

Type	Name	Explanation	Values/Unit	Primary data source(s)	Details
biological	capspos	positioning of the capsule on the seta	erect, erect to inclined, immersed, inclined, inclined to pendulous, pendulous	BryForTrait; manual completion	
biological	dmnt	whether species have the ability to be dominant (according to During 1992)	1 (Yes), 0 (No)	Dierssen 2001	
biological	dwarfm	dwarf males found	1 (Yes), 0 (No)	expert knowledge	
biological	genl	generation length (following Bergamini et al. 2019)	3.3, 6.7, 16.7 (years)	Dierssen 2001 (derived)	
biological	gform	growth form	acr (acrocarpous), fol (foliose), ple (pleurocarpous), sph (Sphagnum), tha (thalloid)	BRYOTRAIT-AZO; manual completion	
biological	lform	life form, simplified system (based on Mägdefrau 1982)	annual, cushion, dendroid, mat, rosette, turf, weft	BryForTrait; BRYOTRAIT-AZO; BRYOATT; Flora indicativa	
biological	lstrat	life strategy, simple system (according to During 1979)	a (annual shuttle), c (colonist), f (fugitive), l (long-lived shuttle), p (perennial), s (short-lived shuttle)	Dierssen 2001; BryForTrait; manual completion	
biological	lstrat_e	life strategy, extended system (according to During 1992)	a (annual shuttle), c (colonist), ce (ephemeral colonists), cp (pioneer colonists), f (fugitive), l (long-lived shuttle), p (perennial), pc (competitive perennial), ps (stress tolerant perennials), s (short-lived shuttle)	Dierssen 2001; BRYOTRAIT-AZO; manual completion	
biological	peri	peristome	1 (present), 0 (absent)	BryForTrait; BRYOTRAIT-AZO	
biological	pprot	permanent protonema	1 (present), 0 (absent)	BryForTrait; BRYOTRAIT-AZO	
biological	rhiz	rhizoids	1 (present), 0 (absent)	BRYOTRAIT-AZO; manual completion	
biological	rK	r or K strategy, derived from life strategy	r (lstrat = a/c/f/s), K (lstrat = l/p)	Dierssen 2001 (derived)	
biological	setmaxl	maximum length of the seta	mm	BRYOTRAIT-AZO; manual completion	
biological	sex	mating type/sexual condition	M (monoicous), D (dioicous), M/D (can be monoicous or dioicous)	BryForTrait; BRYOTRAIT-AZO; Flora indicativa; BRYOATT; manual completion	
biological	sfreq	sporophyte frequency	0 (sporophytes unknown in Europe), 1 (rare), 2 (occasional), 3 (common/frequent)	Flora indicativa; BRYOATT; BryForTrait; manual completion	
biological	size	mean size of shoot/gametophyte	mm	BRYOATT; BryForTrait; BRYOTRAIT-AZO; manual completion	
biological	smaxd	maximum spore diameter	µm	BRYOATT; BRYOTRAIT-AZO; manual completion	
biological	smeand	mean spore diameter	µm	BRYOATT; BRYOTRAIT-AZO; BryForTrait; manual completion	
biological	smind	minimum spore diameter	µm	BRYOATT; BRYOTRAIT-AZO; manual completion	
biological	sseas	sporophyte season length	0 (sporophytes unknown in Europe), 1 (sporophytes)	BRYOATT; BryForTrait; Flora indicativa; manual completion	
biological	vp	whether the species has vegetative propagules; at least one of the traits vp_bra, vp_bul, vp_gem, vp_lea, vp_tub	1 (present), 0 (absent)	derived from vegetative propagule types	
biological	vp_bra	deciduous branches or stem tips	1 (present), 0 (absent)	BRYOATT; BRYOTRAIT-AZO; BryForTrait; manual completion	
biological	vp_bul	bulbils	1 (present), 0 (absent)	BRYOATT; BRYOTRAIT-AZO; BryForTrait; manual completion	
biological	vp_gem	gemmae	1 (present), 0 (absent)	BRYOATT; BRYOTRAIT-AZO; Flora indicativa; BryForTrait; manual completion	
biological	vp_lea	deciduous leaves or leave fragments	1 (present), 0 (absent)	BryForTrait; BRYOATT; Flora indicativa; IUCN; manual completion	
biological	vp_tub	tubers	1 (present), 0 (absent)	BRYOATT; BRYOTRAIT-AZO; Flora indicativa; BryForTrait; manual completion	
