Constructing a smart framework for supplying the biogas energy in green buildings using an integration of response surface methodology, artificial intelligence and petri net modelling

Table S.1. The results of experimental practices in CCD-RSM model.

Run	S/W	C/W	pH.	T	t	ABP (ml)
1	100	10	8	45	50	4856
2	200	10	8	10	10	4129
3	200	50	6	45	50	5782
4	150	30	7	6.5	30	2630
5	200	50	6	10	50	3466
6	150	30	5.8	27.5	30	2344
7	150	30	7	27.5	30	5650
8	150	54	7	27.5	30	6653
9	200	10	8	45	10	4780
10	200	10	6	45	10	5100
11	100	10	8	45	10	2230
12	200	50	8	45	50	4356
13	150	30	7	27.5	30	4235
14	200	50	8	45	10	2390
15	100	50	8	45	10	2776
16	100	50	6	10	50	2012
17	100	50	6	45	10	2003
18	100	50	8	45	50	3120
19	150	6	7	27.5	30	3006
20	150	30	7	48.5	30	3949
21	200	50	6	45	10	2051
22	100	50	6	45	50	2640
23	150	30	7	27.5	30	5350
24	210	30	7	27.5	30	5620
25	150	30	8.2	27.5	30	5670
26	200	50	8	10	10	2007
27	200	10	6	10	50	1982
28	150	30	7	27.5	30	5970
29	200	10	8	10	50	2360
30	200	50	8	10	50	2720
31	150	30	7	27.5	30	4539
32	200	10	8	45	50	2214
33	200	10	6	45	50	2143
34	100	10	8	10	50	1980
35	150	30	7	27.5	30	5314
36	100	50	8	10	50	2230
37	100	50	8	10	10	1780
38	100	10	6	45	50	1410
39	150	30	7	27.5	54	5610

40	**100**	**10**	**6**	**45**	**10**	**2137**
41	**100**	**50**	**6**	**10**	**10**	**1640**
42	**100**	**10**	**8**	**10**	**10**	**1320**
43	**200**	**10**	**6**	**10**	**10**	**1210**
44	**100**	**10**	**6**	**10**	**50**	**1150**
45	**150**	**30**	**7**	**27.5**	**6**	**4310**
46	**90**	**30**	**7**	**27.5**	**30**	**2003**
47	**150**	**30**	**7**	**27.5**	**30**	**6320**
48	**200**	**50**	**6**	**10**	**10**	**2150**
49	**100**	**10**	**6**	**10**	**10**	**1002**
50	**150**	**30**	**7**	**27.5**	**30**	**4120**

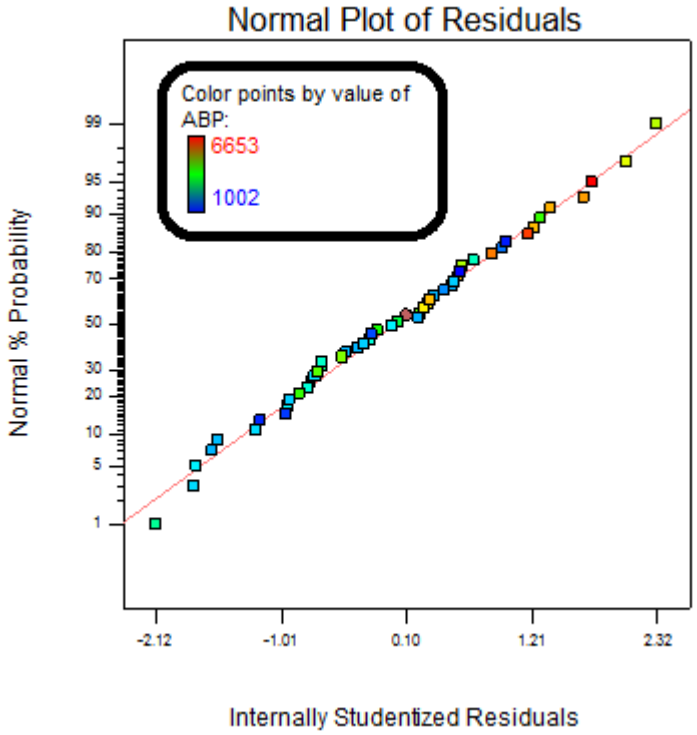

Fig. S.1. The normal plot of residuals in present study.

