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Appendix A

Data of Tyrosinase Inhibition Activity

Table A1. The raw data for the absorbance and tyrosinase inhibition percentages of freeze-dried water extract

No.	conc (mg/ml)	n	A	B	C	D	A-B	C-D	%inh
1	40.00	1	0.346	0.035	0.083	0.080	0.311	0.003	99.04
		2	0.359	0.035	0.090	0.086	0.324	0.004	98.77
		3	0.358	0.049	0.084	0.080	0.309	0.004	98.71
2	20.00	1	0.352	0.035	0.065	0.059	0.317	0.006	98.11
		2	0.356	0.034	0.064	0.060	0.322	0.004	98.76
		3	0.360	0.033	0.063	0.059	0.327	0.004	98.78
3	10.00	1	0.366	0.037	0.058	0.051	0.329	0.007	97.87
		2	0.371	0.036	0.056	0.049	0.335	0.007	97.91
		3	0.359	0.036	0.054	0.047	0.323	0.007	97.83
4	5.00	1	0.344	0.034	0.116	0.044	0.310	0.072	76.77
		2	0.339	0.038	0.114	0.045	0.301	0.069	77.08
		3	0.352	0.035	0.119	0.044	0.317	0.075	76.34
5	2.50	1	0.338	0.033	0.239	0.041	0.305	0.198	35.08
		2	0.338	0.034	0.234	0.042	0.304	0.192	36.84
		3	0.336	0.034	0.225	0.041	0.302	0.184	39.07
6	1.00	1	0.339	0.035	0.297	0.039	0.304	0.258	15.13
		2	0.336	0.037	0.293	0.039	0.299	0.254	15.05
		3	0.366	0.036	0.324	0.039	0.330	0.285	13.64

Table A2. The average percentage of tyrosinase inhibition of freeze-dried water extract (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	1.00	13.64	15.05	15.13	14.61	0.84
2	2.50	39.07	36.84	35.08	37.00	2.00
3	5.00	76.34	77.08	76.77	76.73	0.37
4	10.00	97.83	97.91	97.87	97.87	0.04
5	20.00	98.78	98.76	98.11	98.55	0.38
6	40.00	98.71	98.77	99.04	98.84	0.18

Table A3. The raw data for the absorbance and tyrosinase inhibition percentages of methanol extract

No.	conc (mg/ml)	n	A	B	C	D	A-B	C-D	%inh
1	40.00	1	0.371	0.049	0.139	0.095	0.322	0.044	86.34
		2	0.357	0.037	0.137	0.094	0.320	0.043	86.56
		3	0.349	0.035	0.135	0.093	0.314	0.042	86.62
2	20.00	1	0.355	0.034	0.156	0.066	0.321	0.090	71.96
		2	0.346	0.034	0.151	0.065	0.312	0.086	72.44
		3	0.349	0.036	0.151	0.067	0.313	0.084	73.16
3	10.00	1	0.341	0.036	0.207	0.052	0.305	0.155	49.18
		2	0.354	0.049	0.202	0.050	0.305	0.152	50.16
		3	0.339	0.040	0.205	0.051	0.299	0.154	48.49
4	5.00	1	0.336	0.033	0.249	0.044	0.303	0.205	32.34
		2	0.336	0.036	0.247	0.044	0.300	0.203	32.33
		3	0.342	0.037	0.247	0.043	0.305	0.204	33.11
5	2.50	1	0.349	0.038	0.306	0.045	0.311	0.261	16.08
		2	0.338	0.032	0.302	0.043	0.306	0.259	15.36
		3	0.346	0.033	0.305	0.044	0.313	0.261	16.61
6	1.00	1	0.357	0.034	0.348	0.038	0.323	0.310	4.02
		2	0.354	0.035	0.347	0.043	0.319	0.304	4.70
		3	0.364	0.043	0.345	0.037	0.321	0.308	4.05

Table A4. The average percentage of tyrosinase inhibition of methanol extract (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	1.00	4.05	4.70	4.02	4.26	0.38
2	2.50	16.61	15.36	16.08	16.02	0.63
3	5.00	33.11	32.33	32.34	32.59	0.45
4	10.00	48.49	50.16	49.18	49.28	0.84
5	20.00	73.16	72.44	71.96	72.52	0.60
6	40.00	86.62	86.56	86.34	86.51	0.15

Table A5. The raw data for the absorbance and tyrosinase inhibition percentages of licorice extract

No.	conc (µg/ml)	n	A	B	C	D	A-B	C-D	%inh
1	25.00	1	0.336	0.039	0.062	0.047	0.297	0.015	94.95
		2	0.341	0.040	0.064	0.047	0.301	0.017	94.35
		3	0.325	0.040	0.064	0.048	0.285	0.016	94.39
2	10.00	1	0.330	0.039	0.076	0.044	0.291	0.032	89.00
		2	0.317	0.039	0.076	0.044	0.278	0.032	88.49
		3	0.344	0.037	0.086	0.044	0.307	0.042	86.32
3	5.00	1	0.311	0.039	0.147	0.047	0.272	0.100	63.24
		2	0.306	0.039	0.141	0.048	0.267	0.093	65.17
		3	0.324	0.035	0.145	0.040	0.289	0.105	63.67
4	1.00	1	0.328	0.039	0.203	0.036	0.289	0.167	42.21
		2	0.344	0.040	0.216	0.038	0.304	0.178	41.45
		3	0.336	0.040	0.211	0.039	0.296	0.172	41.89
5	0.50	1	0.325	0.038	0.246	0.039	0.287	0.207	27.87
		2	0.327	0.038	0.248	0.039	0.289	0.209	27.68
		3	0.320	0.040	0.246	0.039	0.280	0.207	26.07
6	0.25	1	0.346	0.039	0.320	0.039	0.307	0.281	8.47
		2	0.327	0.038	0.302	0.038	0.289	0.264	8.65
		3	0.324	0.038	0.298	0.039	0.286	0.259	9.44

Table A6. The average percentage of tyrosinase inhibition of licorice extract (Mean ± SD)

No	conc (µg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.25	8.47	8.65	9.44	8.85	0.42
2	0.50	26.07	27.68	27.87	27.21	0.81
3	1.00	41.89	41.45	42.21	41.85	0.31
4	2.50	63.67	65.17	63.24	64.03	0.83
5	5.00	86.32	88.49	89.00	87.94	1.16
6	10.00	94.39	94.35	94.95	94.56	0.27

Table A7. The raw data for the absorbance and tyrosinase inhibition percentages of L-ascorbic acid

No.	conc (µg/ml)	n	A	B	C	D	A-B	C-D	%inh
1	200.00	1	0.358	0.034	0.040	0.034	0.324	0.006	98.15
		2	0.357	0.033	0.039	0.035	0.324	0.004	98.77
		3	0.359	0.032	0.040	0.035	0.327	0.005	98.47
2	100.00	1	0.344	0.034	0.157	0.035	0.310	0.122	60.65
		2	0.354	0.038	0.161	0.040	0.316	0.121	61.71
		3	0.347	0.034	0.153	0.033	0.313	0.120	61.66
3	50.00	1	0.323	0.040	0.216	0.033	0.283	0.183	35.34
		2	0.346	0.038	0.222	0.035	0.308	0.203	34.09
		3	0.349	0.033	0.241	0.033	0.316	0.208	34.18
4	25.00	1	0.391	0.038	0.299	0.037	0.353	0.262	25.78
		2	0.404	0.036	0.311	0.039	0.368	0.272	26.09
		3	0.355	0.040	0.279	0.043	0.315	0.236	25.08
5	10.00	1	0.387	0.044	0.345	0.040	0.343	0.305	11.08
		2	0.337	0.038	0.305	0.040	0.299	0.265	11.37
		3	0.354	0.038	0.320	0.041	0.316	0.279	11.71
6	5.00	1	0.395	0.035	0.377	0.034	0.360	0.343	4.72
		2	0.359	0.033	0.344	0.035	0.326	0.309	5.21
		3	0.385	0.034	0.367	0.036	0.351	0.331	5.70

Table A8. The average percentage of tyrosinase inhibition of L-ascorbic acid (Mean ± SD)

No	conc (µg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	5.00	5.70	5.21	4.72	5.21	0.49
2	10.00	11.71	11.37	11.08	11.39	0.32
3	25.00	25.08	26.09	25.78	25.65	0.52
4	50.00	35.34	34.09	34.18	34.54	0.70
5	100.00	61.66	61.71	60.65	61.34	0.60
6	200.00	98.47	98.77	98.15	98.46	0.31

Table A9. The IC_{50} values of tyrosinase inhibition of each anti-tyrosinase, and coefficient of determination (R^2) obtained from polynomial regression of the initial portion of the plot concentration (n=3)

