18th European Weed Research Society Symposium

EWRS 2018

17-21 June 2018
Ljubljana, Slovenia

New approaches for smarter weed management

Book of Abstracts

www.ewrs2018.org

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Organiser
Kmetijski inštitut Slovenije (KIS) – Agricultural Institute of Slovenia, Hacquetova ulica 17, 1000 Ljubljana, Slovenija

Editor
Andrej Simončič

Published by
Kmetijski inštitut Slovenije, 2018

The publication is published e-only – http://www.ewrs.org

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani
COBISS.SI-ID=295336960
ISBN 978-961-6998-21-5 (pdf)

Mechanical rice transplanting as a tool for weed management in organic rice

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Weed control is one the main issues in organic rice cultivation. Rice transplanting can favor rice competition against weeds and allow weed control with inter-row tillage. A two year project started in 2016 aimed at evaluating the possibility of applying mechanical rice transplanting in Italy. Rice was mechanically transplanted on 66 hectares included in 24 rice farms involved in the study, all located in Lombardia region. Seedlings were grown in a nursery following the »mat method«, in which about 4,700 rice seeds were sown in a single tray of 60 x 30 cm, filled with a potting mix. About 200 trays were necessary to transplant a single hectare. Trays were sown with nine different rice varieties: Brio, Cammeo, Centauro, Cerere, Ronaldo, Selenio, Spillo, Venere and the hybrid variety Ecco 63. Seedlings were transplanted at 2-3 leaf stage with a self-propelled riding type transplanter, able to transplant 8 rows of rice simultaneously. The transplanting distance between rows was 30 cm, while the spacing between plant hills within the row was 17 cm. The transplanted plant hills consisted of 2 to 6 plants. The transplanting operations were conducted between mid-May and end of June. Weed control was carried out with a prototype rear-mounted inter-row hoeing machine, designed to work on saturated soil. Fields were weeded once, at about 30 days after transplanting. During the season, weed infestation was monitored in three transplanted fields, while rice yield was assessed in all the fields. The growth advantage given to rice by transplanting and the inter-row hoeing were not able to completely suppress weeds. Weed density ranged from 65.4 plants m^{-2} (hybrid variety) to 131.2 plants m^{-2} (Selenio). Rice yield showed high variability, with values ranging from 2.6 t ha^{-1} (Venere) to 6.2 t ha^{-1} (hybrid variety Ecco 63).