

Variation in chemical composition and physical characteristics of cereal grains from different genotypes – Supplementary data

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Table S1a. Content of crude nutrients, fibre fractions, starch and gross energy in different genotypes of barley.

No.	Genotype	Dry matter	Crude ash	Crude protein	Crude fibre	Ether extract	NFE [‡]	aNDFom [*]	ADFom [#]	ADL [†]	Starch	Gross energy
		[%]	[g/kg DM]						[MJ/kg DM]			
01	Yool	87.8	23.9	117	38.4	26.2	794	208	51.3	8.66	642	18.7
02	ACK 2927	87.9	23.9	122	40.8	25.0	789	180	52.6	8.87	637	18.7
03	Lomerit	88.0	23.9	118	48.4	28.4	781	209	56.3	4.55 [•]	619	18.7
04	Companile	87.7	25.1	117	36.9	29.7	791	205	50.5	7.98	625	18.7
05	Canberra	87.9	22.8	131	36.6	28.4	781	191	44.5	6.77	616	18.8
06	Anisette	88.2	23.8	127	39.6	27.2	782	181	52.9	8.50	620	18.7
07	Metaxa	88.2	24.9	132	35.2	28.3	780	183	46.2	6.58	623	18.8
08	Fridericus	88.1	21.6	128	49.1	34.1	767	194	63.4	7.89	606	19.1
09	MH Firenze	88.1	25.0	123	41.2	30.7	781	186	50.3	6.30	606	18.7
10	Finesse	87.9	25.0	123	42.9	29.0	780	189	55.8	7.74	617	18.6
11	Sandra	88.4	24.9	128	35.2	31.2	781	152	46.4	6.33	615	18.7
12	Christelle	88.5	40.7	130	54.6	32.2	743	194	68.9	8.36	567	18.5
13	Highlight	88.3	23.8	129	47.1	28.1	772	187	65.7	8.04	614	18.7
14	Souleyka	88.3	23.8	125	45.5	30.9	775	179	65.7	9.29	596	18.8
15	Semper	88.3	23.8	121	49.3	28.3	777	197	71.1	8.89	610	18.7
16	Leibniz	88.3	23.8	110	42.6	24.4	799	182	56.0	7.25	622	18.6
17	Zzoom	88.5	23.7	108	47.2	29.1	791	181	59.8	8.08	628	18.6
18	Famosa	88.4	24.9	112	38.5	29.0	796	187	53.3	7.75	617	18.6
19	Malwinta	88.2	24.9	136	37.6	30.6	771	162	52.2	8.45	621	18.8
20	Precosa	88.4	26.0	128	42.1	29.0	775	187	57.7	8.94	600	18.7
21	Zephyr	88.2	23.8	120	36.6	25.5	794	188	44.2	5.90	627	18.7

Notes: [‡]NFE, nitrogen-free extract; ^{*}aNDFom, neutral detergent fibre; [#]ADFom, acid detergent fibre; [†]ADL, acid detergent lignin; [•]Mean value is between between limit of detection and limit of quantification.

Table S1b. Content of crude nutrients, fibre fractions, starch and gross energy in different genotypes of maize.

No.	Genotype	Dry matter	Crude ash	Crude protein	Crude fibre	Ether extract	NFE [‡]	aNDFom [*]	ADFom [#]	ADL [†]	Starch	Gross energy
		[%]	[g/kg DM]						[MJ/kg DM]			
01	Öl 3	90.7	12.2	91	21.6	69.3	806	97	30.1	< l.q. [†]	723	19.4
02	Öl 4	91.1	16.4	99	21.7	122.9	740	96	27.4	< l.q.	660	20.7
03	PR37Y12	90.5	13.0	89	19.4	48.7	830	109	25.4	< l.q.	753	19.0
04	MAS37V	91.3	12.1	90	17.5	44.0	837	96	24.1	< l.q.	752	18.9
05	Öl 1	91.8	13.1	98	16.5	97.3	775	84	27.2	< l.q.	692	20.1
06	Öl 2	91.5	16.1	99	22.0	101.2	762	108	28.4	< l.q.	681	20.1
07	P9400	90.8	13.7	78	20.3	43.9	844	109	26.4	< l.q.	759	18.9
08	P9494	90.8	13.0	80	21.5	43.1	842	110	28.7	< l.q.	756	18.8
09	NK Ravello	90.1	13.5	110	16.4	55.9	804	71	31.1	< l.q.	725	19.3
10	NK Falkone	90.2	14.2	96	19.7	48.9	821	84	32.1	< l.q.	738	19.1
11	SY Quartz	90.1	14.1	95	19.5	44.9	827	81	30.0	< l.q.	751	18.9
12	NX 10329	89.9	15.1	104	16.9	51.3	813	81	27.8	< l.q.	734	19.1
13	LG 30.222	89.9	15.4	112	18.6	49.4	805	80	30.0	< l.q.	736	19.1
14	LG 3258	89.9	12.4	96	17.4	46.6	828	79	26.7	< l.q.	757	18.9
15	Tokala	90.1	12.8	92	21.4	51.7	822	95	32.2	< l.q.	730	19.1
16	Lindsey	89.9	13.1	104	18.4	46.0	819	77	26.7	< l.q.	753	19.1
17	DKC 2960	90.3	13.9	83	17.7	47.9	838	78	24.4	< l.q.	767	18.9
18	DKC 3016	90.5	15.2	94	20.8	49.4	820	93	28.7	< l.q.	733	19.0
19	DKC 3398	90.5	14.4	88	18.3	44.5	834	83	22.1	< l.q.	754	18.9
20	DKC 3399	90.1	10.9	85	17.2	47.9	839	87	21.1	< l.q.	773	19.0
21	DKC 3411	89.8	11.1	81	14.0	45.9	848	76	22.3	< l.q.	783	18.8
22	DA Sonka	89.6	11.7	90	16.6	41.7	840	83	26.8	< l.q.	769	19.9
23	Da Oil	89.6	11.2	89	20.9	58.7	820	97	27.9	< l.q.	736	19.2
24	Surezzo	90.2	14.4	102	17.3	57.3	809	90	27.7	< l.q.	729	19.1
25	Susann	89.7	12.7	90	14.6	55.7	827	78	26.8	< l.q.	757	19.1
26	Surreal	89.8	12.5	82	18.3	51.2	836	84	26.7	< l.q.	762	18.9
27	Subito	89.8	11.3	108	21.3	67.5	792	96	30.1	< l.q.	715	19.5

Notes: [†]< l.q., below the limit of quantification; [‡]NFE, nitrogen-free extract; ^{*}aNDFom, neutral detergent fibre; [#]ADFom, acid detergent fibre; [†]ADL, acid detergent lignin.

Table S1c. Content of crude nutrients, fibre fractions, starch and gross energy in different genotypes of oats.

No.	Genotype	Dry matter	Crude ash	Crude protein	Crude fibre	Ether extract	NFE [‡]	aNDFom [*]	ADFom [#]	ADL [†]	Starch	Gross energy
		[%]	[g/kg DM]						[MJ/kg DM]			
01	Aragon	89.3	28.0	124	119.1	47.7	681	319	149.2	26.48	466	19.4
02	Dominik	89.3	29.1	132	111.2	62.2	665	319	142.4	23.90	445	19.9
03	Flämingsgold	89.2	28.0	122	98.8	51.0	700	276	123.2	22.43	495	19.5
04	Ivory	89.4	29.1	130	94.9	50.7	695	268	123.0	25.74	498	19.5
05	Scorpion	89.3	26.9	125	88.7	48.5	711	267	119.9	23.53	518	19.3
06	Buggy	89.0	27.0	121	98.5	52.2	701	261	116.9	20.23	536	19.3
07	Energie (EU)	89.9	31.1	141	133.6	72.9	621	341	166.8	34.48	410	20.1
08	Zorro (EU)	89.7	26.4	126	112.4	44.8	691	320	139.3	14.49	463	19.2
09	NORD 08/318	89.2	27.0	132	103.7	48.4	689	295	132.3	21.30	490	19.4
10	NORD 08/1419	89.3	30.6	124	95.6	51.1	699	265	110.8	7.72	521	19.3
11	NORD 08/1420	89.4	30.3	125	95.9	49.5	700	266	115.2	7.38	521	19.2
12	Max	89.2	27.8	124	92.4	46.7	709	279	125.6	20.19	526	19.2
13	Moritz	89.2	25.2	121	109.9	53.1	691	299	128.9	22.42	503	19.5
14	Flocke	89.0	27.8	125	97.7	49.8	699	276	111.3	16.86	538	19.4

Note: [‡]NFE, nitrogen-free extract; ^{*}aNDFom, neutral detergent fibre; [#]ADFom, acid detergent fibre; [†]ADL, acid detergent lignin.

Table S1d. Content of crude nutrients, fibre fractions, starch and gross energy in different genotypes of rye.

No.	Genotype	Dry matter	Crude ash	Crude protein	Crude fibre	Ether extract	NFE‡	aNDFom*	ADFom#	ADL†	Starch	Gross energy
		[%]	[g/kg DM]						[MJ/kg DM]			
01	Conduct	88.0	16.3	116	18.1	18.9	831	155	30.5	9.60	651	18.3
02	Visello	88.4	16.2	114	19.2	20.2	831	152	33.6	8.49	640	18.3
03	Helltop	87.5	16.4	120	16.3	20.9	826	134	26.3	6.86	649	18.4
04	Bellami	88.1	16.5	115	19.2	19.0	831	170	30.7	8.97	638	18.3
05	Palazzo	87.9	16.5	112	19.6	20.2	832	172	33.0	8.31	634	18.3
06	Dukato	88.2	16.4	115	16.7	18.4	833	133	26.1	6.91	652	18.4
07	Guttino	88.0	16.4	108	18.4	17.7	839	150	29.5	7.61	646	18.3
08	Dankowski Diament	88.0	17.3	127	18.1	18.6	819	148	27.3	7.85	640	18.5
09	Fugato	88.1	17.5	111	16.3	19.3	835	136	29.5	6.58	640	18.4
10	Single I	88.2	19.3	110	18.5	19.4	833	143	31.7	8.50	637	18.3
11	Single II	88.3	18.4	119	19.6	19.7	823	151	30.6	7.93	636	18.4
12	Amilo	87.7	17.6	119	17.2	19.6	826	145	30.8	9.58	640	18.4
13	Single III	87.9	17.0	113	18.4	18.5	833	139	27.3	8.19	649	18.4
14	Cantor	87.8	16.3	122	16.1	18.5	828	138	29.6	8.77	640	18.5
15	Danko	88.0	16.9	121	15.8	18.9	828	127	27.3	8.52	647	18.5
16	Askari	88.1	17.5	112	17.9	18.0	835	145	30.6	9.76	648	18.5
17	Kapitän	87.8	17.7	115	17.3	17.9	832	141	27.3	10.02	642	18.5
18	Hellvus	88.1	17.1	123	15.9	19.5	824	126	23.8	7.49	659	18.5
19	Herakles	87.9	17.5	119	18.2	18.7	826	146	29.6	10.47	635	18.4
20	Boresto	88.2	17.6	124	17.9	17.5	823	157	32.9	10.09	643	18.5
21	Single IV	88.0	18.2	113	18.4	17.7	832	156	30.7	7.16	631	18.3
22	Single V	88.2	18.7	120	20.4	17.5	823	153	31.7	11.11	636	18.5

Note: ‡NFE, nitrogen-free extract; *aNDFom, neutral detergent fibre; #ADFom, acid detergent fibre; †ADL, acid detergent lignin.

Table S1e. Content of crude nutrients, fibre fractions, starch and gross energy in different genotypes of triticale.

No.	Genotype	Dry matter	Crude ash	Crude protein	Crude fibre	Ether extract	NFE [‡]	aNDFom [*]	ADFom [#]	ADL [†]	Starch	Gross energy
		[%]	[g/kg DM]						[MJ/kg DM]			
01	Grenado	88.7	18.0	118	18.9	17.7	828	109	27.1	6.99	703	18.3
02	Tarzan	87.6	18.6	128	17.7	17.8	817	101	30.4	7.42	702	18.4
03	HYT Prime	88.1	18.7	131	20.3	21.1	809	163	30.6	6.30	682	18.4
04	Massimo	87.8	18.0	126	21.0	18.5	817	156	30.5	6.84	704	18.4
05	Cultivo	88.3	19.2	134	21.4	19.4	806	162	31.4	7.25	692	18.5
06	SW Talentro	88.1	17.9	133	20.0	17.7	811	169	27.2	6.02	697	18.4
07	Cando	88.2	17.7	119	15.8	18.9	829	117	24.5	4.54 [•]	727	18.3
08	Agostino	88.4	17.0	121	21.3	20.7	820	144	32.1	7.46	709	18.4
09	Ticino	88.0	18.1	120	19.5	22.7	820	135	28.4	7.84	717	18.4
10	Cosinus	87.7	18.4	125	16.8	19.7	820	119	26.2	7.76	721	18.5
11	Benetto	88.0	19.2	127	22.1	16.4	815	132	31.8	7.50	686	18.5
12	Tulus	88.3	16.9	120	21.3	16.0	826	121	30.6	7.14	692	18.4
13	Lasko	87.9	17.6	120	23.1	21.5	818	118	25.0	9.44	714	18.5
14	Vuka	88.2	18.1	113	24.9	22.1	822	130	29.5	9.98	707	18.4
15	Dinaro	88.0	17.9	123	22.9	16.9	820	134	26.2	8.19	697	18.3
16	Agrano	88.0	18.7	138	22.1	18.0	803	166	28.4	10.00	700	18.4
17	Sequenz	87.8	17.6	121	25.5	17.3	818	126	33.0	8.42	675	18.2
18	Vitalis	87.9	17.7	118	21.2	18.3	825	134	27.3	6.48	713	18.2
19	Amarillo 105	87.9	17.0	117	20.5	19.9	826	115	26.2	7.51	713	18.4
20	Modus	88.0	17.7	122	23.0	21.0	816	145	29.6	7.73	697	18.4
21	Magnat	88.2	18.2	129	22.6	18.4	812	120	31.7	6.69	641	18.4

Note: [‡]NFE, nitrogen-free extract; ^{*}aNDFom, neutral detergent fibre; [#]ADFom, acid detergent fibre; [†]ADL, acid detergent lignin; [•]Mean value is between limit of detection and limit of quantification.

Table S1f. Content of crude nutrients, fibre fractions, starch and gross energy in different genotypes of wheat.

