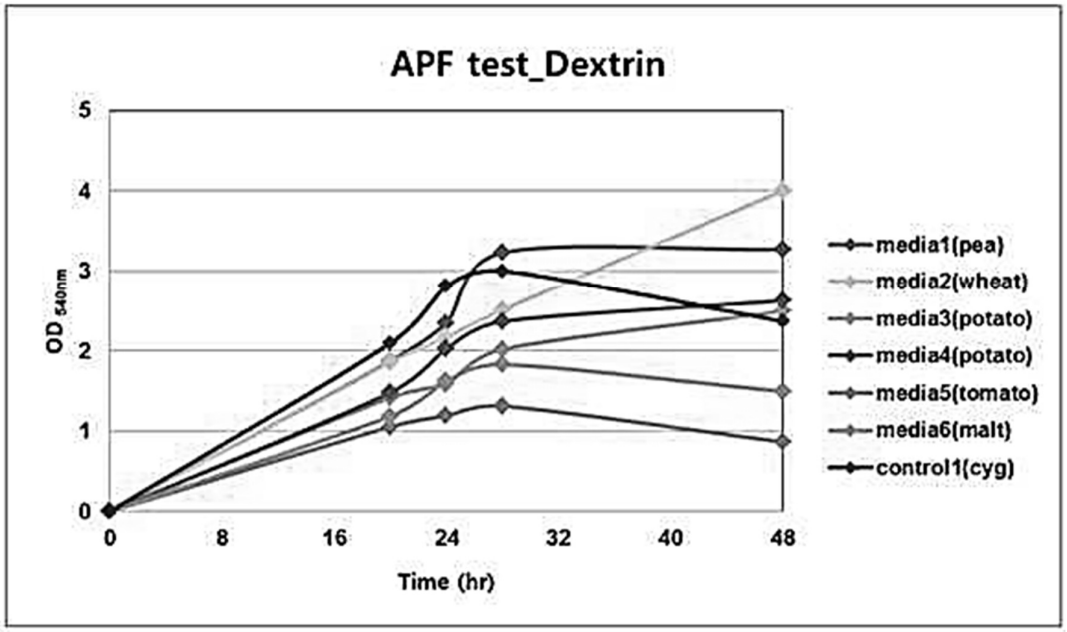
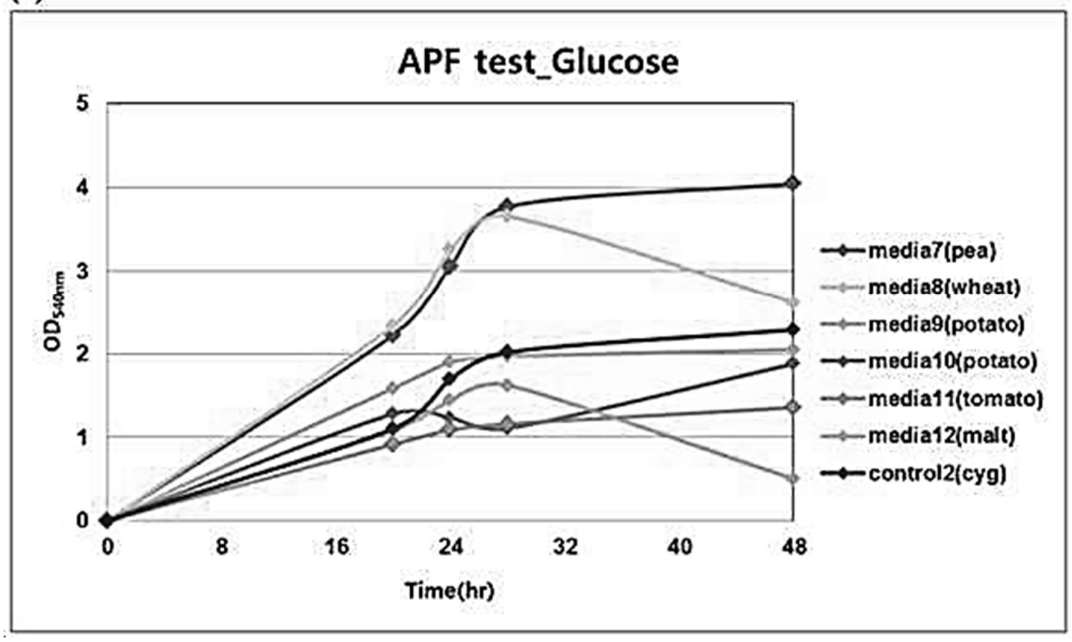
Fig.4

(A)


APF test_Dextrin
OD 540nm
Time (hr)
0
8
16
24
32
40
48
0
1
2
3
4
5
media1(pea)
media2(wheat)
media3(potato)
media4(potato)
media5(tomato)
media6(malt)
control1(cyg)

(B)


APF test_Glucose
OD540nm
Time(hr)
0
8
16
24
32
40
48
0
1
2
3
4
5
media7(pea)
media8(wheat)
media9(potato)
media10(potato)
media11(tomato)
media12(malt)
control2(cyg)

