

Morphological, Physiological and Biochemical Impacts of Different Levels of Long-Term Water Deficit Stress on *Linum album* Ky. ex Boiss. Accessions

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Table S1- Daily temperature conditions of field

Day (from growing start)	Date- Hour	Tmax °C	Tmin °C	Day (from growing start)	Date- Hour	Tmax °C	Tmin °C
1	3/1/2019 0:00	12.55	3.3	67	5/6/2019 0:00	28.45	9.1
2	3/2/2019 0:00	11	-0.8	68	5/7/2019 0:00	28.5	10.65
3	3/3/2019 0:00	12.5	2.2	69	5/8/2019 0:00	29.6	11.7
4	3/4/2019 0:00	15.7	1.7	70	5/9/2019 0:00	31.15	11.25
5	3/5/2019 0:00	14.85	1.5	71	5/10/2019 0:00	29.6	15.05
6	3/6/2019 0:00	15.9	2.7	72	5/11/2019 0:00	27.75	9.7
7	3/7/2019 0:00	14.85	3.7	73	5/12/2019 0:00	30.1	9.9
8	3/8/2019 0:00	11.85	3.2	74	5/13/2019 0:00	30.8	12.9
9	3/9/2019 0:00	10.95	0.55	75	5/14/2019 0:00	30.9	13.15
10	3/10/2019 0:00	13.85	-2.8	76	5/15/2019 0:00	28.65	12.6
11	3/11/2019 0:00	13.95	4.4	77	5/16/2019 0:00	29.1	10.5
12	3/12/2019 0:00	16.75	-0.95	78	5/17/2019 0:00	29.5	10.8
13	3/13/2019 0:00	19.15	7	79	5/18/2019 0:00	32	12.25
14	3/14/2019 0:00	18.2	7.25	80	5/19/2019 0:00	31.75	13.35
15	3/15/2019 0:00	14.1	2	81	5/20/2019 0:00	29.3	15.9
16	3/16/2019 0:00	16.1	1.95	82	5/21/2019 0:00	28.15	14.1
17	3/17/2019 0:00	13.5	5.3	83	5/22/2019 0:00	25.15	10.35
18	3/18/2019 0:00	12.3	1.6	84	5/23/2019 0:00	29.65	10.8
19	3/19/2019 0:00	16.3	-0.25	85	5/24/2019 0:00	31.9	13.75
20	3/20/2019 0:00	15.5	2	86	5/25/2019 0:00	33.5	13.8
21	3/21/2019 0:00	12.3	-0.4	87	5/26/2019 0:00	33.45	14.9
22	3/22/2019 0:00	15.3	-2.55	88	5/27/2019 0:00	36.4	18.7
23	3/23/2019 0:00	16.75	-2	89	5/28/2019 0:00	32.75	12.75

