

APPENDIX A

Analysis of variance (ANOVA) for responses to PEF pre-treatment

A.1. Juice yield

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	166.81	9	18.53	43.98	< 0.0001	significant
A-EFS	66.13	1	66.13	156.91	< 0.0001	
B-PW	50.00	1	50.00	118.64	< 0.0001	
C-PN	15.13	1	15.13	35.89	0.0005	
AB	6.25	1	6.25	14.83	0.0063	
AC	4.00	1	4.00	9.49	0.0178	
BC	6.25	1	6.25	14.83	0.0063	
A ²	3.80	1	3.80	9.02	0.0199	
B ²	6.06	1	6.06	14.39	0.0068	
C ²	10.12	1	10.12	24.00	0.0018	
Residual	2.95	7	0.4214			
Lack of Fit	1.75	3	0.5833	1.94	0.2643	not significant
Pure Error	1.20	4	0.3000			
Cor Total	169.76	16				
Std. Dev.	0.6492		R ²	0.9826		
Mean	35.88		Adjusted R ²	0.9603		
C.V. %	1.81		Predicted R ²	0.8240		
			Adeq Precision	25.3568		

A.2. Total Phenolic content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	139.04	9	15.45	62.89	< 0.0001	significant
A-EFS	33.25	1	33.25	135.36	< 0.0001	
B-PW	0.8515	1	0.8515	3.47	0.1049	
C-PN	37.24	1	37.24	151.59	< 0.0001	
AB	1.92	1	1.92	7.81	0.0267	
AC	2.28	1	2.28	9.28	0.0187	
BC	0.0064	1	0.0064	0.0261	0.8763	
A ²	37.77	1	37.77	153.77	< 0.0001	
B ²	28.68	1	28.68	116.74	< 0.0001	
C ²	0.2797	1	0.2797	1.14	0.3213	
Residual	1.72	7	0.2457			
Lack of Fit	0.5243	3	0.1748	0.5848	0.6561	not significant
Pure Error	1.20	4	0.2988			
Cor Total	140.76	16				
Std. Dev.	0.4956		R ²	0.9878		
Mean	45.15		Adjusted R ²	0.9721		
C.V. %	1.10		Predicted R ²	0.9271		
			Adeq Precision	34.1986		

A.3. Betacyanin content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	28.32	9	3.15	39.16	< 0.0001	significant
A-EFS	1.75	1	1.75	21.76	0.0023	
B-PW	2.32	1	2.32	28.90	0.0010	
C-PN	0.0325	1	0.0325	0.4046	0.5450	
AB	0.0342	1	0.0342	0.4259	0.5348	
AC	0.0020	1	0.0020	0.0252	0.8784	
BC	0.0004	1	0.0004	0.0050	0.9457	
A ²	24.17	1	24.17	300.80	< 0.0001	
B ²	0.0785	1	0.0785	0.9763	0.3560	
C ²	0.0315	1	0.0315	0.3920	0.5511	
Residual	0.5625	7	0.0804			
Lack of Fit	0.4086	3	0.1362	3.54	0.1268	not significant
Pure Error	0.1539	4	0.0385			
Cor Total	28.88	16				
Std. Dev.	0.2835		R ²	0.9805		
Mean	18.19		Adjusted R ²	0.9555		
C.V. %	1.56		Predicted R ²	0.7653		
			Adeq Precision	19.1971		

A.4. DPPH radical scavenging activity

Source	Sum of squares	df	Mean square	F- value	p-value	
Model	272.97	9	30.33	159.55	< 0.0001	significant
A-EFS	232.31	1	232.31	1222.09	< 0.0001	
B-PW	13.16	1	13.16	69.22	< 0.0001	
C-PN	11.02	1	11.02	57.98	0.0001	
AB	0.2862	1	0.2862	1.51	0.2595	
AC	0.7396	1	0.7396	3.89	0.0892	
BC	2.03	1	2.03	10.68	0.0137	
A ²	4.86	1	4.86	25.57	0.0015	
B ²	8.95	1	8.95	47.09	0.0002	
C ²	0.2237	1	0.2237	1.18	0.3139	
Residual	1.33	7	0.1901			
Lack of Fit	0.4341	3	0.1447	0.6456	0.6253	not significant
Pure Error	0.8965	4	0.2241			
Cor Total	274.30	16				
Std. Dev.	0.4360		R ²	0.9951		
Mean	64.47		Adjusted R ²	0.9889		
C.V. %	0.6763		Predicted R ²	0.9696		
			Adeq Precision	43.7322		

A.5. Validation of optimized conditions by paired t test

Summary Statistics

	predicted	Observed
Number of Obs.	4.000	4.000
null values	0.000	0.000
NA	0.000	0.000
min	18.460	18.460
max	72.460	72.450
range	54.000	53.990
sum	185.990	186.300
median	47.535	47.695
mean	46.498	46.575
SE.mean	11.087	11.082
CI.mean.0.95	35.285	35.267
var	491.719	491.221
std.dev	22.175	22.164
coef.var	0.477	0.476

Paired t test

tvalue	df	pvalue	meandiff
-0.92	3	0.425229	-0.078

Since P-value is > 0.05 we don't have enough evidence to reject the null hypothesis at 5% level of significance. (here null hypothesis is: Population mean of group A = Population mean of group B)

APPENDIX B

Analysis of variance (ANOVA) for responses to US- pre-treatment

B.1. Juice yield

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	214.87	5	42.97	10.61	0.0036	significant
A-Amplitude	112.67	1	112.67	27.81	0.0012	
B-Time	32.67	1	32.67	8.06	0.0251	
AB	9.00	1	9.00	2.22	0.1797	
A ²	34.17	1	34.17	8.43	0.0228	
B ²	6.36	1	6.36	1.57	0.2505	
Residual	28.36	7	4.05			
Lack of Fit	6.36	3	2.12	0.3852	0.7704	not significant
Pure Error	22.00	4	5.50			
Cor Total	243.23	12				
Std. Dev.	2.01		R ²	0.8834		
Mean	54.46		Adjusted R ²	0.8001		
C.V. %	3.70		Predicted R ²	0.6114		
			Adeq Precision	10.2514		

B.2. Total Phenolic Content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	123.22	5	24.64	30.29	0.0001	significant
A-Amplitude	57.91	1	57.91	71.17	< 0.0001	
B-Time	18.76	1	18.76	23.06	0.0020	
AB	40.07	1	40.07	49.24	0.0002	

A ²	2.78	1	2.78	3.42	0.1071	
B ²	1.31	1	1.31	1.61	0.2454	
Residual	5.70	7	0.8137			
Lack of Fit	4.56	3	1.52	5.36	0.0693	not significant
Pure Error	1.14	4	0.2838			
Cor Total	128.91	12				
Std. Dev.	0.9021		R ²	0.9558		
Mean	53.41		Adjusted R ²	0.9243		
C.V. %	1.69		Predicted R ²	0.7268		
			Adeq Precision	20.4680		

B.3. Betacyanin content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	22.02	5	4.40	96.69	< 0.0001	significant
A-Amplitude	1.80	1	1.80	39.61	0.0004	
B-Time	1.56	1	1.56	34.27	0.0006	
AB	0.4830	1	0.4830	10.61	0.0139	
A ²	5.92	1	5.92	130.03	< 0.0001	
B ²	5.33	1	5.33	117.05	< 0.0001	
Residual	0.3188	7	0.0455			
Lack of Fit	0.0687	3	0.0229	0.3665	0.7821	not significant
Pure Error	0.2501	4	0.0625			
Cor Total	22.34	12				
Std. Dev.	0.2134		R²	0.9857		

Mean	18.68		Adjusted R²	0.9755
C.V. %	1.14		Predicted R²	0.9538
			Adeq Precision	24.5850

B.4. DPPH radical scavenging activity

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	84.66	5	16.93	36.89	< 0.0001	significant
A-Amplitude	56.98	1	56.98	124.16	< 0.0001	
B-Time	0.9520	1	0.9520	2.07	0.1930	
AB	17.60	1	17.60	38.35	0.0004	
A ²	0.9143	1	0.9143	1.99	0.2010	
B ²	5.22	1	5.22	11.38	0.0119	
Residual	3.21	7	0.4589			
Lack of Fit	1.97	3	0.6583	2.13	0.2394	not significant
Pure Error	1.24	4	0.3094			
Cor Total	87.87	12				
Std. Dev.	0.6774		R²	0.9634		
Mean	71.56		Adjusted R²	0.9373		
C.V. %	0.9467		Predicted R²	0.7636		
			Adeq Precision	22.5067		

B.5. Validation of optimized conditions by paired t test

Summary Statistics

	predicted	Observed
Number of Obs.	4.000	4.000
null values	0.000	0.000
NA	0.000	0.000
min	17.170	19.650
max	69.340	74.490
range	52.170	54.840
sum	197.770	201.840
median	55.630	53.850
mean	49.443	50.460
SE.mean	11.245	11.393
CI.mean.0.95	35.788	36.258
var	505.844	519.227
std.dev	22.491	22.787
coef.var	0.455	0.452

Paired t test

tvalue	df	pvalue	meandiff
-0.467	3	0.672535	-1.017

Since P-value is > 0.05 we don't have enough evidence to reject the null hypothesis at 5% level of significance.

