



# ASSESSMENT OF EFFECTS FROM LIQUID WASTE OF BIOGAS PLANT ON EXPERIMENTAL RICE CULTIVATION AT HAU MY BAC B, TIEN GIANG, VIET NAM.



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## Introduction

Nowadays the conversion from conventional to organic agriculture, specifically for paddy rice, greatly increases sustainability of agriculture. Therefore, mineral fertilizers should be replaced with organic fertilizers, e.g. by using of organic residues as liquid waste from biogas plants. Rice production in Vietnam contributes more than 50% of the GHG emission from agriculture. A large quantity of agriculture waste accumulate in the Mekong Delta of Vietnam. There is a big potential by using this organic waste in biogas plants for producing of electricity. In the period until 2020 could produced 94.2 million MWh/year from rice straw, 18.5 million MWh/year from rice husk, 3.66 million MWh/year from bagasse, and 3.02 million MWh/year from corn straw.

Therefore, an experiment was designed in the Mekong delta with mineral and organic fertilizer treatments. This research focused on using liquid waste from biogas plant as organic fertilizer to replace mineral fertilizer for rice cultivation. The results of the study will show the ability and benefits of the use of biological fertilizers from anaerobic fermentation on the basis of the analysis of the indicators of rice growth, quantity of microorganism and quality of field land.



Conventional way of soil preparation after harvesting of rice grains

## Materials and Methods

An experimental plot was used in a block design with four treatments:

1. 100% mineral fertilizer,
2. 100% organic fertilizer,
3. 50% mineral fertilizer -50% organic fertilizer,
4. 75% mineral fertilizer -25% organic fertilizer.

The treatments were differentiated based on the amount of nitrogen, whereas the basic was 55 N kg/ha.

The size of one field plot was 9 m<sup>2</sup>, every treatment with 3 repetitions.

