New Citizen Science Project to Monitor Asian Plant Biodiversity

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1 - Swinburne University of Technology Sarawak Campus (Malaysia)
2 - UMR AMAP [Cirad - Cnrs - Inra - Ird - Université Montpellier] (France)
3 - Zenith Team, LIRMM, Inria (France)
4 - Multimedia University (Malaysia)
5 - University of Malaya (Malaysia)
6 - Neoun AI (Malaysia)

Taxonomic impediment

Plant identification is crucial for sharing and accessing knowledge about plants

- A huge and unknown number of species,
- Growing shortage of taxonomists & conservators,
- "Plant Blindness" is recognized as a major limitation of the involvement of the society in biodiversity conservation

Snapshot of "trusted" visual data available online (in 2016)
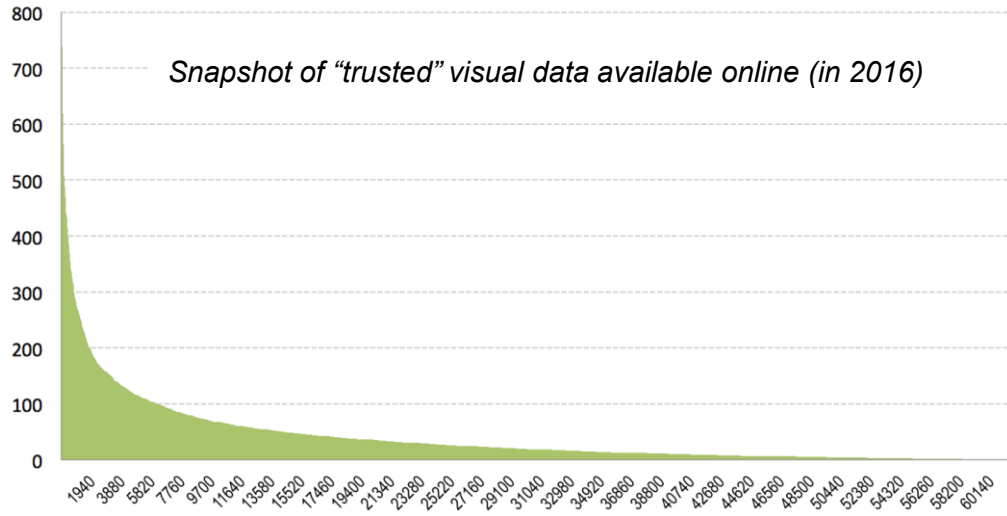
potentially up to 400 K species

Pl@ntNet

A citizen observatory of plant biodiversity that uses machine learning to help people identify plants using their mobile phones
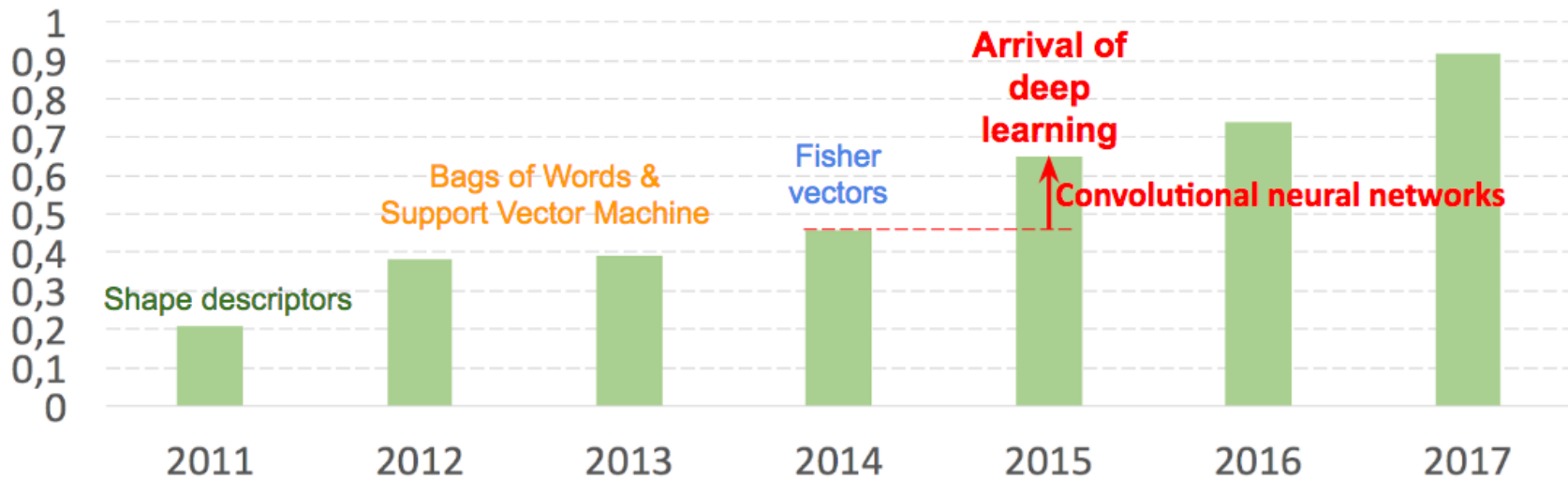
PlantCLEF

