3rd AFRICAN CONFERENCE ON PRECISION AGRICULTURE

MAIN CONFERENCE SITE:

Marrakech, Morocco

3-5 • December • 2024

AfCPA 2024

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PRECISION AGRICULTURE *in* ACTION *for* AFRICA

Egypt Satellite Site Program

NARSS
NATIONAL AUTHORITY FOR REMOTE SENSING & SPACE SCIENCES

ORGANIZED BY:

apni

UM6P
University Mohammed VI Polytechnic

AAPA
AFRICAN ASSOCIATION *for* PRECISION AGRICULTURE

ISPA
International Society of Precision Agriculture

AfCPA 2024

AFRICAN CONFERENCE ON

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ABOUT THE

African Conference on Precision Agriculture

AfCPA 2024

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The mission of the **African Conference on Precision Agriculture (AfCPA)** is to *"connect the science and practice needed to put precision agriculture in action for Africa."* Through this mission, AfCPA seeks to provide a pan-African platform focused on highlighting new advances in the fields of experimental and applied precision agriculture.

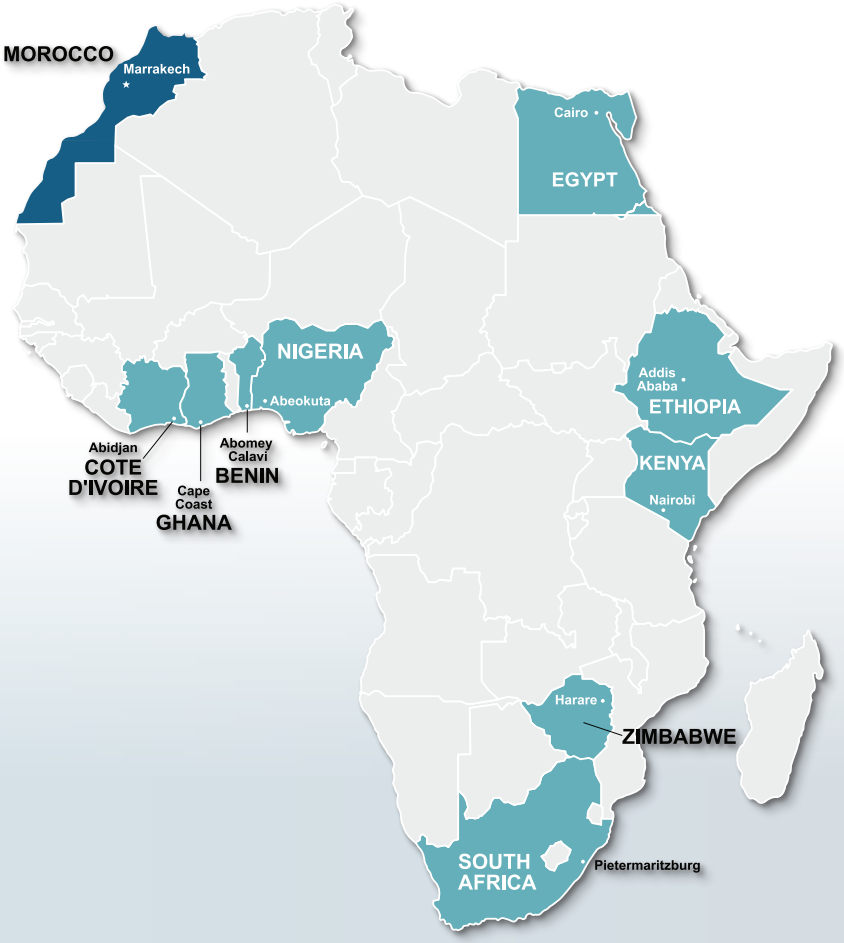
The conference is aimed at strengthening and supporting the precision agriculture community within the African continent. AfCPA wishes to engage key stakeholders including scientists, policymakers, extension staff, crop consultants and advisors, agronomists, and service providers towards the common goal of building the capacity and resilience of African cropping systems.

AfCPA 2024 is one conference, multiple satellite site event offering a local opportunity to view presentations from the main conference while participating in a regional precision agriculture program organized by the site's host.

MAIN SITE:
Marrakech, Morocco

SATELLITE SITES:

- Abomey-Calavi, Benin
- Abidjan, Côte d'Ivoire
- Cairo, Egypt
- Addis Ababa, Ethiopia
- Cape Coast, Ghana
- Nairobi, Kenya
- Abeokuta, Nigeria
- Pietermaritzburg, South Africa
- Harare, Zimbabwe



AfCPA is an initiative of the African Plant Nutrition Institute (APNI) in partnership with Mohammed VI Polytechnic University (UM6P), the International Society of Precision Agriculture (ISPA), and the African Association for Precision Agriculture (AAPA).

apni

UM6P University Mohammed VI Polytechnic

AAPA African Association for Precision Agriculture

ISPA International Society of Precision Agriculture

SATELLITE SITE HOSTS

Prof. Adima Amissa Augustin
National Polytechnic Institute
Félix Houphouët-Boigny, Côte d'Ivoire

Prof. Dr. Abdelaziz Belal
National Authority for Remote
Sensing and Space Sciences, Egypt

Dr. Temesgen Desalegn
Ethiopia Institute
of Agricultural Research

Prof. Kwame Frimpong
University of Cape Coast, Ghana

Femi Adekoya
Integrated Aerial Precision, Nigeria

Dr. Tafadzwa Mabhaudhi
University of KwaZulu-Natal, South Africa

Dr. V. Nicodeme Fassinou Hotegni
Genetics, Biotechnology &
Seed Sciences Unit (GBioS),
Abomey-Calavi Atlantique, Benin

Dr. Onesmas Kitonyo
University of Nairobi, Kenya

Dr. Regis Chikowo
Plant Production Sciences
and Technologies
University of Zimbabwe

AfCPA 2024

AfCPA Program Chair
Dr. Steve Phillips
SENIOR CONSULTING SCIENTIST
African Plant Nutrition Institute (APNI)
e-mail: s.phillips@apni.net

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Program - Day 1

All times listed are GMT +2

Conference Program Legend

Plenary Session	Keynote Presentation	Local Session	Panel Session	LS - Live at Site	LV - Live (virtual)	R - Pre-recorded

Day 1 – Tuesday, 3rd December		
08:00	**Registration**	
08:30	**Welcome to AfCPA - Steve Phillips**	LV
08:35	**Welcome from APNI Director General - Kaushik Majumdar**	LV
08:40	**Welcome from SITE HOST - Prof. Dr. Abdelaziz Belal**	LS
08:45	**Welcome from NARSS Chairman - Prof. Dr. Islam Abou**	LS
08:50	**Welcome from the Egyptian Minister of Higher Education and Scientific Research - Prof. Dr. Mohamed Ayman Ashour**	LS
	General Session 1- Chairperson: Prof. Dr. Alaa El-Bably & Prof. Dr. Noha H. El-Amary	LS
09:00	**Smart Agricultural Management to Adapt the Effects of Climate Change: Smart Application of Water and Fertilizers in Egypt. (SAM-EGY)** *Prof. Dr. Ayman F. Abou-Hadid former Minister of Agriculture and Land Reclamation, Egypt*	LS
09:15	**Application New Information Technologies in Digital Agriculture Transformation** *Dr. Mahmoud Badawy, Advisor for Minister of Ministry of Communications and Information Technology, (Digital transformation)*	LS
09:30	**Mechanisms to Address Water Scarcity Through Climate-smart Agriculture Implementation** *Mohamed Hassaan Felfel Abdelsameaa - Director of Climate Change Risk Studies Administration - Egyptian Cabinet Information and Decision Support Center (IDSC)*	LS
09:45	Break/Posters/Exhibits	
	General Session 1- continued	
10:10	**Precision & Digital Sustainable Agriculture Systems to Achieve Egyptian-African Food Security** *Dr. Abdel-Ghany. M. El-Gindy, Dean of Faculty of Desert Agriculture, King Salman International University (KSIU), Egypt*	LS
10:25	**Impact of Digital transformation in Agriculture Sector in Egypt** *Prof. Dr. Ahmed Tobal Advisor for Minister of Agriculture and Land Reclamation, Egypt (Digital Agriculture Transformation)*	LS
10:40	**Arab Academy for Science, Technology and Maritime Transport (AASTMT) and Agriculture Technology Servicesn** *Prof. Dr. Noha H. El-Amary, Vice Dean of Training and Community Service, AASTMT, Egypt*	LS
10:55	**Open Discussion**	LS

Program - Day 1

Day 1 – Tuesday, 3rd December		
11:00	**Keynote Presentation 1** **Presentation by** *Anthony Chapoto - Africa Network of Agricultural Policy Research Institutes*	LV
11:30	**Keynote Presentation 2** **Presentation by** *Richard Ferguson - Rwanda Institute for Conservation Agriculture*	LV
12:00	**LUNCH**	
	General Session 2- Prof. Dr. Ayman F. Abou-Hadid & Prof. Dr. NOUR SH. EL-GENDY	LS
13:00	**Smart Agriculture Application in Arid and Semi-Arid Area** *Prof. Dr. Adel Tawfik El – Beltagy, former Minister of Agriculture and Land Reclamation, Egypt*	LS
13:15	**Agripreneuring Agriculture 5.0, Key Potentials, Opportunities and Challenges** *Prof. Dr. Osama A. RAYIS, Expert Entrepreneurship and Digital Transformation, Arab organization for Agriculture Development*	LS
13:30	**Smart Innovative Application in Livestock Farming** *Prof. Dr. Sobhy Sallam, Professor at Faculty of Agriculture, Alexandria University, Egypt)*	LS
13:45	**Smart Irrigation Management for Farms: Integrating Evapotranspiration and Soil Moisture Data from Open-Source Satellites** *Dr. Debashis Chakraborty (International Maize and Wheat Improvement Center (CIMMYT)*	LS
14:00	**Develop an automated irrigation system for paddy rice in arid and semiarid regions usingRS, IOT, and AI to monitor water levels for alternate wetting and drying methodology for rice crops under Egyptian condition** *Prof. Dr. Abdel-Aziz Belal, Head of Agriculture Application, Soil and Marine Division (NARSS)*	LS
14:15	**Open Discussion**	
14:30	**Break/Posters/Exhibits**	
15:00	**Keynote Presentation 3** **Presentation by** *Gottfried Pesse - Pessl Instruments GmbH*	LV
	Plenary Session 1 – Precision Ag Service for Smallholders	
15:30	**Presentation by** *Abdellah Hamma - OCP Nutricrops*	LV
15:50	**Presentation by** *Musa Mishamo - Hexagon Agriculture*	LV
16:10	**Presentation by** *Robert Blair - Blair Farms (virtual)*	LV
16:30	**Human-Powered Proximal Soil Sensing for Small Farms** *Eric Lund - Veris Technologies, Inc.*	LV
17:00	**Adjourn**	