24	3/24/2019 0:00	16.45	1	90	5/29/2019 0:00	31.7	12.3
25	3/25/2019 0:00	17.5	7.5	91	5/30/2019 0:00	29.75	12.85
26	3/26/2019 0:00	10.7	5.5	92	5/31/2019 0:00	28.15	10.95
27	3/27/2019 0:00	13.85	3.9	93	6/1/2019 0:00	31.1	11.9
28	3/28/2019 0:00	14.25	3.4	94	6/2/2019 0:00	31.05	13.05
29	3/29/2019 0:00	16.75	3.3	95	6/3/2019 0:00	32	14
30	3/30/2019 0:00	20.4	8.3	96	6/4/2019 0:00	34.35	15.3
31	3/31/2019 0:00	19.2	11	97	6/5/2019 0:00	36.2	18.3
32	4/1/2019 0:00	14.4	8.25	98	6/6/2019 0:00	38.9	18.2
33	4/2/2019 0:00	22.4	6.95	99	6/7/2019 0:00	37.3	21.6
34	4/3/2019 0:00	25.2	3.8	100	6/8/2019 0:00	38	21.5
35	4/4/2019 0:00	25.9	5.75	101	6/9/2019 0:00	35.9	16.9
36	4/5/2019 0:00	29.1	5.8	102	6/10/2019 0:00	34.35	15.85
37	4/6/2019 0:00	21.85	8.45	103	6/11/2019 0:00	33.9	15.85
38	4/7/2019 0:00	18.9	9.8	104	6/12/2019 0:00	34.5	17
39	4/8/2019 0:00	19.35	8.75	105	6/13/2019 0:00	38.1	16.55
40	4/9/2019 0:00	21.7	5.65	106	6/14/2019 0:00	36.25	17.5
41	4/10/2019 0:00	21.55	7.65	107	6/15/2019 0:00	33.65	16.85
42	4/11/2019 0:00	23.45	7.85	108	6/16/2019 0:00	36.9	15.9
43	4/12/2019 0:00	21.6	10.2	109	6/17/2019 0:00	38	19.45
44	4/13/2019 0:00	20.55	5.5	110	6/18/2019 0:00	37.2	17.9
45	4/14/2019 0:00	20.95	4.6	111	6/19/2019 0:00	36.4	17.7
46	4/15/2019 0:00	24.05	3.8	112	6/20/2019 0:00	35.1	17.8
47	4/16/2019 0:00	24.95	10.15	113	6/21/2019 0:00	38.05	17.8
48	4/17/2019 0:00	25.05	10.6	114	6/22/2019 0:00	36.9	16.8
49	4/18/2019 0:00	21.05	11.55	115	6/23/2019 0:00	37.7	19.1
50	4/19/2019 0:00	23	9.4	116	6/24/2019 0:00	38.25	23.75
51	4/20/2019 0:00	18.65	5.35	117	6/25/2019 0:00	38.9	25.2
52	4/21/2019 0:00	21.8	1.05	118	6/26/2019 0:00	39	20.4
53	4/22/2019 0:00	14.25	2.15	119	6/27/2019 0:00	35.7	20.65
54	4/23/2019 0:00	12.8	0.1	120	6/28/2019 0:00	36.8	18.65
55	4/24/2019 0:00	15.8	-1.45	121	6/29/2019 0:00	38.7	19.4
56	4/25/2019 0:00	16.55	0.65	122	6/30/2019 0:00	41	20.8
57	4/26/2019 0:00	19.1	2.4	123	7/1/2019 0:00	34.4	18.55
58	4/27/2019 0:00	21.5	3	124	7/2/2019 0:00	32.45	13.2
59	4/28/2019 0:00	21.15	8.95	125	7/3/2019 0:00	33.4	14.15

60	4/29/2019 0:00	23	7	126	7/4/2019 0:00	38.85	21.2
61	4/30/2019 0:00	22.85	10.45	127	7/5/2019 0:00	38.5	19.15
62	5/1/2019 0:00	29.7	5.5	128	7/6/2019 0:00	36.95	17.45
63	5/2/2019 0:00	28.2	12.05	129	7/7/2019 0:00	38.55	18.35
64	5/3/2019 0:00	27.8	12.8	130	7/8/2019 0:00	36.35	16.2
65	5/4/2019 0:00	27.95	11.95	131	7/9/2019 0:00	37.3	18.35
66	5/5/2019 0:00	28.75	12.55				

Table S2- Analysis of variance of morphological traits

S.O.V	DF	Mean square										
		Capsule diameter	Number of seeds per capsule	Seed yield per plant	Seed width	Seed length	Weight of 1000 seeds	Number of flowers in inflorescence	Number of mature capsules	Capsule to flower ratio	Inflorescence length	Length of main branch
Block	2	0.007ns	0.37ns	0.001ns	0.021ns	0.081ns	0.022ns	7.37*	4.00ns	0.002ns	5.03ns	1.66ns
Treat	3	0.08ns	0.98ns	1.37**	0.003ns	0.089ns	0.07ns	16.43**	30.52**	0.052**	30.11**	7.55*
Accession	5	0.34**	0.80ns	1.15**	0.043**	0.147*	0.62**	12.52**	9.09**	0.004ns	43.87**	54.47**
Treat × Accession	15	0.06ns	1.47**	0.78**	0.021*	0.059ns	0.14**	4.84**	4.32*	0.003ns	14.62**	9.47**
Error	46	0.04	0.47	0.041	0.009	0.048	0.045	1.94	1.81	0.005	2.48	1.82
CV %		3.43	8.2	16.01	3.9	5.45	5.98	14.68	15.77	7.96	9.66	8.17

