

# Action progress RNSA

## Case Study France:

# Analysis of plant occupation of public green spaces

Samuel Monnier, Michel Thibaudon

Réseau National de Surveillance Aérobiologique  
Meeting PARIS 18 January 2017



# Aerobiological Information Systems and allergic respiratory disease management

AIS LIFE

(AIS LIFE LIFE13 ENV/IT/001107)

1. University of Florence - Department of Agrifood Production and Environmental Sciences, Florence - Italy (UNIFI)
2. CNR Institute of Clinical Physiology, Pisa - Italy (IFC-CNR)
3. Medizinische Universitaet Wien, Vienna - Austria (MUW)
4. Reseau National de Surveillance Aerobiologique, Brussieu - France (RNSA)
5. University of Pisa - Department of Biology, Pisa - Italy (UNIPI)
6. Institut national de la santé et de la recherche médicale, Paris - France (INSERM)



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

**DISPAA**  
DIPARTIMENTO DI SCIENZE DELLE  
PRODUZIONI AGROALIMENTARI  
E DELL'AMBIENTE



DIPARTIMENTO DI BIOLOGIA  
UNIVERSITÀ DI PISA



ISTITUTO DI FISIOLOGIA CLINICA  
CONSIGLIO NAZIONALE DELLE RICERCHE



Institut national  
de la santé et de la recherche médicale

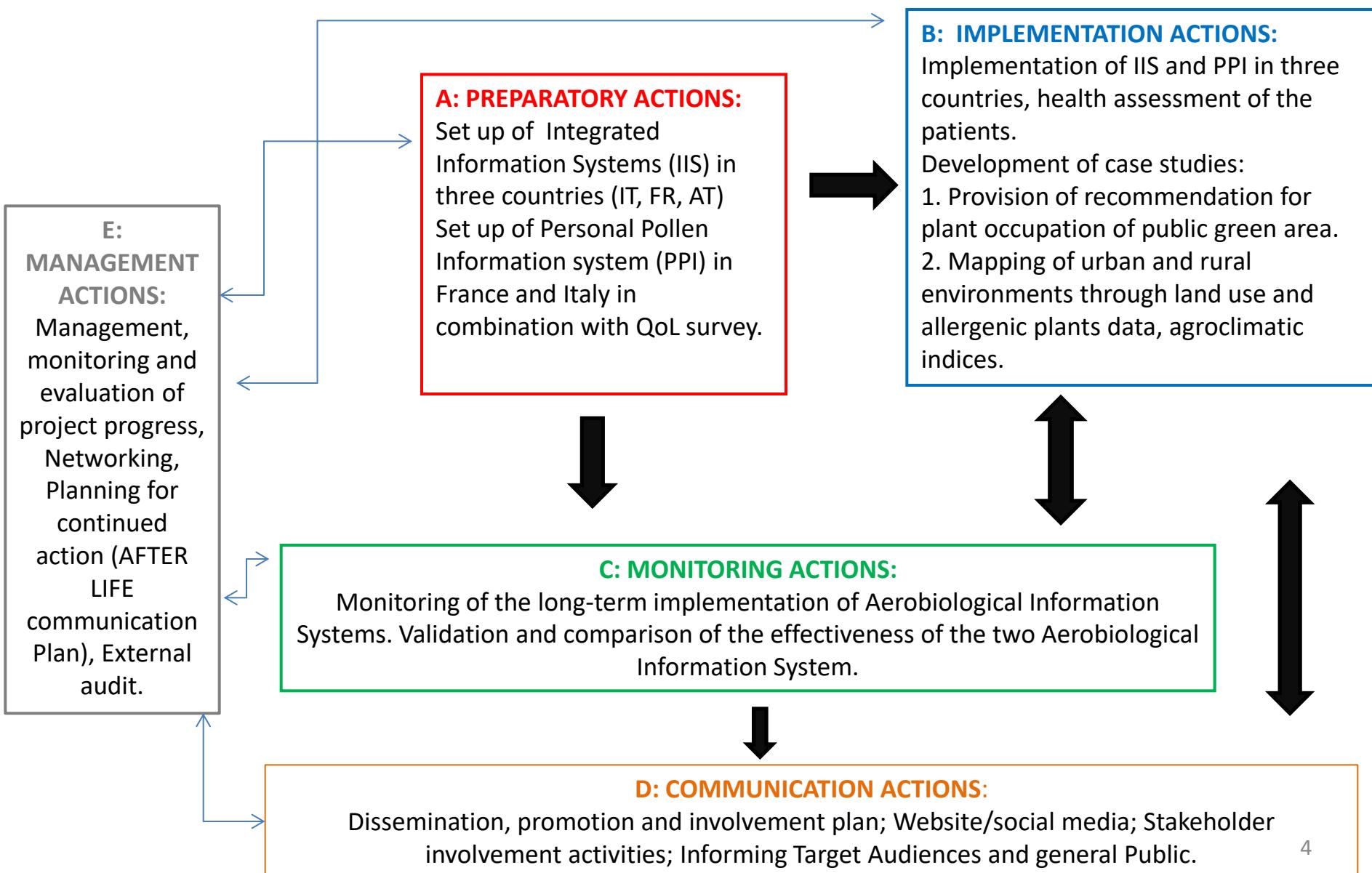


# AIS LIFE\_Map



# LIFE AIS project

Main objective: to develop the information base for policy on environment and health, in term of improved management of pollen-related allergic respiratory diseases



# RNSA actions A1: Objectives

## Action A1: Set up an Integrated Information System (IIS) in France, Italy, Austria

- **Objectives :** This action sets up the Integrated Information System (IIS) for improvement of allergic respiratory diseases management in general population samples. **The action provides the installation of pollen sampling and air pollutants monitoring system in Pisa, Vienna, Paris and Lyon.**
- **Expected results:** installation of system for monitoring chemical data and pollen and fungal spores. Description of the cycle of pollination and sporulation and the air pollutants concentration in atmosphere.

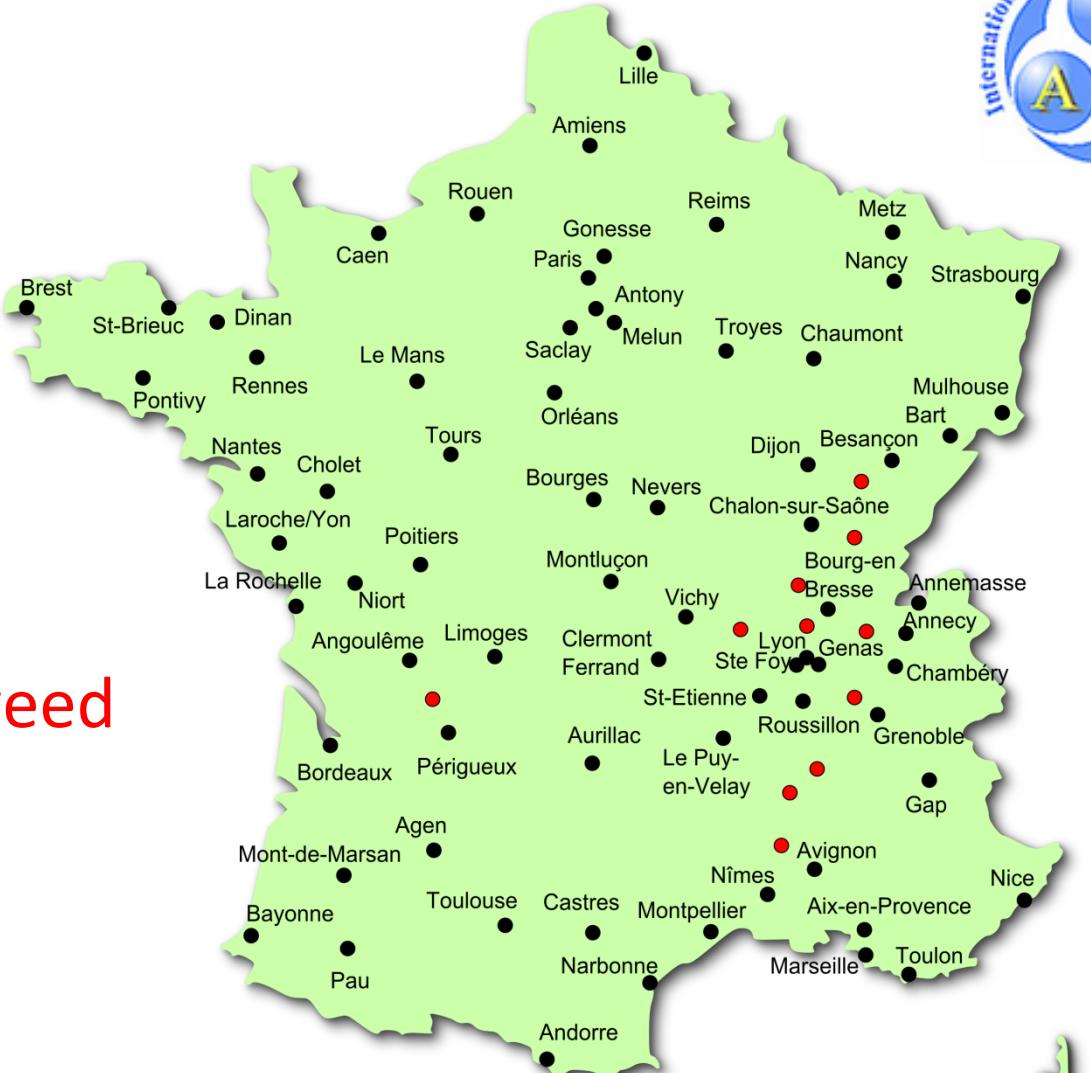


# Pollen stations in France in 2015

70 stations

+

11 during ragweed  
pollination



**RNSA is the French aerobiology network in charge of the analysis of the content of the air in biological particles, and to give some information about their health impact.**



# Information and prevention

**RNSA** Réseau National de Surveillance Aérobiologique

**Alertes Pollens Cliquez ici**

**Pour vous connecter à l'espace adhérents cliquez ici**

**Pour vous inscrire au bulletin d'alerte cliquez ici**

Le site français des allergies aux pollens

Accueil Le réseau Les bulletins Les risques MedAeroNet Les événements Nos partenaires Nous contacter

18 avril : Les données en temps réel sur notre site de Lyon nous permettent de prévoir un risque allergique

■ Bulletin Allergo Pollinique

Bulletin allergo-pollinique n°16 du 18 avril 2014 Valable jusqu'au 25 avril

Les pollens de Pâques !

Entre les œufs, les chocolats ou l'agneau Pascal, les pollens se bousculent pour profiter des Fêtes de Pâques.

Les pluies des prochains jours aideront à se débarrasser des derniers pollens de saule, charme, peuplier et frêne qui pourront encore localement provoquer un risque allergique faible.