biological	vpfreq	frequency of vegetative propagules	1 (rare), 2 (occasional), 3 (common)	BRYOTRAIT-AZO	
biological	vpmaxs	maximum size of vegetative propagule	µm	BRYOTRAIT-AZO	
ecological	EOO_est	estimate of Extent Of Occurrence	km ²	IUCN	
ecological	EOO_unc	uncertainty range of Extent of Occurrence, given as the difference between minimum and maximum EOO	km ² ; n/a (if unknown)	IUCN	
ecological	AOO_est	estimate of Area of Occupancy	km ²	IUCN	

ecological	AOO_unc	uncertainty range of Area of Occupancy, given as the difference between minimum and maximum AOO	km ² ; n/a (if unknown)	IUCN	
ecological	aquatic	aquatic species	1 (Yes), 0 (No)	Flora indicativa; manual completion	A species is scored as "aquatic" (value=1) if a significant part of the European population of a species occurs floating or submerged in lakes or watercourse during at least ca. one fourth of the year.
ecological	biome	major biome	1 (Arctic-montane), 2 (Boreo-arctic montane), 3 (Wide-boreal), 4 (Boreal-montane), 5 (Boreo-temperate), 6 (Wide-temperate), 7 (Temperate), 8 (Southern-temperate), 9 (Mediterranean-Atlantic)	BRYOATT	
ecological	eastlim	eastern limit category	0 (Hyperoceanic), 1 (Oceanic), 2 (Suboceanic), 3 (European), 4 (Eurosiberian), 5 (Eurasian), 6 (Circumpolar)	BRYOATT	
ecological	epiphyte	epiphytic species or not	1 (Yes), 0 (No)	Flora indicativa; manual completion	A species is scored as "epiphyte" (value=1) if it frequently grows epiphytically in large parts of its European distribution.
ecological	forest	how strong species are bound to forest habitats	1 (largely restricted to closed forest), 2 (prefers forest edges and clearings), 3 (occurs in forest as well as in open land), 4 (may occur in forest, but prefers open land)	BryForTrait	
ecological	hab_ar	major habitat class "Artificial/Terrestrial"	1 (present), 0 (absent)	IUCN	
ecological	hab_fo	major habitat class "Forest"	1 (present), 0 (absent)	IUCN	
ecological	hab_gr	major habitat class "Grassland"	1 (present), 0 (absent)	IUCN	
ecological	hab_ro	major habitat class "Rocky areas (eg. inland cliffs, mountain peaks)"	1 (present), 0 (absent)	IUCN	
ecological	hab_sh	major habitat class "Shrubland"	1 (present), 0 (absent)	IUCN	
ecological	hab_sum	sum of habitat classes, i.e. in how many habitats the species is found	1 to 6	IUCN (derived)	
ecological	hab_we	major habitat class "Wetlands (inland)"	1 (present), 0 (absent)	IUCN	
ecological	hem_e	hemeroby; influence of man on habitats in which the species is found	1 (close to nature; mainly in ± close to nature habitat), 3 (indifferent; occurs in both close to nature and hemerobic environments), 5 (hemerobic; mainly in ± hemerobic environments)	Flora indicativa; manual completion	
ecological	hemeroby	hemeroby; occurrence in the gradient of background human impact on the ecosystem	1 (absent), 2 (absent to weak), 3 (weak), 4 (weak to moderate), 5 (moderate), 6 (moderate to strong), 7 (strong), 8 (strong to very strong), 9 (very strong)	BryForTrait	
ecological	indF	indicator value F (moisture)	1 (extreme dryness) to 9 (wet-site indicator), x (indifferent)	Düll 1991 (Ellenberg & Leuschner 2010); BryForTrait	
ecological	indHM	indicator value HM (heavy metal tolerance; Bryoatt)	0 (absent from sites with moderate to high heavy metal concentrations) to 5 (confined to sites with moderate to high heavy metal concentrations)	BRYOATT	
ecological	indK	indicator value K (continentality)	1 (extreme oceanic) to 9 (extreme continental), x (indifferent)	Düll 1991 (Ellenberg & Leuschner 2010); BryForTrait	
ecological	indL	indicator value L (light)	1 (deep shade) to 9 (full light), x (indifferent)	Düll 1991 (Ellenberg & Leuschner 2010); BryForTrait; BRYOATT	
