International specialized medium for agricultural mechanization in developing countries

ISSN 0084-5841

AMA

AGRICULTURAL MECHANIZATION IN ASIA, AFRICA AND LATIN AMERICA

VOL.51, No.2, SPRING 2020

Edited by

YOSHISUKE KISHIDA

Published quarterly by

Farm Machinery Industrial Research Corp.

in cooperation with

The Shin-Norinsha Co., Ltd.

and

The International Farm Mechanization Research Service

TOKYO

Yoshisuke Kishida, Publisher & Chief Editor

Contributing Editors and Cooperators

AFRICA
Kayombo, Benedict (Botswana)
Fonteh, Fru Mathias (Cameroon)
Ndindeng, Sali Atanga (Cote d'Ivoire)
Abdallah, Said Elshahat (Egypt)
El Behery, A. A. K. (Egypt)
Addo, Ahmad (Ghana)
Bani, Richard Jinks (Ghana)
Djokoto, Israel Kofi (Ghana)
Some, D. Kimutaiarap (Kenya)
Gitau, Ayub N. (Kenya)
Houmy, Karim (Morocco)
Oyelade, O. A. (Nigeria)
Bindir, Umar B. (Nigeria)
Igbeka, Joseph C. (Nigeria)
Odigboh, E. U. (Nigeria)
Oni, Kayode C. (Nigeria)
Opara, U. L. (South Africa)
Kuyembeh, N. G. (Sierra Leone)
Abdoun, Abdien Hassan (Sudan)
Saeed, Amir Bakheit (Sudan)
Khatibu, Abdisalam I. (Tanzania)
Tembo, Solomon (Zimbabwe)

AMERICAS
Cetrangolo, Hugo Alfredo (Argentina)
Nääs, Irenilza de Alencar (Brazil)
Ghaly, Abdelkader E. (Canada)
Hetz, Edmundo J. (Chile)
Roudergue, Marco Antonio Lopez (Chile)
Aguirre, Roberto (Colombia)
Ulloa-Torres, Omar (Costa Rica)
Mesa, Yanoy Morejón (Cuba)
Rondon, Pedro Paneque (Cuba)
Luna-Maldonado, A. I. (Mexico)
Magaña, S. G. Campos (Mexico)
Ortiz-Laurel, H. (Mexico)
Bora, C. Ganesh (U.S.A.)
Goyal, Megh Raj (U.S.A.)
Mahapatra, Ajit K. (U.S.A.)

ASIA and OCEANIA
Farouk, Shah M. (Bangladesh)
Hussain, Daulat (Bangladesh)
Mazed, M. A. (Bangladesh)
Ali, Rostom (Bangladesh)
Wangchen, Chetem (Bhutan)
Basunia, M. A. (Brunei)
Li, M. (China)
Luo, X. (China)
Ilyas, S. M. (India)
Mani Indra (India)
Mehta, C. R. (India)
Michael, A. M. (India)
Nath, Surya (India)
Pathak, B. S. (India)
Salokhe, Vilas M. (India)
Singh, Gajendra (India)
Verma, S. R. (India)
Soni, Peeyush (India)
Abdullah, Kamaruddin (Indonesia)
Behroozi-Lar, Mansoor (Iran)
Minaei, Saeid (Iran)
Mahdavian, Alireza (Iran)
Abdul-Munaim, Ali Mazin (Iraq)
Hasegawa, Hideo (Japan)
Snobar, Bassam A. (Jordan)
Chung, Jong Hoon (Korea)
Lee, In-Bok (Korea)
Bardaie, Muhamad Zohadie (Malaysia)
Gonchigdorj, Enkhbayar (Mongolia)
Pariyar, Madan P. (Nepal)
Jayasuriya, Hemanatha P. W. (Oman)
Khan, Alamgir A. (Pakistan)
Mughal, A. Q. A. (Pakistan)
Mirjat, Muhammad Saffar (Pakistan)
Abu-Khalaf, Nawaf A. (Palestine)
Lantin, Reynaldo M. (Philippines)
Venturina, Ricardo P. (Philippines)
Al-suhaibani, Saleh Abdulrahman (Saudi Arabia)
Al-Amri, Ali Mufarreh Saleh (Saudi Arabia)
Illangantileke, S. G. (Sri Lanka)
Chen, Suming (Taiwan)
Krishnasreni, Suraweth (Thailand)
Phongsupasamit, Surin (Thailand)
Senanarong, Akkapol (Thailand)
Ertekin, Can (Turkey)
Haffar, Imad (United Arab Emirates)
Hay, Nguyen (Viet Nam)
Lang, Pham Van (Viet Nam)

