

Genotype by trait biplot analysis to study associations and profiles of Ethiopian white lupin (*Lupinus albus L.*) landraces

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Supplementary Table 1: Ethiopian white lupin landraces considered for the study.

(a). Ethiopian white lupin landraces considered for the first study									
Acc no	EBI code	Zone	District	Altitude	Acc no	EBI code	Zone	District	Altitude
Acc1	242279	Awi	Ankessa	2310	Acc37	238993	BD Sp	Bahir dar	1990
Acc2	242280	Awi	Ankessa	2185	Acc38	238994	BD Sp	Bahir dar	2020
Acc3	242281	Awi	Ankessa	2310	Acc39	239011	BD Sp	Bahir dar	2090
Acc4	242282	Awi	Ankessa	2410	Acc40	239020	BD Sp	Bahir dar	1940
Acc5	242266	WG	Dembecha	2110	Acc41	239022	BD Sp	Bahir dar	1930
Acc6	239044	Awi	Banja	2600	Acc42	239023	BD Sp	Bahir dar	1930
Acc7	242277	Awi	Banja	2560	Acc43	228519	SG	Dera	
Acc8	242278	Awi	Banja	2560	Acc44	242311	SG	Dera	1860
Acc9	242283	Awi	Banja	2160	Acc45	242312	SG	Dera	1960
Acc10	242284	Awi	Banja	1960	Acc46	242313	SG	Dera	1960
Acc11	236619	Awi	Banja	2570	Acc47	242314	SG	Dera	2160
Acc12	239045	Awi	Banja	2600	Acc48	242315	SG	Dera	2380
Acc13	242273	Awi	Banja	2490	Acc49	242316	SG	Dera	2460
Acc14	242274	Awi	Banja	2450	Acc50	242268	WG	Dembecha	2010
Acc15	242276	Awi	Banja	2590	Acc51	239018	WG	BD Z	1950
Acc16	105018				Acc52	242319	SG	Dera	2510
Acc17	105005	Awi	Dangila	1940	Acc53	105002	SG	Este	2420
Acc18	228520	Awi	Dangila		Acc54	226034	SG	Este	2560
Acc19	242290	Awi	Dangila	2240	Acc55	242321	SG	Este	2630
Acc20	242291	Awi	Dangila	2160	Acc56	242219	SG	Farta	2280
Acc21	242292	Awi	Dangila	2060	Acc57	242322	SG	Farta	2850
Acc22	242293	Awi	Dangila	2100	Acc58	242323	SG	Farta	2760
Acc23	242294	Awi	Dangila	2060	Acc59	212754	SG	Fogera	1950
Acc24	236617	Awi	Dangila	2040	Acc60	239008	WG	Achefer	2070
Acc25	239003	Awi	Dangila	2190	Acc61	239029	WG	Achefer	2030
Acc26	239004	Awi	Dangila	2220	Acc62	239033	WG	Achefer	2000
Acc27	239005	Awi	Dangila	2360	Acc63	239038	WG	Achefer	2150
Acc28	242253	EG	Machakel	2140	Acc64	242295	WG	Achefer	2050
Acc29	239007	Awi	Dangila	2190	Acc65	242296	WG	Achefer	1975
Acc30	242287	Awi	Fageta	2550	Acc66	242297	WG	Achefer	2010
Acc31	242288	Awi	Fageta	2425	Acc67	242298	WG	Achefer	1990
Acc32	239017	SG	Dera	2130	Acc68	242299	WG	Achefer	2000

Acc33	242254	EG	Machakel	2150	Acc69	242300	WG	Achefer	2060
Acc34	242286	Awi	Guangua	1740	Acc70	242301	WG	Achefer	2090
Acc35	105003	BD Sp	Bahir dar	1790	Acc71	242302	WG	Achefer	2000
Acc36	239021	BD Sp	Bahir dar	1940	Acc72	239009	WG	Achefer	2000

Acc no = Accession number; EBI = Ethiopian Biodiversity Institute; WG = West Gojam; EG = East Gojam; BD S = Bahir dar Special; SG = South Gondar; Fageta = Fageta lekoma.