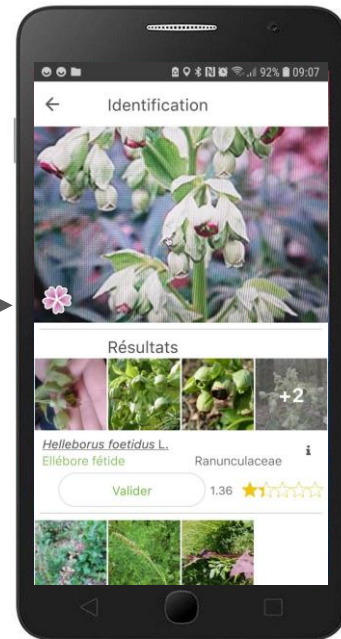|	2011	2012	2013	2014	2015	2016	2017
Espèces	71	126	250	500	1,000	1,000	10,000
Images	5,400	11,500	26,077	60,962	113,205	121,205	1.2 M
Nb. of particip.	8	11	12	22	15	16	17
Best perf.	**0,209**	**0,38**	**0,393**	**0,456**	**0,652**	**0,742**	**0,92 !**

Basic principle

"Artificial Intelligence"
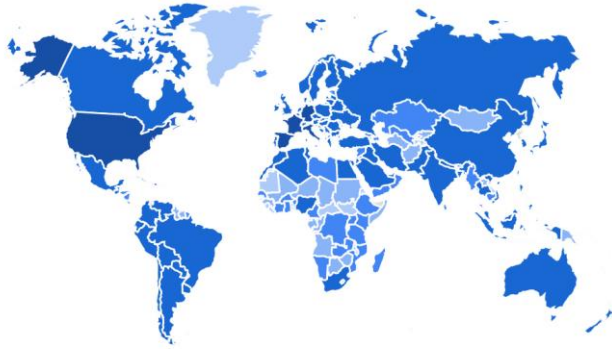"Deep learning"
(Convolutional Neural Network)

Collaborative training set
(Millions of images, 30K species)

Affouard A. et al.,2017.
**Pl@ntnet app in the era of
deep learning**. ICLR Conf.

Pl@ntNet **Today**

Plant identification system based on
Deep Learning since 2015 + **similarity search**