No.	Genotype	Dry matter	Crude ash	Crude protein	Crude fibre	Ether extract	NFE [‡]	aNDFom [*]	ADFom [#]	ADL [†]	Starch	Gross energy
		[%]	[g/kg DM]						[MJ/kg DM]			
01	Skalmeje	87.6	14.6	131	18.8	18.7	817	110	24.6	4.50 [•]	735	18.6
02	Tommi	87.7	15.9	140	20.1	20.0	804	111	29.4	8.10	716	18.7
03	St. Tobak (1)	87.5	15.1	129	22.2	22.8	811	114	37.7	6.91	714	18.6
04	Event	87.5	16.9	137	26.2	21.3	799	123	35.5	6.80	715	18.6
05	Mulan	87.6	16.3	132	21.0	23.9	807	132	33.1	5.94	713	18.6
06	Tabasco	87.8	16.0	125	21.0	22.2	816	126	30.8	6.04	720	18.7
07	Adler	87.6	16.6	152	21.6	23.5	787	120	33.1	6.39	702	18.7
08	KWS Erasmus	87.6	15.4	129	18.6	19.4	817	115	27.4	7.77	723	18.5
09	Akteur	87.2	16.7	162	23.1	21.5	777	134	34.4	8.03	702	18.8
10	JB Asano	87.2	16.0	140	23.9	19.9	800	111	28.7	4.50 [•]	713	18.6
11	Billiant	87.2	15.5	137	22.1	21.8	804	135	32.1	7.34	706	18.6
12	Cubus	87.5	15.1	134	19.3	21.5	810	118	27.4	7.20	719	18.6
13	Dekan	87.8	16.1	140	21.5	21.7	801	109	30.8	7.86	709	18.6
14	Hermann	87.7	15.8	130	25.2	24.5	804	129	31.9	8.44	714	18.5
15	Inspiration	87.9	16.6	130	20.7	20.9	812	101	28.4	9.44	729	18.4
16	Julius	88.1	16.1	138	22.8	20.8	802	125	31.8	8.52	704	18.6
17	Manager	87.9	16.5	136	19.3	20.1	808	109	29.6	6.94	712	18.5
18	Winnetou	87.8	16.6	130	19.2	20.8	813	115	30.8	7.75	724	18.5
19	Pamier	87.6	16.4	134	18.8	23.1	807	104	30.8	6.50	724	18.6
20	Potential	87.8	16.8	133	20.3	25.3	805	118	35.3	7.74	713	18.6
21	Toras	87.6	15.5	144	20.2	26.7	793	120	29.7	8.68	717	18.5
22	Türkis	87.8	16.6	139	20.9	24.6	799	126	28.5	11.16	706	18.5
23	Capo	87.6	18.5	155	19.7	23.0	784	131	27.4	11.19	696	18.5
24	Chevalier	87.9	15.9	138	19.0	24.9	802	122	27.3	10.58	707	18.5
25	Genius	87.8	16.5	145	22.2	19.8	797	134	31.9	10.03	686	18.4
26	Smaragd	87.7	15.3	124	24.5	21.7	815	124	35.4	9.13	715	18.4
27	Fru ment	87.7	16.3	121	23.6	22.4	816	137	37.6	8.09	706	18.4
28	St. Tobak (2)	87.8	16.1	128	21.4	25.0	809	107	36.5	8.66	713	18.4
29	Discus	88.0	16.7	146	19.4	25.0	793	117	31.8	6.94	712	18.6

Notes: [‡]NFE, nitrogen-free extract; ^{*}aNDFom, neutral detergent fibre; [#]ADFom, acid detergent fibre; [†]ADL, acid detergent lignin; [•]Mean value is between limit of detection and limit of quantification.

Table S2a. Concentration of carbohydrate fractions and Klason lignin in different genotypes of barley [g/kg DM].

No.	Genotype	Low molecular weight carbohydrates					Non-starch polysaccharides (NSP)						Klason lignin	
		Glucose	Fructose	Sucrose	Total sugars	Fructans	Cellulose	β-glucans		Arabinoxylans		NSP		
								Total	Soluble	Total	Soluble	Total		Soluble
01	Yool	1.8	0.8	13.8	16.4	5.0	27.1	50.3	27.0	74.4	4.0	168	46.1	20.1
02	ACK 2927	1.8	1.0	14.5	17.3	5.7	32.2	39.5	20.6	81.1	7.2	172	40.3	26.9
03	Lomerit	1.9	1.3	15.0	18.2	6.2	37.0	43.9	20.3	75.5	6.5	177	50.5	20.7
04	Companile	1.6	1.0	16.9	19.5	6.9	28.7	45.7	24.8	75.7	10.4	167	49.9	15.2
05	Canberra	1.8	1.2	15.6	18.6	5.9	30.1	53.3	27.5	70.5	7.4	168	55.4	24.5
06	Anisette	1.9	1.2	14.1	17.2	6.0	13.9	49.8	23.2	86.4	20.1	184	66.1	22.9
07	Metaxa	1.6	1.0	14.0	16.6	6.0	21.2	48.2	24.7	78.8	14.7	173	58.6	18.9
08	Fridericus	1.7	1.1	13.4	13.4	6.6	29.7	43.3	24.4	76.6	7.1	168	37.6	27.4

Table S2b. Concentration of carbohydrate fractions and Klason lignin in different genotypes of rye [g/kg DM].

No.	Genotype	Low molecular weight carbohydrates					Non-starch polysaccharides (NSP)						Klason lignin	
		Glucose	Fructose	Sucrose	Total sugars	Fructans	Cellulose	β-glucans		Arabinoxylans		NSP		
								Total	Soluble	Total	Soluble	Total		Soluble
01	Conduct	4.2	1.4	29.0	34.6	30.0	10.6	20.4	6.2	80.0	26.4	129	35.1	9.4
02	Visello	4.2	1.6	31.0	36.8	31.7	12.5	22.7	6.9	83.0	28.7	139	38.5	13.2
03	Helltop	5.6	1.6	30.6	37.8	32.7	9.36	19.4	5.9	74.3	24.2	122	32.7	10.6
04	Bellami	4.5	1.4	28.5	34.4	29.7	12.8	26.4	6.9	86.7	31.5	146	42.6	13.7
05	Palazzo	3.7	1.3	29.2	34.2	31.8	13.3	23.3	7.1	86.5	28.1	145	37.5	13.9
06	Dukato	3.8	1.4	32.0	37.1	34.5	8.92	17.8	5.3	78.1	28.5	126	37.7	11.8
07	Guttino	3.7	1.2	25.2	30.1	29.3	5.86	24.0	7.4	84.7	33.2	136	43.3	12.6
08	Dankowski Diament	4.5	1.3	28.2	34.1	30.9	18.1	18.2	6.3	83.9	27.3	141	37.9	13.5
09	Fugato	6.8	2.3	26.5	35.7	31.6	13.8	17.9	7.3	86.7	33.5	141	45.9	23.7
10	Single I	5.6	2.1	22.5	30.2	30.7	15.0	25.0	8.6	84.3	27.9	145	39.1	20.9
11	Single II	7.4	2.1	22.5	31.7	25.6	14.5	22.7	8.4	96.1	34.4	158	46.1	20.7
12	Amilo	6.2	2.2	23.5	31.8	27.6	13.9	17.8	7.3	90.9	31.3	146	41.8	17.7
13	Single III	6.4	1.7	20.5	28.6	26.9	13.1	19.3	5.2	95.8	40.5	153	53.5	17.7
14	Cantor	7.0	2.2	24.3	33.6	28.7	11.1	18.7	6.7	86.0	28.3	136	34.6	32.3
15	Danko	8.0	2.1	23.6	33.7	27.3	12.0	16.9	4.9	83.4	33.6	133	46.0	27.0
16	Askari	8.2	1.7	22.3	32.2	24.7	12.2	19.9	7.2	93.8	37.6	148	47.9	21.7
17	Kapitän	6.8	2.2	24.8	33.8	28.6	10.6	19.0	5.2	85.2	32.6	137	42.9	20.2
18	Hellvus	8.8	2.2	25.1	36.2	27.0	7.88	18.0	6.8	76.8	27.5	124	38.1	18.4
19	Herakles	7.8	2.0	23.7	33.5	27.9	9.76	16.9	5.1	86.8	31.6	138	41.1	21.2
20	Boresto	8.0	1.9	22.7	32.6	25.2	11.5	17.9	6.8	84.7	31.9	136	42.1	23.4

Table S2c. Concentration of carbohydrate fractions and Klason lignin in different genotypes of triticale [g/kg DM].

No.	Genotype	Low molecular weight carbohydrates					Non-starch-polysaccharides (NSP)						Klason lignin	
		Glucose	Fructose	Sucrose	Total sugars	Fructans	Cellulose	β-glucans		Arabinoxylans		NSP		
								Total	Soluble	Total	Soluble	Total		Soluble
01	Grenado	5.5	1.2	31.6	38.6	8.9	12.2	6.5	< 0.1	65.4	12.8	99	17.1	14.3
02	Tarzan	6.0	1.5	30.4	37.9	8.0	13.6	5.6	< 0.1	63.7	15.1	97	21.6	17.4
03	HYT Prime	5.1	1.4	27.8	34.2	7.0	14.8	5.7	< 0.1	71.0	15.4	109	20.1	14.8
04	Massimo	3.6	1.0	22.9	27.6	6.8	16.8	6.8	0 [#]	73.8	17.3	113	23.9	17.2
05	Cultivo	4.5	1.2	24.5	30.2	6.7	15.2	6.7	0.1	71.0	17.4	110	23.6	19.3
06	SW Talentro	5.7	1.2	24.0	30.9	3.6	14.9	5.5	< 0.1	70.8	12.6	108	18.0	15.0
07	Cando	3.0	0.9	20.0	23.8	6.7	11.8	7.6	0.7	64.8	14.0	99	20.3	11.2
08	Agostino	3.4	1.0	21.8	26.2	6.8	16.7	7.0	0.4	70.9	11.9	112	17.5	16.5
09	Ticino	4.8	1.1	19.1	25.0	4.8	19.0	6.8	1.5	47.7	11.5	101	20.0	21.7
10	Cosinus	4.8	1.3	22.2	28.4	5.4	18.0	7.0	1.7	40.2	8.1	92	15.2	16.7
11	Benetto	9.7	2.5	25.0	37.2	3.7	25.1	5.7	1.4	52.9	11.0	109	26.2	20.0
12	Tulus	8.6	1.8	30.6	41.0	2.1	22.7	6.8	1.7	43.8	9.8	99	18.3	18.7
13	Lasko	3.5	1.4	18.1	23.0	8.1	20.3	7.5	1.4	43.9	10.8	98	18.0	19.3
14	Vuka	4.1	1.3	20.2	25.7	5.8	25.7	7.7	1.1	50.8	14.0	113	31.1	16.9
15	Dinaro	7.8	1.6	24.0	33.4	6.2	21.1	6.2	0.8	43.5	14.3	93	24.9	13.7
16	Agrano	5.5	1.4	19.6	26.4	5.0	20.0	7.3	1.4	44.4	10.6	96	18.5	18.8
17	Sequenz	9.0	1.4	24.5	34.9	3.3	25.7	6.7	1.2	50.5	13.0	115	18.1	19.4
18	Vitalis	5.0	1.7	20.8	27.5	5.6	21.4	7.3	1.1	43.6	9.2	101	18.1	17.7
19	Amarillo 105	6.6	1.7	17.0	25.3	4.1	23.5	6.6	1.5	45.4	12.4	99	21.0	14.7
20	Modus	5.7	1.4	19.0	26.2	5.2	27.2	6.3	1.5	47.3	10.9	106	20.4	17.2

Note: [#]Difference of analysed total and insoluble concentration below 0.

Table S2d. Concentration of carbohydrate fractions and Klason lignin in different genotypes of wheat [g/kg DM].

No.	Genotype	Low molecular weight carbohydrates					Non-starch polysaccharides (NSP)						Klason lignin	
		Glucose	Fructose	Sucrose	Total sugars	Fructans	Cellulose	β -glucans		Arabinoxylans		NSP		
								Total	Soluble	Total	Soluble	Total		Soluble
01	Skalmeje	1.4	0.5	11.9	13.8	8.2	11.9	4.8	1.5	58.5	12.8	90	19.3	15.5
02	Tommi	1.7	0.6	15.7	18.0	9.5	12.8	5.4	1.4	62.2	9.7	94	12.4	14.8
03	St. Tobak	1.6	0.8	18.0	20.3	12.3	15.2	7.6	2.3	65.7	16.9	103	23.8	14.8
04	Event	1.3	0.6	14.7	16.5	9.3	16.3	4.7	1.6	60.9	8.3	96	10.6	15.7
05	Mulan	1.8	0.7	17.2	19.6	10.1	15.8	6.3	1.9	66.7	12.4	104	17.6	13.4
06	Tabasco	1.6	0.8	19.5	21.9	13.9	15.3	6.4	1.7	60.9	12.4	96	18.0	14.3
07	Adler	1.3	0.5	15.7	17.6	9.8	15.0	5.8	1.6	67.4	16.7	105	22.0	11.9
08	KWS Erasmus	1.7	0.8	18.1	20.5	10.8	12.6	5.9	1.3	59.6	14.1	92	18.8	11.2
09	Akteur	1.9	0.8	9.9	12.7	7.8	15.9	4.6	2.0	64.4	14.1	99	14.0	9.6
10	JB Asano	2.1	0.9	13.7	16.8	9.2	13.1	6.9	3.0	65.1	14.2	99	19.0	8.6
11	Billiant	1.9	0.8	12.1	14.7	8.1	16.4	6.6	2.1	74.2	22.5	113	29.7	8.5
12	Cubus	2.2	1.1	13.4	16.7	7.1	12.9	5.7	1.9	59.7	18.5	92	25.1	7.0
13	Dekan	2.1	0.8	12.1	15.0	9.1	13.8	6.4	1.9	64.0	12.7	97	17.3	7.6
14	Hermann	2.1	1.2	15.6	18.8	10.9	16.1	5.9	1.9	62.5	13.2	98	20.0	11.3
15	Inspiration	2.1	1.1	13.6	16.8	9.4	12.8	7.8	3.4	58.7	11.7	92	16.3	6.9
16	Julius	2.2	1.0	12.8	16.1	8.6	15.8	7.1	2.6	69.3	14.3	106	19.5	10.4
17	Manager	2.4	1.1	12.4	15.8	11.9	14.1	6.7	2.4	69.8	19.2	104	25.7	7.8
18	Winnetou	2.2	1.3	14.8	18.2	11.4	14.9	5.6	1.6	59.8	14.5	93	19.4	8.3
19	Pamier	2.0	1.0	12.3	15.3	9.9	13.8	5.4	1.7	60.7	13.0	91	17.0	8.9
20	Potential	2.1	0.9	13.4	16.3	9.2	15.3	7.1	1.9	64.0	11.4	99	15.7	9.2

Table S3a. Concentration of noncellulosic polysaccharide fractions in different genotypes of barley [g/kg DM].

No.	Genotype	Arabinose		Xylose		Mannose		Galactose		Glucose		Uronic acid	
		Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble
01	Yool	27.3	4.0	47.1	0 [#]	3.3	0.7	3.6	1.3	56.0	39.8	3.3	0.3
02	ACK 2927	28.0	3.3	53.1	3.9	3.4	0.7	3.7	1.3	47.0	30.3	3.9	0.8
03	Lomerit	26.5	3.8	49.0	2.7	3.6	1.3	3.6	1.3	52.9	40.6	3.6	0.7
04	Companile	27.3	5.3	48.4	5.1	3.9	1.2	3.5	1.4	51.2	34.2	3.6	0.6
05	Canberra	25.4	3.9	45.1	3.5	3.3	0.9	3.6	1.4	56.9	45.1	3.4	0.6
06	Anisette	33.5	10.3	52.9	9.9	4.4	1.4	7.1	4.8	68.5	39.0	3.4	0.8
07	Metaxa	30.7	7.3	48.1	7.4	4.0	1.1	4.4	2.3	60.6	39.7	3.3	0.7
08	Fridericus	27.8	5.4	48.8	1.6	3.8	1.1	3.9	1.3	50.4	27.6	3.6	0.5

Note: [#]Difference of analysed total and insoluble concentration below 0.

Table S3b. Concentration of noncellulosic polysaccharide fractions in different genotypes of rye [g/kg DM].

