

## THE ALLERGENIC POLLEN COMPONENT OF THE CITY OF ANNABA

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### **Abstract**

In the City of Annaba, respiratory diseases are important causes of consultation and hospitalization. To contribute to the development of the research as for the biological and environmental pollution, it seemed to us essential to establish a pollen calendar of the city of Annaba. The objective of this study is to know the variability of its allergenic pollen component. The pollen calendar offers a preventive therapeutic utility because it supplies the critical dates of the pollination so allowing knowing the periods about high allergenic risks. For this study, we chose a gravimetric method, using the pollen sensor of Durham. The results we obtained have revealed the existence of pollen from trees or grasses, their monthly average as well as various pollen peaks where these are plentiful in the air of Annaba. The elaboration of the average pollen calendar allowed us to distinguish the seasons in the course of which the allergenic pollen component is plentiful in the air as well as its duration of appearance, periods in the course of which the allergenic symptoms are the most important. The knowledge of the pollen seasons is necessary. It allows us to prevent the appearance of the likely allergic symptoms when the pollen concentration of the air is intense. It is necessary to act as first aids to the public. Thanks to this knowledge the more precise planning of the rhythm of the desensitization of the allergic individuals is possible and easier.

### **Keywords:**

*pollen, allergy, Durham, pollen calendar, pollen peak.*

### **Introduction**

Among the atmospheric allergens, pollens occupy a dominating place<sup>1</sup>. They are produced in considerable quantities in the water, the air and the ground. They can be transported on long distances<sup>1</sup>. They are involved in the induction and the release of the diseases of allergic causes is essentially anemophilous pollens but they can result from plants with mixed pollination<sup>2</sup>. Allergenicity of pollen grain depends on many factors<sup>3-5</sup>: their number and their sizes which can intervene in the genesis of the pathological demonstrations, their smooth or sticky surfaces and the variable rate of the protein fractions which they contain. The allergy is an abnormal immunological reaction of the body face to face of a foreign substance. The set of these clinical demonstrations led by the hay fever is called pollinose<sup>6,7</sup>. Establishing a pollen calendar allows preventing allergies and offers a preventive utility because it supplies the critical dates of the pollination of the various let us tax<sup>8,9</sup>. During four years, we collected pollens which we classified in two types: trees pollens and herb pollens. The results which we obtained revealed us the dates of the pollen peaks, where the allergenic symptoms are the most important. The knowledge of the pollen seasons is necessary. It allows us to prevent the appearance of the likely allergic symptoms when the pollen concentration of the air is intense; it is necessary to act as first aids to the public. The allergy to the pollen is a real problem of public health; it represents an economic cost mattering for the society in terms of medicinal consumption, medical consultations, hospitalizations and school or professional absenteeism. The knowledge of pollens responsible for allergic appearances allows undoubtedly targeting the treatment of the allergic appearances of pollen origin by making cutaneous tests more adequate thus more effective by the elaboration of drum kits containing of pollen

allergens specific to the region. The pollinic calendar would allow determining better the threshold of risks for the raising sensitization and the allergic appearances<sup>10,11</sup>.

## MATERIAL AND METHODS

### Situation of Annaba city

Annaba opened on the Mediterranean Sea and situated in extreme East of Algeria. The city is characterized by a climate Mediterranean and established by mountains, by forests and by hills. It is very rich by its floral holdings. Many botanical families grow to the spontaneous state; certain plants are used in medicinal purposes for their therapeutic properties recognized by the Pharmacopoeia either by the tradition.

### The pollen sensor

We used the sensor of Durham, a gravimetric device, crafted according to the specific standards of size, removable foot and diameter disc. It was placed on one of the terraces of a hospital situated in the urban area of the city of Annaba. This method is descriptive; it concerns a sanitary supervision of the atmosphere. The criteria of evaluation are the presence and the identification of the airborne pollen in the city of Annaba

### Harvesting pollen

Pollens are collected on microscope slides. The slides are coated in part with a thin layer of glycerinated gelatin colored with the basic fucsin, the role of which is the support of the pollen on the slide and the facilitation of its microscopic observation. A label is attached to the end of each slide indicating the day, the month and the year. The location of these slides on the sensor is fixed daily and hour. After 24 hours of exposure, they are sent to the laboratory for microscopic observation.