4 founding organizations
8 members of the Pl@ntNet team

1K users of the API
15 institutional data providers
10 area manager partners
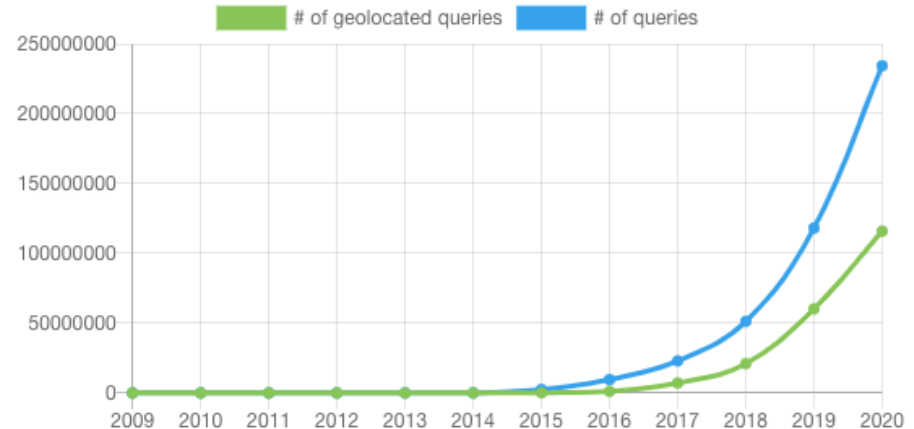6 associative partners
20K followers facebook & twitter

20M downloads
