



International Conference on
ATMOSPHERIC DUST
Castellaneta Marina (TA), Italy - June 1-6, 2014

The pollen as a biological pollutant?

Gilles Oliver – Michel Thibaudon



Contents

- « Pollution »
- Airborne particles and allergy
- Allergy potency and allergy risk
- Metrology
- Health impact
- Pollen and clinical index

« Pollution »

If chemical particles that cause air pollution are subject to measures limiting their sources, it cannot be the case of biological particles such as pollens or moulds from vegetation



Pollens = Biological pollutant?

In quantitative and qualitative terms, most of the pollens and moulds inhaled by the population come from natural plant species. But, downtown, in public park and garden, the air content in pollens is modified by surrounding plant species, planted by man.



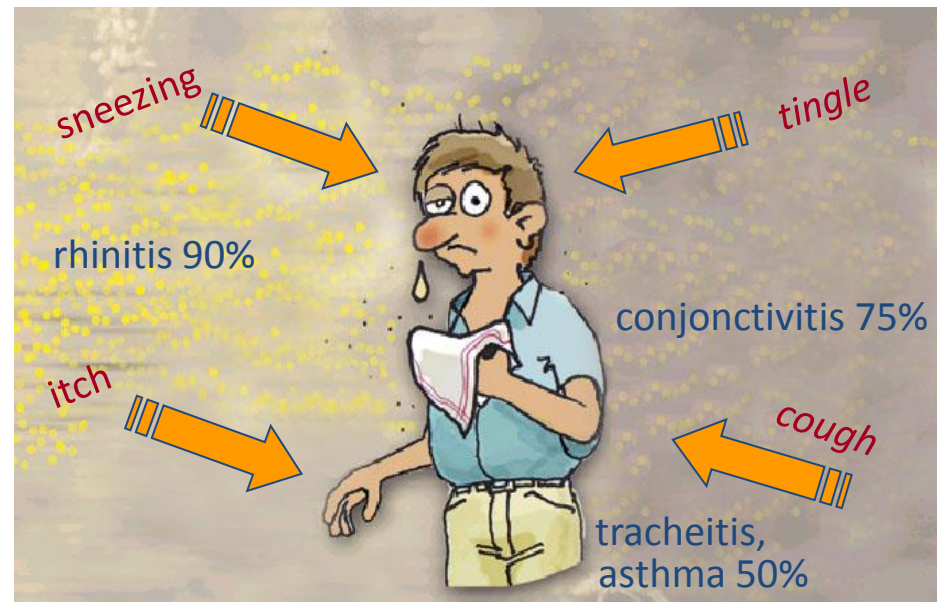
Airborne particles and allergy

Some of these pollens have a high allergy potency and have a real health impact. But can we consider some of them as pollutants ?

Exposure

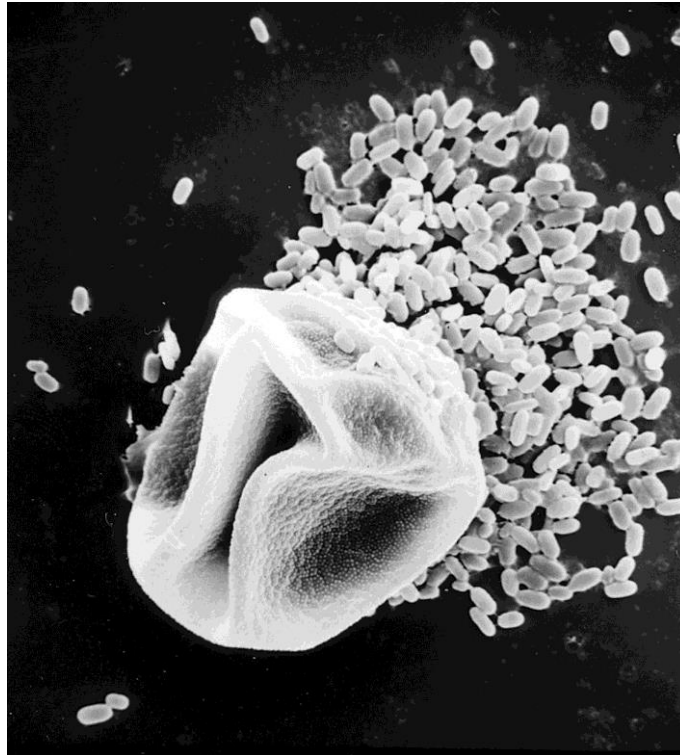


Health impact



Allergy potency of pollens

The allergy potency takes into account the number more or less important of major allergens into pollen grains.



