

## SUPPLEMENTARY DATA

**Appendix S1.** Summary of flow cytometric results of *Rhodohypoxis baurii* var. *platypetala* individuals that were sampled across the Drakensberg grasslands, South Africa. Mean fluorescence intensity (MFI) and coefficient of variation of the mean [CV (%)] are shown for the standard and corresponding sample. FS refers to Free State province, KZN refers to Kwa-Zulu Natal province.

Population	Sample ID	Standard G0/G1 peak MFI	Standard CV (%)	Sample G0/G1 peak MFI	Sample CV (%)
Minerva Nature Reserve, KZN	Min1	102.00	6.86	411.09	3.76
Minerva Nature Reserve, KZN	Min2	109.75	5.49	428.85	3.31
Minerva Nature Reserve, KZN	Min3	121.10	6.37	464.43	4.13
Minerva Nature Reserve, KZN	Min4	101.85	6.62	404.39	3.63
Minerva Nature Reserve, KZN	Min5	100.23	7.19	409.93	4.14
Minerva Nature Reserve, KZN	Min6	102.44	6.67	419.16	3.24
Minerva Nature Reserve, KZN	Min7	110.07	5.44	433.12	4.84
Minerva Nature Reserve, KZN	Min8	110.80	5.05	435.78	3.31
Minerva Nature Reserve, KZN	Min9	100.32	4.90	397.04	3.62
Minerva Nature Reserve, KZN	Min10	103.69	4.87	408.99	3.56
Minerva Nature Reserve, KZN	Min11	105.43	5.05	417.92	3.48
Minerva Nature Reserve, KZN	Min12	105.68	6.50	419.13	3.98
Minerva Nature Reserve, KZN	Min13	98.54	7.30	398.69	4.66
Minerva Nature Reserve, KZN	Min14	106.53	5.19	419.43	4.12
Minerva Nature Reserve, KZN	Min15	107.33	4.57	426.11	3.35
Minerva Nature Reserve, KZN	Min18	105.63	6.15	411.41	4.07
Mt Gilboa Nature Reserve, KZN	Mt1	112.89	5.20	440.40	3.25
Mt Gilboa Nature Reserve, KZN	Mt3	108.43	7.33	411.70	5.49
Mt Gilboa Nature Reserve, KZN	Mt5	114.68	7.12	438.76	5.24
Mt Gilboa Nature Reserve, KZN	Mt6	111.58	7.95	422.49	5.92
Mt Gilboa Nature Reserve, KZN	Mt7	107.26	8.00	412.20	5.73
Mt Gilboa Nature Reserve, KZN	Mt8	110.35	9.86	418.94	6.30
Mt Gilboa Nature Reserve, KZN	Mt9	108.38	7.12	414.53	5.34
Mt Gilboa Nature Reserve, KZN	Mt10	108.23	8.38	414.09	5.66

