Ministry of Agriculture, Livestock and Irrigation
Department of Agriculture
(Seed Division)

Study on the effect of Organic and Inorganic fertilizers on Growth, Yield and Eating quality of Sin Thu Kha Rice Variety in Tha–Yaung Chaung Seed Farm, Pathein Township

Kyi Kyi Oo
Assistant Staff Officer
Tha–Yaung–Chaung Seed Farm, Pathein Township
Ayeyarwaddy Region

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Introduction

- Most important crop and staple food of Asia
- As the world population is increasing year by year, the demand for rice is also increased by 1.13% per year from 1998 to 2020
- By 2030, rice production must reach at least 19.40 million metric tons (MT) , about 60% of which is for local food consumption and 40% for international trade

(MOALI 2015)

Introduction (cont.)

- Chemical fertilizer application plays a vital role in enhancing rice (*Oryza sativa* L.) grain yield, which has been considered as an effective channel to address the food safety issue due to an increasing population

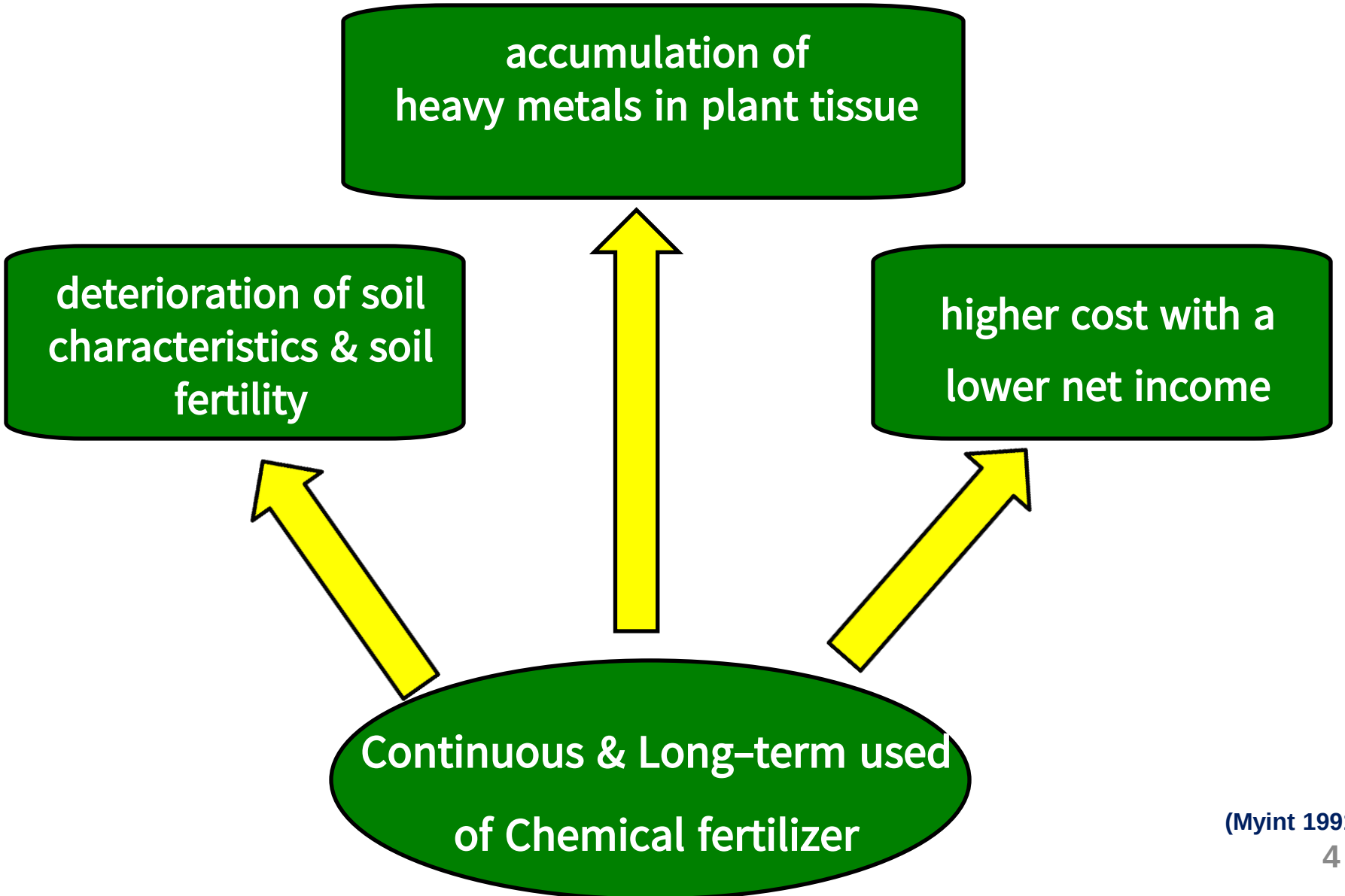
- In recent years, the input of chemical fertilizer is rising rapidly and N and P have been overused in rice production, leading to not only environmental pollution but also an increase in production cost