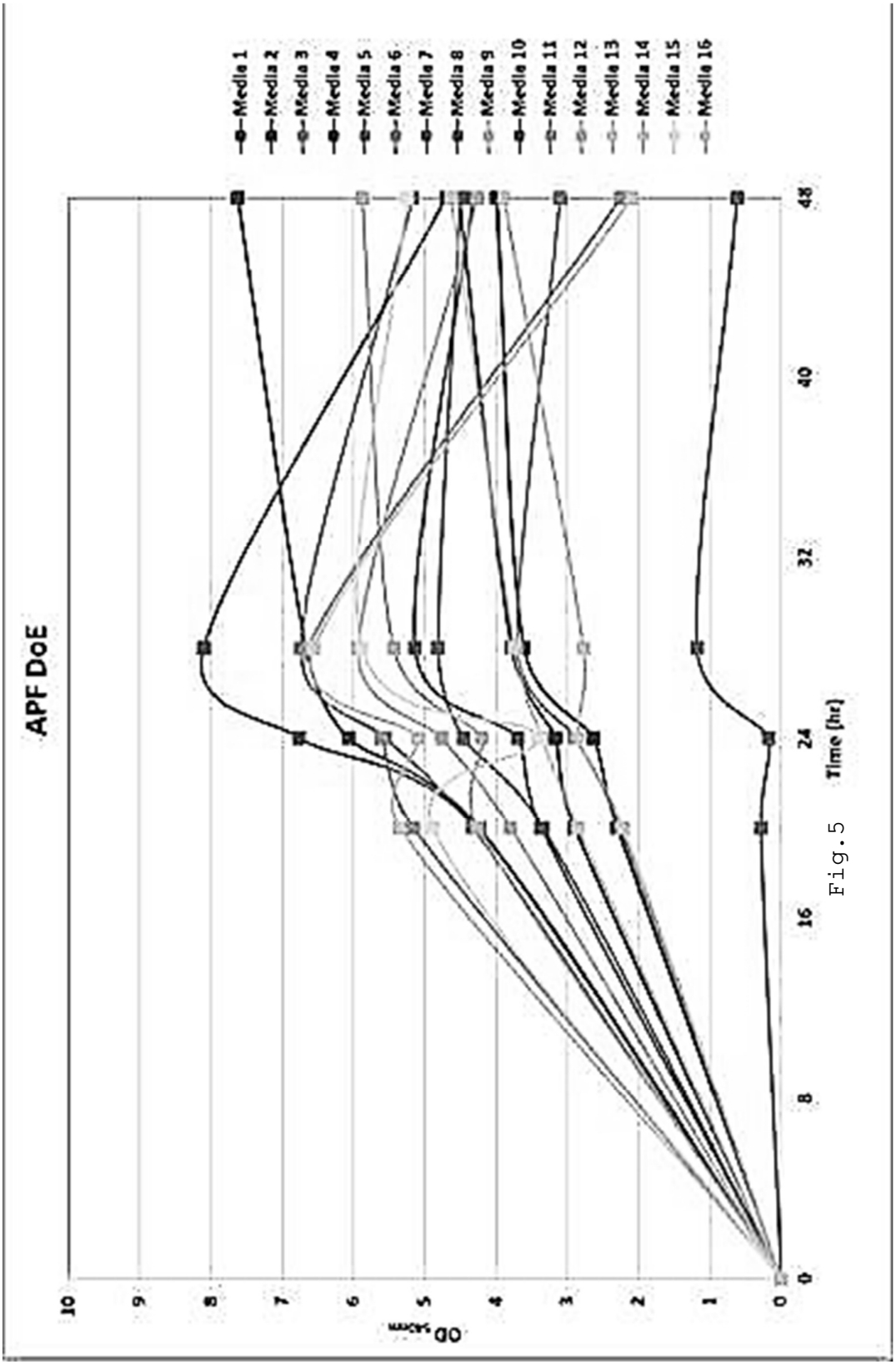

APF DoE
Media 1
Media 2
Media 3
Media 4
Media 5
Media 6
Media 7
Media 8
Media 9
Media 10
Media 11
Media 12
Media 13
Media 14
Media 15
Media 16
OD 540nm
Time (hr)
0
1
2
3
4
5
6
7
8
9
10
0
8
16
24
32
40
48