(here null hypothesis is: Population mean of group A = Population mean of group B)

APPENDIX C

Analysis of variance (ANOVA) for responses to PEF pasteurization

C.1. Betacyanin content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	14.77	9	1.64	7.35	0.0077	significant
A-Electric field strength	0.2381	1	0.2381	1.07	0.3361	
B-Pulse width	6.07	1	6.07	27.20	0.0012	
C-Pulse number	0.8515	1	0.8515	3.81	0.0918	
AB	0.2809	1	0.2809	1.26	0.2990	
AC	0.5041	1	0.5041	2.26	0.1766	
BC	0.0870	1	0.0870	0.3898	0.5522	
A ²	5.21	1	5.21	23.35	0.0019	
B ²	1.49	1	1.49	6.67	0.0363	
C ²	0.3783	1	0.3783	1.69	0.2342	
Residual	1.56	7	0.2232			
Lack of Fit	0.1364	3	0.0455	0.1275	0.9389	not significant
Pure Error	1.43	4	0.3566			
Cor Total	16.34	16				
Std. Dev.	0.4725	R ²		0.9043		
Mean	20.42	Adjusted R ²		0.7813		
C.V. %	2.31	Predicted R ²		0.7300		
		Adeq Precision		9.4550		

C.2. Total Phenolic Content

Source		Sum of squares	df	Mean square	F-value	p-value	
Model		1119.77	9	124.42	4.12	0.0377	significant
A-Electric field strength		397.34	1	397.34	13.14	0.0084	
B-Pulse width		26.90	1	26.90	0.8899	0.3769	
C-Pulse number		52.69	1	52.69	1.74	0.2283	
AB		0.5700	1	0.5700	0.0189	0.8946	
AC		80.01	1	80.01	2.65	0.1478	
BC		50.41	1	50.41	1.67	0.2376	
A ²		506.56	1	506.56	16.76	0.0046	
B ²		9.84	1	9.84	0.3256	0.5861	
C ²		5.23	1	5.23	0.1729	0.6900	
Residual		211.60	7	30.23			
Lack of Fit		9.32	3	3.11	0.0615	0.9775	not significant
Pure Error		202.27	4	50.57			
Cor Total		1331.37	16				
Std. Dev.	5.50	R ²		0.8411			
Mean	53.34	Adjusted R ²		0.6367			
C.V. %	10.31	Predicted R ²		0.6505			
		Adeq Precision		6.1027			

C.3. Total Flavonoid Content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	59.44	9	6.60	23.49	0.0002	significant
A-Electric field strength	43.38	1	43.38	154.30	< 0.0001	
B-Pulse width	2.62	1	2.62	9.33	0.0185	
C-Pulse number	7.32	1	7.32	26.02	0.0014	
AB	0.5041	1	0.5041	1.79	0.2224	
AC	2.67	1	2.67	9.51	0.0177	
BC	1.39	1	1.39	4.95	0.0614	
A ²	1.25	1	1.25	4.44	0.0732	
B ²	0.1171	1	0.1171	0.4164	0.5393	
C ²	0.0816	1	0.0816	0.2904	0.6067	
Residual	1.97	7	0.2812			
Lack of Fit	0.8477	3	0.2826	1.01	0.4760	not significant
Pure Error	1.12	4	0.2801			
Cor Total	61.40	16				

Std. Dev.	0.5303		R ²	0.9679
Mean	21.06		Adjusted R ²	0.9267
C.V. %	2.52		Predicted R ²	0.7506
			Adeq Precision	18.0268

C.4. PPO residual activity

Source		Sum of squares	df	Mean square	F-value	p-value	
Model		4067.19	9	451.91	9.88	0.0032	significant
A-Electric field strength		2363.28	1	2363.28	51.65	0.0002	
B-Pulse width		413.28	1	413.28	9.03	0.0198	
C-Pulse number		200.00	1	200.00	4.37	0.0749	
AB		351.56	1	351.56	7.68	0.0276	
AC		56.25	1	56.25	1.23	0.3042	
BC		0.0000	1	0.0000	0.0000	1.0000	
A ²		10.28	1	10.28	0.2246	0.6499	
B ²		299.75	1	299.75	6.55	0.0376	
C ²		345.81	1	345.81	7.56	0.0285	
Residual		320.31	7	45.76			
Lack of Fit		70.31	3	23.44	0.3750	0.7767	not significant
Pure Error		250.00	4	62.50			
Cor Total		4387.50	16				
Std. Dev.	6.76		R ²	0.9270			
Mean	40.00		Adjusted R ²	0.8331			
C.V. %	16.91		Predicted R ²	0.6546			
			Adeq Precision	11.6250			

C.5. POD residual activity

Source			Sum of squares	df	Mean square	F- value	p- value	
Model			1705.16	9	189.46	22.28	0.0002	significant
A-Electric field strength			808.82	1	808.82	95.10	< 0.0001	
B-Pulse width			112.73	1	112.73	13.25	0.0083	
C-Pulse number			13.29	1	13.29	1.56	0.2515	
AB			225.60	1	225.60	26.52	0.0013	
AC			59.91	1	59.91	7.04	0.0328	
BC			321.31	1	321.31	37.78	0.0005	
A ²			143.03	1	143.03	16.82	0.0046	
B ²			12.98	1	12.98	1.53	0.2566	
C ²			0.5180	1	0.5180	0.0609	0.8122	
Residual			59.54	7	8.51			
Lack of Fit			24.39	3	8.13	0.9255	0.5055	not significant
Pure Error			35.14	4	8.79			
Cor Total			1764.70	16				
Std. Dev.	2.92		R ²	0.9663				
Mean	24.96		Adjusted R ²	0.9229				
C.V. %	11.68		Predicted R ²	0.7477				
			Adeq Precision	15.7056				

C.6. Validation of optimized process parameters (Paired t test)

Summary Statistics

	observed	predicted
Number of Obs.	5.000	5.000
null values	0.000	0.000
NA	0.000	0.000
min	7.200	7.300
max	68.460	68.230
range	61.260	60.930
sum	135.220	136.320
median	21.420	21.280
mean	27.044	27.264
SE.mean	10.742	10.701
CI.mean.0.95	29.825	29.711
var	576.957	572.555
std.dev	24.020	23.928
coef.var	0.888	0.878

Paired t test

tvalue	df	pvalue	meandiff
-0.506	4	0.639447	-0.22

Since P-value is > 0.05 we don't have enough evidence to reject the null hypothesis at 5% level of significance. (here null hypothesis is: Population mean of group A = Population mean of group B)

APPENDIX D

Analysis of variance (ANOVA) for responses to retort pasteurization

D.1. Betacyanin content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	22.99	5	4.60	8.06	0.0080	significant
A-Temperature	18.89	1	18.89	33.13	0.0007	
B-Time	1.21	1	1.21	2.12	0.1885	
AB	1.63	1	1.63	2.85	0.1352	
A ²	0.3722	1	0.3722	0.6528	0.4457	
B ²	0.7435	1	0.7435	1.30	0.2911	
Residual	3.99	7	0.5702			
Lack of Fit	1.06	3	0.3538	0.4829	0.7119	not significant
Pure Error	2.93	4	0.7325			
Cor Total	26.98	12				
Std. Dev.	0.7551		R ²	0.8521		
Mean	22.22		Adjusted R ²	0.7464		
C.V. %	3.40		Predicted R ²	0.5505		
			Adeq Precision	8.7918		

D.2. Total Phenolic Content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	459.71	5	91.94	18.05	0.0007	significant
A-Temperature	63.26	1	63.26	12.42	0.0097	
B-Time	148.81	1	148.81	29.21	0.0010	
AB	172.79	1	172.79	33.92	0.0006	
A ²	45.13	1	45.13	8.86	0.0206	
B ²	38.69	1	38.69	7.59	0.0283	
Residual	35.66	7	5.09			
Lack of Fit	16.90	3	5.63	1.20	0.4164	not significant
Pure Error	18.76	4	4.69			
Cor Total	495.37	12				
Std. Dev.	2.26	R ²		0.9280		
Mean	52.69	Adjusted R ²		0.8766		
C.V. %	4.28	Predicted R ²		0.6982		
		Adeq Precision		14.2262		

D.3. Total Flavonoid Content

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	608.03	5	121.61	27.41	0.0002	significant
A-Temperature	379.64	1	379.64	85.56	< 0.0001	
B-Time	14.13	1	14.13	3.19	0.1175	
AB	20.79	1	20.79	4.69	0.0671	

A ²	193.34	1	193.34	43.58	0.0003	
B ²	1.79	1	1.79	0.4029	0.5458	
Residual	31.06	7	4.44			
Lack of Fit	22.27	3	7.42	3.38	0.1351	not significant
Pure Error	8.79	4	2.20			
Cor Total	639.09	12				
Std. Dev.	2.11		R ²	0.9514		
Mean	22.34		Adjusted R ²	0.9167		
C.V. %	9.43		Predicted R ²	0.7306		
			Adeq Precision	17.3669		

D.4. PPO residual activity

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	1712.71	5	342.54	33.78	< 0.0001	significant
A-Temperature	1527.78	1	1527.78	150.67	< 0.0001	
B-Time	83.40	1	83.40	8.22	0.0241	
AB	1.56	1	1.56	0.1541	0.7063	
A ²	94.08	1	94.08	9.28	0.0187	
B ²	1.55	1	1.55	0.1525	0.7078	
Residual	70.98	7	10.14			
Lack of Fit	40.68	3	13.56	1.79	0.2883	not significant
Pure Error	30.30	4	7.58			
Cor Total	1783.69	12				
Std. Dev.	3.18		R ²	0.9602		

Mean	15.15	Adjusted R ²	0.9318
C.V. %	21.01	Predicted R ²	0.8113
		Adeq Precision	18.4960

D.5. POD residual activity

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	7.75	5	1.55	7.94	0.0084	significant
A-Temperature	6.52	1	6.52	33.39	0.0007	
B-Time	0.8522	1	0.8522	4.36	0.0751	
AB	0.0625	1	0.0625	0.3200	0.5893	
A ²	0.1864	1	0.1864	0.9546	0.3611	
B ²	0.0967	1	0.0967	0.4954	0.5043	
Residual	1.37	7	0.1953			
Lack of Fit	0.3304	3	0.1101	0.4250	0.7460	not significant
Pure Error	1.04	4	0.2591			
Cor Total	9.12	12				
Std. Dev.	0.4419		R ²	0.8501		
Mean	0.9392		Adjusted R ²	0.7431		
C.V. %	47.05		Predicted R ²	0.5648		
			Adeq Precision	8.8590		

D.6. Paired t test

Summary Statistics

	Experimental.values	Predicted.values
Number of Obs.	5.000	5.000
null values	1.000	0.000
NA	0.000	0.000
min	0.000	0.250
max	64.320	64.480
range	64.320	64.230
sum	112.040	112.960
median	20.140	21.330
mean	22.408	22.592
SE.mean	11.311	11.314
CI.mean.0.95	31.406	31.412
var	639.741	639.991
std.dev	25.293	25.298
coef.var	1.129	1.120