Allergy potency of trees

Cypress



TREES	Potency
Cypress	5
Hazel	3
Alder	4
Poplar	2
Elm	1

Birch



Willow	3
Ash	4
Hornbeam	3
Birch	5

TREES	Potency
Plane tree	3
Mulberry	2
Beech	2
Oak	4
Pine	0

Ash

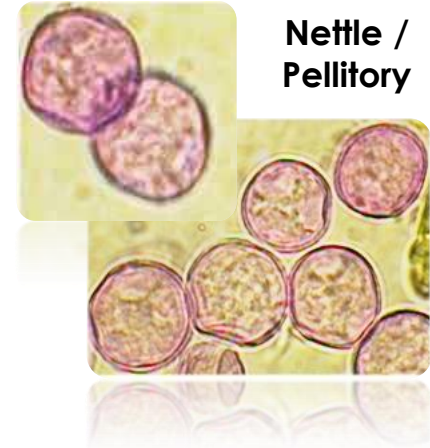
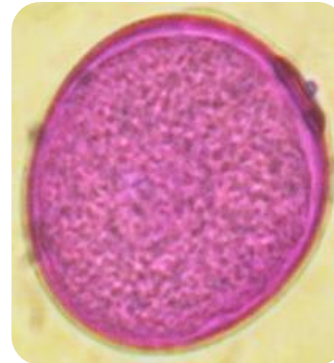


Olive	3
Lime	3
Chestnut	2

Allergy potency of weeds

Weeds	Potency
Sorrel	2
Grasses	5
Plantain	3
Pellitory	4
Nettle	1
Goosefoot	3
Mugwort	4
Ragweed	5

Grasses



Nettle /
Pellitory

Ragweed



Allergy potency

What is the allergy potency of Birch?



High

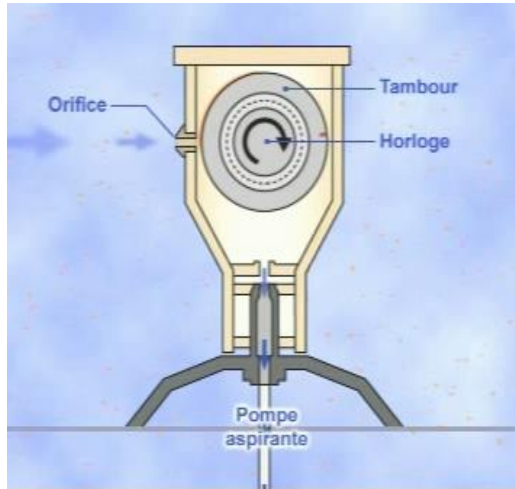
Allergy risk

What is the allergy risk of Birch...

