

Supplementary Materials

Table S1. ANOVA for the Total Titratable Acidity (TTA, mL NaOH 0.1N) from the PBD. The meaning of the factors *A* to *H* is given in **Table 1**.

Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value
Model	8	1136.51	142.06	21.31	0.014
Linear	8	1136.51	142.06	21.31	0.014
<i>A</i>	1	198.86	198.86	29.83	0.012
<i>B</i>	1	33.84	33.83	5.08	0.110
<i>C</i>	1	7.10	7.01	1.07	0.378
<i>D</i>	1	69.65	69.65	10.45	0.048
<i>E</i>	1	35.95	35.95	5.39	0.103
<i>F</i>	1	201.97	201.97	30.30	0.012
<i>G</i>	1	382.73	382.73	57.42	0.005
<i>H</i>	1	206.42	206.42	30.97	0.011
Error	3	20.00	6.67		
Total	11	1156.51			
R ²	0.9827				
R ² adj	0.9366				

¹Df - degrees of freedom; Adj SS - adjusted sum of squares; Adj MS - adjusted mean squares.

Table S2. ANOVA for the antifungal activity of the sourdoughs', measured as the inhibition effect (*I*, %, **equation 2**), against *Aspergillus niger* from the PBD. The meaning of the factors *A* to *H* is given in **Table 1**.

Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value
Model	5	3886.60	777.30	7.25	0.016
Linear	5	3886.60	777.30	7.25	0.016
<i>A</i>	1	770.20	770.20	7.18	0.037
<i>D</i>	1	1533.20	1533.20	14.30	0.009
<i>F</i>	1	463.00	463.00	4.32	0.083
<i>G</i>	1	395.40	395.40	3.69	0.103
<i>H</i>	1	724.80	724.80	6.76	0.041
Error	6	643.50	107.20		
Total	11	4530.10			
R ²	0.8580				
R ² adj	0.7396				

¹Df - degrees of freedom; Adj SS - adjusted sum of squares; Adj MS - adjusted mean squares.

Table S3. ANOVA for the sourdoughs' antifungal activity, measured as the inhibition effect (*I*, %, **equation 2**), against *Aspergillus flavus* from the PBD. The meaning of the factors *A* to *H* is given in **Table 1**.

Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value
Model	5	1404.91	280.98	7.12	0.017
Linear	5	1404.91	280.98	7.12	0.017
<i>B</i>	1	737.90	737.90	18.71	0.005
<i>C</i>	1	34.82	34.82	0.88	0.384
<i>E</i>	1	168.75	168.75	4.28	0.084
<i>G</i>	1	235.68	235.68	5.98	0.050
<i>H</i>	1	227.77	227.77	5.77	0.053
Error	6	236.65	39.44		
Total	11	1641.56			
R ²	0.8558				

R ² adj	0.7357
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¹Df - degrees of freedom; Adj SS - adjusted sum of squares; Adj MS - adjusted mean squares.

Table S4. ANOVA for the sourdoughs' antifungal activity, measured as the inhibition effect (I, %, **equation 2**), against *Penicillium* spp. from the PBD. The meaning of the factors A to H is given in **Table 1**.

Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value
Model	7	3867.50	552.50	7.94	0.032
Linear	7	3867.50	552.50	7.94	0.032
A	1	203.20	203.20	2.92	0.163
B	1	1285.50	1285.47	18.48	0.013
C	1	199.30	199.27	2.86	0.166
D	1	655.30	655.35	9.42	0.037
F	1	489.20	489.22	7.03	0.057
G	1	470.00	470.00	6.76	0.060
H	1	565.00	564.99	8.12	0.046
Error	4	278.30	69.58		
Total	11	4145.80			
R ²	0.9329				
R ² adj	0.8154				

¹Df- degrees of freedom; Adj SS- adjusted sum of squares; Adj MS- adjusted mean squares.

Table S5. ANOVA for the sourdoughs' antibacterial activity, measured as the inhibition effect (I, %, **equation 2**), against *Bacillus* spp. from the PBD. The meaning of the factors A to H is given in **Table 1**.

Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value
Model	3	5865.60	1955.20	5.33	0.026
Linear	3	5865.60	1955.20	5.33	0.026
B	1	164.70	164.70	0.45	0.522
E	1	1574.60	1574.60	4.29	0.072
G	1	4126.30	4126.30	11.25	0.010
Error	8	2934.00	366.70		
Total	11	8799.60			
R ²	0.6666				
R ² adj	0.5415				

¹Df - degrees of freedom; Adj SS - adjusted sum of squares; Adj MS - adjusted mean squares.

Table S6. ANOVA for the Total Titratable Acidity (TTA, mL NaOH 0.1N), antifungal activity of the sourdoughs against *Aspergillus niger*, *Aspergillus flavus* and *Penicillium* spp., and antibacterial activity against *Bacillus* spp., measured as inhibition effect (*I*, %, **equation 2**) from RSM. The meaning of the factors *A* to *F* is given in **Table 2**.

