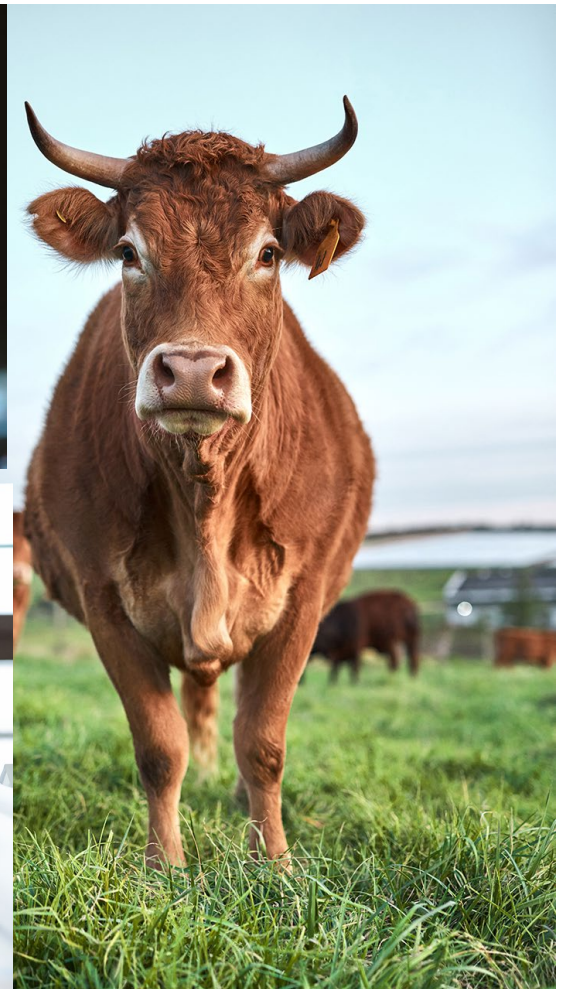
2023

Faculty of Science, Agriculture & Engineering

Annual Postgraduate Symposium

UNIZULU Science Centre, Richards Bay

11 October 2023



WELCOME MESSAGE FROM THE ORGANISING COMMITTEE

The organising committee is pleased to welcome you to the 2023 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium, hosted by the Department of Agriculture on 11 October 2023, at the UNIZULU Science Centre, Richards Bay. The theme is "Tackling emerging global change challenges to achieve Sustainable Development Goals through smart science". This faculty-wide postgraduate symposium aims to create a platform for the sharing, demonstration, and dissemination of postgraduate research across disciplines. The research on display is expected to tackle and answer pertinent questions in relation to emerging global change challenges. This year's symposium is exciting and unique and demonstrates the impacts of these issues if they are left unaddressed while proposing technologies and practices that can be adopted to cope with them. The recommendations are evidence-based and data-driven and the findings shared in this symposium come from postgraduate students and staff studying towards honours, MSc, or doctoral degrees. Their works address a wide range of interesting and topical issues including, but not limited to the following:

- Food and nutrition security
- Climate change, environment, and biodiversity
- Indigenous knowledge-based systems
- Energy, water security and smart societies
- Agriculture, aquaculture, rural development, and land use
- Entrepreneurship, circular economy, and sustainability
- Nanotechnology, material, and space science
- Health, enzymology, ethnomedicine, sports/ biokinetics and pandemics
- Environmental microbiology, drug toxicology and genomics
- 4IR, IoT, Cyber security and networking
- And other topics that could be of interest to the audience

This symposium promises to be a platform for meaningful interdisciplinary discussions and the dissemination of groundbreaking research. We look forward to an inspiring and enlightening event filled with insightful presentations and fruitful exchanges among our postgraduate students and staff. Thank you all for being part of this exciting event.



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ACKNOWLEDGMENTS

The Organising Committee extends its heartfelt gratitude to our esteemed sponsors, the UNIZULU Faculty of Science, Agriculture and Engineering, Deans' Office. We are also grateful for the support we have received from the Communications and Marketing Division (CMD), Information and Communications Technology (ICT) Department, the office of the DVC Research, UNIZULU Research and Innovation Office, the Library, the Science Centre, and the Physical Planning Office (PPO). Others include the collaborating departments – Computer Science and Chemistry – and the entire faculty at large. We would like to acknowledge their generosity and commitment to advancing research and knowledge in the fields of science, agriculture, and engineering. We also want to express our sincere appreciation to the dedicated organising team whose hard work and dedication have been instrumental in bringing this symposium to life. Together, we are embarking on a journey to explore innovative solutions to global challenges and to pave the way for a sustainable future through smart science.

