附录4 苔藓-蓝藻共生体固氮潜力的全球分布

Appendix 4 Global distribution of nitrogen fixation potential of bryophyte-cyanobacteria associations

固氮潜力 Nitrogen fixation potential **kg N·ha^{-1}·yr^{-1}**	生态系统 Ecosystem	国家/地区 Country/Location	经纬度 Longitude and latitude	测定方法 Determination	优势固氮苔藓 Dominant nitrogen-fixing bryophyte	参考文献 Reference
0.5–1.8	北方森林	芬兰	69.03° N, 21.47° E	乙炔还原法	塔藓 *Hylocomium splendens*	Zackrisson et al, 2009
0.5–1.8	北方森林	挪威	65.05° N, 13.84° E	乙炔还原法	塔藓 *Hylocomium splendens*	Zackrisson et al, 2009
0.5–1.8	北方森林	瑞典	66.58° N, 19.43° E	乙炔还原法	塔藓 *Hylocomium splendens*	Zackrisson et al, 2009
0.1–3.5	北方森林	芬兰 Kevo	69.75° N, 27.02° E	–	–	Van Cleve & Alexander, 1981
0.1–3.5	北方森林	挪威 Hardangervidda 国家公园	60.28° N, 7.67° E	–	–	Van Cleve & Alexander, 1981
0.1–3.5	北方森林	美国阿拉斯加	66.25° N, 145.58° W	–	–	Van Cleve & Alexander, 1981
2.85–7.74	北方森林	欧洲东北部	61.55° N, 50.80° E	乙炔还原法	泥炭藓 *Sphagnum*	Patova et al, 2020
2.85–7.74	北方森林	欧洲东北部	67.55° N, 50.77° E	乙炔还原法	泥炭藓 *Sphagnum*	Patova et al, 2020
0.44	北方森林	芬兰 Sevettijärvi	69.57° N, 28.90° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Salemaa et al, 2019
0.31	北方森林	芬兰 Pallasjärvi	67.95° N, 24.23° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Salemaa et al, 2019
0.46	北方森林	芬兰 Kivalo	66.35° N, 6.73° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Salemaa et al, 2019
0.44	北方森林	芬兰 Juupajoki	61.87° N, 24.22° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Salemaa et al, 2019
0.82	北方森林	芬兰 Punkaharju	61.77° N, 29.33° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Salemaa et al, 2019
0.62	北方森林	芬兰 Tammela	60.60° N, 23.83° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Salemaa et al, 2019
0.04–11.53	北方森林	美国阿拉斯加州	64.12º N, 148.50º W	^{15}N 自然丰度法	毛青藓 *Tomentypnum nitens*	Stuart et al, 2021
0.04–11.53	北方森林	美国阿拉斯加州	69.05º N, 149.93º W	^{15}N 自然丰度法	毛青藓 *Tomentypnum nitens*	Stuart et al, 2021
0.04–11.53	北方森林	美国阿拉斯加州	61.18º N, 149.80º W	^{15}N 自然丰度法	毛青藓 *Tomentypnum nitens*	Stuart et al, 2021
0.71–1.84	北方森林	瑞典西部	65.44° N, 18.44° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	Rousk et al, 2014a
0.4–2.0	北方森林	瑞典北部	66.12° N, 17.25° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Zackrisson et al, 2004
0.4–2.0	北方森林	瑞典北部	65.58° N, 19.43° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Zackrisson et al, 2004
0.52–2.0	北方森林	瑞典北部	66.15° N, 17.72° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Lagerström et al, 2007
0.52–2.0	北方森林	瑞典北部	66.92° N, 17.92° E	乙炔还原法	塔藓 *Hylocomium splendens* 赤茎藓 *Pleurozium schreberi*	Lagerström et al, 2007
1.5–2.0	北方森林	瑞典	65.72° N, 16.13° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	DeLuca et al, 2002
1.5–2.0	北方森林	挪威	64.25° N, 13.21° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	DeLuca et al, 2002
1.5–2.0	北方森林	芬兰	69.06° N, 20.80° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	DeLuca et al, 2002
0.2–7	北方森林	瑞典北部	65.58° N, 17.33° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	DeLuca et al, 2007
0.2–7	北方森林	瑞典北部	65.58° N, 19.43° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	DeLuca et al, 2007

