

1 Supplementary Information

2

3

4

5 TABLE S1. Characters and states scored.

6

Character	State	Notes
Plant height	Measurement	Ground level to tip of inflorescence, measured on an arbitrarily chosen specimen
Inflorescence length	Measurement	A single measurement
Number Branches	Count	
Leaf Length	Measurement	Estimated average from tip of leaf to top of sheath
Leaf Diameter	Measurement	On dried leaf (so usually rolled or folded)
Number of florets per spikelet	Count	
Lower Glume Length	Measurement	

Number of Lower Glume Veins	Count
Length of central awn column	Measurement
Length of central awn limb	Measurement
Setae length	Measurement
Leaf anatomy: number of primary vascular bundles (vbs)	Count
Number tertiary vbs	Count
Adaxial groove depth	0: grooves shallow 1: < half leaf depth 2: > half leaf depth
Adaxial grooves differentiated	0: no, all the same depth 1: deeper flanking midrib than at leaf tip
vbs position	0: all ca. middle of leaf 1: 1'vbs leaf middle; 3'vbs adaxial 2: all adaxial
Cells around 1' vbs differentiated	0: both bundle sheath rings thinwalled

	1: one bundle sheath thin, one thickened	
	2: both thickened	
adaxial sclerenchyma rib	0: with a fine stalk	
	1: stalk variable	
	2: stalk thick	
abaxial sclerenchyma	0: only connected to 1'vbs	Usually for (1) in the 3'vbs flanking the midrib
	1: connected to some 3'vbs	
	2: connected to all 3'vbs	
bulliform cells	0: absent	In some cases this is fairly arbitrary
	1: present	
leaf tip caps	0: absent	
	1: almost invisible	
	2: present, but isolated	
	3: present and broad	
	4: present and extended abaxially	
abaxial microhairs	0: absent	Only observed on epidermal scrapes
	1: present	
macrohairs	0: absent	Visible on transverse sections

	1: present	
silicabodies	0: round	Only observed on epidermal scrapes
	1: kidney-shaped	
costal / intercostal differentiation	0: absent	Only observed on epidermal scrapes
	1: present	
Corkcells	0: all on one side of silica bodies	Only observed on epidermal scrapes
	1: intercostal between silica bodies	
abaxial stomata	0: absent	Only observed on epidermal scrapes
	1: intercostal, rare	
	2: intercostal, as a row	

7

8

9

10 TABLE S2. The full anatomical dataset as used for the phenetic analyses; the characters are described in the species description. Adaxial
11 groove depth: 0 = shallow; 1 = < leaf width; 2 = > leaf width. Grooves differentiated: 0 = no, all the same; 1 = deeper towards middle.
12 Vbs position: 0 = all central; 1 = 1'vbs central, 3'vbs abaxially; 2 = all abaxial. 1'vbs bundlesheaths: 0 = both thin-walled; 1 = inner thin,
13 outer thickwalled; 2 = both thickwalled. Adaxial sclerenchyma: 0 = narrow-stalked T-shaped girder; 1 = variably stalked T-shaped
14 girder; 2 = thick-stalked T-shaped girder. Abaxial sclerenchyma: 0 = reaching only 1'vbs; 1 = reaching 1'vbs and some 3'vbs; 2 =
15 reaching all vbs. Bulliform cells: 0 = absent; 1 = present. Leaf tip caps: 0 = absent; 1 = almost absent; 2 = present; 3 = wide; 4 =
16 extended abaxially under epidermis. Abaxial microhairs: 0 = absent; 1 = present. Macrohairs: 0 = absent; 1 = only along leaf margins; 2
17 = generally present. Silica bodies: 0 = round; 1 = kidney-shaped. Costal-intercostal differentiation: 0 = absent; 1 = present. Corkcells: 0
18 = all on same side of silica bodies; 1 = variable. Abaxial stomata: 0 = absent; 1 = intercostal, rare; 2 = intercostal as one row; 3 =
19 intercostal, 2 rows. Missing data indicated by ???.