Mt Gilboa Nature Reserve, KZN	Mt11	110.33	7.02	422.65	5.02
Mt Gilboa Nature Reserve, KZN	Mt12	105.70	5.31	413.81	3.03
Mt Gilboa Nature Reserve, KZN	Mt13	111.61	6.46	418.71	5.23
Mt Gilboa Nature Reserve, KZN	Mt14	110.75	6.62	417.17	5.53
Mt Gilboa Nature Reserve, KZN	Mt15	115.42	7.35	435.17	5.77
Mt Gilboa Nature Reserve, KZN	Mt16	102.93	4.78	403.30	3.69
Mt Gilboa Nature Reserve, KZN	Mt17	102.39	4.26	399.12	2.95
Mt Gilboa Nature Reserve, KZN	Mt18	98.90	6.05	388.22	4.24
Mt Gilboa Nature Reserve, KZN	Mt19	109.00	5.06	425.28	3.11
Mt Gilboa Nature Reserve, KZN	Mt20	103.07	6.94	399.91	3.95
Mt Gilboa Nature Reserve, KZN	Mt21	111.42	5.66	431.03	3.60
Mt Gilboa Nature Reserve, KZN	Mt22	108.57	5.69	424.68	3.19
Mt Gilboa Nature Reserve, KZN	Mt23	107.43	5.09	421.66	3.12
Mt Gilboa Nature Reserve, KZN	Mt24	109.74	4.97	428.87	3.25
Mt Gilboa Nature Reserve, KZN	Mt25	104.79	6.09	408.02	3.75
Mt Gilboa Nature Reserve, KZN	Mt26	104.83	7.71	373.87	3.86
Howick, KZN	Hw1	103.03	5.09	367.07	4.20
Howick, KZN	Hw2	109.08	4.87	385.39	3.79
Howick, KZN	Hw3	99.89	5.03	386.79	3.22
Howick, KZN	Hw4	110.53	5.27	420.87	3.66
Howick, KZN	Hw5	103.14	5.63	396.11	3.28
Howick, KZN	Hw6	99.55	9.43	388.23	4.27
Howick, KZN	Hw7	101.43	5.54	391.14	3.41
Howick, KZN	Hw8	107.58	7.99	405.66	4.45
Howick, KZN	Hw9	107.56	5.41	413.16	3.61
Howick, KZN	Hw11	92.29	6.22	353.94	3.62
Howick, KZN	Hw14	102.66	7.34	409.21	4.03
Howick, KZN	Hw15	99.87	7.08	374.25	3.67
Howick, KZN	Hw16	101.48	5.35	397.14	3.34
Howick, KZN	Hw17	101.85	5.44	398.46	3.02
Howick, KZN	Hw18	108.64	5.51	416.86	3.57
Howick, KZN	Hw19	105.57	5.45	407.89	3.87
Howick, KZN	Hw20	110.19	4.97	424.24	3.83
Howick, KZN	Hw21	110.67	5.40	421.11	4.29
Howick, KZN	Hw22	109.34	4.40	425.28	3.02

Howick, KZN	Hw23	106.64	5.70	414.57	3.84
Howick, KZN	Hw24	108.43	4.40	424.69	3.32
Howick, KZN	Hw25	104.98	4.85	414.71	2.97
Howick, KZN	Hw26	103.12	5.52	400.29	3.05
Hebron, KZN	Heb1	103.12	6.83	411.91	4.13
Hebron Farm road, KZN	Heb16	98.69	5.15	392.11	2.73
Hebron Farm road, KZN	Heb17	75.89	5.07	280.77	3.90
Hebron Farm road, KZN	Heb18	80.84	8.71	305.03	4.51
Hebron Farm road, KZN	Heb19	95.80	5.52	353.09	4.72
Hebron Farm road, KZN	Heb20	99.49	4.08	366.41	2.71
Hebron Farm road, KZN	Heb21	106.27	4.15	411.91	4.13
Stoffelton, Ngqiyana, KZN	St1	103.26	4.76	181.92	3.68
Stoffelton road, Ngqiyana, KZN	St2	98.22	4.60	169.15	3.71
Stoffelton road, Ngqiyana, KZN	St3	91.61	6.98	199.49	4.09
Stoffelton road, Ngqiyana, KZN	St4	97.92	6.09	199.49	4.09
Stoffelton road, Ngqiyana, KZN	St5	95.70	6.80	199.49	4.09
Stoffelton road, Ngqiyana, KZN	St6	102.36	6.38	199.49	4.09
Stoffelton road, Ngqiyana, KZN	St7	103.41	4.70	190.26	6.05
Stoffelton road, Ngqiyana, KZN	St8	97.79	4.62	175.28	3.86
Stoffelton road, Ngqiyana, KZN	St9	97.37	4.53	173.72	3.98
Stoffelton road, Ngqiyana, KZN	St10	100.61	5.16	178.71	3.46
Stoffelton road, Ngqiyana, KZN	St11	100.71	6.11	177.13	4.44
Stoffelton road, Ngqiyana, KZN	St12	96.00	3.99	167.84	3.42
Stoffelton road, Ngqiyana, KZN	St13	96.57	5.26	167.71	3.95
Stoffelton road, Ngqiyana, KZN	St14	94.53	5.38	167.86	3.86
Stoffelton road, Ngqiyana, KZN	St15	96.46	4.63	169.35	3.83
Stoffelton road, Ngqiyana, KZN	St16	100.42	5.21	175.67	4.80
Stoffelton road, Ngqiyana, KZN	St17	90.84	5.92	162.36	4.74
Stoffelton road, Ngqiyana, KZN	St18	94.82	4.54	165.68	3.30
Stoffelton road, Ngqiyana, KZN	St19	90.07	5.93	157.73	4.50
Underberg, KZN	Ub2	102.09	6.68	206.43	4.57
Underberg, KZN	Ub3	100.89	5.02	206.43	4.57
Underberg, KZN	Ub4	99.81	5.31	202.72	5.61
Underberg, KZN	Ub5	97.38	5.35	201.71	4.29
Underberg, KZN	Ub7	103.01	5.08	202.72	5.61