Les quantités de pollens de platane oscillent au son des cloches, le risque allergique sera globalement moyen sur l'ensemble du territoire, mais pourra localement atteindre un niveau élevé, voire très élevé comme sur Castres.

Les pollens de bouleau se font doucement enrôlés de chocolat, le risque allergique est moyen sur une large moitié Nord de Nantes à Grenoble, très faible à faible de Lyon à La Roche sur Yon en passant par Castres et au milieu de cet enrôlage sur le Sud de l'Auvergne et une partie du Limousin se cache un cœur de pollens de bouleau où le risque est élevé à localement très élevé.

Les pollens de chêne participeront à toutes les chasses aux œufs avec un risque allergique globalement moyen à élevé sur le Centre, l'Ouest de la Bourgogne, une partie du Limousin et de l'Aquitaine au Languedoc-Roussillon.

Pour les herbagées, une alternance entre pluie et soleil, avec des températures de saison, sera propice à leur développement. Les parterraies distribueront des pollens au lieu de chocolat sur le pourtour méditerranéen avec un risque allergique pouvant atteindre un niveau moyen. Plantain et oseille se cachent entre les herbes et pourront provoquer un risque localement très faible. Les pollens de graminées eux seront de plus en plus présents, avec un risque allergique qui sera moyen de l'Aquitaine à la Vallée du Rhône jusqu'au Sud de Lyon en passant par Castres et Nîmes et très faible à faible entre les averses partout ailleurs.

Si les pluies prévues la semaine prochaine apporteront quelques répits aux allergiques, ceux-ci doivent rester vigilants et suivre leur traitement en prévision de chaque période ensoleillée.

Charlotte Sint

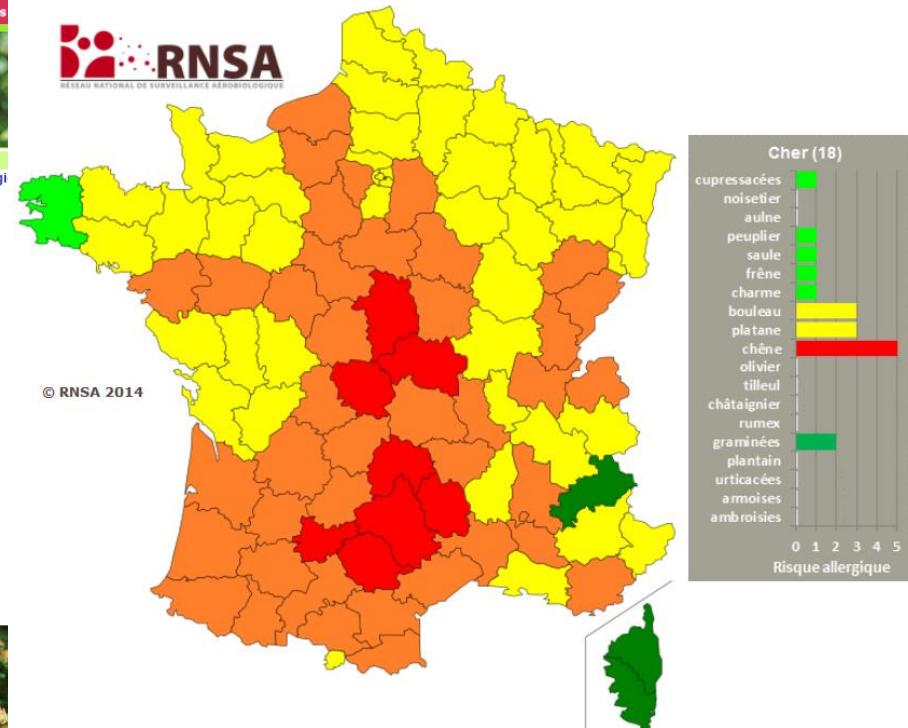
Michel THIBAUDON, Directeur du RNSA

Prévisions à 3 jours de la pollinisation des bouleaux sur la France

## Pollinic and mould bulletins

[www.vegetation-en-ville.org](http://www.vegetation-en-ville.org)

## RNSA activities



Vigilance map



# RNSA actions B4: Objectives

“Aerobiological Information Systems and allergic respiratory disease management”

## Case Study France: analysis of plant occupation of public green spaces

- General: to provide recommendations for plant occupation of public green areas.
- Specific:
  - 1) assess pollen counts (and allergen content) in public gardens
  - 2) on basis of the obtained results to formulate recommendations in order to protect allergic patients.

# RNSA actions B4. Summary

- **WHAT:** Pollen count and allergens
- **HOW:** Pollen traps for analysis of local pollen dispersion:
  - Sigma 2 passive pollen trap (change slide daily)
  - Hirst pollen trap at proximity (change drum once a week)
  - Slides are analysing by the RNSA (in partnership with LHVP).
- **WHERE:** Public gardens (classic/non allergic gardens) in Paris and Lyon
- **WHEN:** 2 campaigns 16 weeks = 32 weeks
  - Campaign 1: March 2015 to mid-June 2015
  - Campaign 2: March 2016 to mid-June 2016
- **LEADER:** INSERM, RNSA will be coordinators of the field survey in their Centers (Paris and Lyon), UPMC will support the activities of the action.
- **Expected results:** field assessment of pollen count during pollen season. Study of distribution of pollen in public green spaces according to season, meteorological parameter and air pollution. Recommendations on plant occupation of public green spaces.

# RNSA actions B4: Pictures of the Hirst pollen traps in Paris



Pollen trap Paris



## Paris Pasteur

The pollen trap is located on the roof of the Pasteur Institut in the 15th district.

*Long. 2°20 – Lat. 48°52 – Alt. 60 m –  
pollen trap brand : Lanzoni– number  
of people concerned : 2 500 000*

## Paris LHVP

The pollen trap is located on the roof of the LHVP (Laboratory of Hygiene of the city of Paris) in the 13th district.

*Long. 2°21 – Lat. 48°49 – Alt. 60 m –  
pollen trap brand : Lanzoni– number of  
people concerned : 2 500 000*

# RNSA actions B4: Pictures of the Hirst pollen traps in Lyon



Pollen trap Lyon



## Lyon HEH

The pollen trap is located on the roof of the Hospital Edouard Herriot (HEH) in the 3th district in Lyon.

*Long. 4°53 – Lat. 45°44 – Alt. 52 m •  
pollen trap brand: Lanzoni • number of  
people concerned: 1 000 000*

## Lyon Gerland

The pollen trap is located on the roof of the Biomnis and Inserm Institut in the 7<sup>th</sup> district Gerland).

*Long. 0°38 – Lat. 44°12 – Alt. 48 m •  
pollen trap brand : Lanzoni • number  
of people concerned : 1 000 000*

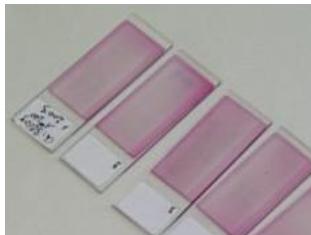
# RNSA actions B4.

## Material and Methods



- Sigma2-like traps (SLT): passive pollen trap
- SLT is composed on one hand of a transfer zone of air flow (high part) and on the other hand of a reception zone of particles by sedimentation (low part). Air flow goes through the trap in central zone, particles sediment and come on a coated slide disposed in the lower part of the trap
- The slides are changed every day
- Then the slides are send to the RNSA and analyzed with an optical microscope to obtain pollen counts (number of pollen grains by unit of time).

Analyzes  
in a lab



1 slide  
by day



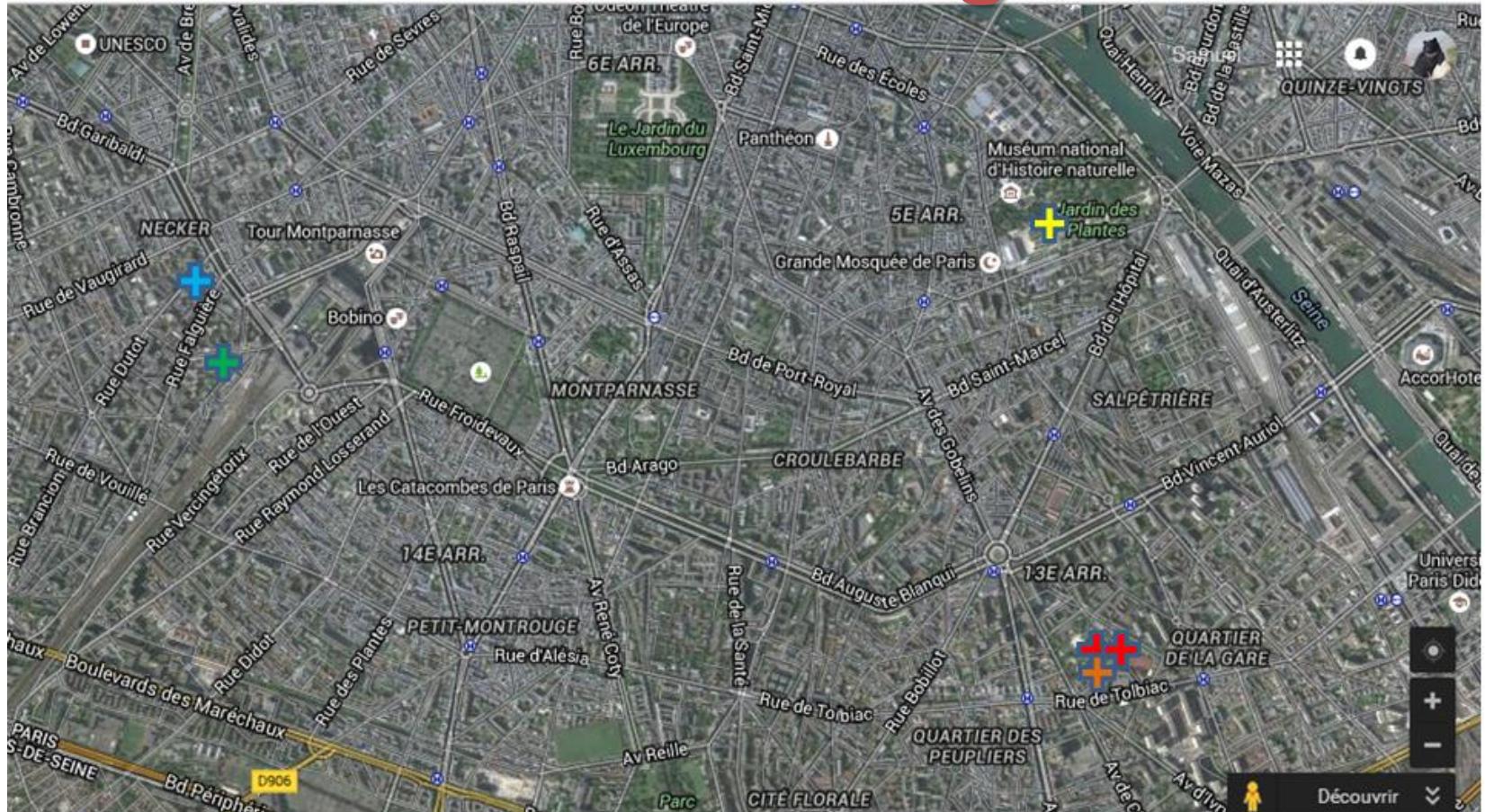
counting pollen  
through a speech  
recognition system  
with an optical  
microscope

# RNSA actions B4. Schedule

- January 2015 : meetings in Paris and Lyon to implement the project and meet the persons in charge of green gardens and staff of city hall.
- February 2015 : visit of the pollen traps location in each garden.
- March 2015 : set up of the pollen traps and training the staff in charge of the daily change of the slides. Beginning of the monitoring of the first measurement campaign in Lyon and Paris. Beginning of the analysis.
- June 2015 : end of the first campaign of measurement / Following analysis
- June 2015-March 2016 : Analysis and report
- March-June 2016 : Campaign monitoring N°2
- June 2016-March 2017 : analysis N°2 and report



# RNSA actions B4. Presentation of the gardens



- + SLT Choisy 1 et Choisy 2
- + SLT Jardin des plantes
- + SLT Dalpayrat
- + Hirst Paris Pasteur
- + Hirst Paris LHVP

Paris

# RNSA actions B4. Presentation of the gardens

- Park de Choisy : It's a public garden of 43 000m<sup>2</sup> which was created in 1937.

