

1 **SUPPLEMENTARY INFORMATION**

2 Table S1: List of cowpea accessions selected from the mini-core subset.

S/N	Accession	Origin	S/N	Accession	Origin
1	TVu-8	Nigeria	27	Tvu-5609	Niger
2	TVu-1583	Nigeria	28	Tvu-14970	Niger
3	TVu-3969	Nigeria	29	Tvu-14788	Senegal
4	TVu-2027	Nigeria	30	Tvu-14406	Senegal
5	TVu-578	Nigeria	31	Tvu-14336	Senegal
6	TVu-969	Nigeria	32	TVu-14346	Senegal
7	TVu-5828	Nigeria	33	TVu-14393	Senegal
8	TVu-6855	Nigeria	34	TVu-12432	Zambia
9	TVu-4557	Nigeria	35	TVu-13305	Zambia
10	TVu-7559	Nigeria	36	TVu-13334	Zambia
11	TVu-10559	Nigeria	37	TVu-15053	Zambia
12	TVu-10005	Nigeria	38	TVu-13437	Zambia
13	TVu-14190	Nigeria	39	TVu-14224	Botswana
14	TVu-15653	Nigeria	40	TVu-14272	Botswana
15	TVu-16722	Nigeria	41	TVu-15973	Botswana
16	TVu-15315	Chad	42	TVu-14691	Botswana
17	TVu-16430	Chad	43	TVu-14321	Botswana
18	TVu-1477	Mali	44	TVu-9801	Malawi
19	TVu-7684	Mali	45	TVu-9866	Malawi
20	TVu-14539	Mali	46	TVu-15112	Malawi
21	TVu-16594	Mali	47	TVu-15143	Malawi
22	TVu-7625	Mali	48	TVu-13463	Kenya
23	TVu-5018	Niger	49	TVu-13485	Kenya
24	TVu-4984	Niger	50	TVu-15411	Lesotho
25	TVu-4711	Niger			
26	TVu-6947	Niger			

3 S/N: Serial Number

5 Table S2: List of cowpea accessions selected from the FIGS subset.

S/N	Accession	Origin	S/N	Accession	Origin
1	TVu-16954	Nigeria	27	TVu-14991	Niger
2	TVu-16980	Nigeria	28	TVu-14988	Niger
3	TVu-16989	Nigeria	29	TVu-14344	Senegal
4	TVu-17000	Nigeria	30	TVu-14404	Senegal
5	TVu-17009	Nigeria	31	TVu-14462	Senegal
6	TVu-17018	Nigeria	32	TVu-14815	Senegal
7	TVu-17024	Nigeria	33	TVu-14834	Senegal
8	TVu-3739	Nigeria	34	TVu-15047	Zambia
9	TVu-3746	Nigeria	35	TVu-17057	Zambia
10	TVu-3768	Nigeria	36	TVu-17128	Zambia
11	TVu-3951	Nigeria	37	TVu-17147	Zambia
12	TVu-17010	Nigeria	38	TVu-17114	Zambia
13	TVu-17030	Nigeria	39	TVu-14895	Botswana
14	TVu-3890	Nigeria	40	TVu-14897	Botswana
15	TVu-74	Nigeria	41	TVu-14900	Botswana
16	TVu-15247	Chad	42	TVu-14902	Botswana
17	TVu-15256	Chad	43	TVu-15055	Botswana
18	TVu-15300	Chad	44	TVu-9908	Malawi
19	TVu-10881	Mali	45	TVu-9913	Malawi
20	TVu-14533	Mali	46	TVu-13014	Madagascar
21	TVu-7639	Mali	47	TVu-11954	Sudan
22	TVu-14846	Mali	48	TVu-11967	Sudan
23	TVu-8244	Mali	49	TVu-11412	Gambia
24	TVu-14977	Niger	50	TVu-14152	Kenya
25	TVu-15000	Niger			
26	TVu-15054	Niger			

6 S/N: Serial Number

Table S3: List of 11 droughts tolerant and 1 susceptible cowpea checks used for this study.

