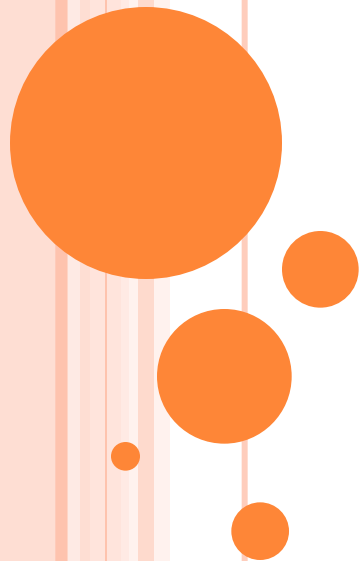


Sabrina Rilke & Ulrike Najmi

„VIRTUAL GUIDE AND PRACTICAL APPROACH TO THE FLORA OF MONGOLIA“

AG Allgemeine & Spezielle Botanik
am Institut für Botanik u. Landschaftsökologie

Universitäts-Rechenzentrum



THE IDEA

Large herbaria collections from Mongolia in Germany

- make available German material (HAL, GFW...)
- add Photo collections: living plants, macro images of details

Create a system

- for the plants of Mongolia
- to give basic information
- to identify a plant by comparison
- to check the identifications by images and descriptive data
- could be extended with contributions of the user



HERBARIUM SCANS



MACRO IMAGES



FLORISTIC DATA

currently the system includes:

2899 Mongolian plant species in 661 genera in 128 families
(name, distribution, habitat)

including about 845 species of **medicinal plants** (not yet identified)

173 species of **food plants**

64 species of **technical plants**

2/3 edited plant species (description, comments)

- 20.610 records
- 3.319 records with scans of herbarium specimens
- 10.800 photos of 16 photographers



VIRTUAL INFORMATION SYSTEM

Taxon data	<ul style="list-style-type: none">- taxonomic backbone (names of taxa)- species description- habitat, distribution- determination hints
------------	--

Record data	<ul style="list-style-type: none">- who collected when where what?- locality data- images of all kinds- verified determinations
-------------	--

Search engines	<ul style="list-style-type: none">- for taxa of all hierarchy levels- digital key for lay persons and specialists
----------------	--

TAXON DATA – AUTHORIZED USERS

Virtual Guide to the Flora of Mongolia Plant Database as Practical Approach

Good Morning **admin** [Logout, My Account]

Help Write Homepage Manage Homepage Links Presentation Plugins Users Options Import **Plant Data** Characters and States Import Export Labels Literature

Plant Data **Taxon Data** Public Records Internal Records Locality Listing Leg/Det Listing Herb. Listing Admin/Misc

☐ class
☐ group
☐ order

☐ subfamily
☐ tribe
☐ section

☒ **family**
☐ genus
☐ species

list

	Family	Author	Editor	Synonym	
39 char. filled in with 42 values selected 1 char. handed down from higher taxa with 1 values selected desc. available ! schwer für Laien zugängliche Gruppe Sonderschlüssel Limb and unguis	Fabaceae G [26] S [318]		S. Rilke, S. Starke, A. Weitkunat: Mai–November 2013; D. Podlech (Astragalus without fotos), Juli 20	Papilionaceae; Leguminosae	edit
30 char. filled in with 37 values selected 1 char. handed down from higher taxa with 1 values selected desc. available ! colour?	Frankeniaceae G [1] S [2]		S. Rilke, March 2009		edit
38 char. filled in with 41 values selected 2 char. handed down from higher taxa with 2 values selected desc. available ! carpell number?	Fumariaceae G [2] S [9]		S. Rilke & S. Starke, March 2012	Papaveraceae p.p. , Papaveraceae subfam. FUMARIOIDEAE	edit

Enter new family:

