BOOK OF ABSTRACTS

AgroSym

VIII International Scientific Agriculture Symposium

Jahorina, October 05-08, 2017





agro sym 2017

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"AGROSYM 2017"

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Jahorina, October 05 - 08, 2017

Impressum

VIII International Scientific Agriculture Symposium „AGROSYM 2017“

Book of Abstracts Published by

University of East Sarajevo, Faculty of Agriculture, Republic of Srpska, Bosnia
University of Belgrade, Faculty of Agriculture, Serbia
Mediterranean Agronomic Institute of Bari (CIHEAM - IAMB) Italy
International Society of Environment and Rural Development, Japan
Regional Rural Development Standing Working Group (SWG) in Southeastern Europe, Macedonia
Balkan Environmental Association (B.EN.A), Greece
University of Applied Sciences Osnabrück, Germany
Perm State Agricultural Academy, Russia
Voronezh State Agricultural University named after Peter The Great, Russia
Centre for Development Research, University of Natural Resources and Life Sciences (BOKU), Austria
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Agricultural Institute of Republic of Srpska - Banja Luka, Bosnia and Herzegovina
Maize Research Institute “Zemun Polje”, Serbia
Faculty of Agriculture, University of Novi Sad, Serbia
Institute for Animal Science, Ss. Cyril and Methodius University in Skopje, Macedonia
Academy of Engineering Sciences of Serbia, Serbia
Balkan Scientific Association of Agricultural Economics, Serbia
Institute of Agricultural Economics, Serbia

Editor in Chief

Dusan Kovacevic

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Milan Jugovic
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Rosanna Quagliariello

Website:

http://www.agrosym.rs.ba

CIP - Каталогизација у публикацији
Народна и универзитетска библиотека
Републике Српске, Бања Лука

631(048.3)(0.034.2)

INTERNATIONAL Scientific Agricultural Symposium "Agrosym 2017" (8 ; Jahorina)
Book of Abstracts [Elektronski izvor] / VIII International Scientific Agriculture Symposium "Agrosym 2017", Jahorina, October 05 - 08, 2017 ; [editor in chief Dušan Kovačević]. - East Sarajevo =Istočno Sarajevo : Faculty of Agriculture =Poljoprivredni fakultet, 2017. - 1 elektronski optički disk (CD-ROM) : tekst, slika ; 12 cm

CD ROM čitač. - Nasl. sa nasl. ekrana. - Registar.

ISBN 978-99976-632-9-0

COBISS.RS-ID 6803480

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DEVELOPMENT A PREDICTION MODEL OF SPECIFIC ENERGY REQUIREMENT FOR MOULDBOARD PLOUGH

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Abstract

Soil tillage is one of the most important operations in crop production. The mouldboard ploughs are the most common primary tillage implement in agriculture and widely used for conventional tillage all over the world. However, mouldboard ploughsare one of the highest energy consuming primary tillage implements. Many studies have been conducted to compare the draught and energy requirement of different types of mouldboard ploughs as well as the other tillage implement under various conditions.In some studies, mathematical models have been developed to predict draught, power and energy requirement of mouldboard ploughs. The energy requirement of mouldboard ploughs is affected by many factors, such as working depth, working witdh, the type and shape of plough body, the sharpness of the share, the overall adjustment of the plough, forward speed, soil type and soil parameters consisted of moisture content, bulk density and cone index. Prediction of the specific energy requirement for mouldboard ploughs could be useful in terms of proper selection of tractors and ploughs, working at optimum operating conditions and increasing field capacity. Thus, energy inputs and costs for tillage operation could be minimized. The objective of the present study was to develop a prediction model for the specific energy requirement of mouldboard ploughs working on a medium heavy soil condition in Turkey. The prediction model was developed based on dependent variables such as soil parameters including cone index, bulk density and moisture content, working witdh, working depth, forward speed and field capacity. The study showed that the specific energy requirement of mouldboard ploughs could be successfully predicted by the model with good accuracy. The regression coefficients of relationship between predicted and measured specific energy requirementof mouldboard ploughs were varied from 0.92 to 0.99.

Keywords: *Mouldboard plough, soil tillage, specific energy requirement, prediction model.*