RECYCLOTRON

Zero Waste Machines

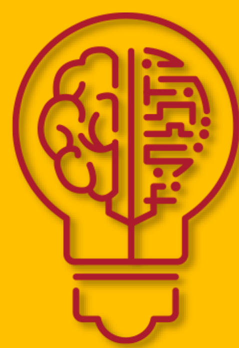
Catalog

Concept

Let's Dare

To Ease Life

Integration of Technologies with Aesthetics & User-Friendliness Is True



INNOVATION

Here is one.

Theme

MINIMALISTIC

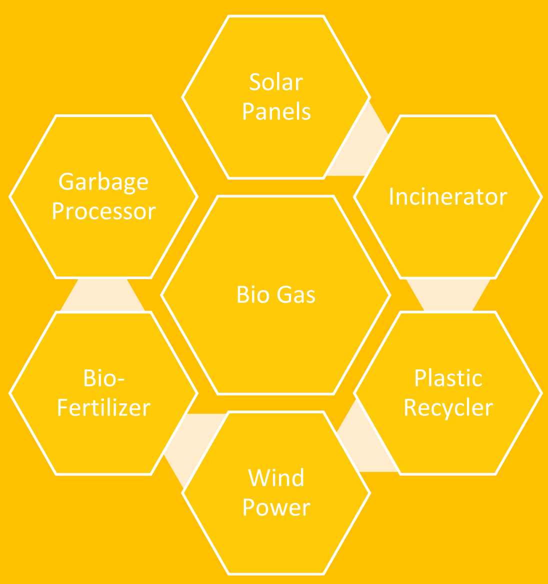
INTEGRATIVE

INNOVATION

FOR NATURAL

ABUNDANCE

WITH BIO-AESTHETICS



The CORE of Bio-Gas Origins

Known Fact:

Methane generated from Cow Dung Culture based Bio-Digester is a well known method to break down bio-wastes from kitchen and garden into Fuel and Fertilizer. Though it is an out right success technology on paper to eliminate wastes on one hand and get free fuel and fertilizer for garden on the other hand, it has remained largely unutilized.

The Cause for its unpopular usage:

In reality an improper utilization of the core of the concept is due to its presentation. The technology per se is absolutely brilliant, for it has come from Nature since eternity. Human focus on the adaptability of the core technology has been lacking.

The Down side to the utilization of Bio-Gas gadgets so far:

1. Huge Bulky gadget.
2. Space occupying nature,
3. Un-aesthetic design.
4. Not user friendly as the user has to go out to dispose the wastes
5. The content of the Bio-Digester has an awful smell.

The Birth of RECYCLOTRON:

We have removed all the "NEGATIVES" from the existing Bio-Gas Plants.

We have Re-designed the traditional Bio-Gas plant to be

1. Sleek in Exterior looks
2. Ready to use on purchase. It requires No installation or mixing of raw cultures.
3. Less Space Occupying
4. User-Friendly, the inlet being inside the kitchen where the waste is generated.
5. Multipurpose features integrated in the design.
6. Priority to safety features.
7. Air Tight System in Inlet and Out Let Junctions, so that NO UNPLEASANT ODOUR is experienced.
8. Compressor to accommodate the Bio-Gas into a small tank.
9. Ease of use in accessing the Slurry for usage as an Organic fertilizer, by providing a Slurry Cartridge like storage can which can be connected to a Hydro-Phonic like system for growing Home Garden.
10. And finally we have rechristened it as RECYCLOTRON.