No.	Genotype	Arabinose		Xylose		Mannose		Galactose		Glucose		Uronic acid	
		Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble
01	Conduct	32.8	10.9	47.2	15.5	4.9	1.7	4.6	1.4	26.3	4.9	2.5	0.6
02	Visello	35.5	11.8	47.5	16.9	5.2	2.1	5.1	1.3	30.0	5.7	2.5	0.6
03	Helltop	31.0	10.4	43.3	13.9	5.1	1.7	4.0	1.3	26.4	4.8	2.2	0.5
04	Bellami	36.7	13.3	50.0	18.2	5.0	2.1	5.1	1.5	33.6	6.9	2.5	0.5
05	Palazzo	35.1	11.2	51.4	16.9	4.8	1.8	5.2	1.4	31.9	5.6	2.6	0.7
06	Dukato	31.1	11.6	47.1	16.9	4.8	2.0	4.4	1.6	26.8	5.0	2.3	0.6
07	Guttino	34.5	13.6	50.2	19.6	4.6	1.8	4.6	1.5	32.8	6.1	2.5	0.6
08	Dankowski Diament	34.2	11.0	49.7	16.3	4.6	1.8	4.7	1.1	27.0	7.0	2.5	0.7
09	Fugato	35.3	13.7	51.4	19.8	6.5	3.0	4.3	1.6	26.5	6.7	2.8	0.9
10	Single I	35.5	10.9	48.8	16.9	5.7	2.2	4.6	1.1	32.0	6.9	2.9	0.9
11	Single II	40.6	14.2	55.5	20.2	6.0	2.6	4.9	1.6	32.6	6.5	2.7	0.8
12	Amilo	36.5	12.7	54.5	18.7	6.0	2.7	4.4	1.5	26.9	5.5	2.9	0.9
13	Single III	38.9	16.1	56.9	24.3	6.5	2.9	4.6	1.7	29.3	7.6	2.6	0.8
14	Cantor	34.6	11.5	51.5	16.8	5.5	2.0	4.4	1.4	25.7	1.4	2.7	0.9
15	Danko	33.3	13.4	50.1	20.2	5.7	2.7	4.2	1.7	24.5	7.0	2.6	0.9
16	Askari	36.9	14.5	56.8	23.2	5.1	2.1	4.8	1.6	27.9	5.5	2.9	0.8
17	Kapitän	34.2	13.1	50.9	19.5	5.6	2.6	4.4	1.6	27.6	5.4	2.7	0.9
18	Hellvus	31.9	11.4	44.9	16.2	5.8	2.5	3.7	1.5	26.7	5.7	2.4	0.7
19	Herakles	35.1	13.0	51.7	18.6	5.7	2.4	4.3	1.7	28.5	4.5	2.8	0.9
20	Boresto	33.9	12.8	50.9	19.1	5.4	2.3	4.4	1.6	26.7	5.8	2.8	0.7

Table S3c. Concentration of noncellulosic polysaccharide fractions in different genotypes of triticale [g/kg DM].

No.	Genotype	Arabinose		Xylose		Mannose		Galactose		Glucose		Uronic acid	
		Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble
01	Grenado	26.9	5.7	38.4	7.1	3.3	0.9	3.5	1.6	11.5	1.6	2.5	0.4
02	Tarzan	26.4	6.9	37.3	8.3	2.8	0.7	3.7	1.8	9.8	3.4	2.6	0.6
03	HYT Prime	29.6	6.4	41.4	9.1	3.3	0.6	3.8	1.6	12.1	1.8	3.2	0.7
04	Massimo	31.0	7.3	42.8	10.0	3.6	1.0	3.9	1.7	11.2	3.2	3.3	0.8
05	Cultivo	28.7	7.4	42.3	10.1	2.9	0.8	3.6	1.5	13.7	3.4	2.9	0.5
06	SW Talentro	31.0	5.7	39.8	6.9	3.2	0.7	3.9	1.6	11.4	2.6	3.2	0.6
07	Cando	27.0	6.4	37.9	7.6	2.7	0.6	3.6	1.9	13.8	3.2	2.3	0.5
08	Agostino	30.0	5.1	40.9	6.9	4.0	1.0	3.7	1.5	12.7	2.5	3.2	0.6
09	Ticino	19.4	4.9	28.3	6.6	4.9	1.9	4.5	2.3	22.0	3.6	2.8	0.8
10	Cosinus	14.3	3.1	25.9	5.0	5.3	1.6	4.1	2.1	21.6	2.8	2.2	0.6
11	Benetto	20.9	4.0	32.0	7.0	5.6	1.7	4.8	2.3	17.0	5.0	3.0	0.6
12	Tulus	16.4	3.9	27.4	5.9	4.7	1.5	4.3	1.8	20.6	4.8	2.7	0.5
13	Lasko	17.4	4.2	26.5	6.6	5.4	1.8	4.1	2.0	21.4	2.7	2.7	0.7
14	Vuka	19.8	5.4	31.1	8.7	5.8	2.6	5.1	2.3	22.4	11.2	2.6	0.7
15	Dinaro	16.7	5.9	26.8	8.5	4.1	1.5	4.2	2.1	17.1	5.9	2.4	0.8
16	Agrano	18.1	4.6	26.4	6.0	4.5	1.6	4.4	2.1	20.0	3.5	2.6	0.8
17	Sequenz	20.1	5.6	30.3	7.5	5.1	1.8	4.6	1.9	24.8	0.6	3.0	0.7
18	Vitalis	16.9	3.3	26.7	5.9	4.6	1.5	4.5	2.3	23.7	4.2	2.8	0.7
19	Amarillo 105	17.7	4.9	27.7	7.5	4.8	1.6	4.5	2.0	17.6	4.1	2.7	0.9
20	Modus	18.2	4.2	29.1	6.7	4.4	1.4	4.5	2.0	18.4	4.9	3.2	1.1

Table S3d. Concentration of noncellulosic polysaccharide fractions in different genotypes of wheat [g/kg DM].

No.	Genotype	Arabinose		Xylose		Mannose		Galactose		Glucose		Uronic acid	
		Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble
01	Skalmeje	22.9	5.1	35.7	7.7	2.2	0.5	3.3	1.9	10.7	3.5	2.6	0.6
02	Tommi	24.1	4.5	38.1	5.2	2.4	0.5	3.5	1.8	10.5	0.1	2.5	0.2
03	St. Tobak (1)	25.2	6.5	40.5	10.3	2.5	0.6	3.7	2.0	12.2	3.9	3.0	0.5
04	Event	23.6	3.3	37.3	5.0	2.3	0.5	3.7	1.8	9.5	0 [#]	2.9	0.2
05	Mulan	26.7	4.8	40.0	7.6	2.4	0.5	3.7	1.8	11.7	2.3	3.3	0.6
06	Tabasco	23.5	5.0	37.4	7.4	2.3	0.5	3.7	2.0	10.9	2.6	2.5	0.4
07	Adler	26.5	6.3	40.9	10.4	2.5	0.5	4.1	2.2	12.3	2.1	3.1	0.6
08	KWS Erasmus	22.2	4.9	37.4	9.2	2.1	0.2	3.2	1.6	11.6	2.3	2.6	0.6
09	Akteur	26.5	4.2	37.9	5.9	2.2	0.5	3.8	2.2	8.6	0.4	3.6	0.8
10	JB Asano	25.8	5.7	39.3	8.5	2.6	0.8	3.6	2.1	11.4	1.4	3.0	0.5
11	Billiant	27.8	8.2	46.4	14.3	2.9	0.8	3.8	2.3	12.1	3.3	3.1	0.7
12	Cubus	23.0	7.2	36.7	11.3	2.8	0.9	3.6	2.3	9.6	2.7	2.5	0.7
13	Dekan	25.1	5.1	38.9	7.6	2.0	0.6	3.5	2.1	10.3	1.3	2.6	0.6
14	Hermann	24.2	4.8	38.3	8.4	2.3	0.7	3.5	2.0	10.0	3.2	3.0	0.8
15	Inspiration	22.1	4.6	36.6	7.1	2.4	0.6	3.5	2.0	11.5	1.3	2.8	0.7
16	Julius	27.4	5.8	41.8	8.5	2.6	0.7	3.5	2.0	11.2	1.7	3.4	0.8
17	Manager	27.1	7.4	42.7	11.8	2.3	0.8	3.6	2.1	10.2	2.8	3.0	0.8
18	Winnetou	22.8	5.7	37.0	8.9	2.4	0.6	3.7	2.1	9.2	1.5	2.7	0.6
19	Pamier	23.5	5.4	37.2	7.6	2.1	0.6	3.5	2.1	8.0	0.7	2.7	0.7
20	Potential	24.8	4.5	39.2	6.9	2.6	0.7	3.5	2.0	12.3	1.1	2.9	0.7

Note: [#]Difference of analysed total and insoluble concentration below 0.

Table S4a. Sum of all detected amino acids and concentration of essential amino acids in different genotypes of barley.

No.	Genotype	Sum of all amino acids [g/kg DM]	[g/16 g N]									
			Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val
01	Yool	113	5.11	2.40	3.22	6.83	3.71	1.62	5.05	3.54	1.29	4.64
02	ACK 2927	114	4.84	2.26	3.26	6.51	3.36	1.54	4.87	3.22	1.16	4.47
03	Lomerit	110	4.63	2.26	3.27	6.33	3.22	1.56	4.79	3.25	1.15	4.48
04	Companile	110	4.93	2.38	2.88	6.63	3.64	1.50	4.69	3.47	1.26	4.37
05	Canberra	124	4.62	2.24	3.13	6.56	3.17	1.56	5.17	3.21	1.18	4.35
06	Anisette	119	4.84	2.24	3.02	6.80	3.48	1.50	4.94	3.29	1.23	4.35
07	Metaxa	126	4.74	2.24	3.09	6.88	3.41	1.52	5.27	3.27	1.17	4.31
08	Fridericus	121	4.75	2.36	2.91	6.60	3.41	1.49	5.09	3.35	1.23	4.14
09	MH Firenzea	115	4.83	2.41	2.98	6.72	3.49	1.62	5.11	3.34	1.23	4.19
10	Finesse	118	4.92	2.24	3.42	6.63	3.33	1.60	5.04	3.22	1.13	4.57
11	Sandra	122	4.83	2.28	3.18	6.70	3.46	1.61	5.23	3.32	1.29	4.34
12	Christelle	123	4.76	2.26	3.10	6.46	3.32	1.52	5.23	3.29	1.25	4.19
13	Highlight	125	4.62	2.46	2.96	6.56	3.33	1.60	5.38	3.41	1.29	4.15
14	Souleyka	125	5.16	2.44	3.32	6.88	3.55	1.66	5.42	3.52	1.23	4.70
15	Semper	115	4.83	2.38	3.00	6.80	3.51	1.49	4.94	3.39	1.20	4.37
16	Leibniz	110	5.12	2.59	3.30	7.07	3.75	1.69	5.39	3.59	1.29	4.60
17	Zzoom	104	4.94	2.49	3.00	6.79	3.66	1.56	5.18	3.49	1.26	4.27
18	Famosa	109	5.11	2.37	3.25	7.05	3.85	1.62	5.09	3.46	1.25	4.80
19	Malwinta	133	4.90	2.38	3.15	6.98	3.45	1.52	5.21	3.39	1.19	4.49
20	Precosa	129	5.01	2.41	3.21	7.15	3.58	1.60	5.32	3.54	1.27	4.58
21	Zephyr	117	4.80	2.37	3.13	6.80	3.57	1.63	5.12	3.56	1.31	4.45

Table S4b. Sum of all detected amino acids and concentration of essential amino acids in different genotypes of maize.

No.	Genotype	Sum of all amino acids [g/kg DM]	[g/16 g N]									
			Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val
01	Öl 3	93	4.92	3.13	3.11	12.1	3.14	2.50	4.92	3.75	0.79	4.45
02	Öl 4	99	5.34	3.18	3.21	11.3	3.53	2.30	4.61	3.72	0.89	4.57
03	PR37Y12	91	4.71	3.03	3.49	12.9	3.06	1.87	5.10	3.69	0.75	4.78
04	MAS37V	86	4.45	3.11	3.39	12.5	2.98	1.80	5.01	3.65	0.67	4.68
05	Öl 1	95	4.61	3.01	3.22	12.4	3.05	2.69	4.92	3.78	0.76	4.59
06	Öl 2	100	4.87	3.06	3.22	12.4	3.09	2.28	4.88	3.70	0.76	4.62
07	P9400	77	4.66	3.09	3.29	11.7	3.16	2.11	4.69	3.69	0.78	4.48
08	P9494	80	4.69	3.15	3.18	11.8	3.08	2.41	4.65	3.70	0.86	4.50
09	NK Ravello	112	4.12	2.99	3.43	13.7	2.57	1.88	5.30	3.55	0.64	4.58
10	NK Falkone	98	4.44	3.11	3.40	13.3	2.81	2.13	5.12	3.65	0.68	4.74
11	SY Quartz	96	4.52	3.11	3.32	13.0	2.93	2.02	4.96	3.58	0.70	4.56
12	NX 10329	105	4.42	3.13	3.14	13.2	2.73	2.08	4.99	3.52	0.66	4.25
13	LG 30.222	116	4.25	2.98	3.44	14.1	2.66	1.88	5.27	3.55	0.66	4.54
14	LG 3258	99	4.50	3.23	3.25	13.2	2.74	1.86	5.06	3.62	0.72	4.35
15	Tokala	94	4.63	2.99	3.40	13.0	2.95	1.85	5.12	3.58	0.76	4.49
16	Lindsey	105	4.29	3.09	3.42	13.5	2.51	1.72	5.06	3.55	0.67	4.55
17	DKC 2960	82	4.55	3.02	3.26	12.3	3.00	1.99	4.84	3.63	0.81	4.38
18	DKC 3016	97	4.48	3.13	3.40	13.0	2.85	2.08	5.03	3.68	0.74	4.47
19	DKC 3398	88	4.48	3.00	3.04	12.5	2.94	1.88	4.90	3.61	0.76	4.14
20	DKC 3399	86	4.65	3.04	3.21	12.6	2.96	2.03	4.95	3.65	0.77	4.57
21	DKC 3411	80	4.50	2.99	3.18	12.5	3.02	1.93	4.92	3.66	0.78	4.34
22	DA Sonka	91	4.94	3.03	3.37	12.2	3.26	1.90	5.05	3.62	0.80	4.41
23	Da Oil	90	5.12	3.07	3.37	11.9	3.44	2.08	4.84	3.74	0.81	4.57
24	Surezza	104	4.74	2.99	3.35	12.8	3.10	2.00	5.18	3.66	0.80	4.52
25	Susann	89	4.77	2.98	3.20	12.0	3.00	2.19	4.80	3.64	0.80	4.43
26	Surreal	79	4.71	3.19	2.98	11.1	3.01	2.01	4.51	3.65	0.83	4.27
27	Subito	108	4.59	3.02	3.19	12.7	2.87	2.16	4.95	3.61	0.75	4.39

Table S4c. Sum of all detected amino acids and concentration of essential amino acids in different genotypes of oats.

No.	Genotype	Sum of all amino acids [g/kg DM]	[g/16 g N]									
			Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val
01	Aragon	123	7.21	2.59	3.67	7.66	4.34	1.75	5.23	3.68	1.46	4.88
02	Dominik	128	6.90	2.54	3.42	7.43	4.10	1.76	5.22	3.60	1.34	4.70
03	Flämingsgold	118	6.72	2.46	3.38	7.43	4.13	1.78	5.08	3.53	1.36	4.69
04	Ivory	126	6.98	2.53	3.57	7.52	4.24	1.74	5.17	3.57	1.40	4.79
05	Scorpion	120	6.82	2.57	3.35	7.33	4.17	1.73	4.98	3.49	1.35	4.55
06	Buggy	115	6.73	2.61	3.34	7.32	4.23	1.68	5.03	3.53	1.39	4.61
07	Energie (EU)	140	6.82	2.65	3.62	7.77	4.15	1.75	5.46	3.65	1.41	4.87
08	Zorro (EU)	121	6.91	2.53	3.62	7.46	4.21	1.78	5.15	3.58	1.56	4.84
09	NORD 08/318	128	7.05	2.54	3.72	7.46	4.30	1.69	5.19	3.56	1.38	4.97
10	NORD 08/1419	118	6.56	2.48	3.43	7.50	4.12	1.71	5.05	3.48	1.40	4.66
11	NORD 08/1420	117	6.54	2.40	3.53	7.30	4.32	1.82	4.83	3.52	1.47	4.80
12	Max	119	6.76	2.50	3.49	7.46	4.23	1.70	5.09	3.48	1.39	4.74
13	Moritz	118	6.87	2.62	3.47	7.57	4.26	1.75	5.25	3.59	1.39	4.70
14	Flocke	119	6.70	2.48	3.51	7.39	4.21	1.74	5.01	3.47	1.40	4.71

Table S4d. Sum of all detected amino acids and concentration of essential amino acids in different genotypes of rye.