S/N	Name	Description	Source
1	TVu-803	Drought Tolerant	Fatokun <i>et al.</i> , 2012
2	TVu-557	Drought Tolerant	Fatokun <i>et al.</i> , 2012
3	TVu-1438	Drought Tolerant	Fatokun <i>et al.</i> , 2012
4	TVu4574	Drought Tolerant	Fatokun <i>et al.</i> , 2012
5	TVu-6443	Drought Tolerant	Fatokun <i>et al.</i> , 2012
6	TVu-11982	Drought Tolerant	Fatokun <i>et al.</i> , 2012
7	TVu-14676	Drought Tolerant	Fatokun <i>et al.</i> , 2012
8	TVu-11986	Drought Tolerant	Agbicodo <i>et al.</i> , 2009
9	IT99K-494-6	Drought Tolerant	Agbicodo <i>et al.</i> , 2009
10	IT98K-506-1	Drought Tolerant	Agbicodo <i>et al.</i> , 2009
11	Dan Ila (Tvu-17360)	Drought Tolerant	Standard
12	TVu-7778	Susceptible	Standard

S/N: Serial Number

12 Table S4: Agronomic traits and mode of observation for 112 Cowpea accessions under well-  
 13 watered and water-stressed conditions.

Serial Number	Traits	Mode of observation
1	Days to first flowering	Number of days from planting to emergence of the first flower in a plot
2	Days to 50% flowering	Number of days from planting to 50% flower emergence per plot
3	Pod weight (g)	Total dried pods harvested per plot and weighed
4	Number of Pods per Plant	Total number of pods harvested per individual plant and summed up per plot
5	Total seed weight (g)	Total weight of seed per plot after threshing of pods.
6	Grain yield (g/m <sup>2</sup> )	Total grain weight per plot / Plot Area harvested. Where Plot Area is 1 m x 0.75 m
7	Above ground biomass (g)	Recorded as total pod weight per plot plus total shoot biomass per plot

14 Source: Bioversity International descriptors for Cowpea, 2010

15

16 Table S5: List of environments derived from water regime, location and year.  
 17

S/N	Location	Water Regime	Year of Evaluation	Environments
1	Ibadan	Well-watered	2020	1
2	Ibadan	Well-watered	2021	2
3	Ikenne	Well-watered	2020	3
4	Ikenne	Well-watered	2021	4
5	Kano	Well-watered	2021	5
6	Kano	Well-watered	2022	6
7	Ibadan	Water-stressed	2020	7
8	Ibadan	Water-stressed	2021	8
9	Ikenne	Water-stressed	2020	9
10	Ikenne	Water-stressed	2021	10
11	Kano	Water-stressed	2021	11
12	Kano	Water-stressed	2022	12

18

Table S6: Mean squares values from combined analysis of variance of agronomic traits measured under well-watered conditions in Ibadan 2020 & 2021, Ikenne 2020 & 2021 and Kano 2021 & 2022.

S.V	Accession	Environment (ENV)	Rep (ENV)	BLK (Rep × ENV)	Accession × ENV	Error	Heritability (H <sup>2</sup> ) (%)
D.F	111	5	12	234	544	969	
D1FLR	196.54**	42960**	362.32**	48.42**	98.42**	31.19	53
D50FLR	281.09**	44808**	287.83**	90.57**	141.47**	66.62	51
PdWt (g)	38976**	267717**	18676**	3920.52**	6156.14**	2733.9	86
Nopdplt	5904.62**	178578**	10120**	1254.56**	1873.98**	937.07	72
TSWt (g)	16662**	114751**	5034.79**	1903.62**	2830.39**	1380.16	85
Grain Yld (g/m <sup>2</sup> )	29754**	208620**	8974.57**	3360.39**	5033.15**	2449.21	85
AbvgBMss (g)	379692**	4987634**	136798	75398**	82691**	43881.2	80

\*, \*\*, Significant at 0.05 and 0.01 probability levels, respectively

Abbreviations: S.V: Source of variation, Rep: Replicate, BLK: Block, ENV: Environment, D.F: Degree of freedom, D1FLR: Days to first flower, D50FLR: Days to 50% flowering, PdWt: Pod weight, Nopdplt: Number of pods per plant, TSWt: Total Seed weight, Grain Yld: Grain Yield, AbvgBMss: Above ground Biomass

Table S7: Mean square values from combined analysis of variance of agronomic traits measured under water-stressed conditions in Ibadan 2020 & 2021, Ikenne 2020 & 2021 and Kano 2021 & 2022