(Asman et al., 1998)





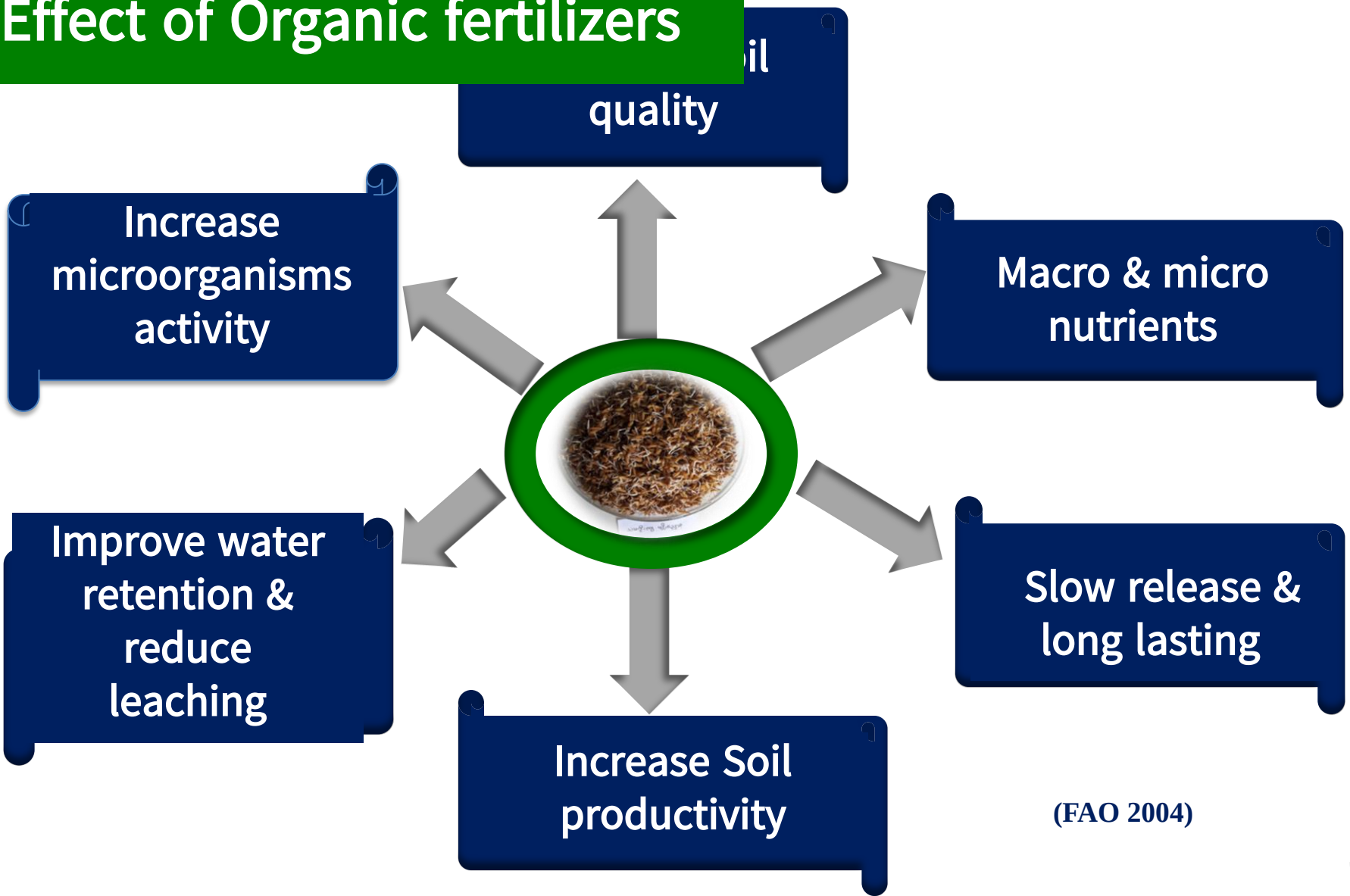
Introduction (cont.)