** : Significant at 1%, * : Significant at 5%, ns: no significant difference.

Continued Table S2

S.O.V	DF	Mean square										
		Plant height	Leaf length	Leaf width	Number of inflorescences per plant	Number of chlorotic leaves	Flower diameter	Root length	Shoot fresh weight	Shoot dry weight	Root fresh weight	Root dry weight
Block	2	8.85ns	0.64ns	0.46ns	1.92ns	0.41ns	0.21ns	2.92ns	35.15**	1.40ns	52.88ns	4.38ns
Treat	3	58.68**	10.10**	1.04ns	13.89**	28.70**	19.11**	35.49**	1089.06**	139.51**	2337.66**	32.22**
Accession	5	123.19**	21.84**	3.82**	12.10**	1.47**	29.88**	32.06**	522.75**	82.46**	1627.39**	42.07**
Treat × Accession	15	28.24**	7.72**	0.86ns	3.51**	1.04**	13.12**	27.21**	239.81**	28.62**	744.75**	13.70**
Error	46	4.54	2.02	0.52	0.93	0.34	1.96	3.46	4.23	1.64	194.26	2.1
CV %		7.05	6.67	9.99	21.59	22.07	4.13	6.57	7.39	13.36	29.7	22.49

** : Significant at 1%, * : Significant at 5%, ns: no significant difference.

Table S3- Analysis of variance of phenological traits

S.O.V	DF	Mean square			
		Leaf stages	Budding	Flowering	Maturity
Block	2	192.10*	65.96ns	387.70ns	1527.91**
Treat	3	27.10ns	164.95ns	47.00ns	3456.93**
Accession	5	644.74**	1165.86**	809.03*	1400.50**
Treat × Accession	15	29.01ns	57.30ns	92.35ns	448.40ns
Error	46	40.82	114.05	274.27	272.49
CV %		11.6	5.54	5.76	2.6

** : Significant at 1%, * : Significant at 5%, ns: no significant difference.

Table S4- Analysis of variance of physiological traits

S.O.V	DF	Mean square					
		Chlorophyll a	Chlorophyll b	Carotenoids	Malondialdehyde	Proline	Glycine betaine
Block	2	16.19**	0.35ns	0.90**	0.00000n	0.03n	237.64ns
Treat	3	28.66**	7.15**	0.41**	0.0070**	3.25**	1832.56**
Accession	5	30.90**	6.19**	2.05**	0.0041**	1.48**	4324.48**
Treat × Accession	15	6.42**	1.30**	0.68**	0.0017**	2.27**	2669.03**
Error	46	0.84	0.28	0.06	0.0003	0.9	137.18
CV %		4.85	7.76	4.72	11.59	6.16	6.36

Continued Table S4

S.O.V	DF	Mean square					
		Relative water content of leaves	Electrolyte leakage	ABA	Catalase	Gaiacol Peroxidase	Ascorbate peroxidase
Block	2	12.95ns	14.42ns	771.10ns	0.000003ns	0.0000002ns	0.00004ns
Treat	3	108.79**	377.48**	9996.34**	0.00007**	0.000008**	0.0005**
Accession	5	48.87**	229.82**	15225.51**	0.00026**	0.000065**	0.0020**
Treat × Accession	15	28.78**	255.04**	5114.49**	0.00008**	0.000008**	0.0017**
Error	46	4.27	12.53	296.77	0.000003	0.0000008	0.000056
CV %		2.52	5.26	12.4	14.21	19.67	14.04

