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## e-FLORA-sys, a website tool to evaluate the agronomical and environmental value of grasslands

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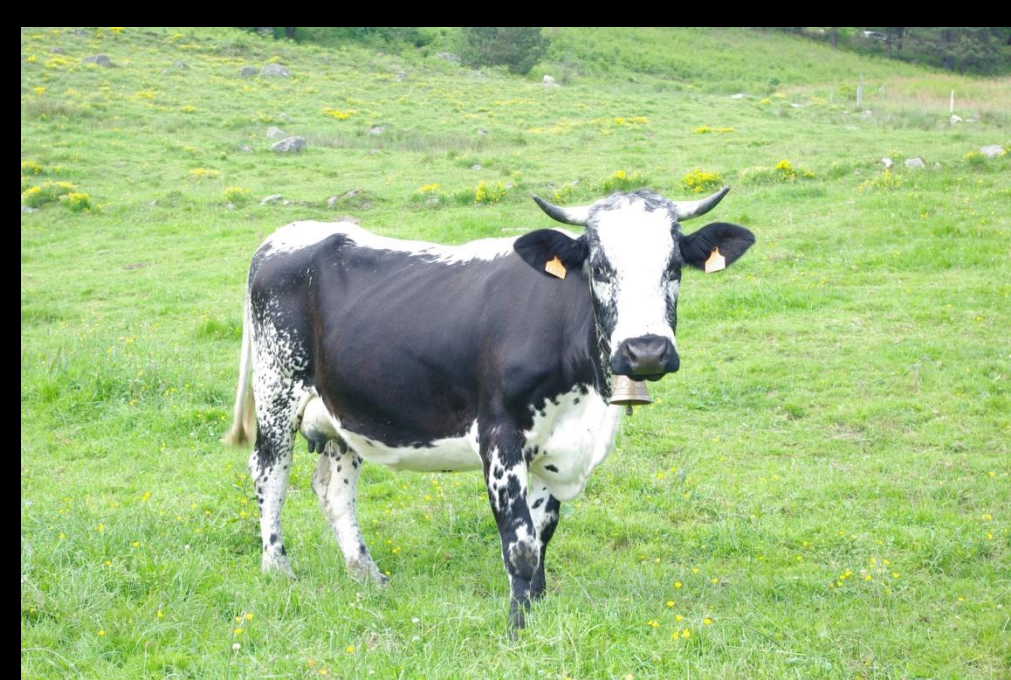


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<http://eflorasys.inpl-nancy.fr>

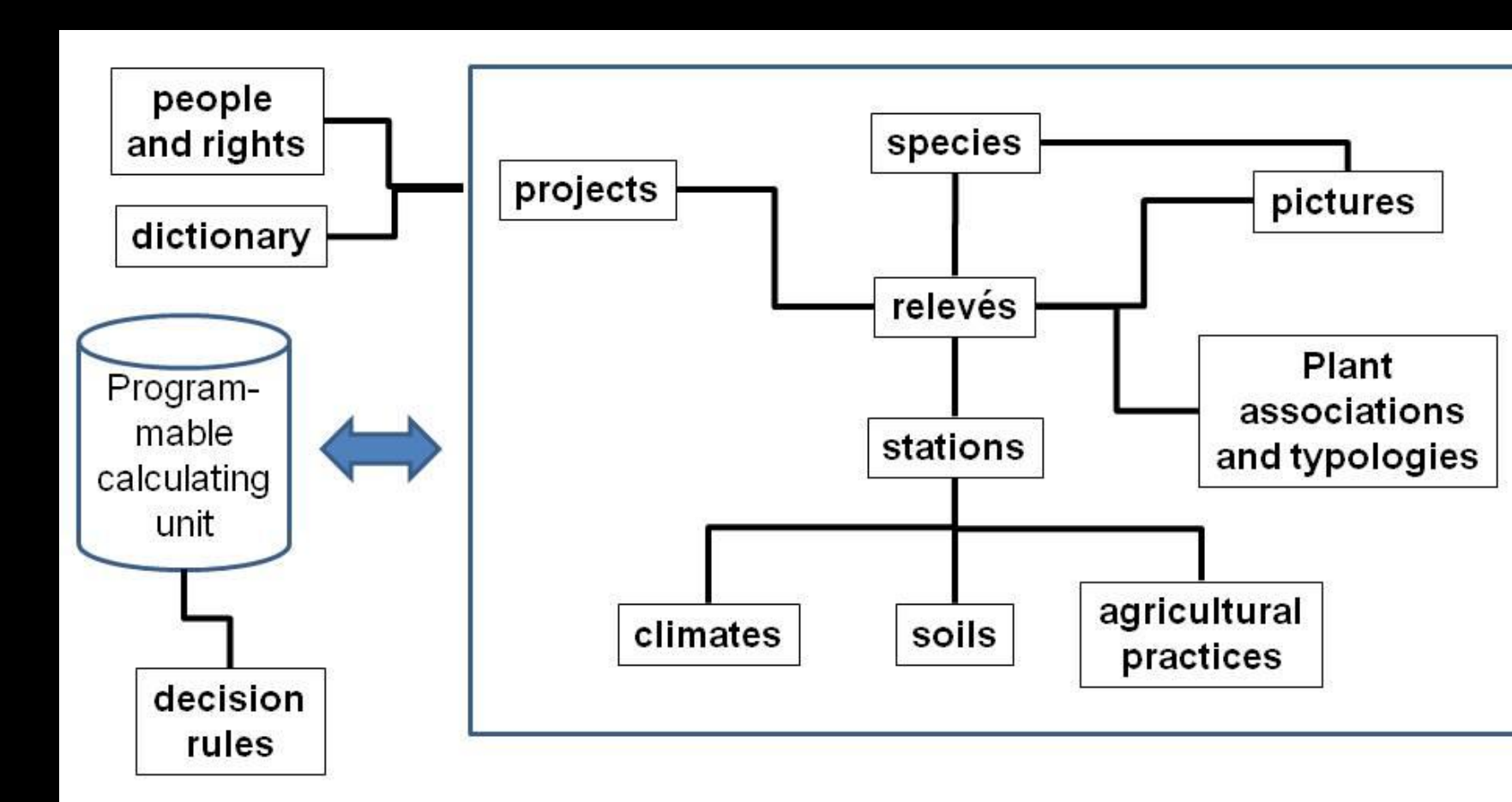
## Introduction



e-FLORA-sys is a free website developed to provide a research and a diagnosis tool for grassland researchers and technicians. The system is based on databases describing grassland species, floristic composition of grasslands, agricultural practices, soils and climates, and vegetation associations. From this information, the system calculates numerous indexes to evaluate the agronomical and ecological value of grasslands. Users can freely record their own observations (botanical relevés, agricultural practices, ...), which are protected by a login device. E-FLORA-sys is currently used in a national program studying grassland agronomical and ecological value (CASDAR)

## eFLORAsys database

The **species** table contains data on plants (currently 3000 species) found in most European grasslands : identification (translations and synonyms), agronomical value (potential production level, quality for cattle, sheep, goats and horses), patrimony value (rarity, inscription on red lists), reaction to abiotic factors (soil and climate) and agricultural practices (i.e. adaptation to frequent cutting or trampling) including Ellenberg indices, biological and ecological characteristics (aerial part, root and diaspore morphology, germination, reproduction and dispersion, life traits, Raunkier types).



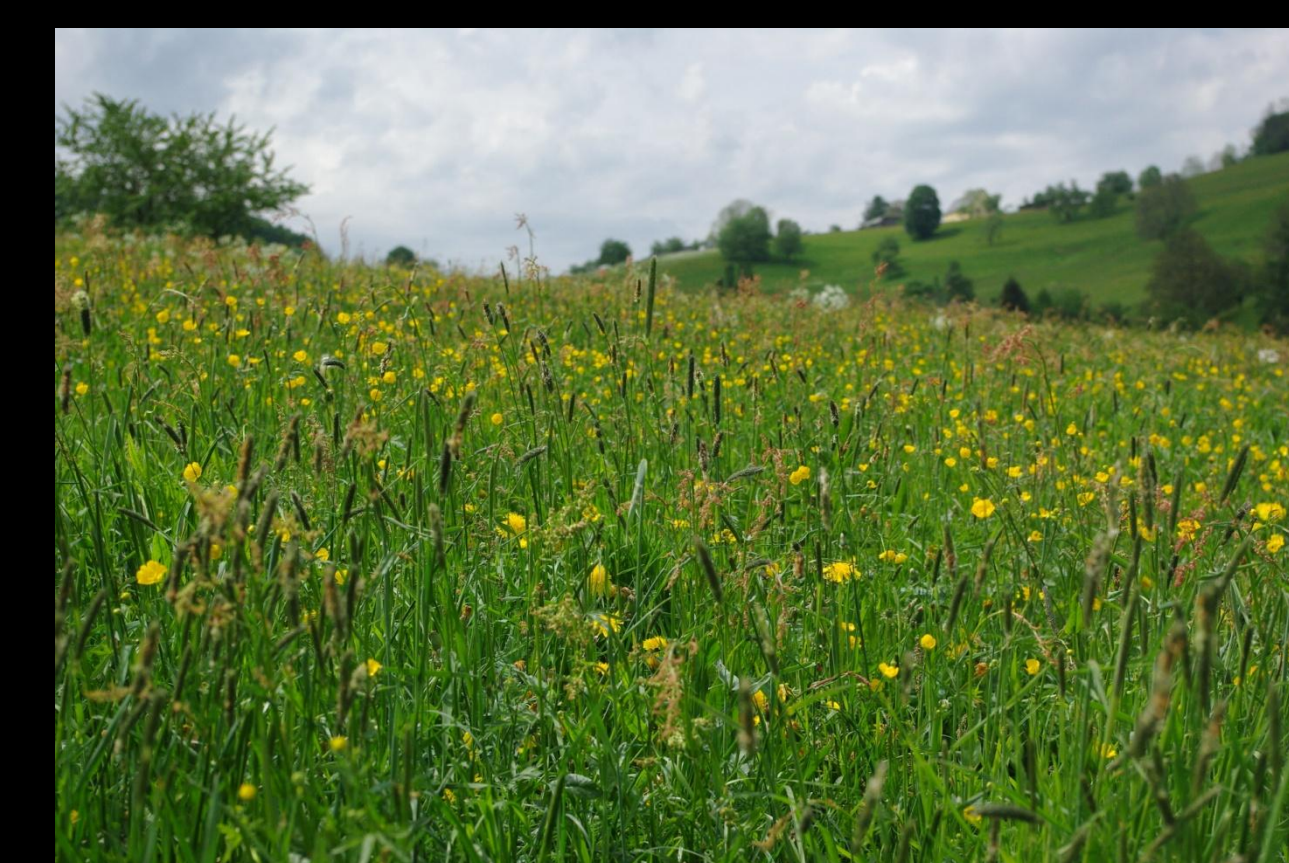
- Help
- Species
- Samples
- Stations
- Geographic area
- Soils
- Climates
- Management
- Associations
- FLORA-Predict
- Bibliography

Member Login

Username:

Password:

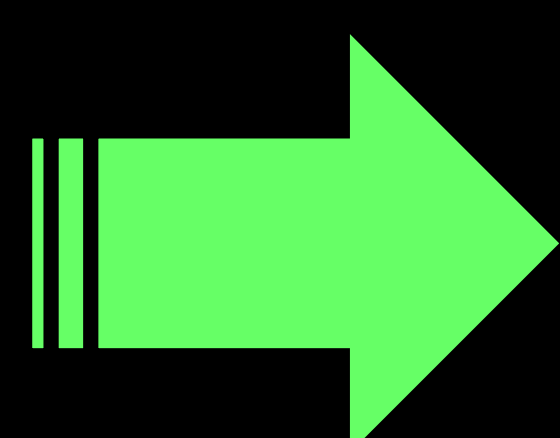
The **relevé** table includes the floristic composition, and all the calculations, graphs and texts for an agronomical and an ecological diagnosis. Several methods of relevés are available. Each relevé is geolocated (Google maps®) and linked to a **station** which is itself linked to 3 tables describing the **climate** (temperature, precipitation, radiation), the **soil** (physical and chemical parameters) and the **agricultural practices** (fertilization, grazing, mowing, other practices). The **associations** table enables the users to link the relevés to recorded known types of grassland vegetation or European habitats. Relevés can be gathered in **studies**, in order to study grasslands of a particular region, to compare evolution in time, or to focus on a specific aspect (i.e. effect of nitrogen fertilization amount). Pictures of species and grasslands can be stored. The access to information is controlled by a system of **user rights** defined in the table of 'people and rights'. A dictionary allows a full english and french translation of all technical and software command terms. A table is describing **decision rules** involved in agronomical and ecological interpretation, and in prediction of floristic composition (Flora-predict model).



## Diagnosis tool

| Species [25]  | EP%  | PA%  |
|---|------|------|
| Sol nu  | 5.0  | 0.50 |
| Festuca rubra L.  | 35.0 | 1.00 |
| Anthoxanthum odoratum L.  | 19.4 | 1.00 |
| Agrostis capillaris L.  | 5.6  | 0.50 |
| Poa trivialis L.  | 0.0  | 0.12 |
| Oenothera lappacea (L.) Oams  | 10.0 | 0.88 |
| Triticum repens L.  | 1.3  | 0.50 |
| Triticum pratense L.  | 0.6  | 0.25 |
| Lathyrus linifolius (Reichard) Bialer subsp. montanus (Benth.) Bialer | 0.0  | 0.00 |
| Lolium comolatus L.   | 0.0  | 0.25 |
| Plantago lanceolata L.  | 10.6 | 0.88 |
| Vaccinium myrtillus L.  | 3.8  | 0.38 |
| Achillea millefolium L.   | 1.9  | 0.62 |
| Hypericum perforatum L.   | 1.3  | 0.25 |
| Koeleria avenacea (L.) Coult. subsp. avenensis                        | 1.3  | 0.25 |
| Luzula campestris (L.) DC.  | 1.3  | 0.88 |
| Hieracium pilosella L.  | 1.3  | 0.50 |
| Rhinanthus alectorolophus (Simp.) Pallisch                            | 0.6  | 0.50 |
| Anemone ranunculoides L. subsp. ranunculoides                         | 0.6  | 0.12 |
| Ranunculus bulbosus L.  | 0.6  | 0.25 |
| Carex sp.   | 0.0  | 0.12 |
| Ranunculus acris L.   | 0.0  | 0.12 |
| Veronica chamaedrys L.  | 0.0  | 0.38 |
| Euphorbia cyparissias L.  | 0.0  | 0.00 |
| Polygonum vulgare L.  | 0.0  | 0.00 |
| Leontodon vulgare Lam.  | 0.0  | 0.00 |
| Pimpinella major (L.) Huds.   | 0.0  | 0.00 |

Botanical composition of the grassland



| Agronomical value                            |      |
|--|------|
| Pastoral value                               | 35.0 |
| Proportion of bare soil                      | 5.0  |
| Palatability index for cattle                | 8.66 |
| Number of species unconsumed by cattle       | 0    |
| Contribution of species unconsumed by cattle | 0.0  |
| Number of species unconsumed by goats        | 0    |
| Contribution of species unconsumed by goats  | 0.0  |
| Palatability index for horses                | 6.33 |
| Number of species unconsumed by horses       | 0    |
| Contribution of species unconsumed by horses | 0.0  |
| Number of species unconsumed by ovines       | 0    |
| Contribution of species unconsumed by ovines | 0.0  |

Forage value

| Biodiversity indices                              |      |
|---|------|
| Species richness                                  | 28   |
| Number of oligotrophic species                    | 9    |
| Contribution of oligotrophic species              | 25.2 |
| Shannon diversity index                           | 2.97 |
| Simpson diversity index                           | 0.91 |
| Simpson evenness index                            | 0.99 |
| Red list - number of disappeared species          | 0    |
| Red list - number of species probably disappeared | 0    |
| Red list - Number of endangered species           | 0    |
| Red list - Number of vulnerable species           | 0    |
| Red list - Number of rare species                 | 0    |
| Total number of red list species                  | 0    |

Biodiversity

| Functional types |       |
|------------------|-------|
| C                | 1.25  |
| OR               | 70.00 |
| ORCSR            | 1.88  |
| CSR              | 0.00  |
| R                | 0.00  |
| SCSR             | 0.00  |
| SR               | 5.63  |
| empty            | 12.50 |

Functional types

| Ecological indices (Ellenberg)   |      |
|--|------|
| Soil moisture index (Ellenberg - calculated with sp presence)                    | 4.69 |
| Soil moisture index (Ellenberg - calculated with sp dominance)                   | 4.91 |
| Number of species tolerant to soil moisture variations                           | 3    |
| Contribution of species tolerant to soil moisture variations                     | 2.5  |
| Number of species tolerant to flooding   | 0    |
| Mean annual temperature index (Ellenberg - calculated with sp presence)          | 5.12 |
| Mean annual temperature index (Ellenberg - calculated with sp dominance)         | 5.21 |
| Continentality index (Ellenberg - calculated with sp presence)                   | 3.2  |
| Continentality index (Ellenberg - calculated with sp dominance)                  | 3.28 |
| Soil nitrogen fertility index (Ellenberg - calculated with sp presence)          | 4.44 |
| Soil nitrogen fertility index (Ellenberg - calculated with sp dominance)         | 4.03 |
| Soil phosphorus fertility index (Ellenberg - calculated with sp presence)        | 4.66 |
| Soil phosphorus fertility index (Ellenberg - calculated with sp dominance)       | 5.44 |
| Soil acidity index (Ellenberg - calculated with sp presence)                     | 5.14 |
| Soil acidity index (Ellenberg - calculated with sp dominance)                    | 4.28 |
| Soil salinity index (Ellenberg - calculated with sp presence)                    | 1.0  |
| Soil salinity index (Ellenberg - calculated with sp dominance)                   | 1.0  |
| Resistance to trampling index (Ellenberg - calculated with sp presence)          | 0.26 |
| Resistance to trampling index (Ellenberg - calculated with sp dominance)         | 0.3  |
| Resistance to frequent cuttings index (Ellenberg - calculated with sp presence)  | 0.27 |
| Resistance to frequent cuttings index (Ellenberg - calculated with sp dominance) | 0.27 |

Ecological indexes