Underberg, KZN	Ub8	105.89	5.63	202.72	5.61
Underberg, KZN	Ub9	107.47	5.84	202.72	5.61
Underberg, KZN	Ubi1	100.41	6.60	202.72	5.61
Underberg, KZN	Ubi2	93.46	6.80	162.58	4.97
Underberg, KZN	Ubi3	98.43	9.84	171.94	4.35
Underberg, KZN	Ubi4	102.77	5.53	171.94	4.35
Underberg, KZN	Ubi5	98.44	4.37	171.94	4.35
Underberg, KZN	Ubi7	95.39	3.36	195.45	3.87
Underberg, KZN	Ubi8	94.88	5.47	195.45	3.87
Drakensberg Gardens, KZN	Dg1	70.27	8.53	128.29	5.68
Drakensberg Gardens, KZN	Dg2	86.03	6.30	162.70	7.23
Drakensberg Gardens, KZN	Dg3	77.76	5.97	141.90	4.62
Drakensberg Gardens, KZN	Dg5	105.55	6.27	193.65	3.96
Drakensberg Gardens, KZN	Dg6	96.88	7.39	212.56	6.69
Drakensberg Gardens, KZN	Dg7	99.14	7.70	198.37	7.56
Sunset Farm, KZN	Sun1	97.86	8.50	220.20	4.78
Sunset Farm, KZN	Sun2	89.56	9.35	220.20	4.78
Sunset Farm, KZN	Sun3	89.26	7.10	220.20	4.78
Sunset Farm, KZN	Sun4	102.50	7.66	220.20	4.78
Sunset Farm, KZN	Sun5	106.85	9.83	211.74	9.91
Sunset Farm, KZN	Sun16	108.22	9.69	335.34	7.71
Sunset Farm, KZN	Sun18	105.07	4.86	317.79	3.31
Sunset Farm, KZN	Sun19	105.44	5.07	317.79	3.31
Sunset Farm, KZN	Sun20	114.46	4.30	220.20	4.78
Sunset Farm, KZN	Sun21	94.86	8.09	189.17	7.17
Sunset Farm, KZN	Sun22	88.91	8.36	178.26	9.09
Sunset Farm, KZN	Sun23	82.32	9.55	166.45	9.97
Sunset Farm, KZN	Sun24	108.81	7.02	220.20	4.78
Sunset Farm, KZN	Sun25	103.35	8.06	220.20	4.78
Sunset Farm, KZN	Sun26	98.41	7.95	220.20	4.78
Sunset Farm, KZN	Sun27	96.59	6.78	190.44	5.37
Sunset Farm, KZN	Sun28	96.74	7.12	220.20	4.78
Sunset Farm, KZN	Sun29	104.23	5.86	220.20	4.78
Sunset Farm, KZN	Sun30	102.90	5.51	203.40	5.27
Sunset Farm, KZN	Sun31	102.81	7.45	173.51	4.27

