



100

15th INTERNATIONAL CONGRESS ON AGRICULTURAL MECHANIZATION AND ENERGY IN AGRICULTURE

October 29-November 1, 2023 - Antalya, Türkiye

Abstract Book





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AND ENERGY IN AGRICULTURE**
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Preface

It is a great pleasure and honor for us to your participation in the 15th International Congress on Agricultural Mechanization and Energy in Agriculture – AnkAgEng'2023" organized between October 29 – November 1, 2023, in Antalya, Türkiye by Ankara University Faculty of Agriculture Department of Agricultural Machinery and Technologies Engineering. We are also honored to hold the 15th of our congress, the first of which was organized by Ankara University in 1980. Since the first International Congress on Agricultural Mechanization and Energy in Agriculture, we have continued our congress on a regular basis every three years. AnkAgEng'2023 Congress was of great importance for us and the Turkish nation as 2023 is the "100th Anniversary of the Republic of Türkiye" and was held like a feast for the scientific world.

AnkAgEng'2023 offered a magnificent international platform for academics, researchers, engineers, industry participants, and students from all over the world to share their research results in the field of agricultural technology engineering. The main subjects of the Congress are; Machinery and Energy Systems, Agriculture Information Technologies, Digital-Smart Agriculture, Ergonomics, Health & Safety, System Engineering, Postharvest Technologies & Process Engineering, Sustainable Agriculture, Natural Resources & Environmental Systems, Plant, Animal & Facility Systems, Agricultural Engineering Education, and Biosystems Engineering. The congress featured keynote speakers, oral and poster presentations, special sessions, and real-time discussions.

A total of 200 researchers from 30 different countries applied to participate in the congress by submitting abstracts. Participants were from the USA, Canada, Italy, England, Ireland, Spain, Portugal, Denmark, Belgium, Greece, China, Japan, Nigeria, Czechia, Pakistan, India, Iran, Russia, Sweden, Brazil, Bulgaria, Oman, Algeria, Poland, Finland, Malaysia, Romania, Sudan, Tanzania, and Türkiye. At the AnkAgEng'23 congress, 5 invited speakers and 8 online keynote speakers made oral presentations. In addition, 57 oral and 12 poster presentations were presented by researchers.

We would especially like to thank our invited/keynote speakers, session chairs, members of the Scientific Committee, authors, and colleagues for making their valuable contributions. We are thankful to Ankara University, Springer Nature, our main sponsor Türk Traktör, gold sponsor Ziraat Bank, European Society for Agricultural Engineers, American Society of Agricultural and Biological Engineers and International Commission of Agricultural and Biosystems Engineering for their kind support that enabled us to hold this congress.

Sincerely yours

On behalf of the Congress Organizing Committee

Prof. Dr. Ahmet ÇOLAK

Congress Chair





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AGRICULTURAL MECHANIZATION
AND ENERGY IN AGRICULTURE**
October 29-November 1, 2023 - Antalya, Türkiye



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Scientific Program

Oct. 29, 2023, Sunday

14.00	Check-in to the Congress Hotel, Sherwood Exclusive Lara Hotel
15.00	Registration
20.00-23.30	100 th Anniversary of the Republic of Türkiye Ball (Gala Dinner)

Oct. 30, 2023, Monday

08.30 -09.15	Opening Ceremony
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Invited Speaker Presentations (1-3) – Hall A

Chair: Jitendra Paliwal – University of Manitoba

09.30-10.00	ISP-1: Hyperspectral Imaging Technology: A Novel Nondestructive Tool for Detecting and Evaluating Agricultural and Food Products Da-Wen Sun – University College Dublin
10.00-10.30	ISP-2: Building a Sustainable Energy Future Yunus Çengel – University of Nevada
10.30-11.00	ISP-3: An Exergy-Based Design of An Agricultural and Horticultural Slow-City Compound with Solar, Wind, and Geothermal Energy with Circular Hydrogen Birol Kılış – Fellow ASHRAE, Ostim Technical University
11.00-11.30	Presentation of Türk Traktör, Main Sponsor
11.30-11.45	Coffee Break

