

SUPPLEMENTARY MATERIALS TO THE ARTICLE

Dune blowouts as microbial hotspots and the changes of overall microbial activity and photosynthetic biomass along with succession of biological soil crusts

Karolina Chowaniec^{1,2}, Jakub Styburski^{1,2}, Szymon Koziol¹, Zofia Pisańska¹, Kaja Skubała^{1*}

¹Institute of Botany, Faculty of Biology, Jagiellonian University, Gronostajowa 3, 30-387 Kraków, Poland

²Doctoral School of Exact and Natural Sciences, Jagiellonian University in Kraków, prof. S. Łojasiewicza 11, 30-348 Kraków, Poland

*Corresponding author. E-mail address: kaja.skubala@uj.edu.pl (K. Skubała)

Table S1. The selected climatic parameters measured at two different meteorological stations near the study area (IMGW codes: 250190390 and 350190566) averaged for 10-year periods (means $\pm$ SE). Raw data source: The Institute of Meteorology and Water Management - National Research Institute 2023.

Decade	Average monthly temperature [°C]	Monthly rainfall [mm]	Number of days with rainfall	Average monthly relative humidity [%]	Average monthly wind speed [m/s]	Number of days with wind speed ≥ 10 m/s*	Number of days with wind speed ≥ 15 m/s*	Number of days with dew*
2022-2013	10.24 $\pm$ 0.06	60.77 $\pm$ 0.36	10.72 $\pm$ 0.04	74.87 $\pm$ 0.07	1.753 $\pm$ 0.003	3.57 $\pm$ 0.03	0.142 $\pm$ 0.003	10.18 $\pm$ 0.07
2012-2003	9.33 $\pm$ 0.07	57.56 $\pm$ 0.36	10.64 $\pm$ 0.05	75.64 $\pm$ 0.07	1.619 $\pm$ 0.003	2.90 $\pm$ 0.02	0.142 $\pm$ 0.004	11.12 $\pm$ 0.08

2002-1993	9.00±0.06	58.51±0.36	10.72±0.05	76.80±0.06	1.555±0.003	2.94±0.03	0.133±0.003	13.53±0.08
1992-1983	8.72±0.06	51.23±0.30	10.18±0.04	77.85±0.04	1.516±0.003	1.20±0.01	0.042±0.002	14.17±0.09
1982-1973	8.35±0.06	53.08±0.26	10.32±0.05	78.75±0.05	1.822±0.004	0.71±0.01	0.017±0.001	13.58±0.09
1972-1963	8.19±0.07	64.14±0.35	10.35±0.05	79.96±0.05	1.927±0.004	N/A	N/A	N/A
1962-1953	8.44±0.06	56.13±0.34	10.04±0.04	80.18±0.08	1.683±0.005	N/A	N/A	N/A
Mean value for given period (2022- 1953 or 2022- 1973)	8.90±0.01	57.36±0.05	10.42±0.01	77.72±0.01	1.696±0.001	2.263±0.004	0.095±0.001	12.51±0.02

*Due to lack of data for the period 1953-1965 no data were provided.

N/A - not available

Table S2. The parameters related to photosynthetic biomass and overall microbial activity of BSC collected from different succession stages (mean $\pm$ SE, n = 85, minimum and maximum values).

Succession stage		Initial		Middle	Late
Parameter		Dune ridge	Dune blowout		
Chlorophyll a + b ($\mu\text{g g}^{-1}$ DW)	Mean $\pm$ SE	97.75 $\pm$ 13.42	391.63 $\pm$ 24.4	121.29 $\pm$ 14.1	264.29 $\pm$ 24.771
	Min-Max	8.99-498.85	101.03-968.79	8.88-734.5	30.48-949.12
Chlorophyll a + b (mg m^{-2})	Mean $\pm$ SE	259.16 $\pm$ 20.54	576.96 $\pm$ 35.4	400.68 $\pm$ 23.35	593.72 $\pm$ 30.99
	Min-Max	29.97-842.77	100.09-1511.56	25.26-883.99	201.82-1538.05
Chlorophyll a ($\mu\text{g g}^{-1}$ DW)	Mean $\pm$ SE	58.84 $\pm$ 7.54	223.28 $\pm$ 14.91	75.97 $\pm$ 8.5	184.04 $\pm$ 17,01
	Min-Max	6.28-258.48	49.25-627.28	6.74-469.08	22.47-684.07
Chlorophyll a (mg m^{-2})	Mean $\pm$ SE	160.62 $\pm$ 12.26	321.42 $\pm$ 19.25	259.07 $\pm$ 14.61	411.76 $\pm$ 22,8
	Min-Max	21.39-490.45	48-771.32	20.44-625.42	136.87-1123.48
Chlorophyll a/b ratio	Mean $\pm$ SE	1.92 $\pm$ 0.07	1.35 $\pm$ 0.05	2.19 $\pm$ 0.09	2.28 $\pm$ 0.06
	Min-Max	0.84-3.20	0.77-2.48	0.99-4.53	0.97-3.52
Dehydrogenase activity - triphenylformazan ($\mu\text{g g}^{-1}$ DW)	Mean $\pm$ SE	227.07 $\pm$ 20.56	1300.35 $\pm$ 64	310.15 $\pm$ 36.92	440.29 $\pm$ 35.81
	Min-Max	39.54-20.56	515.08-2729.53	35.54-2550.49	100.09-1742.8
Dehydrogenase activity - triphenylformazan (mg m^{-2})	Mean $\pm$ SE	695.2 $\pm$ 39.1	1342.74 $\pm$ 21.67	935.36 $\pm$ 441	1030.71 $\pm$ 34.12
	Min-Max	123.75-1509.73	495.77-1526.01	209.56-1527.26	317.28-1544.80