S.V	Accession	Environment (ENV)	Rep (ENV)	BLK (Rep × ENV)	Accession × ENV	Error	Heritability (H <sup>2</sup> ) (%)
D.F	111	5	12	234	541	959	
D1FLR	210.39**	38558**	190.02**	41.24**	76.53**	19.54	65
D50FLR	207.94**	38112**	206.26**	38.15**	77.59**	22.09	64
PdWt (g)	11560**	135990**	13932**	2289.00**	2917.75**	478.06	80
Nopdplt	3822.04**	42278**	5602.88**	983.69**	1221.32**	716.06	73
TSWt (g)	5344.54**	66261**	5890.18**	1191.11**	1424.04**	499.82	78
Grain Yld (g/m <sup>2</sup> )	9400.74**	118796**	10812**	2098.66**	2509.24**	899.29	79
AbvgBMss (g)	141966**	6295416**	394028**	46351**	59731**	33389.8	64

\*, \*\*, Significant at 0.05 and 0.01 probability levels, respectively

**Abbreviations:** S.V: Source of variation, Rep: Replicate, BLK: Block, ENV: Environment, D.F: Degree of freedom, D1FLR: Days to first flower, D50FLR: Days to 50% flowering, PdWt: Pod weight, Nopdplt: Number of pods per plant, TSWt: Total Seed weight, Grain Yld: Grain Yield, AbvgBMss: Aboveground Biomass

Table S8: Mean square values from the combined analysis of variance of photosynthetic traits observed before stress imposition in Ibadan 2020 & 2021, Ikenne 2020 & 2021, Kano 2020 & 2021 and during stress imposition Ibadan 2020 & 2021, Ikenne 2021 and Kano 2021.

BEFORE STRESS IMPOSITION									
Source	DF	RCC	Leaf Angle	LTD	LEF	NPQt	ΦPSII	ΦNO	ΦNPQ
Accession	111	108.56**	109.259**	4.62**	1479.84 <sup>ns</sup>	0.96**	0.003**	0.003**	0.008**
ENV	5	4675.40**	9524.908**	307.68**	614107**	93.23**	2.78**	0.101**	3.200**
Rep (ENV)	12	381.23**	546.872**	40.39**	27718**	2.13**	0.013**	0.008**	0.035**
Block									
(Rep*ENV)	234	45.70**	117.160**	8.35**	3120.75**	0.67 <sup>ns</sup>	0.002**	0.002**	0.005**
Accession*ENV	551	52.21**	84.469	2.14 <sup>ns</sup>	1150.65	0.65**	0.001*	0.002	0.004
Error	1027	32.31	5.797	1.99	1157.70	0.56	0.001	0.001	0.003
H <sup>2</sup> (%)		45	1	61	6	24	55	43	57
DURING STRESS IMPOSITION									
Accession	111	421.97**	81.53*	6.60**	4266.57**	64.20**	0.016**	0.005**	0.036**
ENV	3	26920.61**	17039.65**	1174.01**	1311511.06**	11074.70**	2.338**	0.909**	6.070**
Rep (ENV)	8	2969.34**	1411.18**	495.18**	265886.59**	504.19**	0.553**	0.137**	1.221**
BLK (Rep*ENV)	156	213.35**	82.814*	9.29**	4944.06**	46.75	0.012**	0.003 <sup>ns</sup>	0.024**
Accession*ENV	333	224.39**	71.165	5.57**	4415.18**	49.47	0.013**	0.004**	0.028**
Error	729	133.15	65.07	3.32	2650.16	39.76	0.008	0.002	0.016
H <sup>2</sup> (%)		50	8	-	1	27	23	28	26

\*, \*\*, Significant at 0.05 and 0.01 probability levels, respectively

**Abbreviations:** S.V: Source of variation, Rep: Replicate, BLK: Block, ENV: Environment, H<sup>2</sup> (RCC: Relative Chlorophyll Content, LTD: Leaf Temperature Differential, LEF: Linear Electron Flow, NPQt: Non-photochemical quenching, ΦPSII: Quantum yield of photosystem II, ΦNO: Ratio of incoming light lost, ΦNPQ: Ratio of incoming light towards non-photochemical quenching



