Supplementary materials:

Table S1: Independent process variables with experimental ranges and levels for MAE of SF

Variables	Factors	Level				
	X_i	α-1	-1	0	1	α+1
Ethanol concentration (%)	X_1	0	30	50	70	90
Extraction time (min)	X_2	1	2	3	4	5
Extraction temperature (°C)	X_3	90	110	130	140	150
Equipment power	X_4	150	300	450	600	750

Table S2: Comparison between optimized model and experimental values

Dependent variables	Experimental value	ANN-GA
DPPH (% inhibition)	29.23±0.41	28.017
ABTS (% inhibition)	35.49±0.19	36.075
TPC (mgGAE/g)	43.03±0.24	43.658
TFC (mgCAE/g)	17.30±0.08	17.679

Figure S1. The three-dimensional (3D) response surface plots of MAE-SF extraction condition displaying the influence of independent parameters (Ethanol Concentration, Time, Temperature, and Intensity) on dependent varaiables (DPPH radical-scavenging activity, ABTS, TPC, and TFC) as a function of significant interaction factors for RSM.

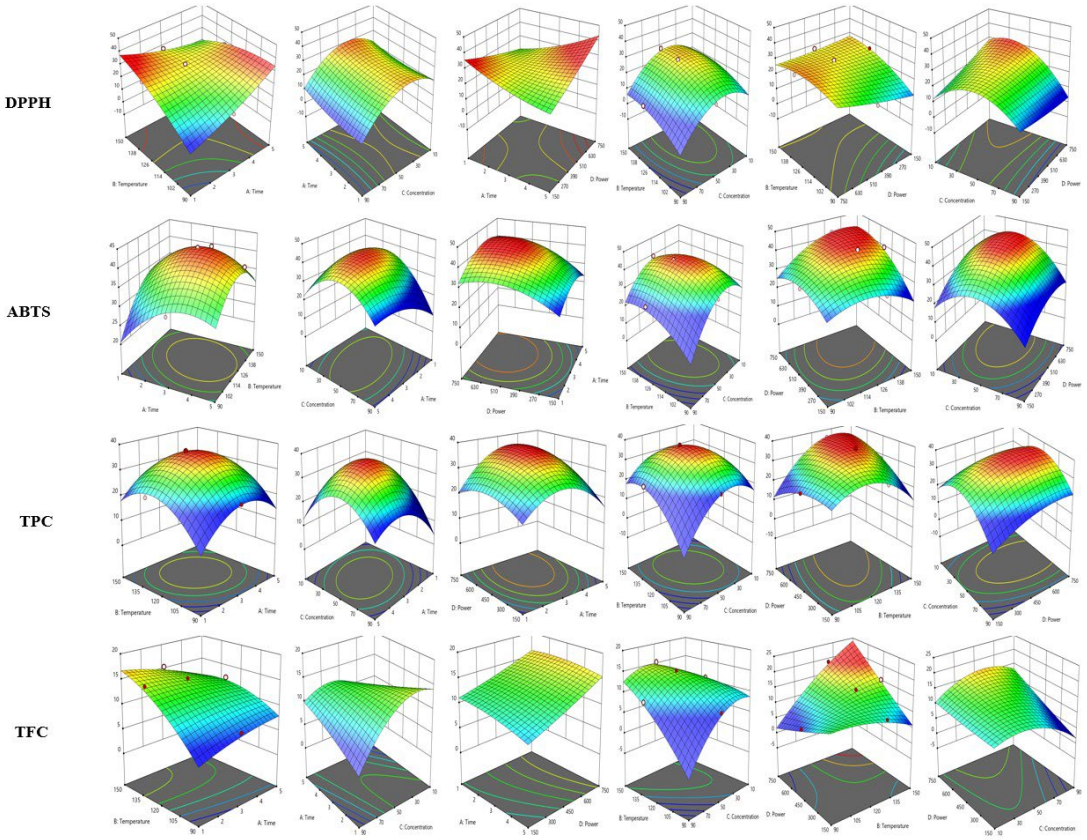

Figure S2: Regression of experimental and predicted values in ANN model of MAE for SF using the training, testing and validation datasets to optimized the extraction conditions.

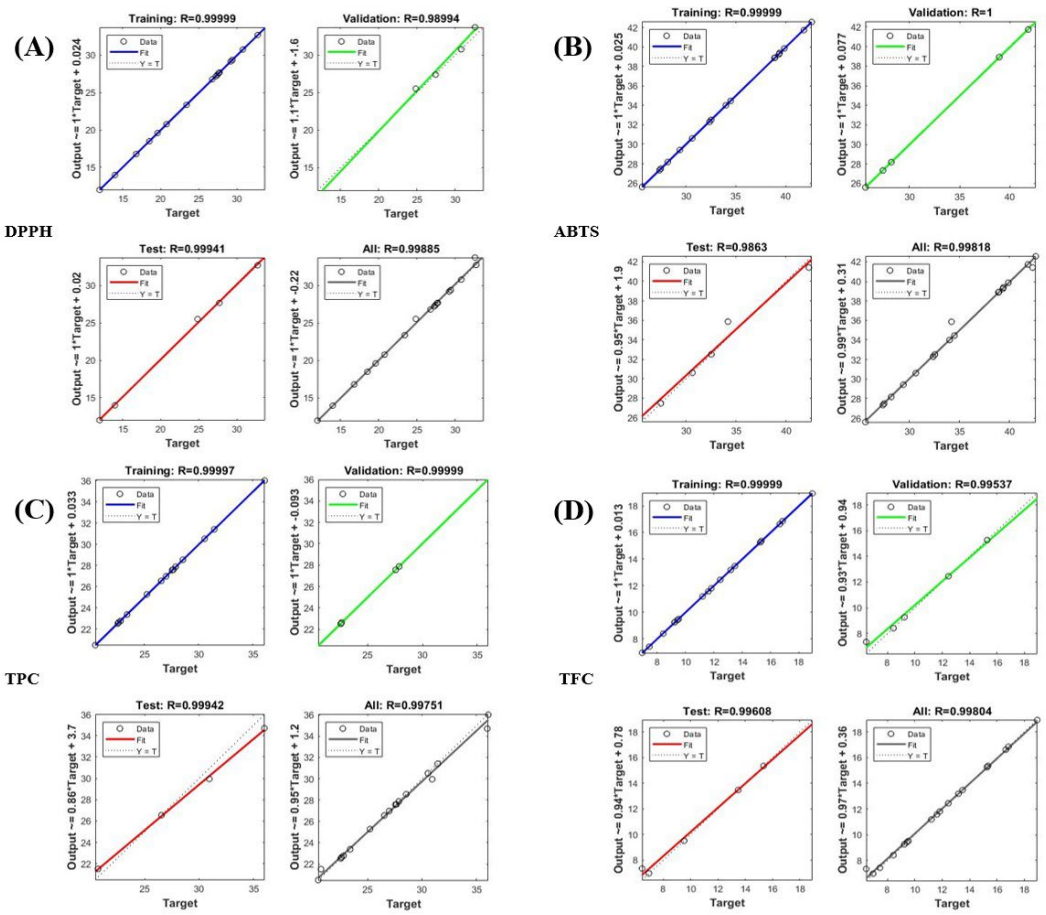

Table S3. Setting parameters of genetic algorithm used in the optimization of process for SF

Setting parameters	**Values**
Population size	90
Scaling function	Rank
Selection function	Stochastic uniform
Elite count	default
Crossover function	Constraint dependent
Mutation function	Constraint dependent
Plot function	Best fitness
Nonlinear constraint algorithm	Augmented Lagrangian