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http://cytgen.com/articles/5440030s.pdf

Table S1. Genotypes of winter common wheat cultivars developed in MIW (M) and PBGI (S) registered before 1996 (1), in 1996-2010 (2), after 2010 (3). PBGI cultivars were also assigned to 5 groups of cultivars registered before 1996 (1*), in 1997-2002 (2*), 2003-2010 (3*), 2011-2014 (4*), and after 2014 (5*).

Cultivar name	*Gli-A1*	*Gli-B1*	*Gli-D1*	*Glu-A1*	*Glu-B1*	*Glu-D1*	*Gli-A3*	Group	5* periods
Volhohradskaya	*b*	*b*	*b*	*a*	*c*	*d*	*a*	M1	
Illichevka	*f*	*b*	*b*	*a*	*c*	*d*	*a*	M1	
Komsomolskaya 56	*c*	*b*	*g+f*	*a*	*c*	*d*	*a*	M1	
Myrleben	*o*	*l*	*g*	*c*	*c*	*d*		M1	
Mironovskaya 10	*o*	*l*	*b*	*a*	*c*	*d*		M1	
Mironovskaya 11	*b*	*b*	*g*	*b*	*c*	*d*	*b*	M1	
Mironovskaya 19	*f*	*l+b*	*b*	*b+a*	*c*	*d*		M1	
Mironovskaya 25	*y*	*b*	*f*	*b*	*c*	*d*	*b*	M1	
Mironovskaya 264	*c*	*b*	*g*	*a*	*c*	*d*	*a*	M1	
Myronivska 27	*b+x*	*l+b*	*b*	*b*	*c*	*d*	*c+d*	M1	
Myronivska 28	*o*	*l*	*b*	*a*	*c*	*d*	*b*	M1	
Mironovskaya 29	*y*	*d*	*f*	*a*	*c*	*d*	*b*	M1	
Myronivska 30	*b*	*l*	*b*	*b*	*c*	*d*	*c+b*	M1	
Myronivska 32	*f*	*b*	*g*	*b+a*	*c*	*d*	*b*	M1	
Myronivska 34	*f*	*b*	*b*	*c*	*c*	*d*	*b*	M1	
Mironovskaya 40	*f*	*b*	*b*	*a*	*c*	*d*	*a+b*	M1	
Mironovskaya 61	*f+x*	*l*	*b*	*a+b*	*c*	*d*	*a+b*	M1	
Mironovskaya 62	*f*	*x*	*b*	*b*	*c*	*d*	*a*	M1	
Myronivska 63	*f*	*d+l*	*f*	*a+b*	*c*	*d*	*b*	M1	

Mironovskaia 808	*f*	*b*	*g*	*a*	*c*	*d*	*a*	M1	
Myronivska napivintensyvna	*o*	*f*	*g*	*b*	*a*	*d*	*b*	M1	
Myronivska ostysta	*o*	*b*	*g*	*b*	*c*	*d*	*a*	M1	
Mironovskaya yubileinaya	*f*	*b*	*g*	*a*	*c*	*d*	*a*	M1	
Ukraiinka 0246	*c*	*b*	*a*	*a*	*c*	*a+d*	*a*	M1	
Bahira	*x*	*l*	*b*	*a*	*c*	*d*	*a*	M2	
Bohdana	*o*	*b*	*b*	*a*	*c*	*d*	*b*	M2	
Vdiachna	*y*	*d*	*f*	*a*	*c*	*d*	*b*	M2	
Veselka	*f*	*l*	*b*	*a*	*c*	*d*	*a*	M2	
Vesnianka	*w*	*b*	*b*	*b*	*d*	*d*	*nnn*	M2	
Vesta	*b*	*l*	*b*	*b*	*c*	*d*	*b*	M2	
Volynska 2	*f*	*l*	*i*	*a*	*u*	*d*		M2	
Volynska napivintensyvna	*o*	*l*	*b+g*	*c*	*c*	*d*	*b*	M2	
Volodarka	*o+b*	*b+l*	*b*	*a+b*	*c+u*	*d*	*b*	M2	
Voloshkova	*x*	*l*	*b*	*a*	*c*	*d*	*b*	M2	
Harazivka	*o*	*l*	*g*	*a+c*	*c*	*d*	*b*	M2	
Harant	*o*	*h*	*b*	*c*	*c+i*	*d*	*c*	M2	
Dashenka	*f*	*f*	*b*	*b*	*c*	*a*	*a*	M2	
Demetra (Myronivska 35)	*b*	*b*	*b*	*b*	*c*	*d*	*b*	M2	
Dobirna	*w*	*b*	*b*	*b*	*d*	*a*	*nnn*	M2	
Dostatok	*o*	*l*	*b*	*c+a*	*c*	*d*	*a*	M2	
Ekonomka	*b*	*b+l*	*b*	*b*	*c*	*d*	*b*	M2	
Ekspromt	*w*	*b*	*b*	*b*	*d*	*a*	*nnn*	M2	
Estet (Halleia)	*ag*	*h*	*b*	*b*	*a*	*e+a*	*b*	M2	
Zymoiarka	*c*	*f*	*b*	*a*	*c*	*a*	*b*	M2	
Zolotokolosa	*w*	*b*	*b*	*b*	*d*	*a*	*nnn*	M2	
Kalynova	*f*	*l*	*b*	*b*	*c*	*d*	*a*	M2	
Kolos Myronivshchyny	*b*	*l*	*b*	*b*	*c*	*d*	*a*	M2	
Kolumbiia	*w*	*b*	*b*	*b*	*d*	*a*	*nnn*	M2	