48 Table S9: SNP markers associated with photosynthetic traits measured before stress imposition.

Traits	S/N	SNP Marker	Chromosome	Position	P.value	Effect	-log10p
Leaf Angle	1	35154506 F 0-48:G>A-48:G>A	VU10	33692003	3.51E-05	-2.0617	4.45528
	2	35152679 F 0-40:T>C-40:T>C	VU05	32241457	0.00015	1.72325	3.82802
	3	14074646 F 0-6:C>T-6:C>T	VU03	12499389	0.00024	3.0124	3.61599
LEF	4	25366687 F 0-10:T>C-10:T>C	VU08	34708837	9.59E-05	-8.3174	4.01808
	5	14075197 F 0-48:G>A-48:G>A	VU02	33630594	0.00015	11.4551	3.83426
	6	14084862 F 0-6:A>G-6:A>G	VU01	28902707	0.00021	7.04258	3.6789
	7	14081982 F 0-8:T>A-8:T>A	VU08	34706496	0.00043	-8.2264	3.37083
	8	14074604 F 0-52:T>C-52:T>C	VU11	337646	0.00045	-9.7617	3.34408
	9	100012097 F 0-16:T>A-16:T>A	VU05	43316282	0.0005	10.0336	3.30368
	10	35153123 F 0-41:T>G-41:T>G	VU01	30355102	0.00054	6.51871	3.27137
	11	14076321 F 0-57:C>T-57:C>T	VU02	33628601	0.00054	8.96522	3.264
NPQt	12	14086036 F 0-18:G>A-18:G>A	VU10	21387851	0.00017	-0.085	3.78186
	13	42215970 F 0-58:C>T-58:C>T	VU01	20107269	0.0004	0.31148	3.39689
	14	14077745 F 0-9:C>T-9:C>T	VU06	13636758	0.00055	0.19384	3.26008
Phi2	15	28497847 F 0-58:G>A-58:G>A	VU08	29649779	1.95E-05	0.00721	4.71071
	16	14083120 F 0-30:T>C-30:T>C	VU03	1855507	0.00021	0.00797	3.66995
	17	14087468 F 0-39:C>T-39:C>T	VU05	1982113	0.00035	-0.0059	3.45407
	18	35154661 F 0-23:G>T-23:G>T	VU02	2168260	0.00041	0.0094	3.38525
PhiNO	19	14087183 F 0-8:G>C-8:G>C	VU04	29274851	0.00051	0.00464	3.29617
	20	14082287 F 0-10:T>C-10:T>C	VU10	33282962	7.53E-05	-0.0145	4.1234
	21	14084966 F 0-21:T>C-21:T>C	VU10	33282470	9.98E-05	0.01082	4.00099
	22	14073827 F 0-12:A>T-12:A>T	VU07	21993383	0.0001	0.01572	3.98969
	23	14073619 F 0-32:T>A-32:T>A	VU07	21877904	0.0001	-0.0157	3.98969
	24	42215292 F 0-60:T>A-60:T>A	VU07	24318383	0.0002	0.01405	3.70522
	25	14075164 F 0-15:G>T-15:G>T	VU10	33258761	0.00023	0.0113	3.63082
	26	14075587 F 0-24:G>A-24:G>A	VU07	24248530	0.00032	0.01432	3.50121
PhiNPQ	27	14085608 F 0-15:G>A-15:G>A	VU10	33257375	0.00041	0.01058	3.38245
	28	14074064 F 0-6:C>A-6:C>A	VU10	33762521	0.00055	0.00827	3.26021
	29	100059639 F 0-22:G>A-22:G>A	VU10	23347554	0.00018	0.01894	3.75458
	30	42215292 F 0-60:T>A-60:T>A	VU07	24318383	0.00019	-0.0189	3.71206
	31	14087590 F 0-26:T>C-26:T>C	VU04	21345582	0.00023	-0.0144	3.63433
	32	14075587 F 0-24:G>A-24:G>A	VU07	24248530	0.00024	-0.0196	3.62533