Address : Avenue de Choisy 75013 Paris France.



2 SLT pollen traps have been installed and the slides are changed every day by trained staff from LHVP (Laboratoire d'Hygiène de la Ville de Paris) who work next to the park.<sup>15</sup>

# RNSA actions B4. Presentation of the gardens

- Park Pierre Adrien Dalpayrat : It's a public garden of 9898 m<sup>2</sup> which was created in 1985.  
**Address : 2 Rue André Gide, 75015 Paris France.**



**1 SLT pollen trap has been installed and the slides are changed every day by trained staff from city hall of Paris ("service exploitation des jardins") who work in the park.**

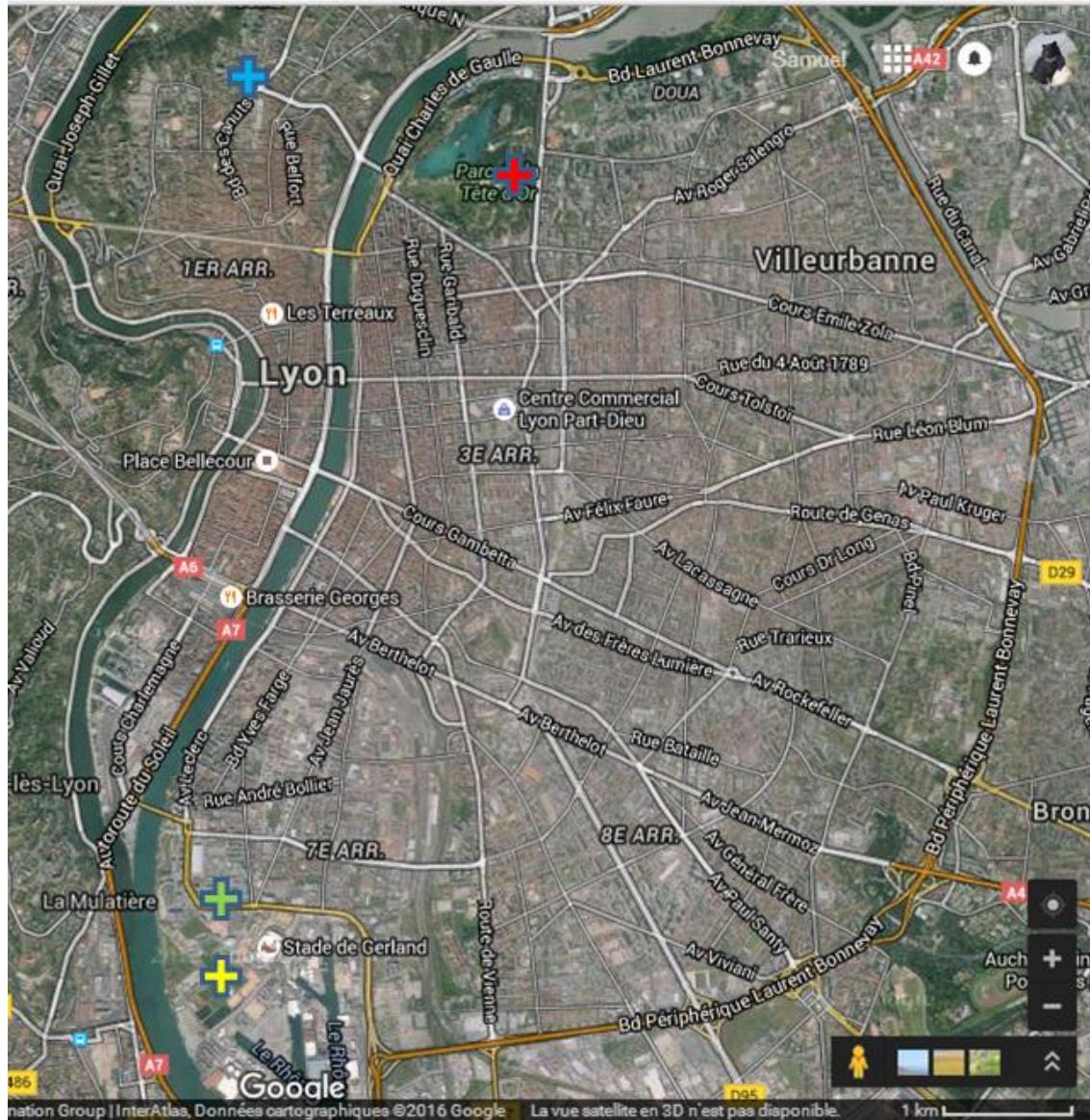
# RNSA actions B4. Presentation of the gardens

- Park Jardin des Plantes du Museum d'Histoire Naturelle: It's a big public garden of 24 hectares open to the public for over 400 years with a wide variety of species.  
**Address : 57 Rue Cuvier, 75005 Paris France**



**1 SLT pollen trap has been installed and the slides are changed every day by trained staff from the natural history museum (MNHN) who works in the garden.**

# RNSA actions B4. Presentation of the gardens



- + SLT Tête d'Or
- + SLT Croix Rousse
- + SLT Gerland
- + Hirst Lyon Gerland

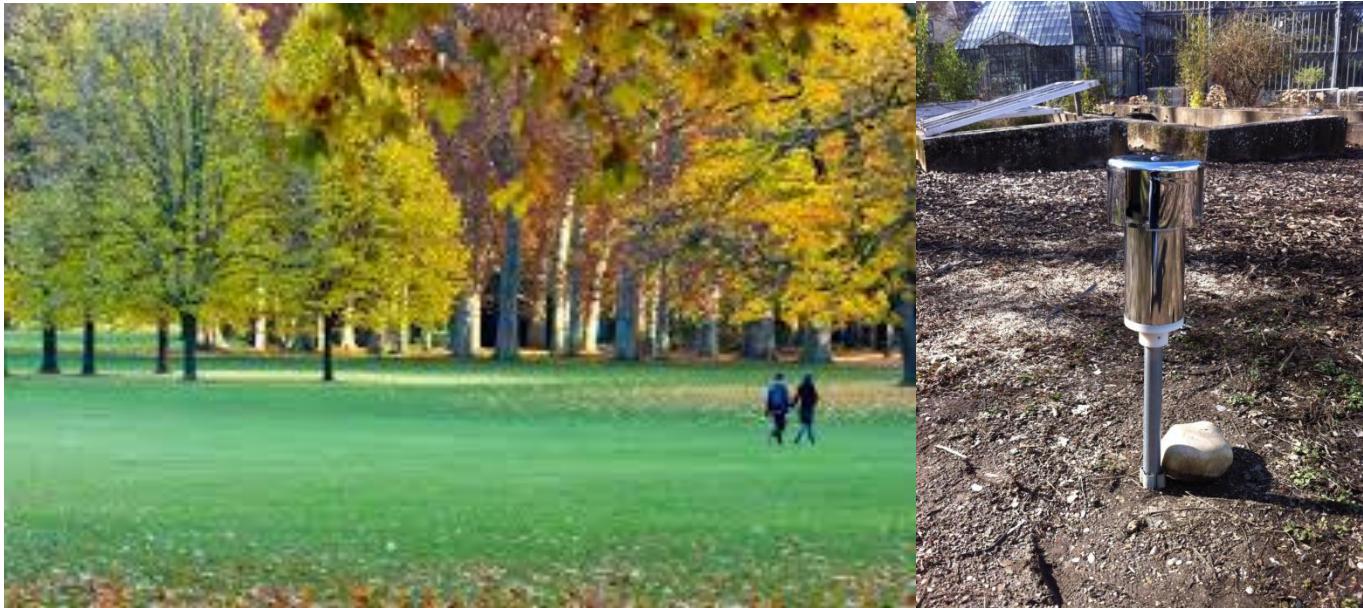
Lyon

# RNSA actions B4.

## Presentation of the gardens

### ➤ Park de la Tête d'Or :

The “Park de la Tête d’Or” is one of the bigger public park in France.  
It was designed on the model of the English garden and was created in 1857.  
**Address : Boulevard de Stalingrad 69006 Lyon France**



**1 SLT pollen trap has been installed and the slides are changed every day by trained student staff from Lyon.**

# RNSA actions B4. Presentation of the gardens

- **Park de Gerland:** It's the second bigger park in Lyon; it occupies an area of 18 hectares and was created recently in 2000.

Address : Avenue Jean Jaures 69007 Lyon



1 SLT pollen trap has been installed and the slides are changed every day by trained staff from “jardin des fleurs” of the park de Gerland in Lyon.