Choose group1

fill group2

fill order

family

family

author





author

editor

editor

save **save and continue**

RECORD DATA – AUTHORIZED USERS

Plant Data	Taxon Data	Public Records	Internal Records	Locality Listing	Leg/Det Listing	Herb. Listing	Admin/Misc					
family	<input type="text"/>	genus	<input type="text"/>	species <input type="text"/>								
coll./phot. by	<input type="text" value="Jäger"/>	coll. no.	<input type="text"/>									
acc. no.	<input type="text"/>	herbar	<input type="text"/>	<input checked="" type="checkbox"/> show records with scans only								
int. remark	<input type="text"/>	edited by	<input type="text"/>	<input type="button" value="Go!"/>								
collector: Jäger												
enter new record:												
currently displayed: 1 – 100 show next records >> (for undetermined records: see below)												
	int. remarks	presentation remarks	record	leg	phot	coll.no. acc.no.	date	dealt with				
scan 			Allium altaicum	Hilbig, W.; Jäger, E.		HAL acc.no. 61750	07.07.1986	det: Jäger, E.	edit	rename	move ->	delete x
scan  *			Ferulopsis hystrix	Jäger, E.		F 78 Aufn. 1 HAL acc.no. 58022	17.06.1982	teste: Sabrina Rilke, Susanne Starke	edit	rename	move ->	delete x
scan  *			Vincetoxicum lanceolatum	Jäger, E.		F 261 Aufn. 47 HAL acc.no. 58070	28.06.1982	teste: Rilke, S.	edit	rename	move ->	delete x
scan 			Asparagus trichophyllus	Jäger, E.		Aufn. 34 HAL acc.no. 57103	26.06.1982		edit	rename	move ->	delete x

Virtual Guide to the Flora of Mongolia


Plant Database as Practical Approach




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[WebGIS Map](#)

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→ [HowTo / Manual](#)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

[list by Order](#)
[listing by Family](#)
[list by Genus](#)
[list by Species](#)

show more parameter for listing

128 taxa found 1 - 15

Distribution	Family	Synonym	Taxon Data	Record Data	Image Data	Editor(s)
	Adoxaceae Dipsacales		genus: 1 species: 1	3 records in 1 species		S. Rilke, July 2009
	Alismataceae Alismatales		genus: 2 species: 4	16 records in 3 species	 	S. Rilke, January 2012
	Alliaceae Asparagales		genus: 1 species: 50	539 records in 43 species	  	N. Friesen 2012; A. Zemmrich & N. Friesen 2008
	Amaranthaceae Caryophyllales		genus: 1 species: 4	13 records in 3 species	 	

Get an Overview



Search Taxa



Search Records and Images



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Taxon *Calligonum*

mongolicum



Records for

Calligonum mongolicum



Herbar scans for

Calligonum mongolicum



Species photos for

Calligonum mongolicum

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Class: [angiosperms](#)
Group: [dicotyledons](#)
Order: [Caryophyllales](#)
Family: [Polygonaceae](#)
Genus: [Calligonum](#)

Scientific name: ***Calligonum mongolicum* Turcz.**

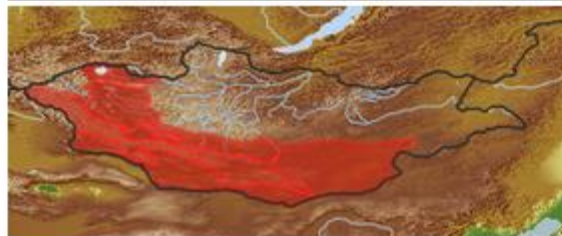
Name acc. to: Gubanov 1996

Description: Taxonomic characteristic "pedicel 1-2 mm, jointed below" accord. to Flora of China, Vol. 5 (2003) is not always evident. Some specimen present pedicels jointed at middle. Pedicel 1-2 mm.

Confuse with: *Calligonum gobicum* Bunge ex Meissn.

Comments: *C. mongolicum* differs from *C. gobicum* by achenes up to 10 mm in diam. and 10 mm long with slender bristles.

Link to Flora of China: http://www.eflora.org/browse.aspx?flora_id=28&name_str=Calligonum+mongolicum



Habitat: Sands in sandy steppes and deserts, Haloxylon woodlands, sandy bottom of says and creek valleys, margins of saline depressions in desert-steppe and desert zones (Grubov 2001).

Character Data:

The character database will be improved continually.
Your feedback is welcome.

Habit (0)

Growth form: (0) [herb \(0\)](#) [shrub, subshrub or semishrub \(0\)](#)

Parasite status: (0) [no parasite/saprophyte \(0\)](#)

Water or terrestrial plant: (0) [terrestrial \(0\)](#)

Leaf (0)

Leaf development: (0) [With green leaves \(0\)](#)

Leaf venation: (0) [pinnate \(0\)](#)

Flower (0)

Flower appearance and pollination: (0) [not attractive, wind-pollinated or some water plants \(0\)](#)

Flower colour: (0) [greenish \(0\)](#) [red \(0\)](#)

FloraGREIF project:

presents the flora of Mongolia, combining:

- **taxa** (species descriptions, distribution and other)
- **plant images**
- **plant records**

for ecologists, specialists in plant taxonomy, students of biological sciences and amateur botanists



Virtual Guide to the Flora of Mongolia Plant Database as Practical Approach



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[Go to Taxon data](#)



[Records for *Stipa klemenzi*](#)



[Herbarium for *Stipa klemenzi*](#)

Need Help?