Program - Day 2

Day 2 – Wednesday, 4th December		
08:00	**Welcome from SITE HOST - Prof. Dr. Abdelaziz Belal**	LS
	Plenary Session 2 – Precision Ag Adoption in Africa	
09:00	**Presentation by** *Samuel Njoroge - African Plant Nutrition Institute (APNI)*	R
09:20	**Yield of Maize (Zea Mays L.) Varieties as Affected by Neem Oil Coated Urea Application in Southern Benin** *Vodjo Nicodeme FASSINOU HOTEGNI - University of Abomey-Calavi (UAC)*	R
09:40	**Scalable Artificial Intelligence, Geospatial Big Data Analytics and Digital Agriculture: a Focus on Lessons Learnt and Their Implication for Improved Production** *Kwabena Niketia - University of Saskatchewan*	R
10:00	**Presentation by** *Tomisin Adefare - GBFoods*	R
10:30	**Break/Posters/Exhibits**	
	Keynote Presentations 4 –	
11:00	**TBD**	LV
	Plenary Session 3 - Remote Sensing Applications	
11:30	**Assessment of Nitrogen Fertilization in Tunisian Wheat Production Using Proximal and Remote Sensing** *Mouna Mechri - National Institute of Field Crops (INGC)*	LV
11:50	**Engineering Technology for Crop Monitoring and Disease Identification** *Manuel Perez Ruiz - Smart Biosystems Laboratory, University of Sevilla*	LV
12:10	**Presentation by** *Anthony Hall - Dronelytics (virtual)*	LV
12:30	**Lunch – Break in Livestream**	
	General Session 3 -Prof. Dr. Abdou Soaud & Prof. Dr. Waled Wlkhoby	
13:15	**The Role of Malr in Developing, Localizing and Applying Modern Technologies to Chieve Sustainable Development and Increase Egyptian and African Food Security** Prof. *Dr. Alaa El-Bably, Egyptian Focal point of Comprehensive Africa Agriculture Development*	LS LS
13:30	**Comparative Study on Precision Nitrogen Management for Wheat Using Greenseeker, Chlorophyll Meter and Leaf Color Chart Based on Spectral Characteristics of Leaves** *Prof. Dr. Abdou Soaud, Emeritus Professor, Faculty of Agriculture, Cairo University*	LS
13:45	**Improving Vegetative Growth and Productivity of Potato Plants Grown Under Smart Irrigation System Compared to the Ordinary System** *Dr. Sameh El-Sawy, Associate professor National Research Center (NRC)*	LS

Program - Day 2

Day 2 – Wednesday, 4th December		
	General Session 3 -continued	
14:00	**Diverse Soil Physicochemical Properties and Digital Mapping in the West Nile Delta, Egypt: Supporting Site-Specific Management Practices** Dr. MOHAMED A. E. ABDELRAHMAN, Associate professor, NARSS	LS
14:15	**Smart Systems for Achieving a Green and Sustainable Environment** *Ahmed Tawfik* and Nour Sh. El-Gendy, MSA Center of Excellence, October University for Modern Sciences and Arts (MSA)*	LS
14:30	**Improving Deep Learning Prediction of Soil Organic Carbon Using On-line Vis-NIR Spectra and Data Augmentation Techniques** *Dr. Said Nawar, Associate Professor, Soil and Water Department, Faculty of Agriculture, Suez Canal University, Ismailia 41522, Egypt*	LS
14:45	**Mitigation of the Climate Change Challenges on Rice Crops By Fertilizer Management** *Prof. Dr. Waled Elkhoby, Professor, Rice Research and Training Center, Field Crops Research Institute, Agricultural Research Center, Egypt*	
15:00	**Break/Posters/Exhibits**	
	Keynote Presentation 5	
15:30	**Presentation by** *Dr. Donald Kelechi Madukwe - OCP Africa*	LV
	Keynote Presentation 6	
15:50	**Presentation by** *Pauline Chivenge - IRRI*	LV
	Panel 1 – Women in Precison Agriculture	
16:20	**Women in Precision Agriculture - Panel Discussion** *Tangi Aziza - UM6P and APNI* *Mouna MECHRI - National Institute of Field Crops (INGC)* *Tomisin Adefare - GBFoods* *Pauline Chivenge - IRRI*	LV

Program - Day 3

Day 3 – Thursday, 5th December		
08:00	**Welcome Session** **Welcome from SITE HOST - Prof. Dr. Abdelaziz Belal**	L
09:00	**Keynote Presentations 7** **Precision Water Management Strategies for Africa** *George Vellidis - University of Georgia*	R
09:30	**Plenary Session 4 - Precision Water Management (pre-recorded)** **Presentation by** *Yafit Cohen*	R
09:50	**Application of Remote Sensing for Drought Monitoring Using Vegetation Indices in Pineapple Growing Areas in the Central Region of Ghana** *Emmanuel Hanyabui - University of Cape Coast*	R
10:10	**Presentation by** *Zakaria Hazzoumi - UM6P*	R
10:30	**Break/Posters/Exhibits**	
11:00	**Keynote Presentation 8 –** **Presentation by** *TBD - OCP Nutricrops*	LV
11:30	**Plenary Session 5 – Precision Nutrient Management** **iSDA's Virtual Agronomist – Expert Advice for Every Farmer** *Paul Chunga - iSDA*	LV
11:50	**Use of "FertiEdge" Application for Optimizing Wheat Fertilization** *Ibtihel Sbai - National Institute of Field Crops* *Mohammed Hmimou* *Faissal SEHBAOUI - AgriEdge SA, Benguerir, Morocco*	LV LV
12:10	**Presentation by** *TBD - OCP Nutricrops*	
12:30	**Keynote Presentation 9 –** **National Agricultural Data Infrastructure As Bedrock for Precision Agriculture** *Benjamin Kwasi Addom - Commonwealth Connectivity Agenda for Trade & Investment (CCA)*	LV
13:00	**Closing Session and Awards - APNI - Kaushik Majumdar**	LV
13:30	**Adjourn**	

Invited Speakers

Prof. Dr. Ayman F. Abou-Hadid

Professor Abou-Hadid has been seconded to several other National Duties including being appointed as Minister of Agriculture in four Cabinets, President of the Agricultural Research Center, chairman of the Egyptian Union of Producers and Exporters of Horticultural Crops, and Executive President of the Egyptian Environmental Affair Agency. He also established three new Institutes, namely, The Arid Land Institute in the Faculty of Agriculture, Ain Shams University, the Central Laboratory for Agricultural Climate in the Agricultural Research Center, and the Climate Change Information Center and Renewable Energy in the Ministry of Agriculture. On the international level, he was elected as the chairman of the Commission Protected Cultivation of the International Society for Horticulture Sciences (ISHS) for two terms from 1998 to 2006.

Professor Abou Hadid has also Established an International Master's Degree between Milan University and Ain Shams University (2006). He was the Rapporteur of the Egyptian Agricultural Research and Development Council 2007-2011, Rapporteur and Member of the Higher Committee for Climate Change in the Agricultural sector since 2007, and Chairman of the Executive Committee of Climate Change in the Agricultural Sector since 2007. Professor Abou-Hadid has obtained several Academic Honors, Grants, and Awards including Ain Shams University Award for Appreciation in Agricultural Sciences (October 2020), the Medal of Science and Arts First Grade- president of Egypt (April 2013), the National Recognition Award for Agricultural Sciences, Egyptian Academy for Scientific Research and Technology (2009), and FAO Silver Medal twice in the occasion of World Food Day celebration and honor contributors to the nutritional and social development in September (2007), and FAO Silver Medal, World Food Day "Water for Life"

Presentation: Smart Agricultural management to adapt the effects of climate change: Smart application of water and fertilizers in Egypt. (SAM-EGY)

Prof. Dr. Adel El-Beltagy

Prof. Dr. Adel El-Beltagy. Former Minister of Agriculture and Land Reclamation, Egypt, He is currently Chair of the International Drylands Development Commission (IDDC), Professor, Arid Land Agricultural Graduate Studies & Research Institute (ALARI), Ain Shams University, Egypt. Chair of the Food and Agriculture Research Council at the Egyptian Academy of Science, Member of the Advisory Board of the Bibliotheca Alexandrina. He has served as Chair of the Executive Committee of the Board of Trustees of the Bib Alex (2015/2018), Minister of Agriculture and Land Reclamation (2014/2015), Board Member of the World Academy of Sciences (TWAS) (2011-2015), President of the Governing Board of the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) (2011-2015), Vice Chair/Member of the board of the Global Crop Diversity Trust (GCDT) (2007-2011), Chair of the Global Forum on Agricultural Research (GFAR) (2006-2010), Chairman of the Scientific/Technical Council of the International Sahara and Sahel Observatory (SSO) (1993-2002), Vice-President (North Africa) of the International Society for Horticultural Science (ISHS) (1987-1990). Award the Trust for Advancement of Agricultural Sciences (TAAS). Dr. M S Swaminathan Award for Leadership in Agriculture. In recognition for efforts in reducing poverty and hunger globally (India 2021). Award the Ain Shams Prize for Scientific Merit in Agriculture Science (Cairo, Egypt 2018). Award of Leaders of the Decade in Agriculture- Women Economic Forum, 2018, the Golden Medal of the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM, 2015), Commander of the Order of Agricultural Merit (France, 2014), The Sultan Qaboos 'First Class' Order for Culture, Sciences and Arts (2009), The Al-Istiklal Medal by His Majesty King Abdullah II bin Hussein of Jordan (2005). And Fellow of the University of Wales (1993).

Presentation: Smart Agriculture Application in arid and Semi-Arid area

Invited Speakers

Prof. Dr. Osama A. RAYIS

Prof. Dr. Osama A. RAYIS is an expert in entrepreneurship and Digital Transformation, Arab Organization for Agricultural Development.5+ years of experience in profession, management, consultation, teaching and research. Rayis is an experienced professional in computing technologies, Fintech, NLP and AI. He served ed as a software and systems engineer and consultant in several companies in Germany, Turkey and the Emirates. He Managed to lead successful development of complex digital projects. Rayis had also proven record in leading technology institutions to success (Universities, Companies, NGOs). He had managed to attract more than 30 million USD funding for development projects in the last 10 years. He maintains a strong network of connections both internationallyvand regionally (UN, IMF ADB, ISDB, IRENA, ...) He is familiar and knowledgeable about SDGs, climate change and green funding. He worked in many rural development projects. He managed to establish, fund, and sustain technology-based institutions.

Presentation: Agripreneuring Agriculture 5.0, Key Potentials, Opportunities and Challenges

Prof. Dr. Ahmed Tobal

Dr. A. Tobal, Advisor to the Minister of Agriculture for Digital Transformation. He has more than 25 years of experience in information technology and space sciences through the Ministry of Communications and Information Technology, Ministry of Administrative Development, Ministry of Higher Education and Scientific Research, represented in the National Authority for Remote Sensing and Space Sciences where he participated in the completion of the first Egyptian remote sensing satellite "MisrSat 1" launched successfully in 17/04/2007 and was awarded the United Nations UNPSA 2009 for service "University Enrollment Project"—working in the area of government services and education for years to improve the services provided to citizens in the simplest form in any place and at the lowest possible cost.