# RNSA actions B4. Presentation of the gardens

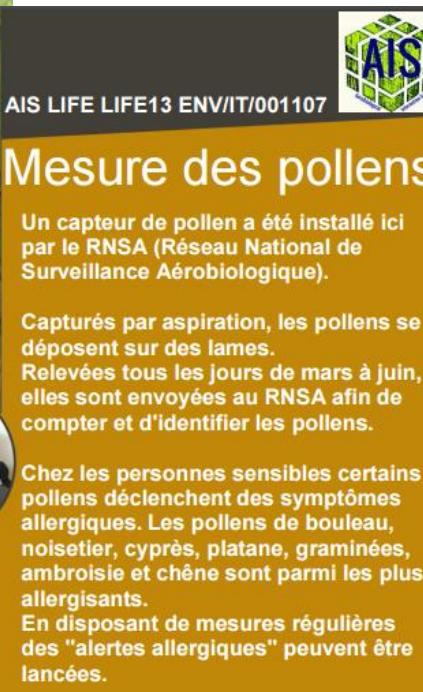
- **Park de l'Hôpital de la Croix Rousse:** It's a park of 4.5 ha Located in the 4th arrondissement of Lyon next to the Croix-Rousse hospital. It was designed by René-Edouard André in 1913 and includes about 1200 trees.  
**Address : 103 Grande Rue de la Croix-Rousse 69004 Lyon France**



**1 SLT pollen trap has been installed and the slides are changed every day by trained student staff from Lyon.**

# RNSA actions B4.

## Large public communication to present the action in each gardens



# RNSA actions B4.

## Large public communication to present the action in each gardens



# RNSA actions B4.

## Congress - communication to present the results of the case study and the AIS Life project



From 18 to 22 July - Lyon, France



6<sup>th</sup> European Symposium on Aerobiology  
of the European Aerobiology Society



<http://www.alphavisa.com/esa/2016>

 RNSA  Université Lumière Lyon 2 

ESA Lyon congress  
19 July 2016  
Oral presentation

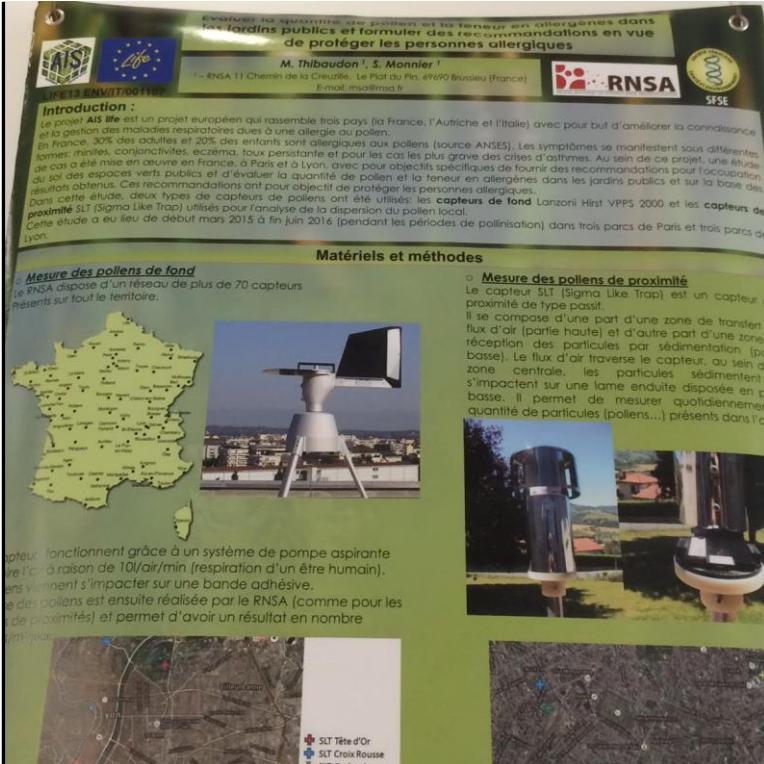


## PROGRAMME

XXI<sup>eme</sup> JOURNEES D'ÉTUDES SCIENTIFIQUES DU RNSA  
17 & 18 novembre 2016



JES RNSA congress Strasbourg  
17 November 2016  
Oral presentation



**Essayer à nouveau de protéger et la teneur en allergènes dans les jardins publics et formuler des recommandations en vue de protéger les personnes allergiques**

M. Thibaudon\*, S. Monnier  
— RNSA 11 Chemin de la Creuzille, Le Plat du Pin, 49690 Brusieu (France)  
E-mail: mstibaudon@orange.fr

**RNSA** SFSE

**Introduction :**  
Le projet AIS LIFE est un projet européen qui rassemble trois pays (la France, l'Autriche et l'Italie) avec pour but d'améliorer la connaissance et la gestion des maladies respiratoires chroniques et à récidive au niveau des pollens. En France, 30% des adultes et 20% des enfants sont allergiques aux pollens (source ANSES). Les symptômes se manifestent sous différentes formes: rhinites, conjonctivites, eczéma, toux persistante et pour les cas les plus grave des crises d'asthme. Au sein de ce projet, une étude de cas a été menée en cours en France, à Paris et à Lyon, avec pour objectifs spécifiques de fournir des recommandations pour l'occupation du sol des espaces verts et de déterminer la qualité de l'air et la teneur en allergènes dans les jardins publics et sur la base des résultats obtenus. Ces recommandations ont pour objectif de protéger les personnes allergiques.

Dans cette étude, deux types de capteurs de pollens ont été utilisés: les **capteurs de fond** Lanzoni Hirst VPPS 2000 et les **capteurs de proximité** SLT (Sigma Like Trap) utilisés pour l'analyse de la dispersion du pollen local.

Cette étude a eu lieu de début mars 2015 à fin juin 2016 (pendant les périodes de pollinisation), dans trois parcs de Paris et trois parcs de Lyon.

**Matériels et méthodes**

**Mesure des pollens de fond**  
Le RNSA dispose d'un réseau de plus de 70 capteurs présents sur tout le territoire.

Le capteur fonctionne grâce à un système de pompe aspirante qui l'aspirer l'air à raison de 10/l'air/min (respiration d'un être humain). Les pollens s'impactent sur une bande adhésive. La mesure des pollens est ensuite réalisée par le RNSA (comme pour les mesures de proximité) et permet d'avoir un résultat en nombre/g/m²/jour.

**Mesure des pollens de proximité**  
Le capteur SLT (Sigma Like Trap) est un capteur de proximité de type passif.  
Il se compose d'une partie d'une zone de transfert de flux d'air (partie haute) et d'autre part d'une zone de réception des particules par sédimentation (partie basse). Le flux d'air traverse le capteur, au sein de la zone centrale, les particules sédimentent et s'impactent sur une lame enduite disposée en partie basse, il permet de mesurer quotidiennement la quantité de particules (pollens...) présents dans l'air.

SFSE congress Strasbourg  
29 November 2016  
Poster

# Allergy potency

- Pollen allergy depends on several parameters such as the amount of pollen in the air, the sensitivity of people and the allergy potency of the pollen of each plant species
- **The pollen allergy potency of a plant species is the ability of its pollen to cause an allergy to a significant part of the population**
- **The pollen allergy potency can be:**
- **Low or negligible:** No problem to plant them in urban garden
- **Moderate:** Only a few species can be planted in the same garden
- **High:** This species cannot be planted in urban places
- Species or genus with a strong AP **in red** should be labeled as "**Not to be planted in habitation or residence area**", those with moderate AP **in yellow** should be labeled as "**Not to be planted in big quantities in habitation or residence area**". Other species with low or negligible AP **in green** may not be affected by public information.



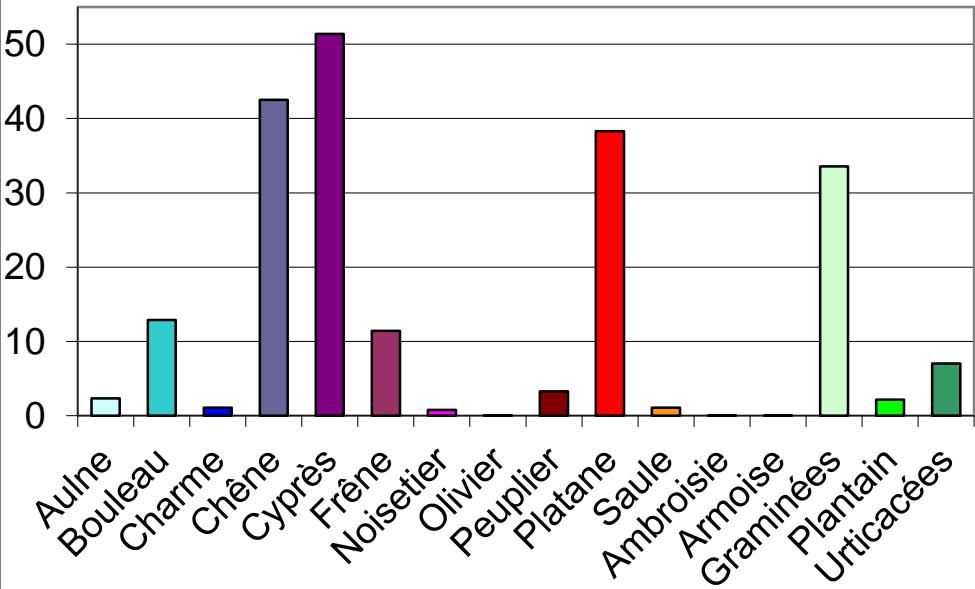
# Results of the first measurement campaign in Paris and in Lyon



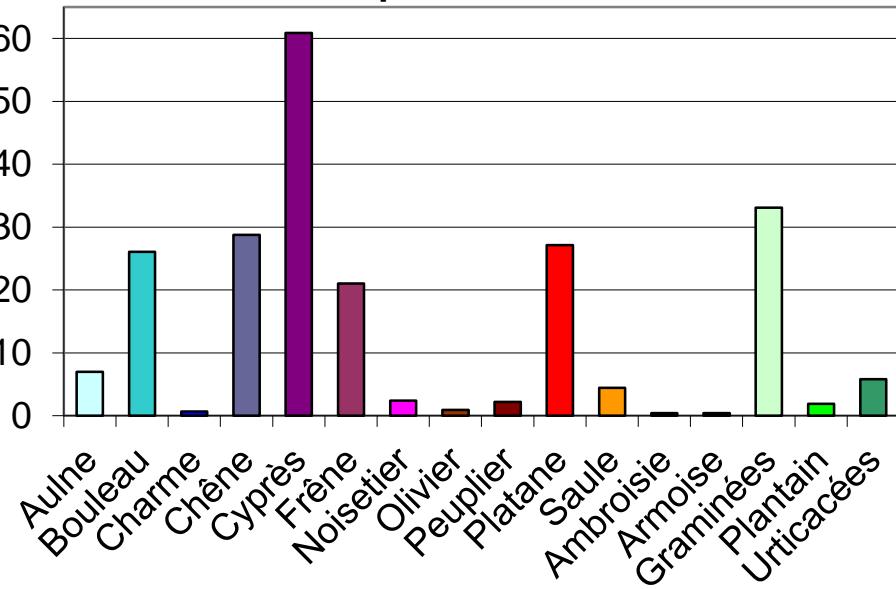
# Results Paris : Number of pollen grains for each alergenic taxa : March-June 2015

Capteurs Taxons \ Capteurs	HIRST Pasteur	HIRST LHVP	SLT CHOISY 1	SLT CHOISY 2	SLT Jardin des Plantes	SLT Jardin Dalpayrat
Bouleau	3607	3606	2537	1913	2860	2415
Charme	273	238	310	233	237	63
Cyprès	6442	5749	14371	9700	5453	5660
Chêne	1666	1461	1249	1284	9453	2664
Frêne	2729	2285	2312	1591	2536	1950
Peuplier	567	1067	890	508	728	202
Platane	3470	4231	2864	2679	8515	2513
Saule	386	368	350	218	244	409
Graminée	2501	3799	2323	7460	3065	2370
Urticacée	2840	2552	994	1096	1560	617
Total	<b>25221</b>	<b>26079</b>	<b>29342</b>	<b>27791</b>	<b>35312</b>	<b>19733</b>