Fig.5

Fig.6

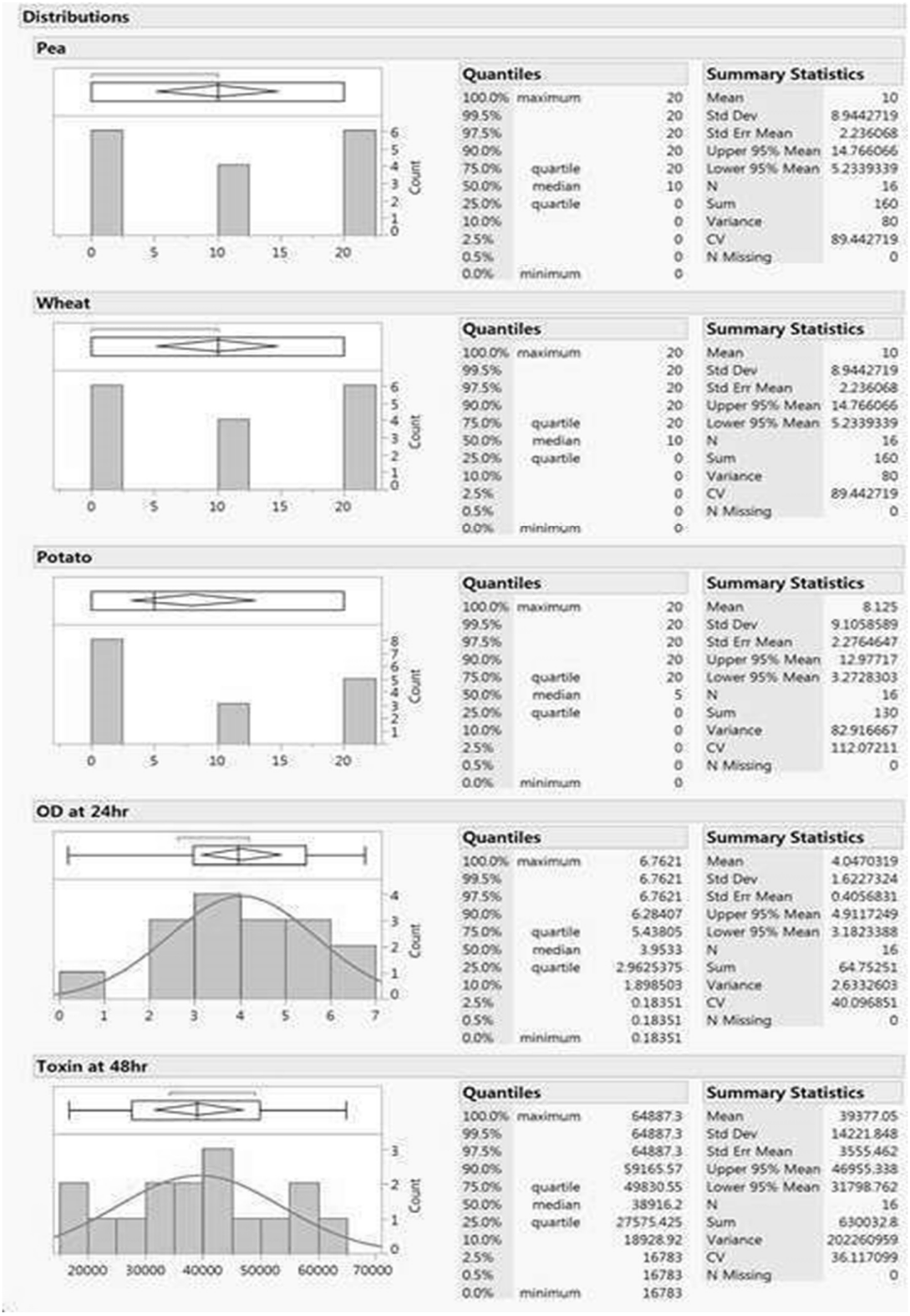

Distributions
Pea
Quantiles
100.0% maximum 20
99.5% 20
97.5% 20
90.0% 20
75.0% quartile 20
50.0% median 10
25.0% quartile 0
10.0% 0
2.5% 0
0.5% 0
0.0% minimum 0
Summary Statistics
Mean 10
Std Dev 8.9442719
Std Err Mean 2.236068
Upper 95% Mean 14.766066
Lower 95% Mean 5.2339339
N 16
Sum 160
Variance 80
CV 89.442719
N Missing 0
Wheat
Quantiles
100.0% maximum 20
99.5% 20
97.5% 20
90.0% 20
75.0% quartile 20
50.0% median 10
25.0% quartile 0
10.0% 0
2.5% 0
0.5% 0
0.0% minimum 0
Summary Statistics
Mean 10
Std Dev 8.9442719
Std Err Mean 2.236068
Upper 95% Mean 14.766066
Lower 95% Mean 5.2339339
N 16
Sum 160
Variance 80
CV 89.442719
N Missing 0
Potato
Quantiles
100.0% maximum 20
99.5% 20
97.5% 20
90.0% 20
75.0% quartile 20
50.0% median 5
25.0% quartile 0
10.0% 0
2.5% 0
0.5% 0
0.0% minimum 0
Summary Statistics
Mean 8.125
Std Dev 9.1058589
Std Err Mean 2.2764647
Upper 95% Mean 12.97717
Lower 95% Mean 3.2728303
N 16
Sum 130
Variance 82.916667
CV 112.07211
N Missing 0
OD at 24hr
Quantiles
100.0% maximum 6.7621
99.5% 6.7621
97.5% 6.7621
90.0% 6.28407
75.0% quartile 5.43805
50.0% median 3.9533
25.0% quartile 2.9625375
10.0% 1.898503
2.5% 0.18351
0.5% 0.18351
0.0% minimum 0.18351
Summary Statistics
Mean 4.0470319
Std Dev 1.6227324
Std Err Mean 0.4056831
Upper 95% Mean 4.9117249
Lower 95% Mean 3.1823388
N 16
Sum 64.75251
Variance 2.6332603
CV 40.096851
N Missing 0
Toxin at 48hr
Quantiles
100.0% maximum 64887.3
99.5% 64887.3
97.5% 64887.3
90.0% 59165.57
75.0% quartile 49830.55
50.0% median 38916.2
25.0% quartile 27575.425
10.0% 18928.92
2.5% 16783
0.5% 16783
0.0% minimum 16783
Summary Statistics
Mean 39377.05
Std Dev 14221.848
Std Err Mean 3555.462
Upper 95% Mean 46955.338
Lower 95% Mean 31798.762
N 16
Sum 630032.8
Variance 202260959
CV 36.117099
N Missing 0
Count