ecological	indN	indicator value N (nutrients; Simmel)	1 (nutrient poorest) to 9 (nutrient richest), x (indifferent)	Simmel 2021; BRYOATT; BryForTrait	
ecological	indR	indicator value R (reaction/acidity)	1 (extreme acidity) to 9 (high pH soils), x (indifferent)	Düll 1991 (Ellenberg & Leuschner 2010); BryForTrait; BRYOATT	
ecological	indS	indicator value S (salt tolerance; Bryoatt)	0 (absent from saline sites) to 5 (highest salt tolerance)	BRYOATT	
ecological	indT	indicator value T (temperature)	1 (cold indicator, alpine-nival) to 9 (extreme warmth indicator), x (indifferent)	Düll 1991 (Ellenberg & Leuschner 2010); BryForTrait	
ecological	lim_low	lower elevational limit (iucn)	m above sea level	IUCN	

ecological	lim_range	elevational range calculated from upper and lower limits (iucn)	m above sea level	IUCN (derived)	
ecological	lim_up	upper elevational limit (iucn)	m above sea level	IUCN	
ecological	sub_an	substrate class: dead animal carcass or dung	1 (present), 0 (absent)	BRYOATT; Flora indicativa; IUCN; manual completion	
ecological	sub_ba	substrate class: bark	1 (present), 0 (absent)	BryForTrait; BRYOATT; Flora indicativa; IUCN; manual completion	
ecological	sub_nw	substrate class: epiphytic on non-woody living substrate (leaves, other bryophytes)	1 (present), 0 (absent)	BRYOATT; Flora indicativa; IUCN; manual completion	
ecological	sub_ro	substrate class: rock (including gravel and sand)	1 (present), 0 (absent)	BryForTrait; BRYOATT; Flora indicativa; IUCN; manual completion	
ecological	sub_so	substrate class: soil (including peat, soil over rock)	1 (present), 0 (absent)	BryForTrait; BRYOATT; Flora indicativa; IUCN; manual completion	
ecological	sub_sum	sum of substrate classes	1 to 6	derived from substrate classes	
ecological	sub_wo	substrate class: deadwood	1 (present), 0 (absent)	BryForTrait; BRYOATT; Flora indicativa; IUCN; manual completion	
bioclimatic	nc	number of extracted grid cells used for calculating bioclimate median values	number of cells	IUCN; CHELSA	The number of extracted grid cells is given as an indicator of range size
bioclimatic	MAT	bio1: mean annual air temperature	°C	IUCN; CHELSA	Mean annual daily mean air temperatures averaged over one year
bioclimatic	T_diurR	bio2: mean diurnal air temperature range	°C	IUCN; CHELSA	Mean diurnal range of temperatures averaged over one year
bioclimatic	T_iso	bio3: isothermality	n/a	IUCN; CHELSA	Ratio of diurnal variation to annual variation in temperatures
bioclimatic	T_seas	bio4: temperature seasonality	°C	IUCN; CHELSA	Standard deviation of the monthly mean temperatures
bioclimatic	Tmax_warmM	bio5: mean daily maximum air temperature of the warmest month	°C	IUCN; CHELSA	The highest temperature of any monthly daily mean maximum temperature
bioclimatic	Tmin_coldM	bio6: mean daily minimum air temperature of the coldest month	°C	IUCN; CHELSA	The lowest temperature of any monthly daily mean maximum temperature
bioclimatic	T_annualR	bio7: annual range of air temperature	°C	IUCN; CHELSA	The difference between the Maximum Temperature of Warmest month and the Minimum Temperature of Coldest month
bioclimatic	T_wetQ	bio8: mean daily mean air temperatures of the wettest quarter	°C	IUCN; CHELSA	The wettest quarter of the year is determined (to the nearest month)
bioclimatic	T_dryQ	bio9: mean daily mean air temperatures of the driest quarter	°C	IUCN; CHELSA	The driest quarter of the year is determined (to the nearest month)
bioclimatic	T_warmQ	bio10: mean daily mean air temperatures of the warmest quarter	°C	IUCN; CHELSA	The warmest quarter of the year is determined (to the nearest month)
