Comparative Study of Different Sewage Farming on Soil Quality

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ABSTRACT

Sewage Sludge contains high amount of nutrients in the form of wastewater. These wastewater are treated in Sewage treatment plant and separation of Sludge from wastewater is taken out using various technology. The sludge separated from wastewater is further treated in sludge treatment unit and removal of maximum amount of water are done using various equipment. The treated water is reused for various purposes or discharge into river bodies and the sludge after treatment are send to disposal site. This study focuses on the utilization of these sewage sludge as a fertilizer and comparison of this sludge with chemical fertilizer. The content of nutrient in sewage shows significant results on application with various plants and discussed the effect of sewage farming on soil quality.

KEYWORDS: Sewage Sludge, Chemical fertilizers, Normal soil, Nutrients value

1. INTRODUCTION

Sewage Sludge is one the major issue facing for any Sewage Treatment Plant for its proper disposal. The final Sludge collected from STP’s required large space for disposal and space should be far away from residential community. The dry sludge is rich in nutrient and contain significant amount of mix nutrients which is useful as a fertilizer. The study focus on the use of sewage sludge as a fertilizer and a comparison between normal soil and chemical fertilizer with sewage sludge is studied. Sewage sludge is dried and taken from 6.5 MLD STP Vrindavan Yojna which is SBR based STP.

The research also focus on the application of sewage sludge spread on near by area in plant premises which result in green grass all over where the sewage sludge spreaded. Further the application of sewage sludge is done on various plants grown in premises. The results show the significant growth of tomato over all the field. The use of sewage is cost economical, eco-friendly and doesn’t require enough attention for proper dosage. The sewage sludge as a fertilizer will solve the problem for disposal of sludge and providing almost zero costlier fertilizer to farmers.

2. METHODOLOGY AND EXPERIMENTAL SETUP

The comparative amount of nutrients in various soil are shown in the table 1

| Parameter | Dry Sludge | Normal Soil (%) | Chemical Fertilizer (%) |
|-----------|------------|-----------------|-------------------------|
| pH        | 8.3        |                 |                         |
| NO₃-N     | 38         | 0.9             | 4                       |
| NH₄-N     | 19.2       | 0.5             | 4.50                    |
| PO₄        | 40.3       | 0.3             | 19                      |
| K         | 4.2        | 2.8             | 19                      |
| SO₄       | 12.5       | 0.15            |                         |
| Moisture Content | 0.80 | 0.20            | 0.50                    |

Table1. Amount of nutrient in Soil
The water used for the irrigation of plants contain some amount of nutrient which is shown in table 2 which contain discharge parameter of STP

| Discharge Parameter | Inlet | Outlet |
|---------------------|-------|--------|
| Ph                  | 8.2   | 7.2    |
| COD                 | 256   | 40     |
| BOD                 | 190   | 12     |
| TSS                 | 165   | 10     |

Table2. Water quality of STP

Initially the dry sludge is mix with normal soil and group of three pot were prepared i.e one with normal soil, second with dry sludge mixture and third with chemical fertilizer.

Results were recorded every fifteen day. The growth of plant were observed for every method of plantation.

After 15th day the growth of seed is shown in fig2

In fig 3 the right side of pot contain normal soil plantation and left side pot contains sludge mixture soil.

3. RESULTS

After 60 day of plantation the growth of plant with sewage sludge is much better than other two. From the overall analysis that had been conducted, it was found that the plant being supplied by fertilizer had dead at early stage which is on 6th week. This was the overload content of nutrients in the fertilizer. Theoretically, daily sludge application using the designed concentration will not cause any major problem to the plant but differ to the daily fertilizer application which caused harm and toxicity to the plant.

|          | Dry Sludge (%) | Normal Soil (%) | Chemical Fertilizer (%) |
|----------|----------------|-----------------|-------------------------|
| pH       | 8.3            | 7.5             | 6.8                     |
| NO\textsubscript{3}N | 38             | 0.9             | 4                       |
| NH\textsubscript{4}N | 19.2           | 0.5             | 4.50                    |
| Total N  | 57.2           | 1.4             | 8.5                     |
| PO\textsubscript{4} | 14.2           | 0.5             | 19                      |
| N:P ratio| 4.02:1         | 2.8:1           | 0.44:1                  |
| K        | 4.2            | 2.8             | 19                      |
| SO\textsubscript{4} | 7.8            | 0.15            |                         |
| Moisture Content | 0.80           | 0.20            | 0.50                    |
| N:S ratio| 7.33:1         | 9.33:1          |                         |

Table3. Comparison of nutrients between sewage sludge and plants

The optimum N:P ratio for most plants ranges from 5:1 to 10:1. According to table 3 the sewage sludge provides the dosage in the optimum range of plant.

Growth Development of Alovera

Initially the aloveera taken on the first day for plantation were 5.6cms, 4.8cms and 4.2cms

| Aloveera Height | Initial (cms) | Final (cms) |
|-----------------|---------------|-------------|
| Sewage Sludge pot| 4.2           | 35          |
| Normal soil pot | 5.6           | 24          |
| Chemical fertilizer pot | 4.8 | 18 |

Table4. Height of Aloveera in different soil
4. CONCLUSION

Sewage sludge potentially contains nutrients which can be used as fertilizers in order to enhance the plant growth.

Major nutrients contain in sewage sludge is nitrogen, phosphorous, potassium and sulfur and might contains some micro nutrients.

Though the utilization of sewage sludge will solve the problem for the disposal of STP sludge and it can be reused for developing green belts in the premises and nearby areas of STP.

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