KEYNOTE SPEAKERS

Prof Edwin Madala, an analytical biochemist in the University of Venda's Faculty of Science, Engineering and Agriculture in Limpopo, South Africa, earned his Ph.D. in Biochemistry from the University of Johannesburg under Prof Ian Dubery's guidance. Initially a lecturer and later a senior lecturer at UJ's Department of Biochemistry, Edwin moved to the University of Venda in April 2018. There, he continued his focus on plant chemistry research, particularly in plant metabolomics, unraveling the complexity introduced by chemical modifications like glycosylation and isomerization of plant metabolites. Edwin's expertise lies in employing LC-MS techniques to study plant metabolites, using nutraceutical plants as models. His current research delves into understanding the mechanistic pathways leading to trans-cis isomer formation triggered by light exposure, a phenomenon exacerbated by climate change-induced excessive sunlight. These isomers, with isobaric mass but



distinct polarities due to structural changes induced by light, pose challenges in distinguishing them from natural counterparts within complex plant metabolomes. With over 95 co-authored publications indexed by Scopus and a Google Scholar h factor of 27, Edwin Madala's contributions extend to supervising/co-supervising over 20 MSc students and 4 Ph.D. students across diverse fields like Chemistry, Food Sciences, Agriculture, and Biochemistry. Currently an Iso Lomso fellow at the Stellenbosch Institute for Advanced Study (STIAS). He brings a wealth of experience and knowledge to plant Chemistry research.

Prof Thulani Makhalanyane is currently a Full professor and SARChI Chair at the University of Pretoria. He has authored over 80 publications, which have accrued over 3000 citations and he has an h-index of 29. These studies have been published in leading journals, including *Nature*, *Science*, *PNAS*, *ISME Journal* and *Nature Microbiology*. Thulani has also authored several reviews including one in *FEMS Microbiology Reviews*. He has received several national and international awards, including the prestigious TW Kambule-NSTF Award and the International Society for Microbial Ecology Ambassador of the Year Award for his outreach activities. Prof Makhalanyane serves as Editor in Chief for the *ISME Journal* and is Senior Editor for *mSystems*. Thulani has supervised over 30 postgraduate students and hosted six postdoctoral scholars. He currently supervises a large team of 18 postgraduate students (including six MSc. and eight

Ph.D. candidates). Prof Makhalanyane holds a P rating from the NRF.



SYMPOSIUM PROGRAMME

2023 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium Programme



"Tackling emerging global change challenges to achieve Sustainable Development Goals through smart science"

11 October 2023

UNIZULU Science Centre, Richards Bay and Online (Zoom Cloud Meetings [plenary sessions only]

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Time	Activity			
08:00-08:30	Arrival			
08:30-09:00	Registration and tea			
	Opening plenary session (Auditorium): Programme director/ symposium chair – Prof M. Sibanda			
09:00-09:05	Entertainment (musical piece) – UNIZULU Choir			
09:05-09:15	Opening address by the Dean, Faculty of Science Agriculture & Engineering – Prof K.C. Lehloenya			
09:15-09:20	Introduction of the Keynote Speaker – Dr M.A. Nkomo			
09:20-09:45	Keynote Address – Prof N. Madala			
09:45-10:00	Entertainment (musical piece) – UNIZULU Choir			
10:00-10:15	Tea/ coffee break (Foyer)			
Breakaway/parallel sessions				
	Breakaway Session 1A (Auditorium) Chair: Mr S.P. Dludla	Breakaway Session 1B (Main classroom) Chair: Dr M.A. Nkomo	Breakaway Session 1C (ECD classroom) Chair: Prof G.E. Zharare	Breakaway 1D (venue: Theatre) Chair: Prof M. Sibanda
10:15-10:30	Effect of extenders and cooling rate on sperm quality parameters of Zulu rams during semen preservation Ngcobo AW, Ndaba, N Masango, M Bhengu & KPM Lekola	Comprehensive comparative analysis of cytochrome P450s and those associated with secondary metabolism in <i>Salinispora</i> species NA Malinga, DR Nelson & K Syed	The Sol-gel mediated preparation of silica-cellulose nanocomposites for potential use in water treatment M Shange & SM Mohomane	CYP109 P450 family has a bacterial origin, not an archaea T Khumalo, DR Nelson & K Syed

