Table S1. 2017 experiment ANOVA results

YIELD

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	33	48131967	1458544	10,7766
Error	19	2571529	135344	**Prob > F**
C. Total	52	50703496		<,0001***

***Significant at the 0.001 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 20	4	4	35517549	65,6062	<,0001***
REP 20[LOCATION 20]	4	4	2406037	4,4443	0,0105*
CNAME 20	5	5	2090285	3,0889	0,0331*
CNAME 20*LOCATION 20	20	20	7285070	2,6913	0,0177*

*, *** Significant at the 0.05 and 0.001 probability levels, respectively.**

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	2323,1000	134,33473	2518,00
iPF7D-RED	2524,7000	134,33473	2800,89
iPF-PURPLE	2727,0533	138,30606	3010,00
iP-PURPLE	2469,7000	134,33473	2769,56
S29-RED	2517,0000	134,33473	2752,89
SERI	2997,0667	134,33473	3197,33

LSMeans Differences Student's t

α=0,050 LSD=2,09302*189,978 = 397.1

LSMean[i] By LSMean[j]

Level				Least Sq Mean
SERI	A			2997,0667
iPF-PURPLE	A	B		2727,0533
iPF7D-RED		B	C	2524,7000
S29-RED		B	C	2517,0000
iP-PURPLE		B	C	2469,7000
iP7D-RED			C	2323,1000

SPIKE LENGHT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	26	20,255248	0,779048	2,4209
Error	14	4,505240	0,321803	**Prob > F**
C. Total	40	24,760488		0,0433*

***Significant at the 0.05 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION	3	3	10,604120	10,9841	0,0006*
REP[LOCATION]	3	3	2,458560	2,5467	0,0979
CNAME	5	5	2,296439	1,4272	0,2745
CNAME*LOCATION	15	15	5,779087	1,1972	0,3707

NUMBER OF SPIKELETS/SPIKE

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	26	269,96543	10,3833	14,3208
Error	14	10,15067	0,7250	**Prob > F**
C. Total	40	280,11610		<,0001***

***Significant at the 0.05 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 2	3	3	187,86267	86,3680	<,0001***
REP 2[LOCATION 2]	3	3	9,07433	4,1718	0,0263*
CNAME 2	5	5	42,24980	11,6544	0,0001***
CNAME 2*LOCATION 2	15	15	20,37755	1,8737	0,1241

*,***Significant at the 0.05 probability levels, respectively.**

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	15,650000	0,33658385	15,9714
iPF7D-RED	15,825000	0,33658385	16,2000
iPF-PURPLE	15,827500	0,37480392	15,3667
iP-PURPLE	15,850000	0,33658385	16,1143
S29-RED	15,825000	0,33658385	16,0571
SERI	18,612500	0,33658385	19,1857

LSMeans Differences Student's t

α=0,050 LSD=2,14479*0,476

Level			Least Sq Mean
SERI	A		18,612500
iP-PURPLE		B	15,850000
iPF-PURPLE		B	15,827500
iPF7D-RED		B	15,825000
S29-RED		B	15,825000
iP7D-RED		B	15,650000

GRAİN/SPİKE

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	25	933,7553	37,3502	4,0449
Error	13	120,0417	9,2340	**Prob > F**
C. Total	38	1053,7969		0,0057*

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 5	3	2	93,80000	5,0791	0,0234*
REP 5[LOCATION 5]	3	3	156,77833	5,6595	0,0105*
CNAME 5	5	4	34,69967	0,9395	0,4718
CNAME 5*LOCATION 5	15	14	244,28667	1,8897	0,1300

***Significant at the 0.05 probability level.**

1000 KERNEL WEIGHT(ESK-LAB)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	43	953,74898	22,1802	27,2055
Error	19	15,49039	0,8153	**Prob > F**
C. Total	62	969,23937		<,0001***

*****Significant at the 0.001 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 8	6	4	704,99431	216,1807	<,0001***
REP 8[LOCATION 8]	4	4	5,69128	1,7452	0,1818
CNAME 8	5	3	29,11067	11,9021	0,0001***
CNAME 8*LOCATION 8	30	28	59,00276	2,5847	0,0175*