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Determined as: *Poaceae Stipa klemenzi* Roshev.

Collected by: Knapp, H.-D., 29.06.1988, Coll.No. 383/88 / I

Determined by: Sabrina Rilke, Susanne Starke, 12.11.2009

Flowering status: fruiting

Comments for presentation : number with two different species (for 383/88 / II see *Stipa glareosa*)

Herbarium: **GFW** Acc. No.: 039172

[herbar scan](#)



Country: Mongolia

Province: Ömnögov

Locality: Süd-Gobi Aimak. Gurvan Sajchan uul: Trockental zwischen Dund und Zuun Sajchan uul an Piste nach Bajandalaj

Altitude: 2100 m asl

Habitat: gravel field with *Dracocephalum discolor*, VA 96/88, Schotterflur mit *Dracocephalum discolor*

Images: linked to Record



Get an Overview



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Need Help?

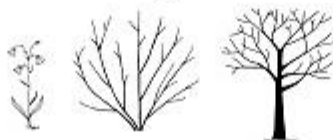
[→ Glossary](#)

[→ HowTo / Manual](#)

Class	Group	Order
<input type="text"/>	<input type="text"/>	<input type="text"/>
Subfamily	Tribe	Section
<input type="text"/>	<input type="text"/>	<input type="text"/>
Family	Genus	Species
<input type="text"/>	<input type="text"/>	<input type="text"/>

Habit (i)

Growth form (i)



Distribution (i)

Distribution (Veg. Zones) (i)



Plant Use

Medical Plant Use (i)

Show result list.

Get an Overview



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Search Records and
Images



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to the Database

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Class

Group

Order

Subfamily

Tribe

Section

Family

Genus

Species

Type of Image

☒ all ☐ scans ☐ species photos ☐ habitat photos

Collected/Photographed (i)

Determined (i)

Tested/Revised (i)

Coll. No./Herb. Acc. No. (i)

Herbarium:

Flowering Status:

Location:

Habitat:

[List frequent habitat terms](#)

Record

Image

Get an Overview



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[Search Records and Images](#)



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Which features do you want to use to determine your plant? These parameters work as preliminary filter.

flowering status of plant (i)

- ☐ vegetative
- ☒ flowering
- ☐ fruiting

technical terminology (i)

- ☒ lay persons (i)
- ☐ advanced (i)
- ☐ systematic botanists (i)

visibility of character (i)

- ☒ easy to see
- ☐ handlense required
- ☐ preparations and/or binocular needed

morphological (i)

- ☒ Habit (i)
- ☒ Leaf (i)
- ☒ Flower (i)
- ☐ Inflorescence (i)
- ☐ Fruit (i)
- ☐ Hairs
- ☐ Shoot/Stem (i)
- ☐ Root / shoot near or below ground (i)

systematic groups

- ☐ Taxon Name (i)
- ☐ Brassicaceae (i)

functional (i)

- ☐ Distribution (i)
- ☐ Phenology (i)
- ☐ Plant Use
- ☐ Plant Status

[select character categories](#)

The result list is possibly not yet complete as the database will be improved continually.

Your feedback is welcome.

See Flora Search: What's new? and List Characters for help.

Habit (i)

[+ Growth form \(i\)](#)

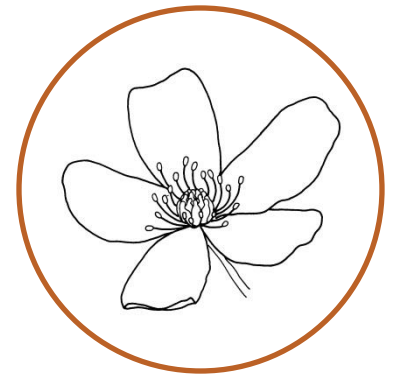


[+ Size of plant \(i\)](#)