Presentation: Impact of Digital Transformation in Agriculture Sector in Egypt

Dr. Hesham Ahmed ABOU El Mandour

Brigadier General Doctor, National Service Project Organization (NSPO)

Dr. Mohamed Abd elzaher Adam

Dr. Mohamed Abd elzaher Adam, PhD Agronomist, is head of plant products, National Service Project Organization (NSPO)

Presentation for Dr. Mandour and Dr. Adam:

The Role of Malr in Developing, Localizing and Applying Modern Technologies to Chieve Sustainable Development and Increase Egyptian and African Food Security

Invited Speakers

Prof. Dr. Alaa El-Bably

Dr. Alaa El-Bably, is a distinguished expert in agriculture, currently serving as an Advisor to the President of the Agricultural Research Center, Egypt. He is the Focal Point for the Comprehensive Africa Agriculture Development Program (CAADP) at the Ministry of Agriculture and Land Reclamation (MALR) and chairs the Specialized Technical Committee for Agriculture, Water, Environment, and Rural Development representing Egypt to the African Union. Dr. El-Bably is a former advisor to the Minister of MALR and previously directed the Soil, Water, and Environment Research Institute.With extensive international and national experience, he has worked as a soil expert and consultant for organizations like the Food and Agriculture Organization (FAO), the African Union Commission, and the Water Arab Council. His roles included projects in Rwanda, Tanzania, and across the Arab League, focusing on irrigation, sustainable agriculture, and food security. Dr. El-Bably has co-authored five books with Springer and published numerous research papers. He has actively contributed to development projects, supervised graduate theses, and participated in global conferences and workshops. He holds intellectual property rights for innovative water management programs and has earned multiple certificates of appreciation for his contributions to agriculture and sustainability.

Presentation: The Role of Malr in Developing, Localizing and Applying Modern Technologies to Chieve Sustainable Development and Increase Egyptian and African Food Security

Prof. Dr. Mariam El Sharkawy

Mariam El Sharkawy, born in 1979, is an accomplished professional currently leading the Agri Ecosystem and Agri eCommerce marketplace at eAswaaq Misr, a subsidiary of eFinance Investment Group. Since joining eAswaaq Misr in 2020 as Head of Marketing, she has spearheaded the development and execution of e-commerce and digital platform strategies. In 2022, she was appointed Head of Agri Ecosystem, where she established a comprehensive digital agritech ecosystem, driving exponential business growth. With over 20 years of experience in marketing and strategic business development across agribusiness, food processing (FMCGs), and other sectors, Mariam has held pivotal roles. At Wadi Group, one of the largest agribusiness conglomerates in the MENA region, she spent over 12 years as Marketing & Communication Manager and a member of the Strategic Business Development Committee. She contributed to strategic expansions in poultry, agriculture, aquaculture, grain logistics, and more while managing the group's regional branding and marketing strategies. In addition to her corporate achievements, Mariam is an associate professor, lecturing in marketing and strategic management at leading Egyptian universities. She holds dual master's degrees in Global Management and Integrated Marketing Communication from ESLSCA University (Egypt/France, 2010) and has completed extensive executive training in strategic management, leadership, and digital marketing.

Presentation: Egypt's End-to-End Agritech Ecosystem:

Invited Speakers

Prof. Dr. Abdel-Ghany.M.El-Gindy

Prof. Dr. Abdel-Ghany.M.El-Gindy, Agriculture Engineering & Dean, Faculty of Desert Agriculture-,Rector of the University Branch -Ras Sudr, South Sinai Egypt, and Independent &International On-farm Irrigation Engineering and Management expert & Cons First Class Medal of Science and Arts- 2014-State Award in the Advanced Technological Agricultural Sciences, 2012-the prize of the University of Ain Shams discretionary June 2008. International Food Day, Food and Agriculture Organization FAO. Int. Univ. Agric. Educated Programmes TEMPUS European Union, May, Professor, Agriculture Engineering, Faculty of Agriculture-Ain Shams Univ 1990-till now. Vice Dean and Dean of the Faculty of Agriculture, Ain Shams University, Egypt, 1999-2007., Deputy Director and Director - Ag. Eng. Res. Institute ARC- Ministry of Agriculture Egypt 1990-97. Secretary of the Committee of the Sector of Agricultural Studies - Supreme Council of Universities from 2003 until 2019., member and Chairman of the agricultural sector faculties working group, Technical Committee for establishing the regulation and educational programs and prepare to start the study- National projects to establish universities and educational and research institutions- Ministry of Higher Education, Egypt.

Presentation: Precision & Digital Sustainable Agriculture Systems to Achieve Egyptian-African Food Security

Prof. Dr. Abdel-Aziz Belal

Prof. Dr. Belal, is Professor of Soil Sciences and Precision Farming, Head of Agriculture Application, Soil and Marine Division, National Authority for Remote Sensing and Space Sciences (NARSS), He is professor of smart agriculture and Head of the Agricultural Applications, Soil and Marine Sciences Division, National Authority for Remote Sensing and Space Sciences, Cairo, Egypt since January 2017 until now. He was Head of the Soil Department, National Authority for Remote Sensing and Space Sciences, Cairo, Egypt from February 2007 to December 2016. Prof. Belal obtained a PhD in the field of smart agriculture from Freiburg University, Germany in 2006. He has many experiences in the application of remote sensing, geographic information systems, building statistical and spatial models in the following fields: Digital agriculture, water management, precise or smart agriculture management (smart agriculture), sustainable agricultural development, crop monitoring, and is involved in research of pedometrics, proximal soil sensing, soil survey, digital soil mapping, soil degradation and desertification, land evaluation l and irrigation water. Soil contamination and the impact of climate change on soil and plant properties.

Presentation: Develop an Automated Irrigation System for Paddy Rice in Arid and Semiarid Regions Using RS, IOT, and AI to Monitor Water Levels for Alternate Wetting and Drying Methodology for Rice Crops under Egyptian Condition

Invited Speakers

Prof. Dr. Noha H. El-Amary

Prof. Dr. Noha H. El-Amary, born in Cairo, Egypt, earned her B.Sc., M.Sc., and Ph.D. degrees in electrical engineering from Ain Shams University in 2000, 2004, and 2009, respectively. She has held various academic positions at the Arab Academy for Science, Technology, and Maritime Transport (AASTMT), including Associate Lecturer (2004–2009), Assistant Professor (2009–2014), Associate Professor (2014–2018), and Professor since June 2018. Her administrative roles include Coordinator and Deputy for African and Asian Affairs (2012–2015), Head of the Electrical and Control Engineering Department (2020–2023), and Vice-Dean of Training and Community Service since March 2023. An IEEE senior member, Dr. El-Amary is active in CIRED Egypt and has extensive publications and research supervision in power systems, smart grids, energy management, and renewable energy. She holds certifications in AI Fundamentals from Microsoft and Impact Rating from Impaakt and serves as a judge for the QS Reimagine Education Committee (2023–2024) and a proctor for the IEEEXtreme Competition. Her research interests span AI in power systems, smart grids, sustainability, and maritime applications. Since 2016, she has been engaged in preparing EU-funded projects under programs like ENI CBC MED, EASME, ERASMUS+, Intra-Africa, and PRIMA.

Presentation: Arab Academy for Science, Technology and Maritime Transport (AASTMT) and Agriculture Technology Services

Prof. Dr. Waled Elkhoby

Prof. Waled Elkhoby is Professor and Head Research at Rice Research and Training Center, Agricultural Research Center, Egypt. He completed a PhD. degree in Agronomy, Tanta University, Egypt. His residual and international level research and training led to the scientific cooperation between his institute and the National Institute of Agrobiological sciences, Japan, Koipesol, Spain, and Inversions Agro gourmet SAS, Colombia. He conducted research on the System of Rice Intensification (SRI) to minimize the quantities of water irrigation and chemical fertilizers that are used in cereal crops cultivation. He worked as head of the Research and Development of Olam International Company. He also evaluated the international rice core collection under Egyptian conditions (heat, drought, and salinity). Research Interest Agronomy, plant nutrition, water management, plant physiology, plant ecology, and seed production.

Presentation: Mitigation of the climate change challenges on rice crop by fertilizer management

Invited Speakers

Prof. Dr. Rabab Mamdouh Elamawi

Prof. Rabab Mamdouh Elamawi, is a distinguished plant pathologist and Head Researcher at the Plant Pathology Research Institute, Agricultural Research Centre (ARC), Sakha, Kafr Elsheikh, Egypt. She currently serves as the Head of the Rice Pathology Department. With a Scopus h-index of 8, she is recognized for her significant contributions to rice pathology and plant disease management. Dr. Elamawi earned her PhD in Cellular and Molecular Biology from the University of Louis Pasteur, Strasbourg, France. She also holds an MSc in Agriculture Science from Tanta University, Egypt, specializing in molecular biology techniques for root-knot nematodes identification, and a BSc in Agriculture Science from the same institution. Dr. Elamawi's career spans decades of impactful research and teaching roles, including positions at King Saud and King Khaled Universities in Saudi Arabia. Her work emphasizes the development of Integrated Disease Management (IDM) systems for rice diseases, applying nanotechnology, and modern biotechnology to enhance disease resistance. She has actively contributed to the release of Egyptian rice varieties and supervised national rice production programs.

Presentation: Integrated Fertilizer Management and Trichoderma Bioagents: A Sustainable Approach to Mitigating Climate Change Impacts on Rice Disease

Prof. Dr. Abdou Abdou Soaud

Prof. Abdou Soaud, is currently a Professor Emeritus in the Department of Soil Science, Faculty of Agriculture, Cairo University. He was the previous secretary of the Scientific Committee for University Staff members' promotion in Soil Science and Agricultural Engineering, Supreme Council of Universities and a Member of the Scientific Committee of Agriculture Research Center for Staff Members' promotion in Soil Science, and Agricultural Engineering. He is Authorized external previewer of the National Authority for Education Quality and Accreditation of Egypt for pre-university and high education. Prof. Soaud's areas of expertise include soil fertility and plant nutrition, soil and water pollution and remediation, and precision agriculture. Dr. Soaud has coauthored numerous cited journal publications, conference articles, book chapters and project reports in the topics, and has received several awards and grants from various funding agencies including the European Union, Egyptian ministry for High Education, Japan Cooperation Center, Petroleum (JCCP), United Arab Emirates University, Cairo University and the 20th World Congress of Soil Science, 2014. At Cairo University and UAE University, he taught 18 courses in Soil and Environmental Sciences to undergraduate and graduate students in Arabic and English and developed some courses as e-learning courses on Blackboard and Moodle (course management software).

Presentation: Comparative Study on Precision Nitrogen Management For Wheat Using Greenseeker, Chlorophyll Meter And Leaf Color Chart Based On Spectral Characteristics of Leaves

Invited Speakers

Prof. Dr. Rashid K. Kurbanov

Dr. Rashid K. Kurbanov, Lead researcher, Candidate of Engineering Sciences. Research in the field of development and application of unmanned aerial vehicles in agriculture, development and implementation of convolutional neural networks in agriculture.

Presentation: Monitoring of Agricultural Bio-Objects Using UAVs and Artificial Intelligence Technologies

Dr. Natalia I. Zakharova

Dr. Natalia I. Zakharova, Junior researcher. Research in application of unmanned aerial vehicles and multispectral data in agriculture.

