ASSESSMENT OF THE EFFECTS OF SELECTIVE WEED MANAGEMENT STRATEGIES FOR THE PRODUCTION OF DIRECT-SEEDED RICE YIELD IN MWEA, KIRINYANGA COUNTY, KENYA.

MUSYOKA SYLVIA KOKI

A Thesis Submitted to the Graduate School in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science in Natural Resources Management of Chuka University.

CHUKA UNIVERSITY OCTOBER, 2024

Declaration

This thesis is my original work and has not been presented for an award of a diploma or conferment of a degree in any institution.

Signature: ..... Date: 22/10/2024

Sylvia Koki
NM22/58093/22

Recommendations

This thesis has been examined, passed and submitted with our approval as the University supervisors.

Signature: ..... Date: 22/10/2024

Dr. Jafford N. Rithaa, Ph. D
Chuka University

Signature: ..... Date: 22/10/2024

Dr. Daniel Menge, Ph.D.
International Rice Research Institute

DECLARATION AND RECOMMENDATION COPYRIGHT

DEDICATION

This thesis is dedicated to my family, for their unwavering support, patience, and encouragement throughout my academic journey. To my parents and brother whose love and belief in my potential have been my greatest source of strength.

ACKNOWLEDGEMENT

I sincerely thank everyone who helped construct and finish my research project making this thesis a reality. My thoughts and work have been greatly shaped and improved by their encouragement and direction. First and foremost, I want to express my appreciation to my supervisors, Dr. Jafford Rithaa and Dr. Daniel Menge for their tremendous advice and never-ending support. Their knowledge and perceptive criticism were extremely helpful in determining the focus and substance of this project. Additionally, I want to express my gratitude to Dr. Peter Gakai, whose contributions and insights have been crucial to the accomplishment of the of this thesis. His expertise and advice were invaluable throughout this journey. I acknowledge the valuable input of Mr. Simon Njau of International Rice Research
Institute (IRRI) and Mr. Bernard Ngari from Kenya Agricultural Research Institute (KALRO), Mwea.

I also want to appreciate my family and friends for their assistance and confidence in me. Their support and compassion have given me the inspiration I needed to get through trying moments. I sincerely thank everyone who helped make this thesis a reality. I am grateful for your support and encouragement and feel privileged to have worked with such inspiring people.

ABSTRACT

The use of Direct Seeded Rice (DSR) is on the rise due to its low input requirements, providing advantages such as reduced labor, water usage, reduced physical strain, early crop maturity, improved soil conditions, reduced methane emissions, and suitability for diverse cropping systems. However, DSR faces challenges from high weed infestation, limiting its adoption and productivity. The study assessed the effects of selective weed management strategies on DSR systems, aiming to enhance overall crop yield and sustainability in Mwea, Kirinyaga County, Kenya. The study was carried out in a randomized complete block design with three replicates. Eight quadrants were established for data collection in each treatment in which four of the quadrants were 0.5m x 0.6m and the other four were one meter running rows. Data on weed counts, biomass, plant phyto-toxicity, weed phyto-toxicity, crop counts, crop height and crop biomass were collected on the 0.5m x 0.6m quadrants. Data on tiller density and yield attributes was collected in the 1m running row. Various methods were used in data analysis including Shannon diversity index to analyze weeds diversity across the various treatments, a two-way ANOVA and Kruskal Wallis was used to evaluate the variations among the treatments and the means separated using LSD and Dunn test. The most dominant weed species in DSR field were *Richardia grandiflora* and *Dactyloctenium aegyptium* with a Shannon Weiner diversity index of 0.98 and 0.60 respectively. The maximum herbicide efficiency was observed under the application of combination of preemergence and post-emergence herbicide; *Pendimethalin* + *Bispyribac sodium* (>80%) and *Pendimethalin* + *Florpyrauxifenbenzyl* (>80). In contrast, *Cyhalofop-butyl* + *penoxsulam* + one hand weeding (<15%) demonstrated the lowest weed control efficiency. Treatments that either solely used or combined *Bispyribac sodium* recorded the highest phyto-toxic effects at 35 DAS (range between 2.80% and 2%). Other than the weedy free check the lowest phytotoxic effects was seen in treatments that had *Pendimethalin* and *Florpyrauxifen-benzyl* (1.08%). Based on yield results other than the weed-free treatment the combination of *Bispyribac sodium* + *pyrazosulfuron* + one hand weeding showed a high adjusted grain weights (1474 g). Thus, treatments that were mostly in combination, for example Pendimethalin + *Bispyribac sodium* and *Bispyribac sodium* + *pyrazosulfuron* + one hand weeding, consistently showed superior control across all weed types. Thus combination of herbicides (PRE-emmergence + POSTemmergence) and with a little boost from hand weeding is recommended for effective weed management practices in DSR.