...in Munich?  High

...in Cordoba?  Null

Metrology



**Orifice
(10 l. air/min)**



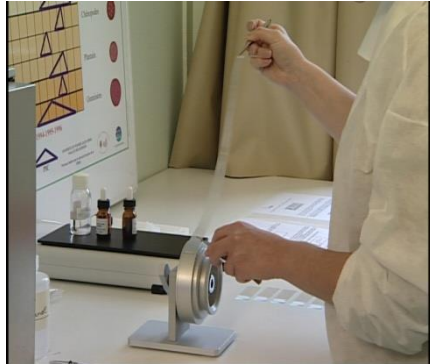
**Reading
2 horizontal lines**

Tape on the drum



1h = 2mm

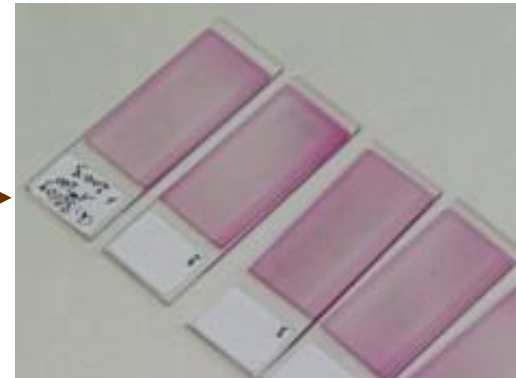
Analysis



Retrieving of the strip
on the drum



Cutting of the strip
in daily parts



1 slide by day



Counting thanks to
a voice recognition system

Daily amounts in grains/m³

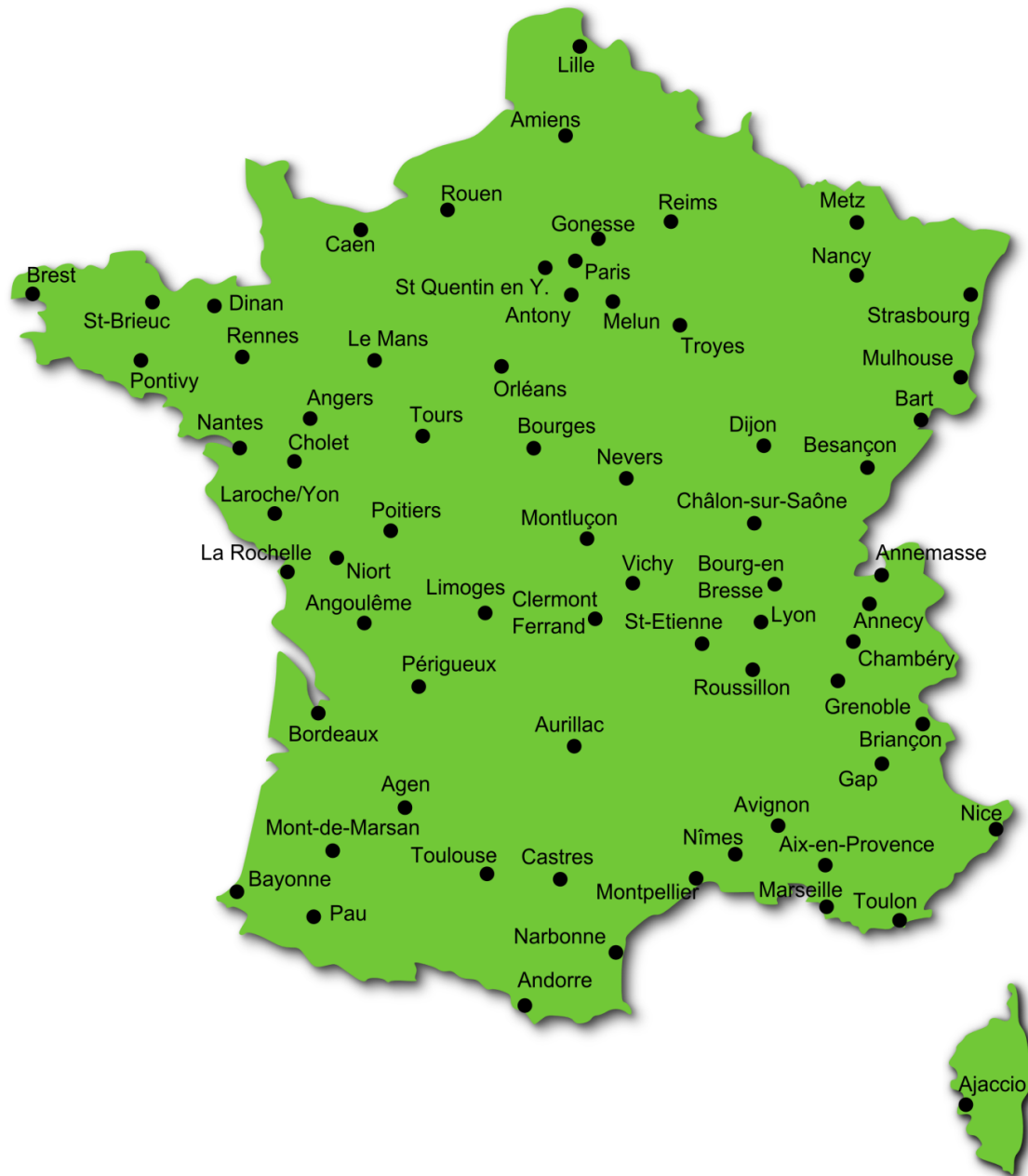
Pollens counts

EAN (European Aeroallergen Network)

- 423 pollen monitoring stations in Europe contributing to EAN
- Most are located in cities
- 1 or more networks in each country
- No official support in many countries (in contrast with air pollution)



Map of the French stations in 2014



Allergy, clinical symptoms and consequences on everyday life

The allergy is an abnormal reaction of the body against external substances called allergen. The main clinical symptoms are rhinitis, conjunctivitis and asthma. Allergies affect the quality of life (restriction of usual activities, sleep disturbances, impaired alertness) and have a cost (absence from work, consultations and treatments).

