

Table S1. Monthly and accumulated precipitation (mm), temperature (°C) and day degrees from May through August in the experimental years, as compared to the normal period of 1961-1990.

Precipitation (mm)					
	2013	2014	2015	2016	1961-1990
April	64.6	69.2	13.2	100	39
May	128	44.6	117	50.2	60
June	123.2	28.4	65.2	89.8	68
July	18.2	48.4	158.8	54.8	81
August	71.4	136	140.2	140	83
September	63.2	34.8	220.2	41	90
Sum	468.6	361.4	714.6	475.8	391
Temperature (°C)					
April	3.4	6.7	6.2	5.2	4.1
May	11.8	10.9	8.3	11.6	10.3
June	14	14.7	13.1	15.6	14.8
July	17.1	19.6	15	16.1	16.1
August	15.2	14.8	15.3	14.6	14.9
September	10.8	12	11.5	14.1	10.6
Day degrees May through August					
	1787	1845	1590	1779	1724

Table S2. Barley genotypes, their origin and best linear unbiased predictors (BLUPs) for the percentage of chlorosis, relative plant height, heading delay, overall condition and relative head number.

Year	Line	Chlorosis	Plant height	Heading date	Overall condition	Head no.	Origin
2013	1091	-2.20971	-0.01211	1.735772	0.37168	-	Norway
2013	1094	-1.40724	-0.04502	0.235772	-0.09046	-	Norway
2013	1095	-1.68848	-0.05807	7.035772	-0.37231	-	Norway
2013	1097	-2.27268	-0.03674	3.035772	-0.41427	-	Norway
2013	1099	-1.78484	-0.03188	5.435772	0.088206	-	Norway
2013	1102	-0.84998	-0.03775	1.735772	-0.12742	-	Norway
2013	1108	-6.24931	-0.02896	-0.36423	0.879689	-	Norway
2013	1169	1.464034	-0.01506	1.735772	0.135497	-	Sweden
2013	1176	-1.65978	0.063001	-5.36423	0.465105	-	Denmark
2013	1178	0.678418	0.044894	-2.56423	0.470048	-	Germany
2013	1179	0.549801	0.037895	3.735772	0.23002	-	Sweden
2013	1180	0.322653	0.039444	-1.76423	-0.11827	-	Denmark
2013	1181	-0.89379	0.027366	-4.56423	-0.12642	-	Denmark

2013	1182	-0.4276	0.045116	5.535772	0.37419	-	Sweden
2013	Agneta	-7.51054	0.032743	-1.36423	-0.19685	-	Sweden
2013	Akka	-5.89477	0.018528	5.735772	0.9007	-	Sweden
2013	Aktiv	-0.7752	0.016043	-0.16423	-0.16587	-	Czech Republic
2013	Amund	-6.48975	-0.05664	0.935772	-0.02755	-	Norway
2013	Annabell	-5.8278	0.021048	-2.56423	0.027249	-	Germany
2013	Arve	-9.5984	-0.02466	-1.26423	0.582546	-	Norway
2013	Asahi 5	5.729614	-0.05645	7.035772	-0.57713	-	Japan
2013	Asplund	1.936716	0.011159	3.435772	0.248703	-	Sweden
2013	Audrey	-6.8384	0.006018	-0.16423	-0.2576	-	-
2013	Axelina	-2.18485	-0.02106	-1.56423	0.500482	-	Sweden
2013	Balder	-2.66961	0.04168	-1.86423	0.253091	-	Sweden
2013	Bamse	-5.87866	0.001959	1.635772	-0.51849	-	Sweden
2013	Barke	-2.79672	0.022883	-0.76423	-0.42907	-	Germany
2013	Baronesse	1.805879	-0.01963	-3.06423	-0.1515	-	Germany
2013	Binder	1.643378	0.032983	1.935772	-0.56589	-	Denmark
2013	Birgitta	1.700867	0.009082	3.335772	0.372683	-	Sweden
2013	Bjørneby	-1.17671	-0.00913	3.435772	0.38786	-	Norway
2013	Bonus	1.613268	0.007656	-0.26423	0.056793	-	Sweden
2013	Brage	-3.44057	0.02914	-1.46423	0.204793	-	Norway
2013	Chevron	0.63532	-0.01487	-1.16423	0.834356	-	Switzerland
2013	Cl11577	-0.63303	0.040958	1.235772	-0.13411	-	Greece
2013	Clho4196	4.353469	-0.03307	8.235772	0.046728	-	China
2013	Delibes	3.26506	0.058805	2.935772	-0.45276	-	UK
2013	Delphi	-1.15347	0.046226	-0.66423	0.215933	-	Denmark
2013	Domen	-0.38253	0.024819	-2.06423	0.190207	-	Norway
2013	Dore	0.669658	-0.04508	6.435772	-0.34046	-	Sweden
2013	Dønnes	2.201125	-0.00482	5.935772	-0.29462	-	Norway
2013	Edel	0.000704	-0.03338	0.035772	-0.10654	-	Norway
2013	Edvin	-4.77813	-0.05495	-1.56423	0.484485	-	Finland
2013	Einar	-3.60486	-0.01367	-2.56423	-0.15043	-	Finland
2013	Elmeri	-7.06154	-0.01551	0.435772	0.131024	-	Finland
2013	Etu	1.044363	0.037164	12.43577	-0.4177	-	Finland
2013	Fager	3.072516	-0.0062	4.135772	-0.58017	-	Norway

2013	Fairytale	-0.70751	0.036544	-2.46423	0.151552	-	Denmark
2013	Finne	0.653774	-0.01527	0.235772	0.684465	-	Norway
2013	Fløya	0.807799	-0.02177	2.235772	0.832845	-	Norway
2013	Fløya2	-4.93688	0.006748	1.135772	0.731787	-	Norway
2013	Forus	1.028401	-0.0351	-6.56423	0.139246	-	Norway
2013	Fredrickson	6.885807	-0.01814	7.435772	0.510535	-	Japan
2013	Frisco	-1.21936	0.052812	-5.36423	0.013542	-	Denmark
2013	Fræg	-2.29147	-0.03298	1.535772	-0.02806	-	Norway
2013	Gammel dansk	7.396189	0.050879	13.23577	-0.8127	-	Denmark
2013	Gaute	-1.14486	-0.05288	3.235772	0.010056	-	Norway
2013	Gull	-1.88719	0.034859	-1.06423	0.257568	-	Sweden
2013	Gunilla	3.103404	-0.03189	4.235772	-0.32838	-	Sweden
2013	Gustav	-1.91185	0.131667	-5.96423	-0.45495	-	Sweden
2013	H3003	2.134694	0.015669	-4.76423	-0.03676	-	Norway
2013	H354-333-7-5	-2.53803	-0.01056	-0.06423	-0.10271	-	Norway
2013	H82011-2-2	3.854263	0.031164	0.635772	-0.06785	-	Norway
2013	Habil	-0.20869	-0.03284	-4.06423	0.21645	-	Norway
2013	Harbinger	4.54803	0.045261	3.235772	-0.1821	-	Finland
2013	Heder	-2.88745	0.006899	-2.16423	-0.00784	-	Norway
2013	Helium	1.621385	0.067588	3.035772	-0.3417	-	Denmark
2013	Henni	-3.0547	0.072764	-6.36423	0.889647	-	Germany
2013	Herse	4.633767	-0.06818	8.735772	-0.37071	-	Norway
2013	Herta	0.479178	0.024942	-0.06423	0.577029	-	Sweden
2013	Ida	7.084005	0.002909	1.835772	0.023444	-	Sweden
2013	Ingrid	-2.0325	0.029434	-4.26423	0.514037	-	Sweden
2013	Iron	-4.76092	-0.02098	-0.86423	-0.42753	-	Denmark
2013	IS-046	3.144693	-0.0087	2.935772	-0.18106	-	Iceland
2013	Iver	-0.03402	0.019956	0.835772	-0.13609	-	Norway
2013	Jarle	-3.93781	-0.04685	0.335772	0.434652	-	Norway
2013	Jazz	1.231218	0.053047	-1.26423	-0.59065	-	Netherlands
2013	Jotun	-2.04895	-0.028	1.735772	0.168962	-	Norway
2013	Juli	-0.14865	0.029358	0.135772	-0.06439	-	Denmark
2013	Jyvå	-5.6857	-0.01691	3.935772	0.066807	-	Finland
2013	Kinnan	-0.75476	-0.01302	-3.26423	0.177715	-	Sweden

