



EFFECT OF PULLING BANANA TRUNK ON PADDY FIELD AS AN ECOFRIENDLY WEED CONTROL METHOD IN THE WET ZONE OF SRI LANKA

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ABSTRACT

For vast segments of the global population, rice (*Oryza sativa L.*) stands as a vital staple food, with weeds posing a substantial threat to both the yield and quality of paddy cultivation. Chemical-based weed control methods, while popular, carry significant risks to the environment and human health. Consequently, fostering chemical-free and eco-friendly paddy production is imperative for safeguarding food security and promoting the sustainable growth of agriculture and paddy cultivation. This study showcases the efficacy of a traditional Sri Lankan practice: the manual removal of weeds by pulling banana trunks over the paddy fields, offering a promising alternative for weed management.

This study compared the efficacy of chemical weedicides versus a traditional method, pulling banana trunks, in rice cultivation. Using a Randomized Complete Block design, rice samples of BG365 were subjected to three treatments: T1 - Chemical Weedicide (Thiamethoxam: trade name Actara) with the dosage of 0.4g per liter, T2 - Pulling Banana Trunk method for one time application between 14-21 day after seed broadcasting with man power, and T3 - Control. A one-way ANOVA analysis revealed statistically significant differences ($P < 0.05$) between treatments T1 and T2 in comparison to T3 across multiple parameters, including weed count at various intervals, plant height, grain weight, and tiller count. However, there were no significant differences ($P > 0.05$) between T1 and T2 in weed count before treatment application and bush count compared to T3. A T test ranking identified T2 as the superior treatment. These findings suggest that the traditional method of pulling banana trunks presents an effective alternative for weed management in Sri Lankan paddy cultivation, promoting sustainable practices in agriculture.

Keywords: Traditional Weed Control, Crop Management, Sustainable, Eco-friendly agriculture,

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INTRODUCTION

Rice (*Oryza sativa*) cultivation has been an integral part of Sri Lanka's agricultural heritage for over 5,000 years, contributing significantly to the nation's food security and cultural identity (Rao, *et al.*, 2017). With rice serving as a staple food for more than half of the global population, its production holds paramount importance, particularly in Asian countries where 90% of the world's rice is grown. Sri Lanka boasts diverse Agro-ecological zones, with approximately 0.734 million hectares dedicated to rice farming across various regions, including the Low Country Dry, Intermediate, and Wet Zones, as well as the Up-Country and Mid-Country areas (Irangani & Shiratake, 2013).

Despite the long history and extensive cultivation areas, Sri Lanka faces challenges in meeting the increasing demand for rice due to rising household consumption (Rao *et al.*, 2017). To address this, enhancing productivity and cultivation areas have become imperative goals (Udayanganie *et al.*, 2006). Integrated management practices offer promising solutions for optimizing rice output, considering the significant influence of climatic conditions, soil characteristics, and environmental factors on final yield (Irangani & Shiratake, 2013).

Weed infestation emerges as a significant impediment to optimal rice production in Sri Lanka, causing substantial yield losses ranging from 20% to 40% (Amarasinghe and Marambe, 1998). Traditional farming communities have developed indigenous weed control practices, such as pulling banana trunks, which have proven effective and environmentally friendly compared to modern methods involving chemical and mechanical weed control (Alahakoon & Edirisinghe, 2021). These indigenous techniques not only contribute to sustainable agriculture but also safeguard human health and environmental integrity.

The general objective of this study is to evaluate the efficacy of the traditional weed control method of pulling banana trunks on paddy fields in Sri Lanka. Specific objectives include enhancing rice yield quality and quantity, introducing this method to farmers, and highlighting the importance of traditional weed control practices for sustainable agriculture.

The field trial was conducted at the "Parakum Govijanasewa Samithi" paddy field in Madiligama, Kandy. The study employed a Randomized Complete Block Design (RCBD) with three treatments: application of chemical weedicide, application of banana trunk treatment, and a control group. Each treatment had three replicates. Data on weed infestation, paddy bush height, tiller count, rice grain production, and immature rice grain production were collected and subjected to statistical analysis using ANOVA and the SAS software package.

By evaluating the effectiveness of traditional weed control methods like pulling banana trunks, this study aims to contribute to sustainable agricultural practices in Sri Lanka. The findings could inform policymakers, agricultural extension services, and farmers about the benefits of indigenous techniques, ultimately enhancing rice productivity and promoting eco-friendly farming practices.

OBJECTIVES:

The general objective is to assess the success and impact of paddy cultivation using the traditional weed control method of pulling banana trunks. Specific objectives include enhancing rice yield, introducing the method to farmers, and emphasizing the importance of traditional weed control.



MATERIALS & METHODOLOGY:

Study area

The study was conducted at the “Parakum Govijanasewa Samithi” paddy field, located in Madiligama, Kandy.

Experimental details

- Crop type: the experimental crop was paddy (*Oryza sativa L.*).
- Variety: bg365 was selected as the rice variety for the experiment.
- Experimental design: the experiment followed a randomized complete block design (RCBD).
- Number of treatments: three treatments were included in the experiment.
- Number of replicates: each treatment had three replicates.

