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# An open access database of plant species useful for controlling soil erosion and substrate mass movement

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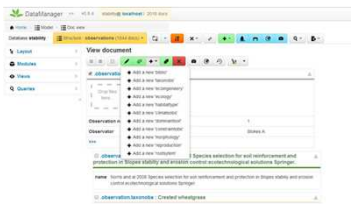


## Introduction

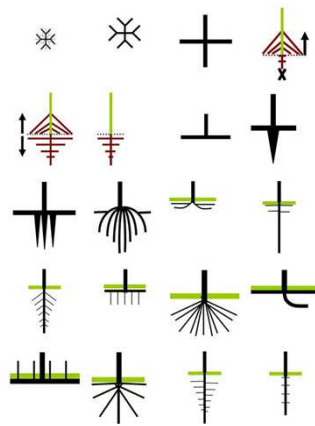
- Due largely to anthropogenic activities and extreme climate events, the risk of shallow landslides and erosion has increased enormously over the last decade.
- To aid the site manager choose the most appropriate species, a database is needed with information on species sorted by their utility for retaining soil on slopes.
- We developed the 'Stability database' which is open to experts who can add new information via a website, whereas the general public can access the data freely:
- [http://publish.plantnet-project.org/project/stability\\_en](http://publish.plantnet-project.org/project/stability_en)

## Entering data

The 'Stability database' OBSERVATIONS page which allows end-users to add data either manually or as a csv file, including photos



*Bauhinia championii* (Yunnan, China)



As root systems are important factors to consider when using vegetation to stabilize soil on slopes, we have included 22 architectural types in the repository TYPOLOGIES. These data are included as line drawings describing horizontal and vertical morphology and topology of root systems. The end user can choose a root system type from a list in the Stability database, which best describes the root system of the species being added to the database.

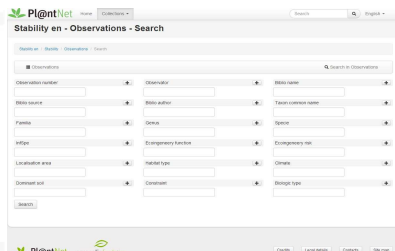
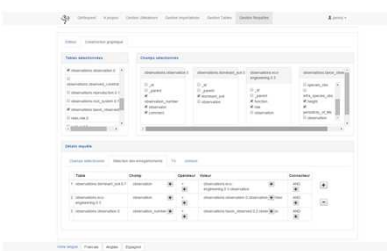
The Observations table comprises fields where data can be entered to describe the observed element. Several hundred records have already been entered.

Observed element	Fields where data can be entered to describe the observation (e.g. species properties, experimental results or literature).	Number of records
BIBLIOGRAPHY	The source data for the observation (personal data, experimental results or literature).	269 records
ECO-ENGINEERING	The use of the plant with regard to a specific function. There are currently six functions: Anchoring, buttressing, bank, channel reinforcement, surface protection and whether the species is a phreatophyte (for reducing soil moisture).	184 records
ECOLOGICAL	The localization (chosen from repository), altitude, soil depth where individual was found and its successional state (pioneer or post pioneer).	115 records
HABITAT TYPE	The habitat where the individual was observed or in which the species can be found (e.g. mountain slopes, grass band, sand dunes, riverbanks, etc...)	107 records
MORPHOLOGY	Life form of species (to be chosen from repository data) and whether woody or not.	111 records
REPRODUCTION	Vegetative or sexual. When vegetative, the common modes of regeneration are included (e.g. rhizomatous, tufted, stoloniferous, etc...)	107 records
ROOT SYSTEM	The maximum depth of the root system observed, along with the observed or general type of lateral spread (e.g. adventitious, wide spreading or extensive). Text describing root system architecture can be added (e.g. tap, heart, sinker, fibrous root system etc). Photographs and drawings can be added here.	107 records
TAXON OBSERVED	Corresponds to information concerning a given individual of a species included in the repository or can be used to describe the species in a general manner.	199 records

## Output

The database can be searched by a) using the tool PI@ntNet Publish which permits a limited amount of data to be obtained in predefined fields and consulted online only or b) using the DBRequest tool which allows data to be exported in text files.

Example of a text file created from the results of DBRequest search. We requested information on species useful for surface protection in a temperate climate. Obligatory output provided but not shown due to lack of space includes the author of the observation and species' Latin names.



dominant soil type	function	risk	height (m)	life cycle	taxon observed
Poor soil	surface protection	Short lived	0.3-0.5	Perennial	Sweet vernal grass
Dry to moist fertile soil	surface protection, shallow reinforcement and erosion control	Not to be used near arable land	0.2-1.5	Perennial	Couch grass Chieridont
Heavy moist soils	surface protection	Sensitive to over-use	0.3-1.2	Perennial	Meadow fescue
Wet soils	surface protection, bank control	Spreading, extensive rhizome, can be invasive	0.1-0.25	Perennial	Reed sweet grass
Wet and sandy soils, never on calcareous ones	surface protection	Weed in gardens and arable areas	0.3-1.6	Perennial	Creeping soft grass
Light and well drained soil	surface protection	Hardy and not frost tender	1.8	Biennial	Cereal rye
Acid moist soil	deep reinforcement and soil strength enhancement	Shade intolerant	0.2-1	Annual	White lupin
Acid moist soil	deep reinforcement and soil strength enhancement	Shade intolerant	0.3-1.2	Annual	Sweet lupin
Wide soil tolerant	deep reinforcement and soil strength enhancement	Dies out with several hard winters	1-1.5	Perennial	Garden lupin
Neutral to alkaline soils. Dry, clayey calcareous	deep reinforcement, surface protection, shallow reinforcement	Sensitive to late frosts	0.3-1.2	Perennial	Lucerne
Well drained, moist gritty soils	surface protection, shallow reinforcement and erosion control	Not susceptible to grazing by deer	0.2	Perennial	Alpine forget-me-not
Wide soil tolerant, prefers damp soil	surface protection, bank control	Unsuitable for lawns	0.1-0.7	Perennial	Creeping bent
Deep fertile moist soil	surface protection	Highly poisonous, not susceptible to grazing	1.5	Perennial	White hellebore
Prefers chalky soils	surface protection	Suckers from roots	3.00	Perennial	Common barberry
Any soil type	deep reinforcement, surface protection	Does not tolerate maritime exposure	3.6	Perennial	Italdier senna
Any soil type	surface protection	Light shade only	3.5	Perennial	Dogwood
Wide soil tolerance	deep reinforcement, phreatophytes removing soil moisture	Thorny	5-14	Perennial	Common Hawthorn

## Conclusion

We have developed an open access database of plant species which can be used to stabilize certain types of substrate mass wasting processes. We have included fields which describe species' habitat, morphology and reproduction, as well as plant traits specific to slope stabilization. End-users can add species' data to the database or simply access it for information. The Stability database can be searched online and data files can be exported as text files. The database can be used by amateurs or professionals from different backgrounds, providing that the mass wasting process to be mitigated is correctly identified.