Kryzhynka	*x*	*l*	*b*	*a+b*	*c*	*d*	*b*	M2	
Lasunia	*x*	*b*	*j*	*c*	*u*	*d*	*d?*	M2	
Madiarka (Maritsa)	*b*	*l*	*b*	*b*	*c*	*d*	*a*	M2	
Myrych	*f*	*l*	*b*	*c*	*c*	*d*		M2	
Myrliena	*o*	*b*	*g*	*a*	*c*	*d*	*a*	M2	
Myronivska 31	*f*	*b*	*b*	*a*	*c*	*d*	*a+b*	M2	
Myronivska 33	*o*	*l*	*g*	*b*	*c*	*d*		M2	
Myronivska 65	*c*	*l*	*b*	*b*	*c*	*d*		M2	
Myronivska 66	*f*	*b*	*b*	*c+b*	*c*	*d*	*a+b*	M2	
Myronivska 67	*f*	*l*	*b*	*a*	*c*	*d*	*a*	M2	
Myronivska ranniostyhla	*y*	*b*	*f*	*a*	*c*	*d*	*b*	M2	
Myronivska storichna	*f*	*x+l*	*b*	*b*	*c*	*d*	*e*	M2	
Myrkhad	*o*	*f*	*g*	*c*	*c*	*a*	*c*	M2	
Myrianka	*x+f*	*l*	*b*	*a*	*c*	*d*	*a*	M2	
Mytets	*f*	*b*	*g*	*b+a*	*u*	*d*	*a*	M2	
Modus (Mykolaiivka)	*b*	*h*	*b*	*a*	*d*	*d*	*d*	M2	
Monoloh	*w*	*d*	*f*	*b*	*c*	*d*	*nnn*	M2	
Monotyp	*f*	*h*	*b*	*b*	*a*	*e*	*b*	M2	
Natalka	*c*	*b*	*g*	*a*	*c*	*d*	*a*	M2	
Oktava	*b*	*e*	*b*	*b+c*	*d*	*d*	*b*	M2	
Pamiati Pemesla	*b*	*b*	*b*	*b*	*u*	*d*	*a*	M2	
Pereiaslavka	*b*	*b*	*g*	*b*	*u*	*d*	*c*	M2	
Pyvna	*o*	*l*	*l*	*a*	*c*	*d*		M2	
Podolianka	*o*	*b*	*b*	*a*	*c*	*d*	*b*	M2	
Pochaiivka	*f*	*h*	*b*	*a*	*c*	*d*	*b*	M2	
Pemeslivna	*b*	*b*	*b*	*b*	*u*	*d*	*a*	M2	
Sviatkova	*x*	*l*	*b*	*b*	*c*	*d*		M2	
Slavna	*w*	*b*	*b*	*a*	*d*	*a*	*nnn*	M2	
Smila	*w*	*b*	*b*	*b*	*d*	*a*	*nnn*	M2	

Smuhlianka	*w*	*b*	*b*	*a*	*d*	*a*	*nnn*	M2	
Snihurka	*o*	*b*	*b*	*a*	*c*	*d*	*b*	M2	
Snizhana (Venera)	*b*	*l*	*f*	*b*	*c*	*d*	*b*	M2	
Troian	*f*	*l*	*b+g*	*a*	*a*	*d*		M2	
Favorytka	*o*	*l*	*b*	*c*	*c*	*d*	*b+a*	M2	
Khazarka	*o*	*l*	*b*	*a*	*c*	*d*	*b*	M2	
Khurtovyna	*b*	*b*	*b*	*a*	*c*	*d*	*b*	M2	
Yuviliar myronivskyi	*x*	*l*	*b*	*b*	*c*	*d*	*b*	M2	
Yavoryna	*w*	*b*	*b*	*b*	*d*	*a*	*nnn*	M2	
Yasnohirka	*o*	*b*	*b*	*a*	*c*	*d*	*b*	M2	
Balada myronivska	*b*	*b*	*b*	*a+b*	*c*	*d*	*b*	M3	
Berehynia myronivska	*b*	*l*	*b*	*b*	*c*	*d*	*c*	M3	
Vezha myronivska	*f*	*b*	*g*	*b*	*c*	*d*	*a*	M3	
Horlytsia myronivska	*b*	*d*	*x+b*	*b*	*c*	*d*	*b*	M3	
Hospodynia myronivska	*ag*	*l*	*b*	*b*	*c*	*d*	*b*	M3	
Hratsiia myronivska	*o*	*b*	*b*	*b*	*c*	*a*	*b*	M3	
Elehiia Myronivshchyny	*f*	*b*	*g*	*a*	*u*	*d*	*a+b*	M3	
Estafeta myronivska	*b*	*l*	*b*	*b*	*u*	*d*	*b*	M3	
Zluka	*x*	*l*	*f*	*a*	*c*	*d*	*c*	M3	
Lehenda myronivska	*x*	*l*	*b*	*a*	*c*	*d*	*a+b*	M3	
Myronivska zolotoverkha	*o*	*l*	*g*	*b*	*c*	*d*		M3	
Myronivska slava	*x*	*f*	*b*	*b*	*c*	*d*	*a*	M3	
MIP Assol	*x*	*b*	*b*	*b*	*c*	*d*	*b*	M3	
MIP Valensiia	*b*	*b+l*	*g*	*b*	*c*	*d*	*b*	M3	
MIP Vyshyvanka	*o+x*	*b*	*b+g*	*b*	*c*	*d*	*a*	M3	
MIP Dniprianka	*x*	*l*	*b*	*a+b*	*c*	*d*	*b*	M3	
MIP Kniazhna	*o*	*f+b*	*g*	*a*	*u*	*d*	*a*	M3	
Oberih myronivskyi	*o*	*b*	*b*	*b*	*c*	*a*	*b*	M3	
Svitanok myronivskyi	*b*	*l*	*b*	*b*	*c*	*d*	*a*	M3	

Spasivka	*w*	*b*	*b*	*a*	*d*	*a*	*nnn*	M3	
Trudivnytsia myronivska	*x*	*l*	*b*	*a*	*c*	*d*	*b*	M3	
Albatros odesskiy	*b*	*b*	*g+j*	*a*	*u*	*d*	*a*	S1	1*
Brigantina	*b*	*e*	*j+f*	*b*	*d+u*	*d*	*b*	S1	1*
Vympel odesskiy	*o+b*	*b*	*b*	*b*	*c*	*d*	*b*	S1	1*
Erytrospermum 122	*b+c*	*b*	*b*	*b+a*	*c*	*d*	*b*	S1	1*
Erytrospermum 87	*b*	*b*	*g*	*a*	*c*	*d*	*b*	S1	1*
Zabava odeska	*b*	*b*	*g*	*b*	*u*	*d*	*b*	S1	1*
Zalyv	*b*	*l+b*	*b*	*a*	*u+c*	*d*	*b*	S1	1*
Zirka	*b*	*d+b*	*b+j*	*b*	*u*	*d*	*b*	S1	1*
Kooperatorka	*m*	*b*	*g*	*a*	*c*	*d*	*a*	S1	1*
Lada odeska	*b*	*b*	*g*	*a+b*	*c+u*	*d*	*b*	S1	1*
Lan	*o*	*b*	*b*	*b*	*c*	*d*	*b*	S1	1*
Obrii	*b*	*b*	*j*	*b*	*u*	*d*	*b*	S1	1*
Odesskaya polukarlikovaia	*b*	*b*	*b+g*	*b*	*c*	*d*	*b*	S1	1*
Odeska 117	*o*	*b*	*g+f*	*a*	*c*	*d*	*b*	S1	1*
Odeska 120	*b*	*b*	*f*	*b+a*	*u*	*d*	*b*	S1	1*
Odeska 132	*o*	*b*	*b*	*b*	*c*	*d*	*b*	S1	1*
Odeska 133	*b*	*b*	*j*	*a*	*u*	*d*	*b*	S1	1*
Odesskaya 16	*m+o*	*b*	*g*	*a*	*u+c*	*d*	*a+b*	S1	1*
Odesskaya 160	*b*	*b*	*g*	*b*	*u*	*d*	*b*	S1	1*
Odeska 161	*b+c*	*b*	*b+j*	*b+a*	*c*	*d*	*a+b*	S1	1*
Odeska 162	*c+b*	*b*	*j+b*	*a+b*	*c*	*d*	*a+b*	S1	1*
Odesskaya 26	*c*	*b*	*j*	*b*	*c*	*d*	*a*	S1	1*
Odeska 265	*b*	*b*	*x*	*b*	*c+u*	*d*	*b*	S1	1*
Odesskaya 266	*b*	*b*	*j*	*a*	*u*	*d*	*b*	S1	1*
Odesskaya 268	*b+f*	*b*	*b*	*a+b*	*u*	*d*	*a+b*	S1	1*
Odesskaya 3	*m*	*d*	*j*	*c*	*c*	*a*	*b*	S1	1*
Odesskaya 51	*b+o*	*b*	*g+b*	*a+b*	*u*	*d*	*b+b*	S1	1*
Odesskaya 66	*b*	*b+l*	*f*	*a*	*u*	*d*	*b*	S1	1*