SESSION I – Hall A | Oral Presentations (1-4)

Chair: David Herák – Czech University of Life Sciences

11.45-12.00	OP-1: Autonomous Ground Vehicle for Weeding Activities: Preliminary Sustainability Assessments Giuseppe Todde
12.00-12.15	OP-2: Evaluation of Hydration State around Glycerol as a Humectant using Microwave Dielectric Spectroscopy Nao Takeuchi
12.15-12.30	OP-3: Discharge Coefficients for Adjustable Slot Inlets Used to Ventilate Animal Production Buildings John P. Chastain
12.30-12.45	OP-4: Combining Digital Image Processing and Machine Learning is Useful for the Early Detection of Salinity and Drought Stresses in Cucumber Parvin Mohammadi
12.45-13.30	Lunch Break



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Oct. 30, 2023, Monday

SESSION II – Hall A | Oral Presentations (5-8)

Chair: Poulek Vladislav – Czech University of Life Sciences

13.30-13.45	OP-5: Enabling Insecticide Spot Application on Boom Sprayer by Developing Machine Vision and Communication Components Ahmad Al-Mallahi
13.45-14.00	OP-6: Optical Techniques for Automated Evaluation of Seed Damage Mohammad Nadimi
14.00-14.15	OP-7: Estimation of Vitamin A Concentration in Cattle Blood Based on Fluorescence with/without Blood Cell Separation by Plasma Filter Mizuki Shibasaki
14.15-14.30	OP-8: A Network Compaction Strategy to Reduce the Cost of Detection Networks Deployed in Edge-AI Devices: A Case Study for Grading Canola Chyngyz Erkinbaev
14.30-14.45	Coffee Break

SESSION II – Hall B | Oral Presentations (9-12)

Chair: Keyvan Asefpour Vakilian – Gorgan University of Agricultural Sciences and Natural Resources

13.30-13.45	OP-9: Exploring Transfer Learning for Enhanced Seed Classification: Pre-trained Xception Model Zeynep Ünal
13.45-14.00	OP-10: Classification of Pistachio Nut using Convolutional Neural Network Khaled Idress
14.00-14.15	OP-11: Deep Learning as a New Technique to Detect Plant Leaf Diseases Ako Kakarash Omer
14.15-14.30	OP-12: Definition of Reference Models for Functional Parameters and Price for Mowers and Mowers-Conditioners Daniele Pinna
14.30-14.45	Coffee Break

SESSION III – Hall A | Oral Presentations (13-16)

Chair: Birol Kılıç – Fellow ASHRAE, Ostim Technical University

14.45-15.00	OP-13: Impact of Building Geometry, Window Types, and Materials on Daylighting Performance of Livestock Buildings Sheikh Rishad Ahmmad
15.00-15.15	OP-14: Development of Design of Solar PV Panels within Last 25 Years – Possibilities for Renovation Martin Libra



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Oct. 30, 2023, Monday

15.15-15.30	OP-15: Estimating Tall Fescue and Alfalfa Forage Biomass Using an Unmanned Ground Vehicle Ali Bülent Koç
15.30-15.45	OP-16: Tracking Hydraulic Performance of Photovoltaic Pumping System using Solar Radiation Data: An Empirical Model Assia Harkani
15.45-16.00	Coffee Break
SESSION III – Hall B Oral Presentations (17-20)	
Chair: Daniele Pinna – University of Padova	
14.45-15.00	OP-17: Evaluation of Air Conditioning Parameters in Semi-closed Greenhouses According to Turkey's Climate Mohammed Hassan
15.00-15.15	OP-18: Effect of Different OLR and Mixture Ratios on Biogas Production using Goat Dung and Maize Silage Aslı Ayhan Arslan
15.15-15.30	OP-19: Mapping Biomass Energy Potential from Agricultural Residues in Tanzania Geoffrey Prudence Baitu
15.30-15.45	OP-20: The Effect of Different Tillage Methods on Plant Emergence Parameters for Wheat Serkan Özdemir
15.45-16.00	Coffee Break
ONLINE SESSION I – Hall A Online Keynote Presentations (1-4)	
Chairs: John P. Chastain – Clemson University	
16.00-16.30	OKP-1: Robotics for Crop-Load Management in Tree Fruit Crops Manoj Karkee – Washington State University
16.30-17.00	OKP-2: Precision Agricultural Technology Transition in Fruit/Berry Crops Production Management Lav Khot – Washington State University
17.00-17.30	OKP-3: A Greenhouse Plants Heating System Based on Low Temperature Long Wave Radiation Emission George Papadakis – Agricultural University of Athens
17.30-18.00	OKP-4: Development of Thermoset Epoxy Resin Film from Soybean Oil Kasiviswanathan Muthukumarappan – South Dakota State University