Presentation: Monitoring of Agricultural Bio-Objects Using UAVs and Artificial Intelligence Technologies

Prof. Dr. Mohamed Aboelghar

Prof. Dr. Mohamed Aboelghar, Head of Agricultural Applications Department, National Authority for Remote Sensing and Space Sciences (NARSS) with all related tasks for capacity building, continuous developing and research planning (2013 to current).

Expert in Arab Organization for Agricultural Development, League of Arab States from March 2015 to August 2016.

Member of the planning committee of NARSS to manage and organize the research plans and the projects of NARSS (2019 to current).

Presentation: Thermal Imaging as a Tool for Pre-Symptomatic Diagnosis of Fall Armyworm Infestation in Maize

Invited Speakers

Prof. Dr. Sobhy M.A. Sallam

Prof. Dr. Sobhy M.A. Sallam, is a professor and researcher specializing in animal and aquaculture production, currently serving as the Head of the Animal and Aquaculture Production Department, Faculty of Agriculture, Alexandria University. He has held multiple leadership roles, including Dean of Community Service and Environmental Development and Secretary of the Syndicate of Agriculturists in Alexandria. Prof. Salem has a Ph.D. in Agricultural Sciences (Animal Nutrition) from Alexandria University, completed through a joint supervision program with Kyoto University, Japan. He has authored over 95 international papers and eight book chapters and has participated in various international and national research projects focusing on sustainable animal production, climate change mitigation, and alternative feed resources. Recognized for his contributions, Prof. Salem has received prestigious awards such as Alexandria University's Scientific Excellence Award and multiple national honors.Additionally, he has organized and participated in numerous international conferences, workshops, and training programs, advancing innovative practices in animal production and environmental sustainability. His future research interests include addressing climate change impacts on livestock, nutrigenomics, and developing sustainable animal farming systems.

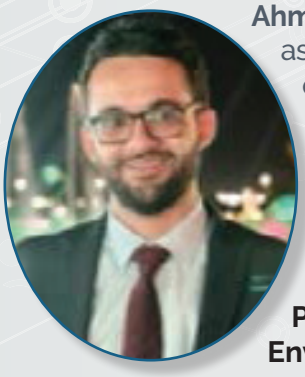
Presentation: Smart Innovative Applications in Livestock Farming

Dr. Nour Sh. El-Gendy

Dr. Nour Sh. El-Gendy is a Professor of Environmental Sciences, Clean Energy, and Nano- Biotechnology, heading the Petroleum Biotechnology Lab at EPRI. She is also the Head of TISC and Vice Head of the Center of Excellence at MSA University, with visiting professorships in India. She serves in multiple national and international committees, including as National Contact Point for Horizon Europe in Environment and Agriculture. An expert in environmental pollution, nanobiotechnology, and biofuels, she has published extensively with 9 books, 134 research papers, and supervised 29 theses. Dr. El-Gendy has led research schools, developed academic programs, and collaborated globally with prestigious institutions. She has participated in over 130 international conferences and workshops, making significant contributions to education and industry. Recognized with numerous international awards, her work continues to impact sustainability, innovation, and environmental solutions worldwide.

Presentation: Smart Systems for Achieving a Green and Sustainable Environment

Ahmed Tawfik



Ahmed Tawfik, Electronics & communication engineer, works as research assistant in MSA Center of Excellence for project & Entrepreneur. With 10 years of experience in the field of Embedded Systems and Information Technology. Tawfik has developed a strong set of skills and a proven track record of success in the technology transfer and deepening the local manufacturing by implementing many projects in the real time monitoring and control systems for smart agriculture, water optimization, and upper-layer weather monitoring and climate change.

Presentation: Smart Systems for Achieving a Green and Sustainable Environment

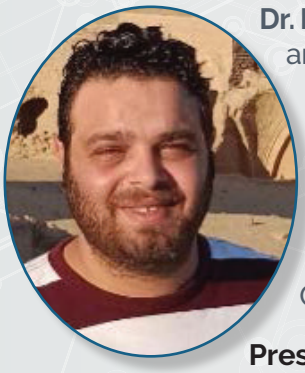
Invited Speakers

Prof. Dr. Mohammed Abd El-Kareim Darwesh

Prof. Dr. Mohammed Abd El-Kareim Darwesh is Head of Research and Senior Researcher at the Wheat Research Department, FCRI, ARC, Egypt, since August 2023. He also serves as Undersecretary of the Sikha Agricultural Research Production Station since April 2021. With over two decades of expertise in wheat research, he has contributed to projects like the Wheat Improvement Program with the Arab Organization for Agricultural Development in Mauritania. Dr. Abdelkereim holds a Ph.D. in crop science (2011) and an M.Sc. (2007) focused on genetic and agronomic studies of bread wheat, along with a B.Sc. in Agricultural Sciences (1998).

Presentation: Spectral Reflectance Indices' Performance to Identify Seawater Salinity Tolerance in Bread Wheat Genotypes Using Genotype by Yield* Trait Biplot Approach.

Dr. Hesham Aboelsoud



Dr. Hesham Aboelsoud is a geospatial and water productivity expert at the Food and Agriculture Organization (FAO), specializing in spatial analysis and remote sensing for water resource assessments, particularly about agricultural water use. With a Ph.D. in Soil and Water Sciences, he has five years of experience in FAO and other UN agencies, providing technical support in GIS/RS software and technologies (LCCS, Arc GIS, Qgis, SEPAL) for various countries. Before his current role, Hesham served as a Senior Researcher at the Soil, Water and Environmental Research Institute (SWERI), Agric. Res. Center (ARC) in Giza, Egypt.

Presentation: Role of WaPOR tool in Precision Agriculture and Sustainable Food Production

Dr. Debashis Chakraborty

Dr. Debashis Chakraborty, currently holds the position of Senior Cropping Systems Agronomist at CIMMYT, Dhaka, Bangladesh. He has Master's and Ph.D. degrees from IARI, New Delhi specializing in Soil Physics, Soil and Water Management and Geoinformatics, and received a Gold Medal for Academic Excellence, and Best Doctoral Thesis Award. Commencing his career as a Research Scientist, Dr Chakraborty progressed to the position of National Fellow at ICAR. He has been involved in various R&D projects as the Principal Investigator, focusing on LULC dynamics, water and nutrient dynamics and participatory-GIS, and collaborated with IRRI and CIMMYT on long-term experiments and conservation agriculture. Additionally, he has also worked as a post-doctoral fellow Rothamsted Research, UK and at the University of Sydney, Australia under the DFAT fellowship. Notable acknowledgement included 12th International Congress Commemoration and Dr KG Tejwani Awards for Management of Natural Resources; esteemed as a Fellow of the National Academy of Agricultural Sciences, India, and Academy of S&T, West Bengal. Since 2001, Dr Chakraborty is a PG Faculty of IARI and has supervised Masters, Doctoral, and Post-doc students. He has to his credit 80 research papers with 7627 citations and an h-index of 40, and a book on 'Fundamentals of GIS.

Presentation: Smart Irrigation Management for Farms: Integrating Evapotranspiration and Soil Moisture Data from Open-Source Satellites

Invited Speakers

Dr. Sameh Mohamed Mohamed El-Sawy

Dr. Sameh Mohamed Mohamed El-Sawy holds a Master's in "Effect of some Fertilizer Treatments on productivity and fruit quality of strawberries" and a PhD in "Rationalization of Water Consumption of Tomato Plants Grown under Sandy Soil Conditions" in 2016. He has been to China three times before to attend training courses. In 2017 he went to the Talent Young Scientist Program in China to work at Ningxia University as a Researcher from October 2017 to October 2018, the job title "Saving irrigation technology in arid regions of intelligence". He worked on a smart irrigation system to save irrigation water. In addition, he carried out many experiments in Tongxin County in the northwest of China using the smart irrigation system. Also, he worked on many local projects (21) and international projects (5), as well as he is the principal investigator of the project "Producing vegetable crops by deficit irrigation techniques for saving irrigation water" funded by the National Research Centre. Also, he worked as a corresponding investigator for the project of "The use of Aquaponics systems to produce vegetables in arid regions affected by salinity in Moghra Area", as well as he worked for three years as a member and executive manager of "Improving the Performance of greenhouses in the Mediterranean countries by using innovative plastic materials, natural additives and modern irrigation technique.

Presentation: Improving the Water Productivity for Vegetable Crops by Using Smart Irrigation Technology in Arid and Semi-arid Regions

Dr. Mohamed A. E. Abdelrahman

Dr. Mohamed A. E. Abdelrahman is an Associate Professor, Division of Environmental Studies and Land Use (DESLU), National Authority for Remote Sensing and Space Sciences (NARSS), Egypt. June 2023- present: Visiting Professor: State Key Laboratory of Efficient Utilization of Arid and Semi-arid Arable Land in Northern China (the Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, Beijing 100081, China) December 2020- present: Associate Professor, Division of Environmental Studies and Land Use (DESLU), National Authority for Remote Sensing and Space Sciences (NARSS), Cairo, Egypt. January 2015 – December 2020: Researcher, Division of Environmental Studies and Land Use (DESLU), National Authority for Remote Sensing and Space Sciences (NARSS), Cairo, Egypt. November 2009 - January 2015: Assistant Researcher, Division of Environmental Studies and Land Use (DESLU), National Authority for Remote Sensing and Space Sciences (NARSS), Egypt. September 2004 – October 2009: (GIS &RS Instructor) & Remote Sensing and geographical information system specialist, Division of Scientific Training and Continuous Studies (DSTCS), at the National Authority for Remote Sensing and Space Sciences, Cairo, Egypt.

Presentation: Diverse Soil Physicochemical Properties and Digital Mapping In The West Nile Delta, Egypt: Supporting Site-Specific Management Practices

Invited Speakers

Dr. Wael A. Murtada

Dr. Wael A. Murtada received the B.Sc. degree in electronics and communications engineering from Banha University, in 1993, the M.Sc. degree in electronics and communications engineering from Cairo University, in 2005, and the Ph.D. degree in electronics and communications from Al-Azhar University, in 2013. He is currently the Head of the Spacecraft On-Board Computers and Space Software Department, Space and Strategic Studies Division, National Authority for Remote Sensing and Space Sciences (NARSS). His research interests include artificial intelligence; real-time embedded software design; embedded hardware design; metaheuristic optimization algorithms; deep learning; data science; spacecraft fault detection, isolation, identification, and recovery (FDIIR); and IoT technology.

Presentation: Smart Farming Using Internet of Things and Machine Learning: A Critical Evaluation

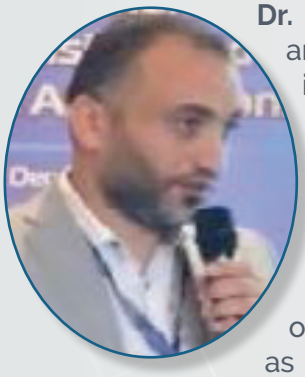
Dr. Mohamed S Shokr

Dr. Mohamed Soliman Shokr was graduated from Faculty of Agriculture, Tanta University. He obtained B.Sc. degree in 2009 with general grade "Excellent with Honor" and obtained M.Sc. degree in soil science at 2013. He obtained PhD at 2018 from Faculty of Agriculture, Tanta University. He did part of his PhD thesis in University of Wolverhampton, UK (Joint supervision channel between Tanta University and University of Wolverhampton). His research interest area is using Remote sensing, GIS and other new techniques in soil and water studies. According to citations in the web of science journal list, he authored numerous research papers in top journals on soil and water. These journals include the Archives of Agronomy, the International Journal of Biometeorology, the International Journal of Geo-information, the Journal of Water and Air Pollution, Agriculture, Sustainability, Land, Toxics, and Frontiers in environmental science. Dr Mohamed Shokr is a guest editor in a lot of highquality research journals such as Sustainability, Discover soil and Frontiers in sustainable food system.

