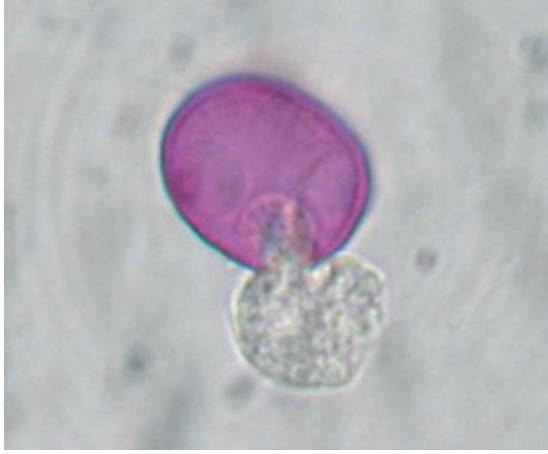
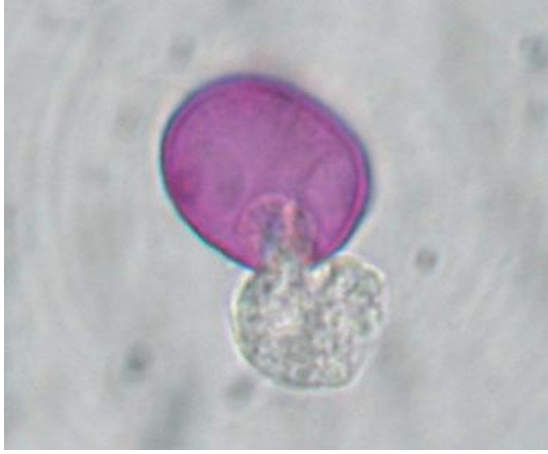


Parietaria pollen bursting under osmotic shock with release of cytoplasm fragments carrying allergens (D'Amato et al., 2007)

Role of sub-micronics and pauci-micronics biological particles

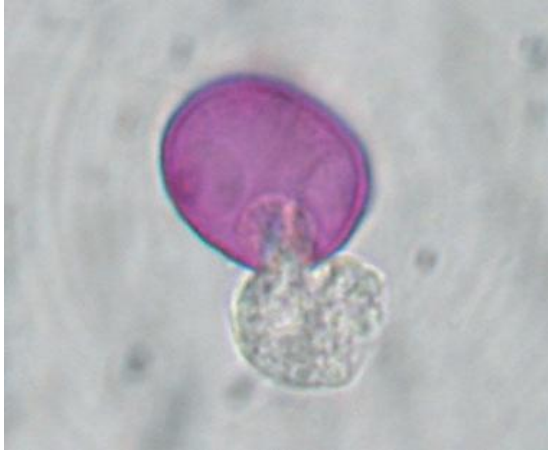
Carmen Galán, UCO (Spain) & Mikhail Sofiev, FMI (Finland)



Parietaria pollen bursting under osmotic shock with release of cytoplasmic fragments carrying allergens (D'Amato et al., 2007)

The existence of allergenic activity in the atmosphere not only associated to pollen grains and fungal spores, but also to submicronic and paucimicronic biological particles (Spieksma et al., 1995)

Most asthma crises appear to be provoked by pollen grains, although recent studies confirm that the solid particles larger than 20 µm are incapable of penetrating to the lower respiratory tract (Taylor et al., 2002)



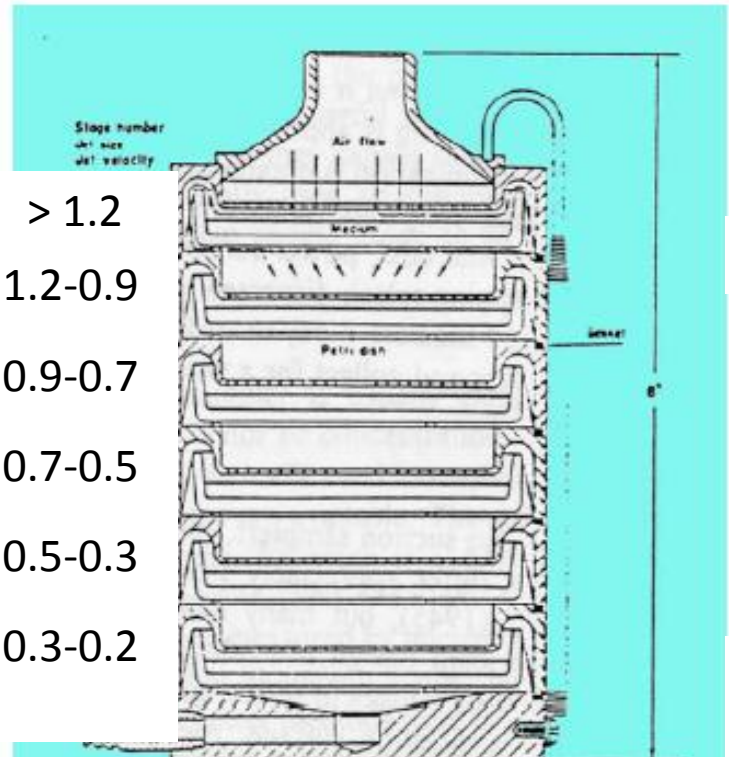
Parietaria pollen bursting under osmotic shock with release of cytoplasmic fragments carrying allergens (D'Amato et al., 2007)