固氮潜力 Nitrogen fixation potential	生态系统 Ecosystem	国家/地区 Country/Location	经纬度 Longitude and latitude	测定方法 Determination	优势固氮苔藓 Dominant nitrogen-fixing bryophyte	参考文献 Reference
0.1–3.5	北方森林	瑞典北部	66.12° N, 19.43° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	DeLuca et al, 2008
0.1–3.5	北方森林	瑞典北部	65.58° N, 17.25° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	DeLuca et al, 2008
0.01–0.9	北方森林	瑞典北部	64.23° N, 19.77° E	^{15}N 自然丰度法	赤茎藓 *Pleuorzium schreberi*	Gundale et al, 2011
0.5	北方森林	瑞典中部	62.12° N, 16.70° E	乙炔还原法	泥炭藓 *Sphagnum*	Rosén & Lindberg, 1980
0.5	北方森林	瑞典中部	52.00° N, 16.70° E	乙炔还原法	泥炭藓 *Sphagnum*	Rosén & Lindberg, 1980
0.91–7.72	北方森林	加拿大曼尼托巴东南部	49.47° N, 96.24° W	乙炔还原法	尖叶泥炭藓 *Sphagnum capillifolium*	Markham, 2009
8.8	北极苔原	挪威斯瓦尔巴群岛、极地自然群岛	79.00° N, 12.00° E	–	泥炭藓 *Sphagnum*	Solheim et al, 2002
0.6	北极苔原	瑞典北部	68.25° N, 19.60° E	–	–	Sonesson 1967
1.3–24.6	北极苔原	瑞典北部	68.35° N, 18.82° E	乙炔还原法	赤茎藓 *Pleurozium schreberi*	Sorensen & Michelsen, 2011
2.9	北极苔原	瑞典阿比斯库地区	68.35° N, 19.00° E	^{15}N 示踪法	大叶镰刀藓 *Drepanocladus cossonii*	Gavazov et al, 2010
0.8	北极苔原	俄罗斯摩尔曼斯克州	69.83° N, 28.90° E	^{15}N 示踪法	大叶镰刀藓 *Drepanocladus cossonii*	Gavazov et al, 2010
0.01–0.05	北极苔原	加拿大埃尔斯米尔岛亚历山德拉峡湾	78.88° N, 75.92° W	乙炔还原法	塔藓 *Hylocomium splendens* 大皱蒴藓 *Aulacomnium turgidum* 毛青藓 *Tomenthypnum nitens*	Deslippe et al, 2005
11.6	北极苔原	冰岛南部	63.30° N, 20.62° W	乙炔还原法	*Rhacomitrium canescens*	Henriksson et al, 1987
0.42	南极苔原	南非爱德华王子群岛	46.90° S, 37.75° E	乙炔还原法 ^{15}N 自然丰度法	–	Vincent 1988 (In: Cleveland et al. 1999)
2.4	南极苔原	南极洲西格尼岛	60.72° S, 45.6° W	乙炔还原法 ^{15}N 自然丰度法	–	Vincent 1988 (In: Cleveland et al. 1999)
0.1–1.19	南极苔原	南极洲	68.50º S, 78.33º E	乙炔还原法	–	Davey & Marchant, 1983
4.9	高山苔原	美国科罗拉多州	39.99° N , 105.38° W	^{15}N 自然丰度法	–	Bowman et al, 1996
4.8	亚北极苔原	加拿大西北部	64.87° N, 111.58° W	乙炔还原法	–	Stewart et al, 2011
0.02–4.5	北极高地	挪威极地自然群岛	78.78° N, 16.32° W	乙炔还原法	三洋藓 *Sanionia uncinata*	Zielke et al, 2005
9.5–24.4	北极低地	加拿大努纳武特地区	75.55° N, 84.67° W	乙炔还原法	–	Chapin et al, 1991
2.35	北极低地	加拿大北极地区	78.88° N, 75.92° W	乙炔还原法	–	Stewart et al, 2011
1.72	北级低地	加拿大北极地区	76.11° N, 84.97° W	乙炔还原法	–	Stewart et al, 2011
1.34	北级高原沙漠	加拿大北极地区	78.85° N, 76.1° W	乙炔还原法	–	Stewart et al, 2011
0.4–6.6	亚北极沼泽	瑞典阿比斯库地区	68.37° N, 19.05° W	^{15}N 示踪法	*Drepanocladus cossonii*	Gavazov et al, 2010
0.48–0.96	寒温带森林	加拿大东部	48.37° N, 68.52° W	乙炔还原法	*Anomodon attenuatus*	Jean et al, 2012
0.6	暖温带森林	美国伊诺河州立公园	36.14° N, 79.02° W	乙炔还原法	*Anomodon attenuatus*	Jean et al, 2012
0.008–0.124	温带草原	美国华盛顿冰川遗产保护区	46.86° N, 123.04° W	乙炔还原法	赤茎藓 *Pleurozium schreberi* *Racomitrium elongatum* 大拟垂枝藓 *Rhytidiadelphus triquetrus*	Calabria et al, 2020
0.008–0.124	温带草原	美国华盛顿米玛土丘自然保护区	46.90° N, 123.05° W	乙炔还原法	赤茎藓 *Pleurozium schreberi* *Racomitrium elongatum* 大拟垂枝藓 *Rhytidiadelphus triquetrus*	Calabria et al, 2020
0.008–0.124	温带草原	美国华盛顿散溪天然野生动物区	46.83° N, 123.02° W	乙炔还原法	赤茎藓 *Pleurozium schreberi* *Racomitrium elongatum* 大拟垂枝藓 *Rhytidiadelphus triquetrus*	Calabria et al, 2020
0.14–2.19	温带草原	美国佐治亚大学植物科学农场	33.78° N, 84.40° W	乙炔还原法	真藓属一种 *Bryum sp.* *Weisia controrwsa*	Reddy & Giddens, 1981