20

21

Collector	Number	form	Number 1' vbs	Number 3' vbs	Adaxial groove depth	Grooves differentiated	vbs position	differentiated	ad sclerenchyma rib	abaxial sclerenchyma	bulliform cells	leaf tip caps	abaxial microhairs	macrohairs	silicabodies round	differentiation	Corkcells	abaxial stomata
Perl	d41	bog	5	5	1	1	0	2	0	0	0	4	0	2	1	0	0	0
Ellis	3192	bog1	5	6	1	1	0	1	0	0	0	4	0	2	1	1	0	0
Perl	d29	bog10	5	6	1	1	0	2	1	0	0	4	0	2	1	0	0	0
Perl	d43b	bog11	4	5	1	1	0	2	1	0	1	4	0	2	1	0	0	0
Ellis	5689	bog2	3	4	1	0	0	1	0	???	???	???	???	???	???	???	???	???
Du Toit	699	bog3	5	10	2	1	1	1	2	2	0	2	0	0	0	0	0	0
Du Toit	2207	bog4	3	4	1	0	0	???	0	0	0	4	0	2	0	1	0	0
Ellis	3184	bog5	5	6	1	0	0	1	0	1	0	4	1	2	0	1	0	0
Ellis	3316	bog6	5	7	1	0	0	1	0	0	0	4	???	???	???	???	???	???
Ellis	3309	bog7	5	7	1	0	0	1	0	0	0	4	???	???	???	???	???	???
Ellis	3183	bog8	5	6	1	0	0	1	0	0	0	4	1	2	0	1	0	0
Ellis	3315	bog9	5	8	1	0	0	1	0	0	0	4	???	???	???	???	???	???

Ellis	3157	Drak	8	10	2	1	1	1	2	1	1	2	0	0	0	0	0	0
Ellis	3185	Drak	9	10	2	1	1	1	2	1	0	2	0	0	0	0	0	0
Ellis	3152	drak	6	9	2	1	1	1	2	1	1	2	0	0	0	0	0	0
Mcallister	112	Drak	7	7	2	1	1	1	2	1	???	2	0	0	0	0	0	0
Ellis	3312	Drak	7	7	2	1	1	1	2	2	0	2	???	???	???	???	???	???
Ellis	3233	Drak	9	12	2	1	1	1	2	1	0	1	0	0	0	0	0	0
Ellis	1404	Drak	7	9	2	1	1	1	2	2	1	2	0	0	0	0	0	1
Ellis	2382	Drak	5	8	2	1	1	1	2	1	0	1	0	0	0	1	0	0
Perl	d20	drak	8	11	2	1	1	2	2	1	1	1	0	2	0	0	0	0
Perl	d21	drak	8	12	2	1	1	2	2	1	1	0	0	2	0	0	0	0
Perl	d25	drak	9	14	2	1	1	2	2	1	1	1	0	0	0	0	0	0
Perl	d26	drak	11	14	2	1	1	2	2	1	0	1	0	0	0	0	0	0
Perl	d28	drak	8	10	2	1	1	2	2	1	0	1	0	0	0	0	0	0
Perl	d30	drak	5	9	2	1	1	2	1	1	0	2	0	0	0	0	0	0
Perl	d31	drak	9	11	2	1	1	2	2	1	1	4	1	0	0	0	0	0
Perl	d34	drak	7	7	2	1	1	2	1	1	1	1	0	1	0	0	0	0