Sample	Polynomial equation (partial)					
	IC_{50} (mg/ml)	Mean	SD	R^2	Mean	SD
Freeze-dried water extract	3.07	3.09	0.036	0.9953	0.9931	0.002
	3.09			0.9931		
	3.14			0.9908		
Methanol extract	9.66	9.62	0.075	0.9927	0.9949	0.002
	9.53			0.9969		
	9.66			0.9952		

Sample	Polynomial equation (partial)					
	IC_{50} (µg/ml)	Mean	SD	R^2	Mean	SD
Licorice extract	1.22	1.23	0.015	0.9925	0.9907	0.002
	1.25			0.9890		
	1.23			0.9907		
L-ascorbic acid	72.12	73.57	1.263	0.9901	0.9865	0.003
	74.40			0.9840		
	74.20			0.9854		

Table A10. Independent Samples T-Test and Z-Test on the IC_{50} values of tyrosinase inhibition of freeze-dried water extract and methanol extract

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	Variable 2
Mean	3.1	9.616666667
Variance	0.0013	0.005633333
Observations	3	3
Pooled Variance	0.003466667	
Hypothesized Mean Difference	0	
df	4	
t Stat	-135.5548605	
P(T<=t) one-tail	8.88185E-09	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	1.77637E-08	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	3.1	9.616666667
Known Variance	0.0013	0.0056
Observations	3	3
Hypothesized Mean Difference	0	
z	-135.8818932	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract and Variable 2 = methanol extract

Table A11. Independent Samples T-Test and Z-Test on the IC_{50} values of tyrosinase inhibition of licorice extract and L-ascorbic acid

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	1.233333333	73.57333333
Variance	0.000233333	1.594133333
Observations	3	3
Pooled Variance	0.797183333	
Hypothesized Mean Difference	0	
df	4	
t Stat	-99.23046552	
P(T<=t) one-tail	3.09205E-08	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	6.18411E-08	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	1.233333333	73.57333333
Known Variance	1.26	1.59
Observations	3	3
Hypothesized Mean Difference	0	
z	-74.21927399	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= licorice extract and Variable 2 = L-ascorbic acid

Appendix B

Data of DPPH Radical Scavenging Activity

Table B1. The raw data for the absorbance and DPPH radical inhibition percentages of freeze-dried water extract at 0 month

No.	conc (mg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
		1	0.0916			1	0.1102			1	0.0940		
1	4.00	2	0.0838	0.0868	89.40	2	0.0894	0.0955	88.26	2	0.0914	0.0929	88.67
		3	0.0851			3	0.0868			3	0.0932		
		1	0.0973			1	0.0963			1	0.1065		
2	3.00	2	0.1040	0.0995	87.86	2	0.1031	0.0992	87.81	2	0.1047	0.1030	87.43
		3	0.0971			3	0.0982			3	0.0978		
		1	0.1194			1	0.1455			1	0.1264		
3	2.00	2	0.1302	0.1234	84.94	2	0.1293	0.1344	83.48	2	0.1189	0.1238	84.89
		3	0.1208			3	0.1283			3	0.1262		
		1	0.2513			1	0.2336			1	0.2555		
4	1.00	2	0.2341	0.2459	69.99	2	0.2588	0.2473	69.60	2	0.2542	0.2508	69.40
		3	0.2522			3	0.2494			3	0.2427		
		1	0.5028			1	0.4905			1	0.5085		
5	0.50	2	0.4888	0.4931	39.83	2	0.5042	0.5042	38.03	2	0.5006	0.5018	38.77
		3	0.4878			3	0.5179			3	0.4962		
		1	0.7192			1	0.7212			1	0.7388		
6	0.10	2	0.6932	0.7163	12.60	2	0.7306	0.7169	11.89	2	0.7229	0.7270	11.30
		3	0.7635			3	0.6990			3	0.7192		
		1	0.7645			1	0.7538			1	0.7833		
7	0.05	2	0.7850	0.7734	5.63	2	0.7643	0.7638	6.12	2	0.7699	0.7759	5.33
		3	0.7706			3	0.7733			3	0.7744		
		1	0.8201			1	0.8073			1	0.8103		
8	0.00	2	0.8212	0.8195	0.00	2	0.8112	0.8136	0.00	2	0.8312	0.8195	0.00
		3	0.8173			3	0.8222			3	0.8170		

Table B2. The average percentage of DPPH inhibition of freeze-dried water extract at 0 month (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	4.00	89.40	88.26	88.67	88.78	0.58
2	3.00	87.86	87.81	87.43	87.70	0.24
3	2.00	84.94	83.48	84.89	84.44	0.88
4	1.00	69.99	69.60	69.40	69.66	0.30
5	0.50	39.83	38.03	38.77	38.88	0.90
6	0.10	12.60	11.89	11.30	11.93	0.65
7	0.05	5.63	6.12	5.33	5.69	0.40
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B3. The raw data for the absorbance and DPPH radical inhibition percentages of freeze-dried water extract at 1 month

No.	conc (mg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
		1	0.0842			1	0.0887			1	0.0799		
1	4.00	2	0.0864	0.0862	88.87	2	0.0894	0.0895	88.40	2	0.0809	0.0815	89.35
		3	0.0880			3	0.0905			3	0.0838		
		1	0.0991			1	0.1018			1	0.1001		
2	3.00	2	0.0988	0.0992	87.20	2	0.0990	0.0999	87.05	2	0.1005	0.0998	86.96
		3	0.0997			3	0.0990			3	0.0988		
		1	0.1213			1	0.1202			1	0.1229		
3	2.00	2	0.1242	0.1251	83.85	2	0.1238	0.1229	84.07	2	0.1158	0.1192	84.43
		3	0.1298			3	0.1247			3	0.1168		
		1	0.2348			1	0.2239			1	0.2618		
4	1.00	2	0.2243	0.2410	68.89	2	0.2188	0.2349	69.55	2	0.2225	0.2368	69.07
		3	0.2640			3	0.2621			3	0.2262		
		1	0.4932			1	0.4785			1	0.4589		
5	0.50	2	0.4697	0.4734	38.90	2	0.4894	0.4772	38.15	2	0.4702	0.4661	39.12
		3	0.4573			3	0.4636			3	0.4693		
		1	0.6874			1	0.6511			1	0.6808		
6	0.10	2	0.6523	0.6677	13.82	2	0.6877	0.6744	12.56	2	0.6617	0.6770	11.57
		3	0.6635			3	0.6844			3	0.6886		
		1	0.7294			1	0.7500			1	0.7190		
7	0.05	2	0.7281	0.7377	4.78	2	0.7178	0.7330	4.99	2	0.7418	0.7334	4.21
		3	0.7556			3	0.7312			3	0.7394		
		1	0.7693			1	0.7845			1	0.7603		
8	0.00	2	0.7919	0.7748	0.00	2	0.7703	0.7715	0.00	2	0.8119	0.7656	0.00
		3	0.7631			3	0.7598			3	0.7246		

Table B4. The average percentage of DPPH inhibition of freeze-dried water extract at 1 month (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	4.00	88.87	88.44	89.35	88.89	0.46
2	3.00	87.20	87.05	86.96	87.07	0.12
3	2.00	83.85	84.07	84.43	84.12	0.30
4	1.00	68.89	69.55	69.07	69.17	0.34
5	0.50	38.90	38.15	39.12	38.72	0.51
6	0.10	13.82	12.56	11.57	12.65	1.13
7	0.05	4.78	4.99	4.21	4.66	0.40
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B5. The raw data for the absorbance and DPPH radical inhibition percentages of freeze-dried water extract at 2 month

No.	conc (mg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
		1	0.0824			1	0.0832			1	0.0882		
1	4.00	2	0.0820	0.0831	89.37	2	0.0916	0.0864	88.84	2	0.0837	0.0863	88.93
		3	0.0848			3	0.0845			3	0.0870		
		1	0.1032			1	0.1049			1	0.1031		
2	3.00	2	0.0939	0.0998	87.22	2	0.0963	0.1005	87.02	2	0.1011	0.1013	87.00
		3	0.1024			3	0.1004			3	0.0996		
		1	0.1237			1	0.1252			1	0.1240		
3	2.00	2	0.1293	0.1237	84.16	2	0.1269	0.1255	83.79	2	0.1258	0.1247	84.00
		3	0.1182			3	0.1245			3	0.1244		
		1	0.2257			1	0.2488			1	0.2310		
4	1.00	2	0.2362	0.2369	69.68	2	0.2367	0.2369	69.40	2	0.2375	0.2391	69.33
		3	0.2487			3	0.2253			3	0.2488		
		1	0.4786			1	0.4911			1	0.4905		
5	0.50	2	0.4579	0.4735	39.16	2	0.4869	0.4808	37.91	2	0.4863	0.4810	38.29
		3	0.4895			3	0.4644			3	0.4773		
		1	0.6812			1	0.6782			1	0.6785		
6	0.10	2	0.6777	0.6822	12.69	2	0.6765	0.6811	12.04	2	0.6880	0.6810	12.64
		3	0.6867			3	0.6887			3	0.6765		
		1	0.7329			1	0.7260			1	0.7502		
7	0.05	2	0.7314	0.7370	5.67	2	0.7458	0.7411	4.29	2	0.7263	0.7344	5.79
		3	0.7467			3	0.7513			3	0.7267		
		1	0.7538			1	0.7748			1	0.7782		
8	0.00	2	0.8026	0.7813	0.00	2	0.7801	0.7743	0.00	2	0.7980	0.7795	0.00
		3	0.7876			3	0.7680			3	0.7623		

