Title:	The analysis and improvement the quality of soil in King Mongkut's University of Technology Thonburi Bangkhuntien Campus
Field:	Environmental Science and Ecology
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Abstract

The King Mongkut's University of Technology Thonburi, Bangkhuntian Campus were located near the mangrove forest. It was divided into seven zones. The survey was shown that in 3rd zone was the one of all zones, the plants could not grow and salt flakes was found on the soil surface in area. In the quality analysis of 3rd zone soil sample was found that the soil moisture content was 4.5%, pH value was 7.79, specific conductivity value was 7.8 ds / m, the amount of soil organic matter was 0.42%, the amount of phosphorus and nitrogen were 0.89 PPM and 2.44 PPT, respectively. From the results could indicated that in the 3rd zone was facing saline soil problem and that parameters were very lower than Land develop department's standard (2010) parameters. So, the purpose of this project is to investigate and improve problematic soils. The soils must be repaired for plants to grow properly. This experiment was used the fertilizers to repaired the soil, which divided into four types such as chicken manure, chemical fertilizer formula 20-11-11, chicken manure mixed with chemical fertilizer, and organic fertilizer from the industrial waste sludge (Biosoil). Each type of fertilizers was mixed with the 3rd zone soil samples. After that, Chinese morning glory was selected for planting trials for soil quality testing.

Keyword :   Soil quality, Fertilizer, Chinese Morning Glory

Introduction

Saline soil is a one problem in the agriculture.These problem often occur in the sea or mangrove forest area. Because the soil absorbs salt that was soluble in water from the sea and keeps into soil particles. As a result, the plants root can absorb water into system hardly and can not use this soil for planting. (Department of Mineral Resources ,2016) There are three main ways to solve the saline soil problem including the engineering methods such as improving soil for better infiltration and water absorption, plan and adjust the drainage area. Second method was the biological methods such as salt tolerant crops and the usage of organic compounds to improve soil and the last one was the

chemical methods such as the usage of chemical soil improvements suitable for a problem soil (Basic anthropology ,1998). From the soil quality analysis was found that the soil lack of a nutrition. So, the chemical methods such as a fertilizer was used to improvement the soil because there ability to providing high nutrient, low cost and short time to solve the problem. The fertilizers in the experiment could divided into two type including a organic fertilizers and inorganic fertilizers. An Organic fertilizers in the experiment was a chicken manure because there are a lot of the amount of nitrogen in urea from. At the same time an inorganic fertilizer in the experiment was a chemical fertilizer formula 16-16-16. That fertilizer can increase a nutrients such as nitrogen, phosphorus and potassium. It will be experimented with the Chinese morning glory. The result of this experiment will be applied to solve the problem of soil in other areas in the future.

Methodology:

1. Sample collection

1.1 Make the 2 x 2 m^2 size of table by the plastic rope on the random areas

1.2 Choose to dig a hole about 30 cm deep in 5 positions.
1.3 Mix the all of soil together.
1.4 Drying soil by sunlight

1.5 Keep it in the bags for the experimen4444t.

2. Checking Soil Chemistry

2.1 Soil pH

2.1.1 Dissolve 20 g of soil sample with water at a ratio 1:5 (w/v).

2.1.2 Stir the soil solution about 5 minutes and wait 30 minutes.

2.1.3 Filtrate soil solution by a filter paper and vacuum pump into the bottle.

2.1.4 Determine the pH value by pH meter.

2.2 Soil Electrical Conductivity (EC)

2.2.1 Following the 2.1.1-2.1.3

2.2.2 Determine the EC value by EC meter.

2.2.3 Calculate the EC value according to following equation.

$$EC_e = \frac{EC_t \times 6.0}{1 + 0.02(t - 25)}$$

Determined

EC_e	=	The EC of 25°C.
EC_t	=	The EC of t°C.
t	=	Temperature.