固氮潜力 Nitrogen fixation potential	生态系统 Ecosystem	国家/地区 Country/Location	经纬度 Longitude and latitude	测定方法 Determination	优势固氮苔藓 Dominant nitrogen-fixing bryophyte	参考文献 Reference
5.4	温带森林	中国广东	31.83° N, 114.05° E	乙炔还原法	–	Zheng et al, 2019
0.5	温带森林	加拿大温哥华岛西海岸	49.46º N, 126.04º W	乙炔还原法	塔藓 *Hylocomium splendens*	Lindo & Whiteley, 2011
0.3	温带森林	加拿大温哥华岛西海岸	49.46º N, 126.03º W	乙炔还原法	塔藓 *Hylocomium splendens*	Lindo & Whiteley, 2011
0.7–10	温带森林	新西兰西部国家公园	43.42° S, 170.17° E	乙炔还原法	–	Menge & Hedin, 2009
0.01–0.3	热带雨林	夏威夷 Kohala 遗址	21.32° N, 157.83° W	乙炔还原法	–	Matzek et al, 2003
2.8	热带雨林	中国海南	24.47° N, 113.25° E	乙炔还原法	–	Zheng et al., 2019
nmol C_2H_4•g^{-1} wet•h^{-1}						
8.10–28.46	北方森林	加拿大东部	50.74° N, 76.39° W	乙炔还原法	赤茎藓 *Pleurozium schreberi* 毛梳藓 *Ptilium crista-castrensis*	Renaudin et al, 2022
0.72	北方森林	瑞典北部	68.35° N, 18.18° E	乙炔还原法	赤茎藓 *Pleurozium schreberii*	Rousk et al, 2021
0.41	亚北极苔原	瑞典中部	59.88° N, 17.35° E	乙炔还原法	赤茎藓 *Pleurozium schreberii*	Rousk et al, 2021
0.69–113.00	亚北极苔原	瑞典北部	68.32° N, 18.83° E	乙炔还原法	大皱蒴藓 *Aulacomnium turgidum* 塔藓 *Hylocomium splendens* 毛青藓 *Tomentypnum nitens*	Liu & Rousk, 2022
9–94	亚北极苔原	瑞典北部	68.32° N, 18.83° E	乙炔还原法	赤茎藓 *Hylocomium splendens*	Alvarenga & Rousk, 2021
2.09–6.09	火山口苔原	冰岛东部	65.30° N, 15.95° W	–	–	Henriksson et al, 1987
0.23	温带荒原	丹麦斯堪的那维亚	55.88° N, 11.97° E	乙炔还原法	赤茎藓 *Pleurozium schreberii*	Rousk et al, 2021
10.16–20.21	亚热带山地雨林	中国云南	23.53° N, 101.02° E	乙炔还原法	刀叶树平藓 *Homaliodendron scalpellifolium*	Fan et al, 2022
nmol C_2H_4•g^{-1} dry•h^{-1}						
65.3–693.6	北极苔原	挪威斯瓦尔巴群岛	79.00° N, 12.00° E	乙炔还原法	三洋藓 *Sanionia uncinata*	Solheim et al, 1996
83–138	沼泽地	瑞典北部	68.37° N, 19.05° E	乙炔还原法	岸生泥炭藓 *Sphagnum riparium*	Berg et al, 2013
3.9–2700	亚北极沼泽地	瑞典北部	68.20° N, 19.03° E	乙炔还原法	泥炭藓 *Sphagnum* 镰刀藓 *Drepanocladus*	Granhall & Selander, 1973
780–1335	亚南极沼泽	南非爱德华王子群岛	46.90° S, 37.75° E	乙炔还原法	*Brachythecium subplicatuin*	Smith, 1984

附录 1–4 中引用的参考文献

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