Sunset Farm, KZN	Sun32	110.45	8.07	183.09	5.06
Sunset Farm, KZN	Sun33	104.71	7.04	265.24	4.26
Sunset Farm, KZN	Sun34	106.59	8.11	188.42	7.12
Highmoor Nature Reserve, KZN	Hig1	97.93	4.68	183.54	4.55
Highmoor Nature Reserve, KZN	Hig2	83.19	4.68	154.10	3.84
Highmoor Nature Reserve, KZN	Hig10	96.41	7.91	194.72	7.70
Golden Gate Highlands National Park, FS	Gg1	100.28	5.25	191.14	3.93
Golden Gate Highlands National Park, FS	Gg2	94.43	8.19	180.50	6.97
Golden Gate Highlands National Park, FS	Gg4	99.58	5.93	182.80	4.32
Golden Gate Highlands National Park, FS	Gg6	104.02	6.42	192.97	4.81
Golden Gate Highlands National Park, FS	Gg7	99.08	7.45	191.67	8.90
Golden Gate Highlands National Park, FS	Gg8	100.05	7.38	192.62	7.68
Golden Gate Highlands National Park, FS	Gg10	104.59	7.64	189.41	4.94
Golden Gate Highlands National Park, FS	Gg11	102.24	7.88	196.26	8.38
Golden Gate Highlands National Park, FS	Gg26	110.19	7.43	204.15	6.85
Cobham Nature Reserve, KZN	Cob1	97.43	7.38	182.78	5.45
Cobham Nature Reserve, KZN	Cob3	104.70	6.13	204.63	5.27
Cobham Nature Reserve, KZN	Cob4	103.19	6.18	191.32	4.30
Cobham Nature Reserve, KZN	Cob5	100.08	7.51	184.57	4.44
Cobham Nature Reserve, KZN	Cob6	92.87	6.35	231.68	4.66
Cobham Nature Reserve, KZN	Cob7	96.19	8.49	178.45	5.74
Cobham Nature Reserve, KZN	Cob8	95.41	6.55	182.17	5.00
Cobham Nature Reserve, KZN	Cob9	103.03	5.87	191.86	4.57
Cobham Nature Reserve, KZN	Cob10	103.46	6.12	199.70	5.19
Cobham Nature Reserve, KZN	Cob14	94.29	9.47	186.48	6.28
Bushman's Nek, KZN	Bsh6	98.30	7.97	168.94	5.10
Bushman's Nek, KZN	Bsh8	99.31	6.31	206.43	4.57
Bushman's Nek, KZN	Bsh11	92.63	7.33	206.43	4.57
Bushman's Nek, KZN	Bsh13	104.92	8.69	184.21	5.40
Bushman's Nek, KZN	Bsh16	96.98	7.07	168.52	6.40
Bushman's Nek, KZN	Bsh18	82.56	8.85	184.21	5.40
Giants Castle Game Reserve, KZN	Gc20	113.79	8.02	215.12	8.57
Underberg, KZN	Ubi1	98.56	5.31	186.09	9.78
Underberg, KZN	Ubi2	101.79	4.58	181.43	3.60
Underberg, KZN	Ubi3	102.13	5.19	209.42	3.48