Fig.9

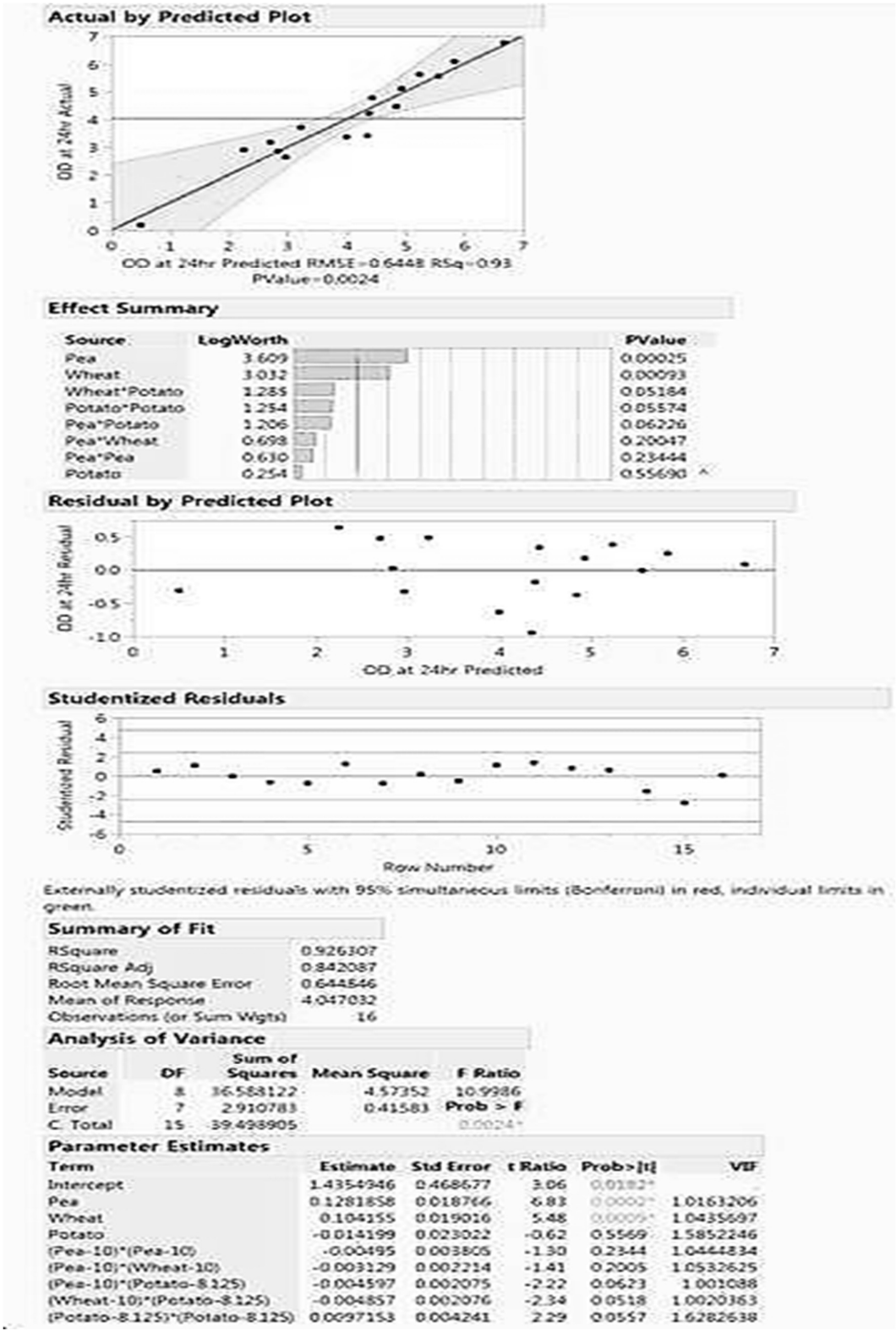
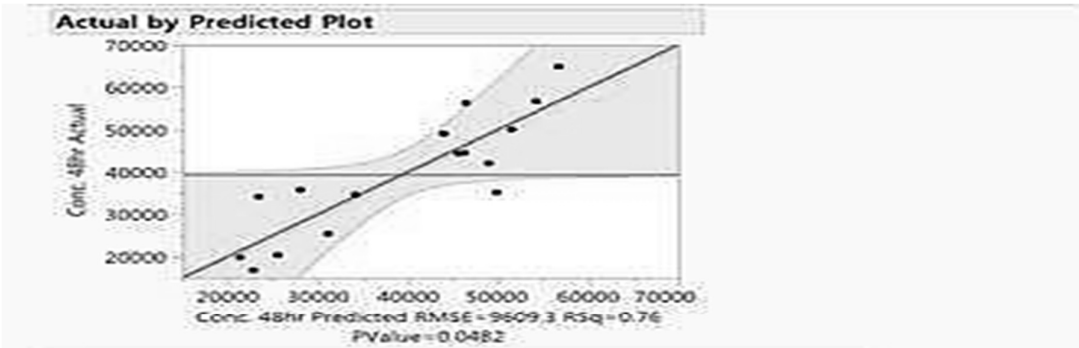
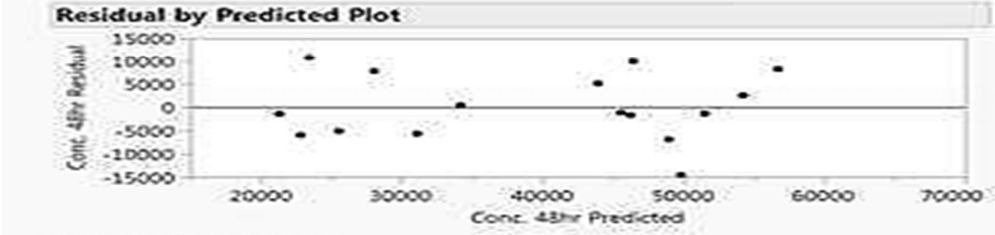

