

Comparison study to investigate the rice yield, using inorganic NPK fertilizer and Environmentally Friendly Liquid (EFL) fertilizer

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1. Introduction

Oryza sativa is the most commonly grown rice variety in Sri Lanka. Presently cultivated about 100 species in both improved (Weerakoon et al., 2011) and traditional varieties (Ginigaddara & Disanayake, 2018). Paddy has played a major role in supplying food to growing population. Therefore, paddy cultivation is distributed throughout the country, predominantly low country dry and wet agro ecological zones with favourable climatic condition. Modern agricultural methods in paddy sector are supported by improved high yielding rice varieties (Dharmasena, 2010), machineries and pest control. According to the sources, 1,117,000 ha cultivated in 2019 Yala and Maha seasons in Sri Lanka (Central bank report, 2020) and depends largely on subsidies; free water supply, fertilizer subsidiary scheme, free extension services are some of them. Fertilizer subsidy is the major and the most controversial input subsidy program for paddy sector. Yield of paddy cultivation is mainly depending on soil fertility, therefore, applying high efficient inorganic fertilizer is inevitable. However, adding excessive inorganic agro-inputs to soil over a long period leads to various repercussions such as soil deterioration, environmental toxicity and poor public health. Moreover, most of paddy lands are abandoned in low country wet zone due to iron toxicity. Therefore, government is trying to promote environmental friendly farming to minimize using toxic agro-inputs. As a result, paddy farmers in southern province were introduced Environmental Friendly Liquid (EFL) Fertilizer as a subsidy. The objective of this study was to compare the productivity of paddy cultivation with EFL fertilizer and conventional inorganic fertilizer.

2. Materials and Methods

The experiment was carried out in Galle district, in southern province in WL1b geographical location under field condition, during Yala season in 2020 of low country wet zone. Annual rainfall ranges between 2500mm and 3000mm, daily mean temperature ranges fluctuate from 24 °C to 30 °C. Improved paddy variety BW-372 was used for the experiment. T tests were carried out to compare two treatments. Each plot size was 1,011.71 m² (¼ acre) and both tests were repeated 15 times. Significance level 0.05. Treatments are as follows;

T1 - Application of inorganic conventional fertilizer (NPK)

T2 - Application of conventional fertilizer with EFL fertilizer

Inorganic fertilizers (T1) were applied according to the recommendation of Department of Agriculture (DOA) as shown in Table 1. In treatment two (T2), EFL fertilizer was applied together with inorganic NPK fertilizer mix. EFL fertilizer was applied twice in 14 and 28 days. NPK inorganic fertilizer mixes were added three times in 3, 5 and 7 weeks after sowing seed. In T2 trial, NPK inorganic fertilizer quantity was reduced comparing the DOA recommendation as given in the Table 2.

Table 01. Application of inorganic fertilizer with time Kg/Acre

Time	Urea	TSP	MOP
Basal fertilizer	-	10	-
Top dressing 1 (3 week after sowing)	12	-	12
Top dressing 2 (5 week after sowing)	14	-	18
Top dressing 3 (7 week after sowing)	10	-	10

Table 02. Application of EFL fertilizer and inorganic fertilizer mixes Kg/Acre

Time	Urea	TSP	MOP	O.L. F
Basal fertilizer	-	14	-	-
EFL Fertilizer (14 days after sowing)				500ml
Top dressing 1 (21 days after)	10	-	10	
EFL Fertilizer (28 days after)				500ml
Top dressing 2 (35 days after)	10	-	15	
Top dressing 3 (49 days after)	7	-	5	

3. Results and Discussion

Data on plant height, number of leaves, number of tillers, number of panicles, number of seed in a panicle, total yield and the cost of fertilizer were collected and analysed as given in Table 3.

Table 03. Mean values of quantitative characters

Measurements	Conventional fertilizer application (T1)	EFL fertilizer + conventional fertilizer application (T2)
PH (cm)	84.3	97.8
NOL	16.5	29.2
NOT	7.9	9.4
NOP/B	7.8	9.3
LOFL (cm)	30.2	40.0
WOFL (cm)	1.47	1.4
NOS/P	171.4	175.1
YIELD (bushels/Acre)	41.2	55.2
TCOFA (Rs.)	1302.9	1853.8

EFL with inorganic fertilizer (T2) application has depicted greater values of Plant Height (PH), Number of leaves (NOL), Number of Tillers (NOT), Number of Panicles/ Bush (NOP/B), Length of Flag Leaf (LOFL) than T1. Width of Flag Leaf (WOFL) and Number of Seeds/Panicle (NOS/P) were almost similar in both treatments. 13.8 bushels were harvested from T2 whereas 10.4 bushels were given from T1 per 1011.7M². Total Cost of Fertilizer Application (COFA) was indicated as higher value in T2 (Rs. 1853.85) comparing to T1 (Rs. 1302.90).

4. Conclusions

EFL fertilizer with NPK application (T2) has shown better performances than T1 in most of the parameters even though the result was not statically significant. Most importantly, rice yield was increased with EFL fertilizer. In addition, there were no pests and diseases incidents in T2. Average cost for application of EFL fertilizer was greater than Inorganic fertilizer as EFL should be sprayed twice as foliar application. Bacterial blight (*Xanthomonas oryzae*) was found in T1 and controlled by using Carbendazim pesticide. Further improvement of EFL fertilizer may leads to commercialized and it will give promising results in paddy cultivation, which helps to cut down inorganic fertilizer application while increasing rice productivity.

5. References

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