

Grain of Hybrids Between Spelt (*Triticum spelta* L.) and Bread Wheat (*Triticum aestivum* L.) as a New Raw Material for Breadmaking. **Marian Wiwart, Anna Szafrńska, Elżbieta Suchowilska**

Supplementary Material

Table S1. The values of flour parameters tested in the experiment. S10...S14, parental spelt lines; ^I, ^{II}, ^{III}, ^{IV}, sister lines.

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	Moisture	Ash content	Gluten content	Gluten	Protein	Falling	Starch damage		Water	Stability	Stability	Amplitud e
	(g/100 g)	(g/100 g d.m.)	(g/100 g)	index	(N×5.7) (g/100 g d.m.)	number (s)	UCD	UCDc	absorption (g/100 g)	C1 (min)	Cs (min)	
S10	15.1	0.73	48.5	41	16.7	343	15.5	16.5	61.7	5.925	6.835	0.043
S11	14.7	0.74	51.9	38	17.0	348	16.3	17.3	62.0	5.865	7.140	0.044
S12	14.5	0.63	37.3	65	15.2	327	17.7	18.1	57.5	8.040	6.500	0.058
S13	14.4	0.66	52.0	9	17.3	336	19.8	21.0	62.7	3.075	7.740	0.049
S14	14.3	0.64	37.6	65	13.7	341	18.2	18.6	57.7	7.700	6.280	0.064
Torka	13.9	0.61	29.3	99	12.6	339	23.4	23.5	59.2	11.020	8.083	0.091
Zebra	14.2	0.63	27.5	97	12.0	366	22.0	22.1	56.7	9.835	8.015	0.072
Kontesa	14.7	0.63	29.1	60	11.6	359	23.7	23.8	59.1	8.140	8.150	0.090
Kontesa×S10	14.6	0.60	35.2	60	13.9	301	18.9	19.4	57.2	8.525	6.750	0.063
Kontesa×S11 ^I	14.2	0.63	33.3	69	12.0	322	24.7	24.7	62.7	6.845	7.685	0.097
Kontesa×S11 ^{II}	14.4	0.60	33.6	75	12.8	349	23.4	23.7	61.1	8.000	6.780	0.092
Kontesa×S12	14.4	0.67	35.9	45	12.7	334	24.0	24.2	64.2	6.325	7.945	0.098
Kontesa×S14	14.7	0.60	34.4	60	13.7	320	18.2	18.6	56.4	7.740	6.685	0.043
Zebra×S11	14.8	0.68	33.7	86	12.8	351	23.1	23.5	62.2	10.025	7.137	0.100
Zebra×S13 ^I	13.9	0.71	28.9	99	13.3	379	24.8	25.1	59.3	10.685	8.450	0.077
Zebra×S13 ^{II}	13.6	0.63	33.7	92	12.6	348	22.9	22.9	61.5	9.390	7.447	0.060
Zebra×S13 ^{III}	13.7	0.64	31.1	90	12.7	163	17.0	17.1	55.8	9.160	6.850	0.059

Zebra×S13 ^{IV}	13.7	0.59	38.1	85	14.3	312	18.5	18.9	59.6	9.265	8.175	0.064
S10×Kontesa	14.6	0.56	34.8	58	13.3	279	19.8	20.2	56.3	8.475	6.170	0.081
S10×Torka	14.1	0.57	34.8	68	12.4	310	14.4	14.4	56.8	7.210	6.610	0.082
S11×Torka	14.3	0.64	35.6	65	13.8	361	23.7	24.2	62.9	8.670	7.770	0.072
S13×Torka ^I	14.5	0.59	36.2	84	14.6	321	17.6	18.1	55.9	9.920	8.215	0.065
S13×Torka ^{II}	14.5	0.60	31.8	99	13.7	372	23.2	23.7	59.7	11.435	7.298	0.056
S12×Kontesa	14.6	0.51	34.4	83	12.5	317	16.7	16.9	55.9	10.600	8.420	0.064
S13×Kontesa	14.5	0.65	33.8	88	13.4	355	20.9	21.3	57.6	10.080	8.620	0.062