Actual by Predicted Plot
OD at 24hr Actual
OD at 24hr Predicted RMSE=0.6448 RSq=0.93
PValue=0.0024
Effect Summary
Source
LogWorth
PValue
Pea 3.609 0.00025
Wheat 3.032 0.00093
Wheat*Potato 1.285 0.05184
Potato*Potato 1.254 0.05574
Pea*Potato 1.206 0.06226
Pea*Wheat 0.698 0.20047
Pea*Pea 0.630 0.23444
Potato 0.254 0.55690
Residual by Predicted Plot
OD at 24hr Residual
OD at 24hr Predicted
Studentized Residuals
Studentized Residual
Row Number
Externally studentized residuals with 95% simultaneous limits (Bonferroni) in red, individual limits in green.
Summary of Fit
RSquare 0.926307
RSquare Adj 0.842087
Root Mean Square Error 0.644546
Mean of Response 4.047032
Observations (or Sum Wgts) 16
Analysis of Variance
Source DF Sum of Squares Mean Square F Ratio
Model 8 36.580122 4.57352 10.9986
Error 7 2.910783 0.41583 Prob > F
C. Total 15 39.490905 0.0024*
Parameter Estimates
Term Estimate Std Error t Ratio Prob>|t| VIF
Intercept 1.4354946 0.468677 3.06 0.0182*
Pea 0.1281858 0.018766 6.83 0.0002* 1.0163206
Wheat 0.104155 0.019016 5.48 0.0009* 1.0435697
Potato -0.014199 0.023022 -0.62 0.5569 1.5852246
(Pea-10)*(Pea-10) -0.00495 0.003805 -1.30 0.2344 1.0444834
(Pea-10)*(Wheat-10) -0.003129 0.002214 -1.41 0.2005 1.0532625
(Pea-10)*(Potato-8.125) -0.004597 0.002075 -2.22 0.0623 1.001088
(Wheat-10)*(Potato-8.125) -0.004857 0.002076 -2.34 0.0518 1.0020363
(Potato-8.125)*(Potato-8.125) 0.0097153 0.004241 2.29 0.0557 1.6282638

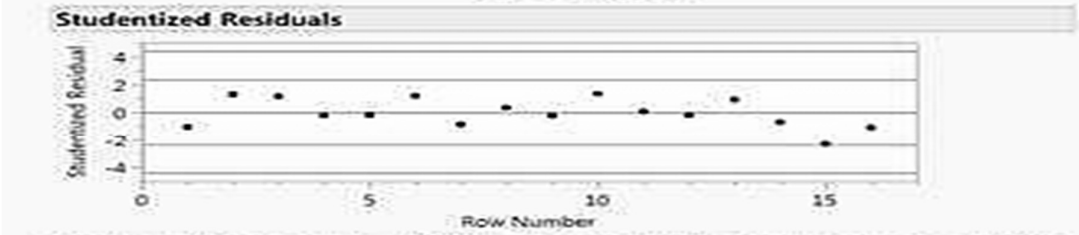
Fig.12



Effect Summary

Source	LogWorth	PValue
Pea	2.366	0.00430
Pea*Pea	0.836	0.14596
Pea*Potato	0.627	0.23621
Potato	0.506	0.31221
Wheat*Potato	0.466	0.34231
Wheat*Wheat	0.290	0.51260
Wheat	0.163	0.68740





Externally studentized residuals with 95% simultaneous limits (Bonferroni) in red, individual limits in green.