Table B6. The average percentage of DPPH inhibition of freeze-dried water extract at 3 month (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	4.00	89.40	88.84	88.93	89.06	0.30
2	3.00	87.86	87.02	87.00	87.29	0.49
3	2.00	84.94	83.79	84.00	84.24	0.61
4	1.00	69.99	69.40	69.33	69.57	0.36
5	0.50	39.83	37.91	38.29	38.68	1.02
6	0.10	12.60	12.04	12.64	12.43	0.34
7	0.05	5.63	4.29	5.79	5.24	0.82
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B7. The raw data for the absorbance and DPPH radical inhibition percentages of methanol extract at 0 month

No.	conc (mg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
		1	0.0861			1	0.0842			1	0.0897		
1	4.00	2	0.0846	0.0852	89.43	2	0.0869	0.0879	89.06	2	0.0867	0.0890	88.95
		3	0.0848			3	0.0925			3	0.0906		
		1	0.1136			1	0.1086			1	0.1165		
2	3.00	2	0.1022	0.1070	86.72	2	0.1064	0.1071	86.67	2	0.1146	0.1144	85.79
		3	0.1051			3	0.1062			3	0.1121		
		1	0.2655			1	0.2723			1	0.2596		
3	2.00	2	0.2522	0.2634	67.30	2	0.2671	0.2716	66.20	2	0.2688	0.2688	66.62
		3	0.2725			3	0.2753			3	0.2781		
		1	0.4773			1	0.4884			1	0.4773		
4	1.00	2	0.4838	0.4691	41.75	2	0.4608	0.4721	41.25	2	0.4618	0.4758	40.92
		3	0.4463			3	0.4670			3	0.4884		
		1	0.5983			1	0.6119			1	0.6008		
5	0.50	2	0.5936	0.6026	25.18	2	0.6019	0.5966	25.76	2	0.6171	0.6037	25.03
		3	0.6160			3	0.5759			3	0.5931		
		1	0.7344			1	0.7448			1	0.7477		
6	0.10	2	0.7491	0.7450	7.50	2	0.7471	0.7375	8.23	2	0.7255	0.7359	8.62
		3	0.7516			3	0.7206			3	0.7344		
		1	0.7696			1	0.7621			1	0.7462		
7	0.05	2	0.7609	0.7698	4.42	2	0.7709	0.7670	4.55	2	0.7869	0.7731	4.00
		3	0.7516			3	0.7679			3	0.7863		
		1	0.8049			1	0.8009			1	0.8056		
8	0.00	2	0.8060	0.8054	0.00	2	0.8146	0.8036	0.00	2	0.8080	0.8053	0.00
		3	0.8053			3	0.7953			3	0.8023		

Table B8. The average percentage of DPPH inhibition of methanol extract at 0 month (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	4.00	89.43	89.06	88.95	89.15	0.25
2	3.00	86.72	86.67	85.79	86.39	0.52
3	2.00	67.30	66.20	66.62	66.71	0.56
4	1.00	41.75	41.25	40.92	41.31	0.42
5	0.50	25.18	25.76	25.03	25.32	0.39
6	0.10	7.50	8.23	8.62	8.12	0.57
7	0.05	4.42	4.55	4.00	4.32	0.29
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B9. The raw data for the absorbance and DPPH radical inhibition percentages of methanol extract at 1 month

No.	conc (mg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
		1	0.0874			1	0.0835			1	0.0894		
1	4.00	2	0.0857	0.0873	89.28	2	0.0857	0.0857	89.50	2	0.0903	0.0898	89.08
		3	0.0889			3	0.0880			3	0.0897		
		1	0.1028			1	0.1082			1	0.1138		
2	3.00	2	0.1001	0.1054	87.06	2	0.1158	0.1095	86.58	2	0.1176	0.1159	85.91
		3	0.1133			3	0.1046			3	0.1162		
		1	0.2421			1	0.2652			1	0.2585		
3	2.00	2	0.2755	0.2668	67.25	2	0.2692	0.2767	66.08	2	0.2901	0.2724	66.89
		3	0.2827			3	0.2958			3	0.2685		
		1	0.4825			1	0.4858			1	0.4785		
4	1.00	2	0.4690	0.4788	41.22	2	0.4753	0.4757	41.69	2	0.4816	0.4738	42.41
		3	0.4788			3	0.4659			3	0.4612		
		1	0.6007			1	0.5942			1	0.6163		
5	0.50	2	0.6302	0.6092	25.21	2	0.6274	0.6078	25.50	2	0.6100	0.6097	25.89
		3	0.5967			3	0.6017			3	0.6027		
		1	0.7424			1	0.7448			1	0.7326		
6	0.10	2	0.7544	0.7463	8.38	2	0.7554	0.7522	7.80	2	0.7462	0.7430	9.69
		3	0.7420			3	0.7563			3	0.7503		
		1	0.7645			1	0.8070			1	0.7717		
7	0.05	2	0.8025	0.7782	4.46	2	0.7703	0.7810	4.27	2	0.7643	0.7807	5.11
		3	0.7677			3	0.7656			3	0.8060		
		1	0.8107			1	0.8209			1	0.8156		
8	0.00	2	0.8215	0.8145	0.00	2	0.8146	0.8158	0.00	2	0.8221	0.8227	0.00
		3	0.8114			3	0.8119			3	0.8304		

Table B10. The average percentage of DPPH inhibition of methanol extract at 1 month (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	4.00	89.28	89.50	89.08	89.29	0.21
2	3.00	87.06	86.58	85.91	86.52	0.58
3	2.00	67.25	66.08	66.89	66.74	0.60
4	1.00	41.22	41.69	42.41	41.77	0.60
5	0.50	25.21	25.50	25.89	25.53	0.34
6	0.10	8.38	7.80	9.69	8.62	0.97
7	0.05	4.46	4.27	5.11	4.61	0.44
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B11. The raw data for the absorbance and DPPH radical inhibition percentages of methanol extract at 2 month

No.	conc (mg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
1	4.00	1	0.0845	0.0864	89.33	1	0.0910	0.0895	88.98	1	0.0873	0.0880	89.08
		2	0.0887			2	0.0894			2	0.0887		
		3	0.0859			3	0.0882			3	0.0881		
2	3.00	1	0.1093	0.1098	86.44	1	0.1122	0.1129	86.10	1	0.1157	0.1118	85.91
		2	0.1112			2	0.1126			2	0.1056		
		3	0.1089			3	0.1140			3	0.1142		
3	2.00	1	0.2594	0.2663	67.10	1	0.2912	0.2687	66.93	1	0.2795	0.2708	66.89
		2	0.2816			2	0.2692			2	0.2522		
		3	0.2580			3	0.2458			3	0.2807		
4	1.00	1	0.4678	0.4766	41.13	1	0.4753	0.4757	41.45	1	0.4785	0.4713	42.41
		2	0.4825			2	0.4659			2	0.4674		
		3	0.4794			3	0.4858			3	0.4681		
5	0.50	1	0.6007	0.6013	25.72	1	0.5956	0.6024	25.86	1	0.6027	0.6065	25.89
		2	0.6065			2	0.6060			2	0.6005		
		3	0.5967			3	0.6057			3	0.6160		
6	0.10	1	0.7464	0.7423	8.30	1	0.7347	0.7431	8.54	1	0.7371	0.7413	9.69
		2	0.7318			2	0.7393			2	0.7437		
		3	0.7486			3	0.7554			3	0.7430		
7	0.05	1	0.7607	0.7708	4.78	1	0.7685	0.7746	4.66	1	0.7859	0.7768	5.11
		2	0.7746			2	0.7806			2	0.7609		
		3	0.7771			3	0.7748			3	0.7837		
8	0.00	1	0.8081	0.8095	0.00	1	0.8209	0.8125	0.00	1	0.8236	0.8095	0.00
		2	0.8091			2	0.8046			2	0.8021		
		3	0.8112			3	0.8119			3	0.8029		