Models | Versions

INDOOR

1

Home Bio-Gas | Basic

Recycles Bio-Degradable Kitchen wastes | Indoor

IN/OUT-DOOR

2

Home Bio-Gas | Split

Recycles Bio-Degradable Kitchen wastes | Indoor + Out-door

IN/OUT-DOOR

3

Office Bio-Gas | Advanced

Recycles Bio-Degradable Food wastes Micro-processor Controlled

IN/OUT-DOOR

4

Home BG Incinerator

Recycles Bio-Degradable Kitchen wastes + Paper Wastes

OUT-DOOR

5

Homes ZWM | Advanced

Group Housing

OUT-DOOR

6

Public Facility ZWM | Advanced

Recycles Bio-Degradable Food wastes IN Public Garden Areas

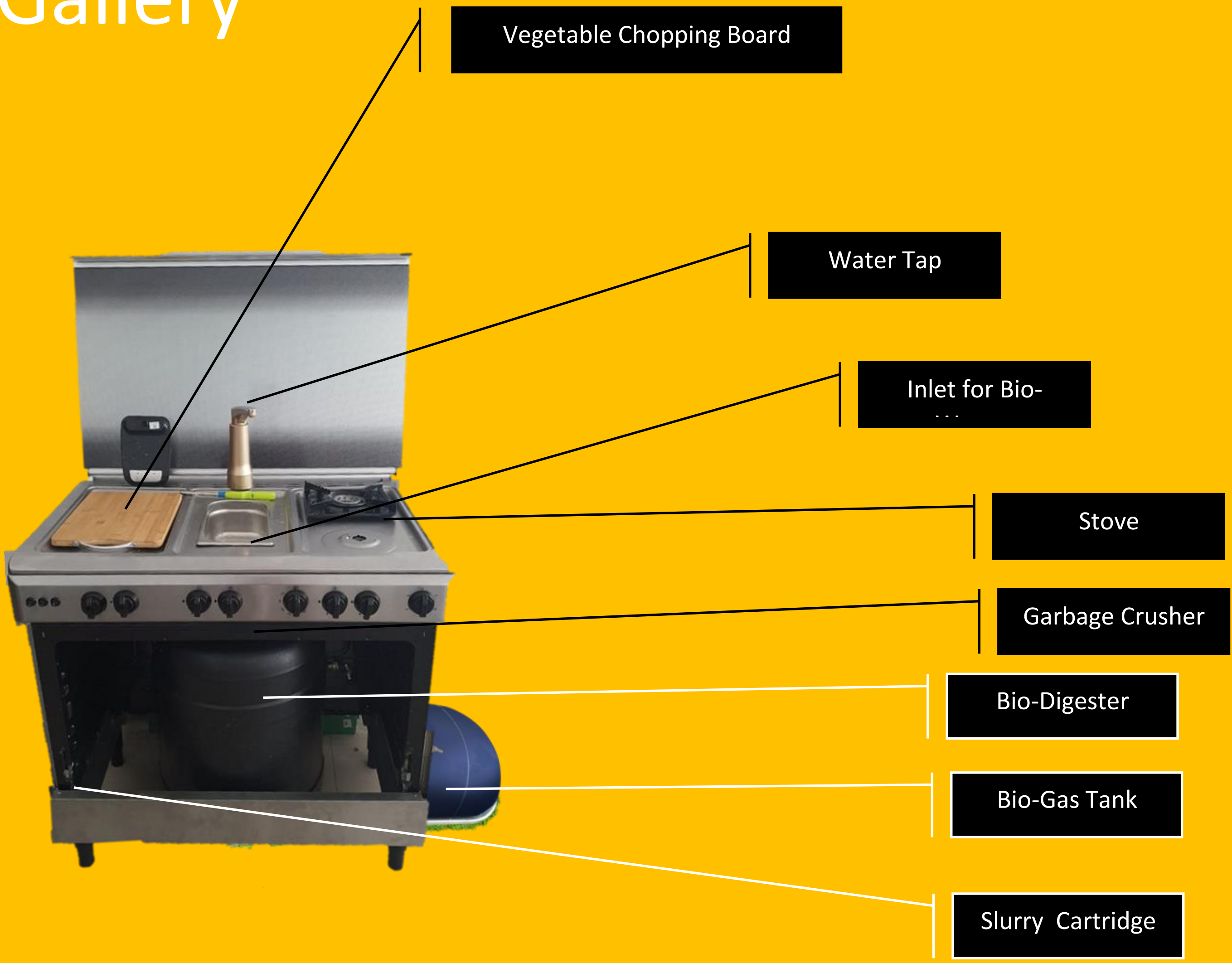
OUT-DOOR

7

Zero Waste Machine ULTIMO

Recycles Bio-Degradable Food wastes + Paper Wastes + Plastic Wastes

Gallery



INDOOR

Home Bio-Gas | Basic

INDOOR | OUTDOOR

Home Bio-Gas | Split

Recycles Bio-Degradable Kitchen wastes | Indoor + Out-door

INDOOR | OUTDOOR

Home Bio-Gas | Adv Split

Recycles Bio-Degradable Kitchen wastes | Indoor + Out-door

Safety Profile

Safety

Priority

Enriched

Technology

Programmed for Life

SAFETY FEATURES

Playing with Fire is dangerous.

Working with the source of Fire is dangerous to the core.