Odesskaya 75	*b*	*b*	*b*	*b*	*c*	*d*	*b*	S1	1*
Odesskaya 76	*o+b*	*b*	*g+b*	*a*	*c*	*d*	*b*	S1	1*
Odesskaya 83	*b*	*b*	*f*	*a*	*u*	*d*	*b*	S1	1*
Odesskaya 95	*o+b*	*b*	*b+g*	*b*	*u+c*	*d*	*b*	S1	1*
Odesskaya krasnokolosaya	*g*	*c*	*f*	*b*	*al*	*d*	*a*	S1	1*
Odesskaya ostistaya	*b*	*b*	*b*	*a*	*c*	*d*	*b*	S1	1*
Olviya	*b*	*b*	*x*	*b*	*c*	*d*	*b*	S1	1*
Peresvet	*b*	*b+c*	*f+b*	*b*	*c*	*d*	*a*	S1	1*
Porada	*o*	*b*	*g*	*b*	*c*	*d*	*b*	S1	1*
Priboy	*o*	*b*	*b*	*a*	*c*	*d*	*b*	S1	1*
Progress	*m*	*b*	*j*	*b*	*c*	*d*	*a+b*	S1	1*
Prokofievka	*b+g*	*b*	*x+g*	*b*	*u+c*	*d*	*a+b*	S1	1*
Prometei	*b*	*b*	*g*	*a*	*c*	*d*	*a+b*	S1	1*
Promin	*b*	*b*	*j*	*b*	*u*	*d*	*b*	S1	1*
Selena	*c*	*b*	*g*	*c*	*c*	*d*	*a*	S1	1*
Simvol odesskyi	*b*	*b*	*j+g*	*a+b*	*u*	*d*		S1	1*
Stepniak	*o*	*b*	*b*	*a*	*c*	*d*	*b*	S1	1*
Stepovychka	*b*	*b*	*g+j*	*a+b*	*u*	*d*	*a*	S1	1*
Ukraiinka odeska	*b*	*b*	*g*	*a*	*u*	*d*	*a*	S1	1*
Fantaziia odeska	*b*	*b*	*j*	*b+a*	*u*	*d*	*a+b*	S1	1*
Fedorovka	*c*	*b*	*g*	*b*	*u*	*d*	*b*	S1	1*
Khvylia	*b*	*d*	*b*	*b*	*u*	*d*	*a*	S1	1*
Chaika	*o*	*b*	*b*	*a*	*c*	*d*	*b*	S1	1*
Charivnytsia odeska	*o*	*b*	*b*	*b*	*c*	*d*	*a*	S1	1*
Yuvileina 75	*b*	*c*	*f+b*	*b*	*c*	*d*	*a*	S1	1*
Yuzhnaia zaria	*b*	*b*	*b*	*a*	*c*	*d*	*a*	S1	1*
Yunnat odesskyi	*b*	*b*	*b*	*a*	*c*	*d*	*b*	S1	1*
Yakor odesskyi	*b*	*b*	*b+j*	*b*	*u+c*	*d*	*a+b*	S1	1*
Antonivka	*b+o*	*b*	*j*	*b*	*u*	*d*	*a+b*	S2	3*

Bezmezhna	*b+o*	*b*	*j*	*a+b*	*c+u*	*d*	*a+b*	S2	3*
Blahodarka odeska	*b+o*	*b*	*b*	*a+b*	*u*	*d*	*a+b*	S2	3*
Borvii	*b*	*b*	*g*	*a*	*u*	*d*	*a*	S2	3*
Bunchuk	*b*	*b*	*b+g*	*b*	*c*	*d*	*b*	S2	3*
Vdala	*b*	*b*	*g*	*a+b*	*u*	*d*	*a+d*	S2	3*
Viktoriia odeska	*b*	*b*	*g*	*b*	*u+c*	*d*	*a*	S2	2*
Hoduvalnytsia odeska	*b*	*e*	*g*	*b*	*u+c*	*d*	*b*	S2	3*
Hospodynia	*b*	*b*	*g+b*	*b*	*u*	*d*	*a*	S2	3*
Dalnytska	*b*	*e*	*g*	*b*	*u*	*d*	*b*	S2	3*
Dobropolka	*b*	*d+b*	*j*	*a*	*u*	*d*	*a*	S2	2*
Diuk	*b*	*b*	*j*	*b+a*	*c*	*d*	*a*	S2	3*
Epokha odeska	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S2	3*
Yednist	*b*	*e*	*g*	*b*	*u*	*d*	*b*	S2	3*
Zhaivir	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S2	3*
Zahrava odeska	*b+f*	*b*	*g+x*	*b+a*	*u*	*d*	*a+b*	S2	3*
Zamozhnist	*o+b*	*b*	*b+j*	*a+b*	*u*	*d*	*a*	S2	3*
Zaporuka	*o*	*b*	*g+b*	*b+a*	*c+u*	*d*	*a+b*	S2	3*
Zastava odeska	*b*	*e*	*g+f*	*b*	*u+d*	*d*	*a+b*	S2	2*
Zemliachka odeska	*b*	*b*	*j+g*	*b*	*u*	*d*	*a*	S2	3*
Zmina	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S2	3*
Znakhidka odeska	*b*	*b*	*j*	*a*	*u*	*d*	*a*	S2	2*
Zustrich	*g*	*b*	*x*	*b*	*u*	*d*	*a*	S2	2*
Kiriia	*b*	*b*	*j*	*b*	*c*	*d*	*a*	S2	3*
Kosovytsia	*b+o*	*b*	*j*	*b+a*	*c*	*d*	*a+b*	S2	3*
Krasen	*b*	*c*	*i*	*b*	*c*	*d*	*a*	S2	3*
Krasunia odeska	*b*	*b*	*j*	*b*	*u*	*d*	*a*	S2	2*
Kuialnyk	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S2	3*