Health impact

Allergenic pollens cause to around 20% of the population troubles known as "hay fever" or "pollinosis". To measure the health impact, the RNSA use a network of sentinel clinicians who provide weekly data including information on the intensity of symptoms they noticed during consultations for the current week. From this information is calculated a clinical index.



Health impact

RNSA Clinical Report							
RNSA - Clinical Report 2008				Dr.		Week 31 - City of	
Pollinic Symptoms	Yes <input type="radio"/>	No <input checked="" type="radio"/>	Number of pollinoses <input type="text"/>	Evolution / previous week	Increase <input type="radio"/>	Stagnation <input checked="" type="radio"/>	Decrease <input type="radio"/>
Symptom Gravity	Null		Weak		Mean		Strong
Conjunctivitis	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Rhinitis	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Cough	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Asthma	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Cutaneous signs or other	<input checked="" type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>
Pollen type (Optional)	<input type="text"/>						
Observations (Optional)	<input type="text"/>						
<input type="button" value="Send the form"/>							
Please fill in all the obligatory fields							

Clinical report

Sent each week to one hundred doctors

Distribution map of the French network of doctors of the RNSA



Health impact

RNSA Clinical Report					
RNSA - Clinical Report 2008		Dr.	Week 31 - City of		
Pollinic Symptoms	Yes <input type="radio"/>	No <input checked="" type="radio"/>	Number of pollinoses <input type="text"/>	Evolution / previous week Decrease <input type="radio"/>	
Symptom Gravity	Null		Weak	Mean	Strong
Conjunctivitis	<input type="radio"/>				
Rhinitis	<input type="radio"/>				
Cough	<input type="radio"/>				
Asthma	<input type="radio"/>				
Cutaneous signs of	<input type="radio"/>				
Pollen type (Optional)	<input type="text"/>				
Observations (Optional)	<input type="text"/>				
<input type="button" value="Send the form"/>					
Please fill in all the obligatory fields					

Number of pollinosis :

Chosen criteria for the determination of pollinosis number correspond to the number of patients with symptoms consulting or phoning.

Health impact

RNSA Clinical Report				
RNSA - Clinical Report 2008		Dr.	Week 31 - City of	
Pollinic Symptoms	Yes <input type="radio"/>	No <input checked="" type="radio"/>	Number of symptoms per week	Stagnation <input checked="" type="radio"/>
Symptom Gravity	Null <input type="radio"/> Weak <input type="radio"/> Mean <input type="radio"/> Strong <input type="radio"/>			
Conjunctivitis				
Rhinitis				
Cough				
Asthma				
Cutaneous signs or other				
Pollen type (Optional)				
Observations (Optional)				

Symptoms :

The 4 chosen criteria for the quotation of symptoms are :

- disabling
- diurnal
- nocturnal
- repercussions on work

0 criteria correspond to NULL

1 ou 2 criteria correspond to WEAK

3 criteria correspond to MEAN

4 criteria correspond to STRONG

How to evaluate the intensity of symptoms?

		0	1	2	3
Symptom Gravity		Null	Weak	Mean	Strong
x1	Conjunctivitis	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
x2	Rhinitis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
x1	Cough	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
x1	Asthma	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
x1	Cutaneous signs or other	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Example for a doctor:

« Mean » Conjunctivitis = 2 x 1 = 2

« Strong » Rhinitis = 3 x 2 = 6

« Weak » Cough = 1 x 1 = 1

« Mean » Asthma = 2 x 1 = 2

« Null » Cutaneous signs = 0 x 1 = 0

To add the results of all doctors of a town and make an average by doctor

Clinical Index → 11/18

Pollens = biological pollutants?

For some species like oak and ash for instance, they come from natural species, and it is not possible to control sources. So we cannot consider them as pollutant.



Pollens = biological pollutants?

On the other hand, some species are planted by man :

- birch (planted in public parks)



Pollens = biological pollutants?