Supplementary Table 1: Ethiopian white lupin landraces considered for the study

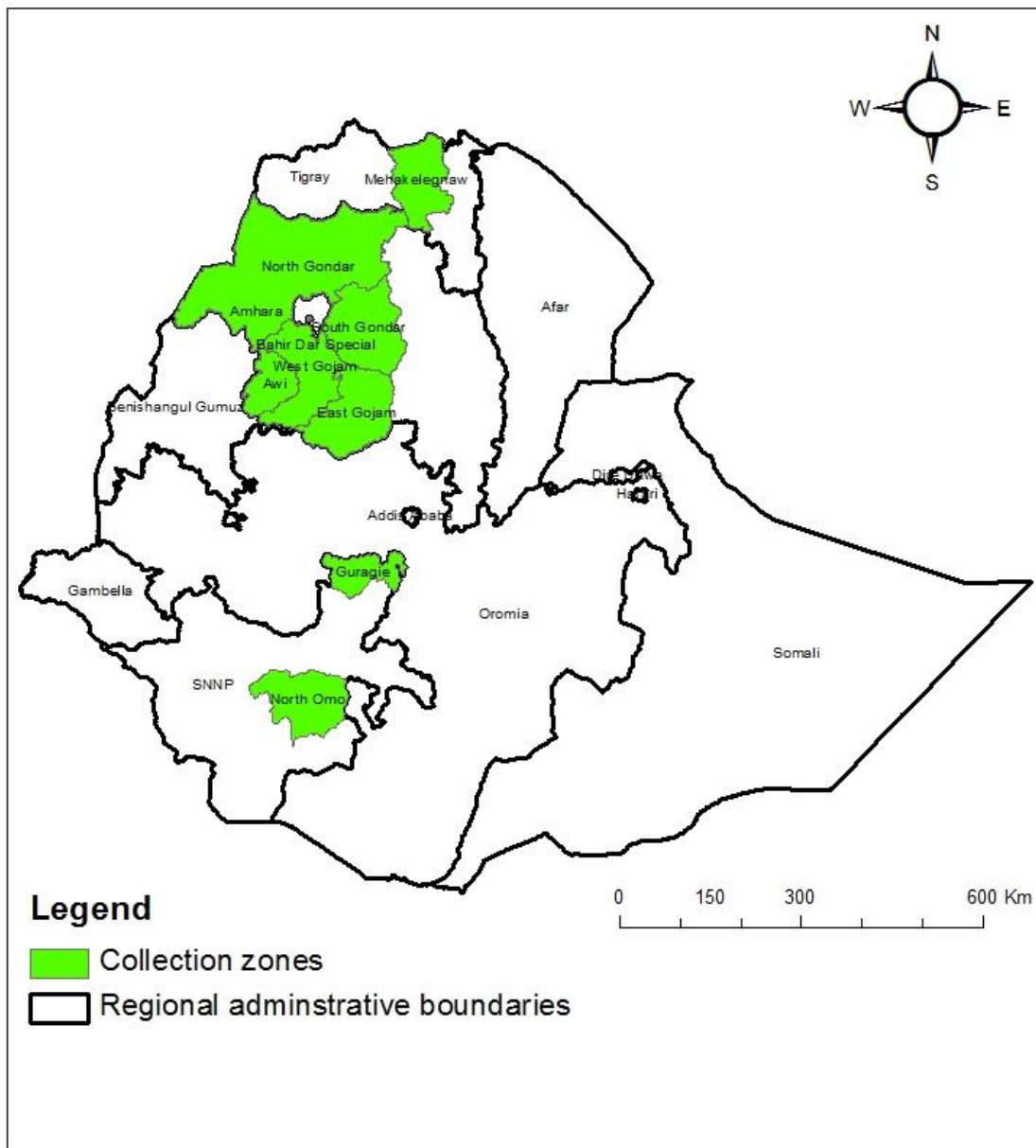
Acc No	EBI code	Zone	District	Altitude	Acc No	EBI code	Zone	District	Altitude
Acc73	239027	WG	Achefer	2060	Acc109	242272	WG	Bure W	2500
Acc74	239030	WG	Achefer	2010	Acc110	105007	EG	Guzamn	2430
Acc75	239032	WG	Achefer	2000	Acc111	216013	EG	Guzamn	2500
Acc76	239034	WG	Achefer	2020	Acc112	239028	EG	Achefer	2060
Acc77	242308	WG	Bd z	1975	Acc113	242248	EG	Guzamn	2450
Acc78	242309	WG	Bd z	2000	Acc114	242252	EG	Guzamn	2350
Acc79	242310	WG	Bd z	1880	Acc115	105008	EG	Machakel	
Acc80	239015	WG	Bd z	1910	Acc116	105009	EG	Machakel	
Acc81	239016	WG	Bd z	1920	Acc117	105010	EG	Machakel	
Acc82	239019	WG	Bd z	2000	Acc118	105011	EG	Machakel	
Acc83	239046	WG	Bure w	2520	Acc119	238996	BD Sp	Bahir dar	2050
Acc84	239051	WG	Bure w	2120	Acc120	239035	WG	Achefer	2050
Acc85	236620	WG	Damot	2110	Acc121	239002	WG	Merawi	2070
Acc86	105006	WG	Dembecha	2430	Acc122	105015	EG	Machakel	
Acc87	242263	WG	Dembecha	2380	Acc123	105016	EG	Machakel	
Acc88	242264	WG	Dembecha	2430	Acc124	105017	EG	Machakel	
Acc89	242265	WG	Dembecha	2450	Acc125	242255	EG	Machakel	2200
Acc90	242267	WG	Dembecha	2060	Acc126	242256	EG	Machakel	2200
Acc91	242269	WG	Dembecha	2010	Acc127	242257	EG	Machakel	2120
Acc92	242270	WG	Dembecha	2050	Acc128	242258	EG	Machakel	2300
Acc93	105001	WG	Jabi	2280	Acc129	242260	EG	Machakel	2400
Acc94	242303	WG	Mecha	1950	Acc130	105004	NG	Belesa	1820
Acc95	242304	WG	Mecha	1950	Acc131	239012	NG	G zuria	1930
Acc96	242305	WG	Mecha	2000	Acc132	208464	Awi	Dangela	2100
Acc97	242306	WG	Mecha	2010	Acc133	239060	NG	G zuria	1900
Acc98	242307	WG	Mecha	2010	Acc134	208365	GURA	Gumer	
Acc99	236615	WG	Mecha	2000	Acc135	225802	NO	Dermallo	2800
Acc100	236616	WG	Mecha	2060	Acc136	242320	NO	Dermallo	2800
Acc101	238997	WG	Mecha	2060	Acc137	207912	Mk	Adwa	
Acc102	238999	WG	Mecha	2050	Acc138	Local	WG	Dembecha	
Acc103	239001	WG	Mecha	2050	Acc139	Local	Awi	Fageta	
Acc104	239010	WG	Mecha	2050	Acc140	Local	WG	Achefer	
Acc105	242249	EG	Baso	2300	Acc141	Local	WG	Mecha	
Acc106	242250	EG	Baso	2310	Acc142	Local	SG	Dera	
Acc107	242251	EG	Baso	2300	Acc143	Local	BD Sp	Bd z	
Acc108	242271	WG	Bure w	2450	Acc144	Sweet	Gm	Gm	