Leleka	*g*	*c*	*b*	*b*	*al*	*d*	*a*	S2	2*
Lelia	*b*	*b*	*g+b*	*a*	*u*	*d*	*a*	S2	2*
Lytanivka	*b*	*e*	*g*	*b*	*u*	*d*	*b*	S2	3*
Liona	*b*	*b+d*	*f+j*	*b+a*	*c+u*	*d*	*a*	S2	3*
Lira odeska	*b*	*b*	*j*	*b*	*u*	*d*	*a*	S2	4*
Luzanivka odeska	*b*	*d*	*g*	*a*	*u*	*d*	*b*	S2	2*
Liubava odeska	*b*	*d+b*	*b+j*	*a*	*u+c*	*d*	*a+b*	S2	2*
Misiia odeska	*b*	*b*	*g*	*b*	*u*	*d*	*a*	S2	3*
Nadiia odeska	*b*	*e*	*j*	*b*	*c*	*a*	*b*	S2	2*
Nikoniia	*b*	*b*	*j*	*a*	*u*	*d*	*a*	S2	2*
Odeska 267	*b*	*b+b**	*g*	*b*	*u*	*d*	*b*	S2	2*
Oksamytna	*b*	*b*	*j*	*b*	*c*	*d*	*b*	S2	2*
Oksana	*b*	*b*	*g*	*b*	*c*	*d*	*b*	S2	3*
Otaman	*b*	*b*	*j*	*b*	*c+u*	*d*	*b*	S2	3*
Panna	*g*	*c*	*g*	*a*	*al*	*d*	*a*	S2	2*
Pysanka	*b*	*b*	*g*	*b*	*u+c*	*d*	*b*	S2	3*
Povaha	*b+o*	*b*	*g+j*	*a+b*	*c*	*d*	*a+b*	S2	3*
Podiaka	*o*	*b+d*	*b*	*b*	*u*	*d*	*b*	S2	3*
Poliovyk	*g+b*	*b*	*g*	*a*	*u*	*d*	*a*	S2	3*
Poshana	*b*	*b*	*g*	*b*	*u*	*d*	*a*	S2	3*
Pryma odeska	*c*	*f+d*	*f+b*	*b+c*	*u+c*	*d*	*b*	S2	2*
Selianka odeska	*g*	*b*	*g*	*b*	*u*	*d*	*a*	S2	2*
Syrena odeska	*o*	*b*	*g+b*	*b*	*u+c*	*d*	*b*	S2	2*
Skarbnytsia	*b*	*b*	*j*	*a*	*al*	*d*	*d*	S2	3*
Sluzhnytsia odeska	*b*	*e*	*g*	*b*	*u*	*d*	*b*	S2	3*
Strumok	*o*	*d*	*b*	*b*	*c*	*d*	*b*	S2	2*
Suputnytsia	*b*	*b*	*x*	*b*	*c+u*	*d*	*b*	S2	3*
Tira	*g*	*b*	*j+b*	*a*	*c*	*d*	*a*	S2	2*
Tronka	*b+o*	*b*	*g*	*b+a*	*u*	*d*	*a+b*	S2	3*
Turunchuk	*b*	*b*	*j*	*a*	*u*	*d*	*a*	S2	3*

Uzhynok	*g*	*b*	*g*	*b*	*u*	*d*	*a*	S2	3*
Biliava	*g*	*b*	*g*	*b*	*u*	*d*	*a*	S3	5*
Vatazhok	*b+g*	*b*	*b*	*b*	*c+u*	*d*	*a+b*	S3	4*
Veteran	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S3	4*
Vykhovanka	*w*	*e*	*b*	*a+b*	*c*	*d*	*nnn*	S3	4*
Vihen	*b*	*d*	*j+f*	*a*	*u*	*d*	*a*	S3	4*
Vidpovid	*g*	*l*	*j*	*b*	*c*	*a*	*a*	S3	5*
Harantiia odeska	*g+o*	*b*	*j*	*b*	*u*	*d*	*a*	S3	5*
Harmoniia odeska	*o*	*b*	*g+x*	*b*	*c*	*d*	*a*	S3	5*
Holubka odeska	*b*	*b*	*j*	*a*	*u*	*d*	*a*	S3	4*
Hurt	*b*	*b*	*f*	*a*	*u*	*d*	*a*	S3	4*
Dachnianka	*g*	*b*	*g*	*a+b*	*c*	*d+a*	*a*	S3	5*
Dobrochyn	*g*	*b*	*g+f*	*b*	*al*	*d*	*a+b*	S3	4*
Era odeska	*b+g*	*b*	*g*	*b*	*al*	*d*	*a*	S3	4*
Zhytnytsia odeska	*b+w*	*b+e*	*g+x*	*b*	*c+u*	*d*	*a+nnn*	S3	5*
Zhuravka odeska	*b*	*bLast*	*j*	*a*	*u*	*d*	*a*	S3	4*
Zadumka odeska	*b+g*	*b*	*g*	*b*	*al+c*	*d*	*a*	S3	4*
Zvytiaha	*b*	*b*	*j*	*b*	*u*	*d*	*a*	S3	4*
Zysk	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S3	4*
Zlahoda	*b*	*b*	*b*	*b*	*u*	*d*	*a*	S3	4*
Zorepad	*g*	*b*	*x*	*b*	*al*	*d*	*a*	S3	4*
Istyna odeska	*b*	*e*	*g+b*	*b*	*u*	*d*	*b*	S3	4*
Kantata odeska	*b+o*	*b*	*g*	*b*	*u*	*d*	*a*	S3	5*
Katrusia odeska	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S3	5*
Klad	*g+ b*	*b*	*g*	*a+b*	*u*	*d*	*a*	S3	5*
Kniahynia Olha	*w*	*b+e*	*g*	*b*	*c*	*d*	*nnn*	S3	4*
Kruhozir	*b*	*b*	*g*	*a*	*al*	*d*	*a*	S3	5*
Kubok	*g*	*b*	*j*	*a+b*	*c*	*d*	*a*	S3	5*
Lanovyi	*b*	*b*	*j*	*b*	*c*	*d*	*b*	S3	4*
Lastivka odeska	*b*	*bLast*	*j*	*a*	*u*	*d*	*a*	S3	4*

