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Comparative Study of Biogas Production from some Organic Wastes by Fungal Biodegradation at Room Temperature.

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Abstract: *Society is today confronted with dwindling and depletion of fossil fuel , green house emission and the proliferation of wastes generated by municipalities, agriculture and industries.The conversion of these wastes to biogas will help in mitigating the above challenges. These challenges have necessitated research on the comparative study of the production of biogas from biodegradable organic wastes: elephant grass, maize cub, maize chaff and saw dust in the presence of yeast at room temperature(25^{oc}) and slurry condition of ratio 4g to 30cm^3.Elephant grass, sawdust, maize cub and maize chaff were dried in the sun for about two weeks and ground to fine particles separately in different mortals. 4g of each sample was weighed separately and placed in different digesters. 0.6g of yeast and 30cm^3 of water was added to the samples in the four different digesters. The results showed that maize curb produced 245 cm^3 of biogas, elephant grass produced 235 cm^3 of biogas, sawdust and maize chaff produced 116 cm^{3}and 670 cm^3 of biogas respectively. Maize chaff was found to produce the highest yield of biogas. Therefore, for maximum production of biogas, maize chaff is preferable above others. The graphs plotted show a similar pattern. it increases gradually for the first few days and a sudden rise as the days progress and finally reach a plateau(constant).*

KEY WORD*: Comparative, biodegradable, Slurry, organic waste, Biogas, yeast and digester.*

Introduction: Society is today confronted with dwindling and depletion of fossil fuel and battling with the proliferation of wastes generated by municipalities, agriculture and industries. The conversion of these wastes to biogas will help in mitigating the above challenges (Obrecht,2011). Biogas is a mixture of gases produced by the breakdown of organic matter in the absence of oxygen (Badiyya,2018) by anaerobic bacteria (Garba, Zuru & Sambo, 1996). Ekwenchi &Yaro (2010) produced biogas from banana leaves and also from cow dung (Ekwenchi,2007).The gas is a mixture of methane (CH_4) 50 %-70%, carbon dioxide 30%-40%, hydrogen 5%-10%, nitrogen 1%-2%, hydrogen sulphide (trace)and water vapour 0.3%. The gas is useful domestic cooking and electricity. The main contributors of waste energy are municipal solid waste (Adeyemo, 2001). Biogas is also a key option for short and medium term to mitigate Green House gas emissions and replace fossil fuels since it can be used as source of heat, electricity and produce transport fuel (Elaiyaraju & Partha, 2016).

Material and Method: The materials used as biodegradable wastes are elephant grass, sawdust, maize cub and maize chaff. The apparatus used are measuring cylinder, delivering tube, retort stand, digester, rubber cork, weighing machine and water trough. The organic waste materials: elephant, grass, sawdust, maize cub and maize chaff were dried in the sun for about two weeks and ground to fine particles separately in different mortals with pestle 4g of each sample was weighed in a weighing machine and transferred to four different digesters (reacting vessels) of the same capacity of 100 cm^3. 30cm^3 of water and 0.6g of yeast were added to the contents of the four digesters which were connected by delivering tubes to measuring cylinders of 100cm^3, emerged in a water trough .The biogas production was recorded daily for the different set up. Working temperature for the digesters is 25^{0c} (room temperature)

Results and Discussion: From the results shown in table 1-4, maize chaff produced a biogas yield of 245cm^{3,} elephant grass produced 235 cm^3, sawdust produced 116 cm^3 and maize chaff produced 670 cm^3. The graphs plotted above, show a similar pattern. It

increases gradually for the first few days and a sudden rise as the days progress and finally reach a plateau(constant).

Conclusion: From the above results, the sample that produced the highest maximum yield of biogas production is maize chaff with a value of 670 cm^3.Therefore for maximum yield of biogas production, maize chaff is preferable above others.

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TABLE 1: CUMULATIVE DAILY BIOGAS PRODUCTION FROM MAIZE CUB

DAY	Cumulative Daily Biogas Production(Cm^3)

1	70
2	91
3-10	116
11	185
12-20	245

TABLE 2: CUMULATIVE DAILY BIOGAS PRODUCTION FROM ELEPHANT GRASS

DAY	cumulative Daily Biogas Production(Cm^3)
1	30
2	40
3-10	45
11	55
12	55
13	79
14	165
15	175
16-20	235