,Significant at the 0.05 probability levels, respectively.**

Least Squares Means Table

Level	Least Sq Mean		Std Error	Mean
iP7D-RED	.	NonEstimable	.	30,2300
iPF7D-RED	32,595238		0,29788984	32,6818
iPF-PURPLE	33,955714		0,31419965	33,9900
iP-PURPLE	31,450000		0,29788984	31,7455
S29-RED	32,109524		0,29788984	32,1182
SERI	.	NonEstimable	.	34,1700

LSMeans Differences Student's t

α=0,050 LSD=2,09302*0,43297

Level				Least Sq Mean
iP7D-RED	A	B	C	.
iPF7D-RED	A			32,595238
iPF-PURPLE		B		33,955714
iP-PURPLE			C	31,450000
S29-RED	A		C	32,109524
SERI	A	B	C	.

GRAIN WEIGHT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	26	3,6206494	0,139256	3,4982
Error	14	0,5573166	0,039808	**Prob > F**
C. Total	40	4,1779660		0,0087**

****Significant at the 0.01 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 4	3	3	1,2966101	10,8571	0,0006***
REP 4[LOCATION 4]	3	3	0,2290759	1,9182	0,1731
CNAME 4	5	5	0,5215821	2,6205	0,0712
CNAME 4*LOCATION 4	15	15	1,2375517	2,0725	0,0906

*****Significant at the 0.001 probability level.**

TEST WEIGHT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	42	1410,5231	33,5839	107,6538

Source	DF	Sum of Squares	Mean Square	F Ratio
Error	14	4,3675	0,3120	**Prob > F**
C. Total	56	1414,8905		<,0001***

***Significant at the 0.001 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GRAIN ORIGIN	6	5	1188,6048	762,0193	<,0001***
REP[GRAIN ORIGIN]	4	4	5,5142	4,4190	0,0162*
CNAME	5	2	5,4003	8,6554	0,0036**
CNAME*GRAIN ORIGIN	30	27	168,6002	20,0167	<,0001***

*,**, *** Significant at the 0.05, 0.01, and 0.001 probability levels, respectively.

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	74,293469	0,19882998	75,1222
iPF7D-RED	74,131837	0,18801493	74,4400
iPF-PURPLE	.	.	74,9250
iP-PURPLE	.	.	74,0222
S29-RED	75,162449	0,18801493	75,5900
SERI	.	.	75,5909

LSMeans Differences Student's t

α=0,050 t=2,14479 LSD =2,14479* 0,27276

Level			Least Sq Mean
S29-RED	A		75,162449
SERI	A	B	.
iP7D-RED		B	74,293469
iPF7D-RED		B	74,131837
iPF-PURPLE	A	B	.
iP-PURPLE	A	B	.

L*(UNL)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	45	373,88817	8,30863	43,4083
Error	19	3,63672	0,19141	**Prob > F**
C. Total	64	377,52490		<,0001***

***Significant at the 0.001 probability level.

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 17	6	6	12,56369	10,9398	<,0001***
REP 17[LOCATION 17]	4	4	0,22159	0,2894	0,8812
CNAME 17	5	5	288,02743	300,9588	<,0001***
CNAME 17*LOCATION 17	30	30	20,44364	3,5602	0,0026**

, * Significant at the 0.01 and 0.001 probability levels, respectively.

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	84,840714	0,14433767	84,8627
iPF7D-RED	84,531905	0,14433767	84,6309
iPF-PURPLE	80,405905	0,15224032	80,5380
iP-PURPLE	80,516429	0,14433767	80,5473
S29-RED	84,695952	0,14433767	84,7745
SERI	86,613333	0,14433767	86,6309

LSMeans Differences Student's t

α=0,050 LSD=2,09302*0,20412

Level				Least Sq Mean
SERI	A			86,613333
iP7D-RED		B		84,840714
S29-RED		B		84,695952
iPF7D-RED		B		84,531905
iP-PURPLE			C	80,516429
iPF-PURPLE			C	80,405905

a*(UNL)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	45	7,6952079	0,171005	12,8336
Error	19	0,2531706	0,013325	**Prob > F**
C. Total	64	7,9483785		<,0001***

***Significant at the 0.001 probability level.

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 18	6	6	2,2824015	28,5484	<,0001***
REP 18[LOCATION 18]	4	4	0,0074461	0,1397	0,9654
CNAME 18	5	5	4,0325871	60,5277	<,0001***
CNAME 18*LOCATION 18	30	30	0,8394014	2,0999	0,0470*

*, ***Significant at the 0.05 and 0.001 probability levels, respectively.