No.	Genotype	Sum of all amino acids [g/kg DM]	[g/16 g N]									
			Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val
01	Conduct	111	5.13	2.49	3.04	6.23	3.65	1.57	4.74	3.24	1.03	4.27
02	Visello	107	5.27	2.60	2.75	6.15	3.63	1.51	4.60	3.24	1.00	4.10
03	Helltop	115	5.09	2.44	3.10	6.23	3.54	1.51	4.78	3.19	1.01	4.29
04	Bellami	109	5.17	2.65	2.77	6.21	3.60	1.51	4.73	3.22	0.98	4.14
05	Palazzo	107	5.24	2.54	3.04	6.32	3.65	1.62	4.69	3.34	1.02	4.25
06	Dukato	108	4.96	2.49	2.96	6.13	3.60	1.56	4.62	3.22	1.03	4.15
07	Guttino	103	5.26	2.58	2.88	6.24	3.65	1.58	4.62	3.32	1.04	4.27
08	Dankowski Diament	120	4.98	2.46	2.94	6.13	3.48	1.52	4.74	3.18	1.02	4.06
09	Fugato	105	4.95	2.56	2.78	6.17	3.68	1.53	4.67	3.28	1.04	3.98
10	Single I	105	5.20	2.56	3.01	6.29	3.66	1.52	4.84	3.29	1.05	4.25
11	Single II	111	5.04	2.45	2.98	6.19	3.65	1.49	4.68	3.21	1.02	4.21
12	Amilo	115	5.09	2.51	2.96	6.24	3.57	1.54	4.79	3.23	1.03	4.17
13	Single III	107	5.09	2.48	2.97	6.15	3.68	1.51	4.67	3.22	1.02	4.21
14	Cantor	115	5.04	2.53	2.86	6.10	3.57	1.51	4.69	3.20	0.99	4.03
15	Danko	114	4.92	2.42	2.88	6.06	3.52	1.51	4.71	3.17	1.00	4.05
16	Askari	106	5.08	2.48	2.94	6.15	3.68	1.55	4.57	3.25	1.03	4.18
17	Kapitän	110	5.09	2.48	3.01	6.20	3.61	1.56	4.70	3.29	1.08	4.17
18	Hellvus	114	4.64	2.49	2.51	5.86	3.29	1.44	4.61	3.13	1.02	3.62
19	Herakles	114	5.10	2.45	3.07	6.22	3.56	1.53	4.79	3.21	1.03	4.27
20	Boresto	116	4.92	2.43	2.77	5.98	3.43	1.48	4.69	3.14	0.98	3.95
21	Single IV	108	5.16	2.56	2.93	6.19	3.75	1.50	4.74	3.25	1.07	4.20
22	Single V	112	4.87	2.53	2.69	6.05	3.54	1.43	4.64	3.17	0.96	4.00

Table S4e. Sum of all detected amino acids and concentration of essential amino acids in different genotypes of triticale.

No.	Genotype	Sum of all amino acids [g/kg DM]	[g/16 g N]									
			Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val
01	Grenado	109	4.88	2.39	3.00	6.15	3.13	1.56	4.31	2.98	1.09	3.95
02	Tarzan	121	4.93	2.38	2.98	6.31	3.08	1.53	4.50	3.00	1.04	3.89
03	HYT Prime	124	5.08	2.34	3.22	6.30	3.21	1.59	4.44	3.03	1.11	4.16
04	Massimo	118	4.98	2.40	3.08	6.37	3.20	1.59	4.41	3.05	1.08	4.10
05	Cultivo	125	4.89	2.42	2.99	6.24	2.98	1.52	4.53	2.97	1.02	3.80
06	SW Talentro	124	4.82	2.37	2.94	6.24	3.02	1.48	4.44	2.90	0.94	3.89
07	Cando	111	4.85	2.42	3.01	6.34	3.02	1.57	4.50	2.97	1.10	3.96
08	Agostino	114	5.08	2.41	3.11	6.38	3.22	1.57	4.57	3.02	0.98	4.01
09	Ticino	114	5.07	2.45	3.12	6.48	3.47	1.62	4.56	3.17	1.16	4.13
10	Cosinus	118	5.27	2.45	3.10	6.36	3.34	1.58	4.36	3.08	1.09	4.18
11	Benetto	120	5.03	2.37	2.97	6.17	3.25	1.53	4.41	2.99	1.02	3.90
12	Tulus	113	5.32	2.46	2.92	6.19	3.32	1.55	4.39	3.06	1.07	3.98
13	Lasko	113	5.15	2.49	3.02	6.40	3.46	1.67	4.49	3.21	1.14	4.06
14	Vuka	106	5.26	2.62	2.78	6.33	3.49	1.54	4.24	3.19	1.19	3.87
15	Dinaro	115	4.92	2.44	2.93	6.19	3.17	1.53	4.37	3.03	1.09	3.83
16	Agrano	133	4.86	2.39	3.14	6.40	3.16	1.62	4.59	3.09	1.05	4.06
17	Sequenz	115	5.11	2.52	3.01	6.27	3.24	1.53	4.53	3.01	1.16	3.96
18	Vitalis	115	5.04	2.62	3.08	6.67	3.42	1.66	4.61	3.23	1.09	4.15
19	Amarillo 105	112	5.08	2.48	3.00	6.43	3.35	1.61	4.47	3.16	1.04	4.05
20	Modus	115	4.82	2.52	3.06	6.43	3.17	1.63	4.68	3.02	1.02	3.99
21	Magnat	121	5.13	2.51	2.87	6.14	3.16	1.50	4.44	2.96	0.97	3.82

Table S4f. Sum of all detected amino acids and concentration of essential amino acids in different genotypes of wheat.

No.	Genotype	Sum of all amino acids [g/kg DM]	[g/16 g N]									
			Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val
01	Skalmeje	124	4.82	2.47	3.11	6.61	2.69	1.43	4.59	2.81	1.06	3.89
02	Tommi	135	4.54	2.44	3.09	6.67	2.57	1.44	4.72	2.81	1.11	3.75
03	St. Tobak (1)	125	4.87	2.54	3.16	6.75	2.79	1.51	4.66	2.89	1.16	3.89
04	Event	133	4.67	2.52	2.94	6.57	2.59	1.43	4.69	2.85	1.10	3.70
05	Mulan	127	5.02	2.55	3.05	6.72	2.84	1.45	4.50	2.89	1.20	3.94
06	Tabasco	118	4.84	2.63	2.79	6.50	2.76	1.50	4.42	2.90	1.20	3.60
07	Adler	146	4.73	2.52	3.12	6.63	2.64	1.48	4.52	2.87	1.11	3.86
08	KWS Erasmus	123	4.91	2.50	3.03	6.55	2.79	1.45	4.66	2.81	1.12	3.75
09	Akteur	157	4.29	2.48	2.92	6.49	2.41	1.38	4.77	2.74	1.15	3.44
10	JB Asano	135	4.47	2.49	3.11	6.54	2.58	1.44	4.71	2.78	1.19	3.78
11	Billiant	132	4.70	2.44	3.09	6.50	2.69	1.43	4.51	2.85	1.10	3.71
12	Cubus	129	4.70	2.50	3.20	6.66	2.73	1.51	4.62	2.89	1.15	3.91
13	Dekan	135	4.48	2.49	3.03	6.61	2.65	1.40	4.69	2.80	1.15	3.68
14	Hermann	125	4.74	2.56	2.92	6.54	2.82	1.42	4.60	2.86	1.13	3.62
15	Inspiration	125	4.94	2.57	3.02	6.62	2.76	1.48	4.62	2.88	1.12	3.80
16	Julius	133	4.41	2.56	2.85	6.53	2.53	1.36	4.72	2.77	1.10	3.48
17	Manager	131	4.67	2.49	2.95	6.60	2.69	1.40	4.74	2.84	1.08	3.64
18	Winnetou	126	5.20	2.54	3.26	6.71	2.89	1.52	4.59	2.89	1.29	4.05
19	Pamier	132	5.04	2.49	3.26	6.76	2.92	1.59	4.60	3.02	1.18	4.05
20	Potential	129	4.99	2.54	3.17	6.78	2.77	1.53	4.59	2.93	1.18	4.03
21	Toras	144	4.96	2.57	3.38	6.90	2.74	1.52	4.88	2.88	1.12	4.16
22	Türkis	137	5.06	2.61	3.35	6.87	2.79	1.56	4.68	2.96	1.14	4.14
23	Capo	151	4.72	2.48	3.12	6.68	2.59	1.44	4.76	2.81	1.16	3.82
24	Chevalier	134	4.84	2.51	3.14	6.70	2.72	1.50	4.59	2.87	1.17	3.94
25	Genius	141	4.53	2.48	3.17	6.65	2.55	1.41	4.73	2.78	1.15	3.80
26	Smaragd	123	5.14	2.67	3.19	6.87	2.92	1.51	4.65	2.98	1.21	4.10
27	Fru ment	117	4.94	2.50	3.08	6.69	2.86	1.47	4.54	2.91	1.23	3.89
28	St. Tobak (2)	125	4.96	2.55	3.20	6.81	2.82	1.51	4.72	2.92	1.19	4.01
29	Discus	145	4.76	2.63	3.17	6.88	2.69	1.46	4.93	2.87	1.15	3.88

Table S5a. Concentration of non-essential amino acids in different genotypes of barley.

No.	Genotype	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
		[g/16 g N]							
01	Yool	4.06	6.01	2.09	23.3	4.14	12.1	4.42	2.89
02	ACK 2927	3.80	5.60	1.91	24.1	3.50	12.3	4.34	2.67
03	Lomerit	3.77	5.42	2.02	24.2	3.65	12.3	4.32	2.72
04	Companile	4.06	5.96	2.18	22.5	4.10	11.4	4.43	2.80
05	Canberra	3.68	5.36	2.02	24.9	3.58	13.2	4.32	2.73
06	Anisette	3.80	5.71	2.21	23.1	3.74	12.4	4.25	2.76
07	Metaxa	3.75	5.50	2.19	24.4	3.70	13.4	4.27	2.85
08	Fridericus	3.80	5.64	2.07	23.9	3.97	12.7	4.36	2.84
09	MH Firenze	3.89	5.83	2.00	23.5	3.77	12.1	4.36	2.67
10	Finesse	3.83	5.50	2.09	24.9	3.51	13.1	4.31	2.73
11	Sandra	3.83	5.77	2.04	24.1	3.71	12.7	4.26	2.74
12	Christelle	3.79	5.56	1.85	24.4	3.66	13.0	4.28	2.76
13	Highlight	3.83	5.72	1.95	25.5	3.83	13.3	4.38	2.83
14	Souleyka	4.10	6.04	2.09	25.7	3.96	13.4	4.54	2.93
15	Semper	3.90	5.74	2.12	23.7	3.92	12.5	4.41	2.81
16	Leibniz	4.17	6.24	2.10	24.9	4.15	13.1	4.61	2.94
17	Zzoom	4.09	5.98	2.04	23.7	4.09	12.4	4.48	2.85
18	Famosa	4.17	6.29	2.21	23.5	4.02	12.2	4.38	2.87
19	Malwinta	3.92	5.69	2.20	25.1	3.88	13.2	4.42	2.88
20	Precosa	4.04	5.88	2.25	25.5	4.00	13.8	4.57	3.00
21	Zephyr	4.06	5.97	2.17	24.3	4.09	12.5	4.47	2.87

Table S5b. Concentration of non-essential amino acids in different genotypes of maize.

No.	Genotype	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
		[g/16 g N]							
01	Öl 3	7.73	6.63	2.34	18.4	4.07	10.5	5.20	3.83
02	Öl 4	7.49	6.84	2.38	17.3	4.15	10.7	4.95	3.52
03	PR37Y12	8.10	6.77	2.14	18.9	3.68	10.6	5.06	3.76
04	MAS37V	8.23	6.80	2.19	18.7	3.56	10.8	5.03	3.63
05	Öl 1	8.05	6.66	2.22	18.5	3.97	10.6	5.24	3.82
06	Öl 2	7.93	6.74	2.17	18.4	3.94	10.8	5.18	3.76
07	P9400	7.72	6.96	2.28	17.9	3.84	9.8	4.85	3.51
08	P9494	7.68	6.83	2.43	18.2	3.90	10.4	4.93	3.60
09	NK Ravello	8.09	6.32	2.10	19.5	3.27	11.0	5.12	3.73
10	NK Falkone	7.93	6.56	2.24	19.0	3.54	11.1	5.06	3.74
11	SY Quartz	8.00	6.69	2.19	18.7	3.45	10.7	4.99	3.67
12	NX 10329	7.99	6.30	2.31	19.3	3.36	11.1	5.13	3.71
13	LG 30.222	8.42	6.45	2.05	19.8	3.30	11.0	5.23	3.81
14	LG 3258	8.12	6.62	2.35	19.4	3.54	11.1	5.15	3.78
15	Tokala	8.16	6.72	2.15	18.7	3.64	10.6	5.14	3.74
16	Lindsey	8.15	6.34	2.18	19.4	3.34	10.7	5.04	3.67
17	DKC 2960	7.76	6.96	2.18	18.4	3.60	9.5	5.01	3.68
18	DKC 3016	8.01	6.84	2.36	19.1	3.72	10.8	5.04	3.83
19	DKC 3398	7.88	6.58	2.22	18.8	3.63	10.3	5.16	3.74
20	DKC 3399	7.95	6.68	2.28	18.8	3.76	10.4	5.13	3.81
21	DKC 3411	7.84	6.89	2.22	18.6	3.64	10.0	5.04	3.73
22	DA Sonka	7.65	7.09	2.12	18.3	3.80	10.1	5.13	3.57
23	Da Oil	7.64	6.90	2.25	18.2	4.20	10.1	5.08	3.75
24	Surezzo	7.93	6.81	2.02	18.9	3.80	10.6	5.18	3.81
25	Susann	7.55	6.74	2.27	17.9	3.90	10.0	5.01	3.56
26	Surreal	7.17	6.59	2.43	17.2	3.86	10.5	4.84	3.43
27	Subito	7.90	6.47	2.20	18.9	3.74	10.5	5.06	3.75

Table S5c. Concentration of non-essential amino acids in different genotypes of oats.

No.	Genotype	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
		[g/16 g N]							
01	Aragon	4.95	8.74	2.79	20.5	5.03	5.99	5.21	3.41
02	Dominik	4.89	8.31	2.76	20.4	4.88	5.90	5.10	3.32
03	Flämingsgold	4.85	8.09	2.99	20.4	4.88	6.11	5.03	3.30
04	Ivory	4.88	8.46	3.00	20.0	4.97	6.02	5.12	3.23
05	Scorpion	4.81	8.29	2.96	19.7	4.93	5.97	5.04	3.20
06	Buggy	4.84	8.23	2.80	19.5	5.00	5.59	5.03	3.18
07	Energie (EU)	5.03	8.51	2.85	21.1	4.95	6.19	5.22	3.43
08	Zorro (EU)	4.88	8.44	2.94	19.5	4.97	5.91	5.00	3.35
09	NORD 08/318	4.86	8.57	2.76	19.3	4.97	5.90	5.00	3.30
10	NORD 08/1419	4.80	7.94	3.10	19.7	4.93	6.05	5.06	3.31
11	NORD 08/1420	4.85	7.88	3.24	18.4	5.05	5.94	4.91	3.27
12	Max	4.77	8.19	2.82	20.1	4.88	6.01	5.03	3.25
13	Moritz	4.82	8.28	2.95	20.6	5.05	6.06	5.20	3.37
14	Flocke	4.69	8.10	2.98	19.6	4.90	5.83	5.01	3.30

Table S5d. Concentration of non-essential amino acids in different genotypes of rye.