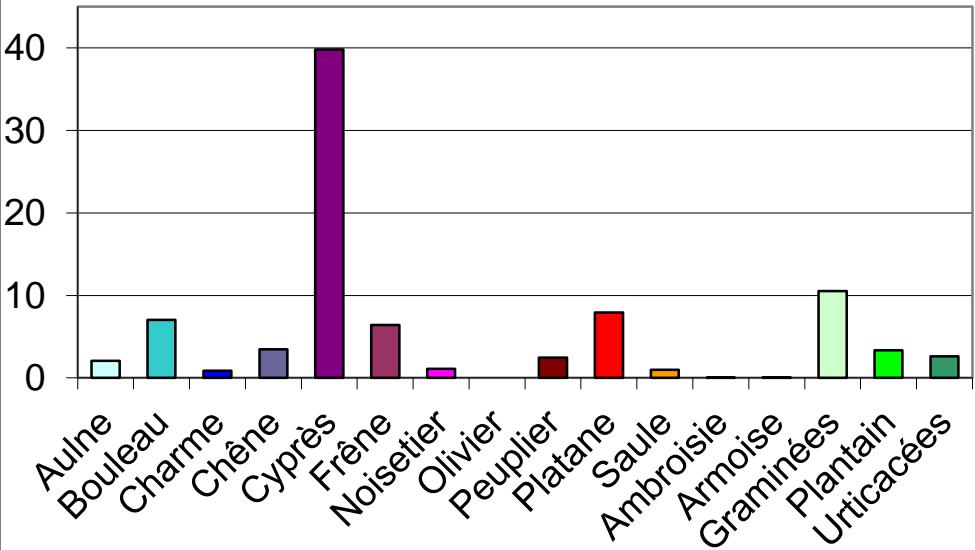
**Paris SLT Jardin des plantes - Percentage of each taxa compared to the total taxa**



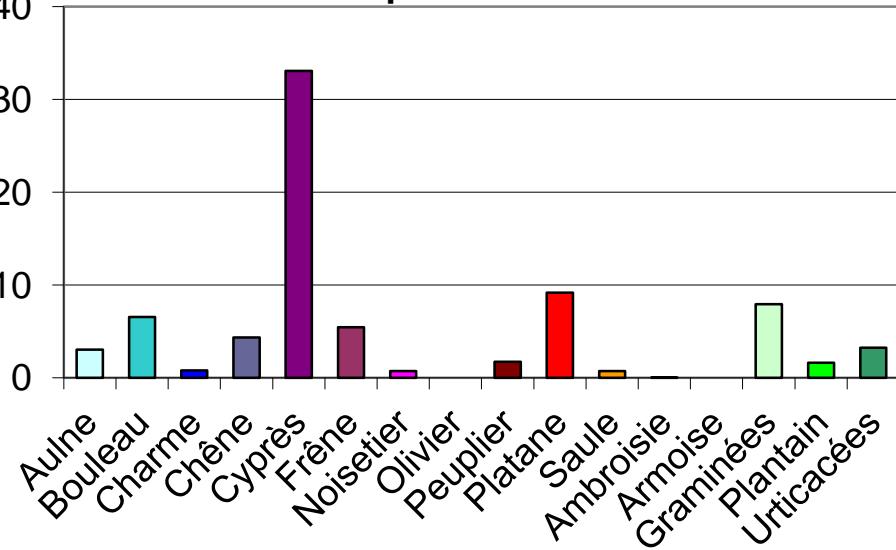
**Paris SLT Dalpayrat - Percentage of each taxa compared to the total taxa**



**Paris SLT Choisy 1 - Percentage of each taxa compared to the total taxa**



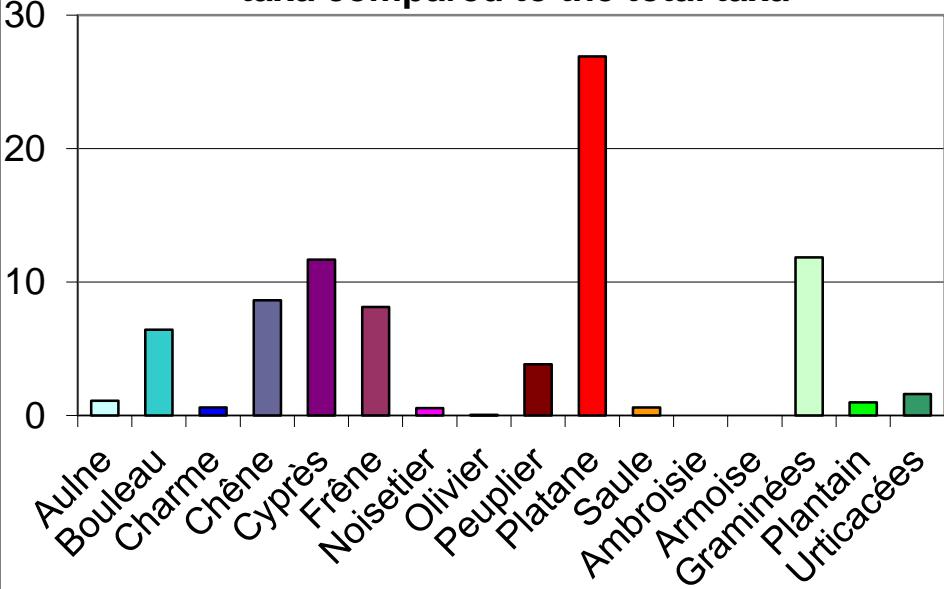
**Paris SLT Choisy 2 - Percentage of each taxa compared to the total taxa**



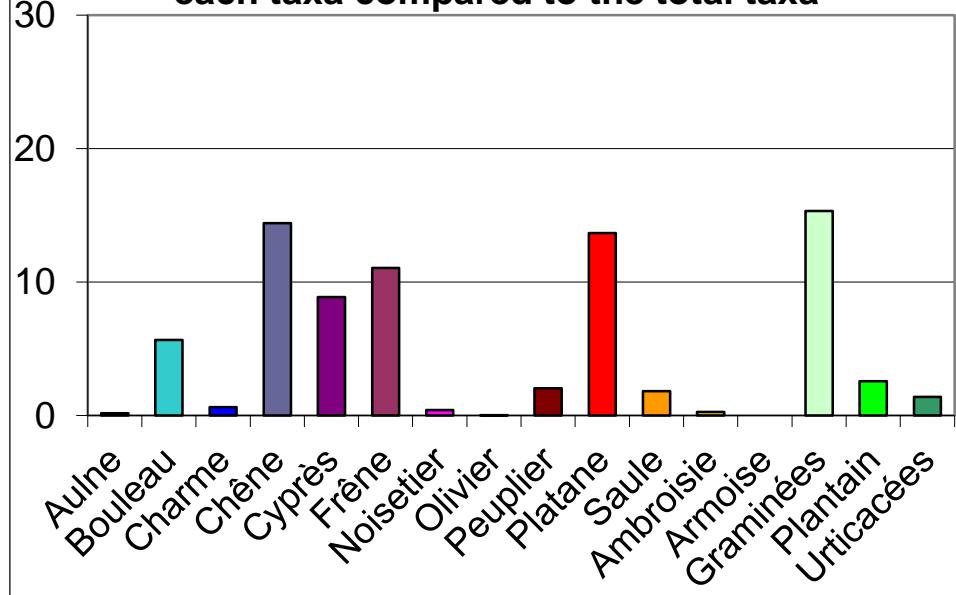
# Results Lyon : Number of pollen grains for each alergenic taxa : March-June 2015

Capteurs Taxons	HIRST Gerland	SLT Gerland	SLT Croix-Rousse	SLT Tête d'Or
Bouleau	1171	2731	2544	1829
Charme	191	329	302	515
Cyprès	6904	6239	4296	14748
Chêne	5875	4618	6964	6338
Frêne	4990	4352	5344	4749
Peuplier	1400	2050	991	1420
Platane	6886	14383	6607	20090
Saule	265	326	879	288
Graminée	5849	6224	7401	5037
Urticacée	1592	865	678	678
Total	<b>35123</b>	<b>42117</b>	<b>36006</b>	<b>55692</b>

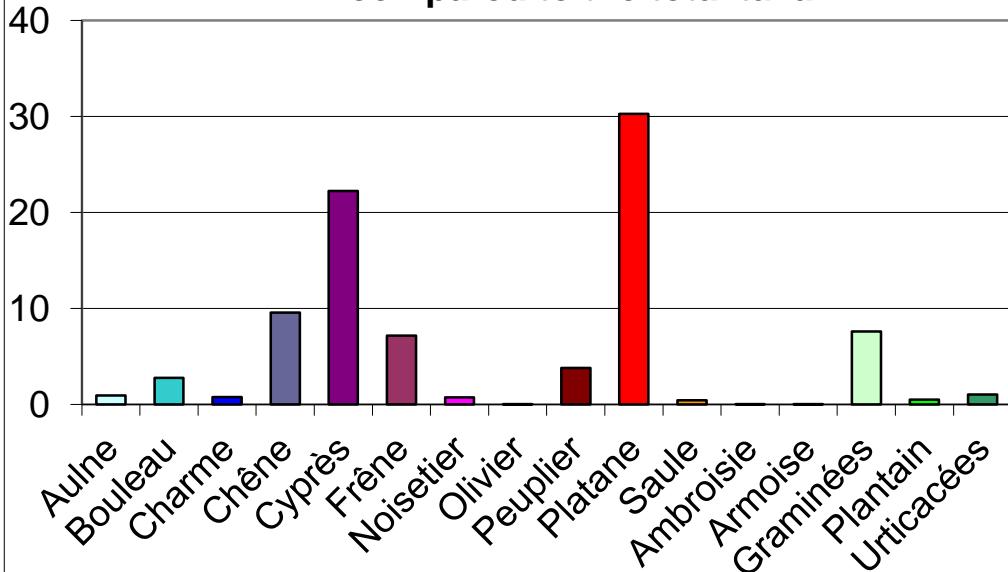
**Lyon SLT Gerland - Percentage of each taxa compared to the total taxa**