### Reading of slides

The reading of the slides is made by using an optical microscope used in magnifications (X10, X40 and X100). The reading is made on 2 cm<sup>2</sup> of the gelatinized slide by sweeping in slots (from top to bottom and from left to right).

### Identification of pollens

It is made by the determination of their morphological characteristics (the size, the ornamentation of the exine, the presence or the absence of apertures).

We use different Atlas that determine both the morphological characteristics of pollen as their identification<sup>4</sup>. The identification is also done with the help of "Palynothèques" (a reference slide collection containing pollen previously collected and identified). These slides are an indispensable tool. They allow us to identify the pollens whose determination may seem doubtful. It is provided by several laboratories:

- Medical material Laboratory of Pharmacognosy, Faculty of Medicine of Algiers,
- Mediterranean Institute of Ecology and paleoecology of the Faculty of St. Jerome of Science and Technology of the University of Aix-Marseille.
- Climate and Health Laboratory of the Faculty of Medicine, University of Bourgogne).

## Results and discussion

### Average of trees and herb pollens

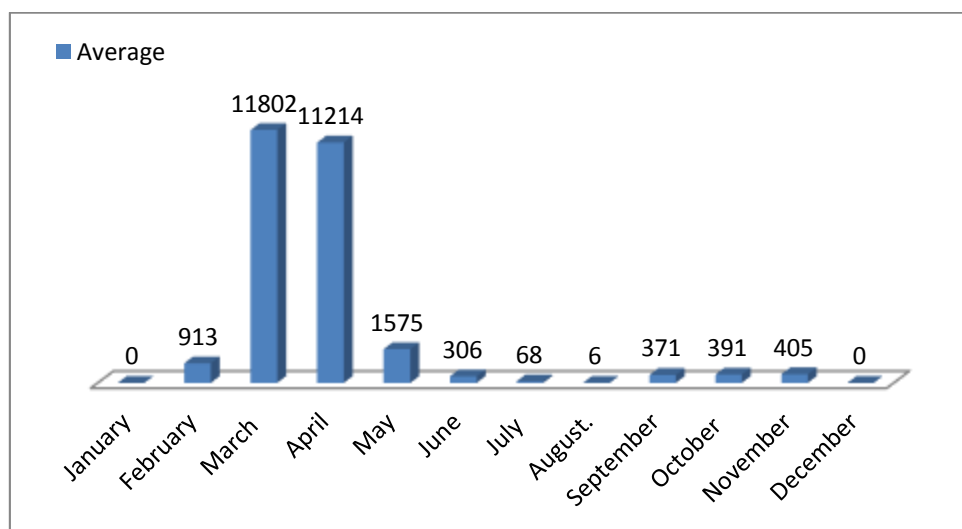
During for years we listed 128659 pollens that we separated in two types: trees pollen and herb pollen. Pollens seeming plentiful are the ones in particular of trees type (Table I ). We obtained high averages, and the most important were those of *Cupressaceae* (7416, 75), *Pinaceae* (5908, 00), *Oleaceae* (394, 25) and *Fagaceae* (3075). Concerning the averages of herb pollen, the most important were those of *Poaceae* (98, 5), *Cyperaceae* (68, 25), *Brassicaceae* (46, 25) and *Asteraceae* (42, 5) (Table I).