Two sample unpaired t-test

t_value	df	Pvalue	alt.Hypothesis
-0.012	8	0.991105	two.sided

Since P-value is > 0.05 we don't have enough evidence to reject the null hypothesis at 5% level of significance. (here null hypothesis is: Population mean of group A = Population mean of group B)

APPENDIX E

Analysis of variance for results of juice characterization

E.1 Analysis of variance (ANOVA) for sensory properties among control and optimally pasteurized juice samples

		Sum of Squares	df	Mean Square	F	Sig.
color	Between Groups	.349	2	.174	.140	.873
	Within Groups	7.499	6	1.250		
	Total	7.848	8			
smell	Between Groups	.499	2	.250	.206	.819
	Within Groups	7.266	6	1.211		
	Total	7.766	8			
taste	Between Groups	.637	2	.318	.162	.854
	Within Groups	11.775	6	1.963		
	Total	12.412	8			
consistency	Between Groups	.426	2	.213	.098	.908
	Within Groups	12.978	6	2.163		
	Total	13.403	8			
overall	Between Groups	.298	2	.149	.116	.892
	Within Groups	7.676	6	1.279		
	Total	7.974	8			

Homogeneous Subsets**Color**Tukey HSD^a

treatments	N	Subset for alpha = 0.05
		1
RETORT	3	7.5200
control	3	7.8000
PEF	3	8.0000
Sig.		.862

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

SmellTukey HSD^a

treatments	N	Subset for alpha = 0.05
		1
RETORT	3	6.2800
PEF	3	6.6800
control	3	6.8400
Sig.		.813

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

TasteTukey HSD^a

treatments	N	Subset for alpha = 0.05
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		1
RETORT	3	6.4000
PEF	3	6.9200
control	3	7.0000
Sig.		.863

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

Consistency

Tukey HSD^a

treatments	N	Subset for alpha = 0.05
		1
RETORT	3	6.5600
control	3	6.9200
PEF	3	7.0800
Sig.		.903

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

Overall acceptability

Tukey HSD^a

treatments	N	Subset for alpha = 0.05
		1
RETORT	3	6.8400
control	3	7.1200
PEF	3	7.2800
Sig.		.885

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

E.2. Betacyanin content

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
control	24.32	0.15	24.126	24.514	24.17	24.47
PEF	24.95	0.14	24.756	25.144	24.81	25.09
Retort	22.36	0.12	22.166	22.554	22.24	22.48

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	10.947	5.473	290.618	0
Error	6	0.113	0.019	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
0.019	0.112	0.079	0.575

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.019	6	23.877	0.575	2.447	0.274

Treatment Grouping

	trt_mean	grouping
PEF	24.95	a
control		
Retort	22.36	c

Treatments with same letters are not significantly different

E.3. CRD analysis of TPC

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
control	71.06	0.35	70.584	71.536	70.71	71.41
PEF	62.70	0.32	62.224	63.176	62.38	63.02
Retort	64.54	0.34	64.064	65.016	64.20	64.88

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	115.786	57.893	510.069	0
Error	6	0.681	0.113	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.113	0.275	0.195	0.51

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.113	6	66.1	0.51	2.447	0.673

Treatment Grouping

	trt_mean	grouping
control	71.06	a
Retort	64.54	b
PEF	62.70	c

Treatments with same letters are not significantly different

E.4. CRD analysis of TFC

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
control	14.16	0.06	14.088	14.232	14.10	14.22
PEF	17.83	0.05	17.758	17.902	17.78	17.88
Retort	20.16	0.04	20.088	20.232	20.12	20.20

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	54.898	27.449	10694.38	0
Error	6	0.015	0.003	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
0.003	0.041	0.029	0.291

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.003	6	17.383	0.291	2.447	0.101

Treatment Grouping

	trt_mean	grouping
Retort	20.16	a
PEF	17.83	b
control	14.16	c

E.5. CRD analysis of DPPH radical scavenging activity

Treatment mean and other statistics

	Treatment means	std	LCL	UCL	Min	Max
control	78.60	0.36	78.091	79.109	78.24	78.96
PEF	79.56	0.36	79.051	80.069	79.20	79.92
Retort	74.82	0.36	74.311	75.329	74.46	75.18

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	37.678	18.839	145.361	0
Error	6	0.778	0.130	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
0.13	0.294	0.208	0.464

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.13	6	77.66	0.464	2.447	0.719

Treatment Grouping

	trt_mean	grouping
PEF	79.56	a
control	78.60	b
Retort	74.82	c

E.6. CRD analysis of vitamin C

Treatment mean and other statistics

	Treatment means	std	LCL	UCL	Min	Max
control	55.47	0.35	55.16	55.78	55.12	55.82
PEF	39.39	0.14	39.08	39.70	39.25	39.53

	Treatment means	std	LCL	UCL	Min	Max
Retort	19.13	0.05	18.82	19.44	19.08	19.18

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	1989.630	994.815	20639.31	0
Error	6	0.289	0.048	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
0.048	0.179	0.127	0.578

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.048	6	37.997	0.578	2.447	0.439

Treatment Grouping

	trt mean	grouping
control	55.47	a
PEF	39.39	b
Retort	19.13	c

E.7. CRD analysis of reducing sugars*Treatment mean and other statistics*

	Treatment means	std	LCL	UCL	Min	Max
control	7.08	0.03	7.042	7.118	7.05	7.11
PEF	6.98	0.02	6.942	7.018	6.96	7.00
Retort	7.02	0.03	6.982	7.058	6.99	7.05

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	0.015	0.008	10.364	0.011
Error	6	0.004	0.001	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
0.001	0.022	0.016	0.385

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.001	6	7.027	0.385	2.447	0.054

Treatment Grouping

	trt mean	grouping
control	7.08	a
Retort	7.02	b
PEF	6.98	b

E.8. CRD analysis of TSS*Treatment mean and other statistics*

	Treatment means	std	LCL	UCL	Min	Max
control	12.18	0.02	12.149	12.211	12.16	12.20
PEF	12.20	0.03	12.169	12.231	12.17	12.23
Retort	11.46	0.01	11.429	11.491	11.45	11.47

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	1.066	0.533	1142.571	0
Error	6	0.003	0.000	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
0	0.018	0.012	0.181

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0	6	11.947	0.181	2.447	0.043

Treatment Grouping

	trt_mean	grouping
PEF	12.20	a
control	12.18	a
Retort	11.46	b

E.9. CRD analysis of pH*Treatment mean and other statistics*

	Treatment means	std	LCL	UCL	Min	Max
control	4.62	0.01	4.60	4.64	4.61	4.63
PEF	4.68	0.01	4.66	4.70	4.67	4.69
Retort	4.65	0.02	4.63	4.67	4.63	4.67

ANOVA table

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	0.005	0.003	13.5	0.006
Error	6	0.001	0.000	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
0	0.012	0.008	0.304

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0	6	4.65	0.304	2.447	0.028

Treatment Grouping

	trt_mean	grouping
PEF	4.68	a
Retort	4.65	b
control	4.62	c

E.10. CRD analysis of viscosity*Treatment mean and other statistics*

	Treatment means	std	LCL	UCL	Min	Max
control	34.201	0.15	33.957	34.445	34.050	34.350
PEF	24.629	0.12	24.385	24.873	24.509	24.749
Retort	30.488	0.23	30.244	30.732	30.258	30.718

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	2	139.737	69.869	2334.066	0
Error	6	0.180	0.030	NA	NA

MSE	SE(d)	SE(m)	CV (%)
0.03	0.141	0.1	0.581

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.03	6	29.773	0.581	2.447	0.346
	trt_mean	grouping			

MSerror	Df	Mean	CV	t.value	LSD
control	34.201	a			
Retort	30.488	b			
PEF	24.629	c			

APPENDIX F

Assumptions for cost estimation

F.1. Cost Analysis of PEF Pasteurized Juice

Assumptions

1. Red dragon fruit availability per year = 7 months
2. Total number of processing days = 210
3. Rent of plant per month = Rs.10,000
4. Working hours per day = 8
5. Unit cost of electricity = Rs.8
6. Power consumption by PEF equipment = $0.3 \text{ kW} \times 8 \times 210 = 504 \text{ kWh}$
7. Power consumption by ultrasonic probe system = $0.75 \text{ kW} \times 8 \times 210 = 1260 \text{ kWh}$
8. Power consumption of juicer = $0.15 \text{ kW} \times 8 \times 210 = 252 \text{ kWh}$
9. Power consumption of refrigerator = $0.5 \times 8 \times 210 = 840 \text{ kWh}$
10. Power consumption of cold storage facility = 25 kWh
11. Total power consumption = 2881 kWh
12. Total electricity cost per year = 23048/-
13. Cost of 1 kg dragon fruit = 200
14. Quantity of dragon fruit required to produce 1L of juice = 3 kg
15. Cost of dragon fruit required to produce 1L of juice = 600
16. Batch Capacity of PEF equipment = 0.5 L
17. Number of batches that can be treated in a day = 50
18. Capacity per day = 25 L
19. Quantity of dragon fruit required per day = 37.5 kg
20. Capacity per year = $25 \times 210 = 5250 \text{ L}$
21. Cost of dragon fruit required per year = Rs.3150000
22. Cost of PET bottle with 1L capacity = 40
23. Total cost of packaging = 21000
24. Number of labours required = 2
25. Labour cost per day = 400

- 26. Total labour cost per year = 168000
- 27. Quantity of water required per day = 250 L
- 28. Water per year = 52500 L
- 29. Cost of 1 litre of water = 0.01
- 30. Water charges per year = 525