**Lyon SLT Croix Rousse - Percentage of each taxa compared to the total taxa**

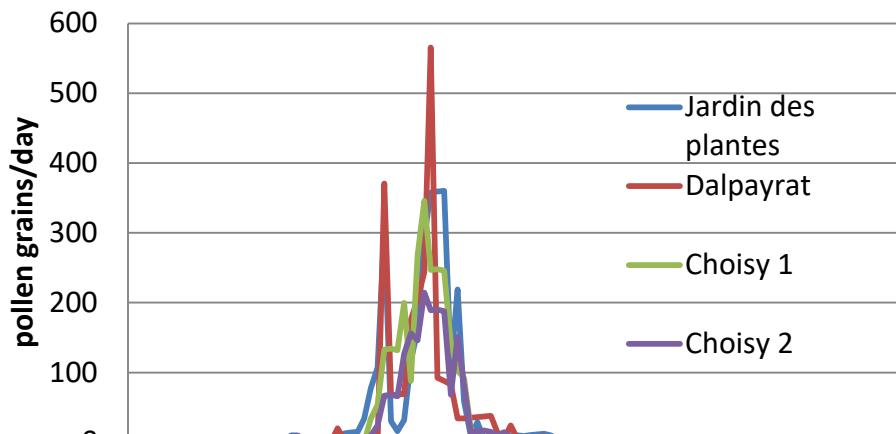


**Lyon SLT Tête d'or - Percentage of each taxa compared to the total taxa**

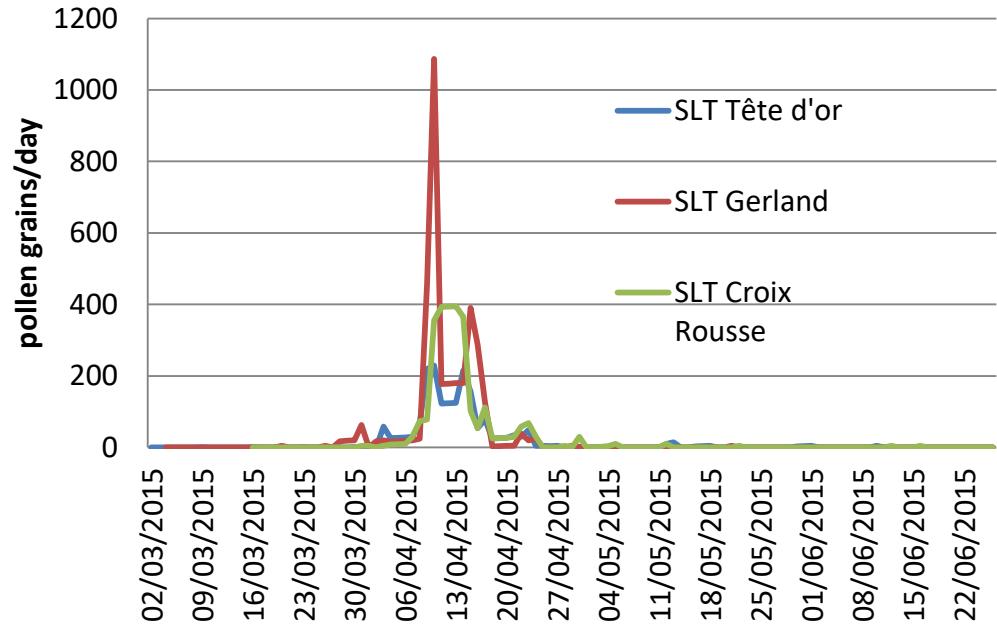


# Betula (birch) in Paris and in Lyon

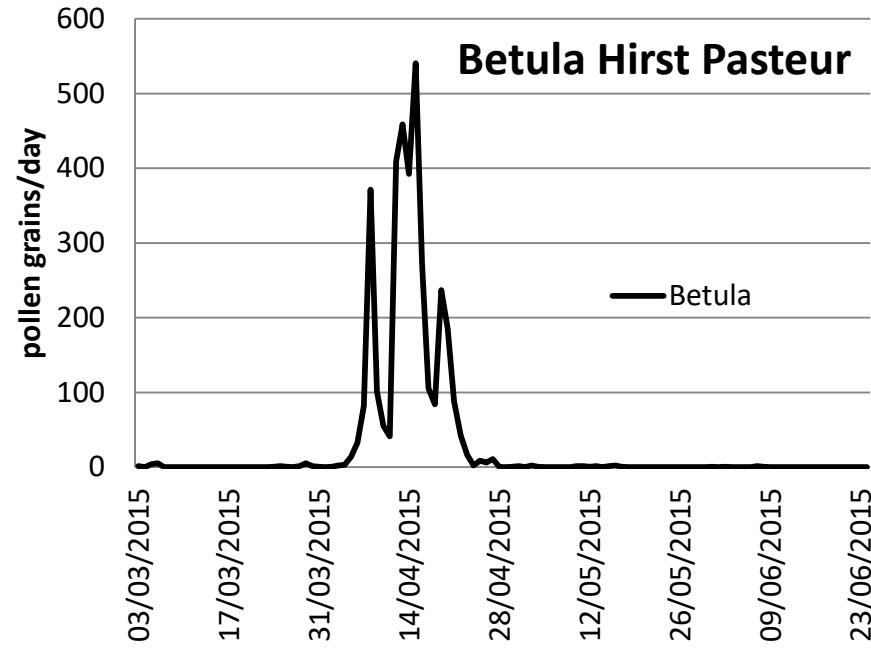
## Betula SLT Paris



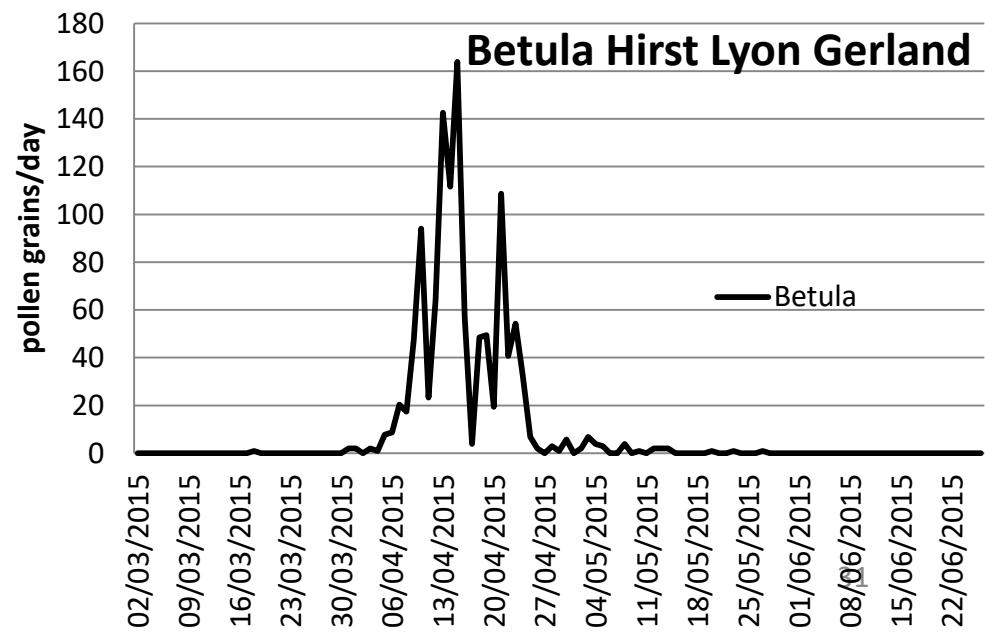
## Betula SLT Lyon



## Betula Hirst Pasteur

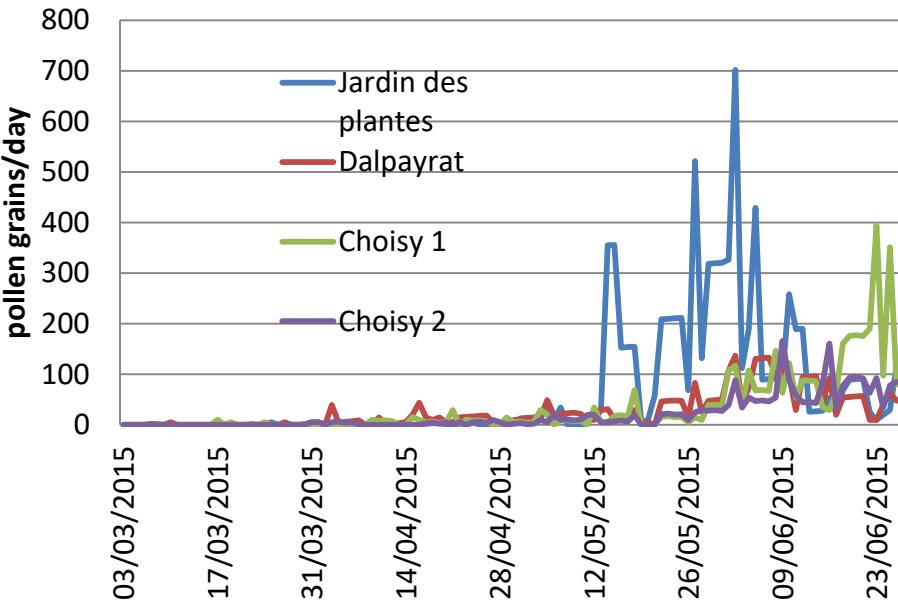


## Betula Hirst Lyon Gerland

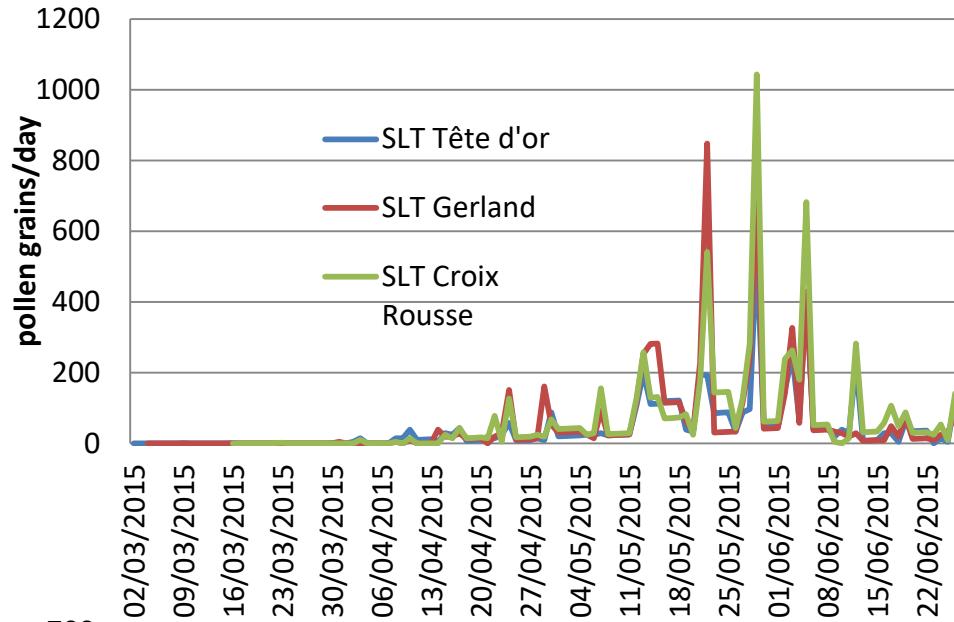


# Poaceae (grasses) in Paris and in Lyon

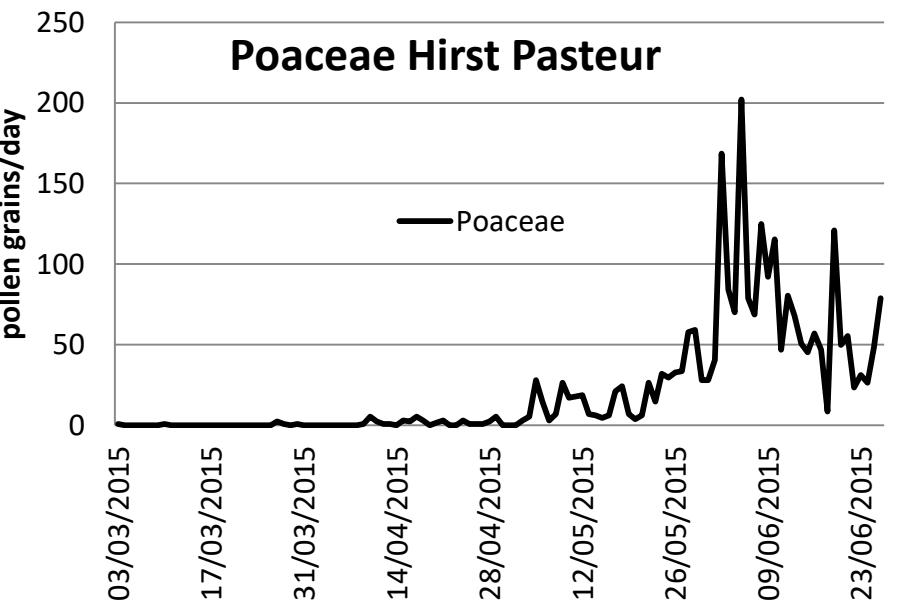
## Poaceae SLT Paris



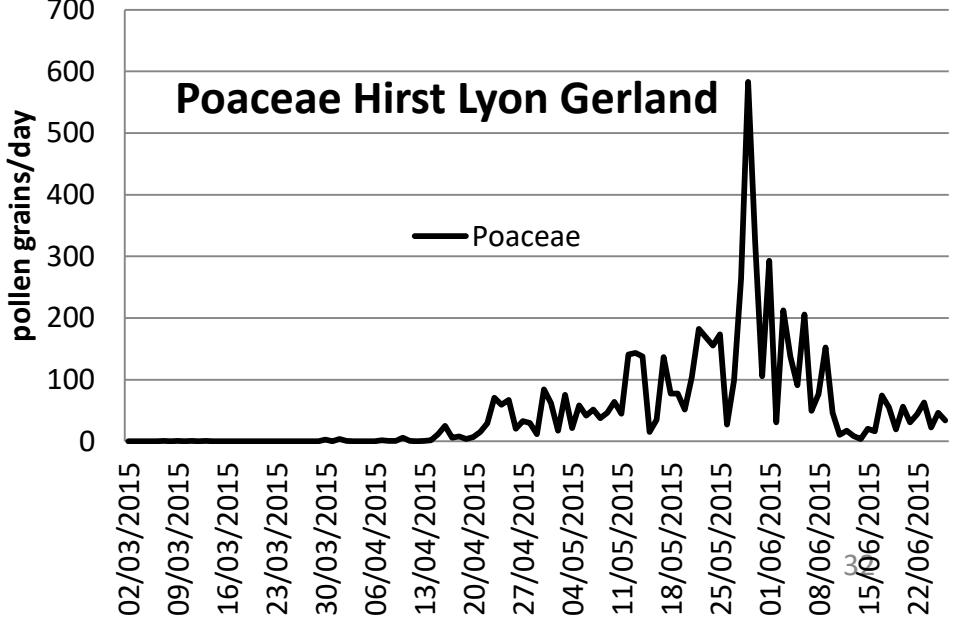
## Poaceae SLT Lyon



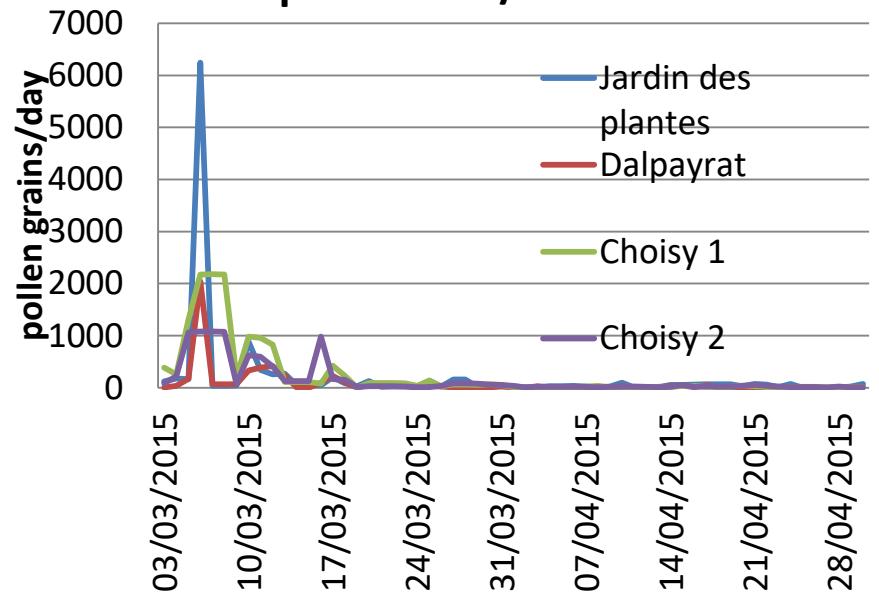
## Poaceae Hirst Pasteur



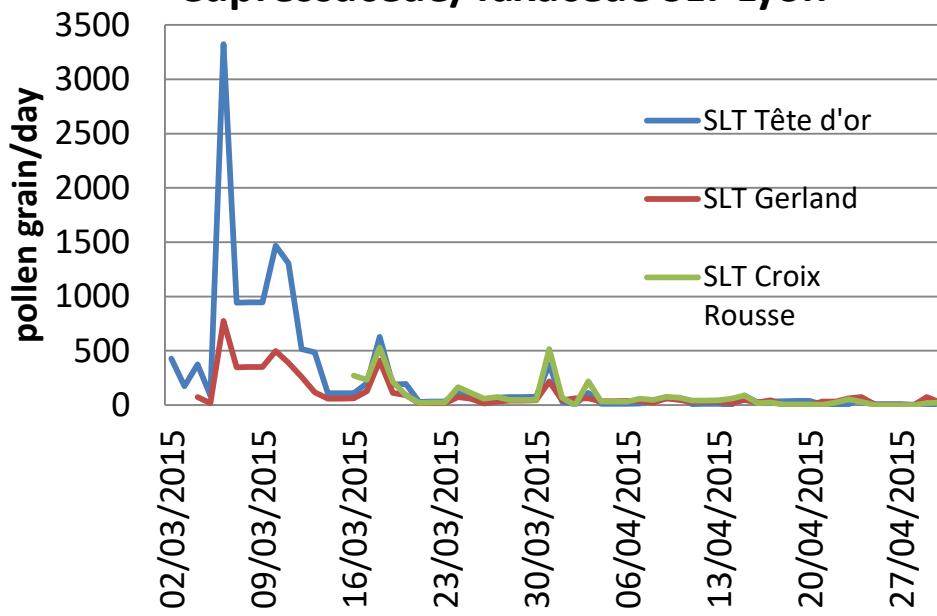
## Poaceae Hirst Lyon Gerland



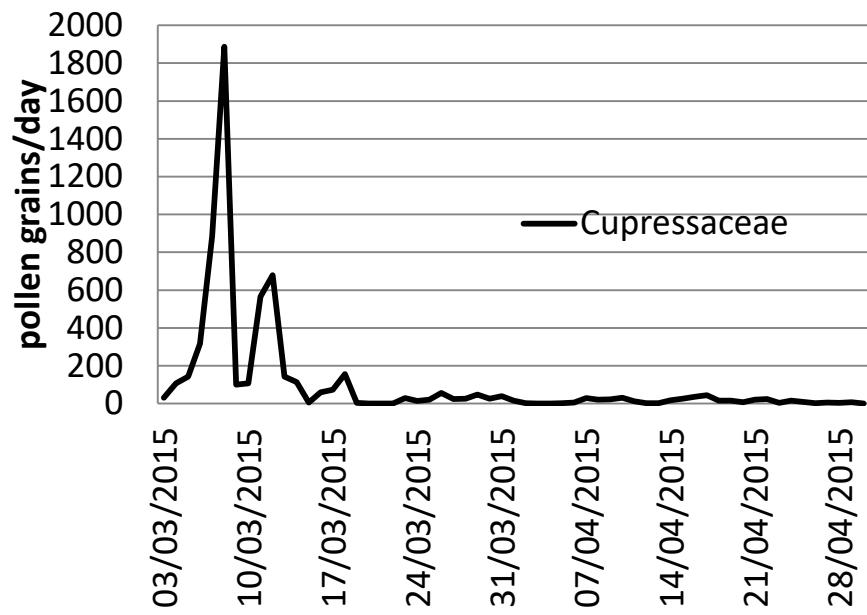
### Cupressaceae/Taxaceae SLT Paris



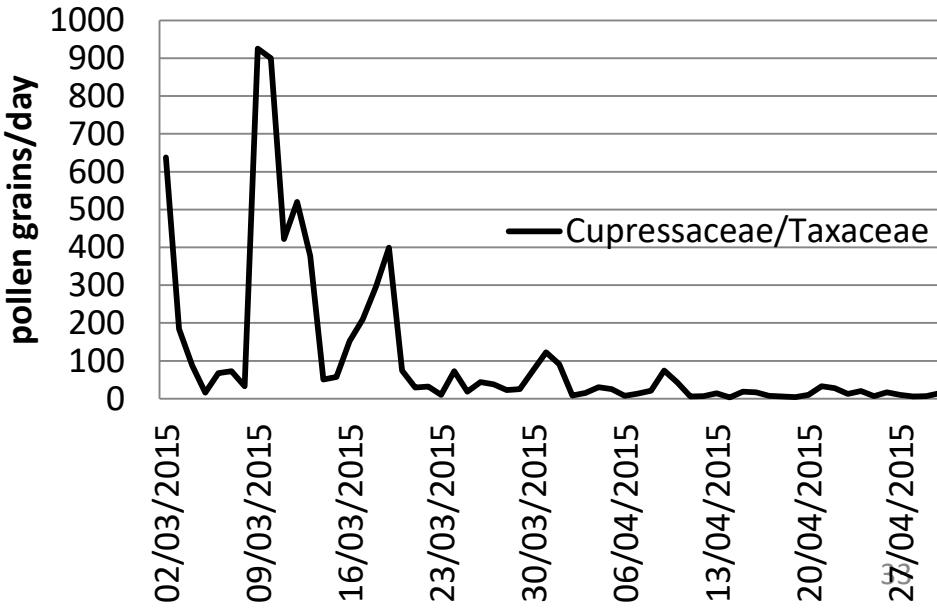
### Cupressaceae/Taxaceae SLT Lyon



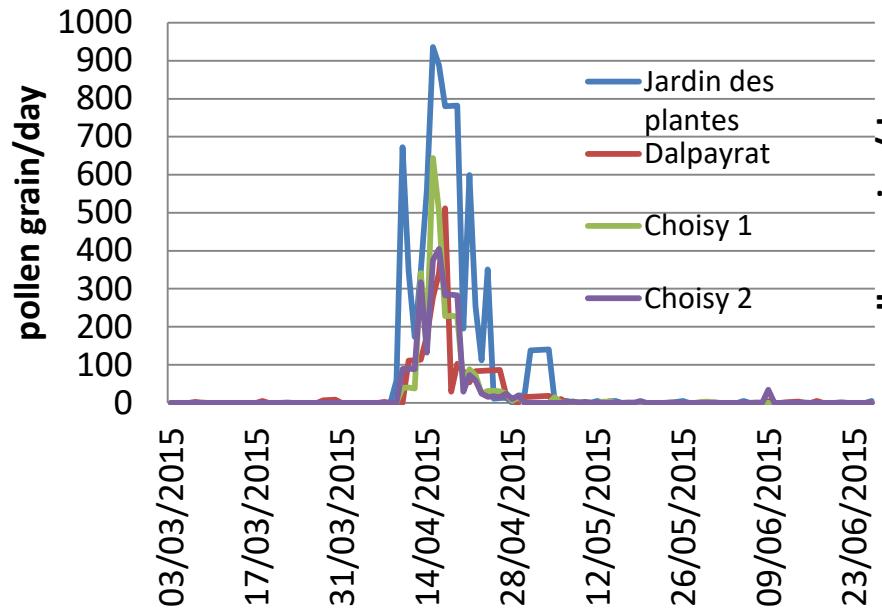
### Cupressaceae/Taxaceae Hirst Pasteur



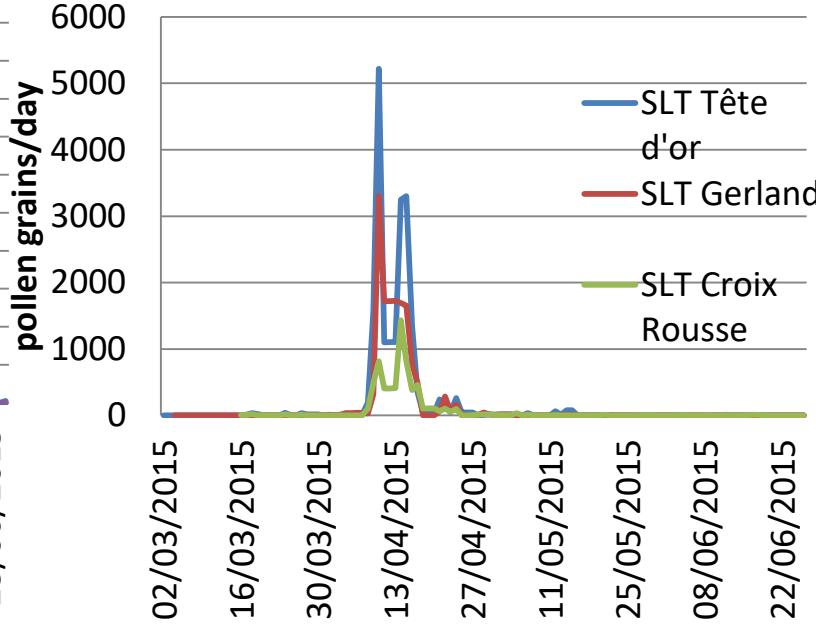
### Cupressaceae/Taxaceae Hirst Lyon Gerland



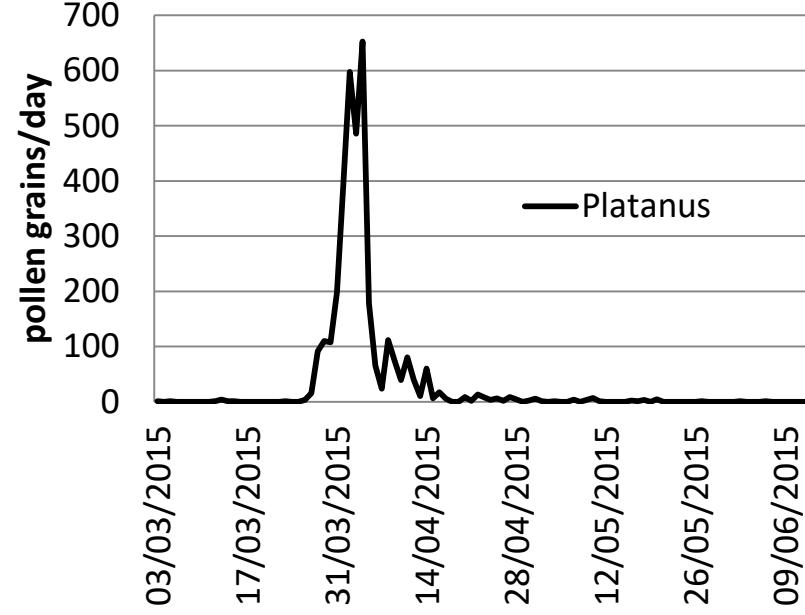
### Platanus SLT Paris



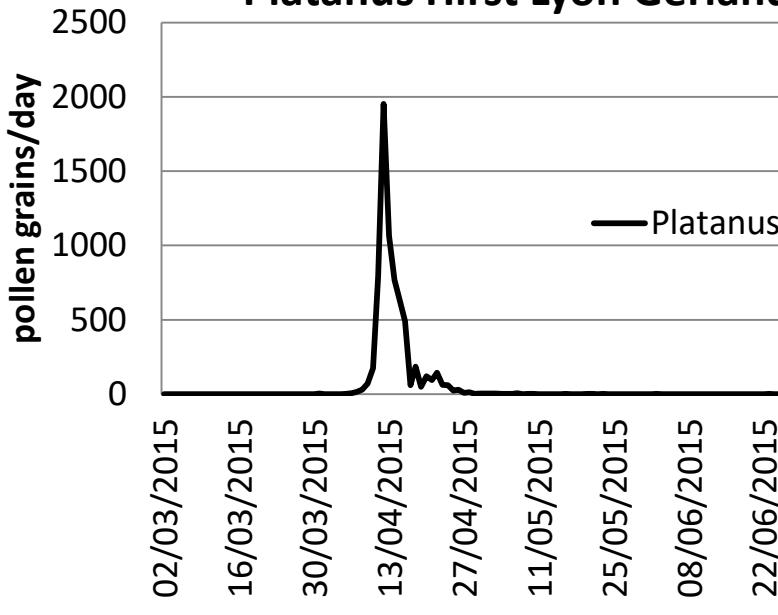
### Platanus SLT Lyon



### Platanus Hirst Paris Pasteur



### Platanus Hirst Lyon Gerland



# Conclusion 1/2

- The different results show that according to their locations, SLT pollen trap provide substantially similar results, despite some little differences for some taxa from one garden to another depending on the species locally present.