Presentation: Using Integrated Multivariate and GIS Techniques to Evaluate Crop Suitability and Soil Capability to Promote Agricultural Sustainability

Invited Speakers

Dr. Mostafa Khaled



Dr. Mostafa Khaled is an accomplished researcher of marine science and integrated coastal zone management with a strong background in Geoinformatics. He is currently a Researcher at the Marine Science Department, Agricultural Applications, Soil and Marine Science Division, National Authority for Remote Sensing & Space Sciences, Cairo, Egypt. He holds a bachelor's degree in marine biology & fisheries from the Faculty of Science Al Azhar University and a master's degree in marine ecology from Assiut University Dr. Khaled completed his Ph.D. in Science Zoology (Marine Ecology) at Assiut University-USF channel, focusing on the effects of climate change on coral reefs using remote sensing data. He is a working as lecturer of Remote Sensing & GIS Application in Fisheries at Aswan and Suez Universities. His research interests include modeling climate change impacts on coral reefs, sea grass, and mangroves using multispectral satellite images to estimate environmental states and spatial distribution models for Fisheries systems. Dr. Khaled's work has contributed significantly to the understanding of coral reef ecosystems and the development of fisheries management technologies. He serves as a consultative in AU-IBAR meeting for the Master Plan of Egyptian Blue Economy and as Climatic Ambassador for ECCADP Project. He currently serves as a member of the Egyptian Syndicate of Scientific Professions (ESSP), and the PADI Open Water Diver.

Presentation: Application of IOT and Artificial Intelligence in Aquaculture

Dr. Abdelraouf M. Ali

Dr. Abdelraouf M. Ali is an Associate professor Agricultural Application department, National Authority for Remote Sensing and Space Sciences, Cairo, Egypt

10/2021-Pending: Associate professor., distance work, Department of Environmental Management, Institute of Environmental Engineering, People's Friendship University of Russia (RUDN University), 6 Miklukho-Maklaya St, Moscow, 117198, Russian Federation.15/10/2023 - 15/3/2024 - Junior machine learning engineering at the technology training center.,11/2019 – 11/2020: Junior Researcher, Agroengineering department., Agrarian- Technological Institute of the Peoples' Friendship University of Russia., Moscow, Russia.03/2016- 09 / 2016: Visiting scholar at Digital Photogrammetry Research Group (DPRG) Lyles School of Civil Engineering, Purdue University, INDIANA, USA. 06/2016 –11/2019: Researcher at Agricultural Application Department, National Authority for Remote Sensing and Space Sciences, Cairo, Egypt., 05/2012 – 06/2015: Assistant researcher at Agricultural Application Department, National Authority for Remote Sensing and Space Sciences (NARSS), Cairo, Egypt. ,08/2008 – 05/2012

Presentation: Multi Sensors Unmanned Aerial Vichels (Uavs) In Crop Management and Precision Agriculture

Speakers Abstracts
(Egypt Local Site)

Smart Agricultural Management to Adapt the Effects of Climate Change: Smart Application of Water and Fertilizers in Egypt (Sam- Egy)

Ayman F. Abou-Hadid

Emeritus Professor, Faculty of Agriculture, Ain Shams university. Cairo, Egypt

ayman_abouhadeed@agr.asu.edu.eg

This proposal aimed to reduce the effects of climate change by managing the most commonly used resources in agricultural fields, namely water, and fertilizers. Besides integrating ground and space- borne data into mobile web applications and cloud processing to create a suitable method for integrated water and fertilizer consumption, use, efficiency, and productivity, as well as crop monitoring tools. Excessive water use releases methane gas stored in the soil, which appear in flooded rice cultivation, and its role in greenhouse gas emissions increases. While the fertilizer industry consumes a lot of energy, most of which may come from fossil fuels, effective water and fertilizer management will mitigate or reduce the effects of climate change. AIl techniques and modern data analysis and processing technologies for ground and satellite data to maximize water and fertilizer beneficiaries through the SAM-EGY application. The SAM-EGY will be implemented in the Nile delta of Egypt. Wheat, maize, potatoes, and tomatoes are all strategic and profitable crops. Farms will assess and evaluate existing methods, equipment, and agricultural practices. The proposed method combines extensive monitoring plots for methodological development and validation with actual farm practice to assess the impact of the SAM-EGY system and its tools on these farms' economic and environmental practices.

Precision & Digital Sustainable Agriculture Systems to Achieve Egyptian-African Food Security

Abdel-Ghany. M. El-Gindy *

Prof. of Agricultural Engineering and Dean of Faculty of Desert Agriculture-KSIU. Egypt

Due to climate change and water scarcity challenges, it has become necessary to introduce modern technology to ensure optimal use of water and enhance the productivity of agricultural resources. The continuous climatic changes and their direct and indirect effects on the environmental elements and the various natural and water resources, and on the agricultural system in particular. Water resources is the critical factor for all production processes and sustainable development in some of African Countries which reached the water poverty line (blow 1000 m3 /year per capita), Egypt (500 m3 /year per capita) To achieve the sustainable development goals of these challenges, agricultural production systems need to simultaneously address three overlapping challenges:

- Sustainably increase productivity and income in agriculture.
- Building resilience to the effects of climate change.
- Contribute to mitigating climate change whenever possible

Precision & Digital agriculture is one of the alternatives and solutions to meet these three challenges and climatic changes with the aim of increasing crop productivity and water unit productivity.

Keywords: Precision Agriculture, Sustainable, smart irrigation. food security

Develop an Automated Irrigation System for Paddy Rice in Arid and Semiarid Regions Using Rs, Iot, and Ai to Monitor Water Levels for Alternate Wetting and Drying Methodology for Rice Crops Under Egyptian Condition

Belal, A.A.[1*], Abo-Elsebah M.[2], Jlhum, M.[1], Saleh, N.[1], Elkoby, W.[3], Elamawy, R. [3], Ahmed, M.[1], Emam, M.[1] , Elhabshy, A.[4], Zhran, M.[2], Ehab, A., Abdelraouf M. Ali

[1] National Authority for Remote Sensing and Space Sciences (NARSS), Cairo, Egypt

[2] Electronic Research Institute (ERI), Cairo, Egypt

[3] Rice Research Center, Agriculture Research Center, Kafr Elskiekh, Egypt

[4] Faculty of Agriculture, Tanta University, Egypt

*Corresponding author **Belalabd@gmail.com** or **abelal@narss.sci.eg**

Things on the Internet (IoT) is the most efficient and important technique for the development of solutions to problems. IoT evolves from different building blocks which includes lots of sensors, software, network components, and other electronic devices. Also, it makes data more effective IoT makes it possible to exchange data via a network without involving humans. The project aims to use wireless sensors for real-time monitoring of field water level would greatly facilitate the application of alternate wetting and drying (AWD), an irrigation water management technique proven to result to significant water savings and reduced methane emissions in rice fields. This study developed a low-cost wireless sensor under Egyptian conditions that can perform real-time monitoring of water depth in rice fields under an AWD irrigation regime. The sensor is composed mainly of an ultrasonic depth sensor and a Wi-Fi-enabled microcontroller enclosed in a PVC cap that can be mounted in AWD pipes. The sensor was tested under lab and actual field conditions in Sakha research station. Results showed a relatively high degree of agreement between sensor and manual measurements of water depth under all testing conditions. Also, results show the clear advantage of adopting an automated AWD system, yielding a 30% reduction in irrigation water usage compared to the conventional approach.

Keywords: IOT, wireless sensor, Rice Crop, AWD, Egypt

The Role of Malr in Developing, Localizing and Applying Modern Technologies to Chieve Sustainable Development and Increase Egyptian and African Food Security

Alaa Elbably

Africa has experienced notable economic and agricultural growth, with its GDP doubling from 2000 to 2021 and agriculture becoming the fastest-growing sector globally. Despite progress, challenges like hunger (affecting 20.4% of the population), malnutrition, and disrupted agricultural systems due to climate change, conflicts, and unfair trade practices persist. Small farmers face persistent poverty, and the continent imports 40% of its food. Leveraging modern technologies such as digital agriculture, AI, and climate-smart practices is critical for food security and sovereignty. Efforts by Egypt's Ministry of Agriculture and Land Reclamation (MALR) include initiatives like "With You in the Field," digital transformation collaborations with IFAD, and the Sustainable Agricultural Development Strategy 2030. These focus on improving living standards, addressing climate challenges, and promoting innovations like precision agriculture, drones, and IoT. While small farms benefit from these tools, challenges such as high costs, lack of training, and inadequate infrastructure remain. Solutions include financial support, training, partnerships, and improved infrastructure. Success stories, like Ahmed in Egypt using precision farming, Sarah in Kenya adopting solar-powered drip irrigation, and Mohamed in Morocco employing AI for pest control, demonstrate how technology improves productivity, efficiency, and profitability. Empowering small farmers through technology is vital for advancing Africa's food security and sustainable agricultural development.

Smart Systems for Achieving a Green and Sustainable Environment

Ahmed Tawfik* and Nour Sh. El-Gendy

MSA Center of Excellence, October University for Modern Sciences and Arts (MSA)

Email: atawfeek@msa.edu.eg

Tel: 01126446427

In an attempt to achieve the sustainable development goals (SDGs) with its three pillars (environment, society, and economy) and to meet the intergovernmental panel on climate change (IPCC)-Working Group III's goal of enhancing national innovation, technology development, and transfer, October University for Modern Sciences and Art (MSA), represented by the Technology Innovation Commercialization Office (TICO) will make a presentation about many projects that have been implemented on the ground and target of the local manufacturing in the field of smart agriculture and irrigation, environment, and green economy. Some of these projects are; a smart network for real time monitoring and analyzing pollutants in the Mediterranean Sea that would occur from the agricultural drainages, a real time monitoring station for water level of wells, canals, and rivers, a smart device for monitoring and analyzing exhaust gases from motor engines, and Irwi mobile application for water irrigation requirements, along with many other projects targeting smart management of water resources and smart agriculture.

Egypt's End-to-End Agritech Ecosystem

Mariam EL Sharkawy

Head of Agri-Ecosystem & Agri eCommerce Marketplace Platform that is geared to the end-to-end farmer journey, addressing all the challenges faced by the Egyptian small holder farmer hroughout the value chain from providing access to finance all the way to crop marketing and delivery to the end user. Considering this concept, eAswaaq Misr has developed Egypt's End-to- End AGRITECH platform, that is based on farm and crop profiling using satellite and remote sensing, in an attempt to provide customized digital agro advisory service to small holder farmers based on the land, climate conditions, soil & crop health. The satellite and remote sensing service is complimented by AI algorithms to provide customized services and agro advisory digital content for each farm and crop based on the growth stage of each corp.