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Oct. 31, 2023, Tuesday

Invited Speaker Presentations (4-5) – Hall A

Chair: Martin Libra – Czech University of Life Sciences

08.45-09.15	ISP-4: Robotics and Perception in Agriculture, Challenges to a Fully Automated Process Fernando Auat Cheein – Heriot-Watt University
09.15-09.45	ISP-5: Smart Agriculture and its Connection to the Digital Twin's Ideas David Herák – Czech University of Life Sciences
09.45-10.00	Coffee Break

ONLINE SESSION II – Hall A | Online Keynote Presentations (5-8)

Chairs: Hong Liu – Oregon State University, Serap Görücü – University of Florida

10.00-10.30	OKP-5: Flying Lora-Drone Gateway for IoT Monitoring in Oil Palm Plantation Samsuzana Abd Aziz – Universiti Putra
10.30-11.00	OKP-6: Key Technologies for Fully Intelligent Production of Kiwifruit Longsheng Fu – Northwest A&F University
11.00-11.30	OKP-7: Detecting the Basal Stem Rot (BSR) Disease using Vegetation Index, Thermal Imaging, and Machine Learning Siti Khairunniza Bejo – Universiti Putra
11.30-12.00	OKP-8: Exploring the Impact of Dust on Photovoltaic Performance: An Overview of Historical Trends, Current Findings, and Future Prospects Hussein A Kazem – Sohar University
12.00-13.30	Lunch Break

SESSION IV – Hall B | Oral Presentations (21-27)

Chair: Yeşim Benal Öztekin – Ondokuz Mayıs University

10.00-10.15	OP-21: Design and Implementation of a Real-Time Wireless PTO Torque Measurement System for Agricultural Applications T.Göktürk Seyhan
10.15-10.30	OP-22: Recent Developments in Agricultural Machinery and Technologies M. Metin Özgüven
10.30-10.45	OP-23: Developing Test Method for Automatic Steering Systems M. Barış Eminoğlu
10.45-11.00	OP-24: Estimation of Some Soil Loss Characteristics using Machine Learning Algorithms Sema Kaplan
11.00-11.15	OP-25: Effect of Different Drying Temperatures on CO2 Emissions in Acorn Drying Mahmut Kaplan



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11.15-11.30	OP-26: Microwave Assisted Convective Drying Effect on Drying Time, Energy, Quality and Bioactive Compounds of the Cantaloupe Mohammad Kaveh
11.30-11.45	OP-27: Prediction of the Kinetics of Drying Rheum ribes L. by an Infrared-Convective Dryer using Artificial Neural Network and ANFIS Mohammad Kaveh
12.00-13.30	Lunch Break

SESSION V – Hall A | Oral Presentations (28-32)

Chair: Aaron Turner – Clemson University

13.30-13.45	OP-28: Farm Vehicle and Farm Labor Transportation Crashes in Florida: 2013-2021 Serap Görücü
13.45-14.00	OP-29: Implementation and Assessment of an Autonomous Ground Vehicle (AGV) for On-Field Agricultural Operations Gabriele Sara
14.00-14.15	OP-30: Criteria of Ecological Pressure on Agricultural Systems Valentin B. Sapunov
14.15-14.30	OP-31: Rural Development Policy for Water Management Sustainability in Italy: Opportunities to Achieve Water Framework Directive Objectives Myriam Ruberto
14.30-14.45	OP-32: Hazard Identification and Risk Assessment for Cattle Stunning: Case Study Serap Görücü
14.45-15.00	Coffee Break

