

TENT-TENT-2021-0881.R1-KINETICS OF COMBINED HYDROTHERMAL PRETREATMENT AND ANAEROBIC DIGESTION OF LIGNOCELLULOSIC BIOMASS (PEPPER PLANT AND EGGPLANT)

PRIMARY DATES

Table I. Solubilization of total organic carbon, total soluble nitrogen, total volatile fatty acid and individual volatile fatty acid concentration with hydrothermal pretreatment time.

Pepper Plant-Hydrothermal treatment							
Time (h)	TOC (g C/kg dry matter)	NTS (g N/kg dry matter)	VFA (mg C/L)	Acetic acid (mg/L)	Propionic acid (mg/L)	Isobutiric acid (mg/L)	Butirix acid (mg/L)
0	108 ± 1	16 ± 1	23 ± 1	26 ± 1	8 ± 1	17 ± 1	n.d.
10	148 ± 1	18 ± 1	33 ± 1	43 ± 6	7 ± 1	22 ± 1	n.d
20	182 ± 10	20 ± 1	32 ± 7	-	7 ± 1	24 ± 5	n.d
30	212 ± 1	22 ± 1	29 ± 3	37 ± 4	7 ± 1	19 ± 1	n.d
40	217 ± 8	22 ± 1	30 ± 6	36 ± 8	7 ± 1	23 ± 4	n.d
60	221 ± 11	24 ± 1	24 ± 3	28 ± 5	6 ± 1	19 ± 1	n.d
70	227 ± 4	25 ± 1	33 ± 2	46 ± 2	6 ± 1	22 ± 2	n.d
Eggplant-Hydrothermal treatment							
0	121 ± 1	22 ± 1	27 ± 1	39 ± 1	7 ± 1	8 ± 1	6 ± 1
10	130 ± 2	23 ± 1	35 ± 6	46 ± 8	6 ± 1	20 ± 2	5 ± 1
20	161 ± 7	25 ± 1	19 ± 1	24 ± 4	6 ± 1	11 ± 1	n.d
30	172 ± 9	25 ± 1	20 ± 3	26 ± 3	7 ± 1	12 ± 2	n.d
40	204 ± 5	27 ± 1	29 ± 5	41 ± 9	7 ± 2	16 ± 1	n.d
60	197 ± 2	28 ± 1	31 ± 7	42 ± 10	7 ± 1	19 ± 3	n.d
70	196 ± 1	29 ± 1	37 ± 6	49 ± 8	7 ± 1	25 ± 5	n.d

n.d: non detected

Table II. Average pH, Alkalinity and Volatile Acidity during anaerobic co-digestion of pepper plant and eggplant.

	pH	VA (mg/L)	Alk (mg/L)
100% pretreated pepper plant	8.19 ± 0.11	271 ± 26	9500 ± 88
75% pretreated pepper plant	8.05 ± 0.06	852 ± 44	10669 ± 130
50% pretreated pepper plant	8.03 ± 0.06	763 ± 33	10442 ± 118
25% pretreated pepper plant	8.07 ± 0.02	726 ± 30	10188 ± 112
0% pretreated pepper plant	8.13 ± 0.01	584 ± 13	8927 ± 128

Table III. Experimental maximum specific methane production potential ($Y_{CH_4/S}$).

$Y_{CH_4/S}$ (mLSTP CH ₄ /g VS)	
SINGLE ANAEROBIC DIGESTION	
100% pretreated pepper	64.00 ± 11.00
100% untreated pepper plant	15.30 ± 3.00
100% pretreated eggplant	59.00 ± 10.00
100% untreated eggplant	24.50 ± 3.00
ANAEROBIC CO-DIGESTION	
25% pretreated pepper	73.00 ± 15.00
50% pretreated pepper	79.00 ± 23.00
75% pretreated pepper	63.00 ± 21.00

Table IV. Experimental methane volume with anaerobic digestion time.

Time (h)	100% untreated eggplant (mL_{STP})	100% pretreated eggplant (mL_{STP})	100% untreated pepper (mL_{STP})	100% pretreated pepper (mL_{STP})	25% pretreated pepper (mL_{STP})	50% pretreated pepper (mL_{STP})	75% pretreated pepper (mL_{STP})
0	2.00	6.25	1.00	4.85	11.49	2.00	1.98
1	5.00	12.51	3.00	11.10	16.89	4.50	2.64
2	7.00	17.37	4.00	13.88	24.33	13.00	3.30
3	9.00	24.33	6.00	20.82	28.38	17.50	5.94
4	12.00	29.19	7.00	25.68	31.09	21.50	7.26
5	15.00	36.14	8.00	27.76	33.79	23.00	8.58
6	17.00	43.79	9.00	34.70	41.23	25.00	11.22
7	19.00	54.22	11.00	38.87	43.26	27.00	13.86
8	20.00	59.78	12.00	45.81	50.69	29.50	15.18
9	21.00	66.04	13.00	52.75	62.18	35.00	29.70
22	23.00	72.29	14.00	56.92	68.94	51.50	64.68
24	24.00	72.99	15.00	59.00	73.00	83.50	66.06