The presentation will also entail a detailed explanation of the application of the satellite and remote sensing technology in agriculture, how to expand on it and optimize it's use and application to increase farmer's productivity, optimize the return on farmer investment and hence, develop the agricultural sector at large.

Comparative Study on Precision Nitrogen Management for Wheat Using Greenseeker, Chlorophyll Meter and Leaf Color Chart Based on Spectral Characteristics of Leaves

Soaud A, El-Metwally E, Ali A, Sayed R

Collecting results on nitrogen (N) uptake throughout the growing season using tools such as GreenSeeker optical sensor, chlorophyll meter and Leaf Color Chart (LCC) holds great promise for optimizing N fertilizer management in cereal crops. To investigate this further, field experiments were conducted over two consecutive winter seasons (2017/2018 and 2018/2019) on wheat at the Experimental Farm of the Faculty of Agriculture, Cairo University, located in Giza Governorate, Egypt. The primary objective of these experiments was to develop effective strategies for managing N fertilizer in wheat during the growing season using GreenSeeker optical sensor, chlorophyll meter or LCC. The ultimate goal was to enhance N-use efficiency, reduce the N

fertilizer input and achieve optimal results. In the first season, various rates of N fertilizer were applied to create diversity in the readings obtained from the three tools: GreenSeeker optical sensor, chlorophyll meter and LCC. Based on the findings from the first season, a strategy was proposed for refining the application of N fertilizer during the jointing growth stage of wheat. This strategy was guided by the readings obtained from the three tools and implemented in the second season. For the GreenSeeker optical sensor, chlorophyll meter and LCC, an initial application of prescriptive N fertilizer (100 kg N ha-1 in two splits) was recommended. Followed by corrective doses based on the guidance provided by the three tools. The results of this study were remarkable. The N recovery efficiency that correlated with higher yield values achieved using the GreenSeeker optical sensor, chlorophyll meter, and LCC was 74.1%, 67.4%, and 55.4%, respectively, compared to only 50.5% with the general recommendation treatment. Also, the rate of nitrogen application decreased to 160, 180, 190 Kg N.ha^{-1} with the use of GreenSecker, chlorophyll meter, LCC, compared to 240 kg N. ha-1 with the treatment of general recommendations without affecting grin yield. These findings clearly demonstrate that the utilization of tools such as the GreenSeeker optical sensor, chlorophyll meter, and LCC can significantly improve the N-use efficiency and decrease the N application rate without compromising grain yields.

Smart Innovative Applications in Livestock Farming

Sobhy M.A. Sallam

Animal and Fish Production Department, Faculty of Agriculture, Alexandria University, Alexandria, Egypt

The livestock sector is experiencing a shift driven by smart technologies that increase productivity, improve animal welfare, and promote sustainability. As global demand for meat, dairy, and other products grows, farmers must adopt efficient tools to meet these needs, while protecting the environment. Smart applications use sensors, data analytics, machine learning (ML), and the Internet of Things (IoT) to provide real-time insights. Wearable devices (smart health collars, predictive disease control) help monitor livestock health by tracking vital signs and behavior, this allows early detection of illnesses, reducing veterinary costs and improving survival rates. Other technologies, such as robotic milking systems and GPS-based animal management, increase operational efficiency and farm profitability.

Precision livestock farming (PLF) focuses on using automation and data-driven tools to improve decision-making and reduce resource waste. Automated systems, like robotic feeders and milking machines, cut labor costs and improve productivity. Artificial Intelligence-powered systems analyze animal behavior and health metrics in real-time, helping farmers take quick actions to prevent issues. These technologies also support sustainable practices by optimizing water and feed usage. Smart livestock applications mark a major change in how farms operate by combining technology with practical farming knowledge, farmers can increase productivity, improve animal well-being, and reduce environmental impact.

Despite these benefits, several challenges slow adoption. High setup costs, limited rural connectivity, and complex data management make it difficult for many farmers to integrate these systems. Collaboration among farmers, technology providers, and policymakers is essential to develop affordable solutions and ensure farmers receive the necessary training. Expanding internet access and offering smart financing programs are also needed to support widespread adoption. As the sector grows, cooperation between researchers and industry stakeholders will be key to developing effective, farmer- friendly solutions.

In conclusion, adopting smart applications in livestock farming is critical to building a sustainable and resilient industry. These innovations not only make farming more efficient but also help farmers respond to future challenges. With continued advancements and collaborative efforts, the livestock industry will be better equipped to meet global demands, while safeguarding the environment and animal welfare.

Keywords: Artificial intelligence, Internet of Things, Precision livestock farming, Animal Welfare

Mitigation of the Climate Change Challenges on Rice Crops by Fertilizer Management

Waled Elkhoby

Rice Research and Training Center, Field Crops Research Institute, Agricultural Research Center, Egypt

Climate change presents significant challenges to rice production in Egypt, impacting growth, yield, and resilience to environmental stressors. This study investigates the role of fertilizer management and inoculation with plant growth-promoting bacteria (PGPB) as adaptive strategies to mitigate the adverse effects of climate change on rice crop. Experiments were conducted to assess the combined impact of different fertilizer levels and PGPB strains, including Azospirillum brasilense, Pseudomonas fluorescens, and cyanobacteria, on the growth and yield of the rice cultivar Sakha 108. The results demonstrated that optimized fertilizer application, when combined with PGPB inoculation, enhanced key agronomic parameters, such as leaf area index, tillering capacity, panicle density, and grain yield, under variable climatic conditions. Notably, the mixed PGPB treatment provided the greatest improvements, increasing nitrogen-use efficiency, soil health, and plant resilience. These findings highlight the potential of integrated fertilizer and microbial inoculation practices as sustainable solutions for rice cultivation in the face of climate change.

Keywords: Climate change, rice, PGPB, nitrogen levels, grain yield

Smart Irrigation Management for Farms: Integrating Evapotranspiration and Soil Moisture Data from Open-Source Satellites

Tridiv Ghosh[1], Vinay K. Sehgal[1], Ajit Govind2, Joydeep Mukherjee[1], Rajkumar Dhakar[1], Soumen Pal[3] and Manoj Khanna[1], Mahesh Gathala[4] and Debashis Chakraborty[4]*

[1]ICAR-Indian Agricultural Research Institute, New Delhi, INDIA;
[2]International Center for Agricultural Research in the Dry Areas (ICARDA), Maadi, Cairo, EGYPT;
[3]ICAR-Indian Agricultural Statistics Research Institute, New Delhi, INDIA;
[4]International Maize and Wheat Improvement Center (CIMMYT), Dhaka, BANGLADESH

*** Corresponding author, D.CHAKRABORTY@cgiar.org**

The global agriculture sector accounts for up to 70% of the world's freshwater use, which placing significant pressure on the limited water resources. Effective water conservation strategies are essential, and irrigation scheduling plays a key role in optimizing water use. Remote sensing technologies offer valuable tools for irrigation scheduling by providing real-time monitoring of crop health and soil moisture.

The study leveraged open-source multi-satellite data (Landsat 8/9 and Sentinel-2) to retrieve evapotranspiration frequently (ET) estimates and employed machine-learning (ML) algorithms – specifically Boruta-Random Forest (RF), Boruta-Cubist, Boruta-Gradient Boosting Machine (GBM), RF, Cubist, and GBM – to retrieve profile soil moisture based on remote sensing data, soil physical properties, and elevation information.

For real-time ET monitoring, the study utilized Surface Energy Balance (SEB) models that combine optical-thermal bands from Landsat 8/9 and the Optical Trapezoidal Model-based Evapotranspiration (OPTRAM-ET) estimates using optical bands from Sentinel-2. Six SEB models were evaluated, with SEBAL achieving the highest correlation coefficient (r = 0.93) and a root mean square error (RMSE) of 0.58 mm d-1. OPTRAM-ET also demonstrated reliable ET estimation (r = 0.89 and RMSE = 0.9 mm d- 1).

In terms of soil moisture estimation, ML models using Boruta for feature selection and the RF and GBM performed best, with an r of ~0.83 and RMSE of ~2.9% in capturing soil moisture profiles. Landsat data proved more accurate than Sentinel-2 for soil moisture estimation. The study found that spectral indices and dynamic variables impacted soil moisture up to a depth of 60 cm, allowing remote sensing to predict average soil moisture content effectively. The indices, MNDWI, SRPI, NPCI, VARI, SIPI, and NDVI2 showed strong correlations with soil moisture in the root zone, while soil properties played a more significant role in soil moisture prediction at depths greater than 100 cm.

By integrating ET and soil moisture estimates from satellite data into a field water balance model, the study provided more accurate predictions of irrigation water requirements (IWR), which could lead to water savings of up to 36%. The results suggest that additional water conservation could be achieved during early growth stages, where irrigation tends to be over-applied – up to 55% more water was used during phase than necessary. The approach used satellite-derived ET and soil moisture estimates with a spatial resolution of 30 m and a temporal resolution of 5 days, demonstrating the effectiveness of open- source multi-satellite synergy for improving irrigation scheduling and enhancing water conservation.

Smart Farming Using Internet of Things and Machine Learning: A Critical Evaluation

Wael A. Murtada

Spacecraft On-Board Computers and Space Software Department, Space and Strategic Studies Division, National Authority for Remote Sensing and Space Sciences (NARSS).

Smart farming is all about utilizing internet of things (IoT) and machine learning (ML) to transform agriculture for better productivity, efficiency, and sustainability. Such IoT devices monitor environmental, soil properties, and crop conditions in real time. Machine learning algorithms use such data interpretations to obtain predictive information. Thus, automating decision-making activities with resources allocated more precisely, which gives an early detection of the condition of a crop to protect against pests or diseases.The benefits derived from this will be the water, fertilizers, and pesticides that are optimally used. This will prevent the wastage of inputs besides lowering operational costs. Precision agriculture techniques have minimal environmental impact and assist in the conservation of natural resources. However, very few consider a few of the limitations of high initial costs, data security, lack of infrastructure, and over-dependence on technology. Solutions to deal with these challenges involve financial incentives, scalable technologies, investments in rural connectivity, education, and robust cybersecurity measures. It is very important to have collaboration among governments, technological providers, and farming communities. At the end, though there are challenges, benefits due to the integration of IoT and ML in agriculture remain eminent. Solving these challenges will lead to sustainable and effective practices for smart farming, hence meeting the ever-growing need of the global population.

Monitoring of Agricultural Bio-Objects Using Uavs and Artificial Intelligence Technologies

Rashid R. Kurbanov[1], Natalia I. Zakharova[1]

[1]Federal Scientific Agroengineering Center VIM, 1st Institutsky proezd 5, 109428 Moscow, Russia

One of the most promising trends in precision agriculture is the use of unmanned aerial vehicles (UAVs). The application of drones in agriculture has significant potential, and interest in their use is growing annually. The implementation of digital technologies in crop production commences with the monitoring of soil and plant conditions. To this end, aerial monitoring tools based on various types of UAVs with payloads are employed. Optical, multispectral, thermal, and hyperspectral cameras, as well as lidars, serve as suspended equipment for UAVs. The employment of UAVs in agricultural applications, coupled with machine learning algorithms, represents a promising avenue for the advancement of artificial intelligence in agriculture.