No.	Genotype	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
		[g/16 g N]							
01	Conduct	4.03	6.99	2.18	24.1	4.25	11.6	4.62	2.35
02	Visello	4.07	6.95	2.10	23.5	4.27	11.2	4.69	2.29
03	Helltop	3.97	6.64	2.14	24.7	4.19	12.2	4.54	2.37
04	Bellami	4.09	7.00	2.04	24.2	4.28	11.8	4.78	2.26
05	Palazzo	4.13	7.05	2.20	23.8	4.31	11.1	4.66	2.33
06	Dukato	4.05	7.03	2.14	23.6	4.15	11.4	4.57	2.29
07	Guttino	4.19	7.06	2.20	23.7	4.38	11.2	4.73	2.34
08	Dankowski Diament	3.82	6.51	2.09	24.4	4.15	12.0	4.63	2.27
09	Fugato	4.21	7.23	2.12	23.6	4.27	11.5	4.67	2.32
10	Single I	4.07	7.11	2.11	24.3	4.31	11.6	4.63	2.35
11	Single II	4.01	6.82	2.00	23.4	4.21	11.1	4.55	2.32
12	Amilo	4.08	6.73	2.19	24.8	4.29	11.8	4.71	2.29
13	Single III	4.06	6.96	1.98	23.8	4.30	11.3	4.57	2.35
14	Cantor	4.04	7.08	2.12	24.2	4.15	11.7	4.63	2.26
15	Danko	3.96	6.95	2.13	24.6	4.05	11.8	4.56	2.23
16	Askari	4.13	7.32	2.14	23.5	4.31	11.2	4.61	2.36
17	Kapitän	4.05	7.09	2.21	24.0	4.24	11.5	4.63	2.31
18	Hellvus	3.87	6.48	2.12	24.4	4.20	12.2	4.61	2.19
19	Herakles	3.98	6.83	2.10	24.4	4.19	11.6	4.58	2.33
20	Boresto	3.93	7.00	2.09	24.0	4.28	11.8	4.61	2.21
21	Single IV	4.12	6.98	1.94	23.9	4.39	11.3	4.63	2.39
22	Single V	3.97	6.75	1.96	24.0	4.30	11.2	4.68	2.26

Table S5e. Concentration of non-essential amino acids in different genotypes of triticale.

No.	Genotype	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
		[g/16 g N]							
01	Grenado	3.72	6.38	2.10	25.3	4.14	10.5	4.57	2.52
02	Tarzan	3.71	6.01	2.20	26.1	3.91	11.2	4.70	2.45
03	HYT Prime	3.76	6.00	2.15	25.8	4.12	11.1	4.51	2.58
04	Massimo	3.72	5.70	2.24	25.5	4.11	10.8	4.58	2.53
05	Cultivo	3.58	5.85	2.20	26.2	3.94	11.3	4.64	2.44
06	SW Talentro	3.57	5.76	2.08	26.6	3.97	11.0	4.59	2.45
07	Cando	3.59	5.85	2.31	26.2	3.86	11.0	4.70	2.35
08	Agostino	3.72	5.83	2.16	26.1	4.01	10.9	4.67	2.41
09	Ticino	3.89	5.99	2.22	25.4	4.33	10.7	4.69	2.57
10	Cosinus	3.80	6.20	2.29	25.3	4.29	10.6	4.61	2.60
11	Benetto	3.81	6.75	2.08	25.9	4.02	10.6	4.57	2.46
12	Tulus	3.84	7.13	2.28	24.8	4.04	10.4	4.64	2.46
13	Lasko	3.93	6.13	2.40	25.0	4.23	10.8	4.66	2.55
14	Vuka	4.04	6.29	2.21	24.4	4.62	10.1	4.76	2.66
15	Dinaro	3.71	6.63	2.13	25.8	4.27	10.8	4.73	2.52
16	Agrano	3.73	6.17	2.12	27.2	4.12	11.3	4.69	2.56
17	Sequenz	3.76	6.41	2.21	25.5	4.08	11.0	4.60	2.47
18	Vitalis	3.98	6.28	2.34	26.5	4.37	11.0	4.98	2.67
19	Amarillo 105	3.84	6.21	2.19	26.4	4.20	10.8	4.93	2.50
20	Modus	3.74	5.91	2.29	26.1	3.80	11.3	4.67	2.33
21	Magnat	3.80	6.74	2.08	25.4	3.92	10.9	4.73	2.43

Table S5f. Concentration of non-essential amino acids in different genotypes of wheat.

No.	Genotype	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
		[g/16 g N]							
01	Skalmeje	3.39	4.98	2.16	28.8	3.95	11.0	4.75	2.57
02	Tommi	3.31	4.75	2.19	30.2	3.97	11.3	4.91	2.56
03	St. Tobak (1)	3.46	4.91	2.27	29.2	3.97	11.2	4.93	2.64
04	Event	3.34	4.69	2.19	30.5	4.13	11.6	5.00	2.66
05	Mulan	3.50	5.13	2.22	28.4	4.32	11.1	4.83	2.75
06	Tabasco	3.49	5.07	2.31	28.2	4.09	10.8	4.94	2.54
07	Adler	3.41	4.86	2.25	29.4	4.09	11.3	4.87	2.74
08	KWS Erasmus	3.46	5.28	2.13	28.2	3.97	11.0	4.74	2.55
09	Akteur	3.18	4.59	2.10	31.6	3.90	12.0	4.97	2.69
10	JB Asano	3.33	4.69	2.17	30.0	3.87	11.7	4.80	2.64
11	Billiant	3.37	4.89	2.20	29.1	4.07	11.9	4.72	2.80
12	Cubus	3.46	5.11	2.23	29.1	3.95	11.2	4.84	2.63
13	Dekan	3.39	5.12	2.05	30.2	3.89	11.7	4.83	2.66
14	Hermann	3.55	5.31	2.16	29.0	4.07	11.3	4.84	2.66
15	Inspiration	3.47	5.01	2.25	29.1	4.06	11.3	4.98	2.62
16	Julius	3.28	4.79	2.10	30.7	3.95	12.0	4.99	2.65
17	Manager	3.36	4.96	2.11	30.0	3.93	11.6	4.91	2.63
18	Winnetou	3.60	5.34	2.31	28.3	4.02	11.6	4.67	2.72
19	Pamier	3.59	5.33	2.31	28.4	4.19	11.8	4.83	2.84
20	Potential	3.47	5.02	2.32	29.0	4.08	11.2	4.87	2.63
21	Toras	3.51	5.00	2.20	30.6	3.99	11.8	4.86	2.75
22	Türkis	3.53	5.08	2.33	29.6	4.08	11.4	4.93	2.67
23	Capo	3.36	4.76	2.13	30.6	3.95	11.8	4.92	2.70
24	Chevalier	3.44	4.95	2.25	29.2	4.02	11.3	4.80	2.66
25	Genius	3.31	4.74	2.13	30.5	3.94	11.9	4.80	2.69
26	Smaragd	3.68	5.24	2.20	29.1	4.35	11.6	4.90	2.83
27	Fru ment	3.56	5.02	2.20	28.7	4.22	11.0	4.86	2.71
28	St. Tobak (2)	3.53	4.99	2.28	29.2	4.07	11.3	4.97	2.72
29	Discus	3.49	5.08	2.20	30.9	3.93	12.1	4.98	2.68

Table S6a. Concentration of minerals in different genotypes of barley.

No.	Genotype	Ca	Mg	K	Na	Fe	Mn	Zn	Cu
		[g/kg DM]			[mg/kg DM]				
01	Yool	0.52	1.63	5.78	76.8	37.8	14.1	21.4	4.47
02	ACK 2927	0.54	1.50	5.82	48.3	37.6	12.5	20.8	4.67
03	Lomerit	0.61	1.55	5.53	73.3	31.9	13.4	21.6	5.13
04	Companile	0.53	1.57	6.28	75.0	35.2	14.9	24.0	4.73
05	Canberra	0.59	1.63	5.34	63.7	38.0	18.3	24.6	5.15
06	Anisette	0.65	1.72	6.02	40.3	40.5	15.9	22.2	4.96
07	Metaxa	0.59	1.73	5.94	46.1	41.5	14.4	27.6	5.24
08	Fridericus	0.63	1.63	4.84	35.6	38.5	15.0	23.1	4.71
09	MH Firenze	0.44	1.79	5.33	33.2	53.1	15.9	28.9	5.66
10	Finesse	0.55	1.57	5.57	41.1	52.7	16.1	25.9	5.23
11	Sandra	0.56	1.70	5.91	39.7	52.1	17.4	26.4	5.42
12	Christelle	0.77	1.62	5.04	40.1	638 [◇]	37.4 [◇]	28.4	5.62
13	Highlight	0.62	1.68	4.96	34.4	53.7	15.2	26.1	4.90
14	Souleyka	0.66	1.64	4.85	51.5	48.5	14.8	23.6	4.94
15	Semper	0.62	1.54	5.37	84.2	50.1	16.0	23.5	4.51
16	Leibniz	0.56	1.59	5.27	25.7	40.2	12.1	21.6	4.27
17	Zzoom	0.57	1.53	5.71	106 [◇]	33.5	12.7	17.9	4.39
18	Famosa	0.53	1.50	5.99	66.9	37.0	12.7	21.6	4.88
19	Malwinta	0.52	1.73	5.43	28.1	75.7	15.5	28.3	6.20
20	Precosa	0.70	1.71	5.52	32.0	45.9	17.0	27.5	5.21
21	Zephyr	0.57	1.67	5.74	54.0	45.5	15.1	23.1	5.05

Note: [◇]Results were confirmed by repeated analysis, but considered in analyses of means, standard deviation, minimum, maximum and calculation of coefficient of variance (see main publication).

Table S6b. Concentration of minerals in different genotypes of maize.

No.	Genotype	Ca	Mg	K	Na	Fe	Mn	Zn	Cu
		[g/kg DM]			[mg/kg DM]				
01	Öl 3	0.05	1.57	3.55	n.d.*	23.7	6.28	23.2	2.08
02	Öl 4	0.03	1.82	5.00	n.d.	25.9	3.72	21.8	2.58
03	PR37Y12	0.05	1.36	3.94	n.d.	17.7	5.30	16.5	1.47
04	MAS37V	0.05	1.40	3.58	n.d.	23.3	5.35	21.0	1.04
05	Öl 1	0.04	1.66	4.24	n.d.	25.2	5.94	23.1	2.20
06	Öl 2	0.04	1.87	4.81	n.d.	32.3	4.85	21.6	1.64
07	P9400	0.06	1.23	4.45	n.d.	18.7	4.75	17.2	1.59
08	P9494	0.06	1.16	4.26	n.d.	21.1	6.26	22.2	1.94
09	NK Ravello	0.04	1.61	3.75	n.d.	26.0	4.35	25.0	2.69
10	NK Falkone	0.06	1.38	4.09	n.d.	20.3	3.86	20.1	1.97
11	SY Quartz	0.04	1.25	3.88	n.d.	20.8	3.31	20.7	1.70
12	NX 10329	0.05	1.58	4.00	n.d.	23.6	4.24	20.1	2.20
13	LG 30.222	0.04	1.71	4.11	n.d.	31.5	6.36	34.0	1.47
14	LG 3258	0.04	1.49	3.44	n.d.	22.5	5.03	22.7	2.29
15	Tokala	0.04	1.39	3.39	n.d.	20.0	5.23	20.5	1.27
16	Lindsey	0.04	1.59	3.47	n.d.	23.0	6.78	25.9	2.56
17	DKC 2960	0.05	1.46	3.72	n.d.	20.2	4.11	16.5	1.62
18	DKC 3016	0.05	1.48	3.98	n.d.	21.7	5.08	17.2	1.82
19	DKC 3398	0.06	1.44	3.74	n.d.	20.3	5.24	19.4	1.45
20	DKC 3399	0.05	1.35	3.58	n.d.	19.5	5.11	19.7	1.77
21	DKC 3411	0.05	1.15	3.42	n.d.	16.8	4.05	15.6	2.32
22	DA Sonka	0.04	1.35	4.11	n.d.	20.2	6.36	19.4	1.33
23	Da Oil	0.04	1.25	3.77	n.d.	24.7	6.18	23.3	2.45
24	Surezzo	0.03	1.64	4.67	n.d.	22.3	5.99	21.7	2.26
25	Susann	0.03	1.29	4.46	n.d.	23.2	5.25	24.1	2.64
26	Surreal	0.04	1.16	4.30	n.d.	16.2	5.12	19.7	4.11
27	Subito	0.03	1.61	3.34	n.d.	24.7	10.2	22.8	2.56

Note: *n.d., below the limit of detection.

Table S6c. Concentration of minerals in different genotypes of oats.

No.	Genotype	Ca	Mg	K	Na	Fe	Mn	Zn	Cu
		[g/kg DM]			[mg/kg DM]				
01	Aragon	1.00	1.46	4.03	11.7	75.2	24.7	18.5	3.46
02	Dominik	1.13	1.42	4.02	18.4	73.9	22.5	17.8	4.01
03	Flämingsgold	1.06	1.45	3.94	13.7	67.2	25.8	19.1	3.79
04	Ivory	0.95	1.50	4.03	8.45	64.9	31.3	20.9	3.75
05	Scorpion	1.00	1.43	3.75	8.21	62.3	30.2	19.3	3.41
06	Buggy	0.99	1.42	4.03	15.0	59.8	26.5	19.3	3.33
07	Energie (EU)	1.02	1.45	3.77	10.6	82.9	33.3	24.7	4.25
08	Zorro (EU)	1.16	1.40	3.66	14.1	97.8	27.8	20.7	3.80
09	NORD 08/318	1.08	1.42	3.74	10.6	67.8	28.9	20.0	3.44
10	NORD 08/1419	1.08	1.60	3.73	14.1	64.3	33.1	25.7	4.21
11	NORD 08/1420	1.33	1.49	3.47	13.4	66.0	32.7	20.3	3.69
12	Max	1.11	1.43	3.54	8.11	63.6	32.1	17.4	3.15
13	Moritz	1.03	1.36	3.47	9.16	55.8	28.7	17.0	3.27
14	Flocke	1.12	1.54	3.64	10.2	65.1	31.2	18.7	3.35

Table S6d. Concentration of minerals in different genotypes of rye.

No.	Genotype	Ca	Mg	K	Na	Fe	Mn	Zn	Cu
		[g/kg DM]			[mg/kg DM]				
01	Conduct	0.54	1.35	5.02	n.d. [♦]	32.4	20.7	25.6	4.22
02	Visello	0.56	1.28	5.06	n.d.	30.2	18.8	25.7	4.12
03	Helltop	0.48	1.39	4.47	33.4	31.9	23.7	26.1	4.27
04	Bellami	0.48	1.29	4.92	27.8	28.3	19.7	22.8	3.92
05	Palazzo	0.53	1.23	5.05	n.d.	27.7	17.8	20.1	3.74
06	Dukato	0.50	1.31	5.13	n.d.	33.5	20.1	20.4	4.24
07	Guttino	0.51	1.27	4.96	26.8	25.3	19.0	19.8	4.07
08	Dankowski Diament	0.47	1.37	4.97	30.7	33.2	21.8	23.8	4.67
09	Fugato	0.43	1.30	5.37	22.0	27.9	15.6	21.6	4.17
10	Single I	0.47	1.27	6.16	19.9	24.6	14.1	28.3	4.79
11	Single II	0.45	1.19	5.75	24.6	26.3	17.5	28.8	4.67
12	Amilo	0.53	1.42	5.07	27.4	33.2	19.4	28.2	4.87
13	Single III	0.45	1.35	5.25	26.6	24.4	18.9	23.9	3.76
14	Cantor	0.48	1.43	4.75	32.4	29.6	23.0	22.0	4.15
15	Danko	0.48	1.43	4.65	28.0	33.2	19.8	23.6	4.52
16	Askari	0.55	1.46	5.10	29.8	25.5	21.2	22.8	4.20
17	Kapitän	0.45	1.43	5.01	25.2	33.8	17.9	28.0	4.51
18	Hellvus	0.46	1.53	4.72	32.3	35.0	22.9	30.3	4.36
19	Herakles	0.44	1.49	4.74	28.1	29.1	19.9	20.7	4.11
20	Boresto	0.52	1.49	5.07	30.0	40.2	21.2	20.4	4.08
21	Single IV	0.47	1.47	5.72	32.2	27.7	22.9	24.9	4.30
22	Single V	0.51	1.27	5.86	23.8	23.1	16.9	20.6	3.92

Note: [♦]n.d., below the limit of detection.