We are aware of this core issue.

Hence, we have taken the utmost care at every step of our design to avert all imaginable possibilities for hazardous fire accidents.

Safety Features

Bio-Gas - Basic Introduction

Biogas is a colourless, **flammable gas** produced via anaerobic digestion of animal, plant, human, industrial and municipal wastes etc., to give mainly methane (50-70%), carbon dioxide (20- 40%) and traces of other gases such as nitrogen, hydrogen, ammonia, hydrogen sulphide, water vapour etc.

It is smokeless, hygienic and more convenient to use than other solid fuels.

Biogas production is a 3-stage biochemical process.

1. Hydrolysis,

2. Acidogenesis/acetogenesis and

3. Methanogenesis. $(C_6H_{10}O_5)_n + nH_2O \rightarrow n\,(C_6H_{12}O_6)$ - Hydrolysis $n\,(C_6H_{12}O_6) \rightarrow n\,CH_3COOH$ - Acetogenesis/Acidogenesis $3nCH_3COOH \rightarrow n\,CH_4 + CO_2$ - Methanogenesis

When compared to other processes like thermal, pyrolysis, combustion and gasification, Bio-Gas production has in recent times also been viewed as a very good source of **sustainable waste treatment / management**, as disposal of wastes has become a major problem especially to the third world countries.

The effluent of this process is a residue rich in essential inorganic elements like nitrogen and phosphorus needed for healthy plant growth known as **Bio-Fertilizer** which when applied to the soil enriches it with no detrimental effects on the environment.

Table 8: Biogas energy content comparisons

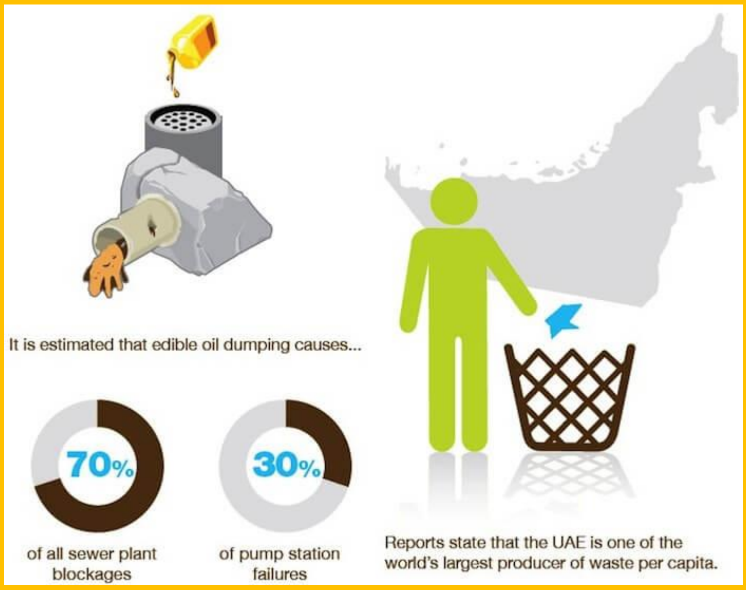
Amount and type of fuel	Volume of biogas with same energy content (m^3)	
	Unadjusted	Adjusted
1 kg fuelwood	0.70	0.25
1 kg charcoal	1.40	0.65
1 litre kerosene	1.60	1.60
1 litre LPG	1.05	1.05
1 kg LPG	2.10	2.10

Note: Energy content of liquid propane gas (LPG) is given in kilograms and litres, in case it is recorded in kg.

CONVERSION FACTORS

- 1 m^3 of biogas = 0.65 m^3 of methane
- 1 m^3 of methane = 34 MJ of energy
- 1 m^3 of biogas = 22 MJ of energy
- 1 m^3/day of biogas = 8,060 MJ/year

Local Waste Management Problem



INPUT of Recyclotron: Feeding of the Digester

Kitchen Bio-Waste:

Kitchen waste comprised of Vegetable cuttings, Cooked food remains, Meat waste can be fed to the Digester.

Paper Waste:

The study has shown that paper waste which abound everywhere including the immediate environment is a very good feedstock for biogas production.

This waste can be utilized for energy generation instead of burning them up or having them littered around and invariably constituting a nuisance to the environment.

The study has also shown that blending the paper waste with cow dung or any other animal waste will give sustained gas flammability throughout the digestion period of the waste since animal wastes are good starters for poor producing wastes.