**Table I: Average of trees pollen in the atmosphere of Annaba**

Average trees Pollens		Average herb Pollens	
<i>Apocynaceae</i>	354,75		
<i>Betulaceae</i>	93,00	<i>Geraniaceae</i>	259,25
<i>Cupressaceae</i>	7416,75	<i>Hippocastanaceae</i>	12,50
<i>Fagaceae</i>	3075,00	<i>Juglandaceae</i>	28,25
<i>Geraniaceae</i>	259,25	<i>Lauraceae</i>	56,00
<i>Hippocastanaceae</i>	12,50	<i>Mimosaceae</i>	757,00
<i>Juglandaceae</i>	28,25	<i>Moraceae</i>	170,50
<i>Lauraceae</i>	56,00	<i>Myrtaceae</i>	2686,00
<i>Mimosaceae</i>	757,00	<i>Oleaceae</i>	5394,25
<i>Moraceae</i>	170,50	<i>Palmaceae</i>	123,75
<i>Myrtaceae</i>	2686,00	<i>Pinaceae</i>	5908,00
<i>Oleaceae</i>	5394,25	<i>Rosaceae</i>	1125,00
<i>Palmaceae</i>	123,75	<i>Salicaceae</i>	197,75
<i>Pinaceae</i>	5908,00	<i>Tiliaceae</i>	123,00
<i>Rosaceae</i>	1125,00	<i>Vitaceae</i>	54,00
<i>Salicaceae</i>	197,75	<i>Geraniaceae</i>	259,25
<i>Tiliaceae</i>	123,00	<i>Hippocastanaceae</i>	12,50
<i>Vitaceae</i>	54,00	<i>Juglandaceae</i>	28,25

**Pollens monthly average**

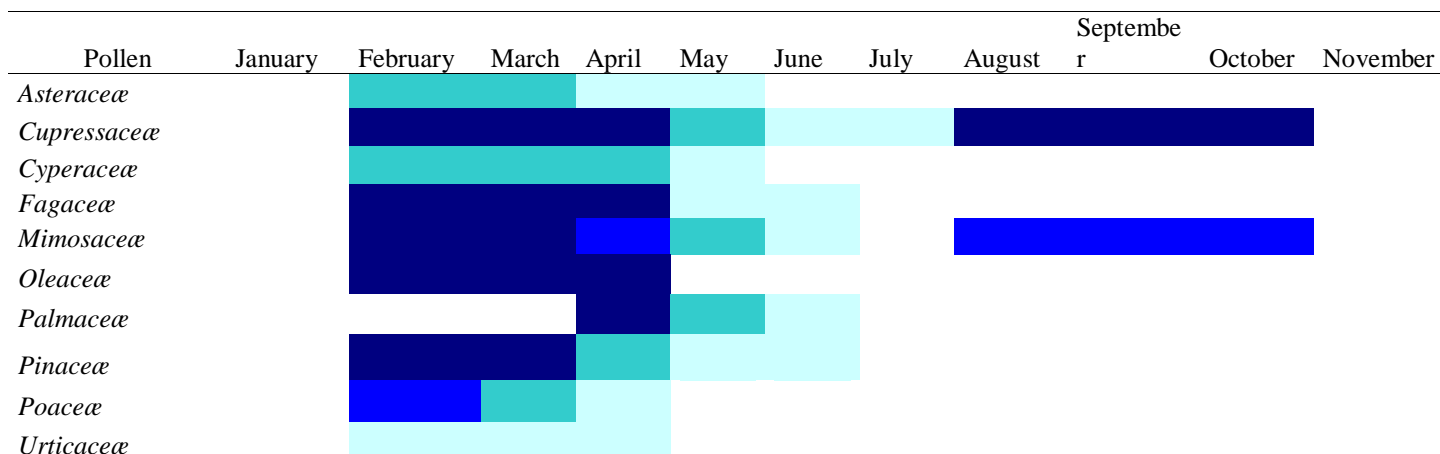
The results of the examination of the correlations between the rates pollen show us that the presence of pollens develops in the air from the month to another one. The pollination begins during February. The monthly abundance in the pollen is important during March and April indeed the rains of pollen appear with a respective average of 11802 and 11814. The air is plentiful in pollens during June, September, October and November, the air is low in pollens the averages are respectively 306, 371, 391 and 405. The air is almost lacking pollens during January, July, of August and in December (Figure 1).