2013	Kunnari	0.008137	0.053414	0.735772	0.338992	-	Finland
2013	Lise	0.59878	-0.07317	4.035772	-0.1043	-	Norway
2013	Luhkas	-6.70353	0.01434	-2.16423	-0.48715	-	France
2013	Maja	1.328223	-0.02862	-1.36423	-0.37045	-	Denmark
2013	Malz	5.999346	0.014139	2.335772	-0.47414	-	Czech Rebublic
2013	Mari	3.902472	-0.00126	4.535772	-0.24199	-	Sweden
2013	Marigold	0.129776	0.047949	-4.56423	-0.16023	-	France
2013	Maskin	-0.68163	-0.01144	1.335772	0.440851	-	Norway
2013	Meltan	2.672833	0.157848	-0.46423	0.032849	-	Sweden
2013	Møyar	1.420866	0.000725	1.535772	-0.22364	-	Norway
2013	Nordlys	-2.10829	-0.02418	1.835772	0.143037	-	Norway
2013	Olli	1.30437	-0.0156	3.335772	0.076286	-	Finland
2013	Olsok	2.751085	-0.02278	4.235772	-0.0004	-	Norway
2013	Olve	3.312376	0.034254	2.635772	0.420783	-	Norway
2013	Opal	-2.30991	-0.00063	-0.96423	-0.26876	-	Denmark
2013	Oppdal	-3.98171	-0.02529	2.735772	0.442613	-	Norway
2013	Otra	1.832329	0.013689	-2.06423	0.112041	-	Finland
2013	Pallas	1.499984	0.006333	4.235772	0.07959	-	Sweden
2013	Pernilla	-2.31695	-0.05864	0.535772	-0.35886	-	Sweden
2013	Polarbygg	-1.00968	0.039867	-2.56423	-0.01257	-	Norway
2013	Quench	-0.73127	-0.04598	-1.76423	-0.01175	-	UK
2013	Rambler	4.297631	0.002234	-2.56423	0.162398	-	-
2013	Rigel	-5.8349	-0.02782	2.335772	0.611296	-	Denmark
2013	Rolfi	6.304897	-0.02108	4.735772	-0.39663	-	Finland
2013	Saana	7.09462	0.027924	4.535772	-0.20631	-	Finland
2013	Seger	4.700991	-0.0436	6.335772	-0.40177	-	Sweden
2013	Seijo 17	-4.20288	0.042725	-3.36423	0.747246	-	Japan
2013	Sold	3.472335	-0.00555	1.635772	-0.42709	-	Norway
2013	Stine	-1.63916	0.038385	-0.76423	0.196253	-	Germany
2013	Stolt	0.652298	-0.04496	0.535772	0.110824	-	Sweden
2013	Sunnita	6.212192	0.043803	3.035772	-0.33109	-	Sweden
2013	Svanhals	10.26399	-0.01911	14.33577	-0.17569	-	Sweden
2013	Thule	0.209874	-0.02494	-0.66423	0.091494	-	Norway
2013	Tiril	-5.98657	-0.03576	0.735772	-0.0877	-	Norway

2013	Tocada	-2.0301	0.041056	-2.96423	0.042997	-	Germany
2013	Tore	6.216657	-0.0825	-2.26423	-0.58832	-	Norway
2013	Toria	1.688528	-0.02874	1.535772	0.053077	-	Norway
2013	Trine	0.242911	-0.01938	-2.86423	-0.2926	-	Norway
2013	Triumph	-0.57233	0.054041	0.935772	-0.05555	-	Germany
2013	Trysil	5.276656	-0.05222	4.035772	-0.06478	-	Norway
2013	Tunga	-2.45807	-0.02313	-1.56423	-0.17114	-	Norway
2013	Tyra	2.442692	0.021866	1.235772	-0.47419	-	Norway
2013	Uforædlet Jämtland	0.348182	-0.02998	-1.16423	-0.19125	-	Sweden
2013	Vada	3.884835	0.006261	2.835772	-0.20503	-	Netherlands
2013	Varde	5.449497	-0.06777	8.835772	-0.10147	-	Norway
2013	Vega ABED	4.666929	0.063851	-6.16423	0.138262	-	Denmark
2013	Ven	4.71192	-0.01615	4.935772	-0.71441	-	Norway
2013	Vena	2.44139	-0.06373	2.735772	-0.10196	-	Norway
2013	Vera	-1.7136	0.013257	1.735772	-0.38618	-	Norway
2013	Verner	-0.75256	-0.0185	4.735772	-0.33145	-	Sweden
2013	Vigdis	1.805101	-0.01166	4.935772	0.028736	-	Norway
2013	Vilde	-1.39307	-0.02912	-1.56423	0.099916	-	Norway
2013	Yrjar	-3.68171	-0.06502	-2.16423	-0.05374	-	Norway
2014	1095	0.00092	0.425981	-1.85943	0.008559	0.768577	Norway
2014	1096	-0.01299	0.484557	-0.97013	-0.00549	0.697414	Norway
2014	1098	0.042367	0.47691	0.115411	-0.01476	0.63333	Norway
2014	1100	0.000428	0.438205	-0.42148	0.022514	0.68474	Norway
2014	1101	-0.02448	0.440568	-0.17841	-0.01493	0.693213	Norway
2014	1103	-0.15787	0.415709	-0.78831	-0.00098	0.716845	Norway
2014	1104	-0.0615	0.452264	-0.35513	0.013096	0.677367	Norway
2014	1105	0.032289	0.471847	-0.2008	0.017809	0.604515	Norway
2014	1106	-0.1277	0.538238	1.76794	0.003734	0.743857	Norway
2014	1107	-0.06827	0.395242	-2.8581	0.017817	0.749583	Norway
2014	1108	0.051243	0.409778	-3.76687	-0.01507	0.590113	Norway
2014	1109	0.003057	0.484179	-0.82903	0.003883	0.65032	Norway
2014	1110	0.006336	0.445308	-1.0211	0.008443	0.716705	Norway
2014	1111	0.098912	0.391055	-1.51628	-0.01022	0.678147	Norway
2014	1112	0.009544	0.512779	-1.85535	-0.03369	0.734824	Norway
2014	1113	0.086647	0.496904	-1.47201	-0.0148	0.76374	Norway
2014	1114	0.056355	0.348486	-2.1258	0.045749	0.579853	Norway
2014	1115	-0.15982	0.556795	2.239322	0.027132	0.772357	Norway
2014	1116	-0.08101	0.411725	-1.57034	0.003728	0.713777	Norway