Summary of Fit

RSquare	0.756516
RSquare Adj	0.543467
Root Mean Square Error	9609.305
Mean of Response	39377.05
Observations (or Sum Wgts)	16

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	22952044460	3278863351	3.5509
Error	8	7387099926	92338741	Prob > F
C. Total	15	30339143386		0.0482*

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	VIF
Intercept	41524.131	7882.841	5.27	0.0008*	
Pea	1112.5467	282.4505	3.94	0.0043*	1.0367686
Wheat	-117.8817	282.4505	-0.42	0.6874	1.0367686
Potato	-294.3954	272.9442	-1.08	0.3122	1.003453
(Pea-10)*(Pea-10)	-90.74848	56.34894	-1.61	0.1460	1.0315941
(Wheat-10)*(Wheat-10)	-38.60844	56.34894	-0.69	0.5126	1.0315941
(Pea-10)*(Potato-8.125)	-39.60464	30.92624	-1.28	0.2362	1.0017996
(Wheat-10)*(Potato-8.125)	-31.21874	30.92624	-1.01	0.3423	1.0017996

Fig.15

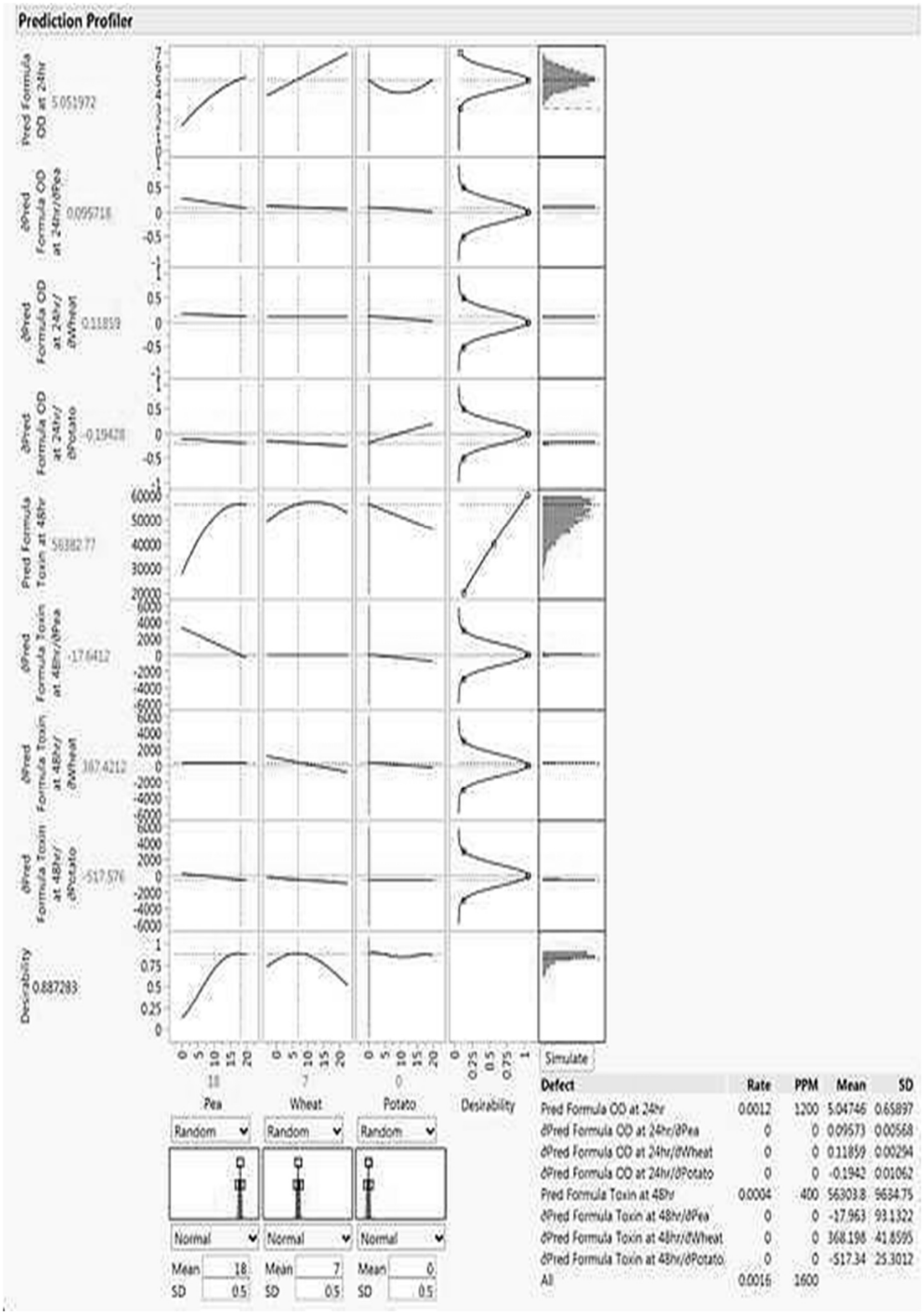

Prediction Profiler
Pred Formula OD at 24hr
5.051972
δPred Formula OD at 24hr/δPea
0.095718
δPred Formula OD at 24hr/δWheat
0.11859
δPred Formula OD at 24hr/δPotato
-0.19428
Pred Formula Toxin at 48hr
56382.77
δPred Formula Toxin at 48hr/δPea
-17.6412
δPred Formula Toxin at 48hr/δWheat
367.4212
δPred Formula Toxin at 48hr/δPotato
-517.576
Desirability
0.887283
Pea
Wheat
Potato
Desirability
Simulate
18
7
0
Random
Normal
Mean
SD
Defect
Rate
PPM
Mean
SD
Pred Formula OD at 24hr 0.0012 1200 5.04746 0.65897
δPred Formula OD at 24hr/δPea 0 0 0.09573 0.00568
δPred Formula OD at 24hr/δWheat 0 0 0.11859 0.00294
δPred Formula OD at 24hr/δPotato 0 0 -0.1942 0.01062
Pred Formula Toxin at 48hr 0.0004 400 56303.8 9684.75
δPred Formula Toxin at 48hr/δPea 0 0 -17.963 93.1322
δPred Formula Toxin at 48hr/δWheat 0 0 368.198 41.8595
δPred Formula Toxin at 48hr/δPotato 0 0 -517.34 25.3012
All 0.0016 1600