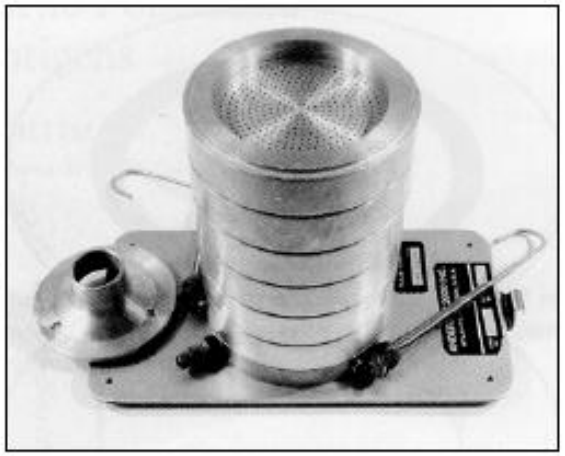
The origin of these allergens can be due to:

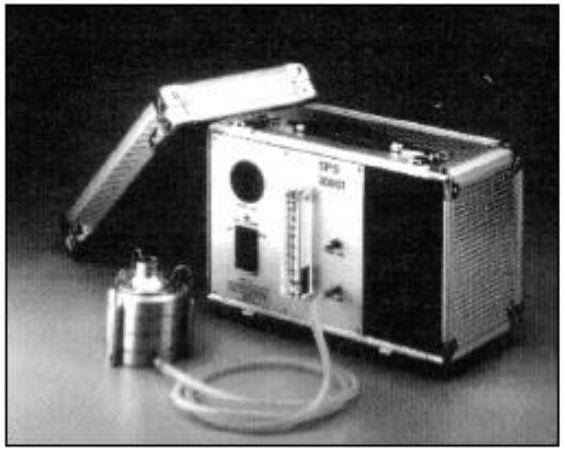
✓ **the rupture of pollen grains transported in the atmosphere or to the presence of allergens from other parts of the plant;**

✓ **when pollen grain contact with the mucosa releases allergens that could rapidly penetrate to the bronchia, provoking asthmatic symptoms**

Pollen grain rupture by osmotic shock release part of their content, including respirable, allergen-carrying starch granules into the atmosphere (D'Amato et al., 2007)





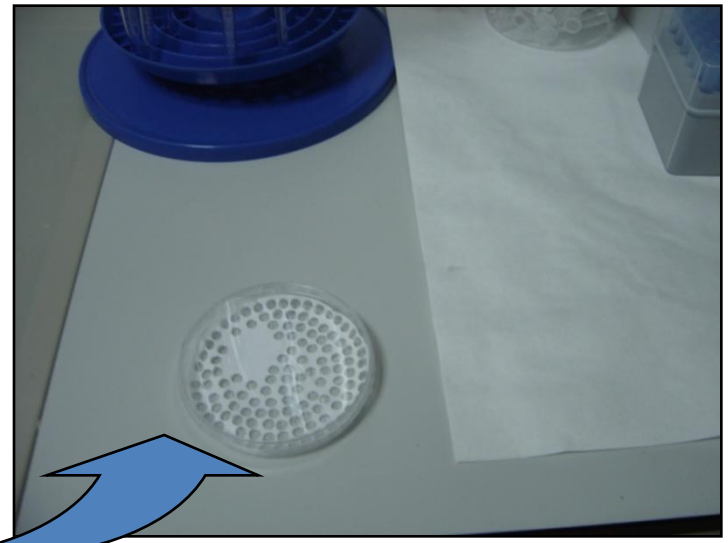


Andersen Cascade Impactor sampler,
Size discrimination of solid particles suspended in the air