Lebidka odeska	*b*	*e*	*g*	*b*	*u*	*d*	*b*	S3	4*
Melodiia odeska	*b*	*e*	*g*	*b*	*c*	*d*	*b*	S3	4*
Mudrist odeska	*b+g*	*b*	*g*	*a*	*al*	*d*	*a*	S3	5*
Nasnaha	*b+g*	*b*	*g*	*b*	*c*	*d*	*a*	S3	5*
Nebokrai	*b*	*b*	*j*	*a*	*u*	*d*	*a*	S3	4*
Nyva odeska	*g*	*b*	*g*	*b*	*c*	*d*	*a*	S3	4*
Obriad	*b*	*b*	*g*	*b*	*u+c*	*d*	*b*	S3	4*
Perepilka	*g+b*	*b*	*x*	*b*	*c+u*	*d*	*b*	S3	5*
Pylypivka	*b*	*b*	*g*	*b*	*u*	*d*	*b*	S3	4*
Poklyk	*b*	*b*	*f*	*a*	*u*	*d*	*b*	S3	4*
Postat	*g*	*b*	*g*	*a+b*	*u*	*d*	*a*	S3	5*
Pozkvit	*g+b*	*b*	*g*	*a*	*al*	*d*	*b*	S3	5*
Pozmai	*b*	*d*	*j*	*a*	*u*	*d*	*b*	S3	4*
SHI 100	*b+f*	*b*	*j+b*	*a+b*	*c+u*	*d*	*a*	S3	5*
Sich	*g*	*b*	*g*	*b*	*u*	*d*	*a*	S3	5*
Slaven	*b*	*b*	*j+null*	*a+b*	*c*	*d*	*a*	S3	5*
Sonata odeska	*b*	*b*	*g+j*	*a+b*	*u*	*d*	*a*	S3	5*
Sofiika	*g*	*b*	*g*	*c*	*al*	*d*	*a*	S3	5*
Storytsia	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S3	5*
Tradytsiia	*g*	*b*	*g*	*b*	*al*	*d*	*a*	S3	4*
Khvala	*g+b*	*b*	*g*	*b*	*c+u*	*d*	*a*	S3	5*
Khyst	*b*	*b+d*	*f+b*	*b+a*	*u*	*d*	*a*	S3	4*
Shchedrist odeska	*g+m*	*l*	*j*	*b*	*c*	*a*	*a*	S3	4*

Table S2. Average total monthly and annual precipitation (x), mm in periods of time 1-3, its standard error (SE), significant differences between values in different periods of time for the station Cherkasy

Month	1961-1991 (1)		1992-2005 (2)		2006-2015 (3)		Significant difference		
	x	SE	x	SE	x	SE	2-1	3-2	3-1
I	35	5	32	5	32	5			
II	33	4	27	4	35	7			
III	28	3	42	6	42	9	14*		
IV	37	3	38	6	26	6			
V	39	4	52	7	53	10			
VI	65	5	74	7	77	21			
VII	75	6	58	9	55	9			
VIII	54	6	54	8	48	8			
IX	36	6	59	11	65	14			
X	32	4	46	10	33	7			
XI	39	4	44	4	28	5		-16*	
XII	42	4	30	6	39	8			
Annual	515	21	556	25	532	24			

*P<0,05

Table S3. Average total monthly and annual precipitation (x), mm in periods of time 1-3, its standard error (SE), significant differences between values in different periods of time for the station Odesa

Month	1961-1991 (1)		1992-2005 (2)		2006-2015 (3)		Significant difference		
	X	SE	x	SE	x	SE	2-1	3-2	3-1
I	38	5	34	8	52	7			
II	37	5	37	7	34	8			
III	29	4	39	6	34	8			
IV	35	5	27	5	33	7			
V	43	6	37	8	36	9			
VI	50	6	56	9	58	12			
VII	58	7	52	12	51	10			
VIII	42	7	47	10	23	9			
IX	41	7	52	15	44	11			
X	26	3	36	8	39	7			
XI	38	6	57	7	36	11	19*		
XII	46	5	32	5	47	13			
Annual	481	21	505	36	486	29			

*P<0,05

Table S4. Average monthly and annual temperature (x), ℃ in periods of time 1-3, its standard error (SE), significant differences between values in different periods of time for the station Cherkasy

Month	1961-1991 (1)		1992-2005 (2)		2006-2015 (3)		Significant difference		
	x	SE	x	SE	x	SE	2-1	3-2	3-1
I	-5.8	0.7	-3.3	0.8	-4.0	0.9	2.5*		
II	-4.6	0.6	-2.7	0.8	-3.5	1.1			
III	0.3	0.6	1.4	0.7	2.5	0.8			2.3*
IV	8.7	0.4	9.3	0.5	9.7	0.4			
V	15.2	0.3	15.2	0.5	16.5	0.6			
VI	18.4	0.3	18.5	0.5	20.1	0.5		1.6*	1.7**
VII	19.8	0.3	20.8	0.5	21.9	0.4			2.1***
VIII	19.1	0.2	19.8	0.3	20.8	0.5			1.7**
IX	14.2	0.2	14.1	0.5	15.0	0.5			
X	7.9	0.3	8.1	0.2	8.3	0.6			
XI	2.1	0.4	1.7	0.9	4.0	0.8			1.8*
XII	-2.5	0.4	-3.1	0.9	-0.9	0.7		2.3*	1.6*
Annual	**7.7**	**0.2**	**8.3**	**0.2**	**9.2**	**0.2**	**0.6***	**0.9****	**1.5*****

*P<0.05. **P<0.01; ***P<0.001

Table S5. Average monthly and annual temperature (x), ℃ in periods of time 1-3. its standard error (SE), significant differences between values in different periods of time for the station Odesa

Month	1961-1991 (1)		1992-2005 (2)		2006-2015 (3)		Significant difference		
	x	SE	x	SE	x	SE	2-1	3-2	3-1
I	-2.1	0.6	-0.6	0.6	-0.4	0.8			
II	-1.3	0.5	0.3	0.7	-0.2	0.8			
III	2.7	0.4	3.7	0.5	4.7	0.5			2.0**
IV	9.4	0.3	9.4	0.4	10.5	0.2		1.0*	1.1**
V	15.4	0.3	15.8	0.4	17.0	0.5			1.6**
VI	19.6	0.2	19.9	0.3	21.5	0.3		1.6**	1.9***
VII	21.7	0.2	22.9	0.5	23.9	0.3	1.2*		2.2***
VIII	21.2	0.2	22.3	0.3	23.8	0.4	1.1**	1.5**	2.6***
IX	16.7	0.2	16.9	0.5	18.2	0.5			1.5**
X	10.7	0.3	11.6	0.2	11.9	0.5	0.9*		1.2*
XI	5.4	0.3	5.7	0.7	7.4	0.7			2.0*
XII	0.8	0.3	0.6	0.8	2.3	0.5			1.5*
Annual	**10.0**	**0.2**	**10.7**	**0.2**	**11.7**	**0.2**	**0.7****	**1.0*****	**1.7*****