Table B12. The average percentage of DPPH inhibition of methanol extract at 3 month (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	4.00	89.28	88.98	89.08	89.11	0.15
2	3.00	87.06	86.10	85.91	86.36	0.62
3	2.00	67.25	66.93	66.89	67.02	0.20
4	1.00	41.22	41.45	42.41	41.69	0.63
5	0.50	25.21	25.86	25.89	25.65	0.38
6	0.10	8.38	8.54	9.69	8.87	0.71
7	0.05	4.46	4.66	5.11	4.74	0.33
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B13. The raw data for the absorbance and DPPH radical inhibition percentages of Trolox ®

No.	conc (µg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
1	50.00	1	0.0316	0.0332	96.22	1	0.0371	0.0359	95.93	1	0.0345	0.0348	96.03
		2	0.0380			2	0.0356			2	0.0370		
		3	0.0299			3	0.0350			3	0.0328		
2	25.00	1	0.0521	0.0521	94.06	1	0.0791	0.0674	92.35	1	0.0883	0.0767	91.25
		2	0.0587			2	0.0768			2	0.0522		
		3	0.0455			3	0.0464			3	0.0896		
3	10.00	1	0.3485	0.3421	60.96	1	0.3186	0.3278	62.80	1	0.3571	0.3489	60.19
		2	0.3271			2	0.3250			2	0.3373		
		3	0.3508			3	0.3397			3	0.3523		
4	5.00	1	0.5302	0.5257	40.02	1	0.5470	0.5480	37.81	1	0.5470	0.5580	36.34
		2	0.5054			2	0.5508			2	0.5438		
		3	0.5414			3	0.5460			3	0.5830		
5	2.50	1	0.7054	0.6786	22.57	1	0.6536	0.6536	25.83	1	0.6738	0.6697	23.58
		2	0.7032			2	0.6549			2	0.6584		
		3	0.6271			3	0.6522			3	0.6770		
6	1.00	1	0.8053	0.7719	11.92	1	0.8086	0.7900	10.35	1	0.7863	0.7835	10.60
		2	0.7804			2	0.7810			2	0.7703		
		3	0.7300			3	0.7804			3	0.7938		
7	0.50	1	0.8635	0.8557	2.35	1	0.8604	0.8576	2.68	1	0.8669	0.8609	1.76
		2	0.8701			2	0.8628			2	0.8628		
		3	0.8336			3	0.8495			3	0.8531		
8	0.00	1	0.8705	0.8764	0.00	1	0.8685	0.8812	0.00	1	0.8647	0.8764	0.00
		2	0.8696			2	0.8810			2	0.8820		
		3	0.8890			3	0.8941			3	0.8825		

Table B14. The average percentage of DPPH inhibition of Trolox ® (Mean ± SD)

No	conc (µg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	50.00	96.22	95.93	96.03	96.06	0.15
2	25.00	94.06	92.35	91.25	92.55	1.42
3	10.00	60.96	62.80	60.19	61.32	1.34
4	5.00	40.02	37.81	36.34	38.06	1.85
5	2.50	22.57	25.83	23.58	23.99	1.67
6	1.00	11.92	10.35	10.60	10.96	0.84
7	0.50	2.35	2.68	1.76	2.26	0.47
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B15. The raw data for the absorbance and DPPH radical inhibition percentages of L-ascorbic acid

No.	conc (µg/ml)	N1				N2				N3			
		n	Abs	Mean	%inh	n	Abs	Mean	%inh	n	Abs	Mean	%inh
		1	0.0201			1	0.0217			1	0.0178		
1	50.00	2	0.0229	0.0221	97.40	2	0.0220	0.0359	95.88	2	0.0198	0.0192	97.81
		3	0.0234			3	0.0242			3	0.0201		
		1	0.0486			1	0.0409			1	0.0460		
2	25.00	2	0.0513	0.0488	94.26	2	0.0581	0.0674	92.26	2	0.0503	0.0491	94.33
		3	0.0464			3	0.0507			3	0.0510		
		1	0.2036			1	0.2286			1	0.2059		
3	10.00	2	0.2174	0.2014	76.34	2	0.1814	0.2047	76.50	2	0.2072	0.2041	76.71
		3	0.1833			3	0.2040			3	0.1993		
		1	0.3135			1	0.3195			1	0.3234		
4	5.00	2	0.3288	0.3144	63.06	2	0.2906	0.3071	64.74	2	0.2988	0.3031	65.42
		3	0.3010			3	0.3111			3	0.2872		
		1	0.5967			1	0.5923			1	0.5803		
5	2.50	2	0.5851	0.5849	31.29	2	0.5769	0.5861	32.70	2	0.5410	0.5645	35.59
		3	0.5728			3	0.5890			3	0.5723		
		1	0.6818			1	0.7126			1	0.6699		
6	1.00	2	0.7153	0.6975	18.06	2	0.6648	0.6904	20.73	2	0.6665	0.6710	23.44
		3	0.6953			3	0.6973			3	0.6766		
		1	0.7556			1	0.7667			1	0.7676		
7	0.50	2	0.7794	0.7717	9.34	2	0.7639	0.7650	12.16	2	0.7717	0.7658	12.62
		3	0.7802			3	0.7645			3	0.7581		
		1	0.8219			1	0.8665			1	0.8747		
8	0.00	2	0.8453	0.8512	0.00	2	0.8920	0.8709	0.00	2	0.8820	0.8764	0.00
		3	0.8865			3	0.8542			3	0.8725		

Table B16. The average percentage of DPPH inhibition of L-ascorbic acid (Mean ± SD)

No	conc (µg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	50.00	97.40	95.88	97.81	97.03	1.02
2	25.00	94.26	92.26	94.33	93.62	1.18
3	10.00	76.34	76.50	76.71	76.52	0.19
4	5.00	63.06	64.74	65.42	64.41	1.21
5	2.50	31.29	32.70	35.59	33.19	2.19
6	1.00	18.06	20.73	23.44	20.74	2.69
7	0.50	9.34	12.16	12.62	11.37	1.78
8	0.00	0.00	0.00	0.00	0.00	0.00

Table B17. The IC_{50} values of DPPH radical inhibition by freeze-dried water extract and methanol extract after 0, 1 and 3 month-storage. Coefficient of determination (R^2) from polynomial regression of the initial portion of the plots between inhibition percentage and concentrations are also provided (n=3)

Month	Samples	IC_{50}(mg/ml)	Mean	SD	R^2	Mean	SD
0	Freeze-dried water extract	0.635 0.650 0.643	0.643	0.007	0.9983 0.9974 0.9987	0.9981	0.001
	Methanol Extract	1.244 1.247 1.254	1.248	0.005	0.9984 0.9971 0.9969	0.9974	0.001
1	Freeze-dried water extract	0.643 0.655 0.645	0.648	0.006	0.9966 0.9972 0.9987	0.9975	0.001
	Methanol extract	1.249 1.244 1.220	1.238	0.02	0.9973 0.9980 0.9960	0.9971	0.001
3	Freeze-dried water extract	0.636 0.648 0.644	0.643	0.006	0.9979 0.9973 0.9974	0.9975	0.000
	Methanol extract	1.245 1.238 1.225	1.236	0.01	0.9969 0.9968 0.9960	0.9966	0.000

Table B18. The IC_{50} of DPPH radical inhibition of each antioxidant, and coefficient of determination (R^2) obtained from polynomial regression of the initial portion of the plots between inhibition percentage and the concentrations of each antioxidant (n=3)

Sample	Polynomial equation (partial)					
	IC_{50} (mg/ml)	Mean	SD	R^2	Mean	SD
Freeze-dried water extract	0.635	0.643	0.007	0.9983	0.9981	0.001
	0.650			0.9974		
	0.643			0.9987		
Methanol extract	1.244	1.248	0.005	0.9984	0.9974	0.001
	1.247			0.9971		
	1.254			0.9969		

Sample	Polynomial equation (partial)					
	IC_{50} (µg/ml)	Mean	SD	R^2	Mean	SD
Trolox®	6.77	6.92	0.29	0.9958	0.9935	0.002
	6.73			0.9920		
	7.25			0.9926		
L-ascorbic acid	3.79	3.60	0.19	0.9927	0.9924	0.001
	3.59			0.9890		
	3.42			0.9895		

Table B19. Independent Samples T-Test and Z-Test on the IC_{50} values of DPPH radical inhibition of freeze-dried water extract and methanol extract