Technique for quantify airborne antigen activity: indirect ELISA

COLD STORE SAMPLERS

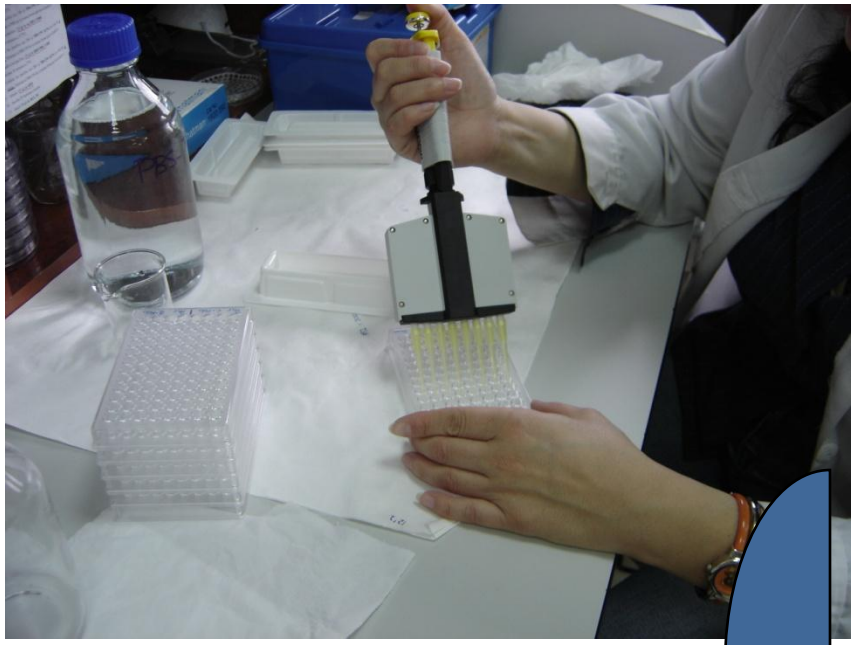
FILTER REPLICATE



12 h BUFFER INCUVATION

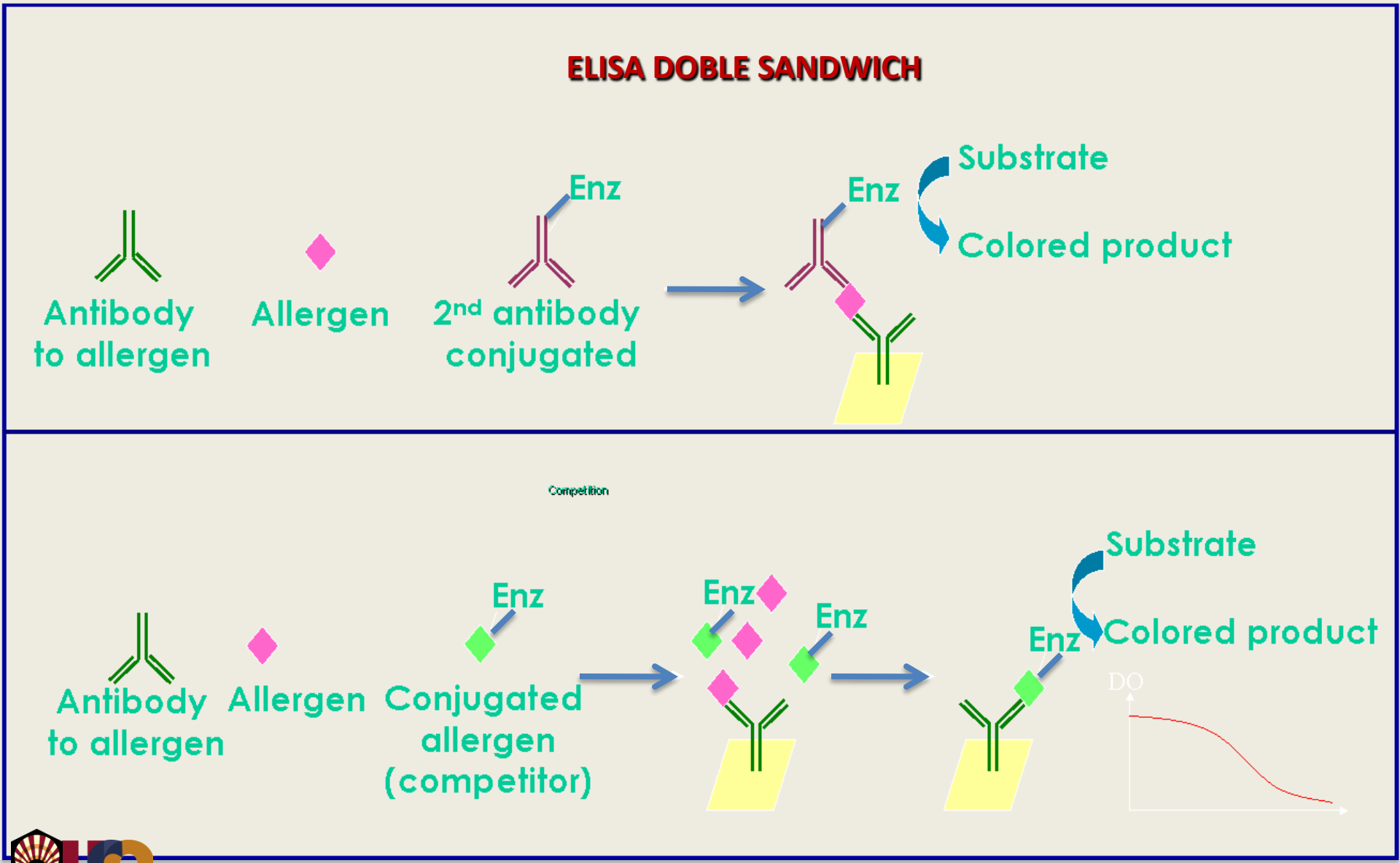
Technique for quantify airborne antigen activity: indirect ELISA