Table S5- Correlation between traits by Pearson method

	1	2	3	4	5	6	7	8	9	10	11	12
1 Number of seeds per capsule	1											
2 Seed yield per plant	0.461*	1										
3 Seed width	-0.028	0.003	1									
4 Weight of 1000 seeds	-0.051	-0.021	0.656**	1								
5 Number of flowers in inflorescence	-0.176	0.091	-0.066	0.021	1							
6 Number of mature capsules	-0.151	0.089	-0.004	0.069	0.958**	1						
7 Inflorescence length	0.02	0.338	-0.147	0.195	0.409*	0.416*	1					
8 Length of main branch	0.172	0.452*	0.394	0.364	-0.109	-0.056	0.335	1				
9 Plant height	0.058	0.529**	0.151	0.216	0.253	0.278	0.750**	0.743**	1			
10 Leaf length	0.113	0.041	0.268	0.582**	0.044	0.007	0.225	0.377	0.308	1		
11 Number of inflorescences per plant	0.224	0.807**	0.233	0.136	0.209	0.236	0.324	0.595**	0.629**	0.085	1	
12 Number of chlorotic leaves	-0.019	-0.275	0.148	0.179	-0.411*	-0.554**	-0.446*	-0.158	-0.389	0.181	-0.404	1
13 Flower diameter	0.143	0.303	-0.118	0.01	0.264	0.281	0.509*	0.265	0.496*	-0.032	0.352	-0.297
14 Root length	0.091	-0.068	-0.092	-0.127	-0.312	-0.327	0.322	0.169	0.176	0.136	-0.132	0.008
15 Shoot fresh weight	0.114	0.308	0.216	0.109	0.22	0.345	0.410*	0.452*	0.568**	0.299	0.556**	-0.593**
16 Shoot dry weight	0.125	0.374	0.245	0.196	0.209	0.326	0.480*	0.504*	0.630**	0.377	0.555**	-0.516**
17 Root fresh weight	0.24	0.445*	0.213	0.285	0.202	0.308	0.393	0.547**	0.500*	0.513*	0.469*	-0.474*
18 Root dry weight	0.155	0.405*	0.373	0.363	0.2	0.289	0.374	0.528**	0.529**	0.558**	0.555**	-0.389
19 Capsule diameter	0.311	0.275	0.666**	0.633**	0.017	0.093	-0.015	0.575**	0.281	0.37	0.458*	0.053
20 Seed length	0.093	0.001	0.296	0.719**	0.216	0.16	0.371	0.247	0.305	0.647**	0.135	0.19
21 Capsule to flower ratio	0.068	0.064	0.228	0.22	0.322	0.572**	0.19	0.202	0.239	-0.084	0.203	-0.663**
22 Leaf width	0.379	0.143	0.404*	0.479*	-0.085	-0.075	-0.098	0.342	0.126	0.709**	0.14	0.133
23 Leaf stages	0.103	-0.129	-0.002	0.34	0.064	0.124	0.139	-0.283	-0.156	0	-0.216	0.073
24 Budding	0.311	-0.24	-0.037	0.242	-0.447*	-0.413*	-0.051	-0.081	-0.287	0.198	-0.35	0.337
25 Flowering	0.179	-0.171	-0.087	0.444*	-0.191	-0.139	0.311	0.09	0.033	0.253	-0.187	0.043
26 Maturity	-0.119	0.151	0.29	0.179	0.192	0.32	0.065	0.489*	0.354	0.081	0.377	-0.526**
27 Chlorophyll a	0.099	0.496*	0.417*	0.111	0.298	0.382	0.263	0.476*	0.569**	0.154	0.649**	-0.463*
28 Chlorophyll b	0.093	0.484*	0.496*	0.209	0.196	0.287	0.266	0.464*	0.529**	0.187	0.636**	-0.450*
29 Carotenoids	0.236	0.398	0.414*	0.102	0.112	0.173	0.156	0.571**	0.543**	0.295	0.539**	-0.204
30 Relative water content of leaves	-0.081	0.032	0.149	0.368	-0.057	0.041	0.266	0.308	0.142	0.181	0.107	-0.34
31 Proline	0.011	-0.178	-0.083	-0.03	-0.201	-0.269	0.143	0.3	0.152	0.333	-0.033	0.138
32 Glycine betaine	0.467*	0.121	0.012	0.093	-0.237	-0.2	-0.081	0.017	-0.133	-0.002	0.136	-0.003
33 Electrolyte leakage	0.034	-0.148	0.143	0.192	-0.022	-0.001	0.14	-0.287	-0.062	0.312	-0.235	0.045
34 Malondialdehyde	-0.172	0.019	-0.144	0.038	0.008	-0.128	0.126	0.013	0.19	0.039	0.061	0.26
35 Catalase	-0.349	0.027	0.179	0.088	0.209	0.224	0.139	-0.012	0.14	-0.044	0.112	-0.315
36 Gaiacol Peroxidase	0.185	-0.331	-0.25	-0.248	-0.231	-0.222	-0.437*	-0.699**	-0.716**	-0.396	-0.545**	0.18
37 Ascorbate peroxidase	0.08	0.039	0.093	-0.034	-0.191	-0.21	-0.169	0.019	-0.078	-0.003	0.098	0.015
38 ABA	-0.064	-0.336	-0.294	-0.128	-0.348	-0.428*	-0.123	-0.439*	-0.540**	-0.113	-0.552**	0.315

Continued Table S5.