SESSION V – Hall B | Oral Presentations (33-37)

Chair: Chyngyz Erkinbaev – University of Manitoba

13.30-13.45	OP-33: Developing a Data-Driven Model for Predicting Water Stress in Pistachio Trees Azar Alizadeh
13.45-14.00	OP-34: Water Distribution Uniformity of Nozzles for a Hose Reel Irrigation Machine Selçuk Arslan
14.00-14.15	OP-35: Economic Analysis of Subsurface Drainage Systems in North Central Iowa Kapil Arora
14.15-14.30	OP-36: Determination of Suitable Shearing Conditions for Effective Pruning of Tree Branches Saeid Minaei
14.30-14.45	OP-37: Development of Variable Rate Irrigation System for Linear Moving Irrigation Machine Bahattin Akdemir
14.45-15.00	Coffee Break



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SESSION VI – Hall A | Oral Presentations (38-42)

Chair: Saeid Minaei – Tarbiat Modares University

15.00-15.15	OP-38: Using Composted Cow Manure to Improve Nutrient Content, Aeration Porosity, and Water Retention of Pine Bark-Based Potting Media Tom O. Owino
15.15-15.30	OP-39: Coefficient of Dynamic Wall Friction for Wood Fuel Pellets Aaron P. Turner
15.30-15.45	OP-40: Emerging Smart Biosensors for the Specific and Ultrasensitive Detection of Plant Abiotic Stresses Keyvan Asefpour Vakilian
15.45-16.00	OP-41: Sexing of Chicken Egg in the Early Incubation Based on the Analysis of Transmission Image Maho Chihara
16.00-16.15	OP-42: EASY4DIGIT – European Agriculture System for Digital-Based Technologies Yeşim Benal Öztekin
16.15-16.30	Coffee Break

SESSION VI – Hall B | Oral Presentations (43-47)

Chair: Kapil Arora – Iowa State University

15.00-15.15	OP-43: Determination of the Effect of Technical Parameters which Affect on the Tractor Energy Efficiency İbrahim Ergül
15.15-15.30	OP-44: Determination of PTO Performance Test Method for Electric Tractors S. Oğuz Yıldız
15.30-15.45	OP-45: Development of Fertigation System for Hose Reel Irrigation Machine Turgay Polat
15.45-16.00	OP-46: Determining the Possibility of Use of the DSSAT Model to Estimate Maize Yield and Water Consumption under Different Irrigation Levels Sener Özçelik
16.00-16.15	OP-47: Enhancing System Understanding, Gathering and Structuring Knowledge to Manage Uncertainty in WEF Systems in Gediz Basin Sinan Aras
16.15-16.30	Coffee Break



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SESSION VII – Hall A | Oral Presentations (48-52)

Chair: Giuseppe Todde – University of Sassari

16.30-16.45	OP-48: Determination of Operating Parameters in Milking Robots with Milk First Cow Traffic Hasan Kuraloğlu
16.45-17.00	OP-49: Shear Tests of Grapevine (<i>Vitis vinifera</i> L.) Canes Abdullah Sessiz
17.00-17.15	OP-50: Comparison and Evaluation of Vegetation Indices for Image Sensing Systems in Precision Agriculture Ömer Barış Özlüoymak
17.15-17.30	OP-51: Development of An Autonomous Mobile Robot Prototype for Agricultural Tasks in Greenhouses Erdem Yıldız
17.30-17.45	OP-52: Investigation of the Compliance of the Milking Routine and Pulsator's Working Characteristics to the Milking Technique in Some Dairy Cattle Farms in Isparta Province Mwiinga Micheal Milimo

SESSION VII – Hall B | Oral Presentations (53-56)