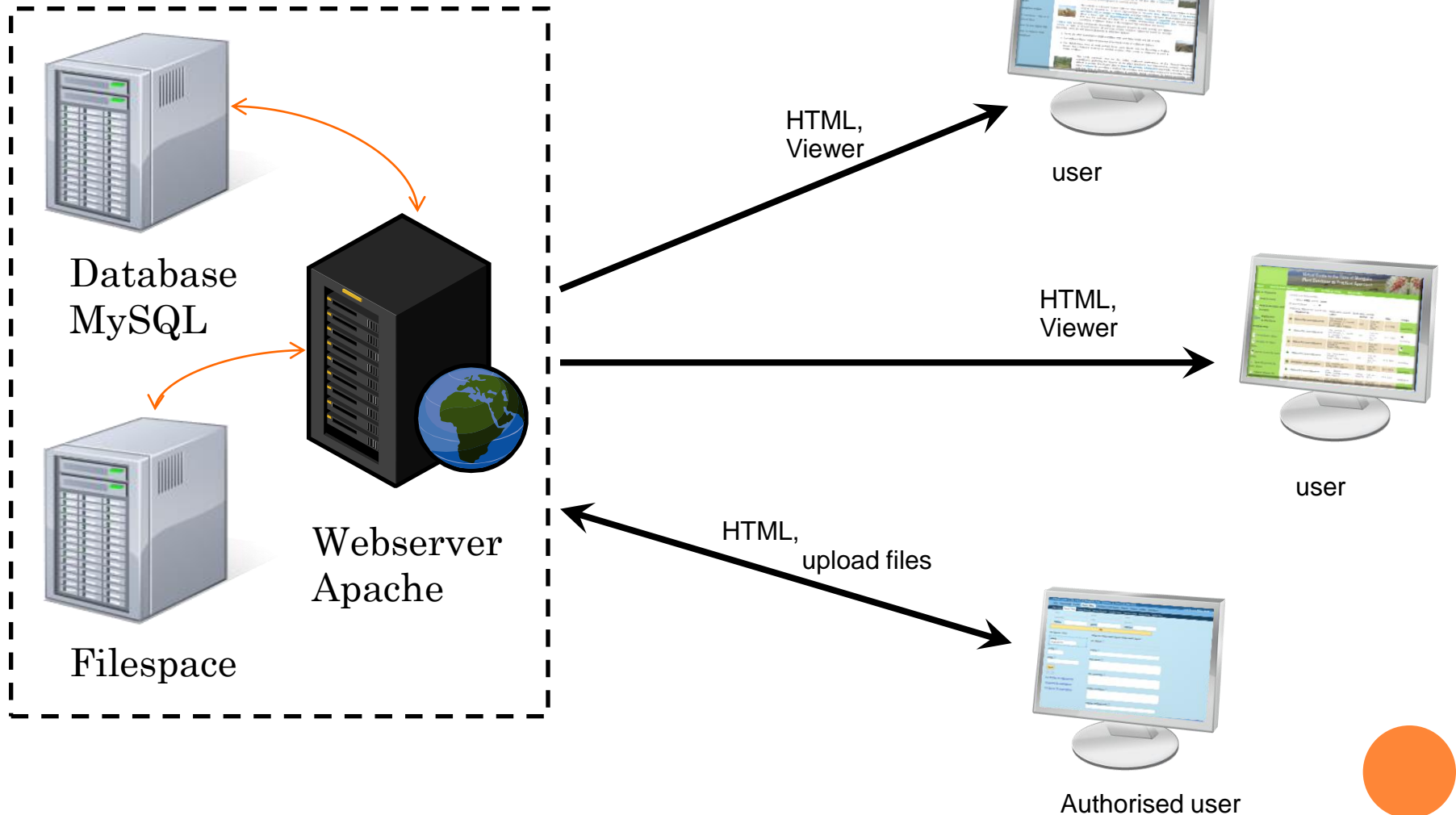
[+ Smell & Touch \(i\)](#)

PART II: HOW TO IMPLEMENT A VIRTUAL GUIDE TO A FLORA

**Based on the open-source information system
FloraGREIF**



TECHNICAL REALISATION



TAXON DATA

Virtual Guide to the Flora of Mongolia Plant Database as Practical Approach

Good Morning **admin** [Logout, My Account]

Help Write Homepage Manage Homepage Links Presentation Plugins Users Options Import **Plant Data** Characters and States Import Export Labels Literature

Plant Data **Taxon Data** Public Records Internal Records Locality Listing Leg/Det Listing Herb. Listing Admin/Misc