2014	1117	-0.13373	0.491685	-0.64115	-0.00534	0.86392	Norway
2014	1118	-0.10847	0.463643	-0.19427	0.013049	0.757555	Norway
2014	1119	-0.07631	0.425805	0.255254	0.003842	0.627707	Norway
2014	1120	-0.14969	0.513537	1.865843	0.027243	0.748354	Norway
2014	1121	-0.17331	0.530907	0.044092	0.02709	0.673124	Norway
2014	1122	-0.11116	0.465612	0.598527	-0.01953	0.642099	Norway
2014	1123	-0.01186	0.37188	-0.99473	0.003662	0.829336	Norway
2014	1124	0.055698	0.450111	-0.09798	0.01329	0.701888	Norway
2014	1125	-0.02865	0.365506	-3.21364	0.027081	0.680149	Norway
2014	1126	0.021808	0.382056	-3.06352	0.036553	0.694754	Norway
2014	1127	0.093727	0.427711	-2.09627	-0.01007	0.756696	Norway
2014	1128	0.071227	0.485006	-0.69698	0.00363	0.700445	Norway
2014	1129	0.132361	0.452758	-0.41505	-0.0384	0.752952	Norway
2014	1130	0.184559	0.419056	-1.93316	-0.02424	0.682929	Norway
2014	1131	0.060349	0.46874	-1.08484	0.003736	0.678066	Norway
2014	1132	-0.12154	0.488133	0.224249	0.017885	0.81845	Norway
2014	1133	-0.13262	0.505758	1.467389	-0.02434	0.702366	Norway
2014	1134	-0.00545	0.478033	-1.25214	-0.03821	0.677797	Norway
2014	1135	-0.01783	0.44732	0.985436	-0.01503	0.681951	Norway
2014	1136	0.000162	0.421612	-0.37168	0.01783	0.690598	Norway
2014	1137	-0.09439	0.425834	1.034053	0.022587	0.684725	Norway
2014	1138	-0.03568	0.454639	0.253322	-0.00098	0.7061	Norway
2014	1139	-0.06167	0.463327	-0.59013	0.013057	0.651856	Norway
2014	1140	-0.04294	0.483508	-0.52969	-0.00563	0.696036	Norway
2014	1141	-0.03743	0.499446	1.06013	0.003649	0.628859	Norway
2014	1142	-0.10414	0.494409	0.069228	-0.03834	0.738793	Norway
2014	1143	-0.01807	0.434061	-1.02316	-0.01945	0.628859	Norway
2014	1144	0.008445	0.428155	-0.23722	-0.01949	0.669638	Norway
2014	1145	-0.17424	0.525946	-0.62313	0.013157	0.736588	Norway
2014	1146	-0.13646	0.48747	0.430008	-0.02409	0.661767	Norway
2014	1147	-0.12841	0.434368	0.729366	0.008603	0.653553	Norway
2014	1148	-0.22807	0.556436	3.488624	0.022314	0.729099	Norway
2014	1149	0.088684	0.425815	-1.31579	-0.00084	0.714517	Norway
2014	1150	0.004382	0.497964	-0.12218	-0.01969	0.704251	Norway
2014	1151	-0.12009	0.430681	-1.10436	0.017808	0.677011	Norway
2014	1152	-0.03232	0.444311	-2.67073	0.003768	0.694153	Norway
2014	1153	-0.06174	0.497369	0.731045	0.022556	0.637851	Norway
2014	1154	0.017831	0.437385	-0.50459	-0.01029	0.592081	Norway
2014	1155	0.014283	0.447936	-1.08017	0.017864	0.65425	Norway
2014	1156	-0.00448	0.536745	1.001259	-0.00558	0.693042	Norway
2014	1157	-0.03448	0.430718	-2.89228	-0.00082	0.626564	Norway
2014	1158	0.01977	0.448589	-2.38756	-0.01022	0.674348	Norway
2014	1159	-0.06927	0.496408	1.18456	-0.0055	0.722672	Sweden

2014	1160	-0.06094	0.462892	-0.77689	-0.00101	0.728694	Norway
2014	1161	-0.10538	0.480388	-0.2907	-0.00084	0.698799	Norway
2014	1162	-0.05756	0.390336	-0.71183	-0.01034	0.616918	Norway
2014	1176	-0.19225	0.572445	4.260954	-0.01503	0.503736	Denmark
2014	1178	-0.38213	0.528897	4.419241	-0.0149	0.483058	Germany
2014	Agneta	-0.06968	0.500183	0.783151	-0.00089	0.829546	Sweden
2014	Akka	0.023526	0.502461	0.675231	0.017737	0.532116	Sweden
2014	Annabell	-0.11998	0.491897	1.410429	-0.02436	0.673491	Germany
2014	Arve	-0.08836	0.49833	0.023983	-0.0365	0.875475	Norway
2014	Asahi 5	-0.03097	0.433895	1.255426	0.01322	0.495479	Japan
2014	Asplund	0.205437	0.42083	-0.207	-0.03348	0.701412	Sweden
2014	Atlas	-0.07791	0.425561	0.222424	0.017831	0.534188	USA
2014	Atlas 46	0.16006	0.44381	0.797941	-0.00551	0.503117	USA
2014	Axelina	0.069034	0.414276	0.303871	0.017805	0.614715	Sweden
2014	Balder	0.036581	0.504616	2.470381	0.031703	0.652011	Sweden
2014	Barke	-0.03742	0.510672	0.436067	0.003735	0.519997	Germany
2014	Baronesse	0.00059	0.51856	3.301815	-0.01022	0.623884	Germany
2014	Bode	-0.01346	0.427554	-1.49348	-0.01019	0.7309	Norway
2014	Brage	-0.09746	0.476623	-0.01853	-0.04898	0.778043	Norway
2014	Chevron	0.103424	0.39603	1.23812	-0.01494	0.606877	Switzerland
2014	Clho4196	0.203969	0.387129	-1.68332	-0.04298	0.526693	China
2014	Clermont	0.326189	0.407992	0.187325	-0.00091	0.759078	France
2014	Delphi	-0.08363	0.533413	-1.71133	-0.03366	0.528387	Denmark
2014	Domen	0.107245	0.443527	-0.10435	-0.01035	0.512719	Norway
2014	Edel	0.056647	0.396322	-0.80422	-0.07385	0.674673	Norway
2014	Fager	0.026655	0.534236	1.015872	-0.01952	0.664154	Norway
2014	Fairytale	-0.06129	0.501318	0.825442	0.008427	0.52803	Denmark
2014	Fløya	0.116151	0.405306	-3.21868	0.003809	0.650016	Norway
2014	Fredrickson	0.162985	0.383698	-1.49533	-0.01507	0.63039	Japan
2014	Frisco	-0.15458	0.48163	1.985318	0.003732	0.567726	Denmark
2014	Gammel dansk	0.044479	0.500904	0.178619	-0.03376	0.572723	Denmark
2014	Gaute	-0.00771	0.45149	-2.17776	-0.0056	0.738344	Norway
2014	Golf	0.041245	0.473703	-0.20722	0.045767	0.600546	UK
2014	Gull	0.110054	0.432278	1.947226	0.041144	0.630844	Sweden
2014	Gunilla	0.0313	0.472686	2.078545	0.013071	0.634148	Sweden
2014	Gustav	-0.00522	0.467423	0.509542	0.013199	0.53703	Sweden
2014	H572-8	-0.12749	0.484977	-0.18498	0.013224	0.672023	Norway
2014	H82009-1-2	-0.16712	0.4556	2.863646	-0.00551	0.701341	Norway
2014	Heder	-0.06169	0.509252	0.858502	0.023258	0.743497	Norway
2014	Helium	0.154011	0.533992	0.322351	0.032068	0.495304	Denmark
2014	Henni	0.078798	0.445967	2.18844	0.042617	0.518806	Germany
2014	Herse	0.059528	0.433405	-1.77624	0.010347	0.724575	Norway