*P<0.05. **P<0.01; ***P<0.001

Table S6. Allele frequencies at storage protein loci in PBGI (S) and MIW (M) cultivars and significance of differences (P) (numbers of cultivars in each group are in parentheses)

Locus, alleles	S (167)	M (108)	P	Locus, alleles	S (167)	M (108)	P
Gli-A1				*Gli-D1*			
b	**0.605**	**0.204**	***	*b*	**0.198**	**0.676**	***
c	0.033	0.056		*f*	0.066	0.088	
f	0.009	**0.231**	***	*g*	**0.422**	**0.204**	***
g	**0.195**	0.000	***	*i*	0.006	0.009	
m	0.024	0.000		*j*	**0.257**	0.009	****
o	**0.120**	**0.222**		*l*	0.000	0.009	
w	0.015	**0.102**	**	*x*	0.048	0.005	
x	0.000	**0.130**	***	*null*	0.003	0.000	
ag	0.000	0.019					
y	0.000	0.037		*Glu-A1*			
				a	**0.341**	**0.431**	
Gli-B1				*b*	**0.638**	**0.477**	***
b	**0.799**	**0.454**	***	*c*	0.021	0.093	
c	0.033	0.000					
d	0.057	0.042		*Glu-B1*			
e	0.075	0.009		*a*	0.000	0.037	
f	0.003	0.051		*al*	**0.123**	0.000	***
h	0.000	0.046		*u*	**0.491**	0.088	***
l	0.018	**0.384**	***	*c*	**0.380**	**0.759**	***
x	0.000	0.014		*d*	0.006	**0.111**	*
*b**	0.003	0.000		*i*	0.000	0.005	
bLast	0.012	0.000					
				Glu-D1			
Gli-A3				*a*	0.027	**0.139**	***
a	**0.536**	**0.325**	***	*d*	**0.973**	**0.847**	***
b	**0.440**	**0.464**		*e*	0.000	0.014	
c	0.000	0.062					
d	0.009	0.026					
e	0.000	0.010					
nnn	0.015	0.113	*				

*P <0.05; ** P<0.01; ***P<0.001

Table S7. Proportion of membership of groups of PBGI cultivars registered before 1996 (S1), in 1996-2010 (S2), after 2010 (S3) in each of the 5 clusters determined using the STRUCTURE software [26]

Groups of cultivars (number)	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
S1 (56)	0.034	0.050	0.151	**0.500**	0.266
S2 (59)	0.178	0.050	0.212	0.201	**0.358**
S3 (52)	**0.429**	0.065	0.160	0.071	0.275

Table S8. Alleles whose frequencies significantly differ between groups of cultivars developed in a certain breeding center in different periods of breeding (MIW (M) and PBGI (S) cultivars registered before 1996 (1), in 1996-2010 (2), and after 2010 (3)), significance of differences (P) and pattern of change

Allele	Groups of cultivars		P	Pattern of change*
Gli-A1f	M1	M3	<0.05	-
Gli-A1o	S1	S3	<0.05	-
Gli-A1o	S2	S3	<0.05	-
Gli-A1x	M2	M3	<0.05	+
Gli-A1g	S1	S3	<0.001	+
Gli-A1g	S2	S3	<0.001	+
Gli-A1g	S1	S2	<0.05	+
Gli-D1b	S1	S3	<0.001	-
Gli-D1b	S1	S2	<0.01	-
Gli-D1b	M1	M2	<0.01	+
Gli-D1g	M1	M2	<0.05	-
Gli-D1g	S1	S3	<0.05	+
Glu-A1b	S1	S2	<0.05	+
Glu-B1al	S1	S3	<0.001	+
Glu-B1b	S1	S2	<0.05	+
Glu-B1c	M1	M2	<0.01	-
Glu-B1c	S1	S2	<0.01	-
Glu-B1c	S1	S3	<0.01	-
Glu-B1d	M1	M2	<0.05	+
Glu-D1d	M1	M2	<0.05	-
Gli-A3a	S1	S3	<0.001	+
Gli-A3a	S1	S2	<0.001	+
Gli-A3b	S1	S3	<0.001	-
Gli-A3b	S2	S3	<0.001	-
Gli-A3b	S1	S2	<0.001	-

*"+" – increase in the allele frequency. "-" – decrease

Table S9. Frequencies of storage protein alleles in groups of PBGI cultivars developed in different periods of time, average annual temperature (t) in these periods, and values of Spearman's rank correlation coefficient (ρ) for relationship between temperature and allele frequency

$Period^t$	1960-1990	1991-1997	1998-2005	2006-2009	2010-2015	ρ
t, ºC	10.1	10.2	11.1	11.7	11.8	
Allele	Allele frequencies					
Gli-A1g	0.035	0.250	0.158	0.333	0.696	0.9*
Gli-A3a	0.386	0.650	0.684	0.667	0.913	0.9*
Gli-A3b	0.754	0.450	0.526	0.333	0.087	-0.9*
Glu-B1al	0.018	0.100	0.132	0.233	0.261	1*

*P<0.05

$Period^t$ - period of time for which the average annual temperature was determined corresponds to the time of selection of genotypes for future cultivars registered in the periods of time 1*-5* (table S1): before 1996 (1*), in 1997-2002 (2*), 2003-2010 (3*), 2011-2014 (4*), and after 2014 (5*).