F.2. Cost Analysis of Retort Pasteurized Juice

Assumptions

- 1. Dragon fruit availability per year = 7 months
- 2. Total number of processing days = 210
- 3. Rent of plant per month = Rs.10, 000
- 4. Working hours per day = 8
- 5. Unit cost of electricity = Rs.8
- 6. Cost of Retort equipment with ancillary equipment = Rs. 2300000
- 7. Power consumption of retort = $15 \text{ kW} \times 8 \times 210 = \text{Rs.}25200$
- 8. Working time of steam exhausting unit = 2 hours
- 9. Power consumption of steam exhausting = $200 \text{ kW} \times 2 \times 210 = 84000 \text{ kWh}$
- 10. Power consumption of pneumatic sealing machine = $1 \text{ kW} \times 8 \times 210 = 1680 \text{ kWh}$
- 11. Power consumption by ultrasonic probe system = $0.75 \text{ kW} \times 8 \times 210 = 1260 \text{ kWh}$
- 10. Power consumption of juicer = $0.15 \text{ kW} \times 8 \times 210 = 252 \text{ kWh}$
- 11. Power consumption of refrigerator = $0.5 \times 8 \times 210 = 840 \text{ kWh}$
- 12. Power consumption of cold storage facility = 25 kWh
- 13. Total power consumption = 88057 kWh
- 14. Total electricity cost per year = Rs. 704456

15. Cost of 1 kg dragon fruit = 200
16. Quantity of dragon fruit required to produce 1L of juice = 3 kg
17. Cost of dragon fruit required to produce 1L of juice = Rs. 600
18. Batch Capacity of retort equipment = 20 L
19. Number of batches that can be treated in a day = 8
20. Capacity per day = 160 L
21. Quantity of dragon fruit required per day = 480 kg
22. Capacity per year = $160 \times 210 = 33600$ L
23. Cost of dragon fruit required per year = Rs. 20160000
24. Cost of retort pouch with 250 ml = Rs. 20
25. Number of pouches processed per batch = 50
26. Number of batches that can be processed per day = 6
27. Total cost of packaging per day = Rs. 6000
28. Total cost of packaging per year = Rs. 1260000
29. Number of labours required = 4
30. Labour cost per day = Rs. 500
31. Total labour cost per year = Rs. 420000
32. Quantity of water required per day = 1000 L
33. Water required per year = 210000 L
34. Cost of 1 litre of water = Rs. 0.01
35. Water charges per year = Rs. 2100

APPENDIX G

ANOVA for storage study of PEF pasteurized juice

G.1. Two factor factorial analysis for changes in betacyanin content during storage after PEF pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	21.447	1.985	21	21.389	21.505	18.68	24.47
PEF	23.433	1.800	21	23.375	23.491	21.54	27.16

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	24.635	0.369	6	24.527	24.743	24.17	25.09
10	25.345	1.766	6	25.237	25.453	23.57	27.16
20	22.625	0.480	6	22.517	22.733	22.08	23.19
30	21.950	0.960	6	21.842	22.058	20.93	22.93
40	21.090	0.554	6	20.982	21.198	20.47	21.64
50	20.625	1.312	6	20.517	20.733	19.37	21.94
60	20.810	2.236	6	20.702	20.918	18.68	22.93

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	24.32	0.15	3	24.167	24.473	24.17	24.47
control_10	23.74	0.17	3	23.587	23.893	23.57	23.91
control_20	22.20	0.12	3	22.047	22.353	22.08	22.32

control_30	21.08	0.15	3	20.927	21.233	20.93	21.23
control_40	20.59	0.12	3	20.437	20.743	20.47	20.71
control_50	19.43	0.06	3	19.277	19.583	19.37	19.49
control_60	18.77	0.09	3	18.617	18.923	18.68	18.86
PEF_0	24.95	0.14	3	24.797	25.103	24.81	25.09
PEF_10	26.95	0.21	3	26.797	27.103	26.74	27.16
PEF_20	23.05	0.14	3	22.897	23.203	22.91	23.19
PEF_30	22.82	0.11	3	22.667	22.973	22.71	22.93
PEF_40	21.59	0.05	3	21.437	21.743	21.54	21.64
PEF_50	21.82	0.12	3	21.667	21.973	21.70	21.94
PEF_60	22.85	0.08	3	22.697	23.003	22.77	22.93

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	41.402	41.402	2486.615	0
Factor B	6	127.830	21.305	1279.580	0
A X B	6	15.312	2.552	153.276	0
Error	28	0.466	0.017	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.017	0.04	0.028	0.082	2.048	0.575

Treatments (A) with same letters are not significantly different

	mean	groups
PEF	23.433	a

control	21.447	b
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CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.017	0.074	0.053	0.153	2.048	0.575

Treatments (B) with same letters are not significantly different

	mean	groups
10	25.345	a
0	24.635	b
20	22.625	c
30	21.950	d
40	21.090	e
60	20.810	f
50	20.625	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.017	0.105	0.074	0.216	2.048	0.575

Treatments (AxB) with same letters are not significantly different

	mean	groups
PEF_10	26.95	a
PEF_0	24.95	b
control_0	24.32	c

control_10	23.74	d
PEF_20	23.05	e
PEF_60	22.85	ef
PEF_30	22.82	f
control_20	22.20	g
PEF_50	21.82	h
PEF_40	21.59	i
control_30	21.08	j
control_40	20.59	k
control_50	19.43	l
control_60	18.77	m

G.2. Two-factor factorial analysis for changes in TPC during storage after PEF pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	61.847	8.738	21	61.683	62.011	49.17	71.41
PEF	61.539	6.059	21	61.375	61.703	49.75	68.70

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	66.880	4.589	6	66.573	67.187	62.38	71.41
10	50.880	0.872	6	50.573	51.187	49.75	52.05
20	67.695	0.493	6	67.388	68.002	66.97	68.39
30	69.675	1.457	6	69.368	69.982	68.06	71.39
40	54.220	5.254	6	53.913	54.527	49.17	59.36

50	57.170	0.892	6	56.863	57.477	56.15	58.21
60	65.330	0.412	6	65.023	65.637	64.70	65.88

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	71.06	0.35	3	70.626	71.494	70.71	71.41
control_10	51.59	0.46	3	51.156	52.024	51.13	52.05
control_20	67.96	0.43	3	67.526	68.394	67.53	68.39
control_30	70.97	0.42	3	70.536	71.404	70.55	71.39
control_40	49.43	0.26	3	48.996	49.864	49.17	49.69
control_50	56.38	0.23	3	55.946	56.814	56.15	56.61
control_60	65.54	0.34	3	65.106	65.974	65.20	65.88
PEF_0	62.70	0.32	3	62.266	63.134	62.38	63.02
PEF_10	50.17	0.42	3	49.736	50.604	49.75	50.59
PEF_20	67.43	0.46	3	66.996	67.864	66.97	67.89
PEF_30	68.38	0.32	3	67.946	68.814	68.06	68.70
PEF_40	59.01	0.35	3	58.576	59.444	58.66	59.36
PEF_50	57.96	0.25	3	57.526	58.394	57.71	58.21
PEF_60	65.12	0.42	3	64.686	65.554	64.70	65.54

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	1.000	1.000	7.423	0.011
Factor B	6	1998.560	333.093	2472.984	0.000
A X B	6	259.016	43.169	320.503	0.000

Error	28	3.771	0.135	NA	NA
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CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.135	0.113	0.08	0.232	2.048	0.595

Treatments (A) with same letters are not significantly different

	mean	groups
control	61.847	a
PEF	61.539	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.135	0.212	0.15	0.434	2.048	0.595

Treatments (B) with same letters are not significantly different

	mean	groups
30	69.675	a
20	67.695	b
0	66.880	c
60	65.330	d
50	57.170	e
40	54.220	f
10	50.880	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.135	0.3	0.212	0.614	2.048	0.595

Treatments (AxB) with same letters are not significantly different

	mean	groups
control_0	71.06	a
control_30	70.97	a
PEF_30	68.38	b
control_20	67.96	bc
PEF_20	67.43	c
control_60	65.54	d
PEF_60	65.12	d
PEF_0	62.70	e
PEF_40	59.01	f
PEF_50	57.96	g
control_50	56.38	h
control_10	51.59	i
PEF_10	50.17	j
control_40	49.43	k

G.3. Two-factor factorial analysis for changes in TFC during storage after PEF pasteurization

TWO FACTOR FACTORIAL ANALYSIS

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	15.293	2.198	21	15.273	15.313	11.55	18.52
PEF	17.921	2.817	21	17.901	17.942	14.44	22.30

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	15.995	2.011	6	15.957	16.033	14.10	17.88
10	19.030	3.506	6	18.992	19.068	15.78	22.30
20	17.595	3.982	6	17.557	17.633	13.93	21.25
30	13.800	2.410	6	13.762	13.838	11.55	16.04
40	16.830	1.830	6	16.792	16.868	15.11	18.52
50	15.000	0.549	6	14.962	15.038	14.44	15.53
60	18.000	0.549	6	17.962	18.038	17.46	18.53

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	14.16	0.06	3	14.106	14.214	14.10	14.22
control_10	15.83	0.05	3	15.776	15.884	15.78	15.88
control_20	13.96	0.03	3	13.906	14.014	13.93	13.99
control_30	11.60	0.05	3	11.546	11.654	11.55	11.65
control_40	18.50	0.02	3	18.446	18.554	18.48	18.52
control_50	15.50	0.03	3	15.446	15.554	15.47	15.53
control_60	17.50	0.04	3	17.446	17.554	17.46	17.54
PEF_0	17.83	0.05	3	17.776	17.884	17.78	17.88

PEF_10	22.23	0.07	3	22.176	22.284	22.16	22.30
PEF_20	21.23	0.02	3	21.176	21.284	21.21	21.25
PEF_30	16.00	0.04	3	15.946	16.054	15.96	16.04
PEF_40	15.16	0.05	3	15.106	15.214	15.11	15.21
PEF_50	14.50	0.06	3	14.446	14.554	14.44	14.56
PEF_60	18.50	0.03	3	18.446	18.554	18.47	18.53

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	72.549	72.549	35266.667	0
Factor B	6	118.041	19.674	9563.504	0
A X B	6	137.148	22.858	11111.490	0
Error	28	0.058	0.002	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.002	0.014	0.01	0.029	2.048	0.273

Treatments (A) with same letters are not significantly different

	mean	groups
PEF	17.921	a
control	15.293	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.002	0.026	0.019	0.054	2.048	0.273