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	0.642666667	1.248333333
Variance	5.63333E-05	2.63333E-05
Observations	3	3
Pooled Variance	4.13333E-05	
Hypothesized Mean Difference	0	
df	4	
t Stat	-115.3796154	
P(T<=t) one-tail	1.69195E-08	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	3.3839E-08	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.642666667	1.248333333
Known Variance	5.63333E-05	2.63333E-05
Observations	3	3
Hypothesized Mean Difference	0	
z	-9.576430848	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract and Variable 2 = methanol extract

Table B 20. Independent Samples T Test on the IC_{50} values of DPPH radical inhibition of Trolox® and L-ascorbic acid

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	6.916666667	3.6
Variance	0.083733333	0.0343
Observations	3	3
Pooled Variance	0.059016667	
Hypothesized Mean Difference	0	
df	4	
t Stat	16.72091801	
P(T<=t) one-tail	3.74797E-05	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	7.49593E-05	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	6.916666667	3.6
Known Variance	0.0837	0.0343
Observations	3	3
Hypothesized Mean Difference	0	
z	16.72327956	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= Trolox® and Variable 2 = L-ascorbic acid

Appendix C

Data of Superoxide Radical Scavenging Activity

Table C1. The raw data for the absorbance and superoxide radical inhibition percentages of freeze-dried water extract

No.	Final conc (mg/ml)	N1						N2						N3					
		n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh
1	0.00	1	0.5520	0.0068	0.5452			1	0.5481	0.0068	0.5413			1	0.5529	0.0083	0.5446		
		2	0.5507	0.0067	0.5440	0.5444	0.00	2	0.5491	0.0078	0.5413	0.5413	0.00	2	0.5482	0.0068	0.5414	0.5427	0.00
		3	0.5505	0.0065	0.5440			3	0.5496	0.0082	0.5414			3	0.5503	0.0063	0.5420		
2	1.00	1	0.5081	0.0068	0.5013			1	0.5189	0.0089	0.5100			1	0.5159	0.0077	0.5082		
		2	0.5103	0.0083	0.5020	0.5020	7.79	2	0.5103	0.0093	0.5010	0.5031	7.39	2	0.5010	0.0083	0.4927	0.5038	7.17
		3	0.5115	0.0088	0.5027			3	0.5065	0.0083	0.4982			3	0.5177	0.0083	0.5104		
3	2.00	1	0.3879	0.0067	0.3812			1	0.3425	0.0067	0.4100			1	0.4089	0.0083	0.4006		
		2	0.3876	0.0070	0.3806	0.3830	29.65	2	0.4167	0.0077	0.3966	0.3982	26.44	2	0.3926	0.0089	0.3837	0.3935	27.49
		3	0.3936	0.0063	0.3873			3	0.4043	0.0096	0.3881			3	0.4039	0.0078	0.3961		
4	4.00	1	0.2814	0.0093	0.2721			1	0.2777	0.0076	0.2801			1	0.2939	0.0083	0.2856		
		2	0.2722	0.0089	0.2633	0.2681	50.75	2	0.2682	0.0070	0.2712	0.2778	46.83	2	0.2801	0.0073	0.2728	0.2798	48.44
		3	0.2772	0.0082	0.2690			3	0.2796	0.0076	0.2820			3	0.2897	0.0088	0.2809		
5	6.00	1	0.1907	0.0098	0.1809			1	0.1949	0.0098	0.1851			1	0.1983	0.0098	0.1885		
		2	0.1876	0.0088	0.1788	0.1789	67.14	2	0.1918	0.0095	0.1823	0.1833	66.14	2	0.1912	0.0105	0.1807	0.1829	66.30
		3	0.1873	0.0103	0.1770			3	0.1914	0.0090	0.1824			3	0.1890	0.0096	0.1794		
6	8.00	1	0.0907	0.0098	0.0809			1	0.1049	0.0098	0.0952			1	0.0983	0.0098	0.0885		
		2	0.0876	0.0088	0.0788	0.0789	85.51	2	0.1018	0.0095	0.0923	0.0933	82.76	2	0.0912	0.0105	0.0807	0.0829	84.72
		3	0.0873	0.0103	0.0770			3	0.1014	0.0090	0.0924			3	0.0890	0.0096	0.0794		

Table C2. The raw data for the absorbance and superoxide radical inhibition percentages of methanol water extract

No.	Final conc (mg/ml)	N1						N2						N3					
		n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh
1	0.00	1	0.5032	0.0085	0.4947			1	0.4996	0.0085	0.4911			1	0.5057	0.0084	0.4973		
		2	0.5044	0.0084	0.4960	0.4959	0.00	2	0.5007	0.0088	0.4919	0.4921	0.00	2	0.5065	0.0090	0.4975	0.4973	0.00
		3	0.5051	0.0082	0.4969			3	0.5024	0.0092	0.4932			3	0.5000	0.0092	0.4908		
2	1.00	1	0.4907	0.0098	0.4809			1	0.4828	0.0081	0.4747			1	0.4905	0.0089	0.4816		
		2	0.4912	0.0089	0.4823	0.4821	2.80	2	0.4901	0.0089	0.4812	0.7685	2.76	2	0.4873	0.0096	0.4777	0.4794	3.60
		3	0.4914	0.0084	0.4830			3	0.4897	0.0100	0.4797			3	0.4888	0.0099	0.4789		
3	2.00	1	0.4100	0.0095	0.4005			1	0.4122	0.0107	0.4015			1	0.4088	0.0104	0.3984		
		2	0.4154	0.0104	0.4050	0.4013	19.08	2	0.4066	0.0114	0.3952	0.3982	19.08	2	0.3977	0.0093	0.3884	0.3930	20.64
		3	0.4089	0.0106	0.3983			3	0.4084	0.0106	0.3978			3	0.4020	0.0099	0.3921		
4	4.00	1	0.3706	0.0103	0.3603			1	0.3516	0.0112	0.3404			1	0.3713	0.0106	0.3607		
		2	0.3710	0.0107	0.3603	0.3577	27.87	2	0.3556	0.0106	0.3450	0.3453	29.83	2	0.3719	0.0110	0.3609	0.3585	27.61
		3	0.3638	0.0112	0.3526			3	0.3612	0.0107	0.3505			3	0.3652	0.0112	0.3540		
5	6.00	1	0.2984	0.0115	0.2869			1	0.2974	0.0100	0.2874			1	0.2963	0.0092	0.2871		
		2	0.2849	0.0107	0.2742	0.2794	43.66	2	0.2951	0.0098	0.2853	0.2821	42.67	2	0.3131	0.0095	0.3036	0.2968	40.32
		3	0.2881	0.0111	0.2770			3	0.2831	0.0095	0.2736			3	0.3097	0.0100	0.2997		
6	8.00	1	0.1569	0.0105	0.1464			1	0.1415	0.0118	0.1297			1	0.1516	0.0112	0.1404		
		2	0.1566	0.0110	0.1456	0.1410	71.57	2	0.1432	0.0110	0.1322	0.1344	72.69	2	0.1500	0.0115	0.1385	0.1395	71.83
		3	0.1416	0.0105	0.1311			3	0.1519	0.0107	0.1412			3	0.1514	0.0118	0.1396		

Table C3. The raw data for the absorbance and superoxide radical inhibition percentages of Trolox ®

No.	Final conc (µg/ml)	N1						N2						N3					
		n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh
1	0.00	1	0.5861	0.0084	0.5777			1	0.5842	0.0070	0.5772			1	0.5829	0.0062	0.5767		
		2	0.5865	0.0077	0.5788	0.5766	0.00	2	0.5852	0.0070	0.5782	0.5810	0.00	2	0.5865	0.0067	0.5798	0.5777	0.00
		3	0.5807	0.0074	0.5733			3	0.5947	0.0071	0.5876			3	0.5835	0.0068	0.5767		
2	10.00	1	0.4741	0.0071	0.4670			1	0.4795	0.0068	0.4727			1	0.4799	0.0067	0.4732		
		2	0.4755	0.0071	0.4684	0.4680	18.83	2	0.4822	0.0074	0.4748	0.4740	18.42	2	0.4791	0.0076	0.4715	0.4726	18.19
		3	0.4760	0.0073	0.4687			3	0.4819	0.0074	0.4745			3	0.4808	0.0076	0.4732		
3	20.00	1	0.3804	0.0073	0.3731			1	0.3785	0.0074	0.3711			1	0.3757	0.0076	0.3681		
		2	0.3807	0.0074	0.3733	0.3719	35.50	2	0.3734	0.0073	0.3661	0.3701	36.30	2	0.3771	0.0071	0.3700	0.3648	36.85
		3	0.3765	0.0073	0.3692			3	0.3801	0.0071	0.3730			3	0.3650	0.0088	0.3562		
4	50.00	1	0.2899	0.0074	0.2825			1	0.2904	0.0067	0.2837			1	0.2892	0.0076	0.2816		
		2	0.2915	0.0073	0.2842	0.2833	50.87	2	0.2905	0.0065	0.2840	0.2836	51.19	2	0.2883	0.0062	0.2821	0.2816	51.25
		3	0.2902	0.0073	0.2829			3	0.2902	0.0071	0.2831			3	0.2872	0.0060	0.2812		
5	100.00	1	0.1807	0.0071	0.1736			1	0.1798	0.0074	0.1724			1	0.1805	0.0068	0.1737		
		2	0.1814	0.0073	0.1741	0.1731	69.98	2	0.1791	0.0074	0.1717	0.1724	70.33	2	0.1816	0.0063	0.1753	0.1730	70.05
		3	0.1790	0.0074	0.1716			3	0.1804	0.0073	0.1731			3	0.1763	0.0062	0.1701		
6	200.00	1	0.0493	0.0068	0.0425			1	0.0503	0.0073	0.0430			1	0.0503	0.0074	0.0429		
		2	0.0471	0.0070	0.0401	0.0417	92.77	2	0.0499	0.0065	0.0434	0.0429	92.62	2	0.0509	0.0073	0.0436	0.0437	92.49
		3	0.0496	0.0071	0.0425			3	0.0493	0.0070	0.0423			3	0.0508	0.0071	0.0437		