Underberg, KZN	Ubii4	94.35	9.92	209.42	3.48
Underberg, KZN	Ubii5	91.03	4.72	160.38	3.87
Underberg, KZN	Ubii6	99.58	6.03	187.41	4.21
Underberg, KZN	Ubii7	96.07	4.55	164.86	3.97
Underberg, KZN	Ubii8	87.85	5.90	181.99	4.62
Underberg, KZN	Ubii10	90.92	7.43	181.99	4.62
Underberg, KZN	Ubii11	91.86	5.65	181.99	4.62
Underberg, KZN	Ubii12	99.09	5.07	202.77	3.72
Underberg, KZN	Ubii13	91.55	5.34	159.59	4.56
Underberg, KZN	Ubii14	92.48	5.93	190.17	3.96
Underberg, KZN	Ubii16	97.82	5.30	172.33	3.73
Ingwe Local Municipality, KZN	Ing1	107.36	6.42	188.25	4.76
Ingwe Local Municipality, KZN	Ing2	101.72	6.41	181.72	4.56
Ingwe Local Municipality, KZN	Ing3	90.59	5.74	154.02	3.60
Ingwe Local Municipality, KZN	Ing4	99.41	8.81	173.64	7.99
Ingwe Local Municipality, KZN	Ing5	94.31	6.25	161.91	4.35
Ingwe Local Municipality, KZN	Ing8	91.57	7.85	154.38	5.41
Ingwe Local Municipality, KZN	Ing9	91.86	9.95	161.50	9.56
Ingwe Local Municipality, KZN	Ing10	103.52	6.15	178.81	5.56
Ingwe Local Municipality, KZN	Ing11	108.45	5.23	188.43	4.39
Ingwe Local Municipality, KZN	Ing13	102.65	5.63	176.52	4.30
Ingwe Local Municipality, KZN	Ing14	91.74	6.78	158.57	6.15
Ingwe Local Municipality, KZN	Ing17	74.69	9.19	129.78	8.66
Ingwe Local Municipality, KZN	Ing18	93.93	6.02	163.26	5.31
Lower Lotheni road, KZN	Low1	97.49	6.47	184.20	9.13
Lower Lotheni road, KZN	Low4	95.35	7.02	178.59	9.64
Lower Lotheni road, KZN	Low5	90.78	6.07	160.93	5.85
Lower Lotheni road, KZN	Low6	104.14	5.46	184.13	3.97
Lower Lotheni road, KZN	Low11	99.96	7.67	175.69	5.73
Lower Lotheni road, KZN	Low15	100.89	5.02	206.43	4.57
Lower Lotheni road, KZN	Low16	102.09	6.68	206.43	4.57

**Appendix S2.** Sample/standard fluorescence ratios are shown for each ploidy level of *Rhodohypoxis baurii* var. *platypetala* individuals that were sampled across the Drakensberg grasslands, South Africa. Letters denote groupings of Kruskal-Wallis multiple comparison post hoc tests where groups that do not significantly differ at  $P = 0.05$  are marked with the same letter.

Ploidy	Relative fluorescence intensity (mean $\pm$ SE)	Number of populations/number of individuals
2x	1.91 $\pm$ 0.02 <sup>a</sup>	12/121
3x	2.92 $\pm$ 0.13 <sup>ab</sup>	1/4
4x	3.87 $\pm$ 0.01 <sup>b</sup>	4/70

**Appendix S3.** Correlation coefficients and significant results of the relationship between *Rhodohypoxis baurii* var. *platypetala* traits and climatic variables. T2M – temperature at 2 meters above the surface of the Earth (°C), ALLSKY\_SFC – all sky surface longwave downward irradiance (horizontal infrared radiation intensity from sky; W m<sup>-2</sup>), PRECTOTCORR – precipitation corrected (mm/day), and GWETPROF – profile soil moisture (0–1). *P*-values are presented in parentheses, where significant results are bolded.

