10.1071/CP18473_AC

Supplementary Material: ***Crop & Pasture Science*****, 2019, 70, 85–94.**

Growth traits associated with drought survival, recovery and persistence of cocksfoot (*Dactylis glomerata*) under prolonged drought treatments

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Supplementary Tables

Table S1. Information on parents of orchardgrass genotypes used in the study

Parental genotype*	Origin	Latitude / longitude	Elevation (m)	Rainfall (mm)	Temperature (C)
G1	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G2	Iran, Semnan	35° 35'N/53° 25'E	1127	140	17.8
G3	Iran, Najafabad	32° 40'N/51 ° 15'E	1600	120	8.15
G4	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G5	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G6	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G7	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G8	Iran, Kuhrang	32° 26' N/50° 7' E	2285	1389	9.2
G9	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G10	Netherland	52.1326° N, 5.2913° E	887	765	17
G11	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G12	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G13	Iran, Najafabad	32° 40'N/51 ° 15'E	1600	120	8.15
G14	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G15	Iran, Semnan	35° 35'N/53° 25'E	1127	140	17.8
G16	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G17	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G18	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G19	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G20	Iran, Semnan	35° 35'N/53° 25'E	1127	140	17.8
G21	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G22	Hungary	47.1625° N, 19.5033° E	1014	500-750	21
G23	Iran, Isfahan	32° 32'N/51° 23'E	1545	108	16.7
G24	Iran, Najafabad	32° 40'N/51 ° 15'E	1600	120	8.15
G25	Hungary	47.1625° N, 19.5033° E	1014	500-750	21

* These information are related to the 25 parental genotypes of orchardgrass which were polycrossed during 2008-2009 and then the genotypes of this study were randomly selected within HS families from the polycross.

Table S2. Analysis of variance for recovery related traits and persistence in 72 genotypes of cocksfoot under two moisture environments (normal and drought stress) during 2016

Traits	Mean squares			
	Recovery yield (g plant^{-1})	Degree of recovery	Recovery ratio	Persistence
Moisture environment (E) (df = 1)	46357.76**	525.84**	0.16**	42534.42**
Replication / E (df = 10)	3605.33**	9.56**	0.08**	12188.65**
Genotype (G) (df = 71)	1942.19**	13.55**	0.04**	10081.46**
G × E (df = 71)	1824.76**	6.52**	0.03**	1742.15$^{n.s}$
Error (df =710)	885.04	3.22	0.02	1787.21

** shows significance at the 0.01 probability level.
n.s: not significant

Table S3. Split-plot in time ANOVA for measured traits in 72 cocksfoot genotypes evaluated at two moisture environments (normal and deficit irrigation regimes) during 2 years (2014- 2015)

Characters	Moisture environment (E) (df = 1)	Replication / E (df = 10)	Genotype (G) (df = 71)	G × E (df = 71)	G × Rep (E) (df = 710)	Year (Y) (df = 1)	E × Y (df = 1)	G × Y (df = 71)	E × G × Y (df = 71)	Error (df =710)
Days to ear emergence, DEE (day)	3476.91**	471.60**	2122.57**	167.14**	97.21**	5.82n.s	1643.89**	470.50**	91.12**	52.89
Days to anthesis, DA (day)	672.88**	231.86**	1313.62**	87.91**	64.21**	259.21**	527.12**	207.54**	61.67**	32.14
Plant height, PH (cm)	202223.14**	1717.01**	1844.56**	628.41**	606.86**	89006.92**	26638.53**	214.20**	258.46**	110.18
Number of stems, NS	739848.68**	13004.19**	28145.34**	8268.25**	3667.39**	732.45n.s	64377.84**	5509.62**	3670.30**	1406.05
Dry matter yield cut 1, DMY1 (g)	2515148.04**	138417.58**	46940.33**	23695.66**	21690.89**	568006.72**	5017.41*	8663.64**	1146.72n.s	944.96
Percent dry matter yield cut1, PDMY1	17540.84**	413.77**	283.57**	136.10**	40.33**	5068.20**	1477.13**	102.42**	31.60**	8.49
Crown diameter, CD (cm)	5876.36**	146.02**	71.66**	28.21**	21.75**	1933.28**	1043.45**	15.29**	8.85**	5.50
Dry matter yield cut 2, DMY2 (g)	402257.88**	8160.60**	11332.13**	1725.26**	2051.06**	243870.40**	2159.35n.s	1782.69**	1047.29*	763.35
Percent dry matter yield cut2, PDMY2	1760.68**	141.22**	36.51**	20.45*	42.36**	1067.77**	3242.31**	36.52**	105.42**	14.60
Dry matter yield cut 3, DMY3 (g)	259572.04**	3178.49**	4023.33**	1273.61**	926.97**	48046.32**	6507.52**	617.91**	633.93**	220.86
Percent dry matter yield cut3, PDMY3	7649.50**	124.73**	64.35**	20.30**	19.88**	2244.09**	1038.31**	15.73*	28.82**	11.66
Degree of winter growth, DWG	719.31**	28.74**	17.39**	6.17**	3.11**	180.96**	12.02**	3.95**	1.48*	1.09