Methods of decoding digital maps and other outputs, as well as machine learning algorithms and neural networks, are employed to analyze monitoring data. Artificial intelligence technologies facilitate the processing of large volumes of data, enabling the identification of the most significant factors influencing yields and product quality. This data is then utilized to inform effective management decisions. The integration of UAVs with artificial intelligence technologies has the potential to revolutionize crop cultivation methods, aligning with the strategy of digital transformation in agriculture.

Diverse Soil Physicochemical Properties and Digital Mapping in the West Nile Delta, Egypt: Supporting Site-Specific Management Practices

Abdelrahman M.A.E.1, Metwaly M. M²

[1] Land Use Department, Division of Environmental Studies and Land Use, National Authority for Remote Sensing and Space Sciences (NARSS), Cairo 11769, Egypt.

[2] Data Reception, Analysis, and Receiving Station Affairs Division, National Authority for Remote Sensing and Space Sciences, Cairo 11769, Egypt

This study aimed to generate a digital soil map (DSM) using various freely available digital elevation models (DEMs) with different spatial resolutions (30 m ALOS, 12.5 m ALOS, 30 m SRTM, and 90 m SRTM) to assess the spatial variability of soil physio-chemical characteristics in El-Beheira Province, Western Nile Delta. A total of 196 geo-referenced soil profiles (495 soil samples) were collected from agricultural fields, and the soil's contents of total nitrogen (TN), available phosphorous (P), potassium (K), sulfur (S), calcium (Ca), magnesium (Mg), boron (B), copper (Cu), zinc (Zn), and manganese (Mn) were analyzed. The study revealed that the soil's contents of TN, P, S, B, and Cu were low, and Mg was suspected to be higher than K, leading to an Mg-induced K shortage. The study also found wide-ranging spatial variability structures of inverse distance weight (IDW) interpolated maps for several soil physio- chemical characteristics. The DSM further revealed that poor status was present in 85.4 % of TN, 91.7% of P, 76.9 % of S, and 87 % of both B and Cu. The conclusion is that soil variability, as demonstrated in DSM, outweighs uniform treatment, and this discovery will assist extension workers, scientists, and decision-makers in implementing site-specific nutrient management strategies. Validation of the DSM is recommended for crop and variety-specific nutrient treatment rates. Understanding the geographical variance in the soil is critical for long-term nutrient management and higher output. The West Nile Delta in Egypt exhibits spatial variability in soil physio-chemical properties, which necessitates the implementation of site-specific management practices. To aid in this endeavor, digital mapping techniques are employed to accurately assess and visualize the distribution of these properties across the region. By understanding the spatial variability of soil characteristics such as pH, organic matter content, and nutrient levels, farmers and land managers can tailor their management practices to suit the specific needs of different areas within the West Nile Delta. This approach promotes efficient resource allocation, enhances agricultural productivity, and minimizes environmental impacts.

Role of Wapor Tool in Precision Agriculture and Sustainable Food Production

Hesham Aboelsoud

Geospatial and water productivity expert, FAO, Egypt

Precision agriculture and sustainable food production have become pivotal in addressing the dual challenges of food security and environmental conservation. The FAO's WaPOR (Water Productivity through Open access of Remotely sensed derived data) tool is instrumental in advancing these objectives by providing high-resolution, near-real-time data on water productivity, crop water requirements, and evapotranspiration across different agroecosystems. By leveraging satellite-derived data and GIS-based analytics, WaPOR enables stakeholders—including farmers, researchers, and policymakers—to make informed decisions that optimize water use, enhance crop yield, and reduce resource wastage. By integrating these data into spatial analyses, The WaPOR (Water Productivity Open Access Regional) tool plays a significant role in precision agriculture and sustainable food production by providing essential data and insights related to water use and productivity in agricultural systems. Here are some key contributions:

Water Management: WaPOR offers detailed information on water consumption and availability at different scales, helping farmers optimize irrigation practices. This leads to more efficient water use, reducing waste and enhancing crop yield.

Irrigation Monitoring: The IRWI app uses satellite data to monitor crop growth and health. This real-time information allows farmers to make informed decisions about when to irrigate or take other management actions. Climate Adaptation: WaPOR assists farmers in understanding how climate variability affects water resources and crop productivity. By providing climate-related data, it helps in developing adaptive strategies for different weather scenarios.

Sustainability Metrics: The platform provides metrics for assessing water productivity, enabling farmers to evaluate the sustainability of their practices. This information is crucial for meeting both economic and environmental goals. Scalability: WaPOR's data is accessible and scalable, making it useful for smallholder farmers as well as large agricultural operations. This inclusivity can drive the widespread adoption of precision agriculture practices. By integrating WaPOR into agricultural practices, it can enhance productivity while conserving water resources, ultimately contributing to more sustainable food production systems.

Keywords: WaPOR, precision Agriculture, food production

Improving Deep Learning Prediction of Soil Organic Carbon Using On-Line Vis-Nir Spectra And Data Augmentation Techniques

Said Nawar

aSoil and Water Department, Faculty of Agriculture, Suez Canal University, Ismailia 41522, Egypt

*corresponding authors: said.nawar@agr.suez.edu.eg

Accurately assessing soil organic carbon (SOC) with vis-NIR spectroscopy (VNIRS) is essential for better soil management in precision agriculture. However, calibrating VNIRS models using fresh, limited soil samples poses greater challenges than laboratory-based models, requiring more advanced modeling techniques to ensure optimal results. This research aims to use the deep learning convolutional neural networks (CNN) combined with spectral data augmentation techniques, augmentation-based spectral parameters (ASP-CNN) and generative adversarial networks (GAN-CNN) compared with the benchmark method partial least square regression (PLSR) for predicting SOC. The vis-NIR spectral data of 375 fresh soil samples were collected from four farms, in Flanders, Belgium. Results showed the superiority of the GAN-CNN over the ASP-CNN, CNN, and PLSR models. The predictive performance of GAN-CNN using the validation set was excellent, with coefficient of determination (R2) and root mean square error (RMSE) values of 0.86 and 0.14%. The GAN-CNN reduced the RMSE of prediction by 39%, compared with the PLSR model. The proposed GAN-CNN deep learning method improved the predictive accuracy and offered a precise assessment of SOC. Future research could expand this model to predict a broader range of soil properties across diverse soil types and environmental conditions, promoting sustainable, data-driven soil management for precision agriculture applications.

Keywords: Soil spectroscopy, soil analysis, generative adversarial networks, convolutional neural network, spectral data augmentation.

Thermal Imaging as a Tool For Pre-Symptomatic Diagnosis of Fal Armyworm Infestation in Maize

Aboelghar M. A

National Authority for Remote sensing and Space Sciences (NARSS), 23, Josef proztito St. Elnozha Elgedida - P.O. Box 1564 Alf maskan, Cairo, Egypt, Tel: 0020226225835

Early detection of Fall Armyworm (FAW), Spodoptera frugiperda infestation in maize is crucial for minimizing crop losses. This study investigated the potentialiy of thermal imaging as a non-destructive technique for differentiating between healthy and FAW-infected maize plants. Investigated samples were collected from Ismailia governorate, Egypt, during the 2023 growing season. Results succeeded to identify crop monitoring data with the highest priorities for maize in Egypt, Maize cultivation covered approximately 3,096 feddans of the study area, with an average productivity 20 ton/ Faddan. The total Maize product in the study area is (61.92) ton.

Using a Testo IR camera, captured thermal images revealing a significant temperature difference between healthy and infected maize plants as infected maize exhibiting an average 3.3˚C increase compared to healthy ones. This suggests that FAW infection alters maize structure, potentially impacting temperature. Thermal imaging offers a promising tool for pre-symptomatic diagnosis of FAW infestation in maize, enabling early intervention and improved pest management strategies. These findings highlight the promise of thermal imaging as a non-destructive technique for early detection of FAW infestation. Early and targeted interventions can significantly reduce crop losses and minimize reliance on broad-spectrum pesticides.

Keywords: Remote sensing, Spodoptera frugiperda, Monitoring, Predictions, Productivity

Improving the Water Productivity for Vegetable Crops by Using Smart Irrigation Technology in Arid and Semi-Arid Regions

Sameh M. El-Sawy

Researcher in Agriculture and Biological Research Institute, National Research Centre, Egypt

E-mail: sameh_nrc@yahoo.com

Arid lands cover around 47% of earth's land surface, these regions experience to a combination of high temperatures and low rainfall. However, in the arid areas the water scarcity is the most serious, as well as climate change impacts are reflected upon different sides of life there, especially the quantity and the time of the rains. On the other hand, the global human population is growing fast, and it has been estimated that the world population would reach about 10.5 billion by 2050, so that there is a higher need for food. In fact, Egypt is located in the arid and semi-arid regions, which experience to the limited water resources and increasing the population. As indication of scarcity in absolute terms, often the threshold value of 1000 m3/capita/year, is used, Egypt has passed that threshold already now. In addition, Agriculture consumes the largest amount of the available water in both countries, its share exceeding 80% of the total demand for water.

Producing vegetable crops in arid and semi-arid regions demands integrated irrigation water management to increase the water use efficiency, which achieved by using the modern irrigation systems. One of the best ways for improving the water use efficiency in arid areas is using new technology for saving irrigation water through smart irrigation devices and using wireless sensor networks, which considered a breakthrough for producing vegetable crops in arid regions, using the green energy (solar and wind energy) for supplying these devices by the power. The complementary water-saving irrigation system has a soil temperature and moisture sensors to control of the irrigation amount, which connected by wireless using the smart irrigation apps in the mobile to control and adjust the irrigation time. The wind-solar complementary water-saving irrigation system can be used in Arab countries to overcome the water scarcity and increase the productivity of vegetable crops in arid and semi-arid regions.

Integrated Fertilizer Management and Trichoderma Bioagents: A Sustainable Approach to Mitigating Climate Change Impacts on Rice Disease

Rabab Elamawi

Rice pathology department, plant pathology Research Institute, Sakha Egypt

Email: rabab.elamawi@yahoo.com

Rice blast disease, impaired by climate change, poses a significant threat to global rice production. This study investigates the combined effects of optimized fertilizer management and the application of the bioagent Trichoderma spp. in mitigating rice blast under stress-inducing environmental conditions. Field trials were conducted to assess how nutrient balance and Trichoderma inoculation can enhance plant resilience to blast infection. Results demonstrated that strategic fertilizer application, coupled with Trichoderma, significantly reduced disease incidence and severity by promoting plant health, and enhancing resistance mechanisms. Trichoderma was particularly effective in inducing plant defenses, reducing reliance on chemical inputs, and supporting

sustainable disease management practices. These findings suggest that integrating balanced fertilization with Trichoderma bioagent application offers a promising, eco-friendly approach to mitigating climate-induced rice blast disease challenges.