☐ class
☐ group
☐ order

☐ subfamily
☐ tribe
☐ section

☒ family
☐ genus
☐ species

list

	Family	Author	Editor	Synonym	
39 char. filled in with 42 values selected 1 char. handed down from higher taxa with 1 values selected desc. available ! schwer für Laien zugängliche Gruppe Sonderschlüssel Limb and unguis	Fabaceae G [26] S [318]		S. Rilke, S. Starke, A. Weitkunat: Mai–November 2013; D. Podlech (Astragalus without fotos), Juli 20	Papilionaceae; Leguminosae	edit
30 char. filled in with 37 values selected 1 char. handed down from higher taxa with 1 values selected desc. available ! colour?	Frankeniaceae G [1] S [2]		S. Rilke, March 2009		edit
38 char. filled in with 41 values selected 2 char. handed down from higher taxa with 2 values selected desc. available ! carpel number?	Fumariaceae G [2] S [9]		S. Rilke & S. Starke, March 2012	Papaveraceae p.p. , Papaveraceae subfam. FUMARIOIDEAE	edit

Enter new family:

Choose group1

fill group2

fill order

family

author

editor

TAXONOMIC BACKBONE





- Is there a compiled plant list?



- Add synonyms, short descriptions ...
- Hierarchical listing of taxa:
class – group – order – family – subfamily –
tribe – genus – section – species



RECORD DATA

Plant Data	Taxon Data	Public Records	Internal Records	Locality Listing	Leg/Det Listing	Herb. Listing	Admin/Misc					
family	<input type="text"/>	genus	<input type="text"/>	species <input type="text"/>								
coll./phot. by	<input type="text" value="Jäger"/>	coll. no.	<input type="text"/>									
acc. no.	<input type="text"/>	herbar	<input type="text"/>	<input checked="" type="checkbox"/> show records with scans only								
int. remark	<input type="text"/>	edited by	<input type="text"/>	<input type="button" value="Go!"/>								
collector: Jäger												
enter new record:												
currently displayed: 1 - 100 show next records >> (for undetermined records: see below)												
	int. remarks	presentation remarks	record	leg	phot	coll.no. acc.no.	date	dealt with				
scan 			Allium altaicum	Hilbig, W.; Jäger, E.		HAL acc.no. 61750	07.07.1986	det: Jäger, E.	edit	rename	move ->	delete x
scan  *			Ferulopsis hystrix	Jäger, E.		F 78 Aufn. 1 HAL acc.no. 58022	17.06.1982	teste: Sabrina Rilke, Susanne Starke	edit	rename	move ->	delete x
scan  *			Vincetoxicum lanceolatum	Jäger, E.		F 261 Aufn. 47 HAL acc.no. 58070	28.06.1982	teste: Rilke, S.	edit	rename	move ->	delete x
scan 			Asparagus trichophyllus	Jäger, E.		Aufn. 34 HAL acc.no. 57103	26.06.1982		edit	rename	move ->	delete x

RECORD DATABASE = VIRTUAL HERBARIUM

- Is there a compiled list of herbarium specimen?