Perl	d35	drak	7	11	2	1	1	2	0	1	0	1	0	0	0	0	0	0
Perl	d36	drak	7	8	2	1	1	2	0	1	1	4	0	0	0	0	0	0
Perl	d37	drak	6	11	2	1	1	2	2	1	1	2	0	0	0	0	0	2
Perl	d38	drak	5	6	2	1	1	2	2	2	1	4	1	2	0	0	0	0
Perl	d39	drak	6	10	2	1	1	2	1	1	1	2	1	1	0	0	0	0
Perl	d40	drak	8	9	2	1	1	2	1	1	1	4	0	2	0	0	0	0
Perl	d42	drak	7	8	2	1	1	2	1	1	1	1	0	0	0	0	0	0
Perl	d43	drak	9	11	2	1	1	2	1	1	0	4	0	0	0	0	0	0
Vlok	1052	oud1	3	4	0	0	2	2	0	2	0	1	???	0	???	???	???	???
Perl	d10	oud2	3	4	0	0	2	0	0	2	0	4	0	0	1	0	0	3
Van Breda	4628	Oud3	3	4	0	0	2	2	0	2	0	1	???	0	???	???	???	???
Moffett	365	oud4	3	4	0	0	2	2	0	2	0	1	???	0	???	???	???	???
Ellis	2603	typ	7	8	0	0	0	1	0	1	0	4	0	0	1	0	0	0
Ellis	2391	typ	7	7	0	0	0	1	0	1	0	4	0	0	1	0	0	0
Liebenberg	7713	typ	7	8	0	0	0	1	2	0	1	4	0	0	1	0	0	0
Liebenberg	6656	typ	7	10	0	0	0	1	2	1	0	4	0	0	1	0	0	0

Ellis	2572	typ	7	10	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Ellis	1263	typ	7	8	0	0	0	1	2	1	1	4	0	0	1	0	0	0
Ellis	669	typ	7	8	0	0	0	1	2	1	1	4	0	0	1	0	0	0
Ellis	2564	typ	5	6	0	0	0	1	2	0	1	4	0	0	1	0	0	0
Acocks	11961	typ	7	8	0	0	0	1	0	1	0	4	0	0	1	0	0	???
Perl	d07	typ	4	5	0	1	0	???	1	1	0	3	0	0	0	0	0	0
Perl	d08	typ	5	5	0	1	0	1	1	1	1	2	0	0	0	0	0	0
Perl	d14	typ	7	8	1	0	0	0	0	1	1	4	0	0	0	0	0	0
Perl	d15	typ	7	10	1	0	0	0	0	1	1	4	0	0	0	0	0	0
Perl	d17	typ	7	10	1	0	0	0	0	1	1	4	0	0	0	0	0	0
Perl	d18	typ	6	8	1	0	0	???	0	1	1	4	0	0	0	0	0	0
Perl	d19	typ	5	9	1	0	0	1	0	1	1	4	0	0	0	0	0	0
Perl	d22	typ	7	7	1	0	0	2	0	1	0	4	0	0	0	0	0	0
Perl	d44	typ	5	6	1	0	0	0	0	1	1	4	0	0	0	0	0	0
Perl	d45	typ	7	8	1	0	0	0	0	1	1	4	0	0	0	0	0	0
Clark	511	z	7	8	1	0	0	1	0	1	1	4	???	0	???	???	???	???

Clark	510	z	7	8	1	0	0	1	0	1	1	4	???	0	???	???	???	???
Simon	2331	Z	5	6	1	0	0	1	0	0	1	4	???	0	???	???	???	???

22

23

24

25 TABLE S3: Morphology data matrix

26

27

Collection	form	Plant	height	Inflo	length	Number	Branches	Leaf	Length	Leaf	Diameter	Fis/	spikelet	LG Length	LG Veins	awncol	length	AwnLimb	length	Setae	length
Perl d41	B		88		21		???		30		0.1		2	9.12	???		3.3		5.7		6.35
Ellis 3192	B		270		40		16		150		0.3		2	12	3		3		8.5		8
Perl d29	B		219		29		???		60		0.1		2	10.8	???		3.4		7.4		7.2
Perl d43 B	B		179		32		???		50		0.3		2	10.7	???		3.6		6.7		5.9
Ellis 5689	B		230		37		11		100		0.3		2	11.5	1		3		10		7.8
Du Toit 699	B		200		35		13		55		0.3		2	11	3		2.5		8.2		5.5
Du Toit 2207	B		200		30		13		70		0.3		2	10	1		2		7		6
Ellis 3184	B		180		25		5		65		0.5		2	10.5	1		3		7		6
Ellis 3316	B		170		32		11		100		0.4		2	9	1		3		7		6