(Myint 1991)

Introduction (cont.)

Effect of Organic fertilizers



(FAO 2004)

Nutrients content in Manda – 31 Natural Fertilizer

SL	Nutrient in Output	
	Content	(%)
1	N (Nitrogen)	1.792
2	P (Phosphorous)	0.5217
3	K (Potassium)	1.514
4	S (Sulphur)	0.135
5	Na (Sodium)	3.5642
6	Zinc (Zn)	0.0147
7	Fe (Iron)	0.33092
8	Mn (Manganize)	0.00933
9	B (Boron)	0.00688
10	Mg (magnesium)	0.48
11	Ca (Calcium)	5.5
12	Cu (Cupper)	0.00307

Combined use of Organic & Inorganic Fertilizers

necessary for sustainable agriculture → ensure food production with high quality → reduce application of Chemical Fertilizer → reducing cost of production

(Shambo et al . 2001)

Objectives

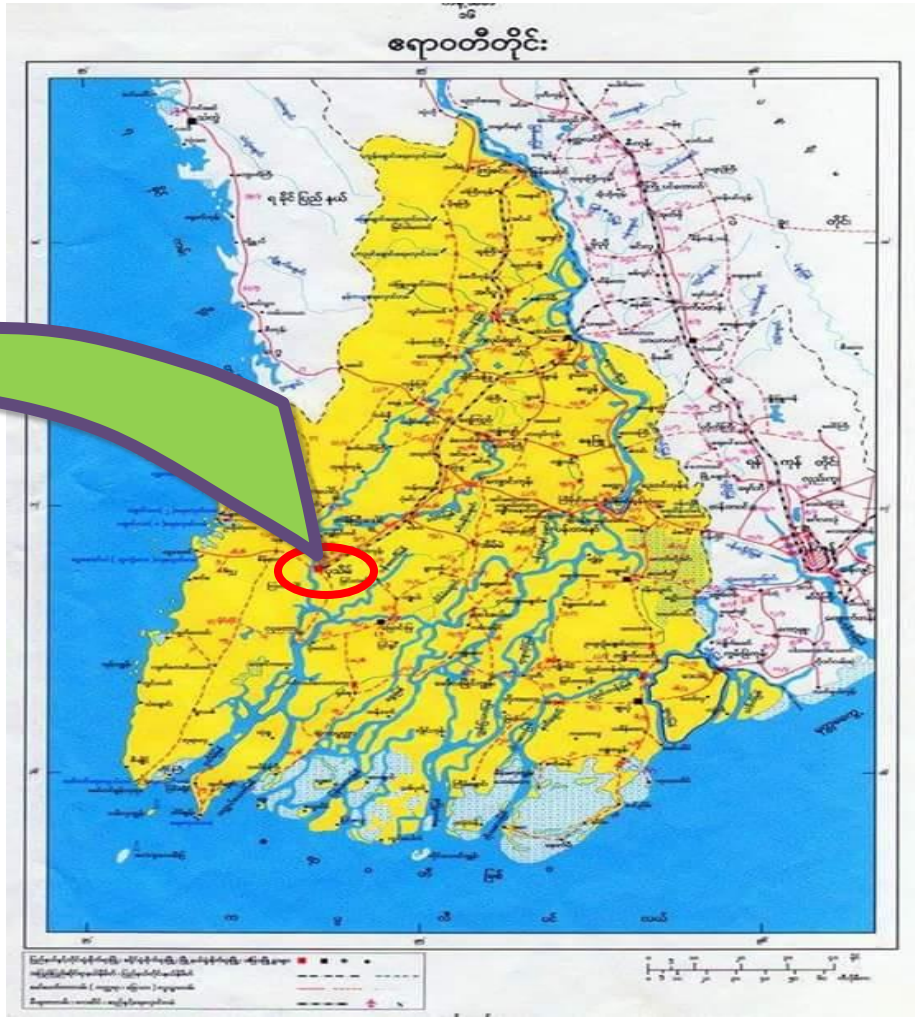
1. To evaluate the effect of organic and inorganic fertilizers on growth and yield of Sin Thu Kha rice variety

