

Table S1. Four-factor, three-level Box-Behnken design and experimental data of ASDF.

Runs	A Liquid-solid ratio (mL/g)	B Extraction time (min)	C Temperature (°C)	D Acid Concentration (%)	ASDF yield (%)
1	20	90	80	1.5	11.16
2	25	60	70	1.0	12.28
3	20	90	80	0.5	10.08
4	20	60	80	1.0	10.44
5	20	120	70	0.5	10.74
6	20	120	60	1.0	12.09
7	15	90	70	1.5	10.9
8	20	90	60	1.5	11.53
9	15	60	70	1.0	10.89
10	25	120	70	1.0	12.71
11	20	90	70	1.0	13.89
12	15	90	70	0.5	9.34
13	20	90	70	1.0	14.05
14	20	90	60	0.5	10.79
15	20	60	70	1.5	11.12
16	20	90	70	1.0	13.45
17	15	120	70	1.0	10.35
18	20	60	60	1.0	11.79
19	25	90	80	1.0	10.34
20	25	90	70	0.5	11.51
21	20	60	70	0.5	10.15
22	20	90	70	1.0	12.83
23	15	90	80	1.0	10.54
24	20	120	80	1.0	10.78
25	15	90	60	1.0	10.09
26	20	90	70	1.0	13.32
27	25	90	70	1.5	10.91
28	20	120	70	1.5	11.97
29	25	90	60	1.0	12.28

Table S2. Three-factor, three-level Box-Behnken design and experimental data of WSDF.

Runs	A	B	C	WSDF yield
	Liquid-solid ratio (mL/g)	Extraction time (min)	Temperature (°C)	(%)
1	40	120	70	10.19
2	35	90	70	9.91
3	30	120	90	11.62
4	35	150	90	10.18
5	35	120	80	13.15
6	35	150	70	9.99
7	35	120	80	12.89
8	35	90	90	10.88
9	35	120	80	13.34
10	30	150	80	11.18
11	40	120	90	11.53
12	30	120	70	11.10
13	30	90	80	10.93
14	35	120	80	13.03
15	40	90	80	10.84
16	35	120	80	13.04
17	40	150	80	10.78

Table S3. Four-factor, three-level Box-Behnken design and experimental data of ESDF.

Runs	A	B	C	D	ESDF yield
	Liquid-solid ratio (mL/g)	Extraction time (min)	Temperature (°C)	Enzyme Concentration (%)	(%)
1	25	90	55	1.5	15.84
2	30	90	60	1.5	13.98
3	25	90	50	2.0	13.35
4	25	120	55	1.0	13.66
5	25	120	55	2.0	12.18
6	25	120	50	1.5	11.98
7	20	90	50	1.5	12.78
8	30	120	55	1.5	12.83
9	25	90	55	1.5	15.48
10	30	60	55	1.5	13.75
11	25	90	50	1.0	13.09
12	30	90	55	2.0	13.65
13	25	60	50	1.5	12.67
14	20	90	55	1.0	11.61
15	25	120	60	1.5	11.88
16	25	60	60	1.5	12.68
17	25	90	60	2.0	13.15
18	25	90	60	1.0	12.19
19	25	90	55	1.5	13.68
20	30	90	50	1.5	11.96
21	20	60	55	1.5	11.59
22	25	90	55	1.5	15.15
23	25	90	55	1.5	15.34
24	20	90	60	1.5	11.12
25	25	60	55	2.0	13.94
26	25	60	55	1.0	11.15
27	30	90	55	1.0	12.09
28	20	90	55	2.0	11.84
29	20	120	55	1.5	12.89