

## LIST OF FIGURES

Figure No.	Figure Caption	Page No.
1.1	Different phases of anaerobic digestion	7
3.1	Fungal strains (a) <i>P. chrysosporium</i> (b) <i>P. ostreatus</i>	51
3.2	Methodology of NaOH and combined pretreatment of sawdust	63
3.3	Schematic diagram of the anaerobic digestion system	65
4.1	Effect of biological treatment on sawdust (a) XRD profile (b) SEM micrograph of <i>P. chrysosporium</i> and (c) <i>P. ostreatus</i> treated sample	73
4.2	Effect of NaOH pretreatment of sawdust on (a) sCOD, (b) phenolic content, (c) glucose and (d) VFA	77
4.3	FTIR spectra: (a) NaOH and NaOH-microwave pretreatment (b) NaOH-autoclave pretreatment of sawdust	80
4.4	XRD pattern of native and treated sawdust	83
4.5	Crystallinity and cellulose profile: (a) NaOH, (b) NaOH-microwave and (c) NaOH-autoclave sawdust after pretreatment	85
4.6	SEM images of sawdust samples: (a) native, (b) microwave without NaOH, (c) NaOH, (d) NaOH-microwave, (e) autoclave without NaOH and (f) NaOH-autoclave	87
4.7	Influence of autoclaving time for NaOH-autoclave pretreatment (a) sCOD and phenolic compound variation and (b) compositional changes and lignin solubilisation	88
4.8	Effect of pretreatment on anaerobic digestion for biogas yield from sawdust	90
4.9	Effect of pretreatment on rate constant of bioconversion (a) native and (b) treated sawdust	92
4.10	X-ray diffraction spectrum of OFMSW: (a) before pretreatment, (b) after thermal pretreatment, (c) after chemical pretreatment and (d) after thermo-chemical pretreatment	97

<b>4.11</b>	FTIR spectrum of OFMSW sample: (a) before treatment, (b) after thermal treatment, (c) after chemical treatment and (d) after thermo-chemical treatment	100
<b>4.12</b>	SEM micrographs of OFMSW sample: (a) before pretreatment, (b) after thermal pretreatment, (c) after chemical pretreatment and (d) after thermo-chemical pretreatment	102
<b>4.13</b>	Effect of biological pretreatment by <i>P. chrysosporium</i> (PCT) and <i>P. ostreatus</i> (POT) on OFMSW solubilisation (a) sCOD (b) VFA and (c) glucose and (d) phenolic content	104
<b>4.14</b>	Biogas production from different pretreatments of OFMSW	106
<b>4.15</b>	Hydrolysis of liquidised OFMSW slurry at different NaOH concentrations for (a) sCOD and (b) VFA estimation with time	107
<b>4.16</b>	Actual vs. predicted values of response for (a) VFA and (b) sCOD chemically treated OFMSW	110
<b>4.17</b>	3D surface response for sCOD (a-c) and VFA (d-f) yield: (a) and (d) NaOH concentration vs. time, (b) and (e) NaOH concentration vs. temperature, c and (f) time vs. temperature of chemically treated OFMSW	113
<b>4.18</b>	Biogas yield at different NaOH concentration <b>(b)</b> comparison between experimental and theoretical biogas produced at 4, 20, 36 g/L and optimised condition of NaOH for chemically treated OFMSW	120
<b>4.19</b>	Logarithmic values of biogas production vs. time of operation for 4, 20, 36 and optimised 18.4 g/L NaOH treated OFMSW sample.	121
<b>4.20</b>	Effect of thermo-chemical treatment (a) NaOH dose (b) temperature and (c) time on OFMSW solubilisation in terms of sCOD, VFA and phenolic content	123
<b>4.21</b>	RSM optimisation of thermo-chemical treatment of OFMSW, (a), (b), (c) effect of NaOH dose and temperature, (d), (e), (f) effect of temperature and time and (g), (h), (i) effect of NaOH dose and time on sCOD, VFA and phenolic content	129

<b>4.22</b>	Biogas production from treated and untreated OFMSW	132
<b>4.23</b>	3D plots of co-digestion depicting the effect of influencing parameters on biogas production	140
<b>4.24</b>	First-order model of co-digestion	143
<b>4.25</b>	Biogas production at optimised condition and kinetic modelling for co-digestion	144