2.3 Soil Moisure

2.3.1 Prepare 10 g of soil sample into a ceramic plate. (Record to a weight of wet soil)

2.3.2 Burning in hot air oven about 105°C for 24 hours.

2.3.3 After that the soil was measure the weight after burning and record to a weight of dry soil.

2.3.4 Calculate the soil moisture according to following equation.

$$\% \text{ Moisure} = \frac{[\text{Weight of wet soil}-\text{Weight of dry soil}]\times100}{\text{Weight of wet soil}}$$

2.4 Organic Matter (OM)

2.4.1 Used soil in 3.4

2.4.2 Burning in the furnace about 600°C for 6-7 hours.

2.4.3 Recording soil weight after burned

2.4.4 Calculate the % OM according to following equation.

$$\% \text{ OM} = \frac{[\text{Weight of wet soil}-\text{Weight of burned soil}]\times100}{\text{Weight of wet soil}}$$

2.5 Nitrogen, Phosphorus and Potassium

The amount of nitrogen, phosphorus and potassium in the soil were determined by KU Soil Test Kit (Attanandana *et al.*, 1999)

3. Soil Improvement

3.1. Preparing Soil for planting

In the experiment 5 treatments were used for soil improvement. Each treatment were consist of the fertilizer and soil sample with the total volume was 1.5 kg. The first treatment was 3 vases of chicken manure. The second treatment was 3 vases of chicken manure combine with chemical fertilizer (Pornmeeyoo *et al.,* 2012). The third treatment was 3 vases of biosoil and the next treatment was 2 vases of normal soil for a positive control. The last one of treatment was 2 vases of 3nd zone soil sample for a negative control. Moreover, the amount of nitrogen in each vases was 1 g/vase (Anugoolprasert *et.al.*, 2015) (Table 1).

Table 1. The amount of ingredients of each treatment

Improvement	Weight(g)				
	Zone 3	Chicken Manure	Chemical Fertilizer	Biosoil	Normal Soil
Treatment 1	1,163	337	-	-	-
Treatment 2	1,344	153.5	2.5	-	-
Treatment 3	1,050	-	-	450	-
Positive Control	-	-	-	-	1,500
Negative Control	1,500	-	-	-	-

3.2. Preparing plant for soil improvement quality

Firstly, soaked the Chinese morning glory seeds with the water for 1 night. After that, put seed into the small vases and watering everyday for 1 week. When the seed was grew, selected plant into the vase of each treatments.

3.3. Recording Data

Measuring the tall of plant and the number of leave every two day. After that is the process of data analysis and discussion.

Result and Discussion

The 3rd zone soil samples had the lowest nutrients and highest of organic matter when compared with the all of fertilizer. Chicken manure had the quality of nutrients and organic matter higher than other fertilizers. Biosoil had the organic matter in a normal level and high nutrients except ammonia and chemical fertilizer doesn't have ammonia because chemical fertilizer were kept nitrogen in nitrate forms. Moreover, the chemical fertilizer had low amount of phosphorus and high value of electrical conductivity because chemical fertilizer has high concentration of nutrition, therefore chemical fertilizer has high electrical conductivity when dissolved in water (Table 2).

Table 2. The value of each parameter of soil sample and three types of fertilizer.

Parameter	Sample			
	3nd zone soil sample	Biosoil	Chicken manure	Chemical fertilizer
moisture (%)	6.46	57.21	24.01	1.03
OM (%)	4.51	13.68	21.08	-
$EC_{1:5}$ (dS/m)	7.02	7.34	2.87	132.7
$pH_{1:5}$	7.00	13.65	9.37	4.75
Ammonium	low	low	very high	-
Nitrate	very low	high	high	very high
Phosphorus	low-medium	very high	very high	low-medium
Potassium	medium	medium - high	high	high

Conclusion

        Chicken manure had the highest the amount of nutrient and some of physical properties. So, it was the best fertilizer for improvement the soil problem when compared with the all of fertilizer that used in the experiment.

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