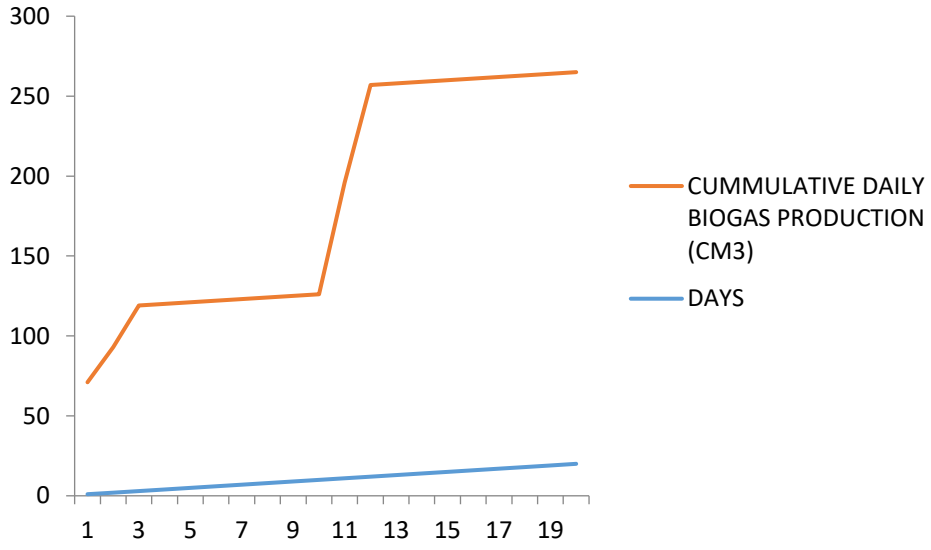
TABLE 3: CUMULATIVE DAILY BIGAS PRODUCTION FROM SAW DUST

DAY	Cumulative Daily Biogas Production
1	10
2-9	15
10	30
11	35
12	35
13	35
14	35
15	35
16-20	116

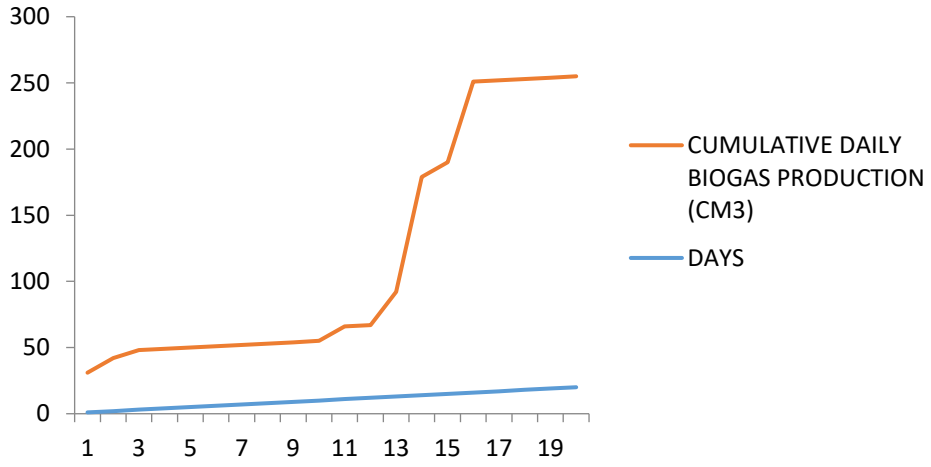
TABLE4: CUMULATIVE DAILY BIOGAS PRODUCTION FROM MAIZE CHAFF

DAY	Cumulative Daily Biogas Production
1	120
2	160
3-8	200
9	260
10	320
11	370
12	545
13-20	670

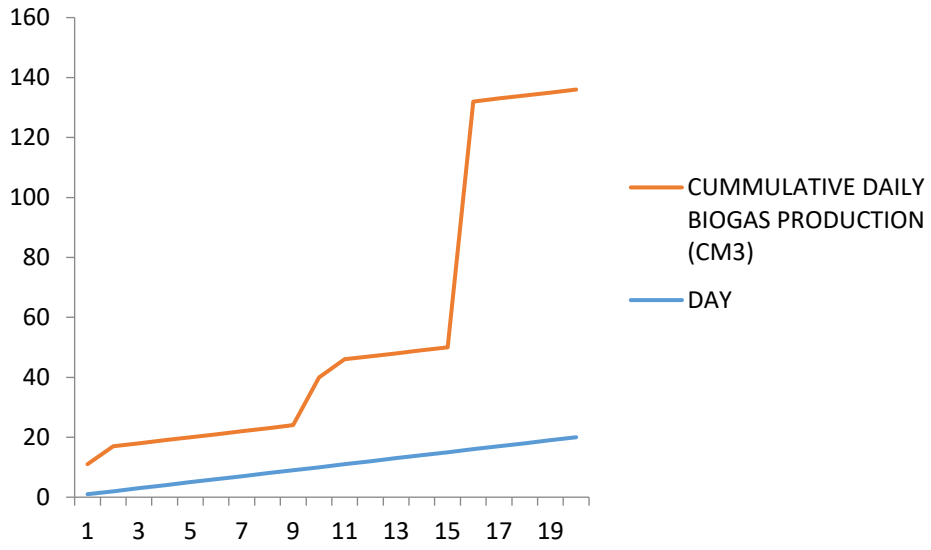
GRAPH1: MAIZE CUB



GRAPH2: ELEPHANT GRASS



Graph3: SAW DUST



Graph4: MAIZE CHAFF