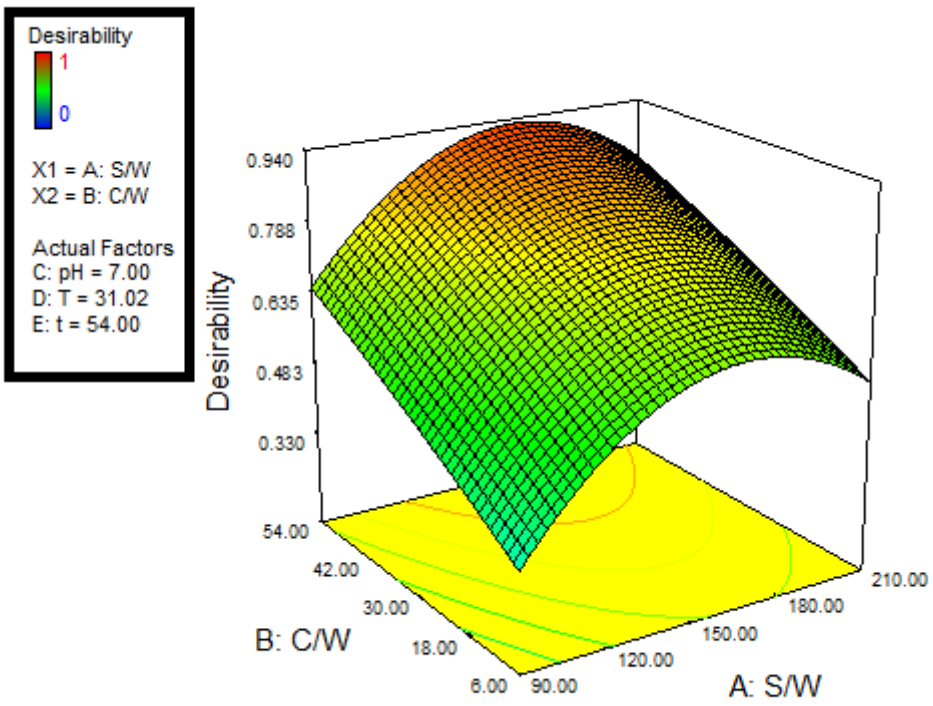

Fig. S.2. The desirability of predicted ABP values in present study.