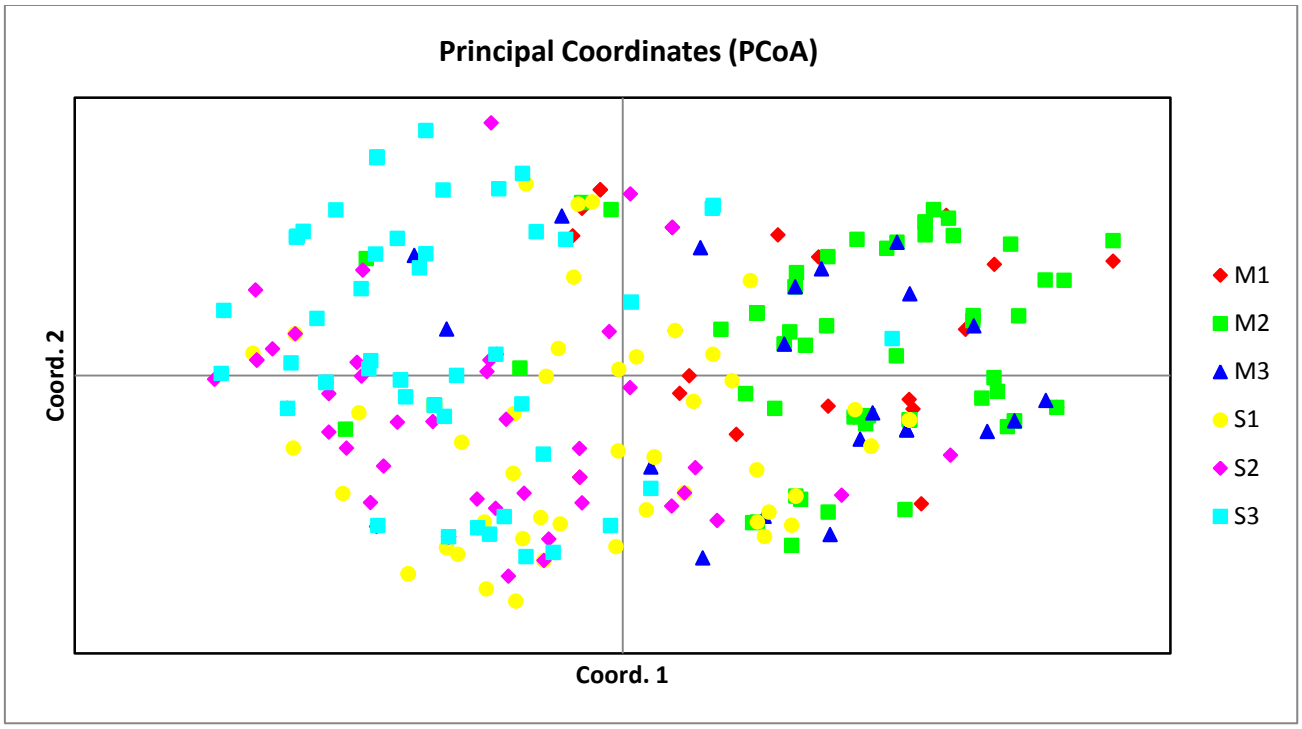

Fig. S1. Principal coordinate analysis of 275 MIW (M) and PBGI (S) cultivars registered before 1996 (1), in 1996-2010 (2), and after 2010 (3) based on analysis of genotypes at the storage protein loci

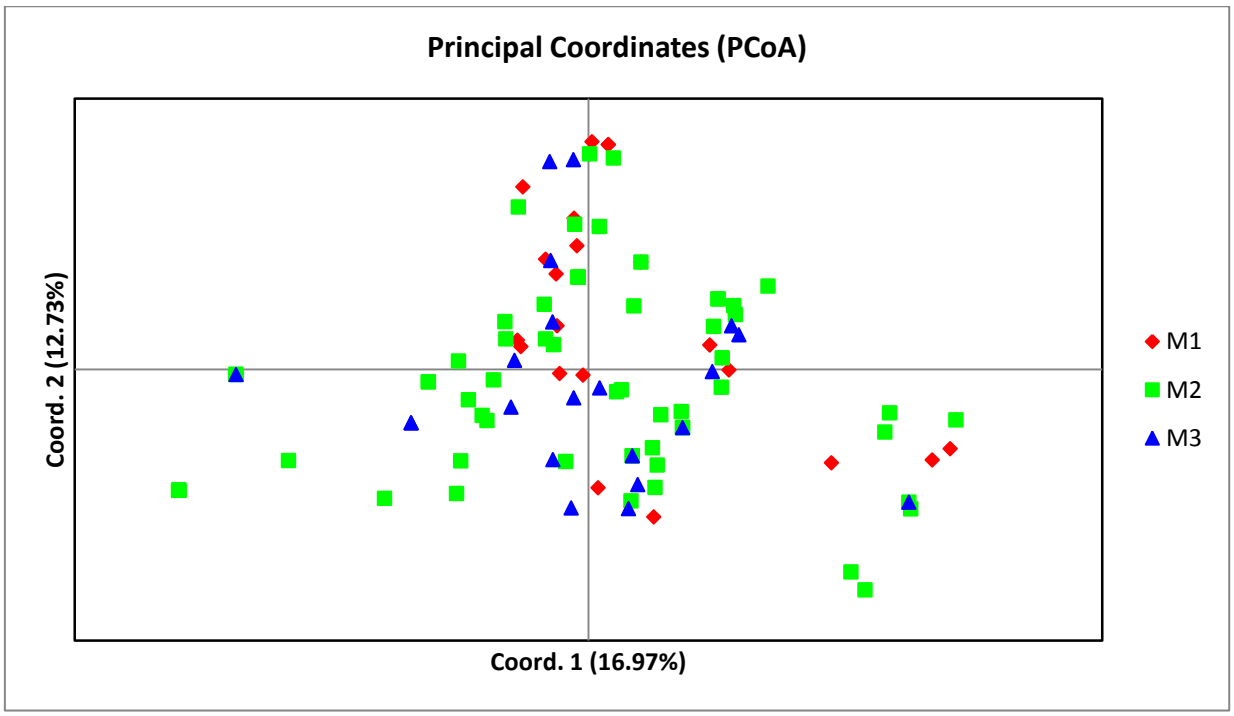

Fig. S2. Principal coordinate analysis of 108 MIW (M) cultivars registered before 1996 (1), in 1996-2010 (2), and after 2010 (3) based on analysis of genotypes at the storage protein loci

