

Screening of Factors Affecting Ferulic Acid Production from Oil Palm Frond Waste via Mix Culture Hydrolysis: Interaction between Factors

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Abstract

Fiber-pressed oil palm frond (FPOPF) was used to produce ferulic acid via hydrolysis using mix culture. FPOPF substrate was acclimatized with the soil from palm oil plantation for 30 days to be used as the mix culture. The FPOPF substrate has a ratio of FPOPF to water at 1:10. The experimental design was a two-level factorial analysis at half fraction with five factors, resulting a total of 16 runs. This design was selected using Design Expert 7.0 software. The factors studied were temperature (26°C to 40°C), pH value (5 to 9), agitation speed (0 and 150 rpm), inoculum percentage (2% to 10%) and response time (1 day to 3 days). From ANOVA, the result was found to be significant with quadratic model. The coefficient of determination obtained was 0.8978. Four factor interactions were discovered among the factors. Temperature and pH value were the main contributor to the hydrolysis with 23.34% and 23.76% of contribution percentage, respectively.

Key words: Ferulic acid, oil palm frond, mix culture, Design Expert, factorial analysis

	Term	Stdized Effects	Sum of Squares	% Contribution
	Intercept			
M	A-Temperature	-38.55	5945.91	23.34
M	B-pH	38.90	6054.13	23.76
M	C-Agitation	19.18	1471.22	5.77
M	D-Time	-8.73	304.64	1.20
M	E-Percentage Inoculum	-14.69	862.93	3.39
M	AB	-30.31	3674.09	14.42
M	AC	-15.07	908.04	3.56
M	AD	1.10	4.82	0.019
M	AE	12.24	598.87	2.35
M	BC	14.13	798.09	3.13
M	BD	-13.12	688.50	2.70
M	BE	-23.15	2143.70	8.41
M	CD	19.44	1512.07	5.93
M	CE	6.50	169.08	0.66
M	DE	-9.27	343.80	1.35
M	ABC		Aliased	
M	ABD		Aliased	

Fig. 1. Factors percentage contribution to ferulic acid production