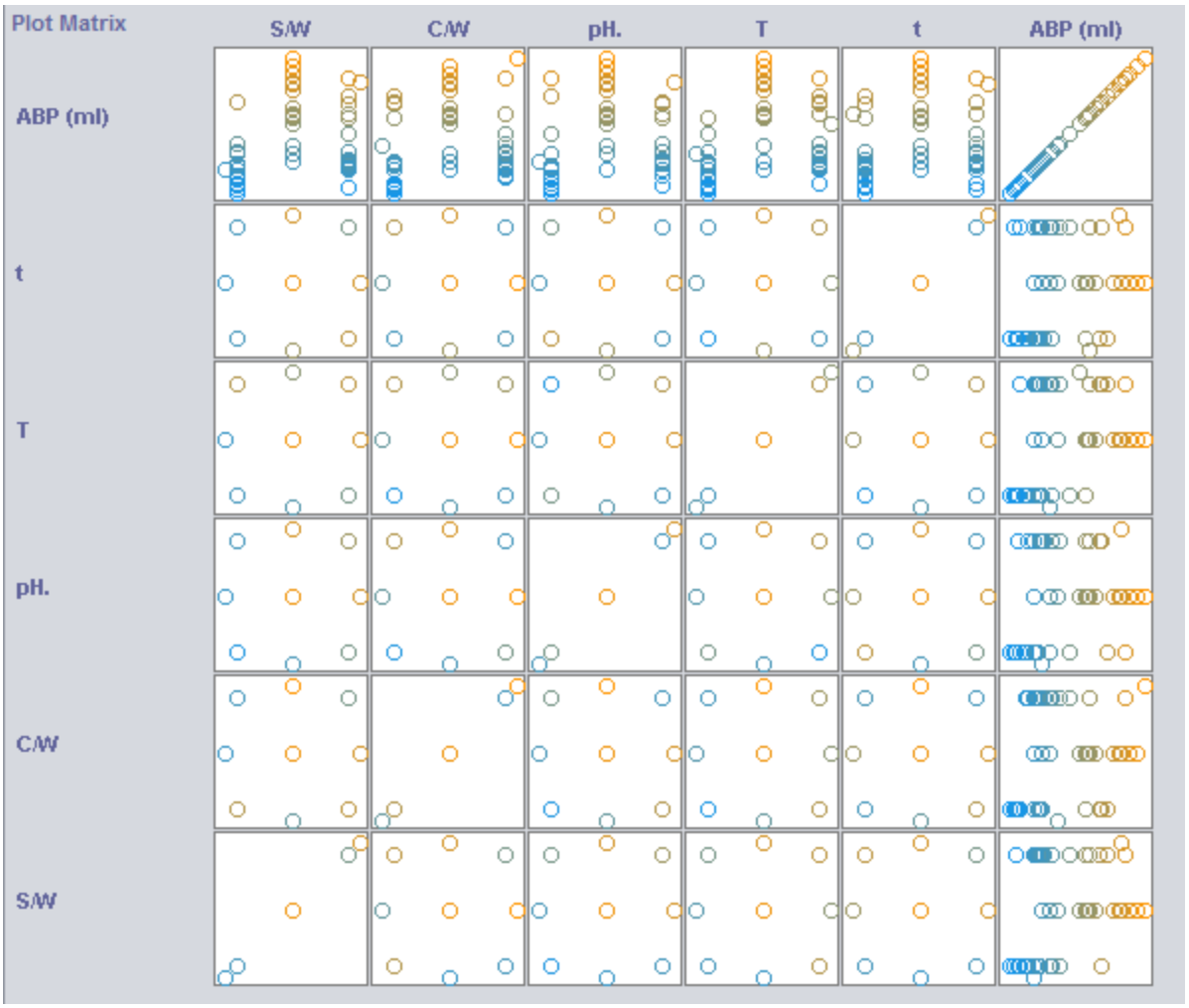

Fig. S.3. The plot matrix of applied data in present study.

