The Compost Made of Sludge from Banglen Water Treatment Plant for Gor Khor 41 Rice Farming

1. Abstract

We compost between the sludge from the water treatment plant and the organic waste at 3 different ratios by weight i.e. 1:2, 1:1, and 2:1, and also make one set of controller mixed between soil and organic waste at ratio of 1:2 by weight. Then, we collect the sample of the compost after 35 days of deterioration and find that the compost made of sludge and organic waste at the ratio of 1:2 contains the maximum organic matter by 7.38%. In which, it comprises Nitrogen, Phosphorus, and Potassium by 0.67%, 0.006% and 0.02%, respectively. However, such percentages are still below the standard of the organic fertilizer stipulated in the Fertilizer Act B.E. 2548.

We experiment by using the compost made of sludge and organic waste at the ratio of 1:2 to mix with the chemical fertilizer for 5 different ratios by weight i.e. 0:1, 100% sludge, 1:1, 3:1 and 1:3. It reveals that to mix between the compost and chemical fertilizer at the ratio of 1:3 provides the maximum rice crop at 999 kg./rai. Even though, this productivity is still less than using only chemical fertilizer which provides 1,278 kg./rai, it can comply with the criteria of Gor Khor 41 rice standard of Rice Department of Thailand, B.E.2553.

2. Introduction

The process to treat the natural raw water always creates the sludge which is from the sedimentation process due to the chemical reaction with liquid alum and polymers. This process is carried out by Banglen Water Treatment Plant of TTW Public Company Limited with maximum capacity of 440,000 cubic meter/day. Our water treatment plant generates the sludge around 20 ton/day causing the difficulty in transportation and landfill.

3. Objectives

3.1 To study the optimum ratio to mix between sludge and organic waste to make the compost.

3.2 To study the amount of nutrients in the compost made of sludge and organic waste.

3.3 To evaluate the performance of the compost made of sludge and organic waste mixed with chemical fertilizer towards the growth of Gor Khor 41 rice crop.

Procedure

1.Preparation and Planning

Step 1 Collect the soil from Banglen district, Nakhon Pathom and crash such soil to become small particles and mix all of them harmonically.

Step 2 Weight the soil and put into the flowerpot by 6 kg. per pot together with chemical fertilizer at the ratio of 1:3 for totally 15 pots.

Step 3 Plan the experiment as Completely Randomized Design (CRD) and repeat the experiment 3 times by changing the ratio between the compost and chemical fertilizer as described above.

Step 4 Consider the amount of nutrients equivalent to chemical fertilizer formula number 16-20-0 and 46-0-0 including the 5 different ratios as below:

A1 : 100% chemical fertilizer
A2 : 100% sludge
A3 : The compost + chemical fertilizer at 1:1 by weight
A4 : The compost + chemical fertilizer at 3:1 by weight
A5 : The compost + chemical fertilizer at 1:3 by weight

2.Planting

Step 1 Prepare the Gor Khor 41 rice sprouts by soaking them in the water for 1 night and drop each of them in the prepared hole filled with black paddy husk and daily water them until 21 days.

Step 2 Plant 3 rice sprouts into 1 pot and wait until 14 days, then, remove rice sprouts from the pot but leaving only 1 rice sprout per 1 pot. Put the compost and/or chemical fertilizer according to 5 different ratios on the soil.

3.Maintenance

Maintain the level of water in the pot around 5-10 cm. from the soil surface during the experiment and always remove the weeds by hand.

4. Recording and Sampling

Step 1 Record the height and amount of rice sprouts weekly.

Step 2 Harvest the rice when it is fully ripe (or when it is about 110 days old)

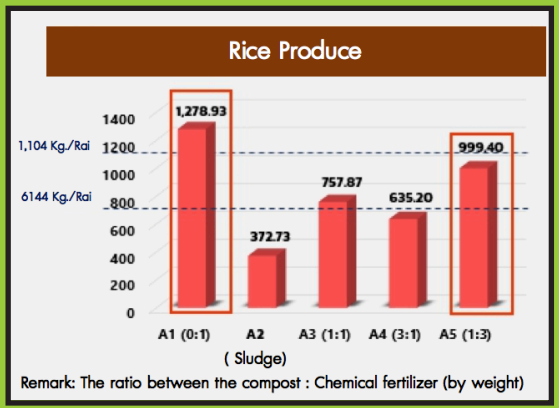
Step 3 Count the amount of ear of paddy, and weight the fresh rice and dry rice for both parts above and under the soil.

4. Results

When we use the compost together with chemical fertilizer to grow the Gor Khor 41 rice at the ratio of 1:3 by weight, it provides the maximum crop around 999 kg./rai less than the crop with only chemical fertilizer which provides 1,278 kg./rai. However, the result is still in line with the standard for Gor Khor 41 rice farm. Hence, our compost is suitable to be the material for quality enhancement in soil due to the fact that it increases organic matter and nutrients to the soil. Furthermore, it also enables the soil to contain more water and withstand the acidity and alkalinity very well.

Parameter	Result	Standard
Moisture (%)	42.89	≤ 35
Organic Matter (%)	7.38	≤ 30
pH	6.88	5.5-8.5
EC (dS/m)	3.10	< 6
C/N ratio	6.14 : 1	≤ 20.1
Total N (%)	0.67	≥ 1.0
Available P (%)	0.006	≥ 0.5
Exchangeable K (%)	0.02	≥ 0.5
Total Pb (mg/kg)	58.29	≤ 500
Total Cd (mg/kg)	2.03	≤ 5
Total Cr (mg/kg)	19.88	≤ 300
Total Cu (mg/kg)	20.00	≤ 500

Source: The Notification of Department of Agriculture, The Standard of Organic Fertilizer B.E. 2548 announced in Royal Gazette



5. Suggestion

5.1 The compost can be applied for other farm plants or garden plants or flowers due to the fact that other plants need different nutrients.

5.2 This experiment will be the guideline to support other agricultural plantation located nearby the water treatment plant by using the sludge to add value to any waste.

5.3 Create the manual to produce the compost from sludge of the water treatment plant and organic waste in order to grow Gor Khor 41 rice.

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