- Some pollens are less represented on proximity pollens traps: Urticaceae ... may be related to their size or to the fact that there is no nearby vegetation.
- Some taxa highlighted on the proximity pollens traps seem to be related to the surrounding vegetation (ex : Cupressaceae, Plantaginaceae, Platanus, Grasses ...)
- The pollen seasons are the same on the Hirst and SLT pollens traps with often peaks at the same time.
- There are many allergenic species in the parks of the cities of Lyon and Paris like birch, cypress, plane tree ...). We need to take in consideration the health impact in the choice of vegetal species to implant in green areas and avoid to plant allergenic species.

# Conclusion 2/2

① [www.vegetation-en-ville.org/que-faire/le-potentiel-allergisant/](http://www.vegetation-en-ville.org/que-faire/le-potentiel-allergisant/)

- With these results, a guide has been done with advices for species to avoid and species to plant in the green areas and parks in France available on the website: <http://www.vegetation-en-ville.org/que-faire/le-potentiel-allergisant/>
- The statistics of the results must be developed with meteorological and air pollution data in order to have a better representation of the results and take several parameters into consideration.
- The results of the second measurement campaign will be compare with the first campaign to confirm these recommendations.

Cryptomeria du Japon	Familles	Pot. Allerg.
Tilleuls*	Tiliacées	Modéré
Ormes*	Ulmacées	Faible/Négligeable

\*plusieurs espèces

\*\* le pollen de platane est faiblement allergisant. Par contre, les micro-aiguilles contenus dans les bourres provenant de la dégradation des capitules femelles de l'année précédente sont très irritantes.