**Fig 1: Monthly average of pollen**

### Calendar of allergenic pollens of Annaba

The pollen calendar, according to the fluctuations in the climate and, consequently, according to the maturity more or less moved forward by the blooming, can vary from one year to another. The studies made over four consecutive years prove it. Our data are useful and can give an overview of the amplitude of the variations of the pollen concentration of the air. The pollen component of the air is relatively rich quantitatively and qualitatively. Quantitatively, the pollen densities, present an interest under the angle of the allergy whose density in the air is the most important. Pollens of *Cupressaceae* have the most important density in the air of Annaba. These pollens become plentiful in March-April (Pollen peak) but to disappear in July-August and to reappear from September till November. They are followed by some pollens of *Pinaceae* which are present in the air of Annaba, from February till June but their abundance is situated between February and March. Their Pollen peaky is registered in March. They begin to disappear from May. Pollens of *Oleaceae* begin to appear from the end of February and are plentiful in March-April. The pollen discharge of these flowers becomes plentiful and we still find these pollens during May. Pollens of *Fagaceae* are plentiful in the air from the middle of February and reach their peak in April. They begin to decrease from May to then to disappear from the air from June. Pollens of *Poaceae* reach a relatively little important concentration. The strong density of these pollens in the air would be the privilege of the regions where important natural meadows recover grounds. This chap of pollen is present from February till November and its pollen peak is observed in March. Pollens of *Asteraceae* are little plentiful in the air of Annaba. Their appearance in the air begins toward the end of February to reach a maximum during March. The pollen disappears to atmosphere on May (Table II).

Tab II: Calendar of allergenic pollens of the city of Annaba



de 1 à 9
  de 10 à 49
  de 50 à 99
  >=100

### Conclusion

Spread in the air, pollens, male gametes of superior vegetables can lead more or less grave allergic reactions. This study appeared to us of a big importance. We attempted to make a pollen inventory in the air of Annaba, wanting by this study, highlight the interest which presents a pollen calendar in the knowledge of these airborne allergens by their identification and the determination of the periods of their appearance in the atmosphere. For this study, we chose a gravimetric method, using the pollen sensor of Durham. The results we obtained have revealed the existence of pollen during for years we listed 128659 pollens. The pollen accounts allowed us to list an important lot of pollens of trees and herbs present in the air of Annaba as pollens of *Cupressaceae*, *Poaceae*, *Urticaceae*, *Asteraceae*, *Chenopodiaceae* and *Pinaceae*. The elaboration of the average pollen calendar allowed us to distinguish the seasons in the course of which the allergenic pollen component is plentiful in the air: Pollens seeming plentiful are the ones in particular of trees type. We obtained high averages, and the most important were those of *Cupressaceae* (7416,

75), *Pinaceae* (5908, 00), *Oleaceae* (394, 25) and *Fagaceae* (3075). The monthly abundance in the pollen is important during March and April indeed the rains of pollen appear with a respective average of 11802 and 11814. The pollen calendar presents a big interest in the allergic practices. Indeed, the pollen allergy not being stable in time, the range of pollens responsible for allergy modifies and new pollens make their appearance quite during the year as aeroallergens. The pollen accounts are then essential to fix the exact nature of the new questioned allergens. The average trees type pollen and herb type pollen which we calculated to know its abundance in the air. So, we obtained the results following ones: pollens seeming plentiful are the ones in particular of trees type, we obtained high averages, and the most important were the ones *Cupressaceae*, *Pinaceae*, *Oleaceae* and *Fagaceae*. Averages of herb pollen the most important are the ones of pollen of *Poaceae*, *Cyperaceae*, *Brassicaceae* and *Poaceae*. The pollen of trees type is transported well by the wind and their sedimentation on the sensor is important where from their maximum density. This explains the massive presence of pollen of *Cupressaceae*, *Oleaceae*, *Pinaceae* and *Fagaceae*. On the other hand, that of herb type as it is the case to *Poaceae*, *Cyperaceae* and *Asteraceae*, the transport of which by the wind is lower and the access up to the sensor is more difficult, their frequency is consequently less important. The determination of the pollen season allowed us to distinguish various phases of pollen production: a phase of increase of concentration, it is the beginning of the pollination (pollen pre-peak), a phase of maximum pollen production (pollen peak) and a phase of pollen decrease (pollen post-peak).

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