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	1,2119048	0,03808300	1,17818
iPF7D-RED	1,2057143	0,03808300	1,17091
iPF-PURPLE	1,6113333	0,04016809	1,56000
iP-PURPLE	1,8138095	0,03808300	1,77727
S29-RED	1,2514286	0,03808300	1,22182
SERI	1,0140476	0,03808300	0,99909

LSMeans Differences Student's t

α=0,050 LSD=2,09302*0,05535

Level				Least Sq Mean
iP-PURPLE	A			1,8138095
iPF-PURPLE		B		1,6113333
S29-RED			C	1,2514286
iP7D-RED			C	1,2119048
iPF7D-RED			C	1,2057143
SERI			D	1,0140476

b*(UNL)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	45	138,00082	3,06668	58,0012
Error	19	1,00458	0,05287	**Prob > F**
C. Total	64	139,00541		<,0001***

***Significant at the 0.05 probability level.

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 19	6	6	31,673229	99,8411	<,0001***
REP 19[LOCATION 19]	4	4	0,145984	0,6903	0,6077

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
CNAME 19	5	5	79,228662	299,6956	<,0001***
CNAME 19*LOCATION 19	30	30	9,717251	6,1262	<,0001***

***Significant at the 0.001 probability level.

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	12,086429	0,07586077	12,0582
iPF7D-RED	12,082619	0,07586077	12,0409
iPF-PURPLE	9,151381	0,08001424	9,1580
iP-PURPLE	9,526667	0,07586077	9,4055
S29-RED	11,853095	0,07586077	11,8345
SERI	11,581429	0,07586077	11,4682

LSMeans Differences Student's t

α=0,050 LSD=2,09302*0,10728

Level					Least Sq Mean
iP7D-RED	A				12,086429
iPF7D-RED	A				12,082619
S29-RED		B			11,853095
SERI			C		11,581429
iP-PURPLE				D	9,526667
iPF-PURPLE					E 9,151381

Zn (ppm)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	45	5679,4908	126,211	23,0119
Error	19	104,2071	5,485	**Prob > F**
C. Total	64	5783,6978		<,0001***

***Significant at the 0.05 probability level.

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 2	6	6	4282,6785	130,1430	<,0001***
REP 2[LOCATION 2]	4	4	728,5713	33,2100	<,0001***
CNAME 2	5	5	43,8509	1,5991	0,2083
CNAME 2*LOCATION 2	30	30	452,8189	2,7521	0,0120*

*,***Significant at the 0.05 and 0.001 probability levels, respectively.

Fe (ppm)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	45	1638,4202	36,4093	9,8152
Error	19	70,4804	3,7095	**Prob > F**
C. Total	64	1708,9006		<,0001***

***Significant at the 0.001 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION	6	6	1082,6472	48,6431	<,0001***
REP[LOCATION]	4	4	14,2213	0,9584	0,4527
CNAME	5	5	161,1467	8,6883	0,0002***
CNAME*LOCATION	30	30	295,0773	2,6516	0,0147*

*, *** Significant at the 0.05 and 0.001 probability levels, respectively.**

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	34,490476	0,63541677	33,4545
iPF7D-RED	34,528571	0,63541677	33,8273
iPF-PURPLE	36,180000	0,67020657	35,5200
iP-PURPLE	33,354762	0,63541677	33,1364
S29-RED	34,419048	0,63541677	33,6909
SERI	38,623810	0,63541677	38,3182

LSMeans Differences Student's t

α=0,050 LSD=2,09302*0,89862

Level				Least Sq Mean
SERI	A			38,623810
iPF-PURPLE		B		36,180000
iPF7D-RED		B	C	34,528571
iP7D-RED		B	C	34,490476
S29-RED		B	C	34,419048
iP-PURPLE			C	33,354762