	13	14	15	16	17	18	19	20	21	22	23	24
Flower diameter	1											
Root length	0.066	1										
Shoot fresh weight	0.378	0.154	1									
Shoot dry weight	0.414*	0.177	0.970**	1								
Root fresh weight	0.173	0.091	0.772**	0.824**	1							
Root dry weight	0.224	0.106	0.874**	0.905**	0.907**	1						
Capsule diameter	-0.043	-0.224	0.211	0.274	0.383	0.388	1					
Seed length	0.317	-0.082	0.195	0.263	0.298	0.374	0.450*	1				
Capsule to flower ratio	0.208	-0.226	0.482*	0.452*	0.436*	0.366	0.342	-0.028	1			
Leaf width	-0.298	-0.024	0.146	0.164	0.372	0.399	0.562**	0.427*	0.085	1		
Leaf stages	0.081	0.035	-0.197	-0.113	-0.151	-0.219	0.198	0.236	0.217	-0.16	1	
Budding	-0.206	0.182	-0.221	-0.212	-0.195	-0.258	0.078	0.109	-0.107	0.111	0.488*	1
Flowering	-0.038	0.171	-0.118	-0.098	-0.102	-0.156	0.127	0.271	0.106	0.137	0.536**	0.818**
Maturity	0.031	-0.111	0.341	0.302	0.266	0.239	0.31	-0.168	0.577**	0.288	-0.177	-0.139
Chlorophyll a	0.436*	0.06	0.786**	0.790**	0.654**	0.717**	0.341	0.179	0.439*	0.131	-0.117	-0.434*
Chlorophyll b	0.397	0.126	0.809**	0.830**	0.682**	0.770**	0.324	0.169	0.399	0.136	-0.102	-0.37
Carotenoids	.437*	0.008	0.686**	0.697**	0.599**	0.650**	0.410*	0.275	0.271	0.176	-0.166	-0.229
Relative water content of leaves	-0.192	-0.064	0.12	0.141	0.312	0.165	0.424*	0.155	0.316	0.236	0.143	0.293
Proline	-0.072	0.418*	0.159	0.193	0.189	0.214	0.085	0.123	-0.345	0.071	-0.271	0.052
Glycine betaine	0.348	0.247	0.022	-0.013	0.024	0.026	0.055	0.119	0.029	0	0.207	0.19
Electrolyte leakage	-0.23	0.051	0.096	0.144	0.158	0.125	0.058	0.252	0.011	0.112	0.391	0.324
Malondialdehyde	0.406*	-0.098	-0.088	-0.038	-0.204	-0.096	-0.016	0.421*	-0.399	-0.082	-0.091	-0.266
Catalase	-0.358	-0.093	0.158	0.191	0.203	0.215	0.059	-0.052	0.119	0.129	-0.148	-0.411*
Gaiacol Peroxidase	-0.207	-0.167	-0.633**	-0.701**	-0.627**	-0.672**	-0.375	-0.299	-0.074	-0.12	0.23	0.332
Ascorbate peroxidase	0.014	0.057	0.097	0.063	-0.053	-0.066	0.167	0.037	-0.108	-0.098	0.31	0.34
ABA	-0.451*	0.147	-0.476*	-0.464*	-0.366	-0.406*	-0.440*	-0.219	-0.490*	-0.143	-0.011	0.484*

Continued Table S5.