Garden Organic Waste :

The waste remains of gardening can be fed to the digester when it is still not dry for maximum effectiveness.

Prohibited Inputs into the Digester

1. Onion Peels

2. Orange Peels

3. Drumstick

References

Biogas Production from Paper Waste and its blend with Cow dung

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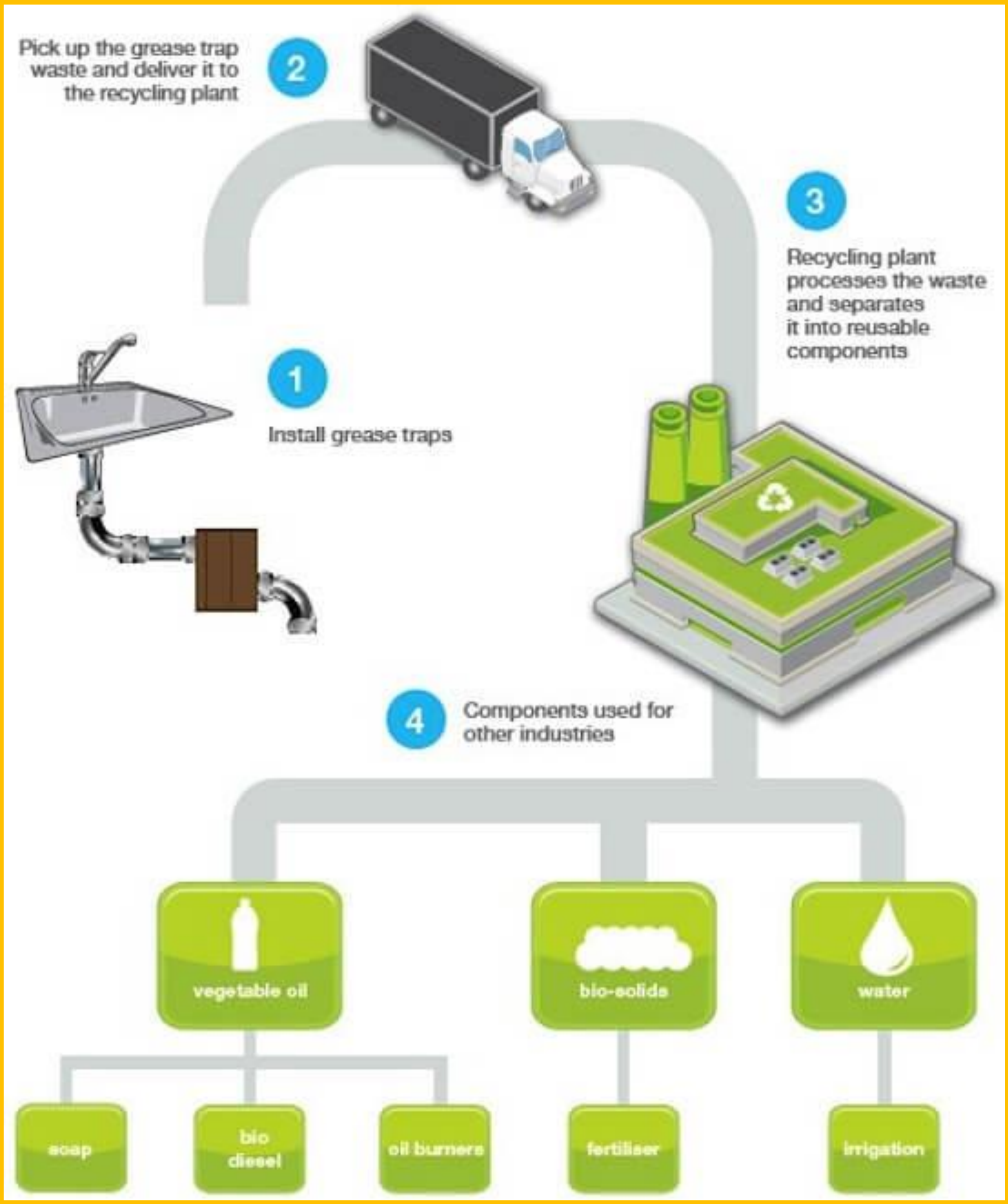
ABSTRACT