2014	Herta	0.013015	0.49227	0.521406	0.013118	0.567539	Sweden
2014	Ingrid	0.047048	0.451296	2.685078	-0.01934	0.619253	Sweden
2014	Iron	-0.10532	0.493665	1.66997	0.049467	0.550846	Denmark
2014	Iver	0.249846	0.488965	-1.54946	-0.00097	0.556002	Norway
2014	Kunnari	0.11202	0.525096	-1.637	-0.02445	0.770456	Finland
2014	KWS Olof	-0.11016	0.448439	1.450469	-0.01008	0.612921	Germany
2014	Lavrans	-0.09869	0.443779	0.061207	-0.00097	0.722475	Norway
2014	Lise	0.233846	0.410699	0.805297	0.041212	0.81962	Norway
2014	Malz	0.215062	0.524153	2.675031	-0.00081	0.61551	Czech Rebublic
2014	Mari	0.11133	0.501437	3.599878	-0.01025	0.458586	Sweden
2014	Marigold	-0.08515	0.50877	1.866591	0.010365	0.568942	France
2014	Maskin	0.06303	0.416014	-1.36241	0.008373	0.798749	Norway
2014	Meltan	-0.035	0.528001	1.368454	0.013069	0.664239	Sweden
2014	Olso	0.012298	0.467334	-1.16083	0.013229	0.739314	Norway
2014	Oppdal	0.248944	0.390576	-0.09156	0.022341	0.649962	Norway
2014	Quench	-0.16246	0.566596	2.729241	-0.0055	0.485068	UK
2014	Saana	0.253471	0.499115	-0.15699	0.017762	0.592799	Finland
2014	Seijo 17	-0.00833	0.443557	2.009028	-0.00084	0.576024	Japan
2014	Shirley	-0.27375	0.534585	1.814431	0.022516	0.523901	Germany
2014	Stine	-0.21684	0.488023	2.058047	-0.02432	0.54659	Germany
2014	Svanhals	0.23736	0.402057	-2.11062	0.013506	0.632443	Sweden
2014	Tammi	0.15438	0.469869	-1.46083	-0.02887	0.644273	Finland
2014	Tampar	0.261798	0.525559	-0.98764	-0.0195	0.840422	Faroe Islands
2014	Tiril	-0.13831	0.509144	-0.27195	-0.00254	0.766253	Norway
2014	Tocada	-0.18372	0.504444	4.148857	-0.01485	0.572034	Germany
2014	Tore	0.163486	0.407319	-0.59887	-0.00096	0.61572	Norway
2014	Tyra	0.229609	0.472503	-0.47101	-0.06154	0.587994	Norway
2014	Varde	0.022084	0.436981	-1.61395	0.041305	0.814856	Norway
2014	Vega	0.224105	0.428695	-0.79752	-0.04292	0.759917	Sweden
2014	Vega ABED	0.067287	0.47101	1.949673	-0.00563	0.588316	Denmark
2014	Ven	0.146386	0.42995	-2.80509	0.026936	0.653165	Norway
2014	Vilde	0.141557	0.470079	0.283757	0.022559	0.706977	Norway
2014	Yrjar-1	0.017349	0.440993	0.252229	-0.00565	0.711595	Norway
2014	Yrjar	0.063503	0.408761	-1.19096	0.013232	0.732599	Norway

Table S3. Wheat genotypes, their origin and best linear unbiased predictors (BLUPs) for the percentage of chlorosis, relative plant height, heading delay, overall condition, relative head number and green biomass recorded 5 and 19 days post treatment in 2014.

Year	Line	Chlorosis	Plant height	Heading delay	Overall condition	Head no.	Green biomass19	Green biomass5	Origin
2013	1175	1.035976	0.042612	-0.06559	0.31801	-	-	-	Norway
2013	1176	-1.73488	0.018845	0.337283	0.183835	-	-	-	Norway
2013	1177	-1.18888	0.017157	-0.27236	-0.19575	-	-	-	Norway
2013	1179	1.978852	-0.01485	0.56661	-0.24877	-	-	-	Sweden
2013	1180	1.562213	-0.01138	0.116972	-0.12912	-	-	-	Sweden
2013	1181	-1.19634	0.063052	-0.86757	0.253613	-	-	-	Norway
2013	1182	-3.97635	0.055704	-0.17083	0.460541	-	-	-	Norway
2013	1183	0.355017	0.011664	-0.45512	0.151788	-	-	-	Norway
2013	1186	-0.57142	-0.00024	0.249783	0.046391	-	-	-	Norway
2013	1187	2.557899	0.077631	0.221797	-0.28657	-	-	-	Norway
2013	1188	-1.8192	0.001902	0.332342	-0.04361	-	-	-	Sweden
2013	1189	3.147531	-0.00077	0.517476	-0.03945	-	-	-	Sweden
2013	1192	-1.78863	0.033212	-0.21136	0.248303	-	-	-	Norway
2013	1193	2.084147	-0.00587	0.72398	-0.38062	-	-	-	Sweden
2013	1194	1.788935	0.000665	-0.3494	-0.1694	-	-	-	Norway
2013	1302	-0.40786	-0.02854	-0.00445	0.124482	-	-	-	Norway
2013	1303	0.501229	-0.02796	0.238073	-0.38052	-	-	-	Norway
2013	1305	-0.85821	0.001625	-0.18507	0.106914	-	-	-	Norway
2013	1306	0.449722	0.049856	0.590275	-0.09174	-	-	-	Norway
2013	1307	-2.51381	0.024299	0.057234	0.138514	-	-	-	Norway
2013	1308	-0.25136	0.014044	-0.42289	0.007199	-	-	-	Norway
2013	1310	4.281978	-0.00483	0.138437	0.135501	-	-	-	Norway
2013	1311	-0.35553	-0.06631	0.642852	-0.33827	-	-	-	Norway
2013	1312	1.953446	0.053973	0.3236	0.096409	-	-	-	Norway
2013	1313	0.649982	-0.0123	-0.60722	0.045823	-	-	-	Norway
2013	1314	-1.25986	0.030189	0.372467	-0.04336	-	-	-	Norway
2013	1315	1.145074	-0.03396	-0.35963	0.238692	-	-	-	Norway
2013	1316	-0.46832	0.022121	0.458818	0.217928	-	-	-	Norway
2013	1324	-0.99078	0.037633	-0.04016	0.321685	-	-	-	Sweden
2013	1327	3.23037	-0.01922	0.455596	-0.44686	-	-	-	Sweden
2013	1328	5.469317	-0.03618	0.955973	0.06742	-	-	-	Sweden
2013	1404	-1.85902	0.03293	-0.2517	-0.04308	-	-	-	Norway
2013	1405	3.652469	0.034942	0.598414	-0.52193	-	-	-	Norway
2013	1406	2.972455	0.032005	0.89589	-0.17924	-	-	-	Norway
2013	1407	4.620318	0.025142	0.805231	-0.10365	-	-	-	Norway
2013	1408	-0.05138	0.008574	0.35045	-0.37351	-	-	-	Norway
2013	1409	-0.43607	0.052841	0.219709	-0.14475	-	-	-	Norway
2013	1410	-1.92079	-0.00392	0.141796	0.04128	-	-	-	Norway
2013	Willy	-4.56726	-0.00626	-0.61788	0.533272	-	-	-	Norway

2013	1412	0.680097	0.061417	0.345832	0.245672	-	-	-	Norway
2013	1415	1.217669	-0.06543	0.167876	-0.12511	-	-	-	Sweden
2013	1416	1.409881	-0.03716	0.064531	-0.12114	-	-	-	Norway
2013	1417	1.693409	-0.01154	0.279647	0.092402	-	-	-	Norway
2013	1418	1.322902	0.010657	0.152057	-0.10749	-	-	-	Norway
2013	512-21	-0.49536	-0.03721	0.131483	0.014301	-	-	-	Norway
2013	512-50	-0.89458	0.027027	0.145645	0.130616	-	-	-	Norway
2013	512-54	0.554813	0.091179	0.248677	-0.00831	-	-	-	Norway
2013	512-70	0.015423	-0.03071	0.50591	-0.26615	-	-	-	Norway
2013	512-87	2.399131	0.026607	-0.21485	-0.15568	-	-	-	Norway
2013	AC Somerset	2.968608	-0.01473	0.550857	-0.07249	-	-	-	Canada
2013	Aino	-2.75663	-0.05817	0.067667	0.018634	-	-	-	Finland
2013	ALTAR 84/Ae.tauschii (224)//ESDA	-0.96628	-0.04201	-0.31448	0.039282	-	-	-	CIMMYT
2013	Altar 84/Ae.tauschii (219)//2*Seri	-2.74062	-0.00194	-0.61091	-0.03134	-	-	-	CIMMYT
2013	Altar 84/Ae.tauschii (219)//2*Seri/3/ Avle	-2.48266	0.030143	-0.36274	0.320363	-	-	-	Norway
2013	Arabella	-1.65034	-0.00848	0.453012	-0.36472	-	-	-	Poland
2013	Avans	2.726741	0.046093	-0.07004	-0.51025	-	-	-	Sweden
2013	Avle	1.926826	-0.01064	0.067012	-0.1425	-	-	-	Sweden
2013	Avocet-YrA	1.923919	-0.01815	-1.32273	-0.40455	-	-	-	Australia
2013	BAJASS-5	-2.00126	0.081917	0.066366	0.119476	-	-	-	Norway
2013	Bastian BCN*2//CROC_1/ Ae.tauschii (886)	-0.32348	0.02472	0.072079	-0.13882	-	-	-	Norway
2013	5.51834	-0.04045	1.247118	-0.51991	-	-	-	-	CIMMYT
2013	Berlock	0.164553	0.00214	0.374874	0.252659	-	-	-	Sweden
2013	Berserk	-0.19406	-0.04618	-0.31919	-0.36215	-	-	-	Norway
2013	Bjarne BJY/COC//CLMS/ GEN	-3.4706	0.023669	-0.63561	0.121851	-	-	-	Norway
2013	-1.58007	0.023481	0.212117	-0.22749	-	-	-	-	CIMMYT
2013	Bombona BOTNO/Ae. tauschii (617)	1.198509	0.014653	0.321187	0.374722	-	-	-	Sweden
2013	-3.67832	-0.04805	0.096308	-0.1123	-	-	-	-	CIMMYT
2013	Brakar	0.547226	0.008735	-0.21662	-0.16841	-	-	-	Norway
2013	Catbird	0.368766	0.051485	-0.4989	0.514567	-	-	-	CIMMYT
2013	CBRD/KAUZ	1.442302	-0.00726	-0.02895	0.035086	-	-	-	CIMMYT
2013	CD87 CETA/Ae. tauschii (895)	0.065906	0.025369	-0.6654	-0.2515	-	-	-	Australia
2013	-1.91356	-0.03001	-0.71666	0.216793	-	-	-	-	CIMMYT
2013	Chara	-3.23368	0.025881	-0.07671	0.191102	-	-	-	Australia
2013	CJ9306	0.119631	-0.05689	0.102897	-0.37095	-	-	-	China
2013	CJ9403 Croc_1/Ae.tausc hii (205)//Kauz	-4.67697	0.011781	-0.27158	0.032667	-	-	-	China
2013	-0.21702	0.003039	0.393089	-0.13088	-	-	-	-	CIMMYT
2013	Demonstrant	-0.8048	0.03908	-0.21124	0.129296	-	-	-	Norway