bioclimatic	T_coldQ	bio11: mean daily mean air temperatures of the coldest quarter	°C	IUCN; CHELSA	The coldest quarter of the year is determined (to the nearest month)
bioclimatic	MAP	bio12: annual precipitation amount	kg m ⁻²	IUCN; CHELSA	Accumulated precipitation amount over one year
bioclimatic	P_wetM	bio13: precipitation amount of the wettest month	kg m ⁻²	IUCN; CHELSA	
bioclimatic	P_dryM	bio14: precipitation amount of the driest month	kg m ⁻²	IUCN; CHELSA	
bioclimatic	P_seas	bio15: precipitation seasonality	n/a	IUCN; CHELSA	Coefficient of Variation as the standard deviation of the monthly precipitation estimates expressed as a percentage of the mean of those estimates (i.e. the annual mean)
bioclimatic	P_wetQ	bio16: mean monthly precipitation amount of the wettest quarter	kg m ⁻²	IUCN; CHELSA	The wettest quarter of the year is determined (to the nearest month)
bioclimatic	P_dryQ	bio17: mean monthly precipitation amount of the driest quarter	kg m ⁻²	IUCN; CHELSA	The driest quarter of the year is determined (to the nearest month)
bioclimatic	P_warmQ	bio18: mean monthly precipitation amount of the warmest quarter	kg m ⁻²	IUCN; CHELSA	The warmest quarter of the year is determined (to the nearest month)

bioclimatic	P_coldQ	bio19: mean monthly precipitation amount of the coldest quarter	kg m ⁻²	IUCN; CHELSA	The coldest quarter of the year is determined (to the nearest month)
bioclimatic	gdd0	growing degree days heat sum above 0°C	°C	IUCN; CHELSA	Heat sum of all days above the 0°C temperature accumulated over one year
bioclimatic	gdd5	growing degree days heat sum above 5°C	°C	IUCN; CHELSA	Heat sum of all days above the 5°C temperature accumulated over one year
bioclimatic	gdd10	growing degree days heat sum above 10°C	°C	IUCN; CHELSA	Heat sum of all days above the 10°C temperature accumulated over one year
bioclimatic	ngd0	number of growing degree days > 0°C	number of days	IUCN; CHELSA	Number of days at which tas > 0°C
bioclimatic	ngd5	number of growing degree days > 5°C	number of days	IUCN; CHELSA	Number of days at which tas > 5°C
bioclimatic	ngd10	number of growing degree days > 10°C	number of days	IUCN; CHELSA	Number of days at which tas > 10°C
status	friendly_name	scientific species name (Genus species) according to European Red List	[1816 species]	IUCN	
status	phylum	taxonomic status according to European Red List	[3 phyla]	IUCN	
status	class	taxonomic status according to European Red List	[10 classes]	IUCN	
status	order	taxonomic status according to European Red List	[40 orders]	IUCN	
status	family	taxonomic status according to European Red List	[133 families]	IUCN	
status	genus	taxonomic status according to European Red List	[424 genera]	IUCN	
status	native	whether species are native to or naturalised in Europe	Yes (native in Europe), No (naturalised in Europe)	IUCN (derived)	
status	endemic	whether species are endemic in Europe	end (endemic), nend (near-endemic: European population >90% of global population), non (non-endemic)	IUCN; Priority Species project	The information on endemic status is based on an ongoing project on bryophyte priority species for conservation being carried out by Irene Bisang, Norbert Schnyder, Christian Schröck, Ariel Bergamini, Neil Lockhart and Nick Hodgetts
status	category	IUCN category (extinction risk) of the European Red List	NA (not applicable), DD (data deficient), LC (least concern), NT (near threatened), VU (vulnerable), EN (endangered), CR (critically endangered), RE (regionally extinct), EX (extinct)	IUCN	

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