

Supporting information

Biorefining of *Eruca sativa* plant for efficient biofuel production

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All data sets were analyzed using ANOVA toolbox of Microsoft Office Excel 2013. The most important analysis of variance (ANOVA) results including esterification, transesterification, ethanol production, biogas production, and ethanol extractive content of the seed cake were presented in the following tables. The 2-factors ANOVA was used for both esterification and transesterification results while single factor ANOVA was utilized for remaining experiments. The p-values less than 0.05 were considered as statistically significant.

Table S1. Analysis of variance of *Eruca sativa* pretreatment (esterification) using 0.4:1 methanol to oil mass ratio and in the presence of 1% H₂SO₄ at different temperature and time.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Sample (Time)	735.7875	3	245.2625	985.9799	4.21E-43	2.798061
Columns (Temperatures)	395.4875	3	131.8292	529.9665	8.91E-37	2.798061
Interaction	34.9825	9	3.886944	15.62591	1.62E-11	2.08173
Within	11.94	48	0.24875			
Total	1178.198	63				

Table S2. Analysis of variance of the effects of temperature and time on the *Eruca sativa* transesterification using 0.3:1 methanol to oil mass ratio and in the presence of 1.5% KOH.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Sample (Time)	25742.3	3	8580.766	9458.285	2.26E-93	2.731807
Columns (Temperature)	2831.335	5	566.267	624.1767	8.55E-58	2.341828
Interaction	167.2717	15	11.15144	12.29186	2.32E-14	1.807571
Within	65.32	72	0.907222			
Total	28806.23	95				

Table S3. Analysis of variance of the effects of methanol to oil mass ratio and time on the *Eruca sativa* transesterification at 60 °C and in the presence of 1.5% KOH.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Sample (Time)	9082.847	3	3027.616	2729.631	1.32E-53	2.798061
Columns (Methanol content)	20864.23	3	6954.743	6270.241	3.06E-62	2.798061
Interaction	1300.023	9	144.4469	130.2302	1.31E-30	2.08173
Within	53.24	48	1.109167			
Total	31300.34	63				

Table S4. Analysis of variance of the effects of methanol to oil mass ratio of 0.3:1 and 0.4:1 when transesterification at performed at 60 °C for 90 min and in the presence of 1.5% KOH.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	0.00125	1	0.00125	0.001457	0.97079	5.987378
Within Groups	5.1475	6	0.857917			
Total	5.14875	7				

Table S5. Analysis of variance of ethanol production using untreated and pretreated *Eruca sativa* straw.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	5253.112	4	1313.278	796.9725903	2.86246E-17	3.055568276
Within Groups	24.7175	15	1.647833			
Total	5277.83	19				

Table S6. Analysis of variance of ethanol production using untreated and pretreated *Eruca sativa* seed cake.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	4639.025	4	1159.75625	1309.472619	7.01488E-19	3.055568276
Within Groups	13.285	15	0.885666667			
Total	4652.31	19				

Table S7. Analysis of variance of biogas production using untreated and pretreated *Eruca sativa* straw

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	44272.04	4	11068.01	1138.079	2E-18	3.055568
Within Groups	145.8775	15	9.725167			
Total	44417.92	19				

Table S8. Analysis of variance of biogas production using untreated and pretreated *Eruca sativa* seed cake.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	23440.75	4	5860.187	276.4761	7.47E-14	3.055568
Within Groups	317.94	15	21.196			
Total	23758.69	19				

Table S9. Analysis of variance of the ethanol extractive content of untreated and pretreated *Eruca sativa* seed cake.

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	248.227	4	62.05675	618.5058	1.89E-16	3.055568
Within Groups	1.505	15	0.100333			
Total	249.732	19				