Treatments (B) with same letters are not significantly different

	mean	groups
10	19.030	a
60	18.000	b
20	17.595	c
40	16.830	d
0	15.995	e
50	15.000	f
30	13.800	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.002	0.037	0.026	0.076	2.048	0.273

Treatments (AxB) with same letters are not significantly different

	mean	groups
PEF_10	22.23	a
PEF_20	21.23	b
control_40	18.50	c
PEF_60	18.50	c
PEF_0	17.83	d
control_60	17.50	e
PEF_30	16.00	f
control_10	15.83	g
control_50	15.50	h

PEF_40	15.16	i
PEF_50	14.50	j
control_0	14.16	k
control_20	13.96	l
control_30	11.60	m

G.4. Two-factor factorial analysis for changes in DPPH radical scavenging activity during storage after PEF pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	73.577	3.739	21	73.431	73.723	67.8	78.96
PEF	73.701	5.364	21	73.555	73.847	65.2	79.92

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	79.080	0.617	6	78.807	79.353	78.24	79.92
10	78.140	0.694	6	77.867	78.413	77.08	78.92
20	74.055	3.412	6	73.782	74.328	70.53	77.57
30	72.170	4.528	6	71.897	72.443	67.80	76.48
40	68.825	1.631	6	68.552	69.098	67.08	70.53
50	73.210	1.978	6	72.937	73.483	71.10	75.26
60	69.995	4.985	6	69.722	70.268	65.20	74.85

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	78.60	0.36	3	78.214	78.986	78.24	78.96

	mean	std	r	LCL	UCL	Min	Max
control_10	77.60	0.52	3	77.214	77.986	77.08	78.12
control_20	70.96	0.43	3	70.574	71.346	70.53	71.39
control_30	68.04	0.24	3	67.654	68.426	67.80	68.28
control_40	70.30	0.23	3	69.914	70.686	70.07	70.53
control_50	75.00	0.26	3	74.614	75.386	74.74	75.26
control_60	74.54	0.31	3	74.154	74.926	74.23	74.85
PEF_0	79.56	0.36	3	79.174	79.946	79.20	79.92
PEF_10	78.68	0.24	3	78.294	79.066	78.44	78.92
PEF_20	77.15	0.42	3	76.764	77.536	76.73	77.57
PEF_30	76.30	0.18	3	75.914	76.686	76.12	76.48
PEF_40	67.35	0.27	3	66.964	67.736	67.08	67.62
PEF_50	71.42	0.32	3	71.034	71.806	71.10	71.74
PEF_60	65.45	0.25	3	65.064	65.836	65.20	65.70

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	0.162	0.162	1.521	0.228
Factor B	6	532.991	88.832	833.040	0.000
A X B	6	319.006	53.168	498.591	0.000
Error	28	2.986	0.107	NA	NA

SEM and other measures of FACTOR A

MSE	SE(d)	SE(m)	CV
0.107	0.101	0.071	0.443

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.107	0.189	0.133	0.386	2.048	0.443

Treatments (B) with same letters are not significantly different

	mean	groups
0	79.080	a
10	78.140	b
20	74.055	c
50	73.210	d
30	72.170	e
60	69.995	f
40	68.825	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.107	0.267	0.189	0.546	2.048	0.443

Treatments (AxB) with same letters are not significantly different

	mean	groups
PEF_0	79.56	a
PEF_10	78.68	b
control_0	78.60	b
control_10	77.60	c
PEF_20	77.15	c

	mean	groups
PEF_30	76.30	d
control_50	75.00	e
control_60	74.54	e
PEF_50	71.42	f
control_20	70.96	f
control_40	70.30	g
control_30	68.04	h
PEF_40	67.35	i
PEF_60	65.45	j

G.5. Two-factor factorial analysis for changes in TSS during storage after PEF pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	11.887	0.448	21	11.873	11.902	11.34	12.61
PEF	11.001	0.903	21	10.987	11.016	9.84	12.32

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	12.190	0.025	6	12.163	12.217	12.160	12.230
10	11.595	0.696	6	11.568	11.622	10.940	12.260
20	12.450	0.165	6	12.423	12.477	12.280	12.610
30	10.950	0.603	6	10.923	10.977	10.395	11.505
40	10.650	0.822	6	10.623	10.677	9.840	11.405
50	11.250	0.171	6	11.223	11.277	11.060	11.460
60	11.025	0.959	6	10.998	11.052	10.120	11.940

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	12.18	0.020	3	12.142	12.218	12.160	12.200
control_10	12.23	0.030	3	12.192	12.268	12.200	12.260
control_20	12.60	0.010	3	12.562	12.638	12.590	12.610
control_30	11.50	0.005	3	11.462	11.538	11.495	11.505
control_40	11.40	0.005	3	11.362	11.438	11.395	11.405
control_50	11.40	0.060	3	11.362	11.438	11.340	11.460
control_60	11.90	0.040	3	11.862	11.938	11.860	11.940
PEF_0	12.20	0.030	3	12.162	12.238	12.170	12.230
PEF_10	10.96	0.020	3	10.922	10.998	10.940	10.980
PEF_20	12.30	0.020	3	12.262	12.338	12.280	12.320
PEF_30	10.40	0.005	3	10.362	10.438	10.395	10.405
PEF_40	9.90	0.060	3	9.862	9.938	9.840	9.960
PEF_50	11.10	0.040	3	11.062	11.138	11.060	11.140
PEF_60	10.15	0.030	3	10.112	10.188	10.120	10.180

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	8.237	8.237	7966.839	0
Factor B	6	16.074	2.679	2591.109	0
A X B	6	4.237	0.706	682.922	0
Error	28	0.029	0.001	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.001	0.01	0.007	0.02	2.048	0.281

Treatments (A) with same letters are not significantly different

	mean	groups
control	11.887	a
PEF	11.001	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.001	0.019	0.013	0.038	2.048	0.281

Treatments (B) with same letters are not significantly different

	mean	groups
20	12.450	a
0	12.190	b
10	11.595	c
50	11.250	d
60	11.025	e
30	10.950	f
40	10.650	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.001	0.026	0.019	0.054	2.048	0.281

Treatments (AxB) with same letters are not significantly different

	mean	groups
control_20	12.60	a
PEF_20	12.30	b
control_10	12.23	c
PEF_0	12.20	c
control_0	12.18	c
control_60	11.90	d
control_30	11.50	e
control_40	11.40	f
control_50	11.40	f
PEF_50	11.10	g
PEF_10	10.96	h
PEF_30	10.40	i
PEF_60	10.15	j
PEF_40	9.90	k

G.6. Two-factor factorial analysis for changes in pH during storage after PEF pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	4.466	0.285	21	4.456	4.476	4.055	4.93
PEF	4.443	0.466	21	4.433	4.453	3.570	5.19

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	4.650	0.034	6	4.631	4.669	4.610	4.690
10	4.750	0.037	6	4.731	4.769	4.700	4.800
20	5.035	0.129	6	5.016	5.054	4.910	5.190
30	4.385	0.054	6	4.366	4.404	4.310	4.450
40	3.995	0.412	6	3.976	4.014	3.570	4.375
50	4.225	0.011	6	4.206	4.244	4.205	4.235
60	4.140	0.088	6	4.121	4.159	4.055	4.230

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	4.62	0.010	3	4.594	4.646	4.610	4.630
control_10	4.72	0.020	3	4.694	4.746	4.700	4.740
control_20	4.92	0.010	3	4.894	4.946	4.910	4.930
control_30	4.34	0.030	3	4.314	4.366	4.310	4.370
control_40	4.37	0.005	3	4.344	4.396	4.365	4.375
control_50	4.23	0.001	3	4.204	4.256	4.229	4.231
control_60	4.06	0.005	3	4.034	4.086	4.055	4.065
PEF_0	4.68	0.010	3	4.654	4.706	4.670	4.690
PEF_10	4.78	0.020	3	4.754	4.806	4.760	4.800
PEF_20	5.15	0.040	3	5.124	5.176	5.110	5.190
PEF_30	4.43	0.020	3	4.404	4.456	4.410	4.450
PEF_40	3.62	0.050	3	3.594	3.646	3.570	3.670
PEF_50	4.22	0.015	3	4.194	4.246	4.205	4.235
PEF_60	4.22	0.010	3	4.194	4.246	4.210	4.230

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	0.005	0.005	11.169	0.002
Factor B	6	4.980	0.830	1690.081	0.000
A X B	6	0.979	0.163	332.257	0.000
Error	28	0.014	0.000	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0	0.007	0.005	0.014	2.048	0.498

Treatments (A) with same letters are not significantly different

	mean	groups
control	4.466	a
PEF	4.443	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0	0.013	0.009	0.026	2.048	0.498

Treatments (B) with same letters are not significantly different

	mean	groups
20	5.035	a
10	4.750	b
0	4.650	c
30	4.385	d
50	4.225	e
60	4.140	f

	mean	groups
40	3.995	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0	0.018	0.013	0.037	2.048	0.498

Treatments (AxB) with same letters are not significantly different

	mean	groups
PEF_20	5.15	a
control_20	4.92	b
PEF_10	4.78	c
control_10	4.72	d
PEF_0	4.68	e
control_0	4.62	f
PEF_30	4.43	g
control_40	4.37	h
control_30	4.34	h
control_50	4.23	i
PEF_50	4.22	i
PEF_60	4.22	i
control_60	4.06	j
PEF_40	3.62	k

G.7. One way Anova for changes residual PPO activity during storage after PEF pasteurization

CRD ANALYSIS

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	13.667	0.153	13.160	14.173	13.50	13.80
10	66.000	1.000	65.493	66.507	65.00	67.00
20	4.310	0.213	3.803	4.817	4.08	4.50
30	44.270	0.171	43.763	44.777	44.11	44.45
40	19.537	0.107	19.030	20.043	19.42	19.63
50	30.700	0.113	30.193	31.207	30.57	30.77
60	39.803	0.224	39.297	40.310	39.56	40.00