10:30-10:45	A Blueprint for South African Public Schools ICT Infrastructure WT Mnyandu & A Terzoli	Structure-functional analysis of catalytically diverse P450 CYP107: special focus on amino acid dynamics and their role in catalysis T Padayachee & K Syed	A preliminary ethnobotanical survey documenting indigenous knowledge on the use of medicinal plants to treat respiratory diseases in KwaDlangezwa, KwaZulu-Natal TT Dlodlo, LN Biyela, NS Zwane & M Ramulondi	Agro-morphological, Chromosomal and Molecular Characterization of Wild Salacia kraussii Harv. (Celastraceae) for Agricultural Fruit Production MM Kisepa, C Zimudzi & GE Zharare
10:45-11:00	Heatwave Variability and Structure in South Africa during Summer Drought N Xulu, & IL Mbokodo	Diversity and evolutionary analysis of Nuclear Factor Kappa light chain enhancer of activated B cells (NF-κB) in the kingdom <i>Animalia</i> S Msweku, SB Pakala & K Syed K	Frequency of SARS-CoV-2 in wastewater treatment plants located around the city of uMhlathuze municipality A Ngcobo, AK Basson, EX Mantshi, QB Mkhwanazi, RN Milase, SF Ndulini, F Tshabuse & NE Mthimunye	Genome-wide analysis of the Cytochrome P450 monooxygenases in the lichenized fungi of the class Lecanoromycetes G Mlambo, T Padayachee, DR Nelson* & S Khajamohiddin
11:15-11:30	Profiling odour emission from pig litter in relation to diet type VW Sithole, FN Fon, & TN Suinyuy	Assessing the economic sustainability and productivity of smallholder crop farming in the Izingolweni Community, Ray Nkonyeni Local Municipality, South Africa: A 2010-2019 analysis HN Mkhize, M Sibanda, JJ Hlongwane & NZ Khumalo	Multiplex-PCR for the Detection of Pathogenic <i>Escherichia coli</i> and <i>Salmonella</i> Species in Chlorinated-treated Wastewater and Their Antimicrobial-resistant Profiles S Gwala, F Tshabuse & AK Basson	A comprehensive web-based healthcare system for disease diagnoses N Ndlela, NL Buthelezi, NY Mkhize, HN Nxumalo, NS Ntshayintshayi & A Terzoli
11:30-11:45	Empowering Rural and Townships Businesses: Web Services for Online Presence B Nxumalo & A Terzoli	Risk mitigation strategies employed by small-scale vegetable growers in the Esphambanweni area BM Dumisa, NZ Khumalo & M Sibanda	Isolation and characterization of LAB from broiler's crop and evaluation of their antioxidant activities S Dimba	A desktop review of perceptions and factors influencing land reform progress in South Africa B Dube, M Sibanda & NZ Khumalo
11:45-12:00	Tea/ coffee break (foyer)			

	Breakaway Session 2A (Auditorium) Chair: Prof L. Vivier	Breakaway Session 2B (Main classroom) Chair: Prof M. Adigun	Breakaway Session 2C (ECD classroom) Chair: Dr S.B.L. Ntombizodwa	Breakaway 2D (Theatre) Chair: Mr L.G. Buthelezi
12:00-12:15	Development and validation of a questionnaire for assessing injury history, prevention practices, and treatment received by long distance runners in a rural municipal district M Linda, H Erasmus & M Mathunjwa	Solvent-less synthesis of transition metal doped Ni₂P for overall water splitting and supercapacitance applications SG Sibiya, GE Ayom MD Khan, J Choi, S Bhoyate, RK. Gupta, & N Revaprasadu	Genome data mining, annotation, and phylogenetic analysis of cytochrome P450 monooxygenases in the fungal class <i>Pezizomycetes</i> NN Nsele, T Padayachee, DR Nelson, & K Syed	Multilingual Conversational System for South African Call Centres using Deep Learning Model PT Mkhwanazi, SA Ajagbe & MO Adigun
12:15-12:30	The Role of Indigenous Based Livestock on Rural Households' Income in uMhlathuze Local Municipality, South Africa ZN Msane, Y Nontu and M Sibanda	<i>In vitro</i> antibacterial activity of crude extracts of <i>cylindrospermum alatosporum</i> NR125682.1 and <i>Loriellopsis cavenicola</i> NR117881.1 AO Ikhane, RA Mosa, FO Osunsanmi, & AR Opoku	Genome data mining, annotation, and phylogenetic analysis of Proline-, glutamic acid-, and leucine-rich protein 1 (PELP1) in Animals N Mngomezulu, SB Pakala, K Syed	The evolution of metastasis associated protein across the domains of life SS Ncube, S Msweli, K. Syed & SP Babu
12:30-12:45	Datasets for low resourced languages in South Africa N Magangane & S Zwane	Bioaccumulation of microplastics in brown mussel, <i>Perna perna</i>, and the rock oysters, <i>Saccostrea cucullata</i> along the kwazulu Natal north-coast, South Africa SC Mkhabela, HMM Mzimela & NF Masikane	Analysis of reproductive performance of roosters following Selenium supplementation NG Masinga, FN Fon, FV Ramukithi, & KC Lehloenya	Modulating the effect of fusarium verticillioides on the vegetative growth of maize seedlings grown under drought stress KS Ndlazi, S Sibiya, A Goku & MA Nkomo
12:45-13:00	Metaheuristic optimized firmware malware detection using audio-based features MI Phiri & P Tarwireyi	Analysis of production capacity, profitability, and constraints in the South African aquaculture industry: Case of Gauteng Province food fish aquaculture BO Sowemimo, L Vivier, & BL Mogoje	Characterization of proton-induced defects in SnO₂ using positron annihilation technique D Motjope, T Jili, M Madhuku, L Ngwazi and Z Ngcobo	Genome-wide data mining, annotation, and evolutionary analysis of transcription factor cellular myelocytomatosis (c-Myc) in animals SH Ndlangamandla, SB Pakala, & K Syed
13:00-14:00	Lunch			

