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Mulching as an adaptation technology for rice farmers to combat the weed problem under water scarce conditions. 'A case study in Nilwala downstream, Matara district, Sri Lanka'.

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Abstract

Rice farmers in southern Sri Lanka are dragged to vulnerable end due to irregular water regimes linked to climate and weather change. Problems are much aggravated after implementing the Nilwala flood protection scheme, to improve the drainage to evacuate flood without provisions for irrigation. The newly emerged problems are reported to be development of acid sulphate conditions, due to water scarcity, and associated problems of nutrient fixation and toxicities. Thus the objective of the study was to introduce a technology for the farmers to improve their paddy production.

A field experiment was conducted in *Yala* 2014 to study the polythene mulching to improve rice production through favorable soil water regime and weed management. In the experiment both seed broadcasting, and transplanting has been established, with and without polythene mulch using the rice variety At 362. Results revealed that mulching maintained the soil moisture at favorable levels during the dry spells where by reducing nearly 100% of weeds. Significantly higher grain yield and plant growth reported with mulching over control. The technology has recommended and disseminated to farmers for seed paddy production without weeds contamination which is one of the major threat confronted by the paddy farmers in Sri Lanka.

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1. Introduction

Rice is the staple food of Sri Lankans and it is essential to understand the impacts of the changing climate factors on the rice production of the country. Therefore, suitable adaptation strategies to overcome the adverse effect of changing climate, is important to ensure the food security of the nation. Production of the rice crop in the country has increased considerably since independence in 1948 with improved technologies including varieties and cultural practices. However there is increasing risk of crop failure due to recent climate changes associated with droughts, flash floods, irregularities of cropping seasons and indirect impacts of biotic and abiotic factors like pests, diseases and weed infestances..etc.

Water is a most precious input in rice cultivation and changing climate and environmental degradation are affecting the regional and seasonal availability and quality of water. The resulting competition over water use in rice cultivation may lead to social conflict and sometimes violence. The situation especially within the man-made modified ecosystems where land quality degrades over time, could be badly affected on crop productivity and food and livelihood security. [1] Thus more attention to technology intervention in such ecosystems is needed to restore natural systems to minimize disaster risk reduction (DRR).There are many evidence that the impact on rice cultivation due to unforeseen climatic changes of floods and droughts and could be further increase the struggle for water in many countries including Sri Lanka [2]. It is important that introduce new innovative technological solutions to building resilience to face multiple hazard risks caused by weather and climate variabilities for livelihood sustainability.

Rice production of Low country wet zone (LCWZ) of Sri Lanka contributed considerably to national rice production of the country. Low average yield of rice in LCWZ (2-3 t /ha) is influencing to minimize national average rice yield (4.3 t/ha) of Sri Lanka [3]. However it is a buffer zone for rice production in the country under adverse climatic situations [4] and needs more efforts to reducing the related vulnerabilities, especially within the man-made modified ecosystems. Nilwala is the major river in Matara District, of low country wet zone (LCWZ) of Sri Lanka. Frequent floods and unexpected drying spells are major problems in the downstream of the Nilwala river, which directed to established the Nilwala Flood Protection Scheme (NGFPS) in 1985 to address the socio-economic impacts in paddy growers in the area.

The main aim of the NGFPS project was manage the flood condition in the area, by constructing flood protection bunds with drainage network. Deeper drainage network in the paddy ecosystems at lower streams of the river enhanced the evacuation of flood water from fields. Due to low water table, the pyrites layer of the sub soil was oxidized and affect the paddy eco systems by acidifying the soil resulting development of acid sulphate conditions in drying paddy fields. [5, 6].

Pons [7] and Fanning [8] have described the acid sulphate soils (ASS) as extremely acidic (low pH < 3.5) soils having sulfidic materials in upper most soil layers (within 50 cm) and/or a sulfuric horizon.Acid sulfate soils are typically low fertile (specially poor in nitrogen and phosphorous) and consider as a soil which is difficult to manage for intensive cropping. With submergence, these soils are nearly neutral in reaction and drained soils are extremely acidic and lethal