2M users accounts
150-300K users per day
24 languages
200+ countries

260M plant observations
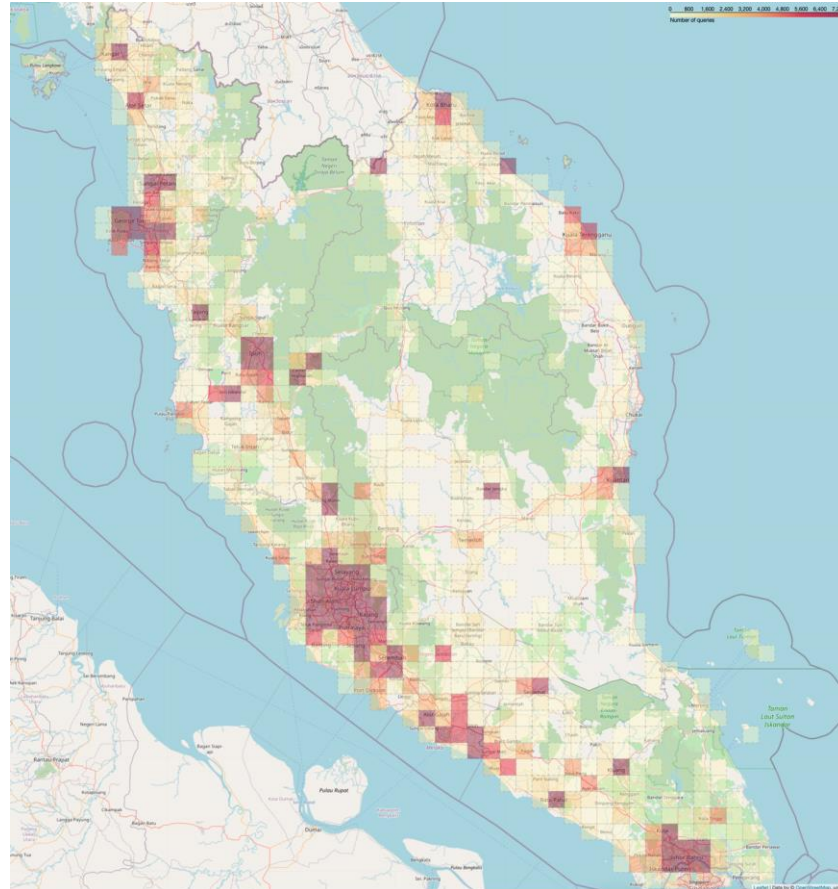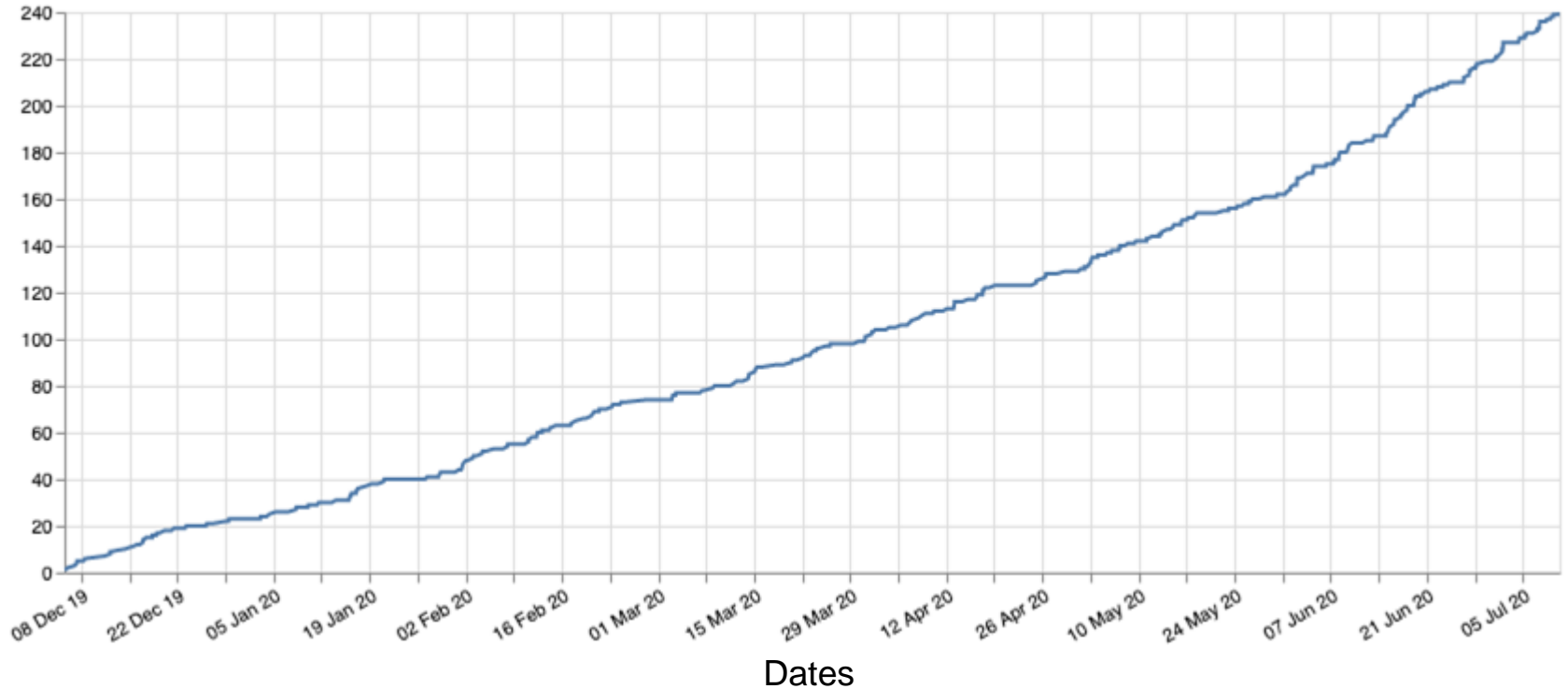30K plant species
7M validated occurrences
https://identify.plantnet.org/stats