ANTOCIANIN(UNL)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	44	30176,482	685,829	2,5188
Error	19	5173,350	272,282	**Prob > F**
C. Total	63	35349,831		0,0160*

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F	
LOCATION 15	6	5	7545,252	5,5422	0,0026**	LostDFs
REP 15[LOCATION 15]	4	4	506,504	0,4651	0,7606	
CNAME 15	5	4	5217,820	4,7908	0,0077**	LostDFs
CNAME 15*LOCATION 15	30	29	11925,011	1,5102	0,1759	LostDFs

****Significant at the 0.01 probability level.**

Least Squares Means Table

Level	Least Sq Mean		Std Error	Mean
iP7D-RED	123,98810		5,4439037	124,155
iPF7D-RED	132,77143		5,4439037	132,373
iPF-PURPLE	152,78476		5,7419637	151,870
iP-PURPLE	137,04524		5,4439037	140,082
S29-RED	122,09048		5,4439037	124,900
SERI	.	NonEstimable	.	112,120

LSMeans Differences Student's t

α=0,050 LSD=2,09302*7,91241

Level			Least Sq Mean
iPF-PURPLE	A		152,78476
iP-PURPLE	A	B	137,04524
iPF7D-RED		B	132,77143
iP7D-RED		B	123,98810
S29-RED		B	122,09048
SERI	A	B	.

ANTIOXIDANTS(UNL)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	44	0,01108013	0,000252	1,3010
Error	19	0,00367762	0,000194	**Prob > F**
C. Total	63	0,01475775		0,2715

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
LOCATION 16	6	5	0,00301574	3,1161	0,0321*
REP 16[LOCATION 16]	4	4	0,00027921	0,3606	0,8335
CNAME 16	5	4	0,00183252	2,3669	0,0893
CNAME 16*LOCATION 16	30	29	0,00549224	0,9784	0,5322

***Significant at the 0.05 probability level.**

HARDNESS (ESK-LAB)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	43	5647,0370	131,326	76,3588
Error	19	32,6773	1,720	**Prob > F**
C. Total	62	5679,7143		<,0001***

***Significant at the 0.001 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F	
LOCATION 10	6	4	4719,9524	686,0956	<,0001***	LostDFs
REP 10[LOCATION 10]	4	4	19,9093	2,8940	0,0501	
CNAME 10	5	3	85,2237	16,5176	<,0001***	LostDFs
CNAME 10*LOCATION 10	30	28	578,0961	12,0046	<,0001***	LostDFs

***Significant at the 0.001 probability level.**

Least Squares Means Table

Level	Least Sq Mean		Std Error	Mean
iP7D-RED	.	NonEstimable	.	77,7400
iPF7D-RED	74,345238		0,43266108	74,2818
iPF-PURPLE	71,772381		0,45634977	71,4800
iP-PURPLE	75,928571		0,43266108	76,4364
S29-RED	75,254762		0,43266108	75,4273
SERI	.	NonEstimable	.	75,0900

LSMeans Differences Student's t

α=0,050 LSD=2,09302*0,62885

Level				Least Sq Mean
iP7D-RED	A	B	C	.
iPF7D-RED	A			74,345238
iPF-PURPLE		B		71,772381
iP-PURPLE			C	75,928571
S29-RED	A		C	75,254762
SERI	A	B	C	.

GRAIN PROTEIN CONTENT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	44	99,18389	2,25418	11,6989
Error	20	3,85365	0,19268	**Prob > F**
C. Total	64	103,03754		<,0001***

***Significant at the 0.001 probability level.

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GRAIN ORIGIN 4	6	5	65,537462	68,0264	<,0001***
REP 4[GRAIN ORIGIN 4]	4	4	5,744684	7,4536	0,0008***
CNAME 4	5	4	2,747397	3,5647	0,0237*
CNAME 4*GRAIN ORIGIN 4	30	29	22,536208	4,0331	0,0010***