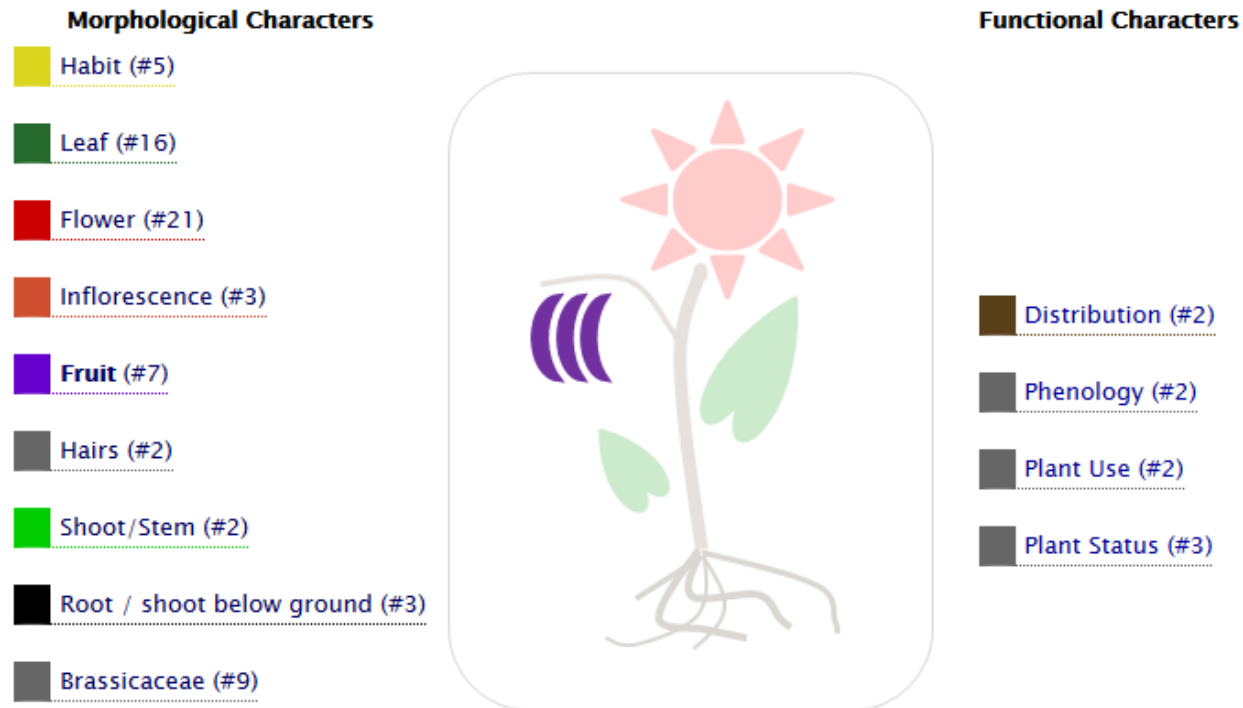


- Add revision/confirmation remarks
- Add images/macros/scans ...



CHARACTER DATABASE

○ What are the characteristics of plants?



CHARACTER DATABASE

save

-

Name

Inflorescence Type

Category

Inflorescence

Type

Choose status values from list

Description

Types of inflorescence. Attention: We here ask for the botanical nomenclature of inflorescences,

Req. Flowering Status

flowering

Accessibility

easy to see

advanced

only characters without status values can be deleted.

Sort Id

3

Status Values for Character 'Inflorescence Type'

others (in traits_comments nicht aufgeführt) (235 species) edit

spike

(233 species)

-

Status Name/ Value ?

Length or Size (Unit: mm. Will be converted on display.) ?

figure

save

figure

figure

nest this value to ?

this value belongs to character ?

spike


Description

all flowers sessile and crowded along a main z

0 - 0

Example

Plantago, Carex vesicaria, Vicia, Typha (spad



delete this image

Durchsuchen... Keine Datei ausgewählt.

Durchsuchen... Keine Datei ausgewählt.

do not nest this value

Inflorescence: Inflorescence Type

delete status

Sort Id

1

raceme

(519 species)

edit

DIGITAL MULTI ACCESS KEY

- What are plants like within this family, genus, species?

+ **Habit**, general appearance of a plant [3: 3]

+ **Fruit**, the seed bearing organ, with or without adnate parts; a ripened ovary and any other structures which are attached and ripen with it. Aggregate fruits are handled like simple fruits for determination. [6: 8]

+ **Flower**, reproductive portion of the plant, consisting of sepals, petals, stamens, and pistils [20: 1 24]

- **Inflorescence**, flowering part of a plant, describes the arrangement of the flowers on the flowering axis [3: 2 2]

Character	Available Status Values	Current Status Values inherited by
Inflorescence +		Flowers in inflorescence → family value acc. to: <input style="width: 100px;" type="text"/>
Appearance +		terminal → family value acc. to: <input style="width: 100px;" type="text"/>
Inflorescence Type +		umbel double umbel value acc. to: <input style="width: 100px;" type="text"/>

+ **Leaf**, expanded, usually photosynthetic organ of a plant (including phylloclades) [8: 3 10]

+ **Shoot/Stem**, a young stem or branch

+ **Root / shoot below ground**, plant part below ground (in most cases), including below ground shoots, without leaves [3: 4]

Taxonomists




information system





DIGITAL KEY

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The result list is possibly not yet complete as the database will be improved continually.
Your feedback is welcome.
See [Flora Search: What's new?](#) and [List Characters for help](#).

Current Search Parameter:

- Growth form: **herb** [x]
- Flower form: **papilionaceous** [x]
- Distribution (Veg. Zones): **Khangai** [x]

☒ [Edit search parameter](#) [Reset search parameter](#)

Matching taxa:


Fabaceae: Astragalus, Glycyrrhiza, Hedysarum, Lathyrus, Lespedeza, Medicago, Melilotus, Onobrychis, Oxytropis, Pisum, Thermopsis, Trifolium, Vicia


Polygalaceae: Polygala


84 taxa matched search parameter: 1 - 84

Fabaceae

Astragalus

*Astragalus bifidus*

*Astragalus brachybotrys*

*Astragalus brevifolius*

