FACTORS INFLUENCING THE CO-DIGESTION OF MANGO HUSK (SEED VESSEL)

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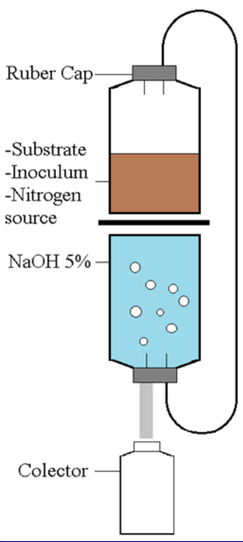
METHODS



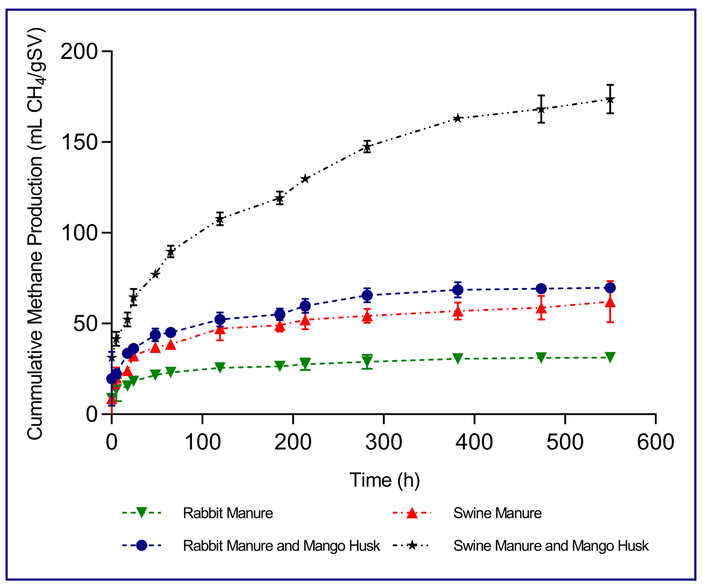
Nutrient	Concentration
Na_2HPO_4	1.12 g/L
KH_2PO_4	0.27 g/L
NH_4Cl	0.53 g/L
$CaCl_2$	0.075 g/L
$MgCl_2$	0.1 g/L
$FeCl_2$	0.02 g/L
Na_2S	0.1 g/L

	Rabbit Manure	Swine Manure	Mango Husk
Total solids %	62.3±7.8	29.3±3.1	92-6±0.2
Volatile Solids %	86.6±3.6	75.1±1.1	99-3±0.1

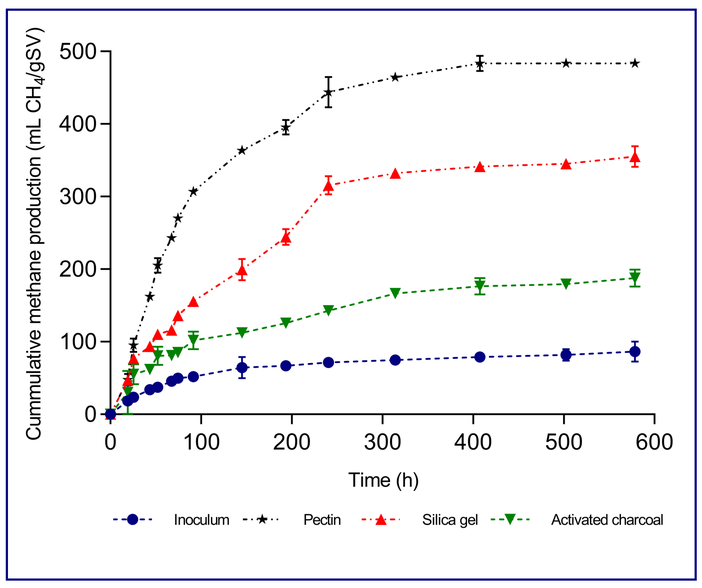
- **Biological methane Potential (BMP):** Based on the VDI4630 protocol.
- **Theoretical BMP:** From elemental analysis and organic fraction composition.
- **Mathematical modeling:** First order model and the modified Gomperzt model.