	Breakaway Session 3A (Auditorium) Chair: Dr C.L. Ndlangamandla	Breakaway Session 3B (Main classroom) Chair: Dr N.P. Ndimande	Breakaway Session 3C (ECD classroom) Chair: Mr J. Cloete	Breakaway Session 3D (Theatre) Chair: Mr L.G. Buthelezi
14:00-14:15	Plane symmetric cosmological model with strange quark matter in gravity theory V Singh, S Jokweni, & A Beesham	Fungal genome mining for endocrine disruptive compounds oxidizing P450, CYP5136 N Mthethwa, DR Nelson, & K Syed	The use of AZTI Marine Biotic Index (AMBI) to assess the effect of fish-farming in Richards Bay Harbour S Nzama, L Vivier & A De Fortier	Profiling the active site cavity of Mycobacterium tuberculosis drug target P450 CYP121 SM Msweli, T Padayachee & K Syed
14:15-14:30	Exploring the spectroscopy of low and medium states in ^{148}Sm nucleus MN Zuma	Profiling the carcinogenic compounds oxidizing P450, CYP63 in fungi T Ngomane, DR Nelson, & K Syed	Bioaccumulation of metals, effects in energy reserves and neurotoxicity in sesarmids (<i>Chiromantes eulimene</i> and <i>Neosarmatium africanum</i>) crabs of uMhlathuze Estuary LR Nsibande, SL Ndwandwe, SC Mkhabela, M Thwala, HMM Mzimela, NF Masikane	A deep learning based code-switching chatbot for healthcare E Thwala & MO Adigun
14:30-14:45	Comparison of chaplygin gas and bulk viscous cosmological models MS Msweli	The contribution of indigenous vegetables to food and security: Insights from Mbazwana of Kwazulu Natal Province, South Africa N Ntshangase, M Sibanda & NZ Khumalo	Data-driven deep learning hybrid models for forecasting diurnal and demidiurnal tides measured by a Kerguelen superdarn HF Radar ZH Bhengu & N Mbatha	Diversity and evolutionary analysis of p21-activated kinase 1 (PAK 1) in the Kingdom Animalia MP Nhlabathi, SB Pakala, & K Syed
14:45-15:00	Fabrication of Pd decorated Zinc Oxide nanoparticles for highly sensitive and selective detection of gases emitted by spoiled meat KB Manqele, T Mpanza, CL Ndlangamandla & S Mavundla	Assessing the contribution of indigenous leafy vegetables to household food security among small-scale urban crop farmers in uMlazi, eThekweni Municipality P Tabalaza, NZ Khumalo & M Sibanda	Evolution of cytochrome P450 enzymes and their redox partners in archaea PE Ngcobo, BVZ Nkosi, W Chen, DR Nelson, & K Syed	Effect of selenium supplementation on <i>Haemonchus contortus</i> infestation & production of reproductive hormones during the reproductive cycle in Zulu sheep ewes NW Nkunzi, FN Fon, FV Ramukhithi, & KC Lehloenya