	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Flowering	1													
Maturity	0.106	1												
Chlorophyll a	-0.404*	0.36	1											
Chlorophyll b	-0.337	0.365	0.958**	1										
Carotenoids	-0.356	0.204	0.849**	0.775**	1									
Relative water content of leaves	0.452*	0.363	-0.045	-0.001	-0.103	1								
Proline	0.074	-0.156	-0.19	-0.14	-0.023	0.131	1							
Glycine betaine	0.119	-0.08	0.055	0.11	0.146	-0.298	-0.024	1						
Electrolyte leakage	0.186	-0.357	0.046	0.065	0.037	0.214	0.007	-0.226	1					
Malondialdehyde	-0.161	-0.283	-0.054	-0.077	-0.003	-0.111	0.26	-0.056	-0.188	1				
Catalase	-0.206	0.257	0.142	0.22	-0.126	0.345	-0.063	-0.576**	0.098	-0.06	1			
Gaiacol Peroxidase	0.155	-0.249	-0.587**	-0.579**	-0.536**	-0.198	-0.425*	0.316	0.067	-0.24	-0.266	1		
Ascorbate peroxidase	0.157	-0.021	0.217	0.179	0.229	0.157	0.057	0.077	0.35	0.103	-0.307	-0.089	1	
ABA	0.354	-0.331	-0.753**	-0.606**	-0.694**	0.175	0.246	-0.111	0.098	-0.059	0.084	0.432*	-0.096	1

** Significant at 1%, * Significant at 5%.

Table S6- Factor analysis matrix of *L. album* accessions

Component	1	2	3	4	5
Initial Eigenvalues	16.2	8.92	6.43	4.46	1.99
Rotation Sums of Squared Loadings	14.85	6.97	6.26	5.39	4.53
% of Variance Explained	39.07	18.35	16.48	14.19	11.92
Cumulative % of Variance Explained	39.07	57.42	73.9	88.08	100
Number of seeds per capsule	-0.01	0.98	-0.13	0.18	-0.03
Seed yield per plant	0.84	0.21	0.43	-0.18	-0.19
Seed width	0.58	-0.33	-0.5	0.49	0.24
Weight of 1000 seeds	0.22	0.14	-0.06	0.89	0.38
Number of flowers in inflorescence	0.09	-0.56	0.81	-0.01	-0.14
Number of mature capsules	0.02	-0.64	0.77	0.05	-0.05
Inflorescence length	0.35	0.38	0.85	-0.09	0.12
Length of main branch	0.81	0.35	-0.2	0.41	-0.16
Plant height	0.85	0.12	0.49	0.15	-0.04
Leaf length	0.64	0.22	-0.15	0.72	0.06
Number of inflorescences per plant	0.91	0.08	0.25	0.09	-0.3
Number of chlorotic leaves	-0.13	0.04	-0.42	0.3	0.85
Flower diameter	0.51	0.36	0.73	-0.25	0.12
Root length	0.46	0.86	0.08	-0.16	-0.09
Shoot fresh weight	0.98	0.05	0.01	0.03	-0.2
Shoot dry weight	0.99	-0.03	0.06	0.11	0.04
Root fresh weight	0.87	0.13	-0.14	0.41	-0.21
Root dry weight	0.93	-0.04	-0.03	0.31	-0.22
Capsule diameter	0.55	0.03	-0.33	0.69	0.34
Seed length	0.41	0.21	0.45	0.74	0.2
Convert flowers to capsules percentage	-0.28	-0.19	-0.43	0.74	0.39
Leaf width	0.37	0	-0.47	0.76	-0.28
Leaf stages	-0.29	0.19	0.23	0.26	0.87
Budding	-0.41	0.67	-0.36	0.06	0.5
Flowering	-0.44	0.69	-0.05	0.4	0.43
Maturity	0.31	-0.1	-0.73	0.53	-0.27
Chlorophyll a	0.97	-0.19	0.12	0.04	-0.06
Chlorophyll b	0.98	-0.2	0.01	0.08	0

Carotenoids	0.99	0.01	-0.09	-0.06	0.06
Relative water content of leaves	0.1	0.42	-0.76	0.34	0.36
Proline	0.75	0.54	-0.1	0.23	-0.28
Glycine betaine	-0.09	0.96	0.08	0.22	-0.11
Electrolyte leakage	-0.26	-0.2	0.18	0.03	0.93
Malondialdehyde	0.68	-0.09	0.72	-0.03	0.13
Catalase	0.07	-0.96	-0.12	0.21	-0.13
Gaiacol Peroxidase	-0.96	0.05	-0.15	-0.22	0
Ascorbate peroxidase	0.37	0.61	-0.03	-0.02	0.7
ABA	-0.84	0.2	-0.33	-0.39	0.04

Rotation converged in 19 iterations.