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Collaborative validation of visual data through the Pl@ntNet identification system

Samuel Dufour-Kowalski, Jeremy Salinier, Aurelien Peronnet, Jennifer Carré,
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Collaborative validation of visual data through the Pl@ntNet identification system

S. Dufour-Kowalski, J. Salinier, A. Peronnet, J. Carré,
J.-P. Milcent, H. Goëau, A. Joly, N. Boujemaa,
P. Bonnet, J. Barbe, J.-F. Molino, D. Barthélémy



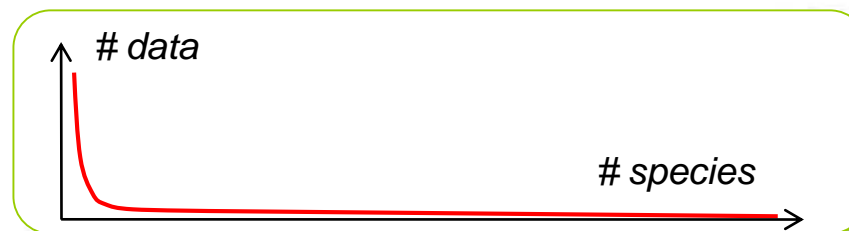
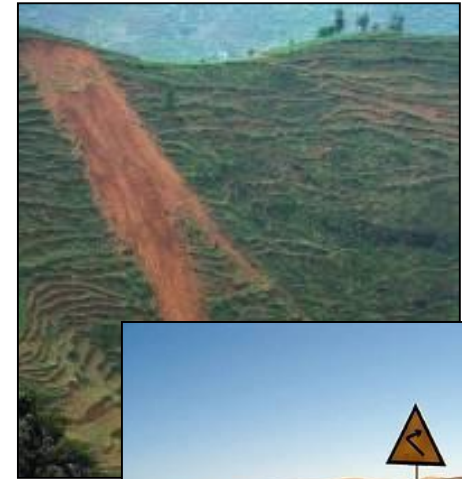
Context & challenges

Accurate knowledge of **plants** (distribution and ecology) is essential for **sustainable agriculture** and **biodiversity conservation**

But accessing basic information about plants is still challenging

Botanical data is:

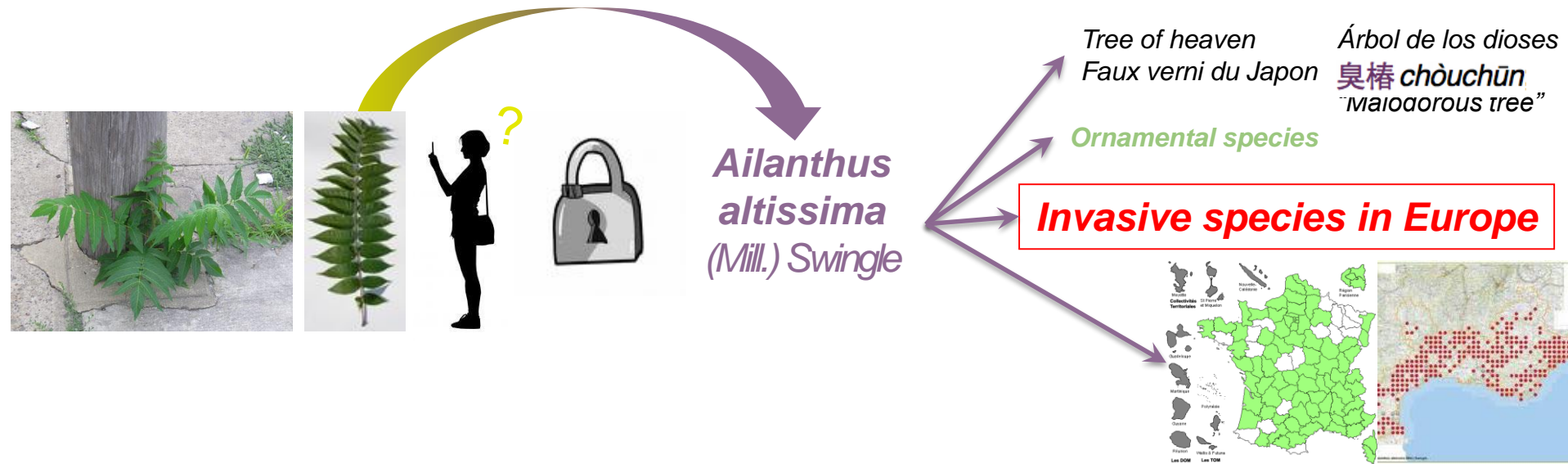
- ❖ *decentralized and heterogeneous*
- ❖ *complex* (un-structured tags, empirical measurements,...)
- ❖ *sparse and incomplete*
 - *huge & unknown number of species*
 - *"long tail distribution" (1 record per species !)*