EUROPE
Katardjiev, Tihomir Hristov (Bulgaria)
Kic, Pavel (Czech)
Müller, Joachim (Germany)
Ferentinos, Konstantinos P. (Greece)
Sigrimis, Nick (Greece)
Gasparertto, Ettore (Italy)
Hoogmoed, W. B. (Netherlands)
Lobachevsky, Y. (Russia)
Martinov, Milan (Serbia)
Jaime, Ortiz-Cañavate (Spain)
Sims, Brian G. (U.K.)

EDITORIAL STAFF
(Tel.+81-(0)3-3291-3674)
Yoshisuke Kishida, Chief Editor
Shinjiro Tetsuka, Managing Editor
R. Lal Kushwaha, Editorial Consultant

ADVERTISING
(Tel.+81-(0)3-3291-3674)
Yuki Komori, Director (Head Office)
Advertising Rate: 300 thousand yen per page

CIRCULATION
(Tel.+81-(0)3-3291-3674)
(Fax.+81-(0)3-3291-5717)
Editorial, Advertising and Circulation Headquarters
1-12-3, Kanda Nishikicho, Chiyoda-ku, Tokyo 101-0054, Japan
URL: https://www.agriculturalmechanization.com/
E-Mail: ama@shin-norin.co.jp
Copylight © 2020 by
FARM MACHINERY INDUSTRIAL RESEACH CORP.
in SHIN-NORINSHA Co., Ltd
Printed in Japan

This is the 183th issue since its maiden issue in the Spring of 1971

CONTENTS

AGRICULTURAL MECHANIZATION IN ASIA, AFRICA AND LATIN AMERICA

Vol.51, No.2, Spring 2020

Yoshisuke Kishida	5	Editorial
Ali Mazin Abdul-Munaim David A. Lightfoot, Dennis G. Watson	7	Could Conservation Tillage Farming Be the Solution for Agricultural Soils in Iraq?
I. P. Singh, Vijay Gautam Padam Singh, Santosh Kumar	10	Design, Development and Testing of 4-Row Tractor Drawn Gladiolus (*Gladiolus Grandiflorus* L.) Planter for Uniformity in Corm Spacing
Ajay Kumar Verma	16	Design and Development of Power Operated Walking Type Weeder
Ritu Dogra, Desai Kishor Waman Baldev Dogra, Ajeet Kumar	22	Optimization of Parameters of Axial Flow Paddy Thresher
Majid H. Alheidary, Qusay, Sameer Abdul Salam G. Maki, Ali F. Nasir	28	Measuring Spray and Spray Deposition on Plant and Unwanted in Field Under Iraqi South Conditions
Boris Boiarskii, Hideo Hasegawa Anna Houde, Elizaveta Kolesnikova Valentina Sinegovskaia	33	Current Situation and Perspectives for Soybean Production in Amur Region, Russian Federation
R. Pandiselvam, R. Kailappan Anjineyulu Kothakota, B. Kamalapreetha G. K. Rajesh	39	Development and Evaluation of Rasp Bar Mechanism for the Extraction of Onion (*Allium Cepa* L.) Seeds
V. B. Shambhu	46	Design and Development of Low Cost Multi-Row Manual Jute Seed Drill
A. Fahim, M. L. Kamboj A. S. Sirohi	52	Performance of Milking Machine at Different Vacuum Levels in Crossbred Dairy Cows Milked in Automated Herringbone Parlour
S. C. Sharma, N. Prasad S. K. Pandey, V. K. Bhargava	58	Development of Integrated Small Scale Lac Processing Unit
Gürkan Alp Kağan Gürdil, Pavel Kic Bahadır Demirel, Emel Demirbas Yaylagül	67	Design and Construction of a Farm Scale Evaporative Cooling System
V. R. Vagadia, Rajvir Yadav, D. B. Chavda Geeta Tomar, D. V. Patel	72	Development and Performance Evaluation of Tractor Drawn Cultivator Cum Spike-Roller
Mahesh Kumar Narang, Rupinder Chandel Baldev Dogra, Gursahib Singh Manes	79	Development of Mat Nursery Raising and Uprooting Techniques for Paddy (*Oryza Sativa* L.) Crop and Their Field Evaluation with Mechanical Transplanter for South East Asia

★ ★ ★

Event Calendar 9
ABSTRACTS 21, 57, 90-94
Co-operating Editors 95
Subscription Information 97

C. S., Hosen, Y., 2015. Effects of seedbed management and delayed transplanting of rice seedlings on crop performance, grain yield, and water productivity. Field Crops Research. 183, 303-314.

