

Table 1 Traits included in BiolFlor. Most of the traits are available for most of the species; however some traits (e.g. “mode of introduction”, “Heterostyly”, or “grassland utilization values”) are not applicable for all of the species. For some other (often measured) traits, there may be some gaps (e.g. seed weight and shape).

trait	data type	comments	main source(s)
<u>Status</u>			
<u>immigration status and alien species:</u>			
floristic status	nominal (5 classes)	Native or residence status of aliens (after Pysek <i>et al.</i> (Pysek <i>et al.</i> 2004a))	Wisskirchen & Haeupler 1998, Haeupler & Muer 2000, Schubert & Vent 1990
species origin/evolution (anecophytes)	nominal (4 classes)	‘anecophytes’ co-evolved with humans and thus lack a natural range	Scholz 1995, Scholz 1996, Wisskirchen & Haeupler 1998, Haeupler & Muer 2000, Kowarik & Sukopp 2000
endemism	ordinal (4 levels)	Endemic in Europe, Central Europe, or Germany	Tutin <i>et al.</i> 1968ff., Korneck <i>et al.</i> 1996, Haeupler & Muer 2000
mode of introduction	nominal (9 classes)	Seed contaminant, escaped from cultivation etc.	Schubert & Vent 1990, Oberdorfer 1994, Haeupler & Muer 2000
time of naturalization	free text	could vary, like “early middle ages”, “17 th century”, or “1905”	Schubert & Vent 1990, Lohmeyer & Sukopp 1992
degree of naturalization	ordinal (3 levels)	From “casuals” to “naturalized in (semi-)natural vegetation”	Lohmeyer & Sukopp 1992, Lohmeyer & Sukopp 2001
<u>Biology</u>			
<u>genetic information</u>			
chromosome number	quantitative (numbers)		several sources documented with each record
ploidy level	quantitative (numbers)	2n, 3n, 4n ...	several sources documented with each record
ploidy type	nominal (3 classes)	di-, poly- or palaeopolyploid	deduced from ploidy level and basic chromosome number
DNA content	quantitative (pg)	pg DNA/2C-nucleus	several sources documented with each record

trait	data type	comments	main source(s)
<u>phylogeny</u>	text string	phylogenetic supertree; data format compatible with CAIC	compiled from over 200 sources
<u>morphology of vegetative organs</u>			
life form	nominal (9 classes)	Classification according to the location of the perennating organs according to (de Mera <i>et al.</i> 1999)	assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources
life span number of generative reproduction cycles	ordinal (5 levels)	Ranging from annual to perennial-pollacanthic	assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources
vegetative propagation and dispersal	nominal (18 classes)		assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources
storage organs	nominal (18 classes)		assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources
shoot metamorphoses	nominal (17 classes)		assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources
root metamorphoses	nominal (9 classes)		assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources

trait	data type	comments	main source(s)
rosette types	ordinal (3 levels)	ranging from erosulate to rosette	assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources
climbing behaviour	nominal (4 classes)		assigned by Krumbiegel after personal observations Krumbiegel 1998, Krumbiegel 1999, Krumbiegel 2002 and several other sources
nutritional adaptations	nominal (4 classes)	carnivore or (hemi)parasites	assigned by Krumbiegel Krumbiegel 2002 after several sources
leaf form	nominal (14 classes)		Frank & Klotz 1990 and personal observation
leaf anatomy	nominal (6 classes)	reflects main structures within a leaf to fulfill specific tasks (e.g. aeration, water storage, supporting tissues).	Ellenberg 1979, Frank & Klotz 1990, Krumbiegel 2002 and personal observations
leaf persistence	ordinal (4 levels)	duration from emergence until cast	Ellenberg 1979, Ellenberg 1991, Frank & Klotz 1990, Jäger & Werner 2002 and personal observations
<u>flowering phenology</u>			
start, end, and duration of flowering phase	quantitative (months)	month of flowering etc.	Schubert & Vent 1990, Oberdorfer 1994 and personal observations
symphenological groups	ordinal (11 levels)	groups of co-flowering plant species	Dierschke 1995