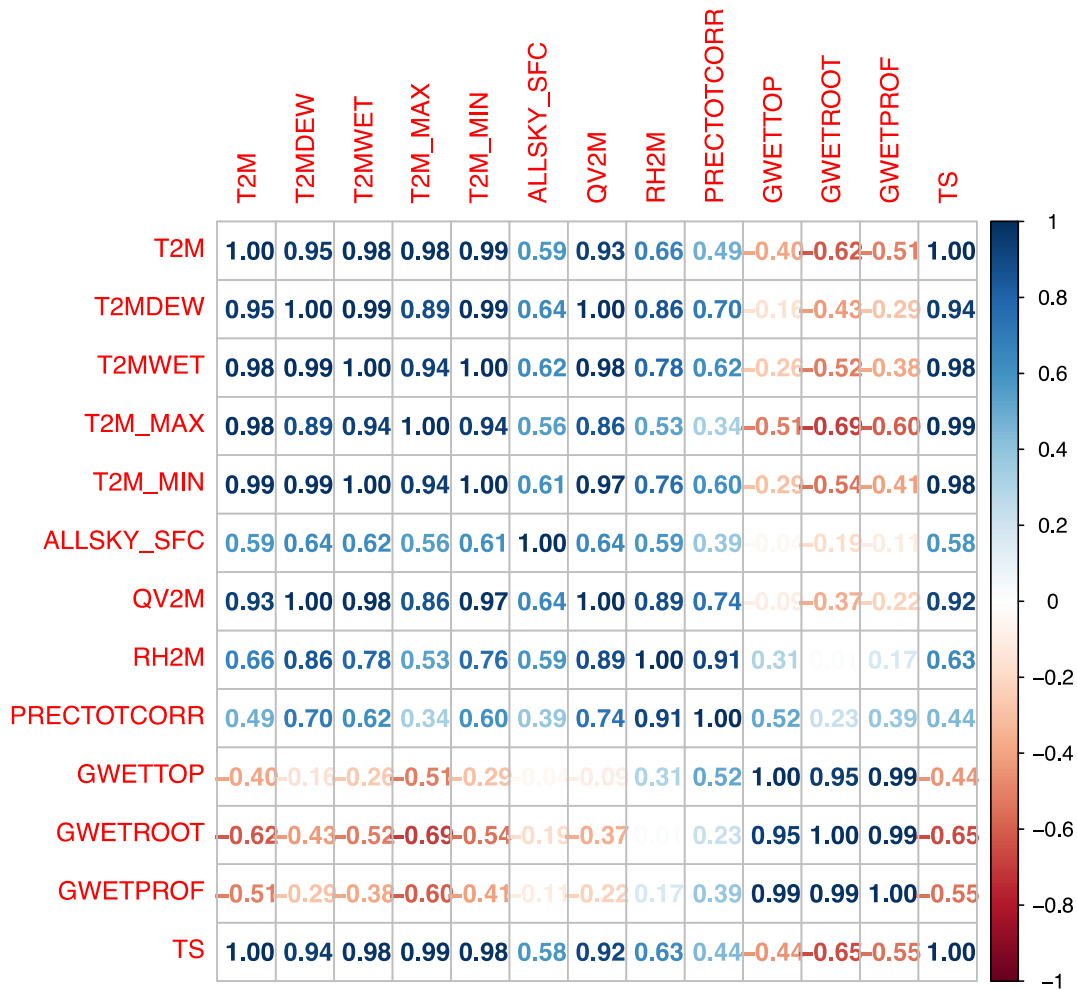
Variable	Largest-leaf width (mm)	Number of flowers and buds	Average outer-petal size of the largest flower (mm)	Largest-flower stem height (mm)
T2M	0.38 (0.63)	-0.50 (0.51)	0.73 (0.11)	0.17 (0.66)
ALLSKY_SFC	0.38 (0.62)	-0.65 (0.18)	0.87 ( <b>0.01</b> )	-0.10 (0.80)
PRECTOTCORR	0.36 (0.68)	-0.64 (0.19)	0.85 ( <b>0.02</b> )	-0.07 (0.86)
GWETPROF	-0.48 (0.75)	-0.05 (1)	-0.06 (1)	-0.17 (1)