ANTIBODY AGREGATION

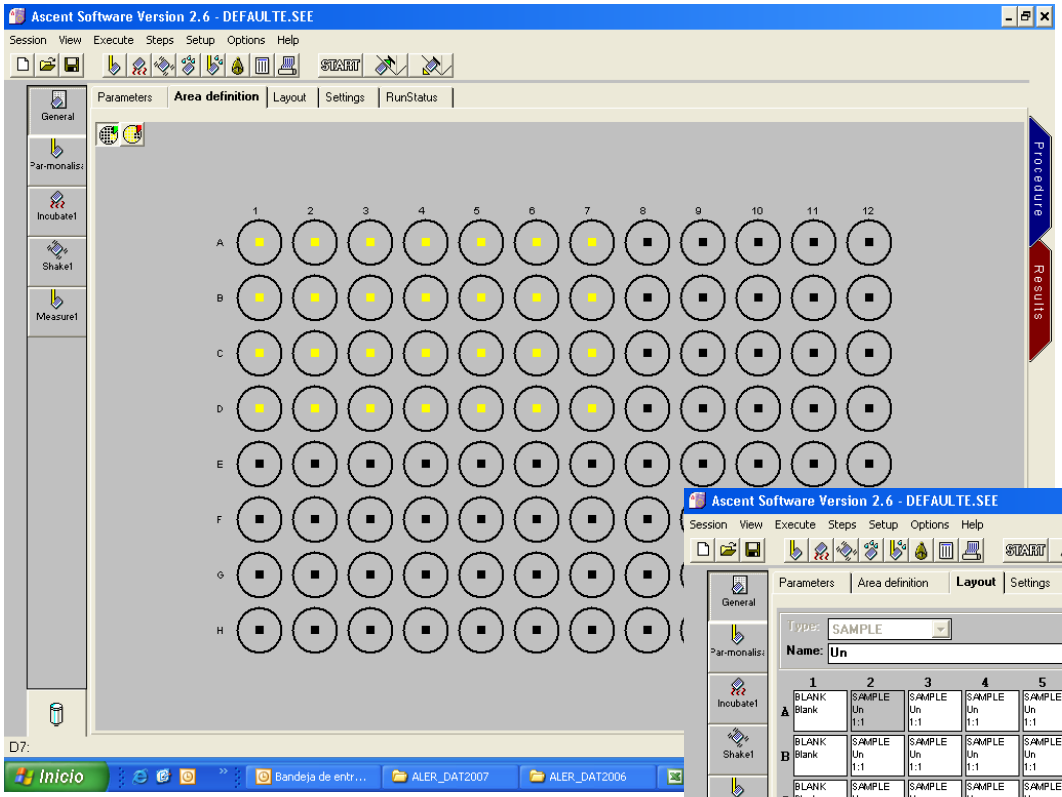


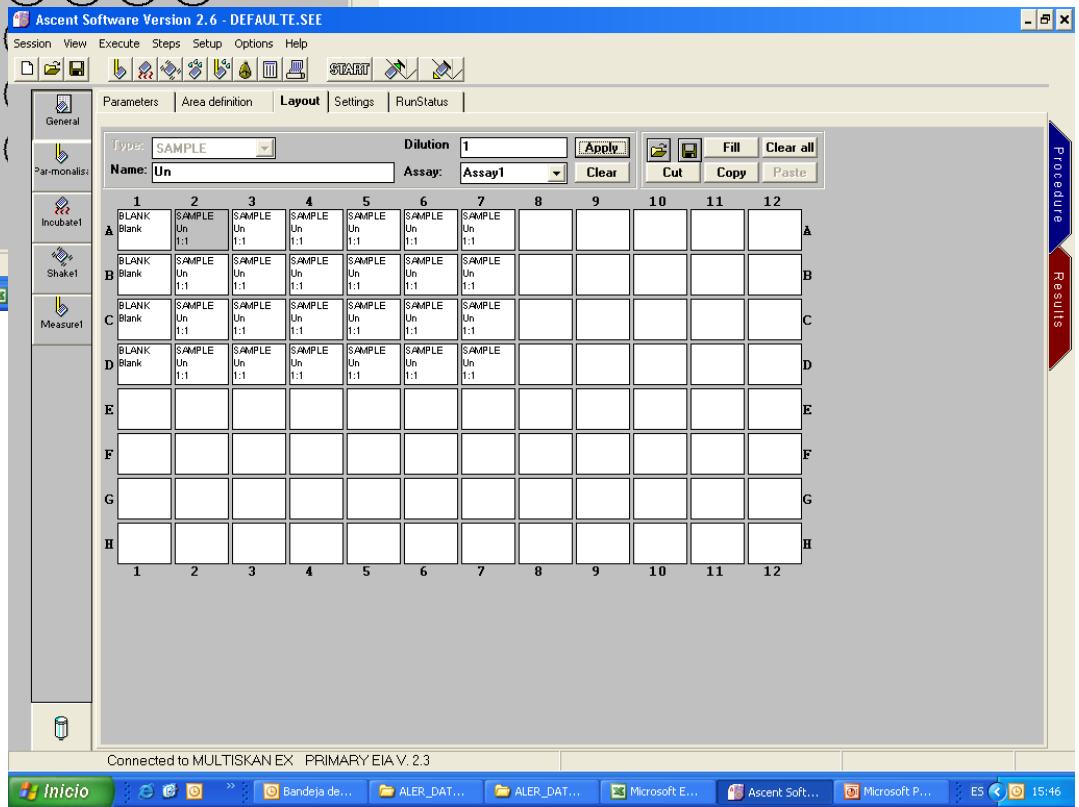
MICROPLATE READER
READING AT 405 NM

Technique for quantify airborne antigen activity: indirect ELISA



Technique for quantify airborne antigen activity: indirect ELISA





Microsoft Excel - Olea Córdoba 2006.xls

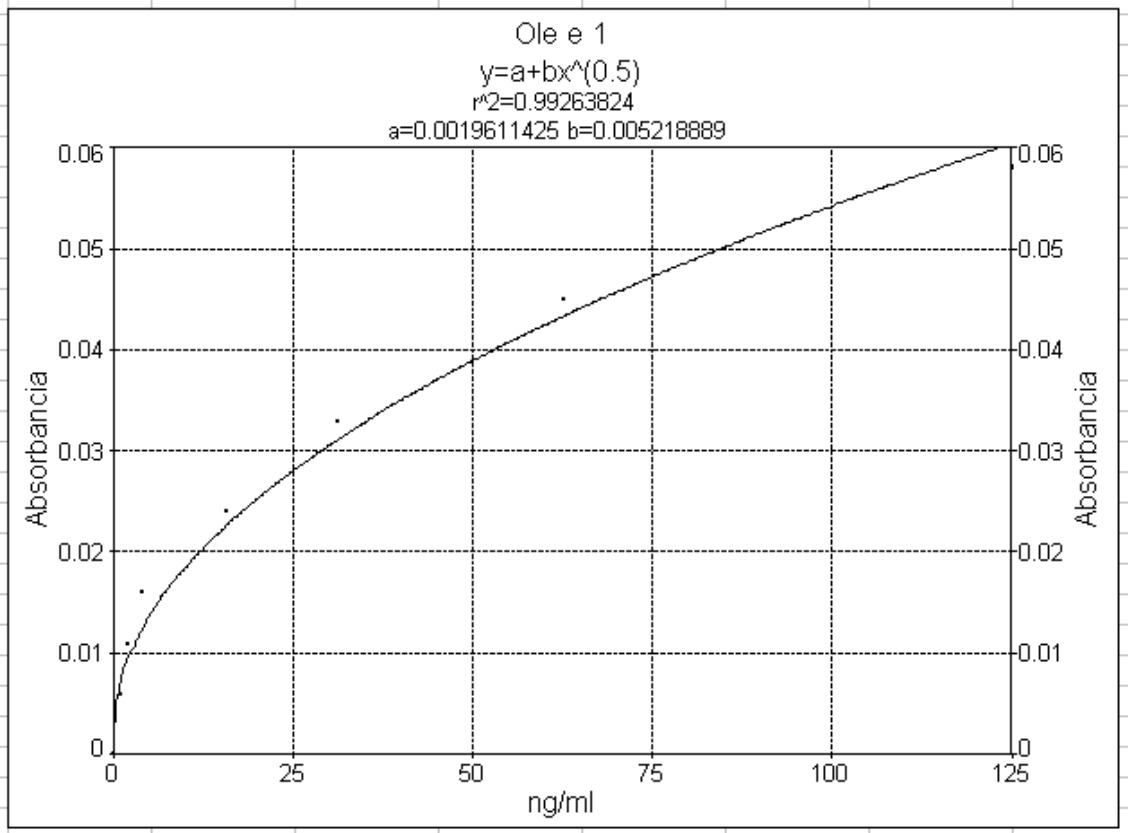
Archivo Edición Ver Insertar Formato Herramientas Datos Ventana ?

Escriba una pregunta

Arial 10

B12 =(((A12-0,0019611425))/0,005218889)*((A12-0,0019611425))/0,005218889

	A	B	C
1	Num. A	0-125nanogr	r=0,99
2			
3	y=a+braizx		
4		a= 0,0019611425	
5		b= 0,005218889	
6			
7		fórmula	
8	0	0,141208937	0
9	0,006	0,59890914	0,9765
10	0,011	2,999652592	1,9531
11	0,016	7,236147513	7,8125
12	0,024	17,83290244	15,625
13	0,033	35,37165123	31,25
14	0,052	91,9302943	62,5
15	0,058	115,2981728	125



Datos diarios | Ajustes diarios c.patrón | Datos por estadios | Gráficos | C. patrón