WG = West Gojam; EG = East Gojam; Bd Z = Bahir dar zuria; Jabi = Jabi Tehnan; Baso = Baso Liben; Bure W = Bure Womberema; BD Sp = Bahir dar Special; NG = North Gondar; NO = North Omo; MK = Mehakelegnaw; South Gondar; Gm = Germany; G Zur = Gondar Zuria; Fageta = Fageta lekoma

Supplementary table 1: Ethiopian white lupin landraces considered for the study.....

(b). Description of white Lupin landraces used for the over-location experiment			
Genotype			
Code	EBI designation	Source	Remark
G1	242281	Awi	Landrace
G2	238996	Bahir Dar special	Landrace
G3	238999	West Gojam	Landrace
G4	236615	West Gojam	Landrace
G5	239029	West Gojam	Landrace
G6	239007	Awi	Landrace
G7	242306	West Gojam	Landrace
G8	239003	Awi	Landrace
G9	239045	Awi	Landrace
G10	239032	West Gojam	Landrace
G11	207912	Mehakelegnaw	Landrace
G12	Local	West Gojam	Local cultivar

EBI=Ethiopian Biodiversity Institute; G1-G11 are codes representing respective local landrace accessions; Zone means an administrative boundary from where the white lupin landrace accessions were collected.



Supplementary Figure 1: Map of collection areas of white lupin accessions which are provided in Supplementary Table 1.

Supplementary Table 2: Description of the study locations for Experiment-II.

Location	Altitude (masl [*])	Latitude	Longitude	Annual RF(mm ^{**})	M min T (0°)	M max T (0°)	Soil Type	Agro- ecology
Debre	2630	11 ⁰ 89'N	38 ⁰ 09'E	1500	11.8	23	Luvisol	Highland
Injibara	2560	10 ⁰ 57'N	36 ⁰ 56'E	2300	8.0	22	Acrisol	Highland
Merawi	1960	11 ⁰ 42'N	37 ⁰ 17'E	1577	7.8	25.8	Nitosol	Mid-alt
Fenote	1917	10 ⁰ 42'N	37 ⁰ 16'E	1344	12.9	29.4	Nitosol	Mid-alt
Dibate	1615	10 ⁰ 77'N	37 ⁰ 26'E	1000.0	15	29	Nitosol	Lowland
Mandura	1400	10 ⁰ 95'N	37 ⁰ 43'E	1300.0	15	35	Nitosol	Lowland

Debre = Debre Tabor; Fenote = Fenote Selam; *= Meters above sea level; ** = Rain fall in millimeter; M min T = Mean minimum and M max T = mean maximum temperature, in degree Celsius; Agro-ecology is mainly based on altitudes; Mid-alt = Mid-altitude.[Source: Yihenew (2002)].