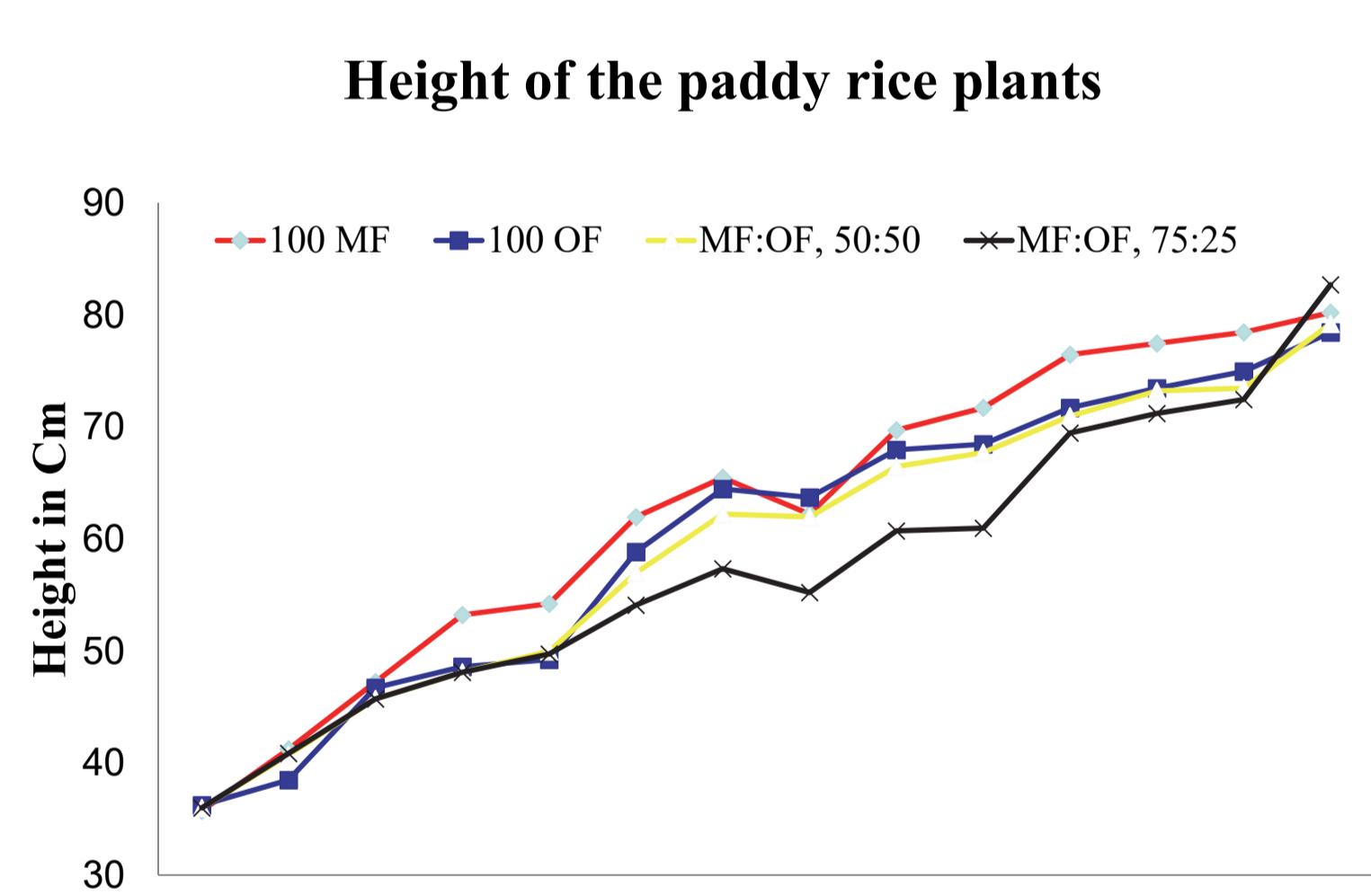
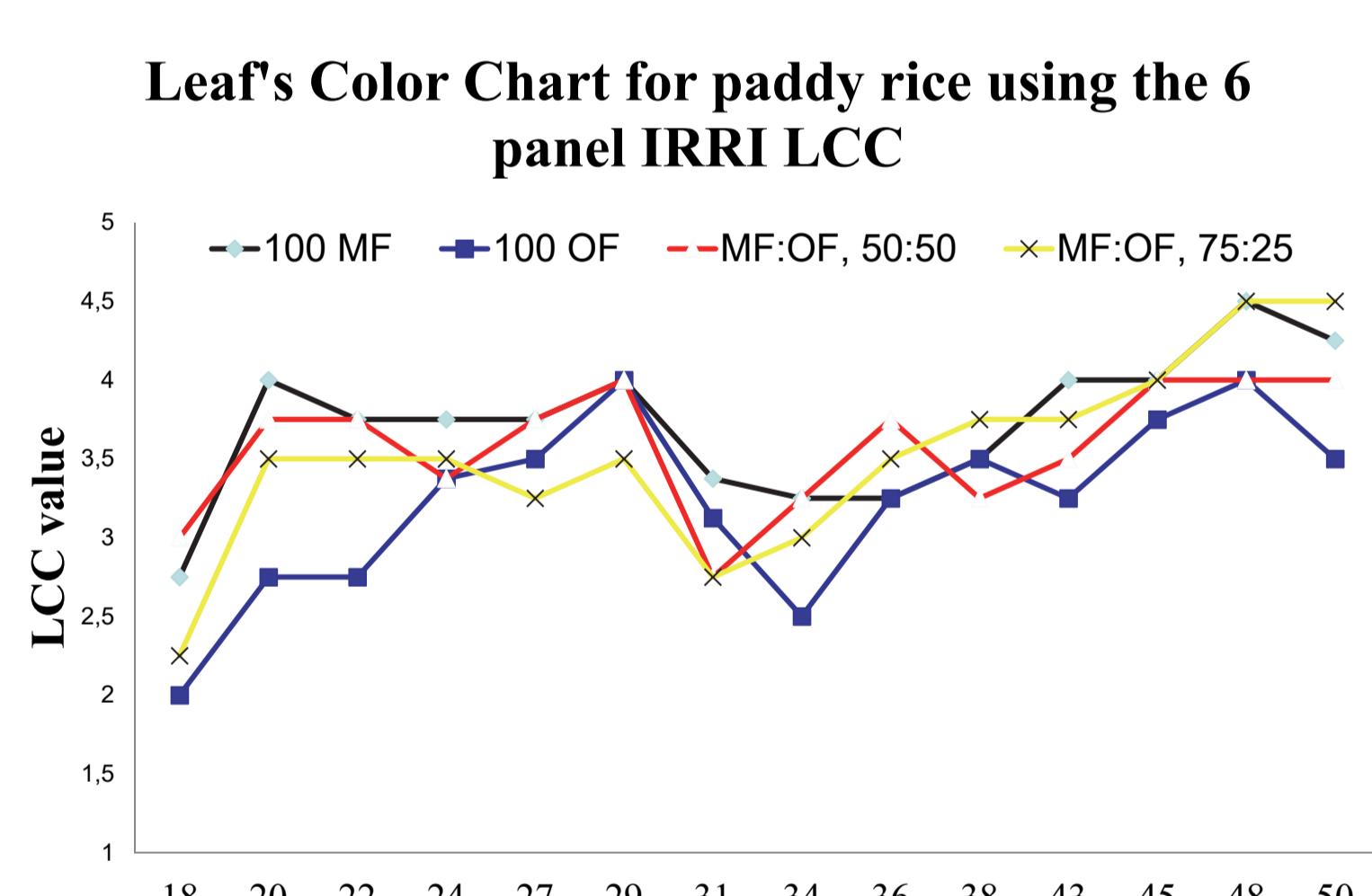
The parameters collected include:

- Leaf's Color Chart (LCC) method.
  - Length of nods
  - Plant height
  - Length of the paddy rice inflorescences
  - Number of seeds per rice ear and number of branches on rice flower
- Furthermore was analyzed in the plants after harvesting:
- Total nitrogen
  - Total potassium
  - Total phosphorus

## Results

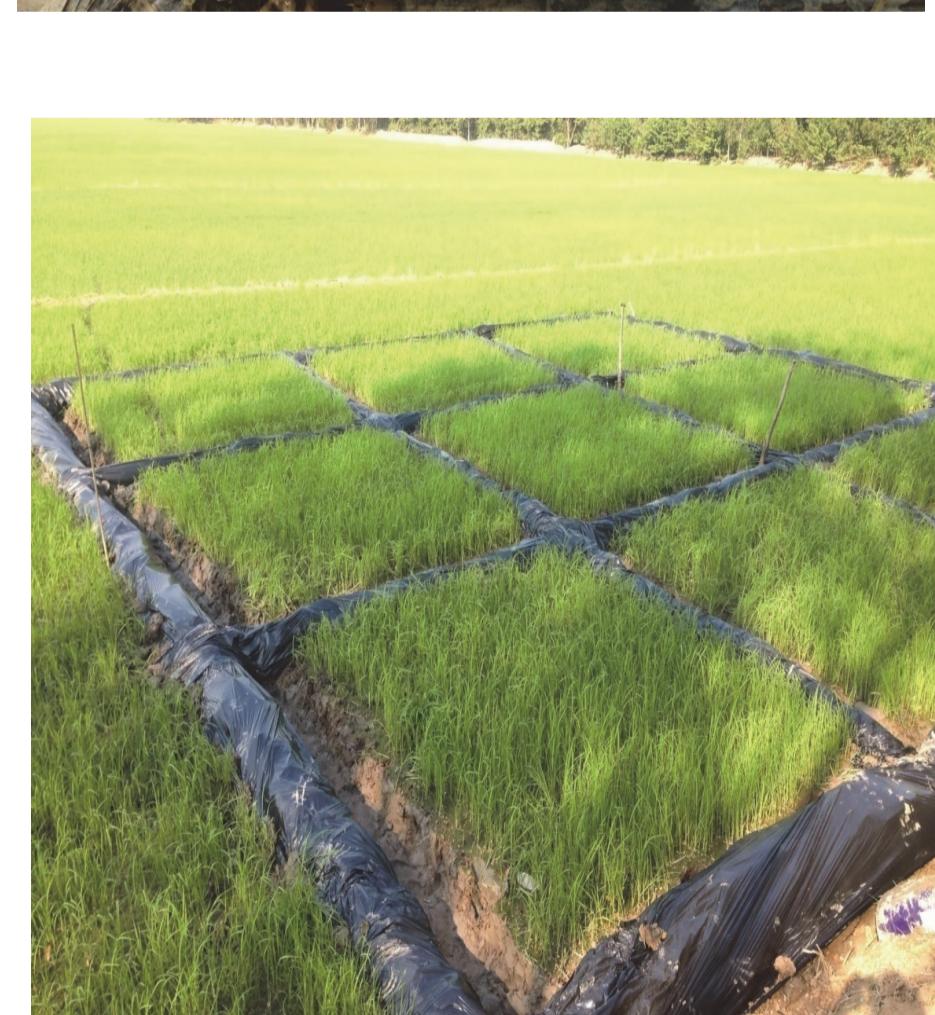
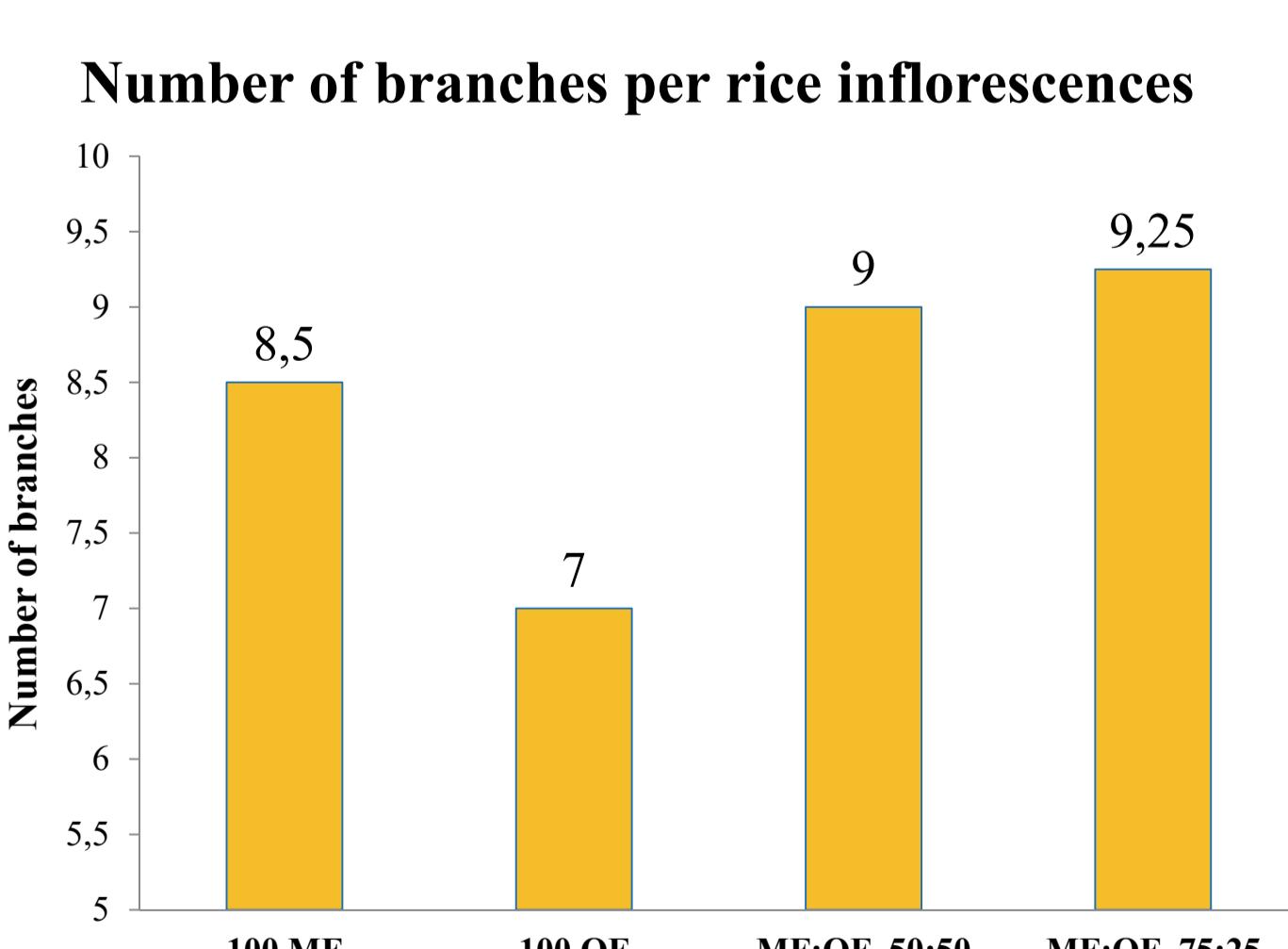