Listo NUM

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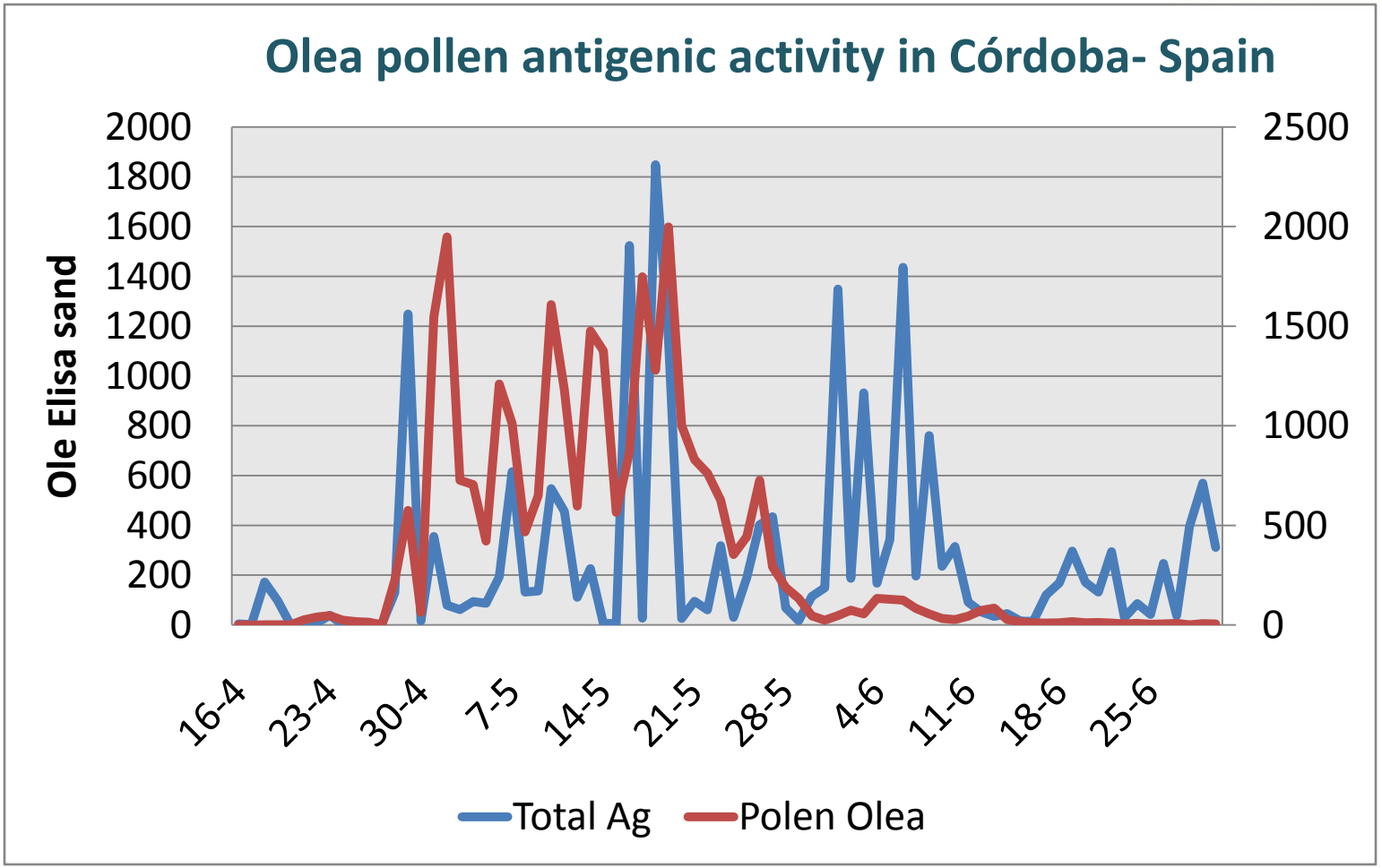
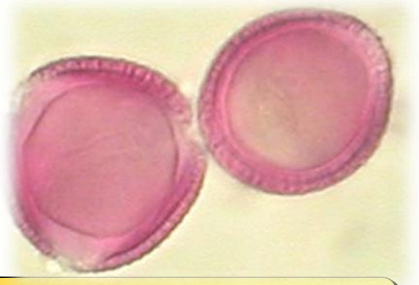