49

50

51 Table S10: SNP markers associated with photosynthetic traits measured during stress imposition.

Traits	S/N	SNP Marker	Chromosome	Position	P.value	Effect	-log10p
RCC	1	14082437 F 0-23:A>C-23:A>C	VU05	9223414	5.43E-05	3.332864	4.2651
	2	35154106 F 0-46:T>C-46:T>C	VU04	28508873	7.53E-05	-4.48374	4.123022
	3	14075625 F 0-53:A>T-53:A>T	VU04	40215362	0.000289	-3.32201	3.539607
	4	14075687 F 0-54:A>G-54:A>G	VU09	42091154	0.000505	-6.69966	3.296898
Leaf Angle	5	35154437 F 0-23:A>G-23:A>G	VU02	7708621	0.000115	-4.08604	3.938036
	6	28497458 F 0-43:C>A-43:C>A	VU01	38076734	0.00047	3.414896	3.327834
	7	25363555 F 0-67:T>A-67:T>A	VU08	7475709	0.000491	-1.56435	3.308539
	8	14082981 F 0-61:C>G-61:C>G	VU11	35410816	0.000493	1.759239	3.307571
LEF	9	14074911 F 0-19:A>C-19:A>C	VU05	46903094	0.000505	2.049759	3.296859
	10	25355835 F 0-14:C>G-14:C>G	VU03	689150	9.39E-05	14.31185	4.02718
	11	28203013 F 0-9:A>G-9:A>G	VU10	32807703	0.000226	7.269981	3.645913
	12	14056866 F 0-39:T>A-39:T>A	VU09	36208899	0.000234	11.79372	3.631711
LTD	13	42215649 F 0-18:G>A-18:G>A	VU11	29035476	0.000279	18.0569	3.554977
	14	14082886 F 0-62:G>T-62:G>T	VU06	20520148	0.00033	-21.9831	3.481662
	15	14055923 F 0-18:T>C-18:T>C	VU02	32058018	0.000405	10.85694	3.392965
	16	14087611 F 0-10:G>A-10:G>A	VU07	38232938	0.000428	7.050293	3.368852
LTD	17	14077445 F 0-12:G>A-12:G>A	VU05	43318921	0.000538	8.957021	3.269548
	18	25363858 F 0-36:T>C-36:T>C	VU02	23829221	0.000556	-8.90222	3.255247
	19	25354011 F 0-63:T>A-63:T>A	VU04	36172186	4.61E-05	-0.57752	4.33618
	20	25354011 F 0-6:T>C-6:T>C	VU04	36172186	0.000171	-0.63189	3.767947
LTD	21	14077371 F 0-45:C>T-45:C>T	VU01	28885381	0.000267	0.813972	3.573435
	22	14082884 F 0-64:G>C-64:G>C	VU04	36150435	0.000282	-0.4219	3.550175
	23	14074608 F 0-24:C>T-24:C>T	VU08	5902475	0.000458	0.392288	3.339261
	24	42215484 F 0-60:T>C-60:T>C	VU01	28607302	0.000461	-0.80312	3.33593
LTD	25	35154947 F 0-39:C>T-39:C>T	VU10	11279555	0.000468	0.621432	3.330078
	26	14081761 F 0-65:T>G-65:T>G	VU05	1398660	0.000547	0.575115	3.262068
	27	14085634 F 0-45:A>G-45:A>G	VU05	1706850	0.00056	0.713402	3.252187
	28	14076589 F 0-32:C>T-32:C>T	VU05	15017004	8.12E-05	0.9248	4.090191
NPQr	29	14075950 F 0-42:T>C-42:T>C	VU10	29849202	0.000152	-1.17676	3.8193
	30	35153664 F 0-9:T>C-9:T>C	VU07	34487122	0.000258	2.129861	3.588028
	31	14085225 F 0-18:C>T-18:C>T	VU07	6479339	0.00036	-1.43802	3.443847
	32	14084282 F 0-14:G>C-14:G>C	VU07	4745348	0.000414	1.348756	3.382554
Phi2	33	14077445 F 0-12:G>A-12:G>A	VU05	43318921	0.000235	0.02035	3.628108
PhiNO	34	25364932 F 0-32:C>A-32:C>A	VU07	37527811	0.000358	-0.02744	3.446616
	35	14086611 F 0-37:C>G-37:C>G	VU11	30566812	0.000539	0.023394	3.268408
	36	14086611 F 0-46:G>T-46:G>T	VU11	30566812	0.000539	0.023394	3.268408
PhiNPQ	37	14077445 F 0-12:G>A-12:G>A	VU05	43318921	0.000139	-0.03116	3.858377
	38	25353929 F 0-50:G>A-50:G>A	VU05	43418353	0.000384	-0.02735	3.415326
	39	25355835 F 0-14:C>G-14:C>G	VU03	689150	0.000536	-0.04067	3.27103
	40	25364932 F 0-32:C>A-32:C>A	VU07	37527811	0.000561	0.070128	3.251189