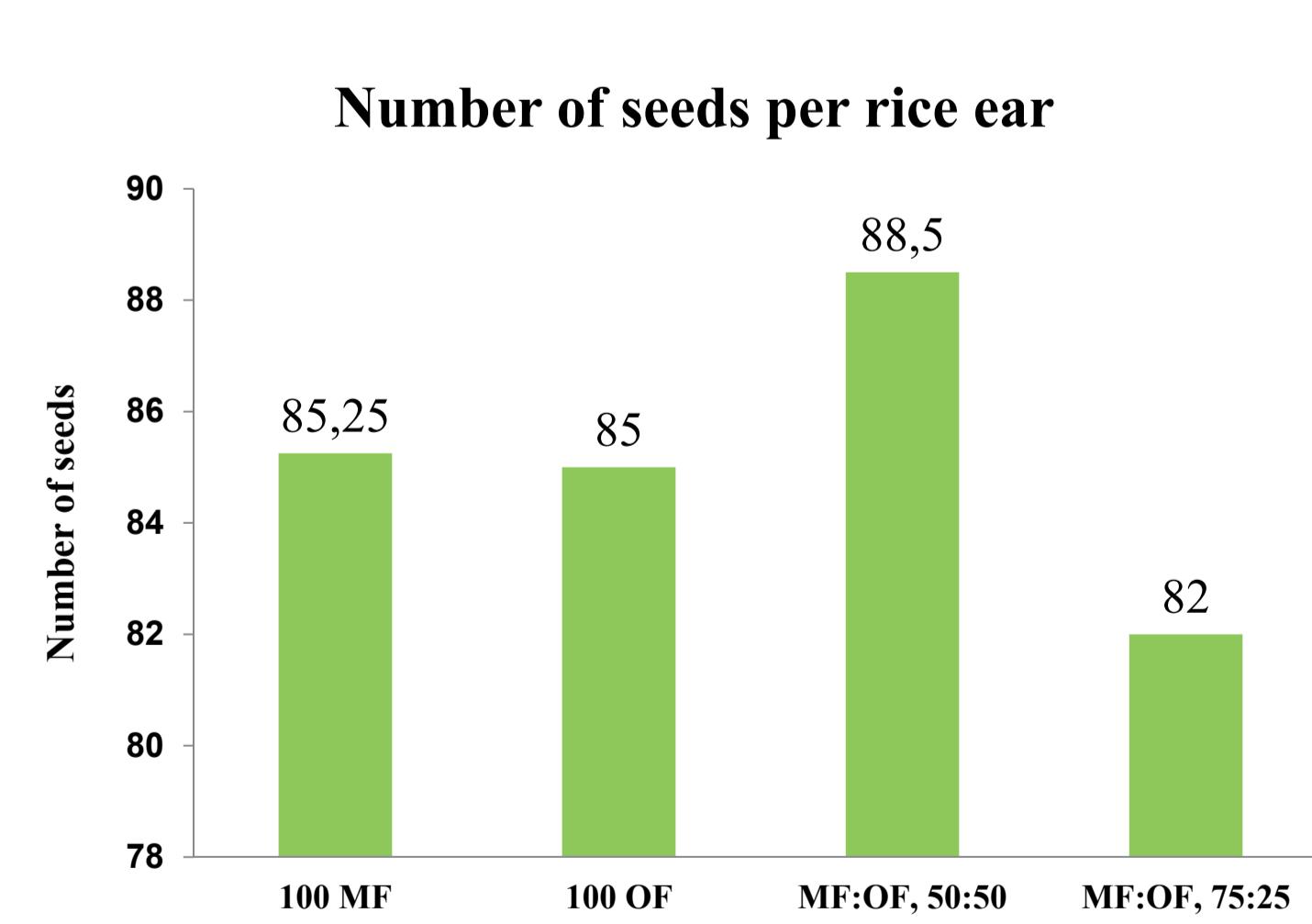
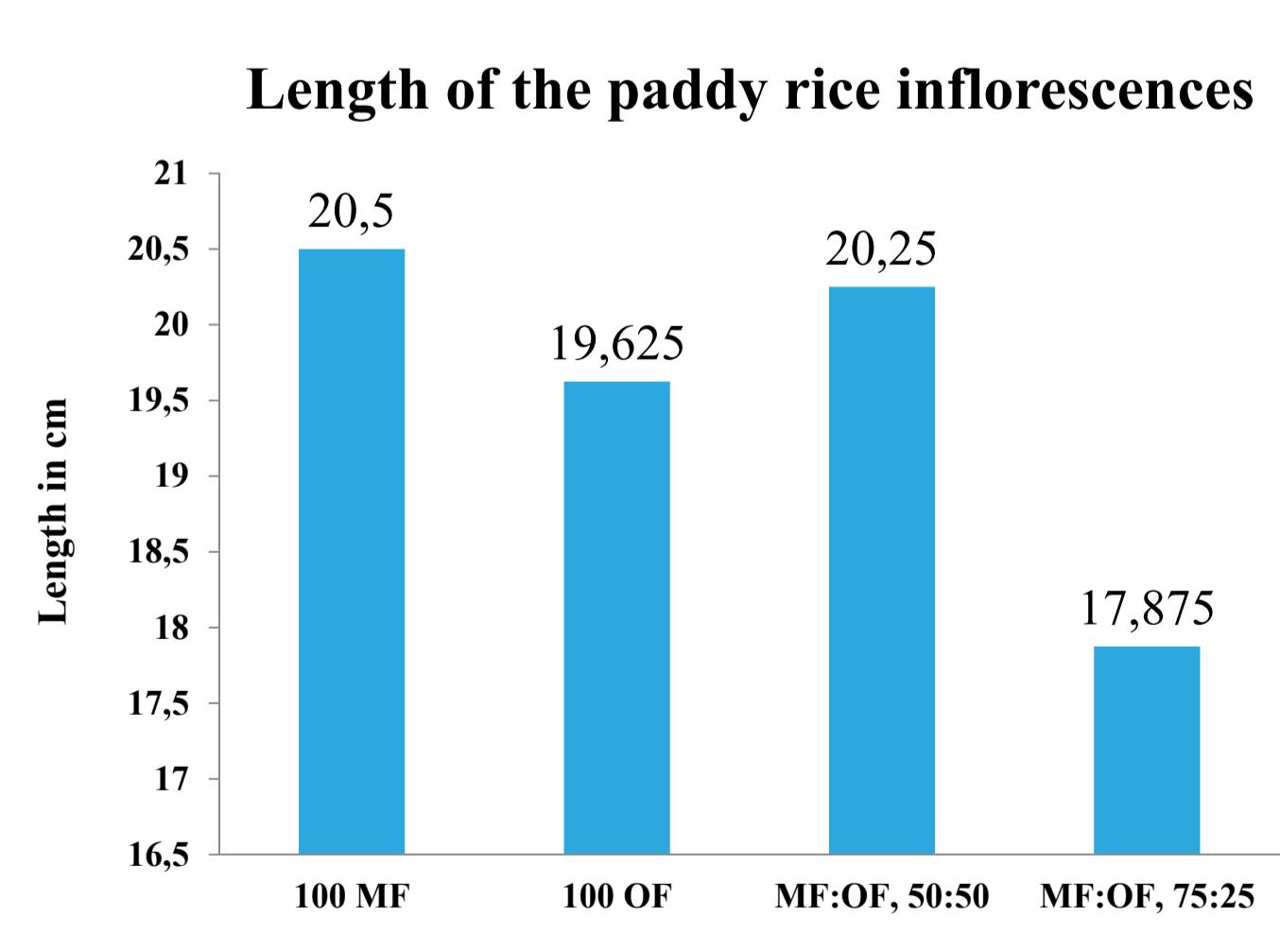
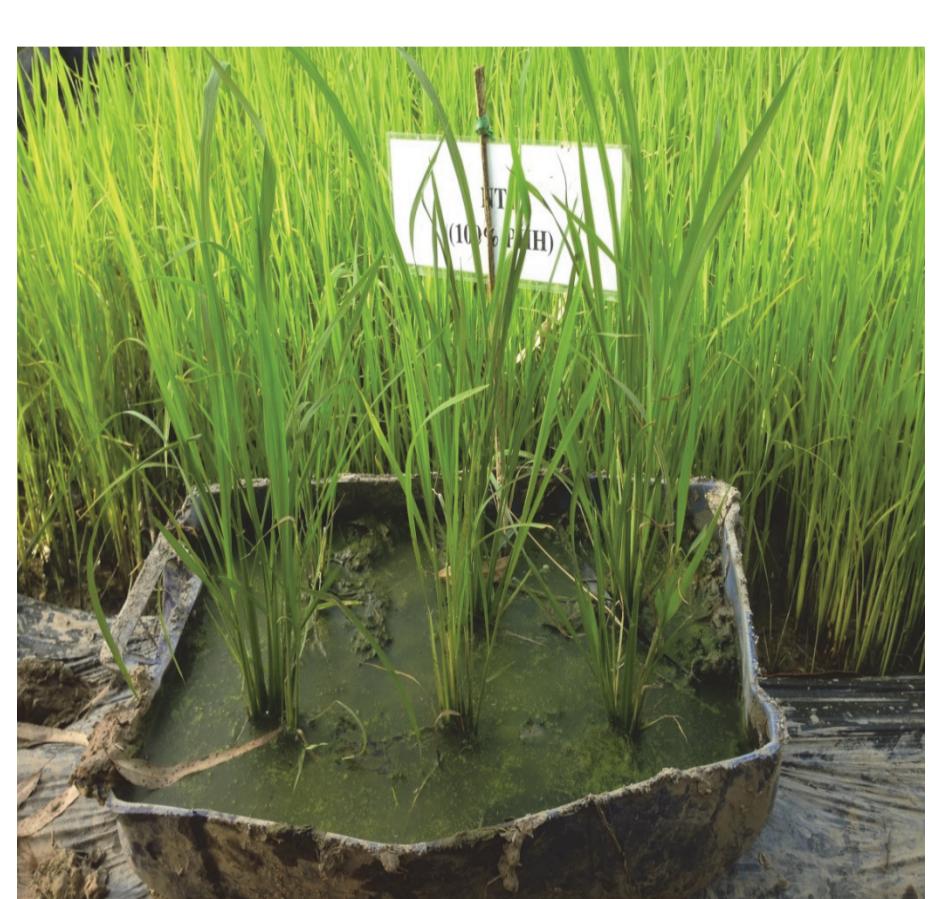