Fig.17

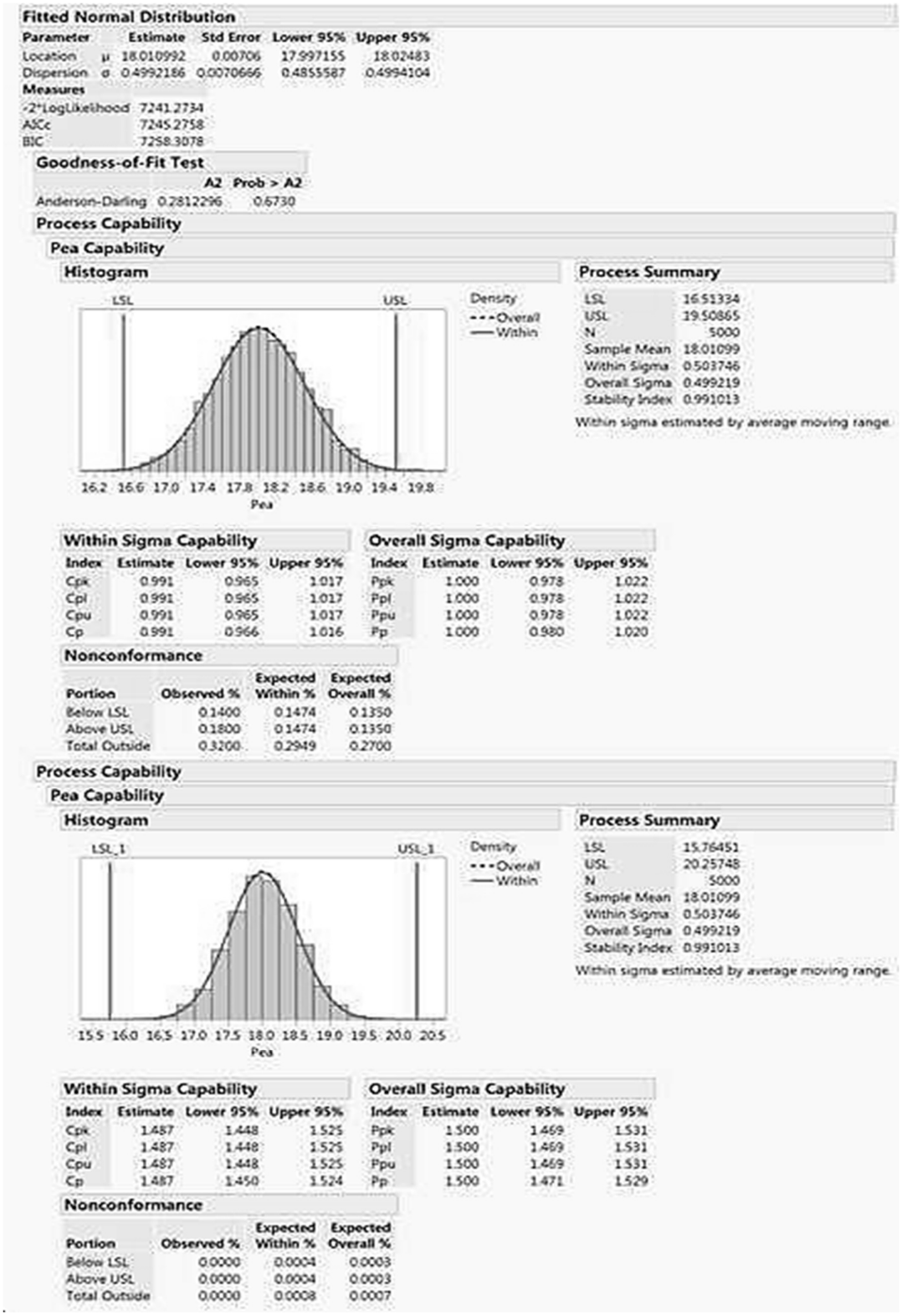

Fitted Normal Distribution
Parameter Estimate Std Error Lower 95% Upper 95%
Location μ 18.010992 0.00706 17.997155 18.02483
Dispersion σ 0.4992186 0.0070666 0.4855587 0.4994104
Measures
-2*LogLikelihood 7241.2734
AICc 7245.2758
BIC 7258.3078
Goodness-of-Fit Test
A2 Prob > A2
Anderson-Darling 0.2812296 0.6730
Process Capability
Pea Capability
Histogram
LSL
USL
16.2 16.6 17.0 17.4 17.8 18.2 18.6 19.0 19.4 19.8
Pea
Density
Overall
Within
Process Summary
LSL 16.51334
USL 19.50865
N 5000
Sample Mean 18.01099
Within Sigma 0.503746
Overall Sigma 0.499219
Stability Index 0.991013
Within sigma estimated by average moving range.
Within Sigma Capability
Index Estimate Lower 95% Upper 95%
Cpk 0.991 0.965 1.017
Cpl 0.991 0.965 1.017
Cpu 0.991 0.965 1.017
Cp 0.991 0.966 1.016
Overall Sigma Capability
Index Estimate Lower 95% Upper 95%
Ppk 1.000 0.978 1.022
Ppl 1.000 0.978 1.022
Ppu 1.000 0.978 1.022
Pp 1.000 0.980 1.020
Nonconformance
Portion Observed % Expected Within % Expected Overall %
Below LSL 0.1400 0.1474 0.1350
Above USL 0.1800 0.1474 0.1350
Total Outside 0.3200 0.2949 0.2700
Process Capability
Pea Capability
Histogram
LSL_1
USL_1
15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5
Pea
Density
Overall
Within
Process Summary
LSL 15.76451
USL 20.25748
N 5000
Sample Mean 18.01099
Within Sigma 0.503746
Overall Sigma 0.499219
Stability Index 0.991013
Within sigma estimated by average moving range.
Within Sigma Capability
Index Estimate Lower 95% Upper 95%
Cpk 1.487 1.448 1.525
Cpl 1.487 1.448 1.525
Cpu 1.487 1.448 1.525
Cp 1.487 1.450 1.524
Overall Sigma Capability
Index Estimate Lower 95% Upper 95%
Ppk 1.500 1.469 1.531
Ppl 1.500 1.469 1.531
Ppu 1.500 1.469 1.531
Pp 1.500 1.471 1.529
Nonconformance
Portion Observed % Expected Within % Expected Overall %
Below LSL 0.0000 0.0004 0.0003
Above USL 0.0000 0.0004 0.0003
