

Response to Reviewer 1 Comments

Manuscript No.: applsci-1208351

“Enhanced Methane Production from Anaerobic Co-digestion of wheat straw and rice straw: A Kinetic Analysis”

Journal: Applied Sciences

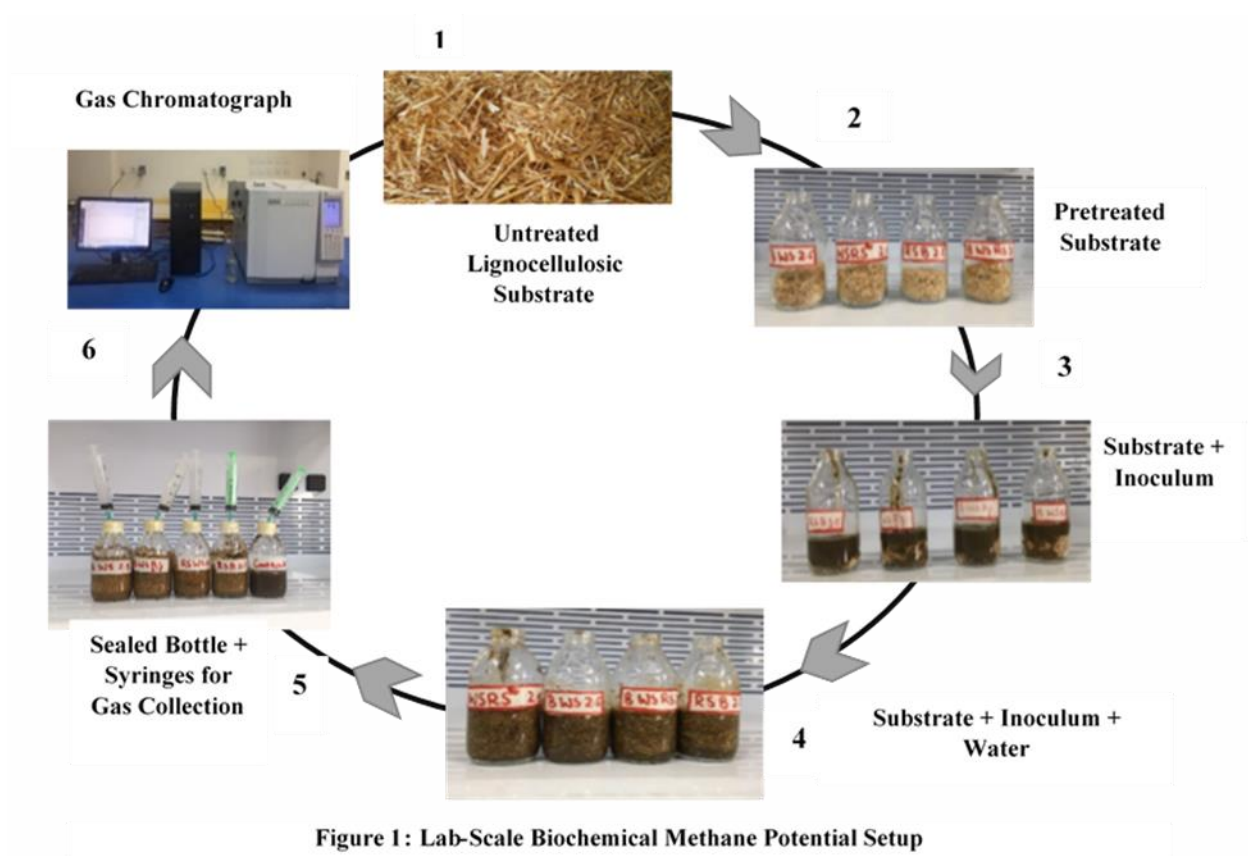
We are thankful to the editor for his considerations and positive response. We have replied to the comments of worthy reviewers, made necessary changes in the manuscript where required, and summarized them all in the section A for Reviewer 1. The yellow highlighted part in the document represents the modification that we have made in our manuscript.

A. Reviewer #1:

The authors are grateful for the time and efforts taken by the editors and referees in reviewing the manuscript and giving constructive comments. We have revised the manuscript following the suggestions and observations made by the reviewers. We hope that the revised manuscript will meet the publication requirements of this well-reputed journal.

Comment 1: Improve quality of Figures 1 and 4, please.

Response: The quality of Figure 1 and 4 has been improved and added in main manuscript document.