Towards bridging the taxonomic gap

Identifying and naming plants is a very difficult task

Plant names are the **KEY** to access and to enrich botanical information on plants



Towards bridging the taxonomic gap

Possible solutions

- ❖ **Collaborative Information Systems**
Sharing and speeding up integration of raw data
- ❖ **Large audience Identification Tools**
Multimedia image retrieval techniques ...

But ...

Few, small, biased datasets



• **Validation / Data quality ?**

Pl@ntNet Workflow

- Image sharing and retrieval app for plant identification
- Shared observations (Creative Commons)

- Botanical obs. management system (pictures, species, date, GIS, author)



Visual search engine



- Collaborative images annotation system

- Tags (flowers, leaves, etc.)
- Quality evaluation

• Joly & al., 2013. Ecological informatics.

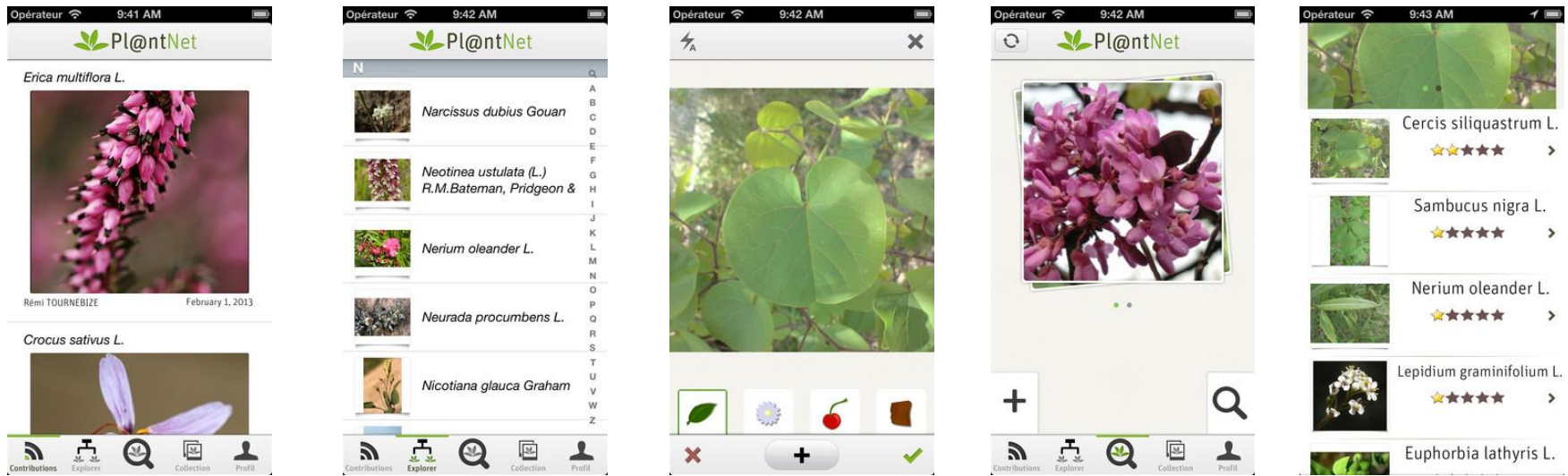
- Collaborative Identification

- Identification suggestion
- Identification vote
- Forum

Pl@ntNet mobile app

iPhone

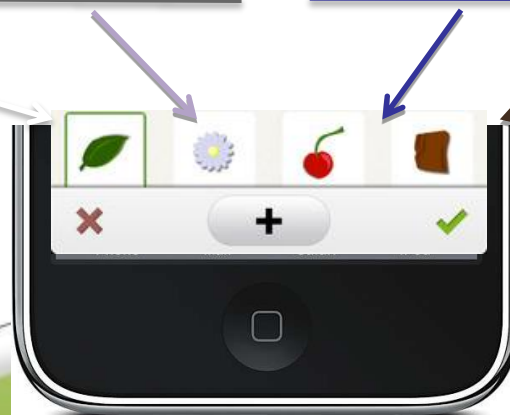
• Goëau & al., 2013. ACMM.