2. To study the effects of organic and inorganic fertilizers on soil physicochemical properties of Sin Thu Kha rice variety in Tha –Yaung Chaung Soil condition

3. To evaluate the effects of organic and inorganic fertilizers on eating quality of Sin Thu Kha rice varieties

Materials and Methods

Experimental site



First experiment	–	Monsoon – 2016
Second experiment	–	Monsoon – 2017
Third experiment	–	Monsoon – 2018
Experimental Design	–	Simple Trial
Test cultivar	–	Sin Thu Kha Rice Variety
Plot Size	–	0.10ac
Spacing	–	7 inch x 6 inch





Treatments

- ✓ T_1 Organic Fertilizer (Manda–31 Natural Fertilizer) + Chemical Fertilizers (Urea + Compound + Potash Fertilizer)

- ✓ T_2 Chemical Fertilizers (Urea + Compound + Potash Fertilizer)

Rate of Fertilizers

Manda–31 Natural Fertilizer	= 297 cc/ac
Urea Fertilizer	= 12.5 kg/ac
Compound Fertilizer (20–10–10 + S + Zn)	= 75 kg/ac
Potash Fertilizer	= 12.5 kg/ac

Time and Rate of Chemical Fertilizers application

(1) Basal application – Compound Fertilizer (37.5 kg/ac)
(2) Active Tillering Stage – Urea Fertilizer (12.5 kg/ac) + Compound Fertilizer (12.5kg/ac)
(3) Panicle Initiation Stage – Potash Fertilizer (12.5 kg/ac)

Time and Rate of Manda Fertilizer application

(1) Seed Soaking – Manda – 31 (1cc/4gal)

(2) Seedling Field

Seedling Age	Manda – 31
7 days	2cc/water 4 gal (20cc/ac)
14 days	4cc/water 4 gal (40cc/ac)

(3) Transplanting Field

	– Days After Transplanting	Manda–31 (cc/ac)
Tillering Stage	10 DAT	40
	20 DAT	50
	30 DAT	50
	40 DAT	50
PI Stage	60 DAT	50
	70 DAT	50

Data collection

Measurement parameters for plant

Plant height and number of tillers – recorded at 15 DAT, 30DAT and 45 DAT after transplanting

- Plant height
- Panicle per hill
- 50% flowering date
- Panicle length
- Spikelet per panicle
- Fill / unfill grain
- Percentage of fill grain
- 1000 grains weight(14%MC)
- Y – Method
- Yield per acre on small plot (14% MC)
- Actual yield per acre
- Milling recovery (%)
- Raw rice measurement
- Cooking rice measurement

Table 2 . Measurement of some Physicochemical Properties of the soil sample

(Initial & After sowing Analysis)