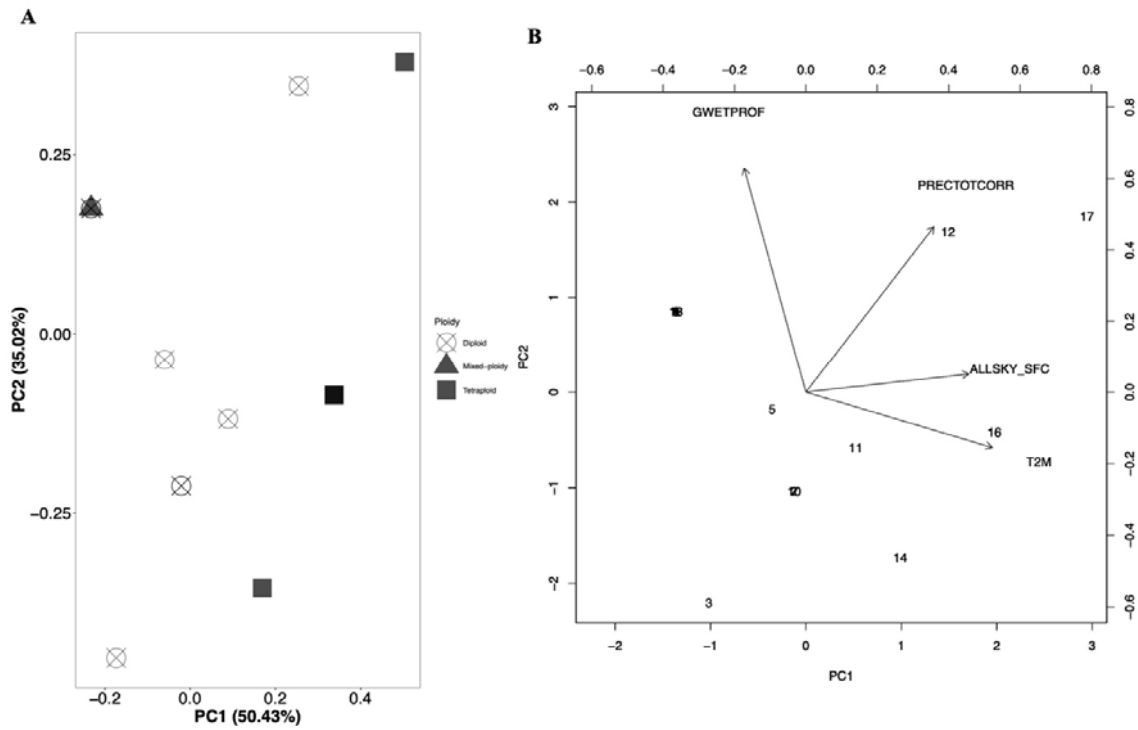
**Appendix S4.** Mean  $\pm$  SE of 13 climactic variables compared among diploid (2x), mixed-ploidy (2x, 3x) and tetraploid (4x) populations of *Rhodohypoxis baurii* var. *platypetala*.

Letters denote groupings of Kruskal-Wallis multiple comparison post hoc tests where groups that do not significantly differ at  $P = 0.05$  are marked with the same letter.