***Significant at the 0.001 probability level.

Least Squares Means Table

Level	Least Sq Mean		Std Error	Mean
iP7D-RED	13,180952		0,14481796	13,3182
iPF7D-RED	13,123810		0,14481796	13,2636
iPF-PURPLE	13,630000		0,15274691	13,5500
iP-PURPLE	12,976190		0,14481796	13,0091
S29-RED	12,904762		0,14481796	12,8909
SERI	.	NonEstimable	.	13,2364

LSMeans Differences Student's t

α=0,050 LSD=2,08596*0,2048

Level			Least Sq Mean
iPF-PURPLE	A		13,630000
iP7D-RED		B	13,180952
iPF7D-RED		B	13,123810
iP-PURPLE		B	12,976190
S29-RED		B	12,904762
SERI	A	B	.

SDS SEDIMENTATION

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	19	439,64885	23,1394	73,9366
Error	9	2,81667	0,3130	**Prob > F**
C. Total	28	442,46552		<,0001***

***Significant at the 0.001 probability level.

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GRAIN ORIGIN 6	2	2	21,41845	34,2188	<,0001***
REP 6[GRAIN ORIGIN 6]	2	2	1,93333	3,0888	0,0952
CNAME 6	5	5	328,46333	209,9056	<,0001***
CNAME 6*GRAIN ORIGIN 6	10	10	11,01625	3,5200	0,0358*

***, *** Significant at the 0.05 and 0.001 probability levels, respectively.**

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	22,333333	0,26371827	22,1000
iPF7D-RED	22,250000	0,26371827	22,0000
iPF-PURPLE	22,550000	0,30068509	22,2500
iP-PURPLE	22,666667	0,26371827	22,6000
S29-RED	22,166667	0,26371827	21,9000
SERI	13,000000	0,26371827	12,3000

LSMeans Differences Student's t

α=0,050 LSD=2,26216*0,37295

Level		Least Sq Mean
iP-PURPLE	A	22,666667
iPF-PURPLE	A	22,550000
iP7D-RED	A	22,333333
iPF7D-RED	A	22,250000
S29-RED	A	22,166667
SERI	B	13,000000

ALVEOGRAPH W VALUE

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	19	598494,68	31499,7	23,4199
Error	8	10760,00	1345,0	**Prob > F**
C. Total	27	609254,68		<,0001***

*****Significant at the 0.001 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GRAIN ORIGIN 7	2	2	25187,27	9,3633	0,0080**
REP 7[GRAIN ORIGIN 7]	2	2	5924,50	2,2024	0,1730
CNAME 7	5	5	451970,70	67,2075	<,0001*
CNAME 7*GRAIN ORIGIN 7	10	10	23807,39	1,7701	0,2151 NS

***, **Significant at the 0.05 and 0.01 probability levels, respectively.**

Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
iP7D-RED	539,50000	17,288403	550,400
iPF7D-RED	530,66667	17,288403	543,200
iPF-PURPLE	559,60000	19,711813	565,250
iP-PURPLE	581,63333	19,711813	579,250
S29-RED	500,50000	17,288403	505,800

Level	Least Sq Mean	Std Error	Mean
SERI	195,16667	17,288403	187,600

LSMeans Differences Student's t

α=0,050 LSD=2,306*24,4495

Level				Least Sq Mean
iP-PURPLE	A			581,63333
iPF-PURPLE	A	B		559,60000
iP7D-RED	A	B		539,50000
iPF7D-RED	A	B		530,66667
S29-RED		B		500,50000
SERI			C	195,16667

ALVEOGRAPH P/L RATIO

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	19	47,647643	2,50777	3,7138
Error	8	5,402000	0,67525	**Prob > F**
C. Total	27	53,049643		0,0315*

***Significant at the 0.05 probability level.**

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GRAIN ORIGIN 8	2	2	22,414667	16,5973	0,0014*
REP 8[GRAIN ORIGIN 8]	2	2	0,628000	0,4650	0,6441
CNAME 8	5	5	11,662658	3,4543	0,0586
CNAME 8*GRAIN ORIGIN 8	10	10	5,285978	0,7828	0,6485

****Significant at the 0.01 probability level.**

Table S2. 2018 experiment ANOVA results.