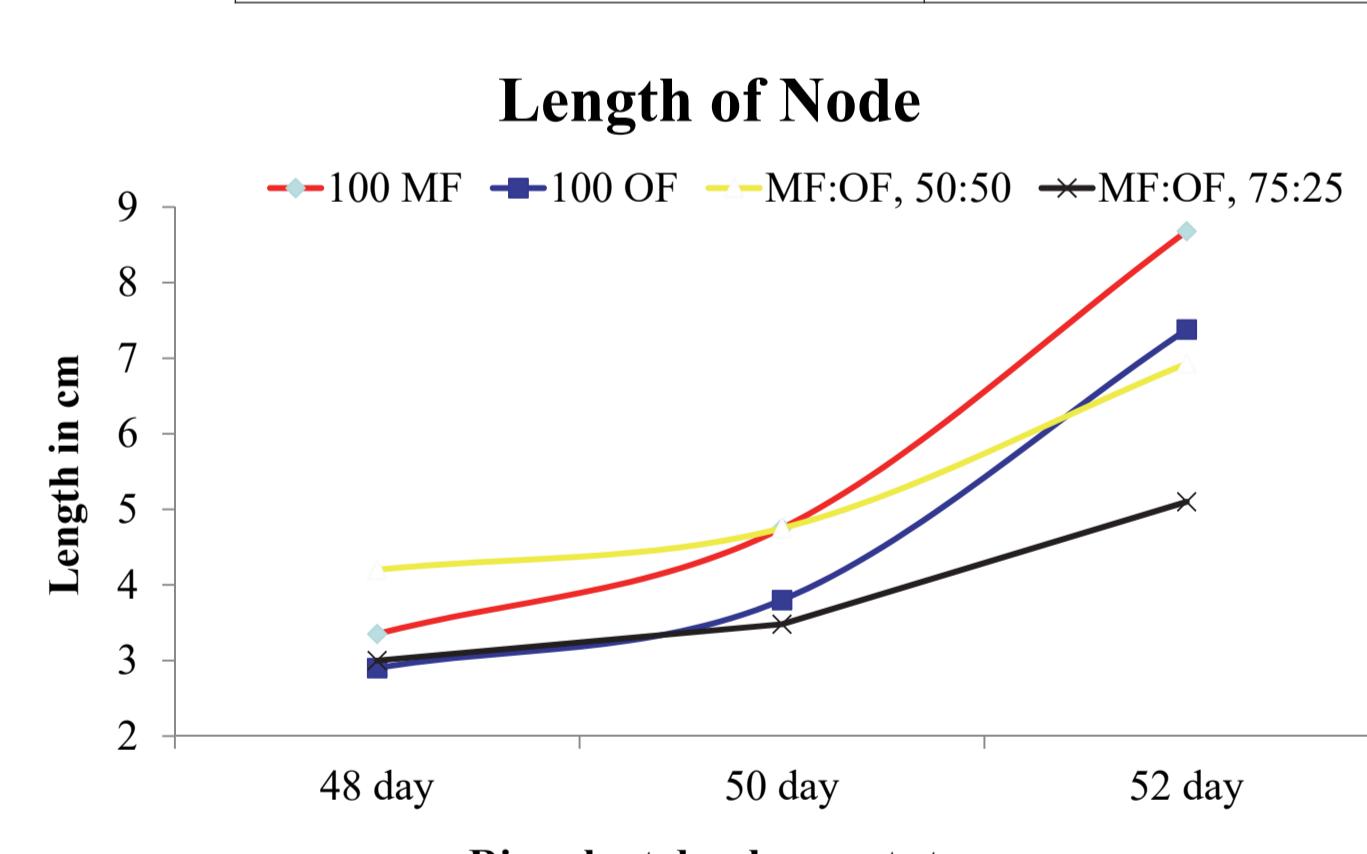
### Results of different parameters of all treatments after 50 days of the experiment