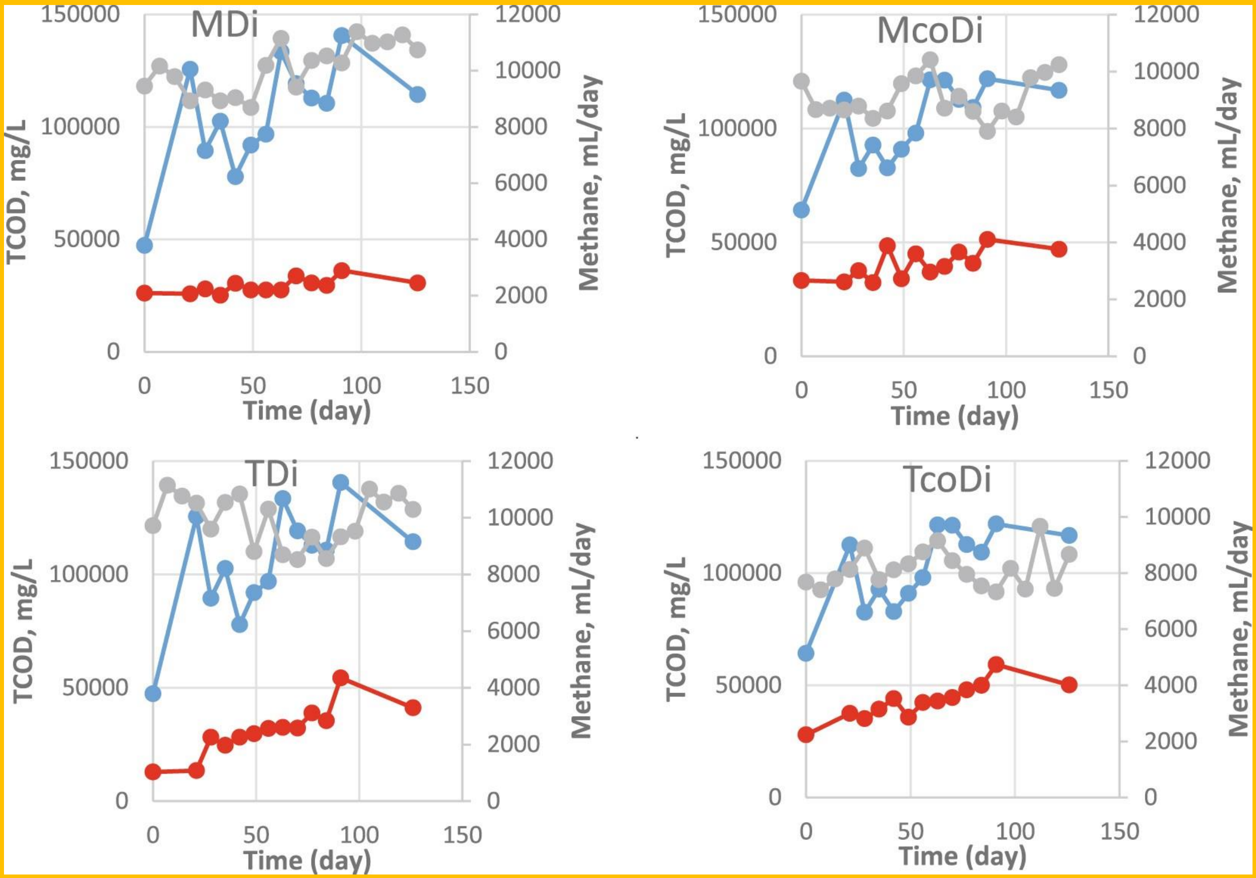
A study of the biogas production potential of paper waste (PW-A) and its blend with cow dung (PW: CD) in the ratio 1:1 was investigated. The two variants were charged into 50L metal prototype biodigesters in the ratio of 3:1 of water to waste. They were subjected to anaerobic digestion under a 45 day retention period and mesophilic temperature range of 26^oC-43^oC. The physicochemical parameters of the wastes were determined including microbial analysis. Results obtained showed that PW had a cumulative gas yield of $6.23 \pm 0.07dm^3$/kg of slurry with the flash point on the 2^{nd} day even though gas production reduced drastically while the flammability discontinued and resumed after 14 days. Blending increased the cumulative gas yield to $9.34 \pm 0.11dm^3$/kg.slurry representing more than 50% increase. The onset of gas flammability took place on the 6^{th} day and was sustained throughout the retention period. The study showed that paper waste which abounds everywhere and is either burnt off or thrown away constituting nuisance to the environment would be a very good feedstock for biogas production. It also indicates that blending paper waste with cow dung or any other animal waste will give sustained gas flammability throughout the digestion period of the waste since animal wastes are good starters for poor biogas producing wastes. Generation of biogas from paper waste upholds the concept of waste to wealth in enhancing sustainability of development.