Trait	Product	DF	SS	MS	VR	P
Grain yield, kg/ha	Grain	5	32538667	5423111	27.48	0.0011**
Test weight, kg/m^3	Grain	5	8.3013500	1.66027	14.32	0.0116*
1000-kernel weight, g	Grain	5	44.937350	8.98747	46.98	0.0012**
Protein content, %	Flour	5	5.0463600	1.00927	7.28	0.0388*
	WWF[1]	5	6.2735000	1.25470	15.64	0.0099**
Zeleny sediment., ml	Flour	5	1147.5250	229.505	8.0176	0.0328*
Color: brightness (L)	Grain	5	259.08695	51.8174	57.95	0.0008**
	WWF	5	80.956260	16.1913	76.40	0.0005**
	B. Crust	5	153.95805	30.7916	8.60	0.0290*
	B. Crumb	5	373.93692	74.7874	63.23	0.0007**
Color: redness (a)	Grain	5	0.8587100	0.171742	3.46	0.1261
	WWF	5	1.1354500	0.227090	17.22	0.0082**
	B. Crust	5	3.1176100	0.623522	6.31	0.0493*
	B. Crumb	5	0.70147000	0.140294	11.51	0.0173*
Color: yellowness (b)	Grain	5	141.05394	28.2108	439.66	<.0001**
	WWF	5	17.506230	3.50125	2.53	0.1945
	B. Crust	5	28.181700	5.63634	28.48	0.0032**
	B. Crumb	5	56.023110	11.2046	220.24	<.0001**
Total dietary fiber, %	WWF	5	5.9685500	1.19371	26.24	0.0037**
	Bread	5	12.159380	2.43188	45.06	0.0013**
Total phenolic content, mg GAE/ kg	WWF	5	103117.57	20623.5	14.75	0.0110*
	Bread	5	71667.385	14333.5	37.23	0.0019**
Antioxidant activity, μmol TE/g	WWF	5	0.54587000	0.109174	3.95	0.1033
	Bread	5	0.08237000	0.016474	3.65	0.1167
Development time, min	Flour	5	1.3059800	0.261196	9.44	0.0246*
BEM (Max. Torque)	WWF	5	1133.6500	226.730	10.05	0.0221*
	Flour	5	55.650000	11.1300	127.20	0.0002**

Volume, ml	Bread	5	1306.1350	261.227	0.75	0.6270
Specific volume,	Bread	5	0.04932000	0.009864	0.60	0.7084
Springiness	Bread	5	0.00295000	0.000590	0.65	0.6827
Cohesiveness	Bread	5	0.00565000	0.001130	12.56	0.0148*

[1] – WWF Whole wheat flour; *, **, *** **Significant at the 0.05, 0.01. and 0.001 probability levels, respectively.**

Table S3. Elemental composition (mg/kg) of flour and bread of purple grain isogenic lines, Konya, Turkey, 2018.

Element	Product	Seri	S29-Purple (PF)	S29-Red(PF)	S29-Purple (P)	S29-Red(P)	$LSD_{0.05}$
Ca	WWF[1]	380	323	335	302	327	ns[3]
	Bread	388a[2]	374ab	358ab	307c	356b	30
Cu	WWF	2.41b	2.85a	2.78a	2.72a	2.68a	0.23
	Bread	2.57c	3.00a	2.85ab	2.55c	2.72bc	0.25
Fe	WWF	35.1	37.4	42.4	35.4	39.6	ns
	Bread	53.9	48.0	47.1	35.6	44.7	ns
K	WWF	3376b	3884a	3715a	3897a	3811a	251
	Bread	3336	3887	3572	3446	3708	ns
Mg	WWF	1048	1112	1094	1136	1094	ns
	Bread	1051	1096	1042	967	1043	ns
Mn	WWF	46.6a	41.6ab	38.5b	40.0b	39.5b	5.0
	Bread	45.6a	39.9ab	35.6b	34.6b	38.4b	6.1
P	WWF	2537c	3026a	2919b	3041a	2960b	67
	Bread	2558	3083	2834	2749	2887	ns
Zn	WWF	16.7	21.9	21.2	18.4	18.3	ns
	Bread	17.9b	21.9a	20.4a	16.9b	18.3b	2.0

[1] – WWF – whole wheat flour

[2] – values designated with different letters are significantly different at $P<0.05$

[3] – ns – non-significant

Table S4. Amino acids content in flour and bread of purple grain isogenic lines, Konya, Turkey, 2018.

