

Table S1: Rubisco kinetics at 25°C as shown in Figure 3

	k_{cat}^c (s^{-1})	K_C (μM)	K_O (μM)	S_c/o ($mol.mol^{-1}$)	calc k_{cat}^o (s^{-1})	Dataset reference
Red Algae						
<i>Griffithsia monilis</i>	2.6	9.3	467	167	0.8	Savir et. al. (2010)
<i>Galdiera sulfuraria</i>	1.2	3.3	374	166	0.8	Savir et. al. (2010)
<i>Porphyridium cruentum</i>	1.6	22	1574	129	0.9	Badger et. al. (1998)
<i>Cyanidium caldarium</i>	1.3	6.7	n.d.	n.i.	n.d.	Badger et. al. (1998)
<i>Cyanidium partita</i>	1.6	6.6	n.d.	n.i.	n.d.	Badger et. al. (1998)
Green algae						
<i>Scenedesmus obliquus</i>	n.d.	38	660	63	n.d.	Savir et. al. (2010)
<i>Chlamydomonas reinhardtii</i>	5.8	29	480	61	1.57	Savir et. al. (2010)
<i>Euglena gracilis</i>	n.d.	25	410	54	n.d.	Savir et. al. (2010)
Gymnosperms						
<i>Basal angiosperm</i>						
C₃						
<i>Arabidopsis thaliana</i>	4.1	10	333	n.d.	n.d.	Galmes et. al. (2014)
<i>Crithmum maritimum</i>	3.4	9	183	n.d.	n.d.	Galmes et. al. (2014)
<i>Dactylis glomerata</i> cv. Porto	3.2	11	453	n.d.	n.d.	Galmes et. al. (2014)
<i>Eucalyptus moorei</i>	3.2	10	285	n.d.	n.d.	Galmes et. al. (2014)
<i>Eucalyptus neglecta</i>	2.5	8	230	n.d.	n.d.	Galmes et. al. (2014)
<i>Flaveria pringlei</i>	3.1	12	666	81	2.1	Savir et. al. (2010)
<i>Glycine max</i>	n.d.	9	430	82	n.d.	Savir et. al. (2010)
<i>Iris douglasiana</i>	3.5	10	413	n.d.	n.d.	Galmes et. al. (2014)
<i>Limonium latebracteatum</i>	2.7	9	344	n.d.	n.d.	Galmes et. al. (2014)
<i>Limonium stenophyllum</i>	2.6	8	457	n.d.	n.d.	Galmes et. al. (2014)
<i>Limonium virgatum</i>	2.4	9	381	n.d.	n.d.	Galmes et. al. (2014)
<i>lolium perenne</i>	n.d.	16	500	80	n.d.	Galmes et. al. (2014)
<i>Nicotiana tabacum</i>	3.1	10	283	83	1.1	Young et. al. (2016)
<i>Pallenis maritima</i>	2.7	6	321	n.d.	n.d.	Galmes et. al. (2014)
<i>Sideritis cretica</i> subsp. <i>spicata</i>	2.0	8	328	n.d.	n.d.	Galmes et. al. (2014)
<i>Spnacia oleracea</i>	3.7	14	480	80	1.59	Savir et. al. (2010)
<i>Tetragonium expnasa</i>	n.d.	13	600	81	n.d.	Savir et. al. (2010)
<i>Teucrium heterophyllum</i>	2.7	7	359	n.d.	n.d.	Galmes et. al. (2014)
<i>Trachycarpus fortunei</i>	2.8	9	364	n.d.	n.d.	Galmes et. al. (2014)
<i>Triticum aestivum</i>	2.5	14	730	90	1.5	Savir et. al. (2010)
<i>Triticum aestivum</i> cv. <i>Alexandria</i>	4.0	10	414	n.d.	n.d.	Galmes et. al. (2014)
C₄						
<i>Amaranthus edulis</i>	4.1	18	289	77	0.9	Whitney et. al. (2011), Savir et. al. (2010)
<i>Amaranthus hybridus</i>	3.8	16	640	82	1.9	Whitney et. al. (2011), Savir et. al. (2010)
<i>Cynodon dactylon</i>	3.7	21	n.d.	89	n.d.	Whitney et al (2011)
<i>Flaveria australasica</i>	3.8	22	309	77	0.7	Whitney et. al. (2011), Savir et. al. (2010)
<i>Flaveria bidentis</i>	4.2	20	n.d.	76	n.d.	Whitney et. al. (2011)
<i>Flaveria kochiana</i>	3.7	23	n.d.	77	n.d.	Whitney et. al. (2011)
<i>Flaveria trinervia</i>	4.4	18	n.d.	77	n.d.	Whitney et. al. (2011)
<i>Paspalum dilatatum</i>	3.4	20	n.d.	88	n.d.	Whitney et. al. (2011)
<i>Sorghum bicolor</i>	5.4	30	n.d.	70	n.d.	Whitney et. al. (2011)
<i>Zea mays</i>	5.5	19	397	88	1.3	Young et. al. (2016)
<i>Zoysia japonica</i>	4.1	19	n.d.	84	n.d.	Whitney et. al. (2011)
Diatoms						
<i>Thalassiosira weissflogii</i> (CCMP 1336)	3.2	65	2032	79	1.3	Young et. al. (2016)
<i>Thalassiosira oceanica</i> (CS-427)	2.4	65	954	80	0.4	Young et. al. (2016)
<i>Skeletonema marinoi</i> (CCMP 1332)	3.2	68	883	n.d.	n.d.	Young et. al. (2016)
<i>Chaetoceros calcitrans</i> (CCMP 1315)	2.6	25	413	57	0.8	Young et. al. (2016)
<i>Chaetoceros muelleri</i> (CCMP 1316)	2.4	23	425	96	0.5	Young et. al. (2016)
<i>Chaetoceros calcitrans</i> (CS-178)	3.4	31	490	75	0.7	Young et. al. (2016)
<i>Bellerochea</i> cf. <i>horologicalis</i> (CS-874/01)	2.1	50	764	n.d.	n.d.	Young et. al. (2016)
<i>Phaeodactylum tricornutum</i> (UTEX 642)	3.2	36	592	108	0.5	Young et. al. (2016)
<i>Phaeodactylum tricornutum</i> (CS-29)	3.3	41	664	116	0.5	this study
<i>Fragilariopsis cylindrus</i> (CCMP 1102)	3.5	64	667	77	0.5	Young et. al. (2016)
<i>Cylindrotheca fusiformis</i> (CS-13)	3.7	n.d.	n.d.	79	n.d.	Young et. al. (2016)

Haptophytes

<i>Pleurochrysis carterae</i> (CS-287)	3.3	18	366	102	0.7	this study
<i>Tisochrysis lutea</i> (CS-177)	2.2	24	800	89	0.8	this study
<i>Pavlova lutheri</i> (CS-182)	2.5	15	1146	125	1.6	this study

n.d. = not determined

n.i. = not included

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