Manjunatha, M. V., Reddy, B. G. M., Shashidhar, S. D., Joshi, V. R., 2009. Studies on the performance of elf-propelled rice transplanter and its effect on crop yield. Karnataka J. Agric. Sci. 22(2): 385-387.

Ojha, P., Kwatra, S., 2014. Analysis of different paddy transplanting methods in northern India: Ergo - economical study. Journal of Applied and Natural Science. 6 (2): 654-658.

Sang-su, K., Bio-kyeong, K., Min-Gyu, C., Woen-Young, C., Seen-Yong, L., 1999. Effects of seedling age on growth and yield of machine transplanted rice in southern plain region. Korean J. Crop Sci. 44(2): 122-128.

Sreenivasulu, S., Reddy, P. B. H., 2014. Effect of mechanized transplanting on yield, yield attributes and economics of rice (*Oryza sativa*). The J. Res. ANGRAU. 42(2): 9-12.

Vasudevan, S. N., Basangouda, Mathad, R. C., Doddagoudar, S. R., Shakuntala, N. M., 2014. Standardization of Seedling Characteristics for Paddy Transplanter. Journal of Advanced Agricultural Technologies. 1(2): 141-146.

Vijayalaxmi, G., Sreenivas, G., Leela Rani, P., Ram Prakash, T., 2016. Influence of Plant Densities and Age of Seedlings on Dry Matter Partitioning and Grain Yield Potential of Transplanted Rice (*Oryza sativa* L.). International Journal of Current Research in Biosciences and Plant Biology. 3(4): 51-55.

ABSTRACTS

The ABSTRACTS pages is to introduce the abstracts of the article which cannot be published in whole contents owing to the limited publication space and so many contributions to AMA. The readers who wish to know the contents of the article more in detail are kindly requested to contact the authors.

1726

Energy Efficient Passive Wet Tillage Tool for Low Land Transplanted Rice Cultivation: C. Ramana, B. Ravindranatha Reddy, V. Munaswamy, P. Lavanya Kumari

Rice (*Orzya Sativa* L.) is a most important crop and highly relished as staple food in India, covering an area of 44 million hectares with annual production of 90 million tones. 60% of rice production area in India adopts low land transplanted rice method, where in 5-10 cm standing water is maintained in the field between raised bunds. The ponding water leads to the deep percolation losses, in turn increases irrigation water requirement. Puddling (wet tillage) process is proven technology to condition soil tilth and forms impervious layer on loose soil, so as to minimize deep percolation losses. Current practice of using inferior implement for puddling, making farmer to lose time, energy and more importantlyprecious water. To improve the efficacy of puddling, the study was taken up under AP Water Management Project, RARS, Tirupati to develop energy efficient implement without compromising with quality of tilth (field preparation). A passive self activating Vishnu (ANGRAU) puddlerwas developed with optimized machine parameters of soil working unit of paddlesnumber 40; tilt angle of the paddle 11° to 14.5° with staggered alignment on rotating shaft for best performance.

The puddling effect of developed implement (Vishnu puddler)in a farm research was analysed and compared with implements like Rotavator, Disc Harrow and Cultivator (farmer's method),through irrigation requirement and Water Use Efficiency. The experiment on irrigated water savingclearly shown that up to 40% shall be obtained through proper puddling with Vishnu (ANGRAU) Puddler and Rotovator.The highest Water Use Efficiency was recorded as 6.09 and 6.07 kg ha^{-1} mm^{-1} in field prepared by Rotavator and Vishnu Puddler respectively, where as lowest W.U.E observed 4.44 kg ha^{-1} mm^{-1} in farmers practice (using cultivator for puddling). Further more than experiment results for their fuel consumption shown to be 13.32 $L.ac^{-1}$, 7.74 $L.ac^{-1}$, 8.29 $L.ac^{-1}$ and 7.63 $L.ac^{-1}$ with, Vishnu Puddler, Rotavator, Disc Harrow and Cultivator respectively. The experiment also concluded that the use of developed Vishnu puddler can createtilth of superior quality (with PI of 32%) on par with the tilth obtained by active tool Rotovator (PI of 32%) with least amount of fuel consumption 7.74 $L.ac^{-1}$ which reduces the operational coast by 72% than the rotovatoruse for attaining same effect of puddling.