- cypress (Cupressaceae Sempervirens for instance) to make hedges in Mediterranean area



Pollens = biological pollutants?

- ornamental grasses on roundabout or public parks

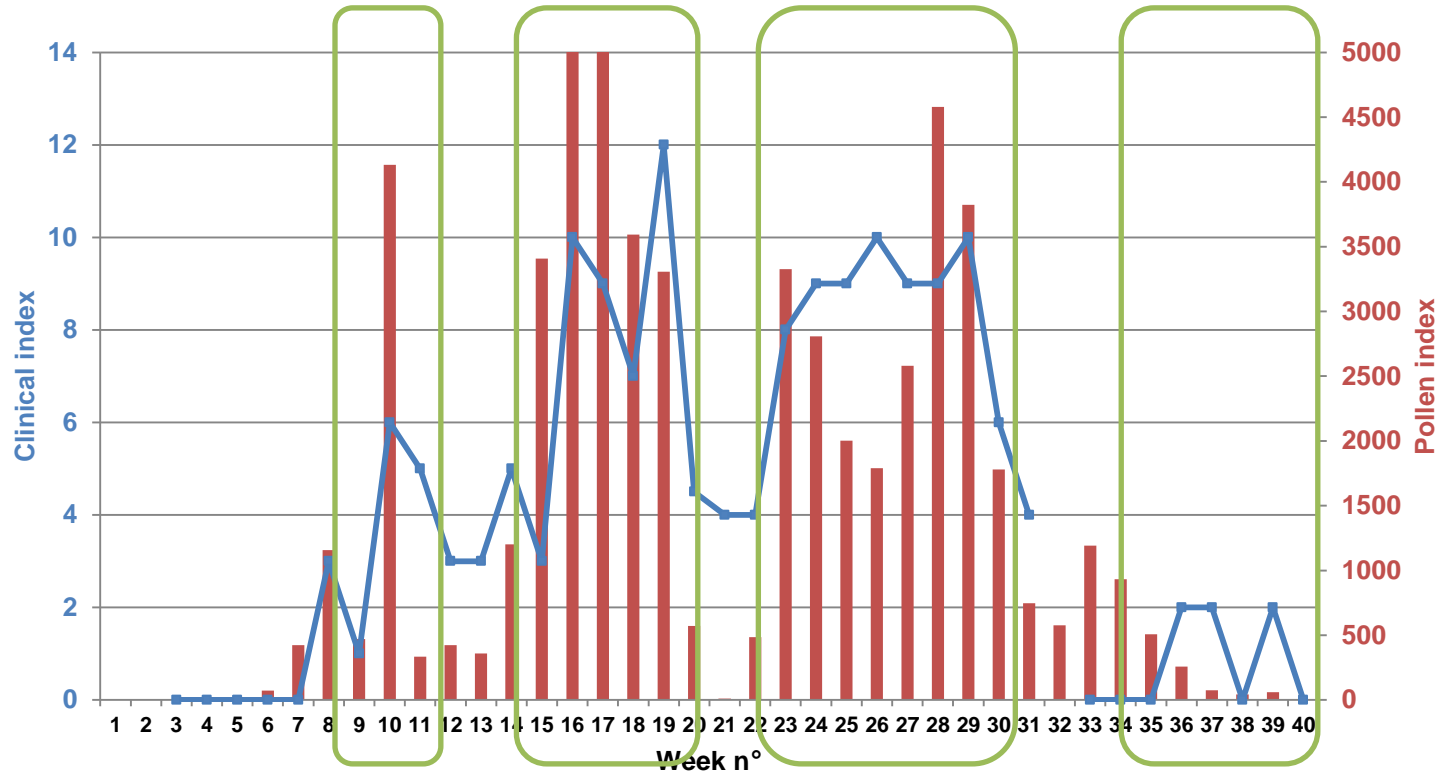


Pollens = biological pollutants?

- ragweed is another kind of species for which human is directly concerned by the transport of the seeds and needs a real strategy of management to limit its proliferation.



Clinical and pollen index



Conclusion

For some species, they come from natural species and it is not possible to control sources. So we cannot consider them as pollutant.

But for some species planted by man (with pollens with a high allergy potency) which could also be controlled by man, maybe we can consider them as « biological pollutant »

THANK YOU
FOR YOUR
ATTENTION