Treatments

Three treatments were applied to the experimental plots:

T1 - Application of chemical weedicide after 14 days of broadcasting.

T2 - Application of banana trunk treatment after 14 days of broadcasting.

T3 - Control group (no treatment).

Uniform distribution of fertilizers and irrigation was maintained across all treatment plots.

Experimental layout

The experimental layout was organized into a randomized complete block design, with treatments assigned randomly to each replicate.

T1R1	T2R2	T3R3
T2R1	T3R2	T1R3
T3R1	T1R2	T2R3

Data collection

Various parameters were measured to assess the efficacy of the treatments:

- Number of weeds before the application of treatments in a 1m² area of each plot.
- Number of weeds after 7 days, 14 days, 21 days, and 1 month of treatment application in a 1m² area of each plot.
- Number of weeds before the harvest in a 1m² area of each plot.
- Average height of the paddy bushes.
- Average number of tillers in the paddy bushes.
- Quantity of rice grains production after harvest in a 1m² area of each plot.
- Quantity of immature rice grains production after harvest in a 1m² area of each plot.

Data analysis

All collected data were subjected to analysis of variance (ANOVA) using statistical software (SAS). Mean separation was performed using the least significant difference test (LSDT) at a significant level of 0.05.

RESULTS & DISCUSSION:

The field trial evaluated the effectiveness of traditional weed control methods, particularly the "pulling banana trunk" technique, alongside chemical weedicide application in paddy cultivation in Sri Lanka. The study aimed to assess weed quantity, paddy growth parameters, and rice grain production following the application of these treatments.



Weed infestation

Analysis of the field trial data revealed no statistically significant difference in weed quantity before treatment application across the three treatments. However, after treatment application up to harvesting, T3 (control) exhibited significantly higher weed quantities compared to T1 (chemical weedicide) and T2 (pulling banana trunk). This suggests that both T1 and T2 effectively reduced weed infestation compared to the untreated control group.

Effect on paddy growth

T2, involving the application of the traditional pulling banana trunk method, resulted in a significantly higher mean value of mature grain weight and tiller count compared to T1 and the control group. This indicates that the traditional method not only effectively controls weeds but also promotes better paddy growth parameters, leading to increased rice grain production.

Weed species encountered

During the field trial, several weed species were observed, including Wal karambu (*Fragaria fragrans*), Diya gowa (*Limnocharis flava*), Kudamatta (*Fimbristylis miliacea*), and Thunassa (*Cyperus iria*). Both chemical and traditional methods were similarly effective in reducing the quantity of these weed species.

Comparison between treatments

T1 (chemical weedicide) and T2 (pulling banana trunk) showed similar effectiveness in weed control. However, T2 demonstrated additional benefits such as promoting paddy growth and enhancing rice grain production, indicating its superiority over chemical weedicide application.

Environmental impact

One of the notable advantages of the traditional pulling banana trunk method is its minimal environmental impact compared to chemical weedicide application. Chemical weedicides pose risks to environmental and human health, whereas the traditional method is ecologically friendly and does not compromise rice grain quality.

Impact on pest control

Observations revealed that T2, using the traditional method, exhibited potential in controlling pest populations such as rice mealy bugs, whiteflies, and rice gall midges. While not quantitatively evaluated, this observation suggests an additional benefit of the traditional method of pest management.

Effect of weed competition

The higher weed content observed in the control plots T3 led to decreased tiller growth and final harvest compared to treated plots. Weeds compete with rice for essential resources, hindering paddy growth and reducing overall yield. Thus, effective weed control is crucial for optimizing rice production.

CONCLUSION:

The study concludes that pulling banana trunks is a highly effective and sustainable method for weed control in paddy cultivation. Its adoption promotes ecofriendly agriculture, enhances yield, and reduces reliance on harmful chemicals. This traditional practice offers a viable alternative to modern weed control methods, ensuring the sustainability of paddy cultivation in Sri Lanka.

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REFERENCES

Alahakoon, N. & Edirisinghe, M., 2021. Spatial Variability of Rainfall Trends in Sri Lanka from 1989 to 2019 as an Indication of Climate Change. *International Journal of Geo-Information*, 10(2), 1-12.

Irangani, M. K. L. & Shiratake, Y., 2013. Indigenous techniques used in rice cultivation in Sri Lanka: An analysis from an agricultural history perspective. *Indian Journal of Traditional Knowledge*, 12(5), 1-7.

Rao, A. et al., 2017. *An Overview of Weeds and Weed*. 5-34 ed. Hyderabad: Asian-Pacific Weed Science Society,.

Shamkuwar, S. et al., 2019. Critical study of weed control techniqs. *International Journal of Advances in Agricultural Science and Technology*, 6(12), 1-12.

Udayanganie, A., Prasada, D. P. & Kodit, K. A., 2006. Efficiency of the agrochemical input usage in the paddy farming system in the dry zone of Sri Lanka. *Journal Canadian Agricultural Economics Society*, 15(1), 1-23.