Source	TTA, mL NaOH 0.1N					Antifungal activity against <i>A. niger</i> I, %					Antifungal activity against <i>A. flavus</i> I, %				
	Df ¹	Adj SS	Adj MS	F-Value	P-Value	Df	Adj SS	Adj MS	F-Value	P-Value	Df	Adj SS	Adj MS	F-Value	P-Value
Model	27	2858.98	105.88	6.59	0.000	27	46450.00	1720.37	2.37	0.017	27	30038.90	1112.55	2.60	0.009
Linear	6	1294.43	215.73	13.43	0.000	6	18197.70	3032.96	4.17	0.005	6	10209.40	1701.56	3.98	0.006
<i>A</i>	1	100.19	100.19	6.23	0.019	1	185.20	185.17	0.25	0.618	1	1099.80	1099.80	2.57	0.121
<i>B</i>	1	148.92	148.92	9.27	0.005	1	3069.60	3069.64	4.22	0.050	1	1409.40	1409.39	3.30	0.081
<i>C</i>	1	612.48	612.47	38.11	0.000	1	5150.90	5150.88	7.09	0.013	1	1763.60	1763.60	4.13	0.053
<i>D</i>	1	89.35	89.35	5.56	0.027	1	17.50	17.53	0.02	0.878	1	38.20	38.17	0.09	0.768
<i>E</i>	1	26.80	26.80	1.67	0.208	1	7916.80	7916.83	10.89	0.003	1	4847.20	4847.17	11.34	0.002
<i>F</i>	1	316.69	316.68	19.71	0.000	1	1857.70	1857.69	2.56	0.122	1	1051.20	1051.23	2.46	0.129
Square	6	1255.93	209.32	13.03	0.000	6	16990.90	2831.82	3.90	0.007	6	13040.80	2173.46	5.08	0.002
<i>A</i> ²	1	616.86	616.85	38.39	0.000	1	6114.80	6114.76	8.41	0.008	1	5796.90	5796.86	13.56	0.001
<i>B</i> ²	1	1.00	0.99	0.06	0.805	1	973.60	973.61	1.34	0.258	1	332.90	332.91	0.78	0.386
<i>C</i> ²	1	19.40	19.39	1.21	0.282	1	17.80	17.75	0.02	0.877	1	310.70	310.67	0.73	0.402
<i>D</i> ²	1	0.08	0.08	0.01	0.944	1	412.30	412.32	0.57	0.458	1	6.20	6.21	0.01	0.905
<i>E</i> ²	1	583.49	583.48	36.31	0.000	1	6714.60	6714.63	9.24	0.005	1	6676.30	6676.25	15.62	0.001
<i>F</i> ²	1	194.31	194.30	12.09	0.002	1	5799.40	5799.39	7.98	0.009	1	1903.50	1903.53	4.45	0.045
Interaction	15	308.62	20.57	1.28	0.284	15	11261.40	750.76	1.03	0.457	15	6788.80	452.58	1.06	0.436
<i>AB</i>	1	1.62	1.62	0.10	0.753	1	210.70	210.74	0.29	0.595	1	92.20	92.21	0.22	0.646
<i>AC</i>	1	6.85	6.84	0.43	0.520	1	912.50	912.50	1.26	0.273	1	132.30	132.28	0.31	0.583
<i>AD</i>	1	17.70	17.70	1.10	0.304	1	1828.30	1828.31	2.51	0.125	1	2.10	2.14	0.01	0.944
<i>AE</i>	1	6.30	6.30	0.39	0.537	1	2378.40	2378.43	3.27	0.083	1	304.40	304.43	0.71	0.407
<i>AF</i>	1	4.35	4.35	0.27	0.607	1	947.40	947.43	1.30	0.264	1	120.40	120.36	0.28	0.600
<i>BC</i>	1	14.85	14.85	0.92	0.346	1	179.90	179.93	0.25	0.623	1	654.90	654.86	1.53	0.227
<i>BD</i>	1	5.12	5.12	0.32	0.577	1	62.90	62.94	0.09	0.771	1	0.30	0.27	0.00	0.980
<i>BE</i>	1	5.45	5.44	0.34	0.566	1	749.60	749.62	1.03	0.320	1	10.10	10.08	0.02	0.879
<i>BF</i>	1	30.42	30.42	1.89	0.181	1	5.20	5.18	0.01	0.933	1	323.60	323.60	0.76	0.393
<i>CD</i>	1	11.05	11.04	0.69	0.415	1	720.90	720.86	0.99	0.329	1	1570.20	1570.24	3.67	0.067
<i>CE</i>	1	69.62	69.62	4.33	0.048	1	119.70	119.66	0.16	0.688	1	443.90	443.87	1.04	0.318
<i>CF</i>	1	57.25	57.24	3.56	0.071	1	646.90	646.92	0.89	0.355	1	146.30	146.29	0.34	0.564