Trait	Units	Product	Seri	S29-Purple (PF)	S29-Red(PF)	S29-Purple (P)	S29-Red(P)	$LSD_{0.05}$
Aspartic	g/100g	WWF[1]	0.69b[2]	0.93a	0.98a	0.94a	0.92a	0.12
Acid	g/100g protein	WWF	5.11	5.98	6.45	6.08	6.00	ns[3]
	g/100g	Bread	0.75	0.80	0.84	0.85	0.80	ns
Glutamic	g/100g	WWF	5.31b	7.21a	7.45a	7.15a	6.90a	0.60
Acid	g/100g protein	WWF	39.4c	46.2a	49.1a	46.3a	44.7b	3.8
	g/100g	Bread		5.94	6.06	6.54	6.10	ns
			5.25					
Glycine	g/100g	WWF	0.56b	0.68a	0.70a	0.65a	0.63a	0.08
	g/100g protein	WWF	4.16b	4.35b	4.58a	4.20b	4.10bc	0.19
	g/100g	Bread		0.58	0.53	0.57	0.61	ns
			0.52					
Threonine	g/100g	WWF	0.41c	0.53ab	0.55a	0.52b	0.51b	0.02
	g/100g protein	WWF	3.05c	3.37ab	3.62a	3.36b	3.34b	0.25
	g/100g	Bread		0.54	0.38	0.39	0.51	ns
			0.46					
Arginine	g/100g	WWF	0.66	0.83	0.84	0.78	0.76	ns
	g/100g protein	WWF	4.88	5.30	5.55	5.02	4.96	ns
	g/100g	Bread		0.65	0.66	0.68	0.67	ns
			0.55					
Alanine	g/100g	WWF	0.54b	0.67a	0.70a	0.68a	0.64a	0.06
	g/100g protein	WWF	4.02c	4.30ab	4.62a	4.41ab	4.15b	0.45
	g/100g	Bread			0.62	0.63	0.62	ns
			0.54	0.60				
Tyrosine	g/100g	WWF	0.24	0.31	0.32	0.28	0.28	ns
	g/100g protein	WWF	1.74	2.01	2.10	1.83	1.81	ns
	g/100g	Bread			0.21	0.25	0.25	ns
			0.20	0.23				
Cystine	g/100g	WWF	0.12	0.17	0.14	0.13	0.12	ns
	g/100g protein	WWF	0.86	1.10	0.93	0.87	0.75	ns
	g/100g	Bread			0.19	0.10	0.13	ns
			0.14	0.10				
Phenylalani	g/100g	WWF	0.63c	0.82a	0.83a	0.76ab	0.70b	010
ne	g/100g protein	WWF	4.66	5.27	5.47	4.93	4.54	ns
	g/100g	Bread			0.78	0.80	0.82	ns
			0.63	0.73				
Isoleucine	g/100g	WWF	0.46b	0.62a	0.64a	0.64a	0.62a	010
	g/100g protein	WWF	3.44	3.94	4.20	4.16	4.03	ns
	g/100g	Bread			0.74a	0.78a	0.71ab	007
			0.65b	0.72ab				
Leucine	g/100g	WWF	0.92b	1.20a	1.22a	1.16a	1.11a	012
	g/100g protein	WWF	6.83c	7.66ab	8.01a	7.52ab	7.20bc	052
	g/100g	Bread	1.01	1.15	1.18	1.24	1.19	ns

Lysine	g/100g	WWF	0.18	0.22	0.25	0.24	0.21	ns
	g/100g protein	WWF	1.35	1.39	1.66	1.56	1.37	ns
	g/100g	Bread	0.39	0.46	0.44	0.45	0.45	ns

[1] – WWF – whole wheat flour

[2] – values designated with different letters are significantly different at $P<0.05$

[3] – n.s. – non-significant