Equation S.1

```
pH. < 6.5
|   S/W < 175
|   |   T < 18.75
|   |   |   C/W < 30
|   |   |   |   t < 30 : 1002 (1/0)
|   |   |   |   t >= 30 : 1150 (1/0)
|   |   |   C/W >= 30
|   |   |   |   t < 30 : 1640 (1/0)
|   |   |   |   t >= 30 : 2012 (1/0)
|   |   T >= 18.75
|   |   |   S/W < 125
|   |   |   |   C/W < 30
|   |   |   |   |   t < 30 : 2137 (1/0)
|   |   |   |   |   t >= 30 : 1410 (1/0)
|   |   |   |   C/W >= 30
|   |   |   |   |   t < 30 : 2003 (1/0)
|   |   |   |   |   t >= 30 : 2640 (1/0)
|   |   |   S/W >= 125 : 2344 (1/0)
|   S/W >= 175
|   |   C/W < 30
|   |   |   T < 27.5
|   |   |   |   t < 30 : 1210 (1/0)
|   |   |   |   t >= 30 : 1982 (1/0)
|   |   |   T >= 27.5
|   |   |   |   t < 30 : 5100 (1/0)
|   |   |   |   t >= 30 : 2143 (1/0)
|   |   C/W >= 30
|   |   |   t < 30 : 2100.5 (2/2450.25)
|   |   |   t >= 30
|   |   |   |   T < 27.5 : 3466 (1/0)
|   |   |   |   T >= 27.5 : 5782 (1/0)
pH. >= 6.5
|   T < 18.75
|   |   S/W < 125
|   |   |   C/W < 30
|   |   |   |   t < 30 : 1320 (1/0)
|   |   |   |   t >= 30 : 1980 (1/0)
|   |   |   C/W >= 30
|   |   |   |   t < 30 : 1780 (1/0)
|   |   |   |   t >= 30 : 2230 (1/0)
|   |   S/W >= 125
|   |   |   C/W < 20
|   |   |   |   t < 30 : 4129 (1/0)
|   |   |   |   t >= 30 : 2360 (1/0)
|   |   |   C/W >= 20
|   |   |   |   t < 20 : 2007 (1/0)
|   |   |   |   t >= 20 : 2675 (2/2025
|   T >= 18.75
|   |   T < 36.25
|   |   |   S/W < 120 : 2003 (1/0)
|   |   |   S/W >= 120
|   |   |   |   C/W < 18 : 3006 (1/0)
|   |   |   |   C/W >= 18
|   |   |   |   |   t < 18 : 4310 (1/0)
|   |   |   |   |   t >= 18
|   |   |   |   |   |   C/W < 42
|   |   |   |   |   |   |   S/W < 180
|   |   |   |   |   |   |   |   pH. < 7.6
|   |   |   |   |   |   |   |   |   t < 42 : 5187.25 (8/577317.69)
|   |   |   |   |   |   |   |   |   t >= 42 : 5610 (1/0)
|   |   |   |   |   |   |   |   pH. >= 7.6 : 5670 (1/0)
|   |   |   |   |   |   |   S/W >= 180 : 5620 (1/0)
|   |   |   |   |   |   C/W >= 42 : 6653 (1/0)
|   |   T >= 36.25
|   |   |   t < 20
|   |   |   |   S/W < 150
|   |   |   |   |   C/W < 30 : 2230 (1/0)
|   |   |   |   |   C/W >= 30 : 2776 (1/0)
|   |   |   |   S/W >= 150
|   |   |   |   |   C/W < 30 : 4780 (1/0)
|   |   |   |   |   C/W >= 30 : 2390 (1/0)
|   |   |   t >= 20
|   |   |   |   S/W < 175
|   |   |   |   |   S/W < 125
|   |   |   |   |   |   C/W < 30 : 4856 (1/0)
|   |   |   |   |   |   C/W >= 30 : 3120 (1/0)
|   |   |   |   |   S/W >= 125 : 3949 (1/0)
|   |   |   |   S/W >= 175
|   |   |   |   |   C/W < 30 : 2214 (1/0)
|   |   |   |   |   C/W >= 30 : 4356 (1/0)
```