Table S1 continued

	C1	Cs	C2	C3	C4	C5	α	β	γ	T1	T2	T3	T4	T5	D1
	(N×m)	(N×m)	(N×m)	(N×m)	(N×m)	(N×m)	(N×m/min)	(N×m/min)	(N×m/min)	(min)	(min)	(min)	(min)	(min)	(°C)
S10	1.086	0.939	0.383	1.816	1.639	3.081	-0.082	0.374	-0.094	5.25	17.19	25.10	28.13	45.01	29.9
S11	1.142	0.980	0.426	1.786	1.569	2.950	-0.074	0.311	-0.072	4.74	16.84	25.11	27.80	45.01	31.3
S12	1.092	1.059	0.416	1.865	1.473	3.037	-0.080	0.140	-0.161	3.37	17.01	26.94	31.20	45.01	30.4
S13	1.137	0.669	0.364	1.606	1.552	2.781	-0.060	0.543	-0.004	3.42	17.29	22.93	25.90	45.02	30.1
S14	1.086	1.049	0.409	1.872	1.459	2.873	-0.100	0.172	-0.234	3.52	16.72	26.68	31.08	45.00	29.7
Torka	1.138	1.129	0.624	2.066	1.654	3.152	-0.103	0.487	-0.063	2.12	16.45	22.69	29.15	45.02	29.6
Zebra	1.108	1.039	0.490	1.911	1.499	3.005	-0.107	0.405	-0.215	5.40	17.08	24.54	27.89	45.01	30.8
Kontesa	1.114	1.001	0.497	1.967	1.619	3.019	-0.073	0.274	0.019	3.51	16.63	26.33	31.24	45.01	28.9
Kontesa×S10	1.111	1.044	0.431	1.921	1.513	3.109	-0.094	0.107	-0.074	3.26	16.74	25.66	28.34	45.00	30.4
Kontesa×S11 ^I	1.090	0.950	0.453	1.765	1.554	2.147	-0.071	0.410	-0.020	3.17	16.55	23.68	31.44	45.01	29.9
Kontesa×S11 ^{II}	1.120	1.055	0.458	1.827	1.695	2.587	-0.082	0.373	-0.018	3.38	16.54	24.03	30.19	45.01	29.2
Kontesa×S12	1.105	0.952	0.456	1.648	1.536	2.308	-0.065	0.368	-0.015	2.93	16.95	23.65	30.33	45.00	29.5
Kontesa×S14	1.077	0.990	0.420	2.138	1.645	3.031	-0.072	1.002	-0.020	6.19	16.85	22.37	26.38	45.02	29.9
Zebra×S11	1.122	1.050	0.535	1.751	1.546	2.588	-0.131	0.441	-0.056	5.29	16.68	22.80	30.57	45.02	29.3
Zebra×S13 ^I	1.102	1.061	0.558	2.141	1.564	2.850	-0.111	0.439	-0.197	3.84	16.46	24.02	28.23	45.02	31.6
Zebra×S13 ^{II}	1.072	1.018	0.514	1.998	1.516	2.773	-0.079	0.406	-0.061	4.54	16.71	23.88	27.76	44.99	31.2
Zebra×S13 ^{III}	1.074	0.983	0.366	1.938	1.067	1.662	-0.107	0.854	-0.124	3.42	17.27	23.10	33.75	45.01	30.0
Zebra×S13 ^{IV}	1.121	1.022	0.486	2.060	1.976	2.808	-0.113	0.788	0.002	4.11	16.93	22.80	30.00	45.02	30.2
S10×Kontesa	1.095	1.041	0.394	1.888	1.694	2.996	-0.102	0.086	-0.168	2.59	16.65	25.79	28.00	45.02	28.9
S10×Torka	1.069	0.952	0.400	2.683	2.517	3.311	-0.083	0.083	-0.033	2.75	16.67	34.84	36.98	45.02	29.2
S11×Torka	1.109	1.043	0.504	1.778	1.389	2.720	-0.092	0.499	-0.034	3.67	16.53	22.74	31.74	45.01	29.8
S13×Torka ^I	1.103	1.048	0.512	2.027	1.693	3.339	-0.113	0.088	-0.154	5.44	16.75	27.08	30.32	45.00	30.9
S13×Torka ^{II}	1.103	1.079	0.652	2.186	1.734	3.172	-0.040	0.406	-0.097	2.63	16.19	23.05	28.74	45.01	29.9
S12×Kontesa	1.065	0.996	0.504	2.241	1.721	2.737	-0.128	0.872	-0.176	5.19	16.54	22.46	26.84	45.02	30.5
S13×Kontesa	1.096	1.052	0.522	1.849	1.396	3.162	-0.104	0.324	-0.168	4.93	16.75	24.37	29.72	45.02	31.9