53 Table S11: SNP markers associated with agronomic traits under well-watered conditions.

Traits	S/N	SNP Marker	Chromosome	Position	P.value	Effect	-log10p
D1FLR	1	14083458 F 0-15:A>T-15:A>T	VU05	37821251	0.000349	2.696274	3.456581
	2	14077654 F 0-34:T>G-34:T>G	VU07	16133528	0.000373	2.732358	3.428093
D50FLR	3	14077654 F 0-34:T>G-34:T>G	VU07	16133528	0.0003	3.15119	3.522373
	4	14078784 F 0-33:G>A-33:G>A	VU08	27442505	0.000332	-4.8069	3.479329
PDWT	5	14074811 F 0-12:G>A-12:G>A	VU04	39340965	1.18E-05	-79.8246	4.926399
	6	14055805 F 0-23:C>G-23:C>G	VU08	34011908	2.48E-05	83.08417	4.605517
	7	14056089 F 0-34:G>A-34:G>A	VU03	57303579	4.46E-05	134.7355	4.350602
	8	14057278 F 0-16:C>T-16:C>T	VU11	36490988	4.46E-05	67.36777	4.350602
	9	14056174 F 0-48:G>A-48:G>A	VU08	30941799	7.85E-05	88.51787	4.105117
	10	14084697 F 0-30:C>G-30:C>G	VU04	42160393	9.53E-05	23.97369	4.020709
	11	14077131 F 0-57:C>T-57:C>T	VU03	1072861	0.000161	43.10597	3.792178
	12	14085596 F 0-23:A>G-23:A>G	VU03	1092128	0.000161	43.10597	3.792178
	13	14073733 F 0-16:G>A-16:G>A	VU03	1081086	0.000175	-42.0296	3.756928
	14	14075093 F 0-47:G>A-47:G>A	VU04	36182035	0.00022	-52.1092	3.656867
	15	25356357 F 0-53:A>G-53:A>G	VU07	17328027	0.000228	32.10753	3.641944
	16	14077339 F 0-28:T>C-28:T>C	VU04	42181325	0.000276	-22.4295	3.558594
	17	14057194 F 0-42:A>T-42:A>T	VU01	38317304	0.000381	37.66215	3.418543
	18	35153037 F 0-31:G>A-31:G>A	VU10	10192254	0.000393	32.56727	3.405392
	19	25352714 F 0-46:A>G-46:A>G	VU10	38128958	0.000404	30.04746	3.39415
	20	14084697 F 0-30:C>G-30:C>G	VU04	42160393	2.10E-05	11.68483	4.677021
NoPdPlt	21	14077339 F 0-28:T>C-28:T>C	VU04	42181325	5.70E-05	-11.1106	4.244128
	22	35153037 F 0-31:G>A-31:G>A	VU10	10192254	0.000114	15.81056	3.942024
	23	14056174 F 0-48:G>A-48:G>A	VU08	30941799	0.000327	35.52035	3.485124
	24	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000501	51.28694	3.300348
	25	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000501	25.64347	3.300348
	26	14074811 F 0-12:G>A-12:G>A	VU04	39340965	1.36E-05	-53.5876	4.867846
TSWT	27	14055805 F 0-23:C>G-23:C>G	VU08	34011908	2.18E-05	56.78362	4.661407
	28	14077131 F 0-57:C>T-57:C>T	VU03	1072861	0.000113	29.78145	3.946573
	29	14085596 F 0-23:A>G-23:A>G	VU03	1092128	0.000113	29.78145	3.946573
	30	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000143	85.25239	3.844948
	31	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000143	42.6262	3.844948
	32	14073733 F 0-16:G>A-16:G>A	VU03	1081086	0.000145	-28.6693	3.837482
	33	14075093 F 0-47:G>A-47:G>A	VU04	36182035	0.000192	-35.548	3.716265
	34	14084697 F 0-30:C>G-30:C>G	VU04	42160393	0.000293	14.95105	3.533342
	35	25352714 F 0-46:A>G-46:A>G	VU10	38128958	0.000424	20.3203	3.372257
	36	25356357 F 0-53:A>G-53:A>G	VU07	17328027	0.000444	21.18694	3.353005
	37	14077339 F 0-28:T>C-28:T>C	VU04	42181325	0.000473	-14.5417	3.325457
	38	14074811 F 0-12:G>A-12:G>A	VU04	39340965	1.52E-05	-71.2002	4.818859
YLD	39	14055805 F 0-23:C>G-23:C>G	VU08	34011908	2.43E-05	75.50122	4.613552
	40	14077131 F 0-57:C>T-57:C>T	VU03	1072861	0.000109	39.88125	3.962977