Ellis 3309	B	160	35	8	65	0.4	2	9	1	2.5	5.5	6
Ellis 3183	B	150	25	11	70	0.2	2	10	1	2.5	7.5	7
Ellis 3315	B	110	20	10	60	0.2	2	9	1	2	6	5
Ellis 3157	D	480	55	24	300	2	2	16	3	5	13	10
Ellis 3185	D	470	65	22	250	0.8	2	15.5	3	5	12	8
Ellis 3152	D	470	50	13	170	0.6	2	14.5	1	5	10	9
Mcallister 112	D	450	70	20	200	0.8	2	14	3	5	9.5	6.5
Ellis 3312	D	400	53	13	250	0.5	2	13.5	3	3.5	10	7
Ellis 3233	D	320	62	19	170	0.6	2	17	3	3	7.5	5.8
Ellis 1404	D	290	60	20	190	0.8	2	13	3	3.5	9	6.5
Ellis 2382	D	230	60	24	160	0.7	2	13.5	3	4.5	13	7.5
Perl d20	D	427	72	???	210	0.6	3	13.3	???	4.0	11.04	7.8
Perl d21	D	496	71	???	240	0.6	2	12.7	???	3.4	8.4	5.355
Perl d25	D	573	79	???	210	1.8	3	13	???	4.6	9.9	7.8
Perl d26	D	386	52	???	170	1.6	2	14.4	???	3.9	10.1	7.8
Perl d28	D	538	71	???	230	0.6	3	15.4	???	5.7	11.8	10

Perl d30	D	157	29	???	65	0.3	2	11.5	???	4.2	7.92	6.4
Perl d31	D	494	69	???	300	1	2	13.6	???	5.4	9.92	5.1
Perl d34	D	313	49	???	125	1	2	11.2	???	3.9	9.4	7.5
Perl d35	D	376	63	???	115	1.3	2	16.3	???	4.8	10.8	8.9
Perl d36	D	197	41	???	80	0.6	2	11.5	???	4.0	7.3	7.6
Perl d37	D	128	29	???	55	0.5	2	13.4	???	4	9.1	7.5
Perl d38	D	253	40	???	75	0.5	2	13.3	???	3.9	10.2	7.3
Perl d39	D	229	43	???	60	0.3	2	11.6	???	3.7	8.0	6.9
Perl d40	D	387	51	???	170	1.2	2	13.1	???	4.1	9.3	7.3
Perl d42	D	607	77	???	230	1.3	2	13.1	???	4.1	9.0	6.9
Perl d43	D	457	53	???	180	1.2	2	12.5	???	3.3	8.1	6.1
Vlok 1052	O	380	45	19	???	0.5	2	14	1	4	8	8
Perl d10	O	562	61	???	210	0.3	6	14.7	???	5.1	9.9	10.3
Van Breda 4628	O	450	40	18	100	0.4	3	10.5	1	4	8	7
Moffett 365	O	420	55	35	200	0.4	3	13	1	3.5	7	7
Perl d33	T	152	30	???	65	0.1	3	11.2	???	3.7	6.9	7.7

Perl d22	T	586	77	???	300	0.3	3	19.2	???	4.8	13.3	10.2
Perl d44	T	491	64	???	???	???	2	10.2	???	2.8	9	4.3
Perl d45	T	565	84	???	???	???	2	13.6	???	3.6	7.2	6.3
Clark 511	T	600	75	???	400	0.4	???	14	???	3	7	6.5
Clark 510	T	450	60	???	300	0.4	???	11	???	2.5	9	4.3
Simon 2331	T	330	65	29	300	0.7	3	13	3	3.5	8	6.5

28

29