15:00-15:20	Tea/ coffee break (foyer) and viewing of poster papers (use the MS Teams links provided)			
	Poster sessions (Authors to present for about 3 minutes and delegates to engage them for about 2 minutes)			
	Poster viewing room 1 (MS teams) Coordinator: Mr J. Du Plessis	Poster viewing room 2 (MS teams) Coordinator: Dr F. Thabethe	Poster viewing room 3 (MS teams) Coordinator: Mr Z.L. Ndou	Poster viewing room 4 (MS teams) Coordinator: Miss N.Z. Khumalo
	Water quality prediction using machine learning and deep learning algorithms LP Gumede, IN Ezeji & SG Zwane Link: Click here to join the meeting	The role of indigenous knowledge based livestock as a valuable source of income for rural communities KS Nkomo, NB Yengwa, AP Cele & ML Mnu kwa Link: Click here to join the meeting	Evaluating face recognition system across deep learning models SA Ajagbe, AA Adegun, P Mudali1 & MO Adigun Link: Click here to join the meeting	Perceptions, knowledge, and utilization of indigenous foods by university students KS Dladla, M Biyela, & C du Preez Link: Click here to join the meeting
	The use of AMBI to assess the effect of fish-farming in Richards Bay Harbour S Nzama, L Vivier & A De Fortier Link: Click here to join the meeting	Adaptive decomposition preprocessed inputs with deep learning models for forecasting the Vegetative Health Index (VHI) of irrigated and rainfed sugarcane fields in KZN F Silwimba, N Mbatha, & M Matadi Link: Click here to join the meeting	Exploring lie group symmetries in difference-based-black scholes equations WH Andrew & MB Matadi Link: Click here to join the meeting	The consumption of indigenous foods by university students S Hlongwane, N Ngwane, L Ngcamu & K Palmer Link: Click here to join the meeting
	Physical, anthropometric, and physiological profiles of male and female University of Zululand boxing athletes S Buthelezi, M Mathunjwa, N Shandu & L Millard Link: Click here to join the meeting	Effect of melatonin treatment on reproductive performance of Merino ewes during spring mating season M Nxumalo & KC Lehloenya Link: Click here to join the meeting	The documentation of indigenous food safety practices by food handlers in community nutrition centres N Manyoni, S Dladla & Sibisi Link: Click here to join the meeting	The consumption of indigenous foods by university staff SI Mdluli, TN Mhlanga & K Ndwandwe Link: Click here to join the meeting

	<p>Evaluating the physio-biochemical responses of two sorghum seedling varieties exposed to prolonged heat stress</p> <p>S Khawula & MA Nkomo</p> <p>Link: Click here to join the meeting</p>	<p>Assessing physio-biochemical markers for studying germination and seedling growth of heteromorphic chia seeds under salinity stress</p> <p>NT Nyawo & MA Nkomo</p> <p>Link: Click here to join the meeting</p>	<p>The documentation of indigenous non-alcoholic fermented beverages: utilization and nutritional value</p> <p>Ndimande, L, Majozi, S. & Qumbisa, N.D.</p> <p>Link: Click here to join the meeting</p>	<p>Perceptions, knowledge, and utilization of indigenous foods by university staff</p> <p>NN Modikoe, SS Mpontshane & Seabi</p> <p>Link: Click here to join the meeting</p>
	<p>Effects of varying sugarcane filter cake treatment rates on plant growth and antioxidant potential of <i>Bidens Pilosa L.</i></p> <p>SS Dlamini, MF Mngoma, N Motsa, K Fatokun1 & MA Nkomo</p> <p>Link: Click here to join the meeting</p>			
	Closing plenary session (Auditorium): Programme director – Prof M. Sibanda			
15:20-15:25	Introduction of Keynote Speaker – Ms S.J. Mnembe			
15:25-15:40	Keynote Address – Prof T. Makhalanyane			
15:40-15:50	Presentation of prizes – Prof K.C. Lehloenya			
15:50-15:55	Entertainment (musical piece) – UNIZULU Choir			
15:50-16:00	Closure and vote of thanks – Prof Innocent Moyo			

Vote of thanks

On behalf of the UNIZULU Department of Agriculture, and the Faculty of Science, Agriculture and Engineering, we extend gratitude for your active participation in the 2023 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium hosted on **11 October 2023** at UNIZULU Science Centre, Richards Bay.

2023 Faculty of Science, Agriculture and Engineering Annual Postgraduate Symposium Organizing Committee



**UNIVERSITY OF
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