AbvgBmss	41	14085596 F 0-23:A>G-23:A>G	VU03	1092128	0.000109	39.88125	3.962977
	42	14073733 F 0-16:G>A-16:G>A	VU03	1081086	0.000138	-38.4161	3.859163
	43	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000148	114.0616	3.828563
	44	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000148	57.03082	3.828563
	45	14075093 F 0-47:G>A-47:G>A	VU04	36182035	0.000218	-47.0673	3.660922
	46	14084697 F 0-30:C>G-30:C>G	VU04	42160393	0.000275	20.08584	3.560036
	47	25356357 F 0-53:A>G-53:A>G	VU07	17328027	0.000392	28.82135	3.406819
	48	25352714 F 0-46:A>G-46:A>G	VU10	38128958	0.000438	27.1339	3.358751
	49	14077339 F 0-28:T>C-28:T>C	VU04	42181325	0.000445	-19.5429	3.351919
	50	14074811 F 0-12:G>A-12:G>A	VU04	39340965	2.63E-05	-202.243	4.57956
	51	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000135	331.0125	3.869027
	52	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000135	165.5062	3.869027
	53	14055805 F 0-23:C>G-23:C>G	VU08	34011908	0.000181	193.314	3.741659
	54	28203121 F 0-13:G>T-13:G>T	VU08	30941579	0.000305	73.33933	3.516317
	55	14075084 F 0-26:C>T-26:C>T	VU02	33172906	0.000307	78.35813	3.512526
	56	14081796 F 0-46:T>C-46:T>C	VU10	967360	0.000436	-128.243	3.360687
	57	35154756 F 0-7:C>T-7:C>T	VU03	331738	0.000487	75.05848	3.312884