that the displacement and the stress change proportionally to the amount of snow. The displacement and stress also grow exponentially as the width of the greenhouse increases according to the amount of snow. It was concluded that larger width increases the risk of collapse of a greenhouse even with smaller snowfall.

17107

Effect of Moisture Contents on Thermal Properties of Fuel Briquettes Made From Ha-zelnut Husk Agricultural Residues: Gürkan Alp Kağan Gürdil, Bahadır Demirel

As we are living in the technology age, we are all dependent on energy. It is known that we will face with fossil fuel shortage in the coming future therefore; any kind of alternative ener-gy source is needed. Biomass obtained from agricultural residues can be a good example of it since a big potential is there everywhere. In this study, fuel briquettes from hazelnut husk res-idue is produced by a hydraulic type briquetting machine and thermal properties of briquettes produced from hazelnut husk agricultural residue are analyzed depending on the moisture contents of the material.

1803

Irrigation and Fertigation Management on Chilli (Capsicum annuum) Under Drip System: Brahmanapuduru Gireesh

Water is the precision source for agriculture growth and quality of agricultural products. In the methods of providing water to crop, the drip system is the first in techniques that provide a high quality yielding and reduce water wastage. Most irrigation water given through control irrigation 961 mm depth of water, throughout the chilli crop period. Followed by 100 pan evaporation (PE), 735.47 mm, 80 PE, 592.81 mm and 60 PE, 441.28 mm through drip irrigation system. Fertilizers are increasingly used to increase investment by assuming that production is high. But with the use of the excess fertilizer, the production is not too high and soil health is also damaged. This results; it may be affected to the future growing crops in the soil. There is no use of excess fertilizer in the experiment done by various fertilizer levels in various water levels, it has been proved that using excess fertilizers, may not effected the production. The randomized block design has three drip irrigation levels (I_1- 60%, I_2- 80% and I_3- 100% of pan evaporation) and one control (furrow) irrigation with three fertilizer levels (F_1- 80%, F_2- 100% and F_3- 120% of RDF through drip) on growth and yield of Chilli. The research experiment results revealed that application of 80% PE with 100% fertilizer level has maximum yield, number of fruits per plant, fruit weight per plant, fruit diameter, primary branches, secondary branches and stem girth were 24.80 t/ha, 78.44 numbers/plant, 261.35 g/plant, 1.18 cm, 11.8, 50.6 and 2.26 cm respectively and minimum was found in control irrigation in all aspects of plant growth and yield attribution. What these results says that, if they use excess water and fertilizers beyond the decline, they will not more effect on the yield.

Chilli crop receiving irrigation supply at 80% PE with a discharge rate of 2 lph and 100% fertilizer application has highest gross income (Rs.496000 ha^{-1}), net income (Rs. 397276 ha^{-1}) and B:C ratio (4.02) than in other treatment combinations.

1805

Development of Mechanical Peeler Cum Corer Machine for Jackfruit: Hareesha T. Shidenur, Santhi Mary Mathew, Sankalpa K. B., Arun Prasath Venugopal

In India most of jackfruit processing unit follows traditional method of peeling, cutting and coring, which are time consuming, causes drudgery and very tedium in manual operation. However, a major chunk of the production is wasted due to lack of post-harvest technological interventions, and hence jackfruit is considered as underutilized fruit. Thus, effective mechanization in processing is a need of the hour. In this context, mechanical jackfruit peeler cum corer was built. The machine consists of a Fruit holder, Peeler assembly, Corer assembly, Power transmission unit and Frame assembly. The machine was designed for peeling and cutting-coring of varying sizes of oblong/round shape matured, unripe jackfruits of Varikka variety.

■■