* and ** show significance at the 0.05 and 0.01 probability level respectively.
n.s: not significant

Table S4. Percentage of survived plants for 72 genotypes of cocksfoot after withholding irrigation and re-watering at the field during 2016

Genotype number	Forage management treatment		Seed management treatment	
	Normal irrigation	Deficit irrigation	Normal irrigation	Deficit irrigation
1	33.33	16.67	16.67	33.33
2	100	100	50	100
3	100	0	66.67	100
4	83.33	0	50	33.33
5	100	33.33	33.33	33.33
6	100	0	50	16.67
7	100	50	50	50
8	33.33	0	83.33	100
9	100	50	33.33	66.67
10	50	33.33	33.33	50
11	50	0	83.33	83.33
12	83.33	33.33	50	66.67
13	33.33	16.67	66.67	100
14	100	83.33	50	16.67
15	50	0	33.33	16.67
16	100	50	33.33	33.33
17	100	33.33	50	50
18	83.33	16.67	50	50
19	100	33.33	33.33	33.33
20	50	0	16.67	50
21	100	0	83.33	83.33
22	83.33	50	50	83.33
23	83.33	50	50	50
24	100	0	66.67	66.67
25	100	83.33	50	66.67
26	50	0	50	16.67
27	50	0	50	33.33
28	83.33	0	50	66.67
29	100	33.33	50	50
30	100	83.33	33.33	50
31	16.67	0	16.67	83.33
32	50	16.67	66.67	66.67
33	100	83.33	66.67	66.67
34	50	0	66.67	66.67
35	66.67	0	50	66.67
36	50	0	50	66.67

Table S5. Principle component loadings for evaluated traits on 36 genotypes of cocksfoot under normal and deficit irrigation regimes

Traits	Normal irrigation		Deficit irrigation	
	PC1	PC2	PC1	PC2
Days to ear emergence (day)	0.25	-0.07	0.24	-0.20
Days to anthesis (day)	0.26	-0.07	0.24	-0.20
Plant height (cm)	-0.19	0.17	-0.26	0.04
Number of stems	-0.24	0.12	-0.26	-0.04
Dry matter yield cut 1 (g/plant)	-0.32	-0.04	-0.24	-0.08
Percentage dry matter yield cut 1 (%)	-0.07	0.13	-0.13	0.40
Crown diameter (cm)	-0.02	0.27	0.12	0.08
Dry matter yield cut 2 (g/plant)	-0.35	-0.23	-0.29	-0.23
Percentage dry matter yield cut 2 (%)	0.03	-0.05	0.07	0.28
Dry matter yield cut 3 (g/plant)	-0.35	-0.01	-0.28	-0.13
Percentage dry matter yield cut 3 (%)	0.22	0.16	0.20	0.26
Degree of winter growth	-0.20	0.24	-0.27	0.06
Recovery forage yield (g/plant)	-0.18	0.36	-0.26	0.14
Degree of recovery	-0.27	0.22	-0.28	0.13
Recovery ratio	-0.07	0.38	-0.16	0.43
Percentage of recovery (%)	-0.17	0.29	-0.24	0.29
Persistence	0.22	0.41	0.21	0.39
Summer dormancy index	0.21	0.31	0.19	0.23
Stress tolerance index	-0.32	-0.21	-0.27	-0.15
Eigenvalue	5.83	3.49	10.16	1.85
Percentage of variation	30.69	18.37	53.46	9.72
Cumulative percentage	30.69	49.06	53.46	63.18