Keywords: Rice blast disease, bioagent Trichoderma spp., disease incidence and severity

Spectral Reflectance Indices' Performance to Identify Seawater Salinity Tolerance in Bread Wheat Genotypes Using Genotype by Yield*Trait Biplot Approach

Ahmed M. S. Elfanah [1,2], Mohamed A. Darwish [1], Adel I. Selim [3], Mahmoud M. A. Shabana [4], Omnya M. A. Elmoselhy [1], Rania A. Khedr [5], Abdelraouf M. Ali [3,6] and Magdi T. Abdelhamid [7,8,*1]

Wheat Research Department, Field Crops Research Institute, Agricultural Research Center, Giza 12619, Egypt

Food Crops Research Institute, Yunnan Academy of Agricultural Sciences, Kunming 650205, China

National Authority for Remote Sensing and Space Sciences (NARSS), Elnozha El-Gedidah, Cairo 11843, Egypt

Soils, Water and Environment Research Institute, Agricultural Research Center, Giza 12112, Egypt

Crops Physiology Research Department, Field Crops Research Institute, Agricultural Research Center, Giza 12619, Egypt

Department of Environmental Management, Institute of Environmental Engineering, People's Friendship University of Russia (RUDN University), 6 Mikluko–Maklaya St., 117198 Moscow, Russia

Botany Department, National Research Centre, 33 El Behouth Steet, Dokki, Cairo 12622, Egypt

Department of Soil and Crop Sciences, Texas A&M University, 370 Olsen Blvd., College Station, TX 77843-2474, USA

Salinity stress harms crop yield and productivity worldwide. This study aimed to iden- tify genotypes with higher grain yield and/or salinity tolerance from forty bread wheat genotypes evaluated under seawater diluted at 4.0, 8.0, or 12.0 dS/m or control (0.4 dS/m) in the 2019/20 and 2020/21 seasons. Six elite genotypes, namely 6, 16, 31, 33, 34, and 36, were chosen and tested in a lysimeter under diluted seawater stress in 2020/21. The results showed significant differences ($p \leq 0.01$) among the genotypes for the traits grain yield (GY), harvest index (HI), chlorophyll content index (CCI), chlorophyll fluorescence parameter Fv/Fm, and their interaction with salinity treatments. Additionally, significant differences ($p \leq 0.01$) were detected among ten genotypes for all agronomic traits along with spectral reflectance indices (SRI), e.g., curvature index (CI), normalized difference vegetation index (NDVI), triangular vegetation index (TVI), modified chlorophyll absorption reflectance index (MCARI), and their interaction with salinity treatments. Genotype by traits (GT) and genotype by yield*trait (GYT) biplots are useful for genotypes screening and selection based on grain yield and other associated traits (agronomic, physiological traits, and spectral reflectance indices combinations) as well as genotypes by stress tolerance indices (GSTI). In conclusion, this study identified that genotypes 6, 16, 31, 33, 34, and 36 in the 2019/20 season and genotypes 2 and 1 performed better than Kharchia 65 and Sakha 8 in the 2020/21 season, which detected as superior genotypes and might be recommended for sowing and/or inclusion in the breeding program in salt-affected soils. It was possible to draw the conclusion that spectral reflectance indices were efficient at identifying genotypic variance.

Using Integrated Multivariateand Gis Techniques to Evaluate Crop Suitability and Soil Capability to Promote Agricultural Sustainability

Mohamed S Shokr

Soil and Water Department, Faculty of Agriculture, Tanta University, Tanta 31527, Egypt

The effective use of land in agriculture depends on its evaluation. Due to their limited agricultural resources and rapid population development, developing nations like Egypt face numerous issues pertaining to food security. In order to identify the best land use based on physiographic units, the study employed multivariate analysis (PCA and cluster analysis) to evaluate soil capability in drylands and the Almagra model of MicroLEIS to assess land suitability for cultivated crops in the investigated area under the current (CS) and optimal scenario (OS) of soil management. Fifteen distinct soil profiles were chosen in order to represent the physiographic units of the area under investigation. According to the findings, the relatively high capability (C2), moderate the capability (C3), and low capability (C4) clusters made up 37.88%, 28.27%, and 2.02% of the entire study area, respectively, while the high capability cluster (C1) occupied 31.83%. High $CaCO_3$ concentrations, shallow soil depth, high salinity, and high exchangeable sodium percentage (ESP) were the research area's limiting variables. Applying OS improved the moderate suitability (S3) and unsuitable classes (S5) to suitable (S2) and marginally suitable (S4) classes, respectively, while the high suitability class (S1) had more land area, which had a significant impact on the suitability of the maize crop. Using multivariate analysis to map and model soil suitability and capability may help decision-makers improve agricultural management practices and show how important it is to manage under intensive land use in drylands in order to achieve agricultural sustainability.

Application of Iot and Artificial Intelligencein Aquaculture

Mostafa Khaled

Researcher at Marine Science Department, Agricultural Applications, Soil and Marine Science Division, National Authority for Remote Sensing & Space Sciences, Cairo, Egypt

Aquaculture is a rapidly growing industry, essential for meeting the global demand for seafood. Traditional aquaculture methods, while effective, face challenges such as environmental impact, resource limitations, and labor-intensive processes. The advent of smart aquaculture, integrating technologies like the Internet of Things (IoT), big data, artificial intelligence (AI), and robotics, offers a transformative solution. Smart aquaculture systems enable precise control over production processes, enhance biosecurity, and improve resource efficiency. By leveraging these advanced technologies, smart aquaculture not only boosts productivity but also promotes sustainability and resilience against environmental and economic pressures. To date, there are several studies about applications of machine learning for smart aquaculture including measuring size, weight, grading, disease detection, and species classification. This abstract explores the global landscape of smart aquaculture, highlighting its benefits, challenges, and prospects in ensuring a sustainable and efficient food production system.

Keywords: Aquaculture; IoT; AI; Robotics; Seafood; Sustainable Management; Security; Control

Multi Sensors Unmanned Aerial Vichels (Uavs) in Crop Management and Precision Agriculture

Abdelraouf M. Ali

Agricultural Applications, Soil and Marine Science Division, National Authority for Remote Sensing & Space Sciences, Cairo, Egypt

raouf.shoker@narss.sci.eg

Integrating Unmanned Aerial Vehicles (UAVs) into precision agriculture has emerged as a transformative approach to enhancing crop management practices. This work focuses on the applications of UAV technology for precision agriculture such as determining the growth of soybean crops, detecting weeds, and measuring plant hightails with advanced imaging technologies, such as multispectral and RGB cameras, allow for the monitoring of high-resolution crop health and growth patterns. By analyzing vegetation indices, such as the Normalized Difference Vegetation Index (NDVI), farmers can assess the growth stage of soybeans, enabling timely interventions to optimize yields. Additionally, UAVs facilitate early detection of weed infestations, which is crucial for effective pest management and minimizing competition for resources. These also addresses methodologies for measuring plant height using UAV data, highlighting its importance for assessing crop development and yield potential. Results indicate that UAV-based measurements of soybean growth and height not only improve accuracy but also provide insights into field variability, ultimately contributing to more informed decision-making in crop management. Through these applications, UAVs prove to be invaluable tools for enhancing agricultural efficiency and sustainability, underscoring the need for ongoing research and adoption of this technology in the agricultural sector. This presentation aims to equip researchers, agronomists, and practitioners with practical insights and findings that can advance the use of UAVs in precision agriculture.

Keywords: Precision Agriculture, UAV, Growth Monitoring, Weed Detection, Plant Height

Notes

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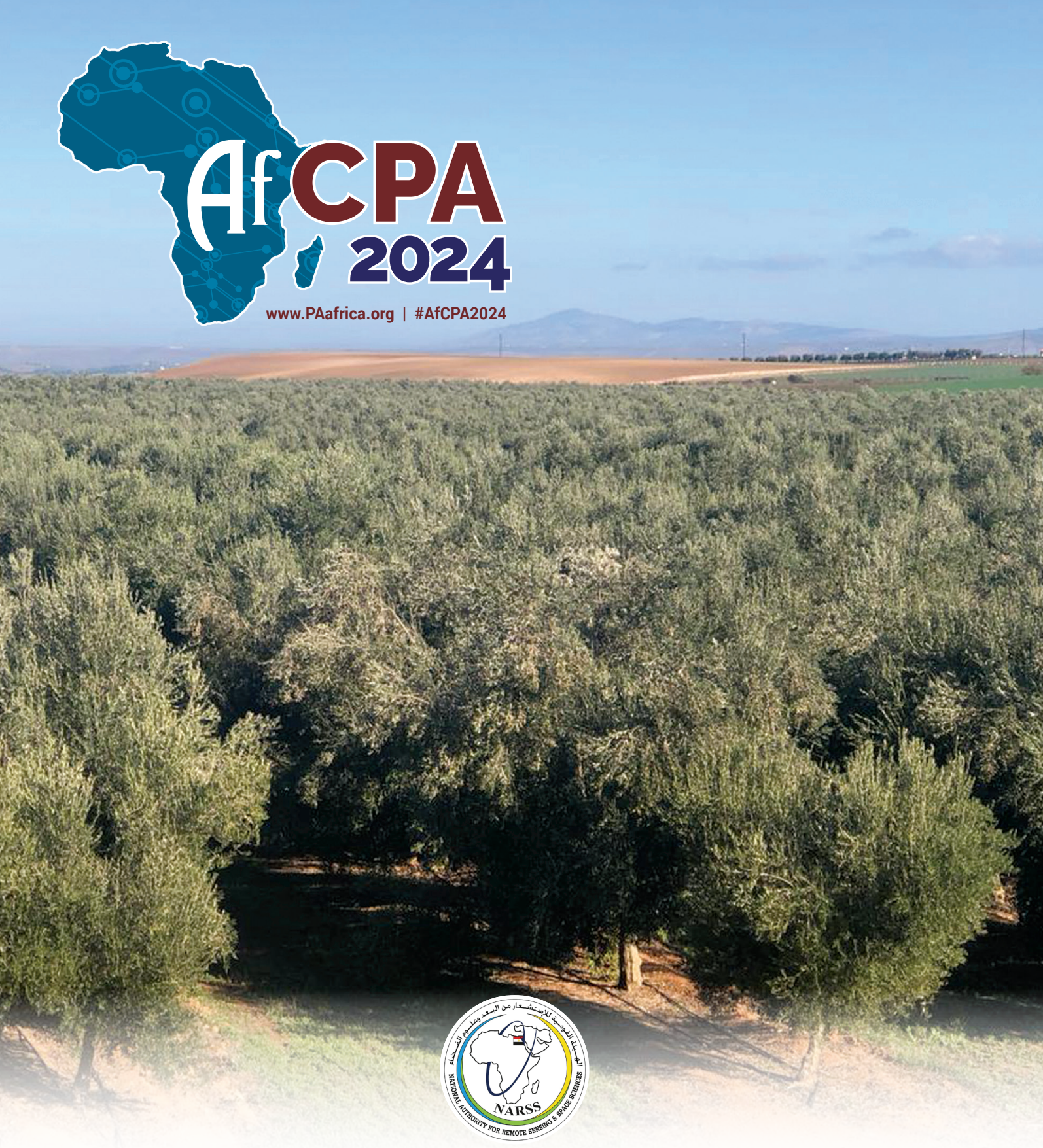

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