2013	DH49-18	1.65101	-0.0757	0.225126	-0.39432	-	-	-	Norway
2013	DH20070	-1.11589	-0.00723	-0.1585	0.039788	-	-	-	Norway
2013	DH20097	-1.06692	-0.03843	0.237006	-0.0612	-	-	-	Norway
2013	Dragon	6.182546	-0.02588	0.4525	-0.14832	-	-	-	Sweden
2013	Dulus DVERD_2//Ae.	-2.36192	0.004193	-0.56184	0.395966	-	-	-	CIMMYT
2013	tauschii (221)	-1.10449	-0.03948	-0.17025	0.346121	-	-	-	CIMMYT
2013	Filin	-3.65156	-0.00648	-0.92888	0.396553	-	-	-	CIMMYT
2013	Fram II	-2.0992	0.044738	-0.30655	0.320009	-	-	-	Norway
2013	Frontana	0.021035	-0.04311	-0.26009	0.176795	-	-	-	Brazil
2013	GONDO	1.253406	0.019289	-0.6299	0.231775	-	-	-	CIMMYT
2013	Gondo	-3.85328	0.00933	-0.47673	0.216543	-	-	-	CIMMYT
2013	Granary GUAM92//PSN/B	5.702146	0.016792	-0.18456	0.106318	-	-	-	UK
2013	OW HAHN/PRL//AUS	4.126548	-0.00709	0.156949	0.062428	-	-	-	CIMMYT
2013	1408	-1.07295	-0.03537	-0.06746	0.052407	-	-	-	CIMMYT
2013	J03	0.63923	-0.02124	0.027037	0.258957	-	-	-	Norway
2013	Kariega	-1.09064	-0.01629	1.186336	-0.64497	-	-	-	South Africa
2013	Krabit	-4.35022	-0.00093	-0.11016	0.201739	-	-	-	Norway
2013	Kruunu	-2.04226	0.003214	0.120364	0.105835	-	-	-	Finland
2013	Kukri	-2.82564	0.021637	-0.80551	0.46001	-	-	-	Australia
2013	Laban MAYOOR//TK SN1081/Ae.tausc	-1.15626	0.011851	0.612379	-0.03079	-	-	-	Norway
2013	hii (222)	1.938625	-0.04052	0.201767	-0.0695	-	-	-	CIMMYT
2013	Milan	-0.20248	-0.02059	-0.44125	0.186654	-	-	-	CIMMYT
2013	MILAN/SHA7	-0.09981	-0.01773	0.415729	0.292119	-	-	-	CIMMYT
2013	Mirakel	-0.88184	0.026817	0.145154	0.410874	-	-	-	Norway
2013	MS273-150	-0.5838	0.026394	0.474032	-0.19437	-	-	-	Norway
2013	Møystad	1.915726	-9.53E-05	-0.72658	-0.01297	-	-	-	Norway
2013	Nanjing 7840	-1.64352	-0.01403	-0.91893	0.033778	-	-	-	China
2013	Naxos	0.973583	-0.00198	0.365045	-0.23743	-	-	-	Germany
2013	NG8675/CBRD	-0.75777	-0.05574	0.227585	0.133871	-	-	-	CIMMYT
2013	Ning 8343	-0.75569	0.034072	-0.80746	0.380573	-	-	-	China
2013	NK00521	-0.32256	0.030733	-0.43729	-0.03897	-	-	-	Norway
2013	NK01513	-4.31243	0.052201	-0.4123	0.191301	-	-	-	Norway
2013	NK01565	0.458688	0.022666	-0.55251	0.200106	-	-	-	Norway
2013	NK93602 (1995)	0.60668	0.013837	0.055001	0.121159	-	-	-	Norway
2013	NK93604	-1.19049	0.015321	0.006084	0.035944	-	-	-	Norway
2013	Nobeokabouzu	2.635364	-0.06379	0.74258	-0.17636	-	-	-	China
2013	Norrøna ALTAR 84/Ae.tauschii (224)//2*YACO/3	2.345309	-0.01551	0.168294	0.004185	-	-	-	Norway
2013	/KAUZ	0.669684	-0.02954	-0.32009	0.29603	-	-	-	CIMMYT
2013	Paros	-1.66658	-0.02065	0.043394	0.293621	-	-	-	Germany