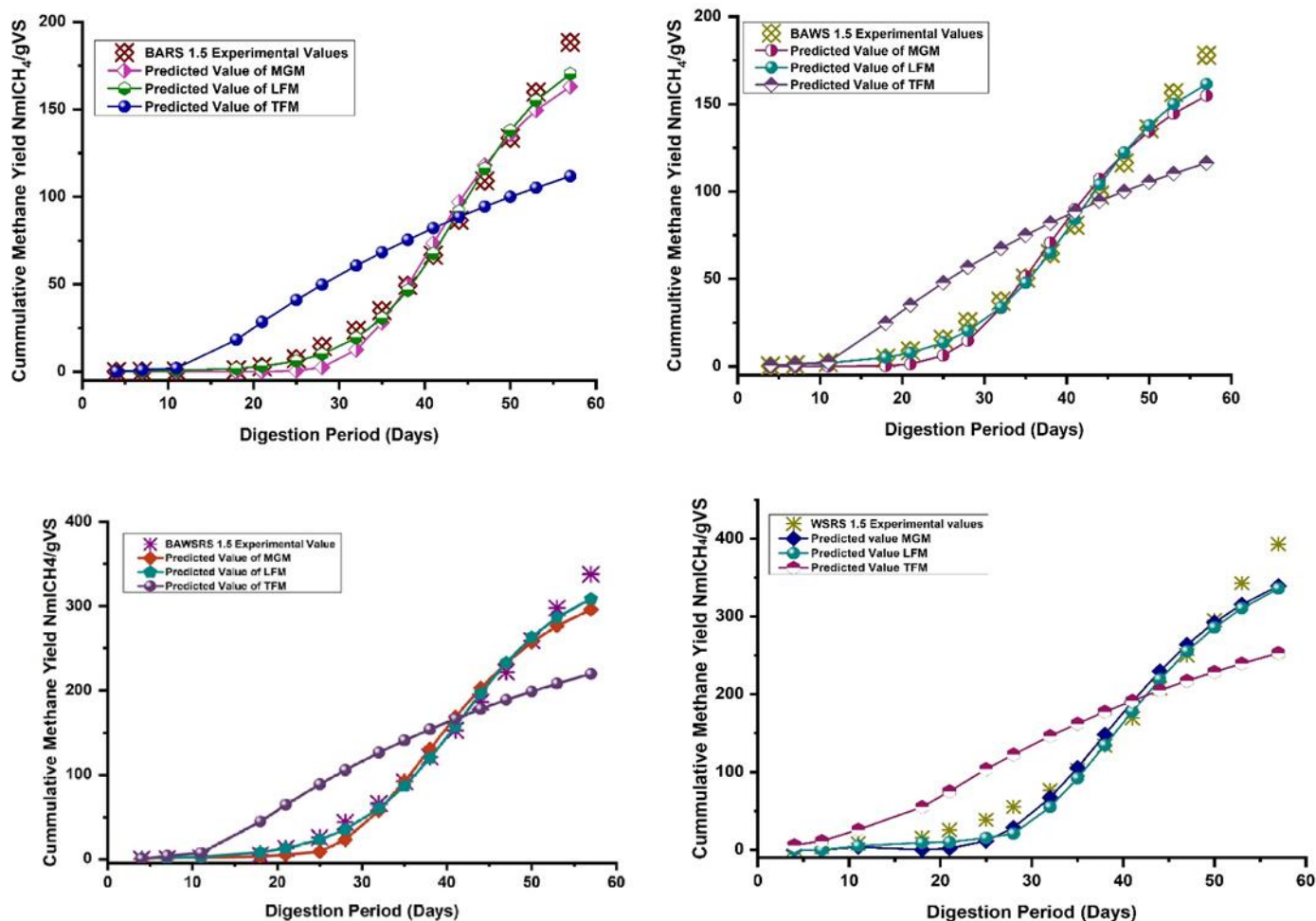


Figure 4: Cumulative Methane Production – Experimental; Transference, Logistic and Modified Gompertz Model for Reactors with S/I 1.5

Comment 2: Units (always in parentheses), also in Figures - to a uniform notation - correct, please. Numerous editorial shortcomings (spaces, references); follow the guidelines for authors and take care of good graphics and editing.

Response:

The editing of the draft has been completed as per the reviewer comment.

Comment 3: Explain all abbreviations in the text, please.

Response: All abbreviations has been explained and yellow highlighted in the manuscript text.

Comment 4: Conclusions must correlate with the abstract. The abstract seems too descriptive in the first part; correct it please.

Response: The abstract and conclusion has been re-narrated and both are in correlated.

Comment 5: The introduction contains generally known information. The description of the anaerobic digestion stages, doesn't make much sense. It lacks detailed information on the management problems of lignocellulose substrates (in AD). Refer to technological solutions proposed by other scientists, as well as discuss the chemical limitations of the decomposition of lignocellulosic materials.

Response:

The following description has been added in the manuscript.

Biogas production through anaerobic digestion is challenging due to the complex structure of lignocellulosic residues. Lignocellulosic crop residues have a complex structure composed of cellulose (23-32%), hemicellulose (38-50%) and lignin (10-25%). Lignin is a major component of such crops, and it endows the structural support, impermeability and resists the microbial attack and is recalcitrant to digest by microbes for renewable biochemical conversion. [7]

During anaerobic digestion of lignocellulosic agricultural residues lignin inhibits the methanogenic bacteria to produce methane whereas cellulose plays a vital role in the production of methane so, to enhance enzyme accessibility to cellulose pretreatment is required which could reduce the cellulose crystallinity, degrade lignin and hemicellulose and increase surface area or porosity so more bacteria could adhere to produce maximum biomethane.

To overcome this challenge, lignocellulosic residues are pretreated and is co-digested with other feedstock. Various methods for pretreatment are developed mechanical, thermal, biological and chemical pretreatments, for this study the mechanical pretreatment was given to the substrates. [8]The objective of mechanical pretreatment is the reduction of size and crystallinity of lignocellulosic material. Physical pretreatment is given by grinding, hammer mill, knife mill, ball milling. For the reduction of particle size, the grinders are used to reduce the crystallinity of the substrate and increase the porosity of the substrate so that it could be easily degraded by the anaerobic bacteria. The decrease in particle size leads to an increase of available specific surface and a decrease in the degree of polymerization (DP). [5] The milling causes also shearing of the biomass, pore volume or porosity of lignocellulosic material and enhances the initial enzymatic hydrolysis rate. [9] An increase in digestibility takes place when the pore size of the substrate is large to easily accommodate both large and small enzymes. [10]