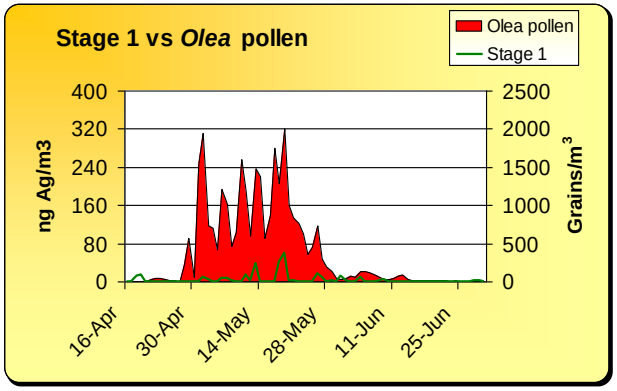
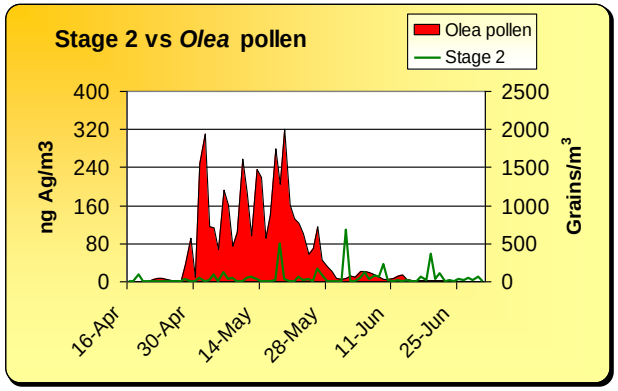
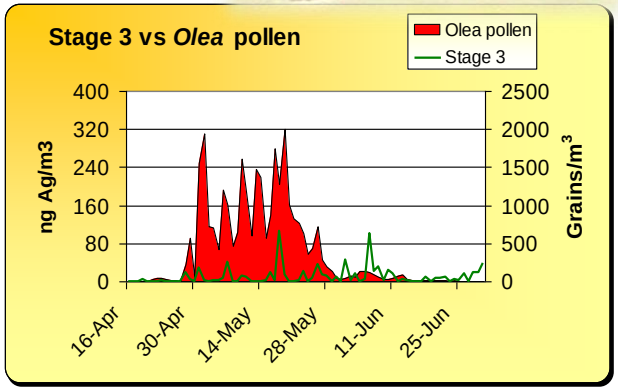