2013	Paros/NK93602	-0.24532	0.016849	0.188069	0.056351	-	-	-	Norway
2013	Paros/T9040	3.879815	0.062393	0.207876	-0.04988	-	-	-	Norway
2013	Pfau/Milan	-0.27853	-0.02997	-0.18345	-0.08575	-	-	-	CIMMYT
2013	Polkka	-2.84249	-0.00193	0.244068	0.150136	-	-	-	Sweden
2013	QUARNA R37/GHL121//KA L/BB/3/JUP/MUS /4/2*YMI	1.259275	-0.0235	0.369975	-0.40914	-	-	-	Switzerland
2013	#6/5/CBRD	-1.84734	0.009569	-0.33805	0.01101	-	-	-	CIMMYT
2013	Rabagast	0.525564	-0.01632	-0.2859	-0.32944	-	-	-	Norway
2013	RB07	1.376376	-0.04078	-0.00793	-0.19776	-	-	-	USA
2013	Rollo	4.870266	-0.00718	0.44877	-0.25009	-	-	-	Norway
2013	Runar	0.111118	-0.02657	0.43678	0.206354	-	-	-	Norway
2013	Saar	-0.00305	-0.00907	0.48274	-0.25895	-	-	-	CIMMYT
2013	Sabin SABUF/5/BCN/4/ RABI//GS/CRA/3/	-0.55905	-0.11083	0.005016	-0.68177	-	-	-	USA
2013	Ae.tauschii (190)	-0.90988	0.03252	0.04253	0.11421	-	-	-	CIMMYT
2013	Scirocco	-1.13828	-0.06559	-0.34516	-0.33061	-	-	-	Germany
2013	Seniorita	1.500686	-0.05391	-0.38582	-0.32143	-	-	-	Norway
2013	SHA3/CBRD	0.287379	0.029039	-1.24708	0.299694	-	-	-	CIMMYT
2013	Sport Sumai #3	-0.11912	0.0019	-0.06962	-0.27294	-	-	-	Sweden
2013	(12SRSN)	-0.88879	-0.02507	-0.70636	0.201945	-	-	-	China
2013	Sumai 3 (18.)	-2.03643	-0.00989	-0.68895	0.418531	-	-	-	China
2013	T10014	-1.34022	0.040498	-0.27854	-0.02392	-	-	-	Norway
2013	T7347	5.405582	0.034893	-0.478	0.482035	-	-	-	Norway
2013	T9040	-2.4628	0.060238	-0.4296	0.475548	-	-	-	Norway
2013	T9040 (1995)	2.682181	-0.04031	0.926114	-0.52395	-	-	-	Norway
2013	T9040/Paros	-1.08675	-1.93E-05	0.486439	0.07197	-	-	-	Norway
2013	Tjalve TJALVE/Purpur	-2.33389	0.003266	0.371592	-0.16977	-	-	-	Sweden
2013	seed	1.679749	0.011972	0.493996	-0.01649	-	-	-	Norway
2013	Tom	-0.93741	-0.04738	-0.10922	-0.41928	-	-	-	USA
2013	TUI/RL4137	0.267167	-0.01644	-0.23241	0.074229	-	-	-	CIMMYT
2013	Vinjett	1.797496	-0.01501	0.012355	0.053557	-	-	-	Sweden
2013	Zebra	-4.18527	-0.01214	-0.56687	0.228532	-	-	-	Sweden
2014	1175	13.41039	0.432855	16.2895	0.169415	0.545176	0.100412	0.310678	Norway
2014	1179	13.66031	0.423901	21.28773	-0.15426	0.3362	-0.23101	0.134417	Sweden
2014	1181	-0.31123	0.446866	17.42848	-0.11656	0.293354	-0.31099	-0.02034	Norway
2014	1182	-10.6001	0.492469	16.31508	0.340926	0.458506	0.035288	0.150846	Norway
2014	1183	8.688025	0.437524	17.034	0.561627	0.464275	0.272576	-0.46803	Norway
2014	1189	19.67172	0.451517	17.15502	-0.01034	0.554876	0.074977	0.024765	Sweden
2014	1192	-0.10721	0.365747	18.8662	-0.65709	0.321915	0.038721	-0.08608	Norway
2014	1193	6.278537	0.430614	17.55464	-0.01108	0.467839	0.064722	-0.10277	Sweden
2014	1303	-0.01405	0.37265	23.03865	-0.52057	0.333961	-0.37365	-0.31327	Norway

2014	1304	-3.73063	0.421511	15.11192	0.097445	0.462934	0.151813	-0.12371	Norway
2014	1305	-3.84855	0.375602	19.39452	-0.15241	0.293097	-0.34106	-0.30063	Norway
2014	1307	-1.73488	0.507571	15.56002	0.445838	0.554601	0.593549	0.591748	Norway
2014	1308	1.307288	0.44262	23.18268	-0.31973	0.303844	-0.58173	-0.27176	Norway
2014	1309	4.463277	0.483833	22.85267	-0.24412	0.244268	-0.68138	0.091295	Norway
2014	1311	1.050651	0.403949	16.92406	0.417797	0.576232	0.52579	0.162614	Norway
2014	1313	-6.84714	0.42171	15.94298	-0.07148	0.348879	-0.10469	-0.33542	Norway
2014	1317	6.641201	0.441813	15.7736	0.367912	0.518271	0.514814	0.471942	Norway
2014	1318	21.17542	0.451261	14.77488	0.137671	0.516816	0.377456	0.683612	Norway
2014	1319	7.796244	0.405856	17.22437	0.316451	0.438238	0.28135	0.306456	Norway
2014	1320	7.677353	0.418739	15.77985	0.057875	0.426259	0.455874	0.620192	Norway
2014	1323	-3.18482	0.432052	18.20851	0.049665	0.506124	0.145858	-0.07102	Sweden
2014	1324	13.34432	0.414856	15.65747	-0.34533	0.44539	0.364526	0.403274	Sweden
2014	1325	17.32927	0.45686	17.87642	0.448314	0.634709	0.345962	0.280611	Sweden
2014	1326	19.5879	0.471581	16.95676	0.007587	0.507777	-0.06026	0.033724	Sweden
2014	1327	10.11768	0.397558	19.62882	-0.43299	0.331015	-0.1543	-0.38926	Sweden
2014	1328	18.93018	0.464517	17.4379	0.823512	0.585713	0.317432	0.048132	Sweden
2014	1404	-4.90413	0.459954	15.851	0.538433	0.554294	-0.02609	0.040414	Norway
2014	1405	14.50395	0.426827	21.9951	-0.26994	0.350942	-0.44789	-0.24098	Norway
2014	1406	-6.50907	0.431139	16.77685	0.653065	0.634723	0.342717	0.396155	Norway
2014	1407	1.183133	0.454315	20.89274	0.144624	0.372911	-0.22462	-0.06205	Norway
2014	1409	-2.96092	0.468897	16.40622	-0.25331	0.365165	-0.26125	-0.1896	Norway
2014	Willy	-4.30447	0.469455	18.95481	-0.09819	0.44417	0.083855	0.172282	Norway
2014	1415	14.45951	0.453074	17.56761	0.526421	0.434134	-0.07269	0.001831	Sweden
2014	1416	-4.89135	0.403843	17.33609	-0.37983	0.296805	-0.65175	-0.50692	Norway
2014	512-70	3.193451	0.448881	25.19476	-0.35969	0.205068	-0.70465	-0.3944	Norway
2014	68.111/RGB- U//WARD/3/Ae. tauschii (454)	5.308094	0.375798	22.82685	-0.49944	0.355903	-0.17893	-0.40655	CIMMYT
2014	68.111/RGB- U//WARD/3/FGO /4/ RABI/5/Ae. tauschii (878)	-6.50071	0.402087	11.82948	0.992427	0.629467	0.815327	0.043937	CIMMYT
2014	206	-6.99965	0.329002	16.34591	0.294218	0.648333	0.090414	-0.13467	CIMMYT
2014	68.111/RGB- U//WARD/3/FGO /4/ RABI/5/Ae. tauschii (878)	-6.99965	0.329002	16.34591	0.294218	0.648333	0.090414	-0.13467	CIMMYT
2014	207	-6.99965	0.329002	16.34591	0.294218	0.648333	0.090414	-0.13467	CIMMYT
2014	AC Somerset	-2.77521	0.370026	16.37867	-0.38995	0.393899	0.049362	0.224081	Canada
2014	Aino	-0.97228	0.441702	20.52175	0.22441	0.439334	0.027605	-0.0452	Finland
2014	ALTAR 84/Ae. tauschii (221)	-14.141	0.457312	11.58587	1.52324	0.551612	0.954148	0.136861	CIMMYT
2014	Altar84/Ae. tauschii(219)//	-7.183	0.424451	17.98394	0.441298	0.546567	0.286885	0.397049	CIMMYT
2014	2*Seri	-7.183	0.424451	17.98394	0.441298	0.546567	0.286885	0.397049	CIMMYT
2014	Altar84/Ae. tauschii(219)//2*	-10.3767	0.49962	21.54756	0.504452	0.498088	-0.30264	-0.09005	CIMMYT
2014	Seri/3/ Avle	-10.3767	0.49962	21.54756	0.504452	0.498088	-0.30264	-0.09005	CIMMYT
2014	Anniina	1.763257	0.399885	19.42171	0.55003	0.429998	0.245587	-0.062	Finland