EFFECT OF INOCULUM, PRESENCE OF ADSORBENT MATERIALS, C/N RATIO, AND NITROGEN SOURCE

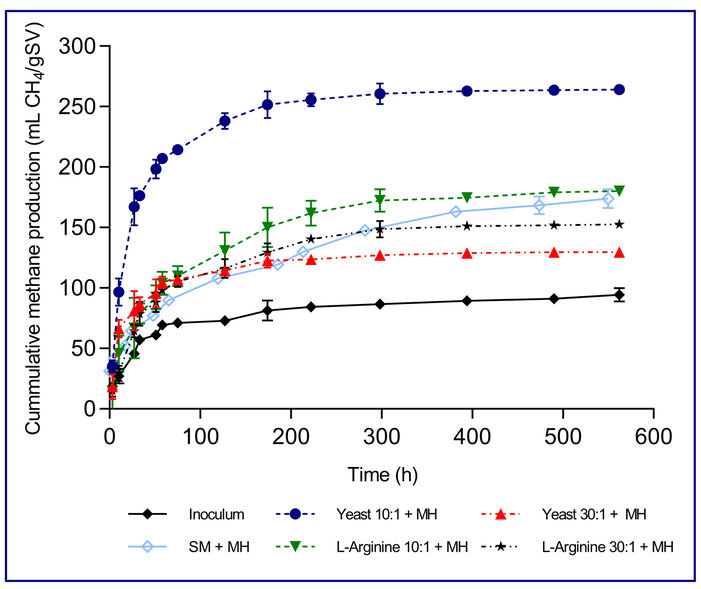
Rabbit manure vs Swine manure



Pectin vs Silica gel vs Charcoal



C/N 10:1 vs C/N 30:1 and Yeast extract vs L-Arginine



The codigestion of **Swine Manure** and Mango Husk results in **~170 mlCH$_4$/gVS**, at least 3 times higher than the methane production obtained with the inoculums alone

The anaerobic digestion process was **enhanced** by the presence of the **adsorbents**. **Pectin** caused the highest increment on methane yields with **~490 mlCH$_4$/gVS**

The codigestion of Swine Manure and Mango Husk is **enhanced** when a complex nitrogen source like **yeast extract** is added in a **C/N ratio of 10:1**, resulting in **~250 mlCH$_4$/gVS**

MATHEMATICAL MODELING

Residue	Modified Gompertz model			First-order model	
	γ [mL CH4/g VS]	K [mL CH4/g VS h]	λ [h]	γ [mL CH4/g VS]	μ [h^-1]
Swine Manure (SM)	53.1	1.087	0	54.09	0.0291
Rabbit Manure (RM)	27.8	0.832	0	28.09	0.0446
SM + MH	149.9	1.471	0	156.29	0.0130
RM + MH	60.8	1.447	0	62.27	0.0319
Silica gel + MH	348.1	0.68	0	369.53	0.0060
Activated carbon+MH	167.0	1.12	0	177.45	0.0090
Pectin + MH	463.4	3.48	0	486.22	0.0100
Yeast extract 10:1 + MH	249.2	5.715	0	253.75	0.0348
Yeast extract 30:1 + MH	120.8	3.09	0	122.59	0.0403
L-Arginine 10:1 + MH	166.9	1.83	0	171.91	0.0153
L-Arginine 30:1 + MH	141.6	1.896	0	85.90	0.0188

CONCLUSIONS

The potential of co-digestion of mango husk and animal manure to increase the production of biomethane was explored. With the results obtained from the biomethane potential tests, it was possible to determine that anaerobic co-digestion increases the methane yield significantly when compared to the digestion of inoculum alone. Results also indicate that the addition of adsorbent materials has a beneficial effect in anaerobic digestion that could be possibly explained by the interaction of microorganisms with the adsorbent matrix. Additionally, analyzing the BMP test results, it was determined that the carbon to nitrogen ratio affects significantly the methane yield of an anaerobic co-digestion whilst nitrogen source does not.

REFERENCES

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