Table S6e. Concentration of minerals in different genotypes of triticale.

No.	Genotype	Ca	Mg	K	Na	Fe	Mn	Zn	Cu
		[g/kg DM]			[mg/kg DM]				
01	Grenado	0.52	1.41	5.46	n.d. [♦]	26.1	25.7	25.0	5.07
02	Tarzan	0.41	1.68	4.68	53.9	33.8	38.2	27.9	6.32
03	HYT Prime	0.44	1.78	5.19	54.1	40.4	38.3	24.9	5.12
04	Massimo	0.60	1.63	5.23	n.d.	34.8	28.3	23.9	4.81
05	Cultivo	0.61	1.67	4.98	32.2	28.0	30.9	29.5	5.30
06	SW Talentro	0.49	1.76	5.00	n.d.	34.9	34.8	30.3	5.38
07	Cando	0.34	1.62	5.38	n.d.	24.2	24.2	23.0	4.61
08	Agostino	0.42	1.60	4.44	46.6	31.4	33.0	24.8	4.28
09	Ticino	0.46	1.40	5.23	33.5	27.3	23.8	18.1	4.47
10	Cosinus	0.44	1.92	4.87	42.0	31.0	29.8	22.0	5.55
11	Benetto	0.47	1.80	5.32	38.4	32.3	27.3	25.2	4.78
12	Tulus	0.46	1.71	4.40	38.2	27.7	27.1	23.1	4.93
13	Lasko	0.51	1.56	4.76	43.6	29.2	30.9	25.5	5.07
14	Vuka	0.39	1.43	5.55	37.3	24.7	26.5	19.8	4.29
15	Dinaro	0.57	1.40	5.07	39.9	33.9	28.3	23.2	4.62
16	Agrano	0.73	1.62	4.79	48.6	33.0	34.5	24.6	4.69
17	Sequenz	0.58	1.63	5.03	41.8	32.9	29.7	24.5	4.94
18	Vitalis	0.47	1.59	5.16	39.6	32.2	28.1	25.7	5.23
19	Amarillo 105	0.51	1.72	4.80	42.5	41.5	30.2	24.1	4.38
20	Modus	0.43	1.76	4.88	36.8	33.1	26.1	23.1	4.52
21	Magnat	0.47	1.73	5.48	32.0	29.6	30.7	25.1	5.37

Note: [♦]n.d., below the limit of detection.

Table S6f. Concentration of minerals in different genotypes of wheat.

No.	Genotype	Ca	Mg	K	Na	Fe	Mn	Zn	Cu
		[g/kg DM]			[mg/kg DM]				
01	Skalmeje	0.40	1.55	4.51	7.42	38.7	30.2	25.4	4.03
02	Tommi	0.44	1.67	5.09	5.54	40.0	29.8	24.8	4.36
03	St. Tobak (1)	0.44	1.68	4.91	n.d. ♦	39.0	29.6	25.5	4.34
04	Event	0.43	1.77	4.55	6.15	32.6	34.1	25.8	4.29
05	Mulan	0.42	1.76	4.66	n.d.	32.8	29.8	23.0	3.96
06	Tabasco	0.41	1.53	5.18	5.95	31.0	27.8	21.3	4.28
07	Adler	0.41	1.73	5.00	8.60	39.6	33.9	25.6	4.35
08	KWS Erasmus	0.45	1.63	4.83	5.36	40.2	33.1	20.4	4.07
09	Akteur	0.37	1.73	4.68	6.12	49.6	33.6	24.5	4.26
10	JB Asano	0.39	1.51	3.97	4.83	46.7	34.8	20.2	3.83
11	Billiant	0.42	1.45	4.03	4.69	54.1	34.8	21.7	4.51
12	Cubus	0.36	1.46	4.08	5.77	49.0	36.2	19.7	4.41
13	Dekan	0.41	1.48	4.34	5.78	41.4	32.3	22.8	4.22
14	Hermann	0.35	1.47	4.14	n.d.	35.8	33.1	18.4	3.95
15	Inspiration	0.41	1.56	4.34	6.98	40.3	31.1	20.9	5.42
16	Julius	0.36	1.43	3.89	5.41	38.3	29.9	21.5	3.84
17	Manager	0.46	1.46	4.34	4.97	36.6	35.0	21.5	3.99
18	Winnetou	0.36	1.46	4.24	n.d.	40.6	31.4	21.8	4.11
19	Pamier	0.33	1.43	4.12	n.d.	37.8	28.8	22.5	4.50
20	Potential	0.46	1.74	4.29	4.83	37.3	34.2	21.6	4.66
21	Toras	0.30	1.43	3.78	4.77	49.4	28.9	25.7	4.85
22	Türkis	0.35	1.43	4.11	5.24	40.0	28.1	21.5	3.99
23	Capo	0.52	2.06	4.18	n.d.	47.4	45.4	25.5	4.61
24	Chevalier	0.44	1.62	3.95	n.d.	43.6	30.8	22.6	4.66
25	Genius	0.43	1.65	4.11	5.21	48.3	34.8	23.5	4.20
26	Smaragd	0.29	1.30	4.15	5.64	44.5	26.2	22.6	4.08
27	Frument	0.40	1.17	4.31	6.96	39.6	30.8	16.2	3.59
28	St. Tobak (2)	0.38	1.41	3.99	5.22	35.7	27.7	22.6	4.27
29	Discus	0.35	1.57	3.90	4.60	36.4	34.1	21.3	4.12

Note: ♦ n.d., below the limit of detection.

Table S7a. Concentration of phosphorus, inositol phosphate phosphorus and phytase activity in different genotypes of barley.

No.	Genotype	P	Ins(1,5,6)	Ins(1,2,3,4,6)	Ins(1,2,3,4,5)	Ins(1,2,4,5,6)	InsP ₆ -P	Phytase activity
		[g/kg DM]	P ₃ -P	P ₅ -P	P ₅ -P	P ₅ -P		
01	Yool	4.22	117	< l.q. [†]	37.5	19.7	2.52	490
02	ACK 2927	3.97	101	n.d. [‡]	26.0	19.4	2.74	780
03	Lomerit	4.07	105	n.d.	23.5	26.0	2.68	640
04	Companile	4.07	193	18.6	25.6	31.1	2.43	1040
05	Canberra	4.37	154	n.d.	23.4	23.8	2.51	570
06	Anisette	4.55	192	15.8	40.3	42.0	3.07	600
07	Metaxa	4.72	173	n.d.	25.1	19.7	2.60	1100
08	Fridericus	4.13	125	11.6	33.1	16.6	2.53	700
09	MH Firenze	4.45	205	n.d.	17.8	25.4	2.71	680
10	Finesse	4.37	113	18.1	43.8	33.8	3.05	730
11	Sandra	4.64	185	11.6	45.1	29.3	3.39	570
12	Christelle	4.14	145	19.4	45.0	45.0	3.52	680
13	Highlight	4.26	80.2	14.7	27.4	26.3	2.72	560
14	Souleyka	4.18	120	38.1	34.2	32.7	3.05	490
15	Semper	4.14	114	34.4	37.2	28.0	2.47	620
16	Leibniz	4.08	86.7	18.7	35.5	27.3	2.75	730
17	Zzoom	3.91	75.0	43.5	43.8	26.8	2.17	600
18	Famosa	4.11	175	16.4	33.3	24.1	2.89	900
19	Malwinta	4.70	266	n.d.	65.8	65.1	5.35 [◇]	790
20	Precosa	4.73	143	n.d.	30.5	31.3	3.28	630
21	Zephyr	4.44	155	15.8	40.4	29.6	3.19	650

Notes: [†] < l.q., below the limit of quantification; [‡] n.d., below the limit of detection; [◇] Results were confirmed by repeated analysis, but considered in analyses of means.

Table S7b. Concentration of phosphorus, inositol phosphate phosphorus and phytase activity in different genotypes of maize.

No.	Genotype	P [g/kg DM]	Ins(1,5,6)	Ins(1,2,3,4,6)	Ins(1,2,3,4,5)	Ins(1,2,4,5,6)	InsP ₆ -P [g/kg DM]	Phytase activity [U/kg DM]
			P ₃ -P	P ₅ -P	P ₅ -P	P ₅ -P		
01	Öl 3	2.83	19.1	n.d. [♦]	n.d.	n.d.	1.94	150
02	Öl 4	4.00	22.3	n.d.	n.d.	21.8	3.09	190
03	PR37Y12	3.16	22.1	n.d.	n.d.	23.2	2.24	n.d.
04	MAS37V	2.84	13.9 [•]	n.d.	n.d.	17.2	1.90	n.d.
05	Öl 1	2.91	13.9 [•]	n.d.	n.d.	n.d.	2.01	160
06	Öl 2	3.81	19.9 [•]	n.d.	n.d.	15.6	2.76	n.d.
07	P9400	2.92	n.d.	n.d.	n.d.	20.8	2.12	n.d.
08	P9494	2.70	13.9 [•]	n.d.	n.d.	n.d.	2.01	100
09	NK Ravello	3.32	13.9 [•]	n.d.	n.d.	n.d.	2.25	120
10	NK Falkone	3.37	n.d.	n.d.	n.d.	11.6 [•]	2.55	n.d.
11	SY Quartz	3.23	n.d.	n.d.	n.d.	n.d.	2.40	n.d.
12	NX 10329	3.77	13.9 [•]	n.d.	n.d.	17.2	2.75	110
13	LG 30.222	3.95	13.9 [•]	n.d.	n.d.	34.5	2.86	n.d.
14	LG 3258	2.78	n.d.	n.d.	n.d.	n.d.	1.86	n.d.
15	Tokala	2.66	13.9 [•]	n.d.	n.d.	21.8	1.89	n.d.
16	Lindsey	3.12	13.9 [•]	n.d.	n.d.	n.d.	2.29	n.d.
17	DKC 2960	3.02	13.9 [•]	n.d.	n.d.	n.d.	2.10	140
18	DKC 3016	3.32	13.9 [•]	n.d.	n.d.	n.d.	2.37	n.d.
19	DKC 3398	3.18	13.9 [•]	n.d.	n.d.	11.6 [•]	2.20	160
20	DKC 3399	3.05	13.9 [•]	n.d.	n.d.	16.2	2.17	170
21	DKC 3411	2.78	13.9 [•]	n.d.	n.d.	11.6 [•]	2.10	150
22	DA Sonka	2.93	n.d.	n.d.	n.d.	21.4	2.08	120
23	Da Oil	2.59	13.9 [•]	n.d.	n.d.	22.5	1.95	n.d.
24	Surezzo	3.49	49.3	n.d.	n.d.	36.4	2.48	n.d.
25	Susann	3.43	23.3	n.d.	n.d.	40.0	2.27	n.d.
26	Surreal	3.22	13.9 [•]	n.d.	n.d.	27.4	2.14	n.d.
27	Subito	3.14	n.d.	n.d.	n.d.	33.3	2.32	150

Notes: [♦]n.d., below the limit of detection; [•]Mean value is between limit of detection and limit of quantification.

Table S7c. Concentration of phosphorus, inositol phosphate phosphorus and phytase activity in different genotypes of oats.

No.	Genotype	P	Ins(1,5,6)	Ins(1,2,3,4,6)	Ins(1,2,3,4,5)	Ins(1,2,4,5,6)	InsP ₆ -P	Phytase activity
		[g/kg DM]	P ₃ -P	P ₅ -P	P ₅ -P	P ₅ -P		
		[mg/kg DM]						
01	Aragon	3.87	n.d. [♦]	n.d.	n.d.	n.d.	1.81	n.d.
02	Dominik	3.79	n.d.	n.d.	n.d.	15.5	1.86	n.d.
03	Flämingsgold	3.83	n.d.	n.d.	n.d.	n.d.	1.81	n.d.
04	Ivory	4.16	n.d.	n.d.	n.d.	11.6 [•]	1.96	n.d.
05	Scorpion	3.91	n.d.	n.d.	n.d.	14.9	1.78	n.d.
06	Buggy	3.86	n.d.	n.d.	n.d.	11.6 [•]	1.85	n.d.
07	Energie (EU)	3.99	n.d.	n.d.	n.d.	11.6 [•]	1.64	n.d.
08	Zorro (EU)	3.67	n.d.	n.d.	n.d.	11.6 [•]	1.65	n.d.
09	NORD 08/318	4.03	n.d.	n.d.	n.d.	11.6 [•]	1.73	n.d.
10	NORD 08/1419	4.45	n.d.	n.d.	n.d.	27.1	1.89	n.d.
11	NORD 08/1420	4.15	n.d.	n.d.	n.d.	11.6 [•]	1.89	n.d.
12	Max	3.90	n.d.	n.d.	n.d.	11.6 [•]	1.87	n.d.
13	Moritz	3.59	n.d.	n.d.	n.d.	11.6 [•]	1.77	n.d.
14	Flocke	4.05	n.d.	n.d.	n.d.	15.5	1.94	n.d.

Notes: [♦]n.d., below the limit of detection; line indicates missing values; [•]Mean value is between limit of detection and limit of quantification.

Table S7d. Concentration of phosphorus, inositol phosphate phosphorus and phytase activity in different genotypes of rye.

No.	Genotype	P	Ins(1,5,6)	Ins(1,2,3,4,6)	Ins(1,2,3,4,5)	Ins(1,2,4,5,6)	InsP ₆ -P	Phytase activity
		[g/kg DM]	P ₃ -P	P ₅ -P	P ₅ -P	P ₅ -P		
01	Conduct	3.65	13.9 [•]	n.d. [♦]	22.9	14.7	1.70	4540
02	Visello	3.51	13.9 [•]	15.8	21.5	15.7	1.55	4100
03	Helltop	3.72	13.9 [•]	11.6 [•]	14.7	11.6 [•]	1.28	4380
04	Bellami	3.49	13.9 [•]	17.9	26.1	15.1	1.24	4150
05	Palazzo	3.49	13.9 [•]	11.6 [•]	25.7	16.9	1.37	4070
06	Dukato	3.54	13.9 [•]	11.6 [•]	15.5	11.6 [•]	1.42	4480
07	Guttino	3.34	13.9 [•]	11.6 [•]	19.1	11.6 [•]	1.23	4760
08	Dankowski Diament	3.67	13.9 [•]	11.6 [•]	18.3	19.3	1.60	4190
09	Fugato	3.61	13.9 [•]	11.6 [•]	18.6	20.0	1.45	4450
10	Single I	3.78	13.9 [•]	11.6 [•]	27.4	27.0	1.82	4250
11	Single II	3.63	21.3	11.6 [•]	19.4	18.1	1.53	3770
12	Amilo	3.78	13.9 [•]	n.d.	21.2	29.1	1.43	3920
13	Single III	3.63	22.4	11.6 [•]	17.0	11.6 [•]	1.42	3900
14	Cantor	3.49	13.9 [•]	11.6 [•]	18.0	20.8	1.41	3970
15	Danko	3.55	13.9 [•]	11.6 [•]	18.1	15.2	1.53	4080
16	Askari	3.61	13.9 [•]	11.6 [•]	21.1	11.6 [•]	1.52	3830
17	Kapitän	3.67	19.1	11.6 [•]	17.5	17.7	1.58	4270
18	Hellvus	3.79	13.9 [•]	n.d.	16.4	11.6 [•]	1.47	3570
19	Herakles	3.55	13.9 [•]	11.6 [•]	21.8	17.0	1.61	3960
20	Boresto	3.63	13.9 [•]	11.6 [•]	21.1	16.0	1.62	4180
21	Single IV	3.82	13.9 [•]	11.6 [•]	29.0	11.6 [•]	1.73	4390
22	Single V	3.71	13.9 [•]	11.6 [•]	23.1	31.8	1.91	4690

Notes: [♦]n.d., below the limit of detection; [•]Mean value is between limit of detection and limit of quantification.

Table S7e. Concentration of phosphorus, inositol phosphate phosphorus and phytase activity in different genotypes of triticale.