Properties	Rating(content)		
	Initial Soil Sample	T_1 (OF + CF)	T2 (CF only)
Organic Carbon %	1. 04	1. 24	1.14
pH	4.24	4.47	4.35
EC (ds m^{-1})	0.09	0.11	0.14
Total N (%)	0.12%	0.14%	0.14%
Available P (mg/kg)	1.21(Medium)	2 .05(Medium)	1.5 (Medium)
Available K2O (mg/kg)	7.9 (Low)	11.07 (Low)	8.58 (Low)
Exchangeable Cation(meq/100gm) Ca, Mg, K	5.11, 1.28, 0.11	6.15, 0.68, 0. 24	5.45, 1.36, 0.18

Soil Analysis Data by Land Use Division

Results and Discussion

Monsoon Season

2016 – 2018

Results and Discussion

Sr	Results of Title	Results of Experiment	
		T_1 (OF + CF)	T2 (CF)
	Seed Soaking with Water		
1	Seed Rate	4 Pyi	4 Pyi
2	Seed Sprouting	7 Pyi	6 Pyi
3	Percentage of Germination	95%	90%
4	Fermented smellable	Non	Fermented smell

Results and Discussion (Cont.)

Sr	Results of Title	Results of Experiment	
		T_1 (OF + CF)	T2 (CF)
	Seedling Field		
1	15 DAT		
	Numbers of Leaves	1.5	1.2
	Root Length	13 cm	11.7 cm
2	30 DAT		
	Plant Height	44.8 cm	42 cm
	Numbers of Leaves	6	5
	Root Length	8.4 cm	7.5 cm
	Leave color	Dark green	Green
	Colour of Stem	Green	Pale Green

Results and Discussion (Cont.)

Sr	Results of Title	Results of Experiment	
		T_1 (OF+ CF)	T2 (CF)
	After Transplanting		
1	15 DAT		
	Plant height (cm)	64.19	56.77
	Tillers	7.8	7.7
2	30 DAT		
	Plant height (cm)	79. 28	76.95
	Tillers	9.7	9.4
3	45 DAT		
	Plant height (cm)	83	80
	Tillers	11. 2	10.8

Results and Discussion (Cont.)

Sr	Results of Title	Results of Experiment	
		T_1 (OF +CF)	T_2 (CF)
	Results in harvesting time		
1	Plant height (cm)	101.5cm	99 cm
2	Colour of Plants	Dark green	Green
3	Panicle Length	20.1 cm	19.1 cm
4	Tiller per Hill	7.5	7
5	Spikelet per Panicle	130	126
6	Filled Grain	108	103
7	Unfilled Grain	22	23
8	Fill Grain (%)	83.08%	81.75%
9	1000 Grain Weight (g) (MC 14%)	21.1	20.7
10	Plant population per acre	149348	149348
11	Yield component basket per acre (MC 14%)	122.2	106.7
12	Yield per Small Plot (MC 14%)	7.9bsk	6.8 bsk
13	Actual yield per Acre	79 bsk	68 bsk

Results and Discussion (Cont.)

Sr	Results of Title	Results of Experiment	
		T_1 (OF+ CF)	T2 (CF)
14	Eating Quality Status	Medium soft, little sticky, white	Low sticky, little yellowish rice
15	Percentage of milling rice	60.5%	53.3%
16	Length of raw rice	6 mm	5.96 mm
17	Length of cooking rice	10.4 mm	10 mm
18	Cooking rice: Rice	1.73	1.67

Conclusion & Suggestions

Suggestions

- Not only Organic fertilizer (Manure) source increased by extraction but also other Organic Fertilizers such as (Manure) source by animals should be examined.
- If cost and benefit point of view, not only Chemical fertilizer (Recommendation rate) + Organic fertilizer and Chemical fertilizer (low rate) + Organic fertilizer should be examined.
- Exportation potential and Nutrients composition should also be examined for future ongoing studied

Growth parameters & yield (Panicle), soil physical & chemical Properties of the soil were more improve after combined application of Organic fertilizer and Chemical fertilizers (Table 1) showed (improve) grain quality and also percentages of milling rice more than 7% than that of Chemical fertilizer alone.

Thank You