Chair: Selçuk Arslan – Uludağ University

16.30-16.45	OP-53: Design Approaches of One-Pass Strip-Till Machines Serkan Özdemir
16.45-17.00	OP-54: Examination of the Farm Machinery Tests Based on the Testing Institutes and Machinery Producers in Türkiye Zeynep Demirel Atasoy
17.00-17.15	OP-55: Fine-Tuning Growth Conditions: Leaf-Level Vapor Pressure Deficit Control for Optimized Photosynthesis T. Göktürk Seyhan
17.15-17.30	OP-56: The Relationship between CO ₂ Emissions and Soil Moisture Content Under Different Tillage Methods in Cotton Farming Şener Özçelik
17.30-17.45	OP-57: Chopper System for In-Line Small Square Balers Sedat Kahraman

POSTER SESSION – 17.45-18.30

18.30	Closing Ceremony
19.00-20.30	Closing Cocktail



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Nov. 01, 2023, Wednesday

08.30-14.00 Half day tour in Antalya

POSTER SESSION – 17.45-18.30

PP-1: A method for Multispectral Images Alignment at Different Heights on the Crop

Sabina Laveglia, Giuseppe Altieri

PP-2: Novel SERS Framework for Sulphur Quality Analysis of Pulse Protein

Catherine RJ Findlay, Mohammad Nadimi, Alex C-T Ko, Pankaj Bhowmik, Jitendra Paliwal

PP-3: Convective Drying of Black Chokeberries (*A. Melanocarpa*) by Different Pretreatments

İsmail Boyar, Hasmet Emre Akman, Nesibe Ebru Yasa Kafkas, Betül Yesil, Sadiye Gözlekçi Kuzu, Can Ertekin

PP-4: Studying the Effect of Surface and Geometry Manipulation on Dew Condensation and Rain Collection in Boreal Field Conditions

Soroush Moradi Zavie Kord, Juuso Tuure, Matti Räsanen, Laura Alakukku, Szabol Galambosi

PP-5: Analysis of Factors affecting Farmers' Intention to Use Autonomous Ground Vehicles

Jonny Waked, Gabriele Sara, Giuseppe Todde, Daniele Pinna, Georges Hassoun, Maria Caria

PP-6: Uncertain Future Menemen Plain Integrated Management of Agriculture and Nature Based Solutions for Sustainable Soil Management

Vural Karagül, Alican Eren, Tuncay Topdemir, Zübeyde Albayram Doğan, Sinan Aras, Nuri Candan, Murat Çağatay Keçeci, Gülay Yılmaz, Gözen Yüceerim, Şener Özçelik

PP-7: Investigation of the Performance of a Pneumatic Hazelnut Harvester with Husker Unit Used in Türkiye

Taner Yıldız

PP-8: Transmission Raman Spectroscopy for Inner Layers Chemical Analysis of Fresh Produce

Rani Arielly

PP-9: Hyperbaric Inactivation – a New Pressure-Based Method to Inactivate *Bacillus subtilis* Endospores at Room Temperature?

Jorge A. Saraiva, Carlos A. Pinto

PP-10: Hyperbaric Storage as a New Food Preservation Methodology to Control the Germination and Development of *Clostridium perfringens* Spores

Carlos A. Pinto, Jorge A. Saraiva, Alireza Mousakhani

PP-11: Applying Nature-Inspired Optimization and Machine Learning for Strawberry Leaf Scorch Detection and Classification

Mohammad Javidan, Ahmad Banakar, Keyvan Asefpor, Ioannis Ampatzidis, Kamran Rahnema

PP-12: The influence of combustion temperature on the emission of pollutants in a low-power wood biomass boiler

Maciej Joński, Adam Ekielski, WULS, Adam Świętochowski, Jan Joński



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Invited Keynote Presentations

ISP-01. Hyperspectral Imaging Technology: A Novel Nondestructive Tool for Detecting and Evaluating Agricultural and Food Products

Da-Wen Sun 2

ISP-02. Building a Sustainable Future in Energy

Yunus A. Çengel 3

ISP-03. Exergy-Based Slow-City/Agriculture Mechanization With Circular Hydrogen And Renewable Energy Systems