2014	Arabella	6.469275	0.477229	18.4116	0.664262	0.576808	0.212833	0.319067	Poland
2014	Avle	8.269468	0.42763	15.66959	-0.226	0.416235	0.111515	-0.00506	Sweden
2014	Avocet-YrA	-6.85983	0.456343	19.78724	-0.33297	0.352687	-0.27038	-0.30156	Australia
2014	BAJASS-5	-3.31789	0.467779	17.90652	-0.16284	0.407704	-0.23988	-0.25084	Norway
2014	Bastian	-12.5931	0.490056	20.70099	-0.21876	0.373521	-0.18966	0.207919	Norway
2014	Bau/Milan -2 BCN*2//CROC_1/ Ae. tauschii (886)	2.279531	0.409326	17.81223	-0.25114	0.356728	-0.0682	-0.28543	CIMMYT
2014	Berlock	-5.17591	0.399497	20.97014	-0.59501	0.239521	-0.34632	-0.24522	
2014	Berlock	16.86117	0.449236	17.08245	0.280005	0.551155	0.496139	0.528535	Sweden
2014	Berserk	-2.52653	0.418985	20.74061	-0.06015	0.316676	-0.33761	-0.12918	Norway
2014	Bjarne Bjarne/LW91W8 6	-5.86274	0.511568	16.41096	0.316338	0.543901	0.021274	0.215195	Norway
2014	BJY/COC//CLMS/ GEN	6.027008	0.412542	16.58638	0.1827	0.332029	-0.44597	-0.47591	Norway
2014	Bombona	-9.18706	0.403823	13.35815	-0.45266	0.480286	-0.07821	0.295162	CIMMYT
2014	Bombona	4.573505	0.410479	14.06948	-0.28544	0.367852	-0.08879	0.217347	Sweden
2014	Brakar	-2.05573	0.340821	23.6606	-0.45603	0.486467	0.074278	-0.00598	Norway
2014	Brakar C80.1/3*QT4522 //2*ATTILA	-3.35421	0.436238	19.46615	0.523895	0.46965	0.024491	0.163199	Norway
2014	C80.1/3*QT4522 //2*PASTOR	0.371593	0.435941	24.60537	-0.07606	0.432964	-0.03483	-0.08804	CIMMYT
2014	Catbird	2.460703	0.341169	19.07291	-1.60052	0.145743	-1.84708	-0.20912	CIMMYT
2014	CD87 CETA/Ae. tauschii (895)	5.017082	0.432436	18.94853	-0.44983	0.240279	-0.43599	-0.49771	CIMMYT
2014	CD87 CETA/Ae. tauschii (895)	-7.80306	0.461173	21.90732	-0.07041	0.280983	-0.62128	-0.05077	Australia
2014	Chara	-19.85	0.411163	13.12248	1.281657	0.759167	1.116992	0.91824	
2014	CJ9306	0.469419	0.41705	22.25162	-0.84037	0.263641	-0.67789	-0.60474	Australia
2014	CJ9403 Croc_1/Ae. tausc hii (205)//Kauz	-5.1346	0.447772	15.91378	-0.48959	0.481414	0.133476	0.120002	China
2014	CJ9403 Croc_1/Ae. tausc hii (205)//Kauz	-0.56567	0.39643	27.29228	-1.69888	0.216067	-1.41223	-0.52352	China
2014	Demonstrant	-5.2825	0.434925	20.48212	0.898682	0.518001	0.561542	-0.13192	CIMMYT
2014	Demonstrant	2.344053	0.422724	18.1907	-0.85703	0.286484	-0.3046	-0.2819	Norway
2014	DH49-18	-8.64071	0.432742	24.96867	-0.03469	0.343421	-0.40585	-0.08149	Norway
2014	Dragon	10.60619	0.419891	17.47514	-0.06466	0.597704	0.526645	0.186909	Sweden
2014	DUCULA (X1)	-2.19118	0.448436	19.2415	-0.2754	0.391924	0.162753	0.697727	CIMMYT
2014	DUCULA (X2)	-4.2358	0.41814	16.75659	0.19967	0.486766	0.096905	0.046696	CIMMYT
2014	DUCULA (X3)	-13.1165	0.381791	14.61013	-0.0132	0.586111	0.045995	-0.29839	CIMMYT
2014	DUCULA (X4)	-11.2189	0.350486	15.90272	-0.31386	0.562551	0.4218	0.208271	CIMMYT
2014	Dulus DVERD_2/Ae. tauschii (221)	-13.2293	0.389194	14.48723	-0.40037	0.504107	0.404637	0.063654	CIMMYT
2014	Dulus DVERD_2/Ae. tauschii (221)	-2.31791	0.457081	11.78328	0.791883	0.564048	1.045716	0.348689	CIMMYT
2014	Filin	-6.38313	0.387526	15.59178	-0.21428	0.6406	0.264818	-0.04981	CIMMYT
2014	Fram II	-0.45347	0.407117	20.2535	-0.10782	0.280955	-0.41759	0.042666	Norway
2014	Frontana	-5.71325	0.368253	14.9159	0.5839	0.654839	0.200074	-0.09118	Brazil
2014	GONDO	2.4774	0.410904	14.93053	-0.35941	0.336086	-0.1554	-0.43794	CIMMYT
2014	Gondo HAHN/PRL//AUS 1408	9.978017	0.399074	17.86533	0.422259	0.44784	0.311805	-0.12575	CIMMYT
2014	Gondo HAHN/PRL//AUS 1408	-10.4847	0.469229	21.73876	-0.54934	0.508913	-0.24286	-0.02226	
2014	J03	-4.43403	0.437034	19.08014	0.248331	0.393037	-0.24468	0.067958	Norway

2014	Kariega	-3.65484	0.387044	27.60061	-1.31004	0.331857	-0.87225	0.129019	South Africa
2014	Krabat	4.524904	0.500121	16.98053	-0.11439	0.51727	0.18875	0.130807	Norway
2014	Kruunu	-1.52063	0.442694	17.30292	0.457289	0.508236	0.153679	0.395345	Finland
2014	Kukri	-0.54116	0.440393	14.92544	0.870578	0.630188	0.556416	0.364744	Australia
2014	Laban	11.53348	0.422619	15.7394	0.239891	0.584523	0.480673	0.481966	Norway
2014	Marble MAYOOR//TK SN1081/Ae.tausc	21.91319	0.390748	20.53582	0.208872	0.516631	0.181578	0.011932	Finland
2014	hii (222)	0.297635	0.383574	17.60159	0.304253	0.533421	0.294476	-0.56171	CIMMYT
2014	Milan	-2.34232	0.418488	20.90892	-0.24873	0.419381	-0.05663	-0.41524	CIMMYT
2014	MILAN/SHA7	-2.03142	0.409959	21.06268	-0.09958	0.456484	0.300372	-0.4884	CIMMYT
2014	Mirakel	9.159597	0.379898	16.54052	0.348902	0.63239	0.864996	0.730523	Norway
2014	Møystad	-1.60314	0.388731	15.00226	-0.24302	0.437289	0.188055	0.14961	Norway
2014	Nanjing 7840	-3.75847	0.432073	16.39348	-0.00218	0.544636	0.319815	-0.04383	China
2014	Naxos	-5.07403	0.40261	25.10146	0.433983	0.490878	-0.25741	-0.00667	Germany
2014	Naxos/2*Saar	-15.6955	0.465103	19.95796	0.488212	0.451083	0.458983	-0.17499	Norway
2014	Ning 8343	4.816247	0.354146	17.45173	-0.85818	0.203103	-0.76196	-0.62231	China
2014	NK00521	4.169316	0.505247	24.03747	-0.36081	0.194926	-0.8632	-0.64826	Norway
2014	NK01513	-0.22441	0.431485	16.7038	-0.41836	0.398491	-0.17788	-0.03435	Norway
2014	NK01565	6.426055	0.481161	14.57198	0.048898	0.418045	0.144641	0.111179	Norway
2014	NK93602 (1995)	-1.16577	0.458169	16.44285	0.772082	0.590599	0.380796	0.02344	Norway
2014	NK93604	-5.09312	0.523274	13.09845	0.66758	0.551923	0.057558	0.211001	Norway
2014	Nobeokabouzu	-2.666	0.319868	21.24768	-1.09271	0.200234	-0.45863	-0.30134	China
2014	Norrøna	1.566618	0.410897	19.60447	-0.12885	0.3967	-0.13689	0.198669	Norway
2014	Paros	0.636782	0.448059	22.75443	0.990679	0.40724	-0.12032	-0.4932	Germany
2014	Paros/NK93602	-6.15553	0.38417	14.74757	0.368588	0.629226	0.308042	0.163568	Norway
2014	Polkka	-1.26855	0.406196	17.67423	-0.19465	0.38876	0.007074	0.105595	Sweden
2014	PRL/SARA	-10.3559	0.411289	14.92258	0.543429	0.581509	0.64814	0.563686	CIMMYT
2014	QUARNA	5.000872	0.349442	25.91667	-0.89297	0.228325	-0.97568	-0.65937	Switzerland
2014	RB07	-2.35875	0.456755	17.67829	0.138707	0.580604	0.480855	0.225345	USA
2014	Reno	-0.08389	0.376545	17.22223	0.07994	0.504626	0.103391	0.350205	Norway
2014	Rollo	3.466275	0.473762	22.18841	0.143666	0.389053	-0.16369	0.078058	Norway
2014	Runar	-5.11727	0.488902	20.14433	-0.24375	0.428114	-0.12199	0.06649	Norway
2014	Saar	-7.11519	0.421117	22.35173	-0.68263	0.290286	-0.41407	-0.31827	CIMMYT
2014	Sabin SABUF/5/BCN/4/ RABI//GS/CRA/3/ Ae.tauschii (190)	-5.44215	0.361696	21.01792	-0.38986	0.296776	-0.58423	-0.51291	USA
2014	SCA/Ae. tauschii (409)	4.092646	0.387701	19.70231	-0.11774	0.378086	-0.18447	-0.66709	CIMMYT
2014	SCA/Ae. tauschii (518)	-3.14038	0.50883	16.01588	0.056104	0.56218	0.707102	0.819008	CIMMYT
2014	Scirocco	-7.84778	0.372484	23.30219	0.004301	0.379622	-0.0733	0.1888	CIMMYT
2014	Seniorita	-9.07458	0.377601	21.65705	0.266333	0.407597	-0.22217	-0.18124	Germany
2014	SHA3/CBRD	2.333907	0.445969	17.10055	0.332762	0.405366	0.029113	0.243115	Norway
2014	Sport	0.338083	0.372251	19.46271	-0.70548	0.322473	-0.512	-0.73527	CIMMYT
2014	Sport	-4.73624	0.391817	16.17783	-0.13939	0.44918	0.109165	-0.07953	Sweden