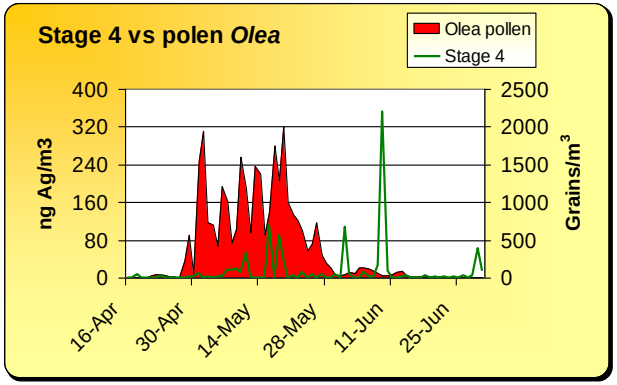
Gómez-Domenech et al. (2008)

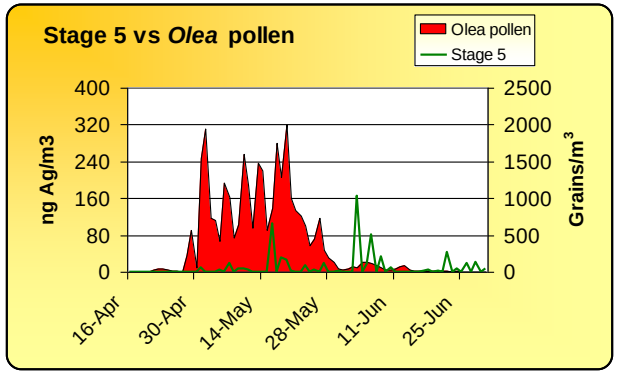


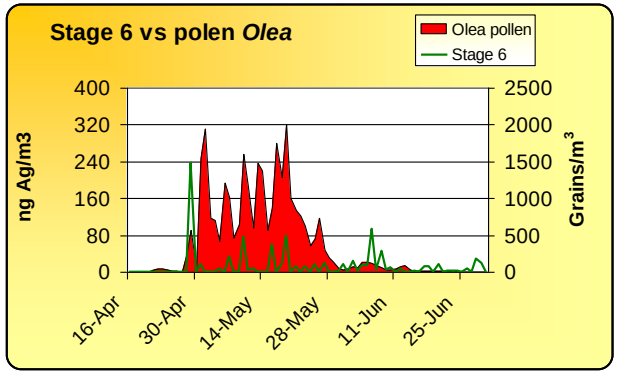






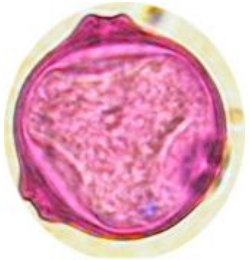






Comparison between relative *Olea* pollen allergenic activities in different particle-size fractions vs daily fluctuacions in the airborne *Olea* pollen counts per cubic metre of air from April to June > 1.2 µm (stage 1); 1.2-0.9 µm (stage 2) ; 0.9-0.7 µm (stage 3); 0.7-0.5 µm (stage 4); 0.5-0.35 µm (stage 5) and 0.35-0.25 µm (stage 6).

Gómez-Domenech et al. (2008)



Betula

Olea

It has been observed a similar tendency between the two variables, especially during the development of the main pollen season.

It has been confirmed the high allergenic activity during the periods before and following pollination.

Ole e 1 **is the specific allergen pollen and is not found in buds, aments or bark (Villalba et al., 1994).**

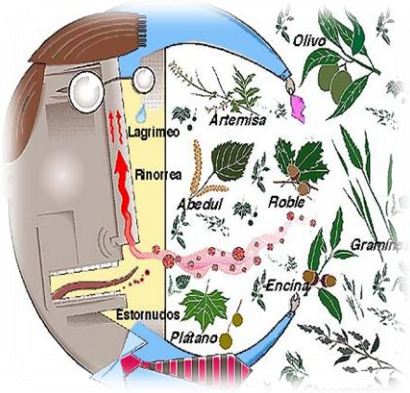
Bet v 1 **is expressed almost exclusively in birch pollen (Taylor et al., 2003)**

Olea