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	7867.961	1311.327	7832.157	0
Error	14	2.344	0.167	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.167	0.334	0.236	1.312

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.167	14	31.184	1.312	2.145	0.717

Treatment Grouping

	trt_mean	grouping
10	66.00000	a
30	44.27000	b
60	39.80333	c
50	30.70000	d
40	19.53667	e
0	13.66667	f
20	4.31000	g

G.8. One way ANOVA for changes residual POD activity during storage after PEF pasteurization

*CRD ANALYSIS**Treatment mean and other statistics*

	Treatment_means	std	LCL	UCL	Min	Max
0	18.50	0.10	17.90	19.10	18.40	18.60
10	200.00	0.44	199.40	200.60	199.56	200.44
20	84.49	0.16	83.89	85.09	84.33	84.65
30	223.93	1.00	223.33	224.53	222.93	224.93
40	89.97	0.08	89.37	90.57	89.89	90.05
50	119.50	0.50	118.90	120.10	119.00	120.00
60	116.93	0.40	116.33	117.53	116.53	117.33

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	88952.354	14825.392	63063.77	0
Error	14	3.291	0.235	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.235	0.396	0.28	0.398

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.235	14	121.903	0.398	2.145	0.849

Treatment Grouping

	trt_mean	grouping
30	223.93	a
10	200.00	b
50	119.50	c
60	116.93	d
40	89.97	e
20	84.49	f
0	18.50	g

G.9. Two-factor factorial analysis for changes in total plate count during storage after PEF pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	42.857	24.876	21	42.410	43.304	9	81
PEF	22.429	17.157	21	21.982	22.876	1	51

\SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	10.0	8.809	6	9.164	10.836	1	19

	mean	std	r	LCL	UCL	Min	Max
10	30.0	21.927	6	29.164	30.836	9	51
20	45.0	27.401	6	44.164	45.836	19	71
30	65.0	16.456	6	64.164	65.836	49	81
40	40.0	5.550	6	39.164	40.836	34	46
50	16.0	12.083	6	15.164	16.836	4	28
60	22.5	13.722	6	21.664	23.336	9	36

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	18	1	3	16.817	19.183	17	19
control_10	50	1	3	48.817	51.183	49	51
control_20	70	1	3	68.817	71.183	69	71
control_30	80	1	3	78.817	81.183	79	81
control_40	45	1	3	43.817	46.183	44	46
control_50	27	1	3	25.817	28.183	26	28
control_60	10	1	3	8.817	11.183	9	11
PEF_0	2	1	3	0.817	3.183	1	3
PEF_10	10	1	3	8.817	11.183	9	11
PEF_20	20	1	3	18.817	21.183	19	21
PEF_30	50	1	3	48.817	51.183	49	51
PEF_40	35	1	3	33.817	36.183	34	36
PEF_50	5	1	3	3.817	6.183	4	6
PEF_60		1	3	33.817	36.183	34	36

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	4381.929	4381.929	4381.929	0

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor B	6	12920.143	2153.357	2153.357	0
A X B	6	5315.571	885.929	885.929	0
Error	28	28.000	1.000	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
1	0.309	0.218	0.632	2.048	3.063

Treatments (A) with same letters are not significantly different

	mean	groups
control	42.857	a
PEF	22.429	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
1	0.577	0.408	1.183	2.048	3.063

Treatments (B) with same letters are not significantly different

	mean	groups
30	65.0	a
20	45.0	b
40	40.0	c
10	30.0	d
60	22.5	e
50	16.0	f
0	10.0	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
1	0.816	0.577	1.673	2.048	3.063

Treatments (AxB) with same letters are not significantly different

	mean	groups
control_30	80	a
control_20	70	b
control_10	50	c
PEF_30	50	c
control_40	45	d
PEF_40	35	e
PEF_60	35	e
control_50	27	f
PEF_20	20	g
control_0	18	h
control_60	10	i
PEF_10	10	i
PEF_50	5	j
PEF_0	2	k

G.10. Two-factor factorial analysis for changes in total yeast and mould count during storage after PEF pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	150.286	136.496	21	149.839	150.733	1	361
PEF	94.000	121.235	21	93.553	94.447	2	381

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	2.5	1.049	6	1.664	3.336	1	4

	mean	std	r	LCL	UCL	Min	Max
10	65.0	5.550	6	64.164	65.836	59	71
20	65.0	16.456	6	64.164	65.836	49	81
30	70.0	21.927	6	69.164	70.836	49	91
40	80.0	32.876	6	79.164	80.836	49	111
50	202.5	161.581	6	201.664	203.336	54	351
60	370.0	10.991	6	369.164	370.836	359	381

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	2	1	3	0.817	3.183	1	3
control_10	60	1	3	58.817	61.183	59	61
control_20	80	1	3	78.817	81.183	79	81
control_30	90	1	3	88.817	91.183	89	91
control_40	110	1	3	108.817	111.183	109	111
control_50	350	1	3	348.817	351.183	349	351
control_60	360	1	3	358.817	361.183	359	361
PEF_0	3	1	3	1.817	4.183	2	4
PEF_10	70	1	3	68.817	71.183	69	71
PEF_20	50	1	3	48.817	51.183	49	51
PEF_30	50	1	3	48.817	51.183	49	51
PEF_40	50	1	3	48.817	51.183	49	51
PEF_50	55	1	3	53.817	56.183	54	56
PEF_60	380	1	3	378.817	381.183	379	381

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	33264.86	33264.86	33264.86	0
Factor B	6	559382.14	93230.36	93230.36	0
A X B	6	107174.14	17862.36	17862.36	0
Error	28	28.00	1.00	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
1	0.309	0.218	0.632	2.048	0.819

Treatments (A) with same letters are not significantly different

	mean	groups
control	150.286	a
PEF	94.000	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
1	0.577	0.408	1.183	2.048	0.819

Treatments (B) with same letters are not significantly different

	mean	groups
60	370.0	a
50	202.5	b
40	80.0	c
30	70.0	d
10	65.0	e
20	65.0	e
0	2.5	f

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
1	0.816	0.577	1.673	2.048	0.819

Treatments (AxB) with same letters are not significantly different

	mean	groups
PEF_60	380	a
control_60	360	b
control_50	350	c
control_40	110	d
control_30	90	e
control_20	80	f
PEF_10	70	g
control_10	60	h
PEF_50	55	i
PEF_20	50	j
PEF_30	50	j
PEF_40	50	j
PEF_0	3	k
control_0	2	k

APPENDIX H

ANOVA for storage study of retort pasteurized juice

H.1. Two factor factorial analysis for changes in betacyanin content during storage after retort pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	21.447	1.985	21	21.388	21.506	18.68	24.47
retort	20.199	1.174	21	20.139	20.258	18.21	22.48

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	23.340	1.080	6	23.229	23.451	22.24	24.47
10	22.045	1.863	6	21.934	22.156	20.19	23.91
20	20.970	1.354	6	20.859	21.081	19.57	22.32
30	20.300	0.866	6	20.189	20.411	19.36	21.23
40	20.575	0.086	6	20.464	20.686	20.47	20.71
50	19.980	0.610	6	19.869	20.091	19.37	20.67
60	18.550	0.259	6	18.439	18.661	18.21	18.86

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	24.32	0.15	3	24.163	24.477	24.17	24.47
control_10	23.74	0.17	3	23.583	23.897	23.57	23.91
control_20	22.20	0.12	3	22.043	22.357	22.08	22.32
control_30	21.08	0.15	3	20.923	21.237	20.93	21.23

	mean	std	r	LCL	UCL	Min	Max
control_40	20.59	0.12	3	20.433	20.747	20.47	20.71
control_50	19.43	0.06	3	19.273	19.587	19.37	19.49
control_60	18.77	0.09	3	18.613	18.927	18.68	18.86
retort_0	22.36	0.12	3	22.203	22.517	22.24	22.48
retort_10	20.35	0.16	3	20.193	20.507	20.19	20.51
retort_20	19.74	0.17	3	19.583	19.897	19.57	19.91
retort_30	19.52	0.16	3	19.363	19.677	19.36	19.68
retort_40	20.56	0.06	3	20.403	20.717	20.50	20.62
retort_50	20.53	0.14	3	20.373	20.687	20.39	20.67
retort_60	18.33	0.12	3	18.173	18.487	18.21	18.45

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	16.369	16.369	929.666	0
Factor B	6	84.374	14.062	798.676	0
A X B	6	21.466	3.578	203.197	0
Error	28	0.493	0.018	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.018	0.041	0.029	0.084	2.048	0.637

Treatments (A) with same letters are not significantly different

	mean	groups
control	21.447	a
retort	20.199	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.018	0.077	0.054	0.157	2.048	0.637

Treatments (B) with same letters are not significantly different

	mean	groups
0	23.340	a
10	22.045	b
20	20.970	c
40	20.575	d
30	20.300	e
50	19.980	f
60	18.550	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.018	0.108	0.077	0.222	2.048	0.637

Treatments (AxB) with same letters are not significantly different

	mean	groups
control_0	24.32	a
control_10	23.74	b
retort_0	22.36	c
control_20	22.20	c
control_30	21.08	d
control_40	20.59	e
retort_40	20.56	ef

	mean	groups
retort_50	20.53	ef
retort_10	20.35	f
retort_20	19.74	g
retort_30	19.52	gh
control_50	19.43	h
control_60	18.77	i
retort_60	18.33	j

H.2. Two-factor factorial analysis for changes in TPC during storage after retort pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	61.847	8.738	21	61.689	62.005	49.17	71.41
retort	58.056	5.282	21	57.898	58.214	49.60	64.88

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	67.800	3.584	6	67.504	68.096	64.20	71.41
10	50.775	0.966	6	50.479	51.071	49.60	52.05
20	63.220	5.207	6	62.924	63.516	58.03	68.39
30	66.360	5.063	6	66.064	66.656	61.37	71.39
40	51.850	2.660	6	51.554	52.146	49.17	54.51
50	55.065	1.453	6	54.769	55.361	53.55	56.61
60	64.590	1.087	6	64.294	64.886	63.28	65.88