Table S1 continued

	D2 (°C)	D3 (°C)	D4 (°C)	D5 (°C)	C10 (N×m)	C12 (N×m)	C14 (N×m)	C16 (N×m)	C18 (N×m)	C1-C2 (N×m)	C3-C2 (N×m)	C3-C4 (N×m)	C5-C4 (N×m)
S10	51.3	76.2	80.4	59.0	0.812	0.663	0.517	0.408	0.418	0.703	1.433	0.177	1.442
S11	50.3	76.3	81.2	59.6	0.876	0.730	0.571	0.445	0.490	0.716	1.361	0.218	1.381
S12	49.3	78.5	82.6	60.3	0.907	0.726	0.563	0.442	0.451	0.677	1.450	0.392	1.564
S13	51.1	71.2	78.1	59.5	0.725	0.609	0.499	0.395	0.392	0.773	1.243	0.055	1.229
S14	49.2	79.5	82.9	58.5	0.892	0.708	0.543	0.428	0.456	0.678	1.464	0.414	1.415
Torka	48.8	70.6	82.2	58.4	1.086	0.981	0.779	0.636	0.710	0.515	1.443	0.413	1.499
Zebra	50.5	75.8	80.7	59.0	0.985	0.850	0.661	0.521	0.522	0.619	1.422	0.413	1.507
Kontesa	48.2	78.2	82.9	59.5	0.894	0.746	0.608	0.512	0.553	0.617	1.471	0.348	1.400
Kontesa×S10	49.7	78.6	82.0	59.6	0.941	0.745	0.573	0.451	0.527	0.680	1.490	0.408	1.596
Kontesa×S11 ^I	48.5	73.8	83.1	58.4	0.836	0.683	0.556	0.461	0.520	0.637	1.312	0.211	0.594
Kontesa×S11 ^{II}	48.8	75.2	82.9	58.3	0.910	0.729	0.576	0.467	0.537	0.662	1.369	0.133	0.893
Kontesa×S12	49.7	73.4	82.4	58.9	0.848	0.698	0.561	0.471	0.500	0.649	1.192	0.113	0.773
Kontesa×S14	49.9	71.1	80.6	57.7	0.847	0.692	0.543	0.438	0.500	0.658	1.718	0.493	1.387
Zebra×S11	48.4	70.0	82.1	57.9	1.005	0.883	0.679	0.549	0.648	0.587	1.216	0.206	1.043
Zebra×S13 ^I	50.1	76.5	82.1	58.1	1.022	0.904	0.707	0.570	0.659	0.544	1.583	0.577	1.286
Zebra×S13 ^{II}	50.3	75.8	81.7	59.3	0.976	0.792	0.643	0.527	0.600	0.558	1.484	0.482	1.257
Zebra×S13 ^{III}	50.7	72.0	80.7	58.9	0.953	0.753	0.561	0.416	0.381	0.708	1.572	0.871	0.595
Zebra×S13 ^{IV}	50.8	72.0	83.6	58.6	1.000	0.872	0.657	0.516	0.536	0.636	1.574	0.084	0.832
S10×Kontesa	48.7	77.9	80.9	58.5	0.903	0.706	0.528	0.412	0.502	0.701	1.494	0.194	1.303
S10×Torka	50.0	70.6	72.4	59.4	0.817	0.649	0.514	0.412	0.505	0.670	2.283	0.166	0.795
S11×Torka	48.6	70.8	83.1	59.2	0.975	0.774	0.614	0.513	0.641	0.605	1.274	0.389	1.331
S13×Torka ^I	52.8	84.2	86.1	59.0	1.012	0.861	0.662	0.530	0.598	0.592	1.515	0.334	1.646
S13×Torka ^{II}	51.4	77.6	85.3	58.9	1.058	0.973	0.805	0.663	0.846	0.451	1.534	0.452	1.438
S12×Kontesa	52.3	74.9	83.7	58.3	0.945	0.867	0.647	0.519	0.619	0.561	1.737	0.520	1.016
S13×Kontesa	52.8	80.0	85.3	57.7	1.050	0.853	0.671	0.542	0.581	0.574	1.327	0.453	1.766