trait	data type	comments	main source(s)
<u>floral and reproductive biology</u>			
types of reproduction	ordinal (5 levels)	seeds(spores) or vegetative	several sources documented with each record
types of seed production	ordinal (4 levels)	sexual or apomictic (asexual)	several sources documented with each record
types of apomixis	nominal (3 levels)	pseudogamous or autonomous	several sources documented with each record
spatial separation of generative organs (dicliny)	nominal (10 classes)	e.g. hermaphroditic, dioecious, gynodioecious	several sources documented with each record
temporal separation of sexes (dichogamy)	ordinal (7 levels)	ranging from pronounced protogynous to pronounced protandrous	several sources documented with each record
types of heterostyly	nominal (5 classes)	e.g. distyly, tristyly	several sources documented with each record
self-incompatibility (SI)	ordinal (4 levels)	ranging from self-compatible to self-incompatible	several sources documented with each record
SI mechanisms	nominal (9 classes)	e.g. sporophytic SI, gametophytic SI	several sources documented with each record
pollen vectors	nominal (10 classes)	e.g. wind, self, insect	several sources documented with each record
mating system	ordinal (6 levels)	ranging from outcrossing to selfing	several sources documented with each record
pollen/ovule ratio	quantitative		several sources documented with each record
types of reward for visiting pollinators	nominal (4 classes)	nectar, pollen	several sources documented with each record
flower colors	nominal (11 classes) + free text		several sources documented with each record

trait	data type	comments	main source(s)
classes and respective percentages of UV-reflection	ordinal (7 levels)	separately for the centre and the periphery of the flowers	several sources documented with each record
UV reflection pattern	boolean		several sources documented with each record
flower classes and main pollinators	nominal (48 classes)	types of nectar bearing and pollinators	Müller 1881, Knuth 1898
blossom types	nominal (46 classes)	morphological types	Kugler 1955, 1970
<u>traits of seeds, fruits, generative germinules, and generative diaspores</u>			
fruit types	nominal (16 classes)	nuts, berries, pods etc.	several sources documented with species/genus and personal observations
types of generative germinules and diaspores	nominal (16 classes)	types of germination or propagation units, respectively; additionally: types of heteromorphism and appendages	several sources documented with species/genus and personal observations
weight of germinules and diaspores	quantitative (mg)		personal measurements and several sources documented with species/genus
length, width, thickness of germinules and diaspores	quantitative (mm)		personal measurements and several sources documented with species/genus
<u>ecology</u>			
<u>ecological strategy types</u>	nominal (7 classes)	following the system of Grime (1979) of ruderals, competitors, stress tolerators and their intermediates	assigned according to life history traits by Klotz using the methodology of Klotz 1984.

trait	data type	comments	main source(s)
<u>grassland utilization indicator values for vascular grassland plant species:</u>			
main habitat structure types	nominal (5 classes)	classification of main grassland dominated vegetation types	assigned by Briemle
guilds	nominal (6 classes)	coarse classification according to growth form of grassland species	assigned by Briemle
forage values for cattle	ordinal (9 levels)	from poisonous to best forage value	assigned by Briemle after Briemle 1992
forage values for deer	ordinal (9 levels)	from poisonous to best forage value	assigned by Briemle after Briemle 1996
mowing tolerance	ordinal (9 levels)	from intolerant to very tolerant to mowing	assigned by Briemle after Briemle & Ellenberg 1994
trampling tolerance	ordinal (9 levels)	from intolerant to very tolerant to trampling	assigned by Briemle after personal observation
grazing tolerance	ordinal (9 levels)	From intolerant to very tolerant to grazing	assigned by Briemle after personal observation
<u>components of a species' range:</u>			
floristic zones	ordinal (9 levels)	latitudinal gradient governed by climatic factors (ordered from north to south)	Frank & Klotz 1990, Schubert & Vent 1990, Bäßler <i>et al.</i> 1996, Jäger & Werner 2002
altitudinal levels	ordinal (6 levels)		Frank & Klotz 1990, Schubert & Vent 1990, Bäßler <i>et al.</i> 1996, Jäger & Werner 2002
oceanity and the corresponding amplitude	ordinal (11 levels)	gradient from oceanic to continental climate	Schubert & Vent 1990, Bäßler <i>et al.</i> 1996
floristic regions	nominal (25 levels)	continents or parts thereof	Frank & Klotz 1990, Schubert & Vent 1990, Bäßler <i>et al.</i> 1996, Jäger & Werner 2002

trait	data type	comments	main source(s)
<u>indicators of human impact onto vegetation</u>			
hemeroby	ordinal (7 levels)		Frank & Klotz 1990, corrected and further assigned by Klotz
urbanity	ordinal (5 levels)	ranges from species exclusively outside urban areas to those exclusively within urban areas	assigned by Klotz after comparative analyses
<u>habitats of the plants</u>	nominal (529 classes)	habitat types are hierarchically classified (nested)	Haeupler & Muer 2000
<u>phytosociological affiliation</u>	nominal (66 classes)	vegetation types using phytosociological classes	assigned by Klotz & Kühn after the system of Schubert <i>et al.</i> 2001

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