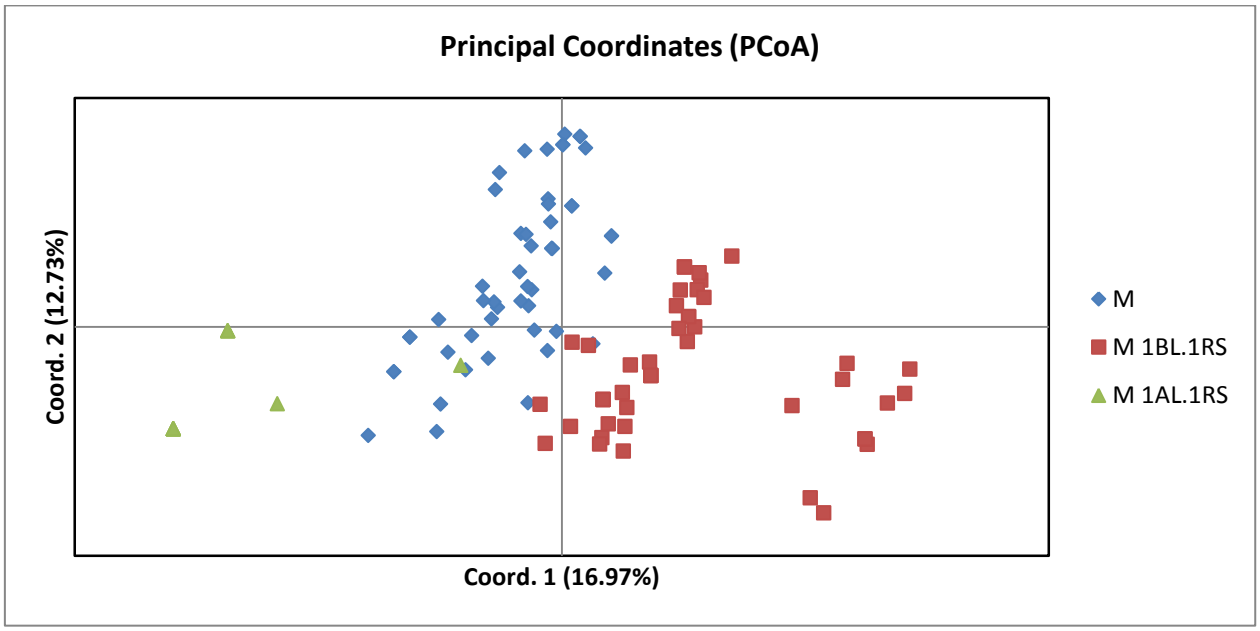

Fig. S3. Principal coordinate analysis of 108 MIW cultivars (without any wheat-rye translocation (M), with the wheat-rye 1BL.1RS translocation as in the cultivar Kavkaz (M 1BL.1RS), with the wheat-rye 1AL.1RS translocation as in the cultivar Amigo (M 1AL.1RS)) based on analysis of genotypes at the storage protein loci

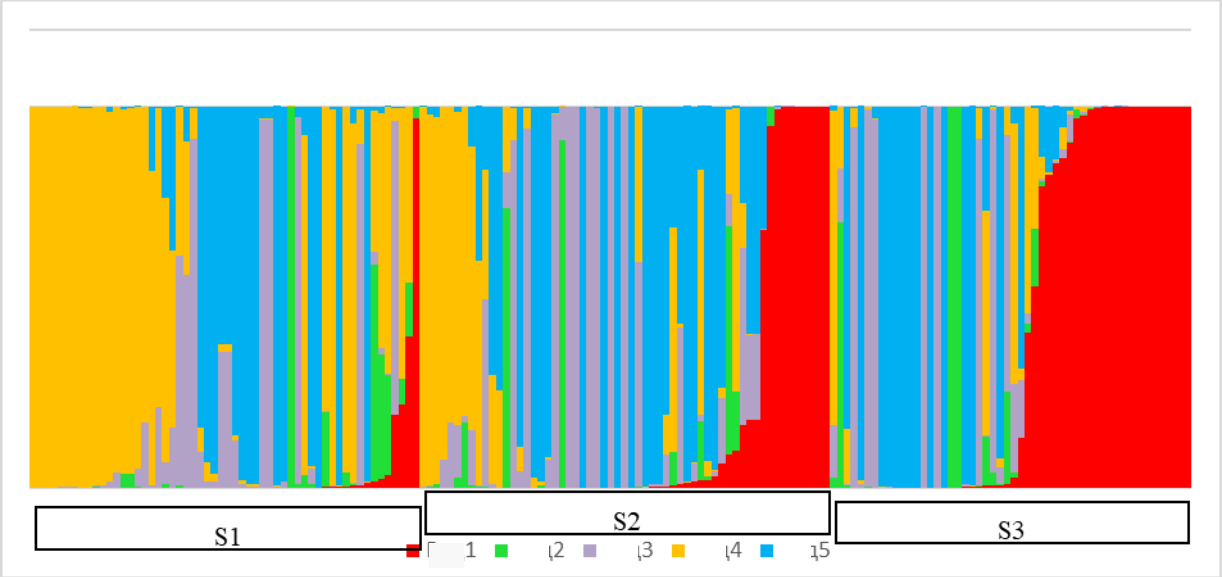

Fig. S4. Population structure of 167 PBGI winter common wheat cultivars assessed by the Bayesian algorithm employed in the software STRUCTURE using genotypes at the storage protein loci (K =5). The row number corresponds to the cluster number in table S7.

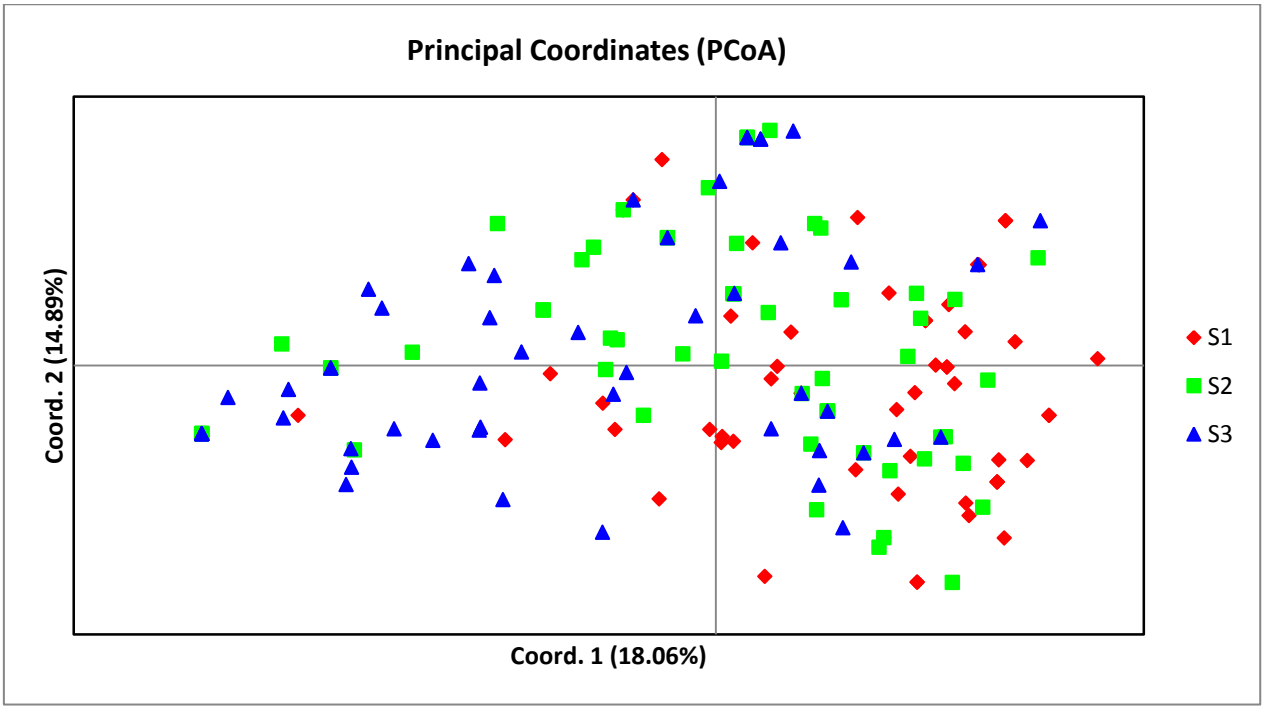

Fig. S5. Principal coordinate analysis of 167 PBGI (S) cultivars registered before 1996 (1), in 1996-2010 (2), and after 2010 (3) based on analysis of genotypes at the storage protein loci