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	71.06	0.35	3	70.642	71.478	70.71	71.41
control_10	51.59	0.46	3	51.172	52.008	51.13	52.05
control_20	67.96	0.43	3	67.542	68.378	67.53	68.39
control_30	70.97	0.42	3	70.552	71.388	70.55	71.39
control_40	49.43	0.26	3	49.012	49.848	49.17	49.69
control_50	56.38	0.23	3	55.962	56.798	56.15	56.61
control_60	65.54	0.34	3	65.122	65.958	65.20	65.88
retort_0	64.54	0.34	3	64.122	64.958	64.20	64.88
retort_10	49.96	0.36	3	49.542	50.378	49.60	50.32
retort_20	58.48	0.45	3	58.062	58.898	58.03	58.93
retort_30	61.75	0.38	3	61.332	62.168	61.37	62.13
retort_40	54.27	0.24	3	53.852	54.688	54.03	54.51
retort_50	53.75	0.20	3	53.332	54.168	53.55	53.95
retort_60	63.64	0.36	3	63.222	64.058	63.28	64.00

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	150.937	150.937	1206.942	0
Factor B	6	1851.522	308.587	2467.568	0
A X B	6	230.061	38.343	306.608	0
Error	28	3.502	0.125	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.125	0.109	0.077	0.224	2.048	0.59

Treatments (A) with same letters are not significantly different

	mean	groups
control	61.847	a
retort	58.056	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.125	0.204	0.144	0.418	2.048	0.59

Treatments (B) with same letters are not significantly different

	mean	groups
0	67.800	a
30	66.360	b
60	64.590	c
20	63.220	d
50	55.065	e
40	51.850	f
10	50.775	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.125	0.289	0.204	0.591	2.048	0.59

Treatments (AxB) with same letters are not significantly different

	mean	groups
control_0	71.06	a
control_30	70.97	a
control_20	67.96	b
control_60	65.54	c

	mean	groups
retort_0	64.54	d
retort_60	63.64	e
retort_30	61.75	f
retort_20	58.48	g
control_50	56.38	h
retort_40	54.27	i
retort_50	53.75	i
control_10	51.59	j
retort_10	49.96	k
control_40	49.43	k

H.3. Two-factor factorial analysis for changes in TFC during storage after retort pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	15.293	2.198	21	15.271	15.314	11.55	18.52
retort	17.969	2.581	21	17.947	17.990	13.11	20.20

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	17.160	3.287	6	17.120	17.200	14.10	20.20
10	17.330	1.644	6	17.290	17.370	15.78	18.90
20	15.885	2.109	6	15.845	15.925	13.93	17.87
30	12.380	0.856	6	12.340	12.420	11.55	13.21
40	19.330	0.910	6	19.290	19.370	18.48	20.19
50	15.500	0.048	6	15.460	15.540	15.43	15.57

	mean	std	r	LCL	UCL	Min	Max
60	18.830	1.457	6	18.790	18.870	17.46	20.20

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	14.16	0.06	3	14.103	14.217	14.10	14.22
control_10	15.83	0.05	3	15.773	15.887	15.78	15.88
control_20	13.96	0.03	3	13.903	14.017	13.93	13.99
control_30	11.60	0.05	3	11.543	11.657	11.55	11.65
control_40	18.50	0.02	3	18.443	18.557	18.48	18.52
control_50	15.50	0.03	3	15.443	15.557	15.47	15.53
control_60	17.50	0.04	3	17.443	17.557	17.46	17.54
retort_0	20.16	0.04	3	20.103	20.217	20.12	20.20
retort_10	18.83	0.07	3	18.773	18.887	18.76	18.90
retort_20	17.81	0.06	3	17.753	17.867	17.75	17.87
retort_30	13.16	0.05	3	13.103	13.217	13.11	13.21
retort_40	20.16	0.03	3	20.103	20.217	20.13	20.19
retort_50	15.50	0.07	3	15.443	15.557	15.43	15.57
retort_60	20.16	0.04	3	20.103	20.217	20.12	20.20

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	75.174	75.174	32482.676	0
Factor B	6	196.772	32.795	14170.818	0
A X B	6	32.957	5.493	2373.429	0
Error	28	0.065	0.002	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.002	0.015	0.01	0.03	2.048	0.289

Treatments (A) with same letters are not significantly different

	mean	groups
retort	17.969	a
control	15.293	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.002	0.028	0.02	0.057	2.048	0.289

Treatments (B) with same letters are not significantly different

	mean	groups
40	19.330	a
60	18.830	b
10	17.330	c
0	17.160	d
20	15.885	e
50	15.500	f
30	12.380	g

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.002	0.039	0.028	0.08	2.048	0.289

Treatments (AxB) with same letters are not significantly different

	mean	groups
retort_0	20.16	a
retort_40	20.16	a
retort_60	20.16	a
retort_10	18.83	b
control_40	18.50	c
retort_20	17.81	d
control_60	17.50	e
control_10	15.83	f
control_50	15.50	g
retort_50	15.50	g
control_0	14.16	h
control_20	13.96	i
retort_30	13.16	j
control_30	11.60	k

H.4. Two-factor factorial analysis for changes in DPPH radical scavenging activity during storage after retort pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	73.577	3.739	21	73.430	73.725	67.80	78.96
retort	69.091	4.787	21	68.944	69.239	59.73	75.18

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	76.710	2.095	6	76.434	76.986	74.46	78.96
10	74.980	2.902	6	74.704	75.256	71.93	78.12
20	71.085	0.362	6	70.809	71.361	70.53	71.52
30	69.385	1.495	6	69.109	69.661	67.80	71.05
40	67.540	3.031	6	67.264	67.816	64.54	70.53
50	72.370	2.887	6	72.094	72.646	69.64	75.26
60	67.270	7.968	6	66.994	67.546	59.73	74.85

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	78.60	0.360	3	78.209	78.991	78.24	78.96
control_10	77.60	0.520	3	77.209	77.991	77.08	78.12
control_20	70.96	0.430	3	70.569	71.351	70.53	71.39
control_30	68.04	0.240	3	67.649	68.431	67.80	68.28
control_40	70.30	0.230	3	69.909	70.691	70.07	70.53
control_50	75.00	0.260	3	74.609	75.391	74.74	75.26
control_60	74.54	0.310	3	74.149	74.931	74.23	74.85
retort_0	74.82	0.360	3	74.429	75.211	74.46	75.18
retort_10	72.36	0.430	3	71.969	72.751	71.93	72.79
retort_20	71.21	0.310	3	70.819	71.601	70.90	71.52
retort_30	70.73	0.320	3	70.339	71.121	70.41	71.05
retort_40	64.78	0.240	3	64.389	65.171	64.54	65.02
retort_50	69.74	0.156	3	69.349	70.131	69.64	69.92
retort_60	60.00	0.270	3	59.609	60.391	59.73	60.27

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	211.277	211.277	1937.053	0
Factor B	6	468.235	78.039	715.486	0
A X B	6	266.614	44.436	407.400	0
Error	28	3.054	0.109	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.109	0.102	0.072	0.209	2.048	0.463

Treatments (A) with same letters are not significantly different

	mean	groups
control	73.577	a
retort	69.091	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.109	0.191	0.135	0.391	2.048	0.463

Treatments (B) with same letters are not significantly different

	mean	groups
0	76.710	a
10	74.980	b
50	72.370	c

	mean	groups
20	71.085	d
30	69.385	e
40	67.540	f
60	67.270	f

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.109	0.27	0.191	0.552	2.048	0.463

Treatments (AxB) with same letters are not significantly different

	mean	groups
control_0	78.60	a
control_10	77.60	b
control_50	75.00	c
retort_0	74.82	c
control_60	74.54	c
retort_10	72.36	d
retort_20	71.21	e
control_20	70.96	e
retort_30	70.73	ef
control_40	70.30	f
retort_50	69.74	g
control_30	68.04	h
retort_40	64.78	i
retort_60	60.00	j

H.5. Two-factor factorial analysis for changes in TSS during storage after retort pasteurization

SUMMARY STATISTICS OF FIRST FACTOR

	mean	std	r	LCL	UCL	Min	Max
control	11.887	0.449	21	11.850	11.924	11.34	12.61
retort	11.471	0.167	21	11.434	11.508	11.21	12.01

SUMMARY STATISTICS OF SECOND FACTOR

	mean	std	r	LCL	UCL	Min	Max
0	11.820	0.395	6	11.751	11.889	11.45	12.20
10	11.865	0.400	6	11.796	11.934	11.48	12.26
20	12.165	0.508	6	12.096	12.234	11.45	12.61
30	11.497	0.005	6	11.428	11.566	11.49	11.50
40	11.450	0.068	6	11.381	11.519	11.35	11.54
50	11.330	0.091	6	11.261	11.399	11.21	11.46
60	11.625	0.305	6	11.556	11.694	11.29	11.94

SUMMARY STATISTICS OF TREATMENT COMBINATIONS

	mean	std	r	LCL	UCL	Min	Max
control_0	12.180	0.020	3	12.082	12.278	12.16	12.20
control_10	12.230	0.030	3	12.132	12.328	12.20	12.26
control_20	12.600	0.010	3	12.502	12.698	12.59	12.61
control_30	11.497	0.006	3	11.399	11.594	11.49	11.50
control_40	11.400	0.050	3	11.302	11.498	11.35	11.45
control_50	11.400	0.060	3	11.302	11.498	11.34	11.46
control_60	11.900	0.040	3	11.802	11.998	11.86	11.94
retort_0	11.460	0.010	3	11.362	11.558	11.45	11.47
retort_10	11.500	0.020	3	11.402	11.598	11.48	11.52

	mean	std	r	LCL	UCL	Min	Max
retort_20	11.730	0.280	3	11.632	11.828	11.45	12.01
retort_30	11.497	0.006	3	11.399	11.594	11.49	11.50
retort_40	11.500	0.040	3	11.402	11.598	11.46	11.54
retort_50	11.260	0.050	3	11.162	11.358	11.21	11.31
retort_60	11.350	0.060	3	11.252	11.448	11.29	11.41