No.	Genotype	P	Ins(1,5,6)	Ins(1,2,3,4,6)	Ins(1,2,3,4,5)	Ins(1,2,4,5,6)	InsP ₆ -P	Phytase activity
		[g/kg DM]	P ₃ -P	P ₅ -P	P ₅ -P	P ₅ -P		
01	Grenado	3.75	n.d. [♦]	20.6	22.5	24.5	1.98	1870
02	Tarzan	4.06	n.d.	n.d.	17.7	17.5	1.92	2630
03	HYT Prime	4.30	n.d.	11.6 [•]	22.6	16.1	1.91	2340
04	Massimo	4.06	n.d.	11.6 [•]	21.1	16.1	1.93	2020
05	Cultivo	4.32	n.d.	11.6 [•]	24.0	16.0	1.79	2400
06	SW Talentro	4.24	n.d.	11.6 [•]	19.9	11.6 [•]	1.82	1640
07	Cando	4.01	n.d.	11.6 [•]	19.2	11.6 [•]	1.86	1710
08	Agostino	3.62	n.d.	11.6 [•]	22.5	11.6 [•]	1.57	2110
09	Ticino	3.81	n.d.	11.6 [•]	21.7	21.1	1.95	2100
10	Cosinus	4.18	n.d.	n.d.	17.8	11.6 [•]	1.96	2550
11	Benetto	3.95	n.d.	20.0	20.3	11.6 [•]	1.87	2400
12	Tulus	3.89	n.d.	16.3	15.8	11.6 [•]	2.04	2570
13	Lasko	4.01	n.d.	n.d.	15.5	11.6 [•]	1.78	2450
14	Vuka	3.64	n.d.	20.8	16.9	24.9	1.73	2090
15	Dinaro	3.59	n.d.	24.0	16.3	11.6 [•]	1.82	1990
16	Agrano	4.35	n.d.	14.9	22.8	28.6	2.53	2520
17	Sequenz	3.93	n.d.	28.7	24.6	11.6 [•]	1.61	1700
18	Vitalis	3.87	n.d.	11.6 [•]	15.5	11.6 [•]	1.82	2100
19	Amarillo 105	3.78	n.d.	n.d.	20.4	11.6 [•]	1.81	2010
20	Modus	4.01	n.d.	n.d.	17.0	11.6 [•]	1.65	2030
21	Magnat	4.00	n.d.	11.6 [•]	16.3	11.6 [•]	1.65	2010

Notes: [♦]n.d., below the limit of detection; [•]Mean value is between limit of detection and limit of quantification.

Table S7f. Concentration of phosphorus, inositol phosphate phosphorus and phytase activity in different genotypes of wheat.

No.	Genotype	P [g/kg DM]	Ins(1,5,6)	Ins(1,2,3,4,6)	Ins(1,2,3,4,5)	Ins(1,2,4,5,6)	InsP ₆ -P [g/kg DM]	Phytase activity [U/kg DM]
			P ₃ -P	P ₅ -P	P ₅ -P	P ₅ -P		
01	Skalmeje	3.47	n.d. [♦]	n.d.	23.2	15.0	1.94	1800
02	Tommi	3.85	n.d.	n.d.	n.d.	n.d.	2.04	1690
03	St. Tobak (1)	3.72	n.d.	n.d.	11.6 [•]	11.6 [•]	1.87	2120
04	Event	3.86	n.d.	n.d.	22.2	33.1	2.29	1700
05	Mulan	3.75	n.d.	11.6 [•]	25.4	19.1	2.09	1800
06	Tabasco	3.41	n.d.	11.6 [•]	18.4	20.4	1.79	2640
07	Adler	3.92	n.d.	n.d.	18.0	15.0	1.86	2040
08	KWS Erasmus	3.31	n.d.	11.6 [•]	20.9	16.3	1.91	1410
09	Akteur	3.96	n.d.	n.d.	n.d.	17.8	2.08	1610
10	JB Asano	3.68	n.d.	n.d.	n.d.	n.d.	2.01	1960
11	Billiant	3.61	n.d.	n.d.	n.d.	n.d.	1.75	1340
12	Cubus	3.57	n.d.	11.6 [•]	20.6	11.6 [•]	1.82	1700
13	Dekan	3.55	n.d.	16.3	18.7	21.5	1.73	1750
14	Hermann	3.42	n.d.	11.6 [•]	15.6	11.6 [•]	1.63	2500
15	Inspiration	3.66	n.d.	11.6 [•]	23.4	24.3	1.97	1910
16	Julius	3.55	n.d.	n.d.	n.d.	n.d.	1.89	1970
17	Manager	3.67	n.d.	11.6 [•]	21.1	29.0	1.92	1660
18	Winnetou	3.76	n.d.	11.6 [•]	27.1	31.9	1.74	1640
19	Pamier	3.69	n.d.	n.d.	n.d.	15.1	1.38	1570
20	Potential	3.90	n.d.	n.d.	19.7	11.6 [•]	1.95	1850
21	Toras	3.61	n.d.	n.d.	11.6 [•]	19.2	2.00	1640
22	Türkis	3.62	n.d.	n.d.	15.0	15.5	2.09	1830
23	Capo	4.43	n.d.	n.d.	11.6 [•]	16.4	2.09	2060
24	Chevalier	3.73	n.d.	n.d.	n.d.	18.7	2.17	1790
25	Genius	3.90	n.d.	n.d.	11.6 [•]	16.1	2.14	1490
26	Smaragd	3.24	n.d.	n.d.	19.8	11.6 [•]	2.01	2130
27	Frument	3.24	n.d.	n.d.	11.6 [•]	17.0	1.85	2190
28	St. Tobak (2)	3.47	n.d.	n.d.	n.d.	11.6 [•]	1.66	2120
29	Discus	3.96	n.d.	n.d.	n.d.	11.6 [•]	1.88	1750

Notes: [♦]n.d., below the limit of detection; [•]Mean value is between limit of detection and limit of quantification.

Table S8a. Physical characteristics of different genotypes of barley.

No.	Genotype	Thousand seed weight [g/1000 seeds]	Test weight [kg/hl]	Falling number [s]
01	Yool	54.0	73.9	404
02	ACK 2927	53.9	71.9	425
03	Lomerit	57.4	72.6	393
04	Companile	60.1	73.5	349
05	Canberra	62.7	73.1	414
06	Anisette	61.7	69.9	443
07	Metaxa	61.5	73.0	405
08	Fridericus	52.9	69.4	332
09	MH Firenze	57.0	72.6	255
10	Finesse	58.1	73.1	362
11	Sandra	66.0	73.4	290
12	Christelle	56.0	66.5	311
13	Highlight	63.1	69.4	365
14	Souleyka	60.6	70.0	377
15	Semper	58.1	69.2	355
16	Leibniz	55.6	72.0	328
17	Zzoom	52.3	71.2	413
18	Famosa	62.1	73.9	341
19	Malwinta	62.1	71.5	423
20	Precosa	61.2	73.9	399
21	Zephyr	59.3	70.7	338

Table S8b. Physical characteristics of different genotypes of maize[§].

No.	Genotype	Thousand seed weight [g/1000 seeds]	Test weight [kg/hl]
01	Ö1 3	300	76.8
02	Ö1 4	219	67.6
03	PR37Y12	296	75.4
04	MAS37V	316	75.7
05	Ö1 1	301	71.0
06	Ö1 2	241	74.1
07	P9400	277	71.0
08	P9494	274	71.2
09	NK Ravello	277	79.7
10	NK Falkone	251	78.6
11	SY Quartz	279	76.6
12	NX 10329	243	77.7
13	LG 30.222	314	79.0
14	LG 3258	296	76.4
15	Tokala	288	75.7
16	Lindsey	287	75.6
17	DKC 2960	272	72.9
18	DKC 3016	303	75.2
19	DKC 3398	300	72.8
20	DKC 3399	285	74.1
21	DKC 3411	285	72.2
22	DA Sonka	290	74.9
23	Da Oil	283	73.0
24	Surezzo	325	80.6
25	Susann	340	80.1
26	Surreal	338	77.6
27	Subito	298	79.5

Note: [§]Falling number was not estimated in maize.

Table S8c. Physical characteristics of different genotypes of oats.

No.	Genotype	Thousand seed weight [g/1000 seeds]	Test weight [kg/hl]	Falling number [s]
01	Aragon	38.1	55.8	68
02	Dominik	37.3	53.3	62
03	Flämingsgold	45.9	54.6	81
04	Ivory	43.1	54.4	66
05	Scorpion	46.4	56.1	143
06	Buggy	35.4	51.6	116
07	Energie (EU)	33.3	51.3	62
08	Zorro (EU)	33.8	56.4	65
09	NORD 08/318	38.5	55.7	80
10	NORD 08/1419	37.9	53.2	104
11	NORD 08/1420	31.3	52.7	95
12	Max	40.3	57.3	227
13	Moritz	41.1	57.6	70
14	Flocke	37.0	55.9	149

Table S8d. Physical characteristics of different genotypes of rye.

No.	Genotype	Thousand seed weight [g/1000 seeds]	Test weight [kg/hl]	Falling number [s]
01	Conduct	40.8	78.7	233
02	Visello	44.3	77.4	172
03	Helltop	44.2	79.5	158
04	Bellami	41.7	77.8	124
05	Palazzo	44.2	78.5	255
06	Dukato	41.2	79.5	171
07	Guttino	40.4	77.9	187
08	Dankowski Diament	43.4	78.4	224
09	Fugato	43.6	76.0	218
10	Single I	38.9	73.9	241
11	Single II	40.5	71.0	229
12	Amilo	40.6	78.2	336
13	Single III	43.7	74.3	223
14	Cantor	42.1	77.0	117
15	Danko	40.6	77.7	117
16	Askari	38.1	76.5	127
17	Kapitän	43.1	77.4	166
18	Hellvus	42.3	77.0	128
19	Herakles	38.8	76.5	181
20	Boresto	41.0	75.9	88
21	Single IV	38.9	73.5	155
22	Single V	41.4	71.5	135

Table S8e. Physical characteristics of different genotypes of triticale.

No.	Genotype	Thousand seed weight [g/1000 seeds]	Test weight [kg/hl]	Falling number [s]
01	Grenado	46.6	74.8	62
02	Tarzan	56.3	77.5	62
03	HYT Prime	61.4	73.7	68
04	Massimo	50.8	76.3	148
05	Cultivo	46.2	75.5	101
06	SW Talentro	54.9	75.2	64
07	Cando	52.0	76.9	148
08	Agostino	47.1	78.3	134
09	Ticino	46.6	74.7	148
10	Cosinus	50.9	77.0	73
11	Benetto	46.8	73.7	64
12	Tulus	48.5	74.3	62
13	Lasko	43.8	76.0	293
14	Vuka	50.4	75.4	146
15	Dinaro	44.0	73.7	62
16	Agrano	47.4	74.6	86
17	Sequenz	52.2	76.4	62
18	Vitalis	52.6	78.6	94
19	Amarillo 105	52.2	73.8	87
20	Modus	53.0	74.2	68
21	Magnat	53.0	70.2	62

Table S8f. Physical characteristics of different genotypes of wheat.

No.	Genotype	Thousand seed weight [g/1000 seeds]	Test weight [kg/hl]	Falling number [s]
01	Skalmeje	46.3	81.1	295
02	Tommi	50.3	80.7	297
03	St. Tobak (1)	54.2	80.0	362
04	Event	55.1	81.0	386
05	Mulan	52.9	79.9	265
06	Tabasco	49.5	79.0	288
07	Adler	56.0	82.2	402
08	KWS Erasmus	59.7	79.4	362
09	Akteur	56.0	83.5	271
10	JB Asano	58.2	82.6	275
11	Billiant	44.9	82.7	399
12	Cubus	50.5	83.0	368
13	Dekan	48.2	80.8	350
14	Hermann	51.3	77.7	342
15	Inspiration	52.5	80.0	345
16	Julius	55.4	83.0	392
17	Manager	49.7	81.5	269
18	Winnetou	51.4	79.6	329
19	Pamier	46.3	80.0	398
20	Potential	48.4	82.8	374
21	Toras	51.2	80.5	400
22	Türkis	51.2	81.2	369
23	Capo	52.0	85.1	365
24	Chevalier	47.9	82.2	363
25	Genius	49.0	80.8	371
26	Smaragd	52.0	81.2	376
27	Fru ment	50.9	77.7	229
28	St. Tobak (2)	53.6	79.8	362
29	Discus	48.7	83.3	365

Table S9a. Extract viscoelasticity of different genotypes of barley.

No.	Genotype	Yield point (τ_0) [mPa]	Consistency index (k) [mPa · s ⁿ]	Flow index (n) (dimensionless)
01	Yool	5.63	7.65	0.98
02	ACK 2927	7.27	1.33	1.03
03	Lomerit	5.83	1.40	1.03
04	Companile	5.11	1.78	1.02
05	Canberra	4.21	2.03	1.02
06	Anisette	3.96	1.69	1.02
07	Metaxa	9.38	1.78	1.02
08	Fridericus	4.55	1.06	1.04
09	MH Firenze	4.85	1.12	1.04
10	Finesse	4.89	1.15	1.03
11	Sandra	5.26	1.26	1.03
12	Christelle	4.24	1.05	1.04
13	Highlight	3.21	1.14	1.03
14	Souleyka	4.61	1.15	1.03
15	Semper	4.99	1.12	1.04
16	Leibniz	7.13	0.97	1.04
17	Zzoom	4.31	1.33	1.03
18	Famosa	8.38	1.46	1.03
19	Malwinta	4.36	1.07	1.04
20	Precosa	3.84	1.95	1.02
21	Zephyr	6.38	2.69	1.01

Table S9b. Extract viscoelasticity of different genotypes of maize.

No.	Genotype	Yield point (τ_0) [mPa]	Consistency index (k) [mPa · s ⁿ]	Flow index (n) (dimensionless)
01	Öl 3	7.44	0.244	1.19
02	Öl 4	6.81	0.256	1.18
03	PR37Y12	10.99	0.207	1.21
04	MAS37V	10.73	0.220	1.20
05	Öl 1	7.31	0.276	1.17
06	Öl 2	6.57	0.266	1.17
07	P9400	8.51	0.245	1.19
08	P9494	40.21	0.075	1.36
09	NK Ravello	10.79	0.207	1.21
10	NK Falkone	12.34	0.195	1.22
11	SY Quartz	13.34	0.195	1.22
12	NX 10329	7.24	0.245	1.19
13	LG 30.222	6.87	0.242	1.19
14	LG 3258	8.94	0.258	1.18
15	Tokala	10.75	0.218	1.20
16	Lindsey	7.78	0.231	1.19
17	DKC 2960	5.64	0.262	1.18
18	DKC 3016	7.11	0.259	1.18
19	DKC 3398	8.51	0.285	1.17
20	DKC 3399	9.65	0.246	1.19
21	DKC 3411	7.62	0.246	1.19
22	DA Sonka	7.20	0.247	1.19
23	Da Oil	6.42	0.250	1.18
24	Surezzo	11.34	0.219	1.20
25	Susann	7.59	0.251	1.18
26	Surreal	8.56	0.271	1.17
27	Subito	8.62	0.220	1.20

Table S9c. Extract viscoelasticity of different genotypes of oats.

No.	Genotype	Yield point (τ_0) [mPa]	Consistency index (k) [mPa · s ⁿ]	Flow index (n) (dimensionless)
01	Aragon	6.25	0.597	1.07
02	Dominik	10.01	0.591	1.07
03	Flämingsgold	5.78	0.575	1.08
04	Ivory	7.54	0.503	1.10
05	Scorpion	4.84	0.691	1.05
06	Buggy	4.89	0.731	1.05
07	Energie (EU)	4.41	0.708	1.05
08	Zorro (EU)	5.62	0.534	1.09
09	NORD 08/318	6.05	0.639	1.06
10	NORD 08/1419	4.44	0.685	1.05
11	NORD 08/1420	6.44	0.594	1.07
12	Max	5.10	0.634	1.06
13	Moritz	7.87	0.697	1.05
14	Flocke	6.87	0.674	1.06

Table S9d. Extract viscoelasticity of different genotypes of rye.