Table C4. The raw data for the absorbance and superoxide radical inhibition percentages of L-ascorbic acid

No.	Final conc (µg/ml)	N1						N2						N3					
		n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh	n	Abs	Blank	Diff	mean	%inh
1	0.00	1	0.5347	0.0071	0.5276			1	0.5356	0.0082	0.5274			1	0.5338	0.0081	0.5257		
		2	0.5339	0.0073	0.5266	0.5271	0.00	2	0.5333	0.0074	0.5359	0.5262	0.00	2	0.5341	0.0077	0.5264	0.5261	0.00
		3	0.5345	0.0073	0.5272			3	0.5331	0.0078	0.5253			3	0.5339	0.0078	0.5261		
2	10.00	1	0.5081	0.0093	0.4988			1	0.5217	0.0084	0.5133			1	0.5098	0.0093	0.5005		
		2	0.5090	0.0093	0.4997	0.5016	4.84	2	0.5203	0.0088	0.5115	0.5135	2.42	2	0.5098	0.0090	0.5008	0.5018	4.62
		3	0.5146	0.0083	0.5063			3	0.5248	0.0090	0.5158			3	0.5135	0.0093	0.5042		
3	20.00	1	0.4382	0.0090	0.4292			1	0.4661	0.0090	0.4571			1	0.4576	0.0089	0.4487		
		2	0.4656	0.0090	0.4566	0.4476	15.08	2	0.4664	0.0089	0.4575	0.4555	13.44	2	0.4519	0.0093	0.4426	0.4476	14.92
		3	0.4657	0.0088	0.4569			3	0.4606	0.0088	0.4518			3	0.4608	0.0093	0.4515		
4	50.00	1	0.3556	0.0103	0.3453			1	0.3336	0.0105	0.3231			1	0.3447	0.0103	0.3344		
		2	0.3357	0.0103	0.3254	0.3364	36.18	2	0.3557	0.0106	0.3451	0.3342	36.49	2	0.3346	0.0103	0.3243	0.3379	35.77
		3	0.3489	0.0104	0.3385			3	0.3447	0.0103	0.3344			3	0.3656	0.0105	0.3551		
5	100.00	1	0.2264	0.0115	0.2149			1	0.2394	0.0111	0.2283			1	0.2429	0.0115	0.2314		
		2	0.2444	0.0107	0.2337	0.2238	57.54	2	0.2246	0.0110	0.2136	0.2233	57.56	2	0.2388	0.0117	0.2271	0.2278	56.70
		3	0.2339	0.0111	0.2228			3	0.2394	0.0115	0.2279			3	0.2360	0.0112	0.2248		
6	200.00	1	0.2693	0.0139	0.2554			1	0.2712	0.0139	0.2573			1	0.2716	0.0140	0.2576		
		2	0.2720	0.0143	0.2577	0.2558	51.47	2	0.2717	0.0134	0.2583	0.2645	49.73	2	0.2670	0.0142	0.2528	0.2548	51.57
		3	0.2686	0.0143	0.2543			3	0.2922	0.0143	0.2779			3	0.2684	0.0145	0.2539		

Table C5. The average percentages of superoxide inhibition of freeze-dried water extract (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	1.00	7.79	7.39	7.17	7.45	0.32
3	2.00	29.65	26.44	27.49	27.86	1.64
4	4.00	50.75	46.83	48.44	48.67	1.97
5	6.00	67.14	66.14	66.30	66.53	0.54
6	8.00	85.51	82.76	84.72	84.33	1.42

Table C6. The average percentages of superoxide inhibition of methanol extract (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	1.00	2.80	2.76	3.60	3.50	0.47
3	2.00	19.08	19.08	20.64	19.60	0.90
4	4.00	27.87	29.83	27.61	28.44	1.22
5	6.00	43.66	42.67	40.32	42.22	1.72
6	8.00	71.57	72.69	71.83	72.03	0.59

Table C7. The average percentages of superoxide inhibition of Trolox® (Mean ± SD)

No	conc (µg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	10.00	18.83	18.42	18.19	18.48	0.33
3	20.00	35.50	36.30	36.85	36.22	0.68
4	50.00	50.87	51.19	51.25	51.10	0.20
5	100.00	69.98	70.33	70.05	70.12	0.19
6	200.00	92.77	92.62	92.49	92.63	0.14

Table C8. The average percentages of superoxide inhibition of L-ascorbic acid (Mean ± SD)

No	conc (µg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	10.00	4.84	2.42	4.62	3.96	1.34
3	20.00	15.08	13.44	14.93	14.48	0.91
4	50.00	36.18	36.49	35.77	36.15	0.36
5	100.00	57.54	57.56	56.70	57.27	0.49
6	200.00	51.47	49.73	51.57	50.92	1.03

Table C9. The IC_{50} and R^2 values of superoxide radical inhibition of each antioxidant obtained from polynomial regression of the initial portion of the plot between inhibition percentage and concentration of each antioxidant (Mean ± SD, n=3)

Sample	Polynomial equation					
	IC_{50} (mg/ml)	Mean	SD	R^2	Mean	SD
Freeze-dried water extract	4.04	4.20	0.142	0.9919	0.9930	0.002
	4.32			0.9952		
	4.22			0.9936		
Methanol extract	6.24	6.28	0.106	0.9810	0.9716	0.008
	6.20			0.9774		
	6.40			0.9658		

Sample	Polynomial equation					
	IC_{50} (µg/ml)	Mean	SD	R^2	Mean	SD
Trolox®	52.44	52.08	0.317	0.9727	0.9731	0.005
	51.84			0.9780		
	51.96			0.9686		
L-ascorbic acid	78.30	78.96	1.036	0.9966	0.9944	0.003
	78.44			0.9904		
	80.16			0.9962		

Table C 10. Independent Samples T Test and Z-Test on the IC_{50} values of Superoxide radical inhibition of freeze-dried water extract and methanol extract

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	4.193333333	6.28
Variance	0.020133333	0.0112
Observations	3	3
Pooled Variance	0.015666667	
Hypothesized Mean Difference	0	
df	4	
t Stat	-20.41786869	
P(T<=t) one-tail	1.69889E-05	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	3.39779E-05	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	4.193333333	6.28
Known Variance	0.02	0.011
Observations	3	3
Hypothesized Mean Difference	0	
Z	-20.52734866	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract and Variable 2 = methanol extract

Table C 11. Independent Samples T Test and Z-Test on the IC_{50} values of Superoxide radical inhibition of Trolox® and L-ascorbic acid

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	52.08	78.96666667
Variance	0.1008	1.072933333
Observations	3	3
Pooled Variance	0.586866667	
Hypothesized Mean Difference	0	
df	4	
t Stat	-42.98459816	
P(T<=t) one-tail	8.75597E-07	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	1.75119E-06	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	52.08	78.96666667
Known Variance	0.1008	1.073
Observations	3	3
Hypothesized Mean Difference	0	
z	-42.98337747	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= Trolox® and Variable 2 = L-ascorbic acid

Appendix D

Data of Singlet Oxygen Scavenging Activity

Table D1. The raw data for the absorbance and singlet oxygen inhibition percentages of freeze-dried water extract