54

55

56 Table S12: SNP markers associated with agronomic traits under water-stressed conditions.

Traits	S/N	SNP Marker	Chromosome	Position	P.value	Effect	-log10p
D1FLR	1	35154477 F 0-68:G>A-68:G>A	VU03	1993882	6.26E-05	-4.58663	4.203313
	2	42215302 F 0-22:C>G-22:C>G	VU09	41395527	0.000131	3.846411	3.881625
	3	14073701 F 0-38:A>C-38:A>C	VU09	1587729	0.000191	-2.47458	3.718222
	4	14082267 F 0-29:T>C-29:T>C	VU11	4317445	0.000262	-3.44116	3.580882
D50FLR	5	35154477 F 0-68:G>A-68:G>A	VU03	1993882	2.30E-05	-4.78485	4.639214
	6	42215302 F 0-22:C>G-22:C>G	VU09	41395527	4.62E-05	4.042261	4.335262
	7	14073701 F 0-38:A>C-38:A>C	VU09	1587729	8.32E-05	-2.57178	4.0798
	8	14082267 F 0-29:T>C-29:T>C	VU11	4317445	0.000142	-3.53056	3.849187
PDWT	9	42215513 F 0-19:G>A-19:G>A	VU07	23434856	0.000362	-4.9259	3.44103
	10	25364251 F 0-67:T>C-67:T>C	VU09	7109840	0.000376	2.566323	3.425238
	11	14075804 F 0-37:G>A-37:G>A	VU06	17922321	0.000473	-3.0832	3.32499
	12	14074811 F 0-12:G>A-12:G>A	VU04	39340965	7.08E-07	-60.9071	6.149813
	13	14055805 F 0-23:C>G-23:C>G	VU08	34011908	2.50E-06	62.27293	5.601677
	14	14075093 F 0-47:G>A-47:G>A	VU04	36182035	6.50E-05	-37.626	4.187363
	15	14082590 F 0-36:A>T-36:A>T	VU09	17208919	0.000159	51.14463	3.799786
	16	100011421 F 0-9:A>G-9:A>G	VU03	4284517	0.000183	78.90853	3.738095
	17	100046154 F 0-6:C>T-6:C>T	VU03	20546099	0.000299	34.29401	3.524952
	18	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000313	77.76086	3.504904
	19	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000313	38.88043	3.504904
	20	14057194 F 0-42:A>T-42:A>T	VU01	38317304	0.000515	0.05102	3.308847
NoPdPlt	21	14074179 F 0-36:T>A-36:T>A	VU11	552867	0.000388	-25.6114	3.411282
	22	42215328 F 0-32:G>A-32:G>A	VU05	35892185	0.000408	-18.6213	3.389192
	23	14074811 F 0-12:G>A-12:G>A	VU04	39340965	4.87E-06	-35.211	5.312246
	24	14055805 F 0-23:C>G-23:C>G	VU08	34011908	5.39E-05	33.33024	4.268373
	25	14057194 F 0-42:A>T-42:A>T	VU01	38317304	0.000123	17.22971	3.910947
	26	100046154 F 0-6:C>T-6:C>T	VU03	20546099	0.000124	23.40486	3.90748
	27	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000227	50.78829	3.644171
	28	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000227	25.39414	3.644171
	29	14059384 F 0-29:G>A-29:G>A	VU04	42146683	0.000315	9.204232	3.501735
	30	14055483 F 0-57:G>A-57:G>A	VU01	38316892	0.000385	-15.1799	3.414522
TSWT	31	14076546 F 0-14:G>T-14:G>T	VU11	36491054	0.0005	16.655	3.301325
	32	14074811 F 0-12:G>A-12:G>A	VU04	39340965	1.05E-06	-40.8925	5.977667
	33	14055805 F 0-23:C>G-23:C>G	VU08	34011908	2.98E-06	42.20856	5.52616
	34	14075093 F 0-47:G>A-47:G>A	VU04	36182035	3.87E-05	-26.5801	4.411924
	35	100011421 F 0-9:A>G-9:A>G	VU03	4284517	0.00023	53.03856	3.638218
	36	14082590 F 0-36:A>T-36:A>T	VU09	17208919	0.000236	33.96287	3.627411
	37	100046154 F 0-6:C>T-6:C>T	VU03	20546099	0.000305	23.40537	3.515384
	38	14077593 F 0-60:T>A-60:T>A	VU07	30170236	0.00035	12.57174	3.456487
YLD	39	35154947 F 0-39:C>T-39:C>T	VU10	11279555	0.000429	-14.6673	3.367707
	40	14082146 F 0-28:T>C-28:T>C	VU11	30563244	0.000474	20.80564	3.324429
	41	14074811 F 0-12:G>A-12:G>A	VU04	39340965	1.06E-06	-54.5286	5.972699

	42	14055805 F 0-23:C>G-23:C>G	VU08	34011908	2.96E-06	56.32839	5.528479
	43	14075093 F 0-47:G>A-47:G>A	VU04	36182035	3.69E-05	-35.5672	4.432708
	44	14082590 F 0-36:A>T-36:A>T	VU09	17208919	0.000211	45.69314	3.676194
	45	100011421 F 0-9:A>G-9:A>G	VU03	4284517	0.000222	70.96008	3.654445
	46	100046154 F 0-6:C>T-6:C>T	VU03	20546099	0.00031	31.18904	3.508612
	47	14077593 F 0-60:T>A-60:T>A	VU07	30170236	0.000354	16.75555	3.450805
	48	35154947 F 0-39:C>T-39:C>T	VU10	11279555	0.000415	-19.6207	3.38198
	49	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000468	68.68725	3.330066
	50	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000468	34.34362	3.330066
AbvgBmss	51	14056089 F 0-34:G>A-34:G>A	VU03	57303579	0.000161	285.5821	3.794165
	52	14057278 F 0-16:C>T-16:C>T	VU11	36490988	0.000161	142.791	3.794165
	53	14055805 F 0-23:C>G-23:C>G	VU08	34011908	0.00039	141.3599	3.408825