TTA, mL NaOH 0.1N						Antifungal activity against <i>A. niger</i> I,%					Antifungal activity against <i>A. flavus</i> I,%				
Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value	Df	Adj SS	Adj MS	F-Value	P-Value	Df	Adj SS	Adj MS	F-Value	P-Value
DE	1	0.10	0.10	0.01	0.937	1	503.10	503.08	0.69	0.413	1	94.30	94.26	0.22	0.643
DF	1	0.45	0.45	0.03	0.868	1	443.40	443.42	0.61	0.442	1	718.20	718.21	1.68	0.207
EF	1	77.50	77.50	4.82	0.038	1	1552.40	1552.36	2.14	0.156	1	2175.70	2175.69	5.09	0.033
Error	25	401.75	16.07			25	18174.50	726.98			25	10686.00	427.44		
Lack of fit	17	310.19	18.24	1.59	0.256	17	14091.60	828.92	1.62	0.247	17	8619.70	507.04	1.96	0.167
Pure error	8	91.56	11.44			8	4082.90	510.36			8	2066.30	258.29		
Total	52	3260.72				52	64624.60				52	40724.90			
R ²			0.8768					0.7188					0.7376		
R ² adj			0.7437					0.4150					0.4542		

Table S6. Cont.

Antifungal activity against <i>Penicillium</i> spp. I,%						Antibacterial activity against <i>Bacillus</i> spp. I,%				
Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value	Df	Adj SS	Adj MS	F-Value	P-Value
Model	27	50272.60	1861.90	3.78	0.001	27	83615.00	3096.90	2.31	0.020
Linear	6	23424.30	3904.10	7.92	0.000	6	38458.00	6409.70	4.77	0.002
A	1	261.30	261.30	0.53	0.473	1	1663.00	1662.70	1.24	0.276
B	1	12133.10	12133.10	24.61	0.000	1	10383.00	10383.20	7.73	0.010
C	1	9815.70	9815.70	19.91	0.000	1	19487.00	19486.70	14.51	0.001
D	1	0.10	0.10	0.00	0.989	1	7.00	6.60	0.00	0.945
E	1	119.20	119.20	0.24	0.627	1	1805.00	1804.60	1.34	0.257
F	1	1095.00	1095.00	2.22	0.149	1	5114.00	5114.10	3.81	0.062
Square	6	15344.20	2557.40	5.19	0.001	6	15412.00	2568.60	1.91	0.118
A ²	1	9276.30	9276.30	18.82	0.000	1	7402.00	7401.70	5.51	0.027
B ²	1	1511.50	1511.50	3.07	0.092	1	612.00	611.90	0.46	0.506
C ²	1	356.30	356.30	0.72	0.403	1	1840.00	1840.50	1.37	0.253
D ²	1	3.70	3.70	0.01	0.931	1	431.00	431.20	0.32	0.576
E ²	1	4669.60	4669.60	9.47	0.005	1	5443.00	5442.60	4.05	0.055
F ²	1	2376.90	2376.90	4.82	0.038	1	3618.00	3618.30	2.69	0.113
Interaction	15	11504.00	766.90	1.56	0.159	15	29745.00	1983.00	1.48	0.189

Antifungal activity against <i>Penicillium</i> spp. I,%						Antibacterial activity against <i>Bacillus</i> spp. I,%				
Source	Df ¹	Adj SS	Adj MS	F-Value	P-Value	Df	Adj SS	Adj MS	F-Value	P-Value
AB	1	0.00	0.00	0.00	0.993	1	4668.00	4668.20	3.48	0.074
AC	1	137.40	137.40	0.28	0.602	1	0.00	0.50	0.00	0.985
AD	1	48.00	48.00	0.10	0.758	1	44.00	43.90	0.03	0.858
AE	1	307.10	307.10	0.62	0.437	1	236.00	235.70	0.18	0.679
AF	1	75.10	75.10	0.15	0.700	1	444.00	443.90	0.33	0.570
BC	1	8107.40	8107.40	16.45	0.000	1	16737.00	16737.20	12.46	0.002
BD	1	2.80	2.80	0.01	0.941	1	318.00	317.60	0.24	0.631
BF	1	60.50	60.50	0.12	0.729	1	529.00	529.40	0.39	0.536
DE	1	64.30	64.30	0.13	0.721	1	170.00	170.30	0.13	0.725
DF	1	553.70	553.70	1.12	0.299	1	1095.00	1094.70	0.82	0.375
EF	1	67.60	67.60	0.14	0.714	1	52.00	52.10	0.04	0.845
Error	25	12323.90	493.00			25	33572.00	1342.90		
Lack of fit	17	10212.10	600.70	2.28	0.119	17	28496.00	1676.30	2.64	0.082
Pure error	8	2111.80	264.00			8	5075.00	634.40		
Total	52	62596.50				52	117187.00			
R ²			0.8031					0.7135		
R ² adj			0.5905					0.4041		

¹Df - degrees of freedom; Adj SS - adjusted sum of squares; Adj MS - adjusted mean squares.