ANOVA TABLE

	DF	Sum of Squares	Mean sum of squares	F-value	Pr(>F)
Factor A	1	1.815	1.815	265.273	0
Factor B	6	3.006	0.501	73.252	0
A X B	6	1.396	0.233	34.010	0
Error	28	0.192	0.007	NA	NA

CD and other measures of FACTOR A

MSE	SE(d)	SE(m)	CD	t value	CV
0.007	0.026	0.018	0.052	2.048	0.708

Treatments (A) with same letters are not significantly different

	mean	groups
control	11.887	a
retort	11.471	b

CD and other measures of FACTOR B

MSE	SE(d)	SE(m)	CD	t value	CV
0.007	0.048	0.034	0.098	2.048	0.708

Treatments (B) with same letters are not significantly different

	mean	groups
20	12.165	a
10	11.865	b

	mean	groups
0	11.820	b
60	11.625	c
30	11.497	d
40	11.450	d
50	11.330	e

Critical difference and other measures of A X B

MSE	SE(d)	SE(m)	CD	t value	CV
0.007	0.068	0.048	0.138	2.048	0.708

Treatments (AxB) with same letters are not significantly different

	mean	groups
control_20	12.600	a
control_10	12.230	b
control_0	12.180	b
control_60	11.900	c
retort_20	11.730	d
retort_10	11.500	e
retort_40	11.500	e
control_30	11.497	e
retort_30	11.497	e
retort_0	11.460	ef
control_40	11.400	ef
control_50	11.400	ef
retort_60	11.350	fg
retort_50	11.260	g

H.6. CRD analysis for changes in PPO residual activity during storage after retort pasteurization

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	0.015	0.002	-0.574	0.604	0.013	0.017
10	9.500	0.500	8.911	10.089	9.000	10.000
20	32.650	0.570	32.061	33.239	32.080	33.220
30	5.800	0.060	5.211	6.389	5.740	5.860
40	10.860	1.000	10.271	11.449	9.860	11.860
50	1.530	0.005	0.941	2.119	1.525	1.535
60	12.300	0.080	11.711	12.889	12.220	12.380

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	2122.129	353.688	1562.099	0
Error	14	3.170	0.226	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.226	0.389	0.275	4.584

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.226	14	10.379	4.584	2.145	0.833

Treatment Grouping

	trt_mean	grouping
20	32.650	a
60	12.300	b

	trt_mean	grouping
40	10.860	c
10	9.500	d
30	5.800	e
50	1.530	f
0	0.015	g

H.7. CRD analysis for changes in POD residual activity during storage after retort pasteurization

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL		Max
0	13.90	0.13	13.662	14.138		14.03
10	33.33	0.25	33.092	33.568	33.08	33.58
20	14.28	0.06	14.042	14.518	14.22	14.34
30	50.00	0.35	49.762	50.238	49.65	50.35
40	30.00	0.22	29.762	30.238	29.78	30.22
50	10.00	0.04	9.762	10.238	9.96	10.04
60	10.81	0.06	10.572	11.048	10.75	10.87

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	4082.713	680.452	18383.5	0
Error	14	0.518	0.037	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.037	0.157	0.111	0.83

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.037	14	23.189	0.83	2.145	0.337

Treatment Grouping

	trt_mean	grouping
30	50.00	a
10	33.33	b
40	30.00	c
20	14.28	d
0	13.90	e
60	10.81	f
50	10.00	g

H.8. CRD analysis for changes in total plate count in control juice during storage*Treatment mean and other statistics*

	Treatment_means	std	LCL	UCL	Min	Max
0	21	1	19.762	22.238	20	22
10	50	1	48.762	51.238	49	51
20	40	1	38.762	41.238	39	41
30	50	1	48.762	51.238	49	51
40	50	1	48.762	51.238	49	51
50	28	1	26.762	29.238	27	29
60	5	1	3.762	6.238	4	6

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	5534.571	922.429	922.429	0
Error	14	14.000	1.000	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
1	0.816	0.577	2.869

LSD test

MSerror	Df	Mean	CV	t.value	LSD
1	14	34.857	2.869	2.145	1.751

Treatment Grouping

	trt_mean	grouping
10	50	a
30	50	a
40	50	a
20	40	b
50	28	c
0	21	d
60	5	e

H.9. CRD analysis for changes in total plate count in in 10^{-3} dilution of control juice during storage**CRD ANALYSIS***Treatment mean and other statistics*

	Treatment_means	std	LCL	UCL	Min	Max
0	8	1	6.762	9.238	7	9

	Treatment_means	std	LCL	UCL	Min	Max
10	13	1	11.762	14.238	12	14
20	12	1	10.762	13.238	11	13
30	20	1	18.762	21.238	19	21
40	15	1	13.762	16.238	14	16
50	11	1	9.762	12.238	10	12
60	5	1	3.762	6.238	4	6

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	420	70	70	0
Error	14	14	1	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
1	0.816	0.577	8.333

LSD test

MSerror	Df	Mean	CV	t.value	LSD
1	14	12	8.333	2.145	1.751

Treatment Grouping

	trt_mean	grouping
30	20	a
40	15	b
10	13	c
20	12	cd
50	11	d
0	8	e
60	5	f

H.10. CRD analysis for changes in total plate count in retort pasteurized juice in 10^{-3} dilution during storage.

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	0	0	-0.936	0.936	0	0
10	0	0	-0.936	0.936	0	0
20	0	0	-0.936	0.936	0	0
30	1	1	0.064	1.936	0	2
40	3	1	2.064	3.936	2	4
50	4	1	3.064	4.936	3	5
60	3	1	2.064	3.936	2	4

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	53.143	8.857	15.5	0
Error	14	8.000	0.571	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.571	0.617	0.436	48.105

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.571	14	1.571	48.105	2.145	1.324

Treatment Grouping

	trt_mean	grouping
50	4	a
40	3	a

	trt_mean	grouping
60	3	a
30	1	b
0	0	b
10	0	b
20	0	b

H.11. CRD analysis for changes in total plate count in retort pasteurized juice in 10^{-4} dilution during storage.

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	0	0	-0.811	0.811	0	0
10	0	0	-0.811	0.811	0	0
20	0	0	-0.811	0.811	0	0
30	0	0	-0.811	0.811	0	0
40	2	1	1.189	2.811	1	3
50	2	1	1.189	2.811	1	3
60	2	1	1.189	2.811	1	3

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	20.571	3.429	8	0.001
Error	14	6.000	0.429	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.429	0.535	0.378	76.376

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.429	14	0.857	76.376	2.145	1.146

Treatment Grouping

	trt_mean	grouping
40	2	a
50	2	a
60	2	a
0	0	b
10	0	b
20	0	b
30	0	b

H.12. CRD analysis for changes in total yeast and mould count in control juice (10⁻³ dilution) during storage.

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	2	1	-2.773	6.773	1	3
10	60	1	55.227	64.773	59	61
20	80	1	75.227	84.773	79	81
30	90	1	85.227	94.773	89	91
40	110	10	105.227	114.773	100	120
50	350	0	345.227	354.773	350	350
60	380	0	375.227	384.773	380	380

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	398804.6	66467.429	4473.769	0
Error	14	208.0	14.857	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
14.857	3.147	2.225	2.517

LSD test

MSerror	Df	Mean	CV	t.value	LSD
14.857	14	153.143	2.517	2.145	6.75

Treatment Grouping

	trt_mean	grouping
60	380	a
50	350	b
40	110	c
30	90	d
20	80	e
10	60	f
0	2	g

H.13. CRD analysis for changes in total yeast and mould count in control juice (10⁻⁴ dilution) during storage.

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	0	0	-1.404	1.404	0	0
10	20	1	18.596	21.404	19	21
20	50	1	48.596	51.404	49	51

	Treatment_means	std	LCL	UCL	Min	Max
30	60	1	58.596	61.404	59	61
40	80	1	78.596	81.404	79	81
50	360	2	358.596	361.404	358	362
60	380	1	378.596	381.404	379	381

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	473914.3	78985.714	61433.33	0
Error	14	18.0	1.286	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV (%)
1.286	0.926	0.655	0.836

LSD test

MSerror	Df	Mean	CV	t.value	LSD
1.286	14	135.714	0.836	2.145	1.986

Treatment Grouping

	trt_mean	grouping
60	380	a
50	360	b
40	80	c
30	60	d
20	50	e
10	20	f
0	0	g

H.14. CRD analysis for changes in total yeast and mold count in retort (10^{-3} dilution) during storage

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	0	0	-1.047	1.047	0	0
10	0	0	-1.047	1.047	0	0
20	10	1	8.953	11.047	9	11
30	10	1	8.953	11.047	9	11
40	10	1	8.953	11.047	9	11
50	9	1	7.953	10.047	8	10
60	10	1	8.953	11.047	9	11

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	414	69.000	96.6	0
Error	14	10	0.714	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.714	0.69	0.488	12.074

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.714	14	7	12.074	2.145	1.48

Treatment Grouping

	trt_mean	grouping
20	10	a
30	10	a

	trt_mean	grouping
40	10	a
60	10	a
50	9	a
0	0	b
10	0	b

H.15. CRD analysis for changes in total yeast and mold count in retort pasteurized juice (10^{-4} dilution) during storage.

Treatment mean and other statistics

	Treatment_means	std	LCL	UCL	Min	Max
0	0	0	-1.047	1.047	0	0
10	0	0	-1.047	1.047	0	0
20	6	1	4.953	7.047	5	7
30	5	1	3.953	6.047	4	6
40	8	1	6.953	9.047	7	9
50	7	1	5.953	8.047	6	8
60	4	1	2.953	5.047	3	5

ANOVA TABLE

SoV	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treatment	6	184.286	30.714	43	0
Error	14	10.000	0.714	NA	NA

Other important Statistics

MSE	SE(d)	SE(m)	CV(%)
0.714	0.69	0.488	19.72

LSD test

MSerror	Df	Mean	CV	t.value	LSD
0.714	14	4.286	19.72	2.145	1.48

Treatment Grouping

	trt_mean	grouping
40	8	a
50	7	ab
20	6	bc
30	5	cd
60	4	d
0	0	e
10	0	e