Variable	Mean $\pm$ SE		
	2x	Mixed-ploidy	4x
Temperature at 2 meters ( $^{\circ}\text{C}$ )	12.92 $\pm$ 0.50 <sup>a</sup>	11.18 $\pm$ 0.08 <sup>b</sup>	15.39 $\pm$ 0.19 <sup>c</sup>
Dew/Frost point at 2 meters ( $^{\circ}\text{C}$ )	4.49 $\pm$ 0.65 <sup>a</sup>	2.73 $\pm$ 0.11 <sup>b</sup>	8.10 $\pm$ 0.57 <sup>c</sup>
Wet bulb temperature at 2 meters ( $^{\circ}\text{C}$ )	8.71 $\pm$ 0.57 <sup>a</sup>	6.96 $\pm$ 0.09 <sup>b</sup>	11.74 $\pm$ 0.37 <sup>c</sup>
Earth skin temperature ( $^{\circ}\text{C}$ )	13.10 $\pm$ 0.48 <sup>a</sup>	11.42 $\pm$ 0.09 <sup>b</sup>	15.49 $\pm$ 0.11 <sup>c</sup>
Temperature at 2 meters maximum ( $^{\circ}\text{C}$ )	20.98 $\pm$ 0.50 <sup>a</sup>	19.18 $\pm$ 0.08 <sup>b</sup>	23.32 $\pm$ 0.23 <sup>c</sup>
Temperature at 2 meters minimum ( $^{\circ}\text{C}$ )	6.59 $\pm$ 0.56 <sup>a</sup>	4.78 $\pm$ 0.08 <sup>b</sup>	9.46 $\pm$ 0.38 <sup>c</sup>
Longwave downward irradiance ( $\text{W m}^{-2}$ )	310.40 $\pm$ 0.09 <sup>a</sup>	310.50 $\pm$ 0.70 <sup>a</sup>	339.01 $\pm$ 6.05 <sup>b</sup>
Specific humidity at 2 meters ( $\text{g kg}^{-1}$ )	7.14 $\pm$ 0.23 <sup>a</sup>	6.57 $\pm$ 0.05 <sup>b</sup>	8.39 $\pm$ 0.24 <sup>c</sup>
Relative humidity at 2 meters (%)	63.31 $\pm$ 0.93 <sup>a</sup>	62.90 $\pm$ 0.25 <sup>a</sup>	67.82 $\pm$ 1.48 <sup>b</sup>
Precipitation corrected (mm/day)	2.83 $\pm$ 0.11 <sup>a</sup>	2.82 $\pm$ 0.09 <sup>a</sup>	3.14 $\pm$ 0.26 <sup>b</sup>
Surface soil wetness (0–1)	0.60 $\pm$ 0.01 <sup>a</sup>	0.64 $\pm$ 0.002 <sup>b</sup>	0.58 $\pm$ 0.02 <sup>c</sup>
Root zone soil wetness (0–1)	0.62 $\pm$ 0.01 <sup>a</sup>	0.66 $\pm$ 0.001 <sup>b</sup>	0.58 $\pm$ 0.02 <sup>c</sup>
Profile soil moisture (0–1)	0.62 $\pm$ 0.01 <sup>a</sup>	0.65 $\pm$ 0.001 <sup>b</sup>	0.59 $\pm$ 0.02 <sup>c</sup>



longwave downward irradiance (horizontal irradiated radiation intensity from sky,  $w_{lw}$ ),  
 PRECTOTCORR – precipitation corrected (mm/day), and GWETPROF – profile soil  
 moisture (0–1).



**Appendix S6.** PCA of *Rhodohypoxis baurii* var. *platypetala* populations according to ploidy level and climatic variables (A). Four climatic variables were chosen for the PCA to assess their associations with ploidy level distributions: T2M – temperature at 2 meters above the surface of the Earth ( $^{\circ}\text{C}$ ), ALLSKY\_SFC – all sky surface longwave downward irradiance (horizontal infrared radiation intensity from sky;  $\text{W m}^{-2}$ ), PRECTOTCORR – precipitation corrected (mm/day), and GWETPROF – profile soil moisture (0–1; B).

**Appendix S7.** Summary of PCA results of four climatic variables that were tested for associations with ploidy level distributions: T2M – temperature at 2 meters above the surface of the Earth (°C), ALLSKY\_SFC – all sky surface longwave downward irradiance (horizontal infrared radiation intensity from sky;  $W m^{-2}$ ), PRECTOTCORR – precipitation corrected (mm/day), and GWETPROF – profile soil moisture (0–1).

	PC1	PC2
Factor loadings		
T2M	0.65	-0.19
ALLSKY_SFC	0.57	0.06
PRECTOTCORR	0.45	0.58
GWETPROF	-0.22	0.79
Eigenvalue	2.02	1.40
Proportion of variance explained	0.50	0.35