Herbacées spontanées		
Espèces	Familles	Potentiel allergisant
Chénopodes*	Chénopodiacées	Modéré
Soude brûlée (Salsola kali)		Modéré
Ambroisies*	Composées	Fort
Armoises*		Fort
Marguerites*		Faible/Négligeable
Pissenlits*		Faible/Négligeable
Mercuriales*	Euphorbiacées	Modéré
Plantains*	Plantaginacées	Modéré
Graminées	Poacées	Fort
Oseilles* (Rumex)	Polygonacées	Modéré
Orties*	Urticacées	Faible/Négligeable
Pariétaires		Fort

\*plusieurs espèces

Graminées Ornamentales		
Espèces	Familles	Potentiel allergisant
Baldingère	Poacées	Fort
Calamagrostis		Modéré
Canche sésitive		Fort
Elyme des sables		Modéré
Fétuques*		Fort
Fromental élevé		Fort
Queue de lièvre		Modéré
Stipe géante		Modéré

\*nombreuses espèces



# A big thanks to

- Jean Claude Bertrand and the staff of the green spaces in Paris
- Eric Joly, Philippe Barré, Xavier Riffer, Sylvie Rebuffat and the staff of the MNHN in Paris
- Georges Salines and Marc Bret from the city hall of Paris
- Isabella Annesi-Maesano from Inserm Paris
- Valérie Bex, Vincent Doucet, Sophie Barral...and the staff of the LHVP in Paris
- Franck Granette and the staff of the « maison des fleurs » de Gerland
- Jean-Claude Teoli the director of the Croix-Rousse hospital in Lyon
- Sophie Pamies Directrice de l'Ecologie Urbaine à Lyon
- Dominique Deruaz, Daniel Boulens, Fabienne Chevalier, Frédérique Pautz, Dominique Peyrard...of the city hall of Lyon
- Audrey Tissot for changing the slides every day of the SLT Parc Tête d'Or and Croix Rousse.
- The staff of the RNSA for reading the slides of each SLT



Thank you for your  
attention !