Total Outside 0.0000 0.0008 0.0007

Fig.18

Fitted Normal Distribution

Parameter		Estimate	Std Error	Lower 95%	Upper 95%
Location	μ	6.9988494	0.0069468	6.985234	7.0124649
Dispersion	σ	0.4912112	0.0070097	0.4776628	0.4913999

Measures

-2*LogLikelihood	7079.5742
AICc	7083.5766
BIC	7096.6085

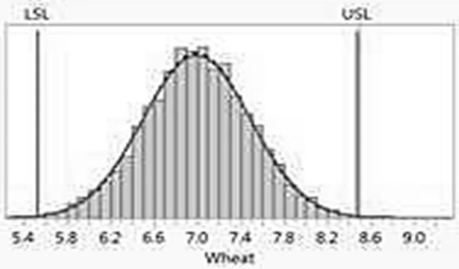
Goodness-of-Fit Test

	A2	Prob > A2
Anderson-Darling	0.4837168	0.2460

Process Capability

Wheat Capability

Histogram



Density
- - - Overall
—— Within

Process Summary

LSL	5.525216
USL	8.472483
N	5000
Sample Mean	6.998849
Within Sigma	0.498115
Overall Sigma	0.491211
Stability Index	0.986141

Within sigma estimated by average moving range.

Within Sigma Capability

Index	Estimate	Lower 95%	Upper 95%
Cpk	0.986	0.960	1.012
Cpl	0.986	0.960	1.012
Cpu	0.986	0.960	1.012
Cp	0.986	0.962	1.011

Overall Sigma Capability

Index	Estimate	Lower 95%	Upper 95%
Ppk	1.000	0.978	1.022
Ppl	1.000	0.978	1.022
Ppu	1.000	0.978	1.022
Pp	1.000	0.980	1.020

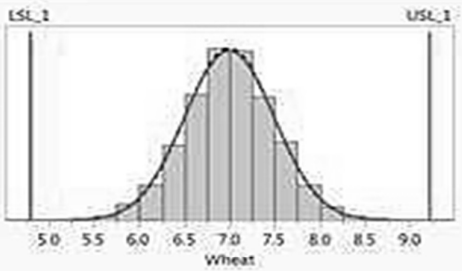
Nonconformance

Portion	Observed %	Expected Within %	Expected Overall %
Below LSL	0.1000	0.1546	0.1350
Above USL	0.2200	0.1546	0.1350
Total Outside	0.3200	0.3092	0.2700

Process Capability

Wheat Capability

Histogram



Density
- - - Overall
—— Within

Process Summary

LSL	4.788399
USL	9.2093
N	5000
Sample Mean	6.998849
Within Sigma	0.498115
Overall Sigma	0.491211
Stability Index	0.986141

Within sigma estimated by average moving range.

Within Sigma Capability

Index	Estimate	Lower 95%	Upper 95%
Cpk	1.479	1.441	1.517
Cpl	1.479	1.441	1.517
Cpu	1.479	1.441	1.517
Cp	1.479	1.442	1.516

Overall Sigma Capability

Index	Estimate	Lower 95%	Upper 95%
Ppk	1.500	1.469	1.531
Ppl	1.500	1.469	1.531
Ppu	1.500	1.469	1.531
Pp	1.500	1.471	1.529

Nonconformance

Portion	Observed %	Expected Within %	Expected Overall %
Below LSL	0.0000	0.0005	0.0003
Above USL	0.0200	0.0005	0.0003
Total Outside	0.0200	0.0009	0.0007