2014	Sumai #3 (12SRSN)	-3.33947	0.340258	17.79955	-0.22877	0.428472	0.282755	0.015758	China
2014	Sumai 3 (18.)	3.640165	0.373334	16.95919	-0.1512	0.39978	-0.09688	-0.22023	China
2014	T10014	-3.47651	0.483479	14.42688	0.379002	0.556709	0.460388	0.450038	Norway
2014	T2038	-5.88807	0.442669	13.48887	0.057123	0.652026	0.325516	0.512402	Norway
2014	T7347	6.005738	0.419287	15.59089	0.603892	0.344562	-0.31444	-0.23473	Norway
2014	T9040	-0.22044	0.45235	18.30643	-0.30203	0.368894	-0.15154	-0.00995	Norway
2014	T9040 (1995)	-3.12609	0.354985	23.40824	-0.43346	0.305148	-0.32186	-0.05215	Norway
2014	Tjalve TJALVE/Purpur	-3.42192	0.414321	18.5022	0.248772	0.388034	-0.20951	-0.17046	Sweden
2014	seed	-1.28908	0.391199	23.262	0.036535	0.383331	-0.15834	-0.50095	Norway
2014	VEE/MYNA	-4.65602	0.380417	13.08582	0.393056	0.648131	0.705417	0.470842	CIMMYT
2014	Vinjett	15.67185	0.444908	16.28498	0.003505	0.579029	0.146809	0.197351	Sweden
2014	Wanamo	1.482873	0.487102	15.23102	0.177123	0.39734	-0.02663	-0.25432	Finland
2014	Wellamo	-4.26737	0.423199	18.0594	-0.43978	0.371049	-0.14936	-0.20425	Finland
2014	Zebra	-4.18526	0.417208	15.4505	-0.15074	0.586968	0.284897	0.636788	Sweden

Table S4. Mean percentage of clay, silt and sand, bulk density (4-9 cm depth) and porosity, pH, total carbon and nitrogen as well as contents of P, K, Ca, Mg and Mn at the locations of the experimental site. Abbreviations: c, control; wl, waterlogged. Values for bulk density and soil porosity was determined from six cylinders (two from each replicate) sampled at the borders of the locations in 2014. Soil texture, pH and chemical contents were determined in one sample for each location. Each of these four samples were consisted of sixteen, evenly distributed spot samples across the locations.

Location	Clay	Silt	Sand	Soil texture type	Bulk density (g ⁻¹ cm ³)	Soil porosity	pH	Tot. C %	Tot. N %	P mg ⁻¹ kg	K mg ⁻¹ kg	Ca mg ⁻¹ kg	Mg mg ⁻¹ kg	Mn mg ⁻¹ kg
N (wl)	25	58	18	silty loam	0.95	45	6.1	8.2	0.5	130	130	2500	250	14.2
N (c)	29	55	16	silty loam	0.80	55	5.9	6.3	0.4	160	130	2200	230	6.7
S (wl)	21	53	26	silty loam	0.93	50	5.5	6.5	0.4	140	88	3700	250	19.5
S (c)	14	38	48	medium loam	1.16	38	5.5	3.9	0.3	150	120	1700	100	14.2

Table S5. Redox potentials (Eh) ± the standard deviation measured at 4-5 cm depth at location N (north) and S (south) in 2014 to 2016.

	2014	2015		2016	
Location	N	N	S	S	N
3 days waterlogging	181±34	-	-	291±21	264±36
5 days waterlogging	-	-	-	282±10	290±33
8 days waterlogging	202±41	-	-	-	-
9 days waterlogging	-	213±37	219±33	-	-

Table S7. Correlations of traits in wheat (2013 and 2014). Abbreviations: CL, chlorosis; OC, overall condition score; HD, heading delay; PH, relative plant height; GBM5, green biomass score 5 days after drainage; GBM19, green biomass score 19 days after drainage; HN, relative head number.

2013		CL	PH	HD	OC		
	CL	-	-	-	-		
	PH	-0.27**	-	-	-		
	HD	0.47***	-0.27**	-	-		
	OC	-0.42***	0.52***	-0.51***	-		
2014		CL	GBM19	PH	GBM5	HN	HD
	CL	-	-	-	-	-	-
	GBM19	0.14	-	-	-	-	-
	PH	0.01	0.13	-	-	-	-
	GBM5	0.05	0.64***	0.29**	-	-	-
	HN	0.05	0.85***	0.25**	0.66***	-	-
	HD	-0.10	-0.68***	-0.13	-0.47***	-0.57***	-
	OC	0.08	0.64***	0.40***	0.40***	0.67***	-0.38***

Table S6. Correlations of traits in barley (2013 and 2014). Abbreviations: CL, chlorosis; OC, overall condition score; HD, heading delay; PH, relative plant height.

2013		CL	OC	PH	HD
	CL	-	-	-	-
	OC	-0.34***	-	-	-
	PH	-0.06	-0.07	-	-
	HD	0.43***	-0.26**	-0.37***	-
2014		CL	OC	PH	HD
	CL	-	-	-	-
	OC	-0.08	-	-	-
	PH	-0.40***	-0.06	-	-
	HD	-0.37***	0.05	0.55***	-
	HN	0.00	-0.04	-0.11	-0.34***

Table S8. Correlations of traits in wheat (2015 and 2016). Abbreviations: CL, chlorosis; OC, overall condition score; HD, heading delay; PH, relative plant height; S, relative straw yield; HN, relative head number.

2015	CL	OC	PH	HD	S	HN
	CL					
	OC	-0.79**				
	PH	-0.86***	0.57			
	HD	-0.60*	0.50	0.61*		
	S	-0.77**	0.71*	0.85**	0.56	
	HN	-0.61*	0.78**	0.47	0.59	0.58
2016	CL	OC	PH	HD	S	HN
	CL					
	OC	-0.62*				
	PH	0.00	0.47			
	HD	0.20	0.44	0.42		
	S	-0.50*	0.51*	0.43	-0.34	
	HN	-0.76***	0.43	-0.23	-0.53*	0.61*