Parameters	Treatments			
	1	2	3	4
N (mg/Kg)	1440	1140	1470	1120
P (mg/Kg)	488	361	502	447
K (mg/Kg)	845	807	972	884
Leaf's Colour Chart (LCC)	4.25 ± 0.43	3.50 ± 0.71	4.00 ± 0.71	4.50 ± 0.43
Plant Height	80.25 ± 2.28	78.50 ± 5.12	79.25 ± 2.17	82.75 ± 2.05
Length of Nods	3.35 ± 0.63	3.80 ± 0.58	4.20 ± 1.30	3.00 ± 0.63



### Initial characteristics of soil

Test content	Field sample
N (mg/Kg)	50
P (mg/Kg)	80
K (mg/Kg)	170
Organic (mg/Kg)	850
Moisture (%)	28.2
pH	7.07



## Conclusions

The leaf's colour LCC of IRRI 6 panel method with an average of 3.75 had no significant differences between the treatments.

Also not significant difference was visible for the plant height between all treatments.

Whereas the length of node is significant different between treatments.

The rice yield of all treatments ranged from 0,794-1,010 kg/m<sup>2</sup>.

Based on initial analysis results, the liquid digestate from the Biogas Plant can be used as bio-fertilizer source in order to replace mineral fertilizer in rice cultivation.

Further studies are necessary to confirm that organic fertilizer based on liquid digestate has an significant positive effect on paddy rice yield.