No.	Genotype	Yield point (τ_0) [mPa]	Consistency index (k) [mPa · s ⁿ]	Flow index (n) (dimensionless)
01	Conduct	-56.8	66.2	0.76
02	Visello	19.0	102.2	0.73
03	Helltop	-25.9	28.6	0.82
04	Bellami	-104.2	138.6	0.71
05	Palazzo	-39.1	48.4	0.80
06	Dukato	-77.8	89.9	0.74
07	Guttino	51.2	60.2	0.79
08	Dankowski Diament	-69.1	95.1	0.73
09	Fugato	-16.3	73.2	0.75
10	Single I	-106.5	156.8	0.69
11	Single II	-119.6	194.0	0.68
12	Amilo	-103.3	188.0	0.68
13	Single III	-153.4	243.9	0.67
14	Cantor	8.1	57.1	0.77
15	Danko	-14.3	37.1	0.81
16	Askari	-118.6	194.1	0.69
17	Kapitän	-16.4	50.1	0.77
18	Hellvus	-23.7	31.5	0.81
19	Herakles	44.9	73.6	0.74
20	Boresto	-43.9	65.8	0.76
21	Single IV	250.2	81.9	0.73
22	Single V	-239.5	390.0	0.62

Table S9e. Extract viscoelasticity of different genotypes of triticale.

No.	Genotype	Yield point (τ_0) [mPa]	Consistency index (k) [mPa · s ⁿ]	Flow index (n) (dimensionless)
01	Grenado	3.08	0.92	1.04
02	Tarzan	3.83	1.04	1.04
03	HYT Prime	3.79	0.83	1.05
04	Massimo	3.96	1.16	1.03
05	Cultivo	5.22	1.17	1.03
06	SW Talentro	3.92	1.00	1.04
07	Cando	4.55	0.97	1.04
08	Agostino	4.20	0.94	1.04
09	Ticino	4.60	0.98	1.04
10	Cosinus	5.26	0.92	1.04
11	Benetto	3.38	1.14	1.03
12	Tulus	4.09	0.78	1.05
13	Lasko	4.46	1.49	1.02
14	Vuka	4.16	1.02	1.04
15	Dinaro	4.44	0.90	1.05
16	Agrano	7.12	0.86	1.04
17	Sequenz	3.72	0.99	1.04
18	Vitalis	4.22	0.86	1.05
19	Amarillo 105	8.39	0.93	1.05
20	Modus	4.26	0.87	1.05
21	Magnat	4.52	1.12	1.03

Table S9f. Extract viscoelasticity of different genotypes of wheat.

No.	Genotype	Yield point (τ_0) [mPa]	Consistency index (k) [mPa · s ⁿ]	Flow index (n) (dimensionless)
01	Skalmeje	2.82	0.76	1.05
02	Tommi	6.27	0.90	1.03
03	St. Tobak (1)	4.54	1.04	1.04
04	Event	3.17	1.05	1.04
05	Mulan	4.28	0.84	1.05
06	Tabasco	4.07	0.73	1.05
07	Adler	4.14	0.99	1.04
08	KWS Erasmus	3.75	0.77	1.05
09	Akteur	7.66	0.69	1.05
10	JB Asano	4.94	0.72	1.05
11	Billiant	3.12	0.97	1.04
12	Cubus	3.66	1.06	1.04
13	Dekan	3.90	0.72	1.05
14	Hermann	5.34	0.72	1.05
15	Inspiration	8.32	0.69	1.06
16	Julius	2.90	0.70	1.05
17	Manager	4.50	0.78	1.05
18	Winnetou	14.94	0.90	1.05
19	Pamier	124.20	0.12	1.33
20	Potential	4.13	0.70	1.06
21	Toras	4.11	0.83	1.05
22	Türkis	6.20	0.76	1.05
23	Capo	4.61	0.78	1.05
24	Chevalier	2.93	0.73	1.05
25	Genius	3.39	1.05	1.04
26	Smaragd	4.10	0.92	1.04
27	Frument	3.78	0.75	1.05
28	St. Tobak (2)	4.85	1.11	1.04
29	Discus	3.96	0.72	1.05

Table S10. Significant coefficients of correlation between content of crude nutrients, fibre fractions, starch and gross energy in cereal grains.

		Crude protein	Crude fibre	Ether extract	NFE‡	aNDFom*	ADFom#	ADL†	Starch	Gross energy
Crude ash	Barley				-0.66				-0.69	-0.43
	Maize	0.40		0.40	-0.54				-0.55	
	Oats									
	Rye								-0.45	
	Triticale	0.65			-0.66					
	Wheat	0.48			-0.56			0.38	-0.48	
Crude protein	Barley				-0.70					0.52
	Maize				-0.62		0.53		-0.56	
	Oats		0.59	0.74	-0.83	0.60	0.68	0.54	-0.74	0.76
	Rye				-0.93					0.60
	Triticale				-0.90	0.61				
	Wheat				-0.95				-0.56	0.41
Crude fibre	Barley				-0.59		0.90		-0.60	
	Maize					0.73	0.48		-0.49	
	Oats			0.65	-0.90	0.93	0.92	0.55	-0.88	0.74
	Rye					0.80	0.67		-0.57	-0.48
	Triticale						0.44	0.63	-0.48	
	Wheat					0.43	0.60			
Ether extract	Barley				-0.68				-0.64	0.49
	Maize				-0.93				-0.90	0.89
	Oats				-0.89	0.53	0.61	0.56	-0.66	0.93
	Rye									
	Triticale									0.48
	Wheat									
NFE	Barley						-0.55		0.82	
	Maize						-0.38		0.97	-0.85
	Oats					-0.82	-0.86	-0.60	0.88	-0.91
	Rye									
	Triticale					-0.70			0.48	
	Wheat								0.63	-0.37

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Table S10. Continuation

		Crude protein	Crude fibre	Ether extract	NFE [‡]	aNDFom [*]	ADFom [#]	ADL [†]	Starch	Gross energy
aNDFom	Barley									
	Maize									
	Oats						0.94	0.53	-0.91	0.68
	Rye						0.75		-0.60	-0.57
	Triticale									
	Wheat								-0.64	
ADFom	Barley							0.51	-0.58	
	Maize									
	Oats							0.71	-0.94	0.75
	Rye							0.43	-0.67	-0.51
	Triticale								-0.66	
	Wheat									
ADL	Barley									
	Maize									
	Oats								-0.60	0.75
	Rye									
	Triticale									
	Wheat								-0.48	-0.54
Starch	Barley									
	Maize									-0.80
	Oats									-0.80
	Rye									
	Triticale									
	Wheat									

Notes: Only significant ($p \leq 0.05$) correlation coefficients are presented; [‡]NFE, nitrogen-free extract; ^{*}aNDFom, neutral detergent fibre; [#]ADFom, acid detergent fibre; [†]ADL, acid detergent lignin.

Table S11. Significant coefficients of correlation between amino acid concentrations in cereal grains.

		Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr	
Sum of all amino acids	Barley					-0.44		0.53							0.66		0.76			
	Maize			0.39	0.70	-0.49		0.67	-0.46	-0.58		0.56	-0.66	-0.45	0.66	-0.44	0.70	0.56	0.47	
	Oats			0.56	0.71			0.80	0.62		0.58	0.73	0.59					0.55	0.55	
	Rye	-0.52	-0.57		-0.45	-0.72			-0.76			-0.85	-0.70		0.68	-0.63	0.72			-0.54
	Triticale		-0.50			-0.48				-0.50		-0.45			0.63		0.66			
	Wheat	-0.51				-0.69		0.60	-0.42			-0.56	-0.55		0.80	-0.45	0.69			
Arg	Barley		0.54		0.72	0.83	0.51		0.68		0.74	0.85	0.81			0.60		0.63	0.59	
	Maize				-0.76	0.93	0.46	-0.56	0.67	0.81		-0.64	0.59		-0.75	0.90				
	Oats		0.55	0.58				0.59	0.71				0.95	-0.67						
	Rye		0.45	0.57	0.86	0.74	0.65		0.75		0.83	0.61	0.45			0.47	-0.47		0.67	
	Triticale					0.74			0.49			0.70	0.50		-0.71	0.52	-0.64		0.45	
	Wheat		0.49	0.53	0.63	0.91	0.79		0.83	0.46	0.80	0.89	0.71	0.72	-0.70	0.65	-0.44			
His	Barley				0.52	0.66	0.50		0.84	0.61		0.76	0.76			0.80		0.86	0.62	
	Maize							-0.45						0.78				-0.44		
	Oats				0.57			0.74	0.58				0.69	-0.66	0.64			0.76		
	Rye								0.48			0.60				0.55		0.83		
	Triticale					0.60			0.62			0.70		0.49		0.50		0.65		
	Wheat				0.50	0.44	0.40		0.52			0.59		0.40		0.43		0.44		
Ile	Barley						0.57				0.78				0.45					
	Maize				0.59		-0.43	0.69		-0.46	0.69	0.61		-0.60	0.52					
	Oats				0.54	0.57			0.56		0.96		0.63						0.56	
	Rye				0.77	0.54	0.66	0.53	0.45	0.47	0.88								0.73	
	Triticale				0.51		0.58	0.53			0.78		-0.46				0.46			
	Wheat				0.80	0.38	0.69		0.49		0.90	0.45		0.43					0.45	
Leu	Barley					0.75		0.46	0.66		0.52	0.68	0.68	0.73		0.60		0.61	0.77	
	Maize				-0.80	-0.48	0.90	-0.66	-0.86		0.88	-0.58	-0.57	0.97	-0.83	0.58	0.55	0.62		
	Oats						0.88	0.73			0.65	0.60		0.78		0.63	0.87	0.81		
	Rye				0.75	0.74	0.46	0.79	0.45	0.90	0.59								0.78	
	Triticale				0.48	0.80	0.57	0.71		0.69		-0.46	0.60				0.58			
	Wheat				0.50	0.68		0.65		0.87	0.61		0.46						0.41	

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Table S11. Continuation

	Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
Lys	Barley							0.82	0.60	0.49	0.91	0.95	0.51		0.83		0.60	0.60
	Maize					0.43	-0.57	0.73	0.81		-0.61	0.76		-0.78	0.87	-0.50		
	Oats														0.73			
	Rye					0.51		0.75	0.46	0.73	0.79	0.68		-0.52	0.50	-0.72		0.82
	Triticale					0.57		0.89	0.58	0.51	0.94		0.45	-0.51	0.78	-0.57		0.67
	Wheat					0.70	-0.40	0.84	0.49	0.66	0.96	0.86	0.60	-0.80	0.67	-0.47		
Met	Barley						0.54	0.51		0.51	0.54	0.56					0.52	
	Maize						-0.46	0.69	0.45				0.42	-0.44	0.66			
	Oats												0.60					
	Rye							0.80	0.52	0.65	0.53	0.49	0.69					0.53
	Triticale						0.44	0.77		0.76	0.49		0.67					
	Wheat							0.87	0.43	0.83	0.74	0.50	0.87	-0.51	0.43			
Phe	Barley													0.73		0.79		0.53
	Maize							-0.48	-0.74		0.81		-0.73	0.88	-0.64	0.50	0.69	0.67
	Oats							0.75			0.67	0.71	-0.61	0.83			0.84	0.69
	Rye													0.69		0.44		
	Triticale													0.64		0.79		
	Wheat												-0.42	0.79	-0.52	0.64		
Thr	Barley								0.77		0.91	0.87			0.94		0.86	0.81
	Maize								0.63		-0.41	0.57		-0.58	0.87			
	Oats									0.59	0.86	0.77		0.55			0.72	0.70
	Rye								0.62	0.60	0.82	0.63			0.53	-0.57		0.66
	Triticale								0.59	0.56	0.85		0.59		0.77		0.59	0.71
	Wheat								0.41	0.73	0.85	0.62	0.78	-0.57	0.73			0.45
Trp	Barley										0.58	0.70			0.72		0.45	0.48
	Maize										-0.78	0.66	0.43	-0.83	0.83	-0.62		-0.39
	Oats																	
	Rye																	0.60
	Triticale										0.53		0.46	-0.53	0.66	-0.44		0.56
	Wheat								0.37	0.54			0.43	-0.37	0.40			
	Barley										0.58	0.70			0.72		0.45	0.48

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Table S11. Continuation

	Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr	
Val	Barley										0.59	0.49	0.45						0.44
	Maize																		
	Oats											0.57							0.56
	Rye										0.44								0.81
	Triticale												0.47						0.47
	Wheat										0.71	0.45	0.62		0.42				
Ala	Barley											0.95			0.85		0.81	0.68	
	Maize											-0.39	-0.56	0.88	-0.66	0.53	0.59	0.66	
	Oats											0.62					0.56		
	Rye											0.77			0.61	-0.62	0.43	0.58	
	Triticale														0.75	-0.55	0.46	0.68	
	Wheat											0.84	0.60	-0.66	0.66	-0.37			
Asp	Barley														0.83		0.69	0.59	
	Maize													-0.56	0.57	-0.66			
	Oats												-0.71				0.60		
	Rye													-0.55		-0.57			
	Triticale															-0.47			
	Wheat													-0.70	0.42		-0.38		
Cys	Barley														0.47			0.58	
	Maize													-0.51	0.42		-0.52		
	Oats																		
	Rye																		
	Triticale																		
	Wheat													-0.58	0.45	-0.41			
Glu	Barley															0.90			
	Maize														-0.77	0.56	0.60	0.70	
	Oats															0.54	0.88	0.56	
	Rye																0.82		
	Triticale																0.79		
	Wheat														-0.53	0.73	0.51		

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Table S11. Continuation

	Arg	His	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val	Ala	Asp	Cys	Glu	Gly	Pro	Ser	Tyr
Gly	Barley																0.75	0.75
	Maize															-0.42		
	Oats																	
	Rye															-0.51	0.51	0.48
	Triticale															-0.61		0.91
	Wheat																	0.52
Pro	Barley																	
	Maize																	
	Oats																	0.54
	Rye																	-0.44
	Wheat																	0.47
Ser	Barley																	0.76
	Maize																	0.81
	Oats																	0.61
	Rye																	
	Wheat																	

Note: Only significant ($p \leq 0.05$) correlation coefficients are presented.

Table S12. Significant coefficients of correlation between concentrations of InsP₆-P and minerals in cereal grains.

	Ca	Na	K	Fe	Mg	Mn	Zn	Cu
Barley		-0.53					0.51	0.76
Maize		-	0.59	0.50	0.59			
Oats				-0.61	0.56			
Rye			0.62					
Triticale	0.48							
Wheat					0.47		0.37	0.06

Notes: Only significant ($p \leq 0.05$) correlation coefficients are presented; -, correlation not calculated because of missing data.

Table S13. Significant coefficients of correlation between extract viscosity at a shear rate of 380 s⁻¹ and concentrations of carbohydrate fractions and Klason lignin in cereal grains.

	Low molecular weight carbohydrates					Non-starch polysaccharides (NSP)						Klason lignin	
	Glucose	Fructose	Sucrose	Total sugars	Fructans	Cellulose	β-glucans		Arabinoxylans		NSP		
							Total	Soluble	Total	Soluble	Total	Soluble	
Barley					-0.76								
Rye				-0.62		0.49			0.79	0.61	0.82	0.61	
Triticale													
Wheat													

Note: Only significant ($p \leq 0.05$) correlation coefficients are presented.

Table S14. Significant coefficients of correlation between extract viscosity at a shear rate of 380 s⁻¹ and concentrations of non-cellulosic polysaccharide fractions in cereal grains

	Arabinose		Xylose		Mannose		Galactose		Glucose		Uronic acid	
	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble	Total	Soluble
Barley												-0.83
Rye	0.82	0.58	0.72	0.62			0.54		0.45			
Triticale												
Wheat							0.49					

Note: Only significant ($p \leq 0.05$) correlation coefficients are presented.