The Waste Problem

The percentage of oil and grease in wastewater is a globally recognised, pressing problem. The regulation of the responsible disposal of edible oil waste has been prioritised by municipalities all over the world. Communities try to avoid the negative impact on health, environment, and the economy that negligent waste dumping can lead to. An estimated 70% of all sewer plant blockages and 30% of pump station failures can be attributed to people either dumping edible oil waste into drains or mixing it with sewage water. Reports state that the UAE is one of the world's largest producer of waste per capita.

With UAE's tourism and hospitality sector having grown exponentially over the last few decades, the number of food service owners has risen dramatically to match the demand. With this came the problem of accumulated edible oil waste. In spite of the early installation of grease traps that capture the fats and oils going down the sinks, the problem of where to dispose of the trap contents remains. Many dispose of grease waste by simply dumping it in the desert or by washing it down the drain. Few know that the consequences can be disastrous for public infrastructure, the environment, and health. Blocked drains and pipes as well as the malfunction of pumps can cause stand-stills for businesses and the community at large. Fixing these problems can lead to considerable costs for individuals and municipalities.


Pick up the grease trap waste and deliver it to the recycling plant
2
3
Recycling plant processes the waste and separates it into reusable components
1
Install grease traps
4
Components used for other industries
vegetable oil
bio-solids
water
soap
bio diesel
oil burners
fertiliser
irrigation



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It has been observed that co-digestion of food waste and manure may enhance biogas production, and lead to more stable digestion processes[7,16,17,18]. We also observed higher methane production when we compared the methane yield of McoDi fed with the mixture of food waste and manure with that of manure-only fed mesophilic (37 °C) digester. The methane yields of manure-fed digester and McoDi were 133 ± 18 and 430 ± 28 mL CH_4/g VS_{feed}, respectively. Based on the measured specific methane yield from MDi and the manure-only reactor, the expected methane yield for McoDi without any synergistic effects would be 341 mL CH_4/g VS_{feed}. However, our results showed that the observed methane yield of McoDi was 430 mL CH_4/g VS_{feed}, meaning that the co-digestion of food waste and manure (McoDi) resulted in 26% higher methane production than the sum of digestions of individual substrates.

SCIENTIFIC REPORTS

OPEN

Biogas production from food waste via co-digestion and digestion-effects on performance and microbial ecology

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In this work, performance and microbial structure of a digestion (food waste-only) and a co-digestion process (mixture of cow manure and food waste) were studied at mesophilic (37 °C) and thermophilic (55 °C) temperatures. The highest methane yield (480 mL/g VS) was observed in the mesophilic digester (MDi) fed with food waste alone. The mesophilic co-digestion of food waste and manure (McoDi) yielded 26% more methane than the sum of individual digestions of manure and food waste. The main volatile fatty acid (VFA) in the mesophilic systems was acetate, averaging 93 and 172 mg/L for McoDi and MDi, respectively. Acetate (2150 mg/L) and propionate (833 mg/L) were the main VFAs in the thermophilic digester (TDi), while propionate (163 mg/L) was the major VFA in the thermophilic co-digester (TcoDi). The dominant bacteria in MDi was *Chloroflexi* (54%), while *Firmicutes* was dominant in McoDi (60%).

Improvement of Biogas Production from Orange Peel Waste by Leaching of Limonene

Limonene is present in orange peel wastes and is known as an antimicrobial agent, which impedes biogas production when digesting the peels. In this work, pretreatment of the peels to remove limonene under mild condition was proposed by leaching of limonene using hexane as solvent. The pretreatments were carried out with homogenized or chopped orange peel at 20–40°C with orange peel waste and hexane ratio (w/v) ranging from 1 : 2 to 1 : 12 for 10 to 300 min. The pretreated peels were then digested in batch reactors for 33 days. The highest biogas production was achieved by treating chopped orange peel waste and hexane ratio of 12 : 1 at 20°C for 10 min corresponding to more than threefold increase of biogas production from 0.061 to 0.217 m3methane/kg VS. The solvent recovery was 90% using vacuum filtration and needs further separation using evaporation. The hexane residue in the peel had a negative impact on biogas production as shown by 28.6% reduction of methane and lower methane p...

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