



# Journal of Research and Applications in Agricultural Engineering

ISSN 1642-686X  
e-ISSN 2719-423X

VOL. 68 (1) 2023

## ABOUT THE JOURNAL

“Journal of Research and Applications in Agricultural Engineering” is a biannual, which contains reviewed research papers and articles on agricultural, horticultural and forest engineering, as well as: ecology, energy, fuels, agriculture and industry 4.0, automatics, robotics, food processing technology, transport. All issues are available at the journal’s website: tech-rol.eu. The periodical is financially supported by the Polish Ministry of Education and Science.

## EDITORIAL BOARD

### Editor-in-chief

Florian Adamczyk (Łukasiewicz Research Network – Poznań Institute of Technology, Poznań, Poland),

### Deputy Editor-in-chief

Agnieszka Klembalska (Institute of Plant Protection – National Research Institute, Poznań, Poland)

### Editorial Secretary

Agnieszka Lewandowicz (Łukasiewicz Research Network – Poznań Institute of Technology, Poznań, Poland)

### Editorial Board Members

Jorge Barriga (Łukasiewicz Research Network – Poznań Institute of Technology, Poznań, Poland), Wesley Clint Hoffmann (United States Department of Agriculture Agricultural Research Service, College Station, Texas, USA), Semyons Ivanovs (Agency of Latvia University of Agricultural, Latvia)

## SCIENTIFIC COUNCIL MEMBERS

Cengiz Akdeniz (Ege University, Faculty of Agriculture, Izmir, Turkey), Krzysztof Bińczak (Poznan University of Technology, Poznań, Poland), Tomasz Dobek (West Pomeranian University of Technology in Szczecin, Szczecin, Poland), Julia Gościańska-Łowińska (Łukasiewicz Research Network – Poznań Institute of Technology, Poznań, Poland), Jürgen Hahn (Department of Biomedical Engineering at Rensselaer Polytechnic Institute, Troy, New York, USA), Semjons Ivanovs (Agency of Latvia University of Agricultural, Latvia), Raida Jirjis (Swedish University of Agricultural Sciences, Uppsala, Sweden), Tadeusz Juliszewski (University of Agriculture in Cracow, Krakow, Poland), Waldemar Karwowski (Department of Industrial & Management Systems, University of Central Florida, USA), Włodzimierz Kęska (Poznan University of Technology, Poznań, Poland), Miho Mihov (Nikola Pushkarov Institute of Soil Science, Agrotechnology and Plant Protection, Sofia, Bulgaria), Sławomir Obidziński (Białystok University of Technology, Białystok, Poland), Luigi Pari (Council for Agricultural Research and Agricultural Economy Analysis, Rome, Italy), Ralf Pecenka (Leibniz Institute for Agricultural Engineering and Bioeconomy – ATB, Potsdam, Germany), Rok Rupnik (Faculty of Computer and Information Science, University of Ljubljana, Ljubljana, Slovenia), Fernando Sebastián (CIRCE – Research Centre for Energy Resources and Consumption, BERA Group – Natural Resources Area, Zaragoza, Spain), Mikio Umeda (Kyoto University, Kyoto, Japan), Józef Walczyk (University of Agriculture in Krakow, Krakow, Poland), Wiesław Zwierzycki (Poznan University of Technology, Poznań, Poland)

## EDITORIAL BOARD OFFICE

Łukasiewicz Research Network – Poznań Institute of Technology  
ul. Ewarysta Estkowskiego 6, 61-755 Poznań, Poland  
tel. +48 693 091 240, e-mail: agnieszka.lewandowicz@pit.lukasiewicz.gov.pl

## PUBLISHER

Łukasiewicz Research Network – Poznań Institute of Technology  
ul. Ewarysta Estkowskiego 6, 61-755 Poznań, Poland  
tel. +48 61 850 48 90, e-mail: office@pit.lukasiewicz.gov.pl



ISSN 1642-686X

e-ISSN 2719-423X

**The electronic version of the journal is the primary one.**

**The periodical’s website: <http://tech-rol.eu>**

© 2023, Łukasiewicz Research Network – Poznań Institute of Technology. All rights reserved.  
All articles are published under the Creative Commons Attribution license (CC BY 4.0).

Cover project and DTP: Małgorzata Słodzinka  
Photo used on the cover: Daria Serdtseva, Getty Images

**CONTENTS**



<b>Eco-design in pro-environmental activity illustrated with example of agricultural trailer loading box cover – towards a sustainable product</b> P. Niewiadomski	<b>5</b>
<b>Mobile Chipper Design with FEM System Application</b> G. Dzieniszewski, D. Nowak, M. Kuboń, K. Furyk-Grabowska	<b>11</b>
<b>Application of CAD Systems in Designing Material Handling Equipment</b> G. Dzieniszewski, A. Rak, M. Kuboń, Z. Kowalczyk	<b>19</b>
<b>Assessment of the potential for use post-production residues of cruciferous vegetables within Zero Waste idea</b> A. Bieńczak, P. Woźniak, J. Markowska	<b>25</b>
<b>The Effect of Pressure on Compaction Process Parameters of Milk Thistle Straw With Binder</b> R. Kulig	<b>33</b>