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Pl@ntNet In Malaysia

Pl@ntNet **In Malaysia**

Cumul. Nb of
contributors

Dates

Pl@ntNet In Malaysia

Cumul. Nb of queries

Dates

Pl@ntNet Mobile App Usages

Professional usage
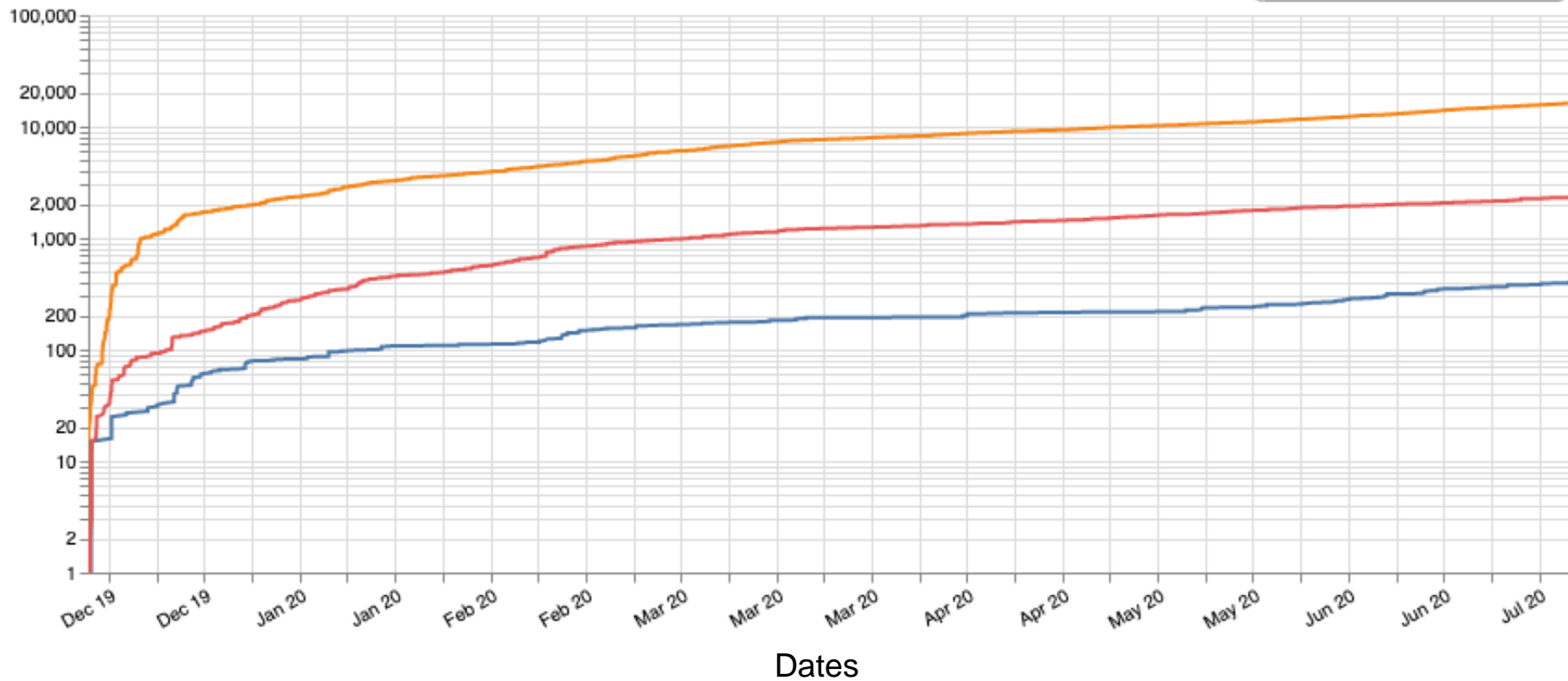
Personal usage
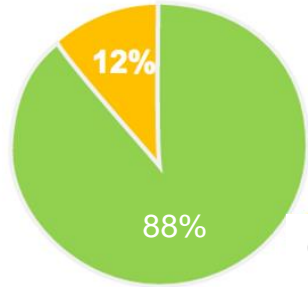
(Survey of 700 people in 2015)
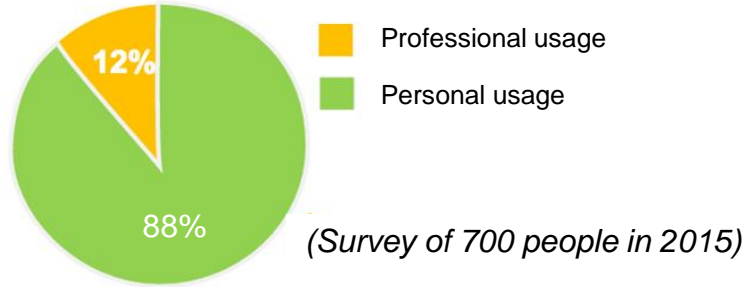
Votes on Google Play
4,5

Number of votes
132 803

Votes with comments
60 822

Pl@ntNet Mobile App Usages

Professional usage

Personal usage

Personal usage (88%)

12%

88%

(Survey of 700 people in 2015)

Phytotherapy, eatable

Houseplants

Gardening

Walk, trekking

Fun

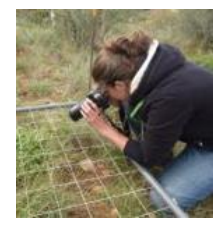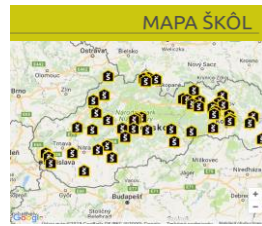# Professional usage (12%)