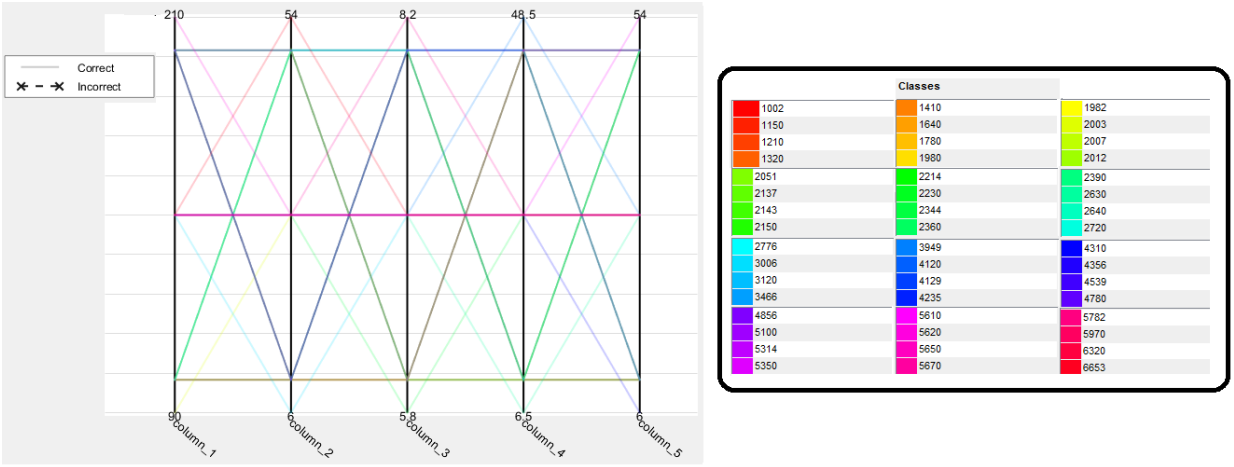

Fig. S.4. The parallel coordinates plot of RF algorithm in present study.

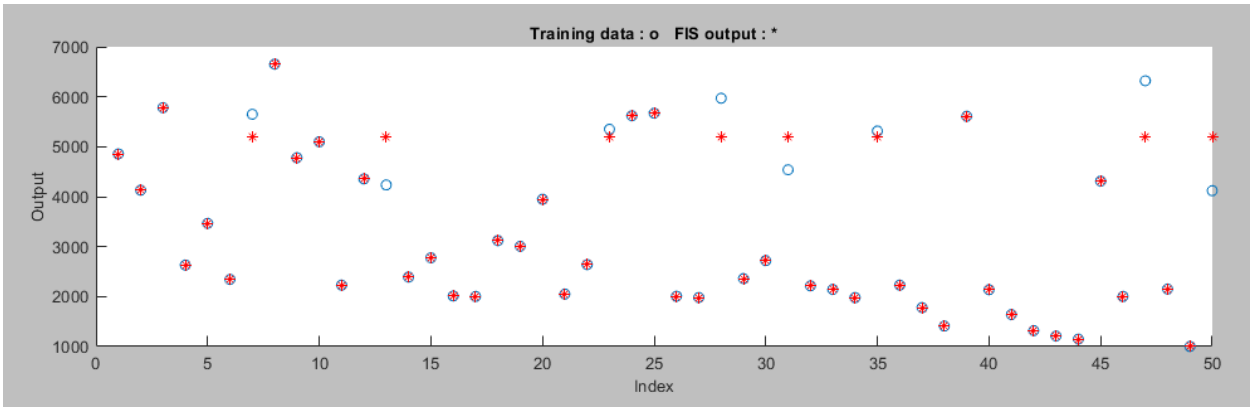

Fig. S.5. The adaption plot of ANFIS algorithm in present study.

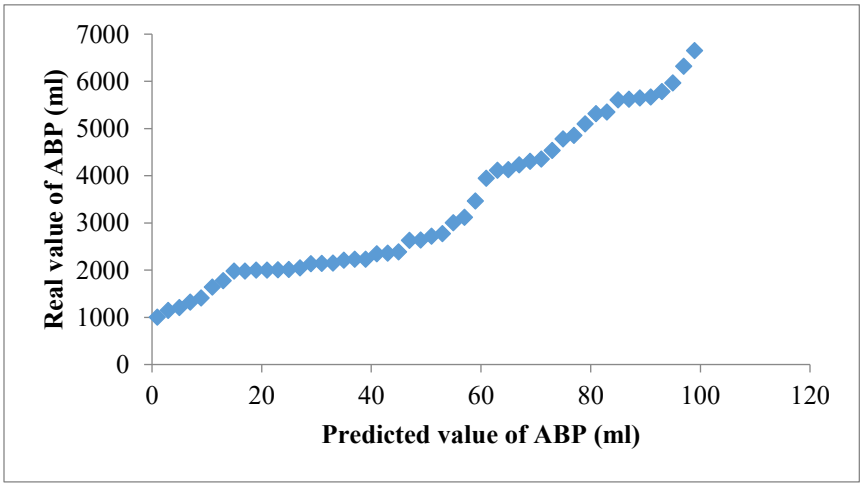

Fig. S.6. The comparison of real and predicted ABP based on ANFIS model in present study.