Birol Kılış..... 4

ISP-04. Robotics and Perception in Agriculture, Challenges to a Fully Automated Process

Fernando Auat Cheein 5

ISP-05. Smart Agriculture and its Connection to the Digital Twin's Ideas

David Herák 6

Online Keynote Presentations

OKP-01. Robotics for Crop-load Management in Tree Fruit Crops

Manoj Karkee 9

OKP-02. Precision Agricultural Technology Transition in Fruit/Berry Crops Production Management

Lav Khot 10

OKP-03. A Greenhouse Plants' Heating System Based on Low Temperature Long Wave Radiation Emission

George Papadakis 11

OKP-04. Development of Thermoset Epoxy Resin Film from Soybean Oil

Kasiviswanathan Muthukumarappan 12

OKP-05. Flying Lora-Drone Gateway for IoT Monitoring in Oil Palm Plantation

Samsuzana Abd Aziz, Nurul Adilah Abdul Latiff, Idrus Salimi Ismail, Fakhru Zaman Rokhani 13

OKP-06. Robotic Operations of Kiwifruit Production in Orchard

Longsheng Fu, Rui Li 14

OKP-07. Detecting the Basal Stem Rot (BSR) disease using vegetation index, thermal imaging, and machine learning

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OP-02. Evaluation of Hydration State Around Glycerol as a Humectant Using Microwave Dielectric Spectroscopy

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OP-03. Discharge Coefficients for Adjustable Slot Inlets Used to Ventilate Animal Production Buildings

John P. Chastain 20

OP-04. Combining Digital Image Processing and Machine Learning is Useful for the Early Detection of Salinity and Drought Stresses in Cucumber

Parvin Mohammadi, Keyvan Asefpour Vakilian² 21



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OP-26. Microwave Assisted Convective Drying Effect on Drying Time, Energy, Quality and Bioactive Compounds of the Cantaloupe

Mohammad Kaveh¹, Necati Çetin², Yousef Abbaspour- Gilandeh³, Kamil Sacilik², Safoura Zadhosein³

¹ Institution, Address¹Department of Petroleum Engineering, College of Engineering, Knowledge University, Erbil 44001, Iraq

²Faculty of Agriculture, Department of Agricultural Machinery and Technologies Engineering, Ankara University, Ankara, Türkiye

³ Department of Biosystems Engineering, College of Agriculture and Natural Resources,
University of Mohaghegh Ardabili, Ardabil, Iran

Corresponding author: sirwankaweh@gmail.com

Drying is a common technology that provides a long post-harvest storage period for products such as cantaloupe. This work aimed to investigate the drying behavior of cantaloupe during combined convective-microwave drying system. Three drying air temperatures (40, 55 and 70 °C), microwave powers (180, 360 and 540 W) and air velocities (0.5, 1 and 1.5 m/s) were investigated on drying time, specific energy consumption, shrinkage, rehydration ratio, changes in total color, phenol and antioxidant content of cantaloupe during drying. Nine mathematical models were selected to fit the experimental data for drying kinetics, and the results revealed that the Midilli model exhibited, in all cases, the best performance in fitting the experimental data (R^2 varying from 0.99959 to 0.99997; χ^2 from 0.00002 to 0.00203 and RMSE from 0.01857 to 0.54241). Calculated values of moisture diffusivity for dried cantaloupe varied from a minimum of 2.42×10^{-11} to a maximum of 9.79×10^{-9} m²/s under the tested drying conditions. Drying time and specific energy consumption values decreased as air temperature, microwave power and air velocity was increased. Shrinkage, rehydration ratio, changes in total color values were calculated and found to vary in the range from 27.85 to 50.07%, 3.44 to 5.57 and 27.11 to 35.74, respectively. The range of antioxidant activity and total phenolic content of the dried cantaloupe was 42.57–79.11% and 18.15–34.36 mg GA/100g dw, respectively.

Keywords: Drying, cantaloupe, energy, antioxidant activity, phenolic content