Agro-ecology

Natural Areas Management

Consulting, expertise, botanists

Education, formation, animation

Tourism

Merchants

Pl@ntNet API
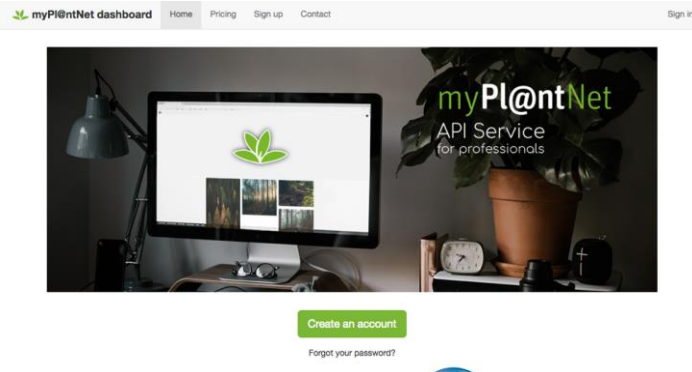
- A secured API with encrypted keys
- Provides developers with programmatic access to Pl@ntNet services
- Monitoring of consumption, accounts management, etc.
- 1K users (private companies, professors, scientists, and students)

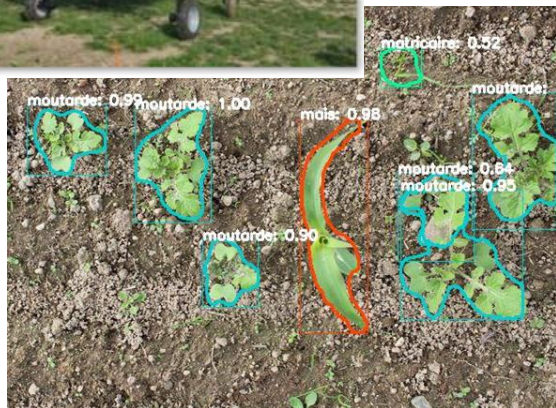More info here : https://my.plantnet.org/

UK Centre for Ecology & Hydrology

August, T. A., Pescott, O. L., Joly, A., & Bonnet, P. (2020). **AI Naturalists Might Hold the Key to Unlocking Biodiversity Data in Social Media Imagery**. Patterns, 1(7), 100116.

Adaptation of DL approaches to agro-biodiversity real world scenarios

Challenges of species detection and identification on autonomous robot

Champ et al., 2020. **Instance segmentation for fine detection of crop and weed by precision agricultural robots**. Applications in Plant Sciences.

Toward a Plant disease monitoring in crowdsourced image streams

Lee, S. H., Goëau, H., Bonnet, P., & Joly, A. (2020). **New perspectives on plant disease characterization based on deep learning**. Computers and Electronics in Agriculture, 170, 105220.

Lee, S. H., & al., Accepted. **Conditional Multi-Task learning for Plant Disease Identification.** 25th International Conference on Pattern Recognition (ICPR2020) - MiCo Milano Congress Center, ITALY 10 - 15 January 2021.

Automated estimation of nutritional value from seed batches, to increase the autonomous production of organic seeds

(a) Mold disease (Bing)

Pl@ntNet is developing innovative digital services aimed at :

(i) facilitating the integration of automated identification in other citizen science portals

(ii), allowing researchers to use Pl@ntNet data and tools for their own research.

The implemented services will be provided on the European Open Science Cloud (EOSC) in order to increase capacity and interest of scientists to implement citizen science projects dedicated to contribute to the SDGs.

```
service: https://my-api.plantnet.org/v2/identify/all
api-key: api-key=
image_1: images=https%3A%2F%2Fmy.plantnet.org%2Fpubli
image_2: images=https%3A%2F%2Fmy.plantnet.org%2Fpubli
organ_1: organs=flower
organ_2: organs=leaf
```

Thank you !