No.	Final conc (mg/ml)	n	A	B	C	A-C	B-C	%inh
control	0.00	1	0.1786	0.0261	0.0261	0.1525	0.0000	0.00
		2	0.1828	0.0269	0.0269	0.1559	0.0000	0.00
		3	0.1834	0.0281	0.0281	0.1553	0.0000	0.00
1	0.10	1	0.1887	0.0318	0.0280	0.1607	0.0038	2.36
		2	0.1902	0.0313	0.0267	0.1635	0.0046	2.81
		3	0.1868	0.0304	0.0279	0.1564	0.0045	2.88
2	0.50	1	0.1898	0.0562	0.0265	0.1633	0.0297	18.19
		2	0.1910	0.0506	0.0286	0.1624	0.0220	13.55
		3	0.1906	0.0522	0.0269	0.1637	0.0253	15.46
3	1.00	1	0.1948	0.1044	0.0274	0.1674	0.0770	46.00
		2	0.1972	0.1038	0.0268	0.1704	0.0770	45.19
		3	0.1963	0.1056	0.0291	0.1672	0.0765	45.75
4	2.00	1	0.2096	0.1358	0.0288	0.1808	0.1070	59.18
		2	0.2124	0.1342	0.0266	0.1858	0.1076	57.91
		3	0.2158	0.1408	0.0275	0.1883	0.1133	60.17
5	4.00	1	0.2260	0.1650	0.0248	0.2012	0.1402	69.68
		2	0.2289	0.1595	0.0274	0.2015	0.1321	65.56
		3	0.2310	0.1698	0.0288	0.2022	0.1410	69.73

Table D2. The average percentage of singlet oxygen inhibition of freeze-dried water extract (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	2.36	2.81	2.88	2.68	0.28
3	0.50	18.19	13.55	15.46	15.73	2.33
4	1.00	46.00	45.19	45.75	45.65	0.42
5	2.00	59.18	57.91	60.17	59.09	1.13
6	4.00	69.68	65.56	69.73	68.32	2.39

Table D3. The raw data for the absorbance and singlet oxygen inhibition percentages of methanol water extract

No.	Final conc (mg/ml)	n	A	B	C	A-C	B-C	%inh
control	0.00	1	0.1843	0.0282	0.0282	0.1561	0.0000	0.00
		2	0.1808	0.0279	0.0279	0.1529	0.0000	0.00
		3	0.1812	0.0286	0.0286	0.1526	0.0000	0.00
1	0.10	1	0.1826	0.0301	0.0279	0.1547	0.0022	1.42
		2	0.1832	0.0313	0.0286	0.1546	0.0027	1.75
		3	0.1844	0.0294	0.0270	0.1574	0.0024	1.53
2	0.50	1	0.1856	0.0442	0.0269	0.1587	0.0173	10.90
		2	0.1862	0.0436	0.0278	0.1584	0.0158	9.97
		3	0.1875	0.0428	0.0259	0.1616	0.0169	10.46
3	1.00	1	0.1988	0.0756	0.0284	0.1704	0.0472	27.70
		2	0.1992	0.0738	0.0280	0.1712	0.0458	26.75
		3	0.1974	0.0746	0.0292	0.1682	0.0454	26.99
4	2.00	1	0.2100	0.1044	0.0287	0.1813	0.0757	41.75
		2	0.2114	0.1059	0.0283	0.1831	0.0776	42.38
		3	0.2148	0.1088	0.0277	0.1871	0.0811	43.35
5	4.00	1	0.2274	0.1650	0.0268	0.2006	0.1382	68.89
		2	0.2316	0.1675	0.0282	0.2034	0.1393	68.48
		3	0.2320	0.1598	0.0285	0.2035	0.1313	64.52

Table D4. The average percentage of singlet oxygen inhibition of methanol water extract (Mean ± SD)

No	conc (mg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	1.42	1.75	1.53	1.57	0.17
3	0.50	10.90	9.97	10.46	10.44	0.47
4	1.00	27.70	26.75	26.99	27.15	0.49
5	2.00	43.35	42.38	41.75	42.29	0.81
6	4.00	64.52	68.48	68.89	67.30	2.41

Table D5. The raw data for the absorbance and singlet oxygen inhibition percentages of Trolox®

No.	Final conc (μg/ml)	n	A	B	C	A-C	B-C	%inh
control	0.00	1	0.1822	0.0280	0.0280	0.1542	0.0000	0.00
		2	0.1798	0.0278	0.0278	0.1520	0.0000	0.00
		3	0.1802	0.0284	0.0284	0.1518	0.0000	0.00
1	10.00	1	0.1814	0.0439	0.0284	0.1530	0.0155	10.13
		2	0.1826	0.0453	0.0282	0.1544	0.0171	11.08
		3	0.1809	0.0424	0.0275	0.1534	0.0149	9.71
2	25.00	1	0.1813	0.0542	0.0279	0.1534	0.0263	17.14
		2	0.1848	0.0536	0.0286	0.1562	0.0250	16.01
		3	0.1852	0.0528	0.0274	0.1578	0.0254	16.09
3	50.00	1	0.1862	0.0656	0.0294	0.1568	0.0362	23.09
		2	0.1824	0.0658	0.0283	0.1541	0.0375	24.33
		3	0.1836	0.0646	0.0297	0.1539	0.0349	22.68
4	75.00	1	0.1847	0.0897	0.0268	0.1579	0.0629	39.84
		2	0.1865	0.0959	0.0292	0.1573	0.0667	42.40
		3	0.1843	0.0888	0.0286	0.1557	0.0602	38.66
5	100.00	1	0.1828	0.1450	0.0274	0.1554	0.1176	75.68
		2	0.1832	0.1475	0.0280	0.1552	0.1195	77.00
		3	0.1844	0.1498	0.0289	0.1555	0.1209	77.75

Table D6. The average percentage of singlet oxygen inhibition of Trolox® (Mean ± SD)

No	conc (μg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	10.00	10.13	11.08	9.71	10.31	0.70
3	25.00	17.14	16.01	16.09	16.41	0.63
4	50.00	23.09	24.33	22.68	23.37	0.86
5	75.00	40.15	39.69	42.24	40.69	1.36
6	100.00	75.68	77.00	77.75	76.81	1.05

Table D7. The raw data for the absorbance and singlet oxygen inhibition percentages of L-ascorbic acid

No.	Final conc (µg/ml)	n	A	B	C	A-C	B-C	%inh
control	0.00	1	0.1812	0.0274	0.0274	0.1538	0.0000	0.00
		2	0.1804	0.0276	0.0276	0.1528	0.0000	0.00
		3	0.1822	0.0280	0.0280	0.1542	0.0000	0.00
1	10.00	1	0.1808	0.0339	0.0284	0.1524	0.0055	3.61
		2	0.1816	0.0353	0.0282	0.1534	0.0071	4.63
		3	0.1821	0.0324	0.0275	0.1546	0.0049	3.17
2	25.00	1	0.1832	0.0442	0.0279	0.1553	0.0163	10.50
		2	0.1828	0.0436	0.0286	0.1542	0.0150	9.73
		3	0.1818	0.0428	0.0274	0.1544	0.0154	9.97
3	50.00	1	0.1849	0.0644	0.0268	0.1581	0.0376	23.78
		2	0.1860	0.0659	0.0292	0.1568	0.0367	23.41
		3	0.1848	0.0688	0.0286	0.1562	0.0402	25.74
4	75.00	1	0.1859	0.0898	0.0294	0.1565	0.0604	38.59
		2	0.1863	0.0915	0.0283	0.1580	0.0632	40.00
		3	0.1872	0.0944	0.0297	0.1575	0.0647	41.08
5	100.00	1	0.1834	0.1250	0.0274	0.1560	0.0976	62.56
		2	0.1847	0.1275	0.0280	0.1567	0.0995	63.50
		3	0.1838	0.1298	0.0289	0.1549	0.1009	65.14

Table D8. The average percentage of singlet oxygen inhibition of L-ascorbic acid (Mean ± SD)

No	conc (µg/ml)	% inhibition			mean	SD
		N1	N2	N3		
1	0.00	0.00	0.00	0.00	0.00	0.00
2	10.00	3.61	4.63	3.17	3.80	0.75
3	25.00	10.50	9.73	9.97	10.07	0.39
4	50.00	23.78	23.41	25.74	24.31	1.25
5	75.00	38.59	40.00	41.08	39.89	1.25
6	100.00	62.56	63.50	65.14	63.73	1.31

Table D9. The IC_{50} values of singlet oxygen inhibition by each antioxidant. The coefficient of determination (R^2) was obtained from polynomial regression of the initial portion of the plot between inhibition percentage and the initial concentrations of each antioxidant (Mean ± SD, n=3)

Sample	Polynomial equation (partial)					
	IC_{50} (mg/ml)	Mean	SD	R^2	Mean	SD
Freeze-dried water extract	1.39	1.42	0.04	0.9816	0.9781	0.01
	1.47			0.9725		
	1.40			0.9801		
Methanol extract	2.38	2.40	0.02	0.9959	0.9957	0.00
	2.40			0.9958		
	2.41			0.9953		

Sample	Polynomial equation (partial)					
	IC_{50} (µg/ml)	Mean	SD	R^2	Mean	SD
Trolox®	79.70	79.59	0.66	0.9707	0.9690	0.010
	78.88			0.9583		
	80.18			0.9781		
L-ascorbic acid	87.61	86.11	1.55	0.9982	0.9987	0.001
	86.22			0.9992		
	84.51			0.9986		

Table D 10. Independent Samples T Test and Z-Test on the IC_{50} values of Singlet oxygen inhibition of freeze-dried water extract and methanol extract

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	1.42	2.396666667
Variance	0.0019	0.000233333
Observations	3	3
Pooled Variance	0.0010667	
Hypothesized Mean Difference	0	
df	4	
t Stat	-36.625	
P(T<=t) one-tail	1.659E-06	
t Critical one-tail	2.1318468	
P(T<=t) two-tail	3.318E-06	
t Critical two-tail	2.7764451	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	1.42	2.396666667
Known Variance	0.0019	0.000233
Observations	3	3
Hypothesized Mean Difference	0	
z	-36.62786166	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract and Variable 2 = methanol extract

Table D 11. Independent Samples T Test and Z-Test on the IC_{50} values of Singlet oxygen inhibition of Trolox® and L-ascorbic acid

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	79.58666667	86.11333333
Variance	0.432133333	2.411033333
Observations	3	3
Pooled Variance	1.421583333	
Hypothesized Mean Difference	0	
df	4	
t Stat	-6.704260806	
P(T<=t) one-tail	0.00128795	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.002575899	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	79.58666667	86.11333333
Known Variance	0.4321	2.411
Observations	3	3
Hypothesized Mean Difference	0	
z	-6.704339409	
P(Z<=z) one-tail	1.0116E-11	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	2.0232E-11	
z Critical two-tail	1.959963985	

Where; Variable 1= Trolox® and Variable 2 = L-ascorbic acid

Appendix E

Data of cytotoxicity test by LDH assay

Table E 1. Independent Samples T Test and Z-Test on % LDH release values of freeze-dried water extract and methanol extract at 0.50 mg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	0.73	0.363333333
Variance	0.0243	0.026133333
Observations	3	3
Pooled Variance	0.025216667	
Hypothesized Mean Difference	0	
df	4	
t Stat	2.827959732	
P(T<=t) one-tail	0.023721575	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.047443149	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.73	0.363333333
Known Variance	0.0243	0.0261
Observations	3	3
Hypothesized Mean Difference	0	
z	2.840187787	
P(Z<=z) one-tail	0.002254349	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0.004508698	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract at 0.50 mg/ml concentration and Variable 2 = methanol extract at 0.50 mg/ml concentration

Table E 2. Independent Samples T Test and Z-Test on % LDH release values of freeze-dried water extract and methanol extract at 2.50 mg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	1.366666667	0.64
Variance	0.075633333	0.0243
Observations	3	3
Pooled Variance	0.049966667	
Hypothesized Mean Difference	1	
df	4	
t Stat	-1.49760761	
P(T<=t) one-tail	0.104294399	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.208588798	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	1.366666667	0.64
Known Variance	0.0756	0.0243
Observations	3	3
Hypothesized Mean Difference	0	
z	5.628735796	
P(Z<=z) one-tail	9.07676E-09	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	1.81535E-08	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract at 2.50 mg/ml concentration and Variable 2 = methanol extract at 2.50 mg/ml concentration

Table E 3. Independent Samples T Test and Z-Test on % LDH release values of freeze-dried water extract and methanol extract at 5.0 mg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	3.37	1.73
Variance	0.0243	0.0243
Observations	3	3
Pooled Variance	0.0243	
Hypothesized Mean Difference	1	
df	4	
t Stat	5.028314888	
P(T<=t) one-tail	0.0036711	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.0073422	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	3.37	1.73
Known Variance	0.0243	0.0243
Observations	3	3
Hypothesized Mean Difference	0	
z	12.70338538	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract at 5.0 mg/ml concentration and Variable 2 = methanol extract at 5.0 mg/ml concentration

Table E 4. Independent Samples T Test and Z-Test on % LDH release values of freeze-dried water extract and methanol extract at 10.0 mg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	5.006666667	3.006666667
Variance	0.403333333	0.075633333
Observations	3	3
Pooled Variance	0.239483333	
Hypothesized Mean Difference	0	
df	4	
t Stat	2.502695325	
P(T<=t) one-tail	0.033287273	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.066574546	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	5.006667	3.006666667
Known Variance	0.4033	0.0756
Observations	3	3
Hypothesized Mean Difference	0	
z	15.49193	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644854	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959964	

Where; Variable 1= freeze-dried water extract at 10.0 mg/ml concentration and Variable 2 = methanol extract at 10.0mg/ml concentration

Table E 5. Independent Samples T Test and Z-Test on % LDH release values of freeze-dried water extract and methanol extract at 15.0 mg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	9.29	5.92
Variance	0.9667	0.9181
Observations	3	3
Pooled Variance	0.9424	
Hypothesized Mean Difference	0	
df	4	
t Stat	4.251653778	
P(T<=t) one-tail	0.006570363	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.013140726	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	9.29	5.92
Known Variance	0.9667	0.9181
Observations	3	3
Hypothesized Mean Difference	0	
z	26.10390775	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; 1= freeze-dried water extract at 15.0 mg/ml concentration and 2 = methanol extract at 15.0 mg/ml concentration

Table E 6. Independent Samples T Test and Z-Test on % LDH release values of freeze-dried water extract and methanol extract at 20.0 mg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	17.94333333	8.926666667
Variance	1.224233333	0.468933333
Observations	3	3
Pooled Variance	0.846583333	
Hypothesized Mean Difference	0	
df	4	
t Stat	12.00208746	
P(T<=t) one-tail	0.00013812	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.000276241	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	17.94333333	8.926666667
Known Variance	1.2242	0.4689
Observations	3	3
Hypothesized Mean Difference	0	
z	69.84279968	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Where; Variable 1= freeze-dried water extract at 20.0 mg/ml concentration and Variable 2 = methanol extract at 20.0 mg/ml concentration

Table E 7. Independent Samples T Test and Z-Test on % LDH release values of sinapic acid and L-ascorbic acid at 25.0 µg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	0.363333333	0.91
Variance	0.026133333	0.0243
Observations	3	3
Pooled Variance	0.025216667	
Hypothesized Mean Difference	0	
df	4	
t Stat	-4.216230873	
P(T<=t) one-tail	0.006759196	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.013518393	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.363333333	0.91
Known Variance	0.0261	0.0243
Observations	3	3
Hypothesized Mean Difference	0	
z	-4.234461792	
P(Z<=z) one-tail	1.1455E-05	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	2.291E-05	
z Critical two-tail	1.959963985	

Where; Variable 1= sinapic acid at 25.0 µg/ml concentration and Variable 2 = L-ascorbic acid at 25.0 µg/ml concentration

Table E 8. Independent Samples T Test and Z-Test on % LDH release values of sinapic acid and L-ascorbic acid at 100.0 µg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	1	1.64
Variance	0.0243	0.0729
Observations	3	3
Pooled Variance	0.0486	
Hypothesized Mean Difference	0	
df	4	
t Stat	-3.555555556	
P(T<=t) one-tail	0.011840111	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.023680222	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	1	1.64
Known Variance	0.0243	0.0729
Observations	3	3
Hypothesized Mean Difference	0	
z	-4.957418683	
P(Z<=z) one-tail	3.5718E-07	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	7.14359E-07	
z Critical two-tail	1.959963985	

Where; Variable 1= sinapic acid at 100.0 µg/ml concentration and Variable 2 = L-ascorbic acid at 100.0 µg/ml concentration

Table E 9. Independent Samples T Test and Z-Test on % LDH release values of sinapic acid and L-ascorbic acid at 250.0 µg/ml concentration

T-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	1.82	2.823333333
Variance	0.0243	0.174633333
Observations	3	3
Pooled Variance	0.099466667	
Hypothesized Mean Difference	0	
df	4	
t Stat	-3.896297307	
P(T<=t) one-tail	0.008798257	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.017596515	
t Critical two-tail	2.776445105	

Z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	1.82	2.823333333
Known Variance	0.0243	0.1746
Observations	3	3
Hypothesized Mean Difference	0	
z	-7.771786581	
P(Z<=z) one-tail	3.88578E-15	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	7.77156E-15	
z Critical two-tail	1.959963985	

Where; Variable 1= sinapic acid at 250.0 µg/ml concentration and Variable 2 = L-ascorbic acid at 250.0 µg/ml concentration

VITA

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