Public version

70 000 images

3 700 species



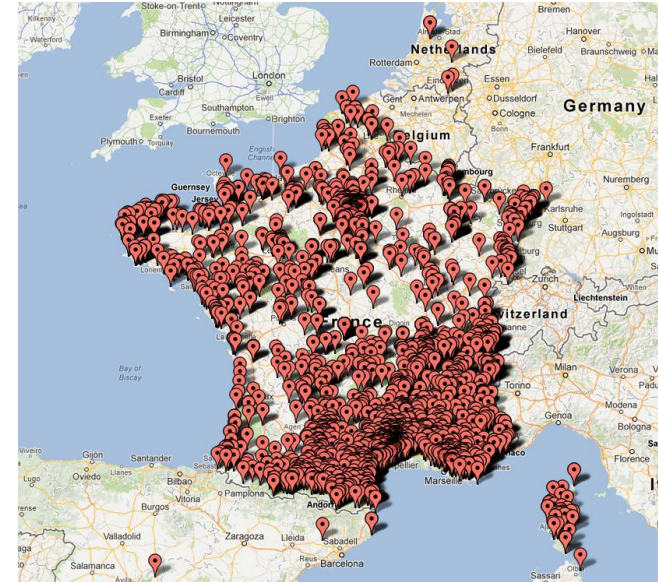
BETA

105 000 images

5 000 species

Dataset based on social network of botanists

- ❖ 21 500 members
 - From amateur to expert botanists
- ❖ Hundreds of contributors with different skills
 - with their own scanners, cameras & Smartphone
- ❖ Thousands of individual botanical records
 - at different growing stage,
 - different periods of the year,
 - under different light conditions (raining, sunny, ...)



A huge visual diversity to canalise

PI@ntViews dataset

Leaf diversity



Leaf at different growing stage of *Platanus x hispanica* Mill ex. Münchh. (London plane)

Spring 2012 Summer 2010
Autumn 2011 Winter 2011

Shooting conditions and used devices, *Acer platanoides* L. (Norway mapple)

Lobe number and deep of leaf lobes on *Ficus carica* L. (Common fig)

localities
seasons
environments
climate
ecosystems
devices

Users =

Leaflets number variability on *Fraxinus angustifolia* Vahl (Narrow-leaved Ash)

Autumnal variability of the lamina color on *Cotinus coggygria* Scop. (Eurasian smoketree)

Growing stage: two compound leaves from the same tree ! *Gleditsia triacanthos* L. (Honey Locust)

Ilex aquifolium L. (European holly)
Quercus ilex L. (Holm oak)

Intra-species diversity versus visual similarities between species

PI@ntViews dataset

Flower diversity



COLOR



Brown

White

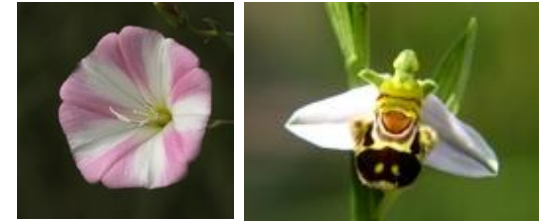
Green

Rose

Blue

Yellow

Symmetry



Radial

Bilateral

Structure



4

5

6

>>6

Number of petals

Orientation



Face

Profil

Size



small

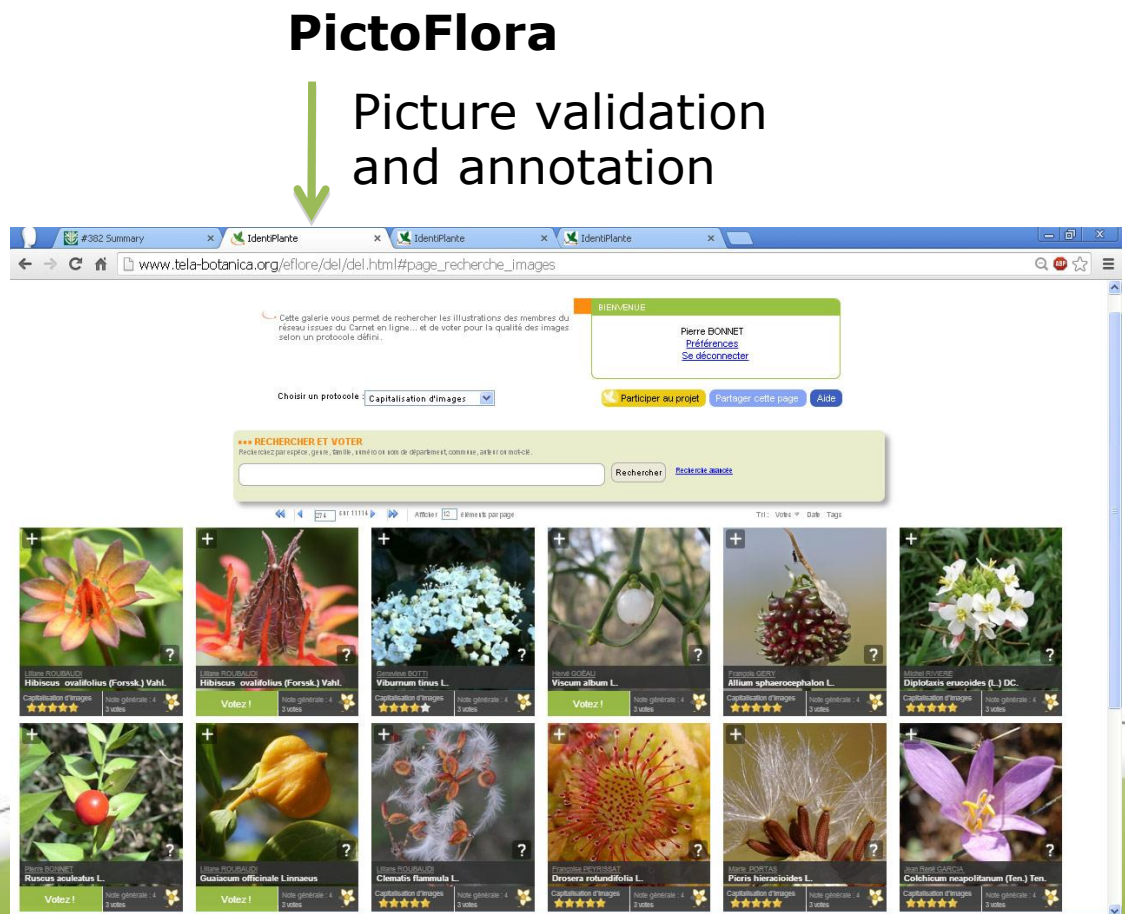
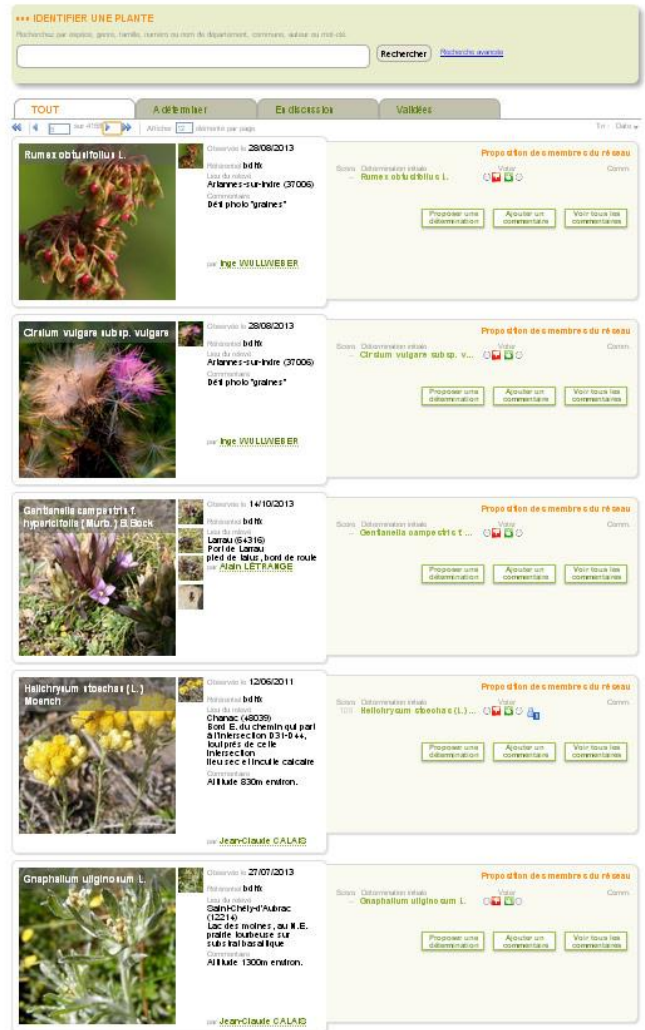
middle

big

A collaborative website for data validation and annotation



IdentiPlante
Botanical records validation



PictoFlora
Picture validation and annotation

IdentiPlante, for Identification validation

www.tela-botanica.org/eflore/del/del.html#page_validation~1053841

IdentiPlante

Tela Botanica Pl@ntNet

BIENVENUE

Pierre BONNET
[Préférences](#)
[Se déconnecter](#)

Proposez une observation à déterminer

Partager cette page Aide

[Retour](#)

Clematis vitalba L. référentiel bdtfx observée à Cébazat (63063) par gisèle ARLIGUIE le 29/09/2013

*** DÉTERMINATION / CONFIRMATION

Proposer une détermination Ajouter un commentaire Suivre cette observation

Détermination la plus probable : **Clematis vitalba L.**

Clematis vitalba L.
Détermination proposée par gisèle ARLIGUIE le 29/09/2013
[Répondre](#)

Proposer une détermination Ajouter un commentaire

Pour vous aider :

Comparer cette image
Saisissez un nom de plante à comparer avec l'image

Vérifier sa détermination
eFlore

Autres outils en ligne
Flores numérisées
Flore Bonnier interactive
Clés de détermination

Web application

Individual URL
Users search Botanical
record
can be logged
but not necessary

User can see
any botanical record,
from any contributors

Botanical record = Image(s) + Taxa name + Place + Date + Contributor name

National
taxonomic
indexes

National
localities
indexes

IdentiPlante, for Identification validation

Retour
sureau référentiel bdtfx observée à Sailly-Flibeaucourt (80692) par Françoise CARLE le 17/07/2013
Lieu : / A16,

Sorbus aucuparia L., proposé par Bernard ANDRIEU le 07/05/2014

Votes Pour 71%		Votes Contre 29%	
David MERCIER	13/10/2013	Florent BECK	13/10/2013
Danièle DOMEYNE	14/10/2013	Charlotte POLLET	14/10/2013
Benoît BOCK	14/10/2013		
jean-claude ecardour	14/10/2013		
Et 1 vote anonyme			

1 Ces votes permettent de confirmer ou non une détermination proposée par un membre du réseau. Vous pouvez changer à tout moment votre vote à l'aide de ou .

Une pondération s'opère pour le calcul des votes : vote en tant que membre identifié (3 points) / non identifié (1 point).

Sorbus domestica L.
Détermination proposée par Florent BECK le 13/10/2013
On ne voit pas bien distinctement, cependant il me semble que la dentation des folioles ne descend pas jusqu'à leur base (ce qui devrait être le cas pour Sorbus aucuparia) mais s'arrête vers le tiers inférieur pour se terminer par une marge lisse, ce qui conduit à Sorbus domestica.

Charlotte POLLET le 14/10/2013
Sorbus domestica n'a pas des fruits rouges mais plutôt jaunâtres/rosés et plus ovales. Pour moi il s'agit de sorbus aucuparia

Proposer une détermination Ajouter un commentaire

Community members
Vote for any
suggestion

Define the most
probable species
Several suggestions

Initial identification
by members of
the social network
Suggestions
vernalonymous

Can be commented

... and then discussed

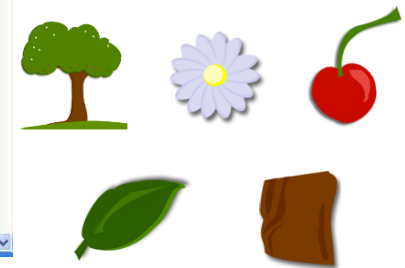
PictoFlora, for Tags and image quality evaluation

The screenshot shows a web browser window with the URL www.tela-botanica.org/eflore/del/del.html#page_recherche_images. The page features a navigation bar with the text "BIENVENUE" and a user profile for "Pierre BONNET" with links for "Préférences" and "Se déconnecter". Below this, there are buttons for "Participer au projet", "Partager cette page", and "Aide". A search section titled "RECHERCHER ET VOTER" includes a search bar and a "Rechercher" button. The main content is a grid of 12 plant images, each with a "Votez !" button and a star rating system. The first image, *Hibiscus ovalifolius*, has a 5-star rating highlighted in yellow. Other images include *Viburnum tinus*, *Viscum album*, *Allium sphaerocephalon*, *Diploxaxis erucoides*, *Ruscus aculeatus*, *Guaiacum officinale*, *Clematis flammula*, *Drosera rotundifolia*, *Pieris hieracioides*, and *Colchicum neapolitanum*.

User can see its **own votes**

Each picture can be tagged

According to visual concepts of PI@ntNet Identification app

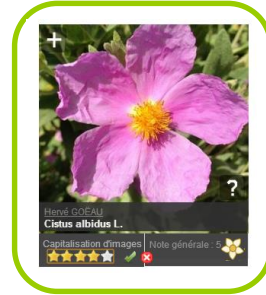


Results

IdentiPlante



PictoFlora



The most probable species name :

- according to collaborative votes
- among the national species index

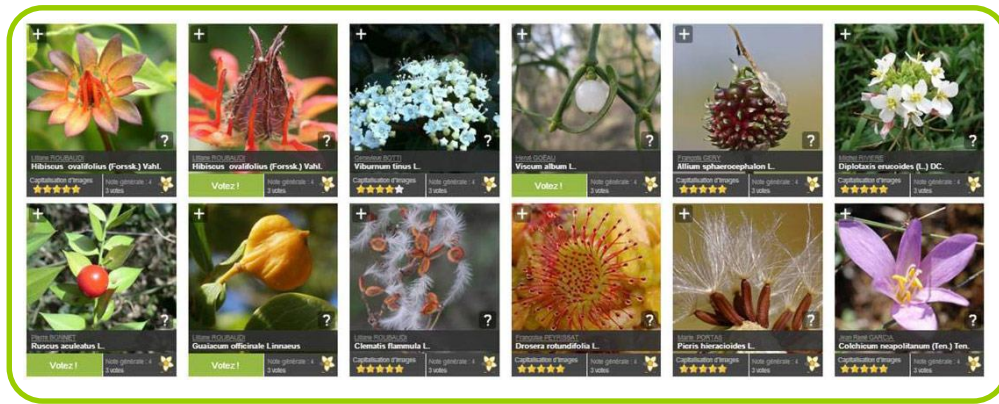
Pictures :

- With one tag only
- A mean of more than 3 stars

*We don't use records with determination
At the family or genus level*

PI@ntView dataset

1100 users
10500 votes
7000 propositions
900 Comments



850 users
63 000 tags
137 000 votes

70 000 images / 3 700 species

Future directions



- ❖ Invest in user profile
(for a specific region, or group of taxa)
- ❖ Use all the data according to their quality
- ❖ Use some automatic algorithm to tag data
- ❖ Use of meta data in the identification and the validation process (localisation and/or date).
- ❖ Apply this workflow on other botanical (or non botanical) datasets

WWW.plantnet-project.org

Email : contact@plantnet-project.org

Pl@ntNet French | English | Search... | ok

Project | Case studies | Tools | Resources | Media room

Plant identification and collaborative information system

News

- ↳ **Lorepsum dolor sit amet, consectetur adipiscing elit.**
Mauris fermentum dictum magna. → Read...
- ↳ **Praesent vestibulum molestie lacus.**
Aenean nuncummy hendrerit mauris. Phasellus porta. → Read...
- ↳ **Fusce feugiat malesuada odio.**
Morbi nunc odio, gravida at, cursus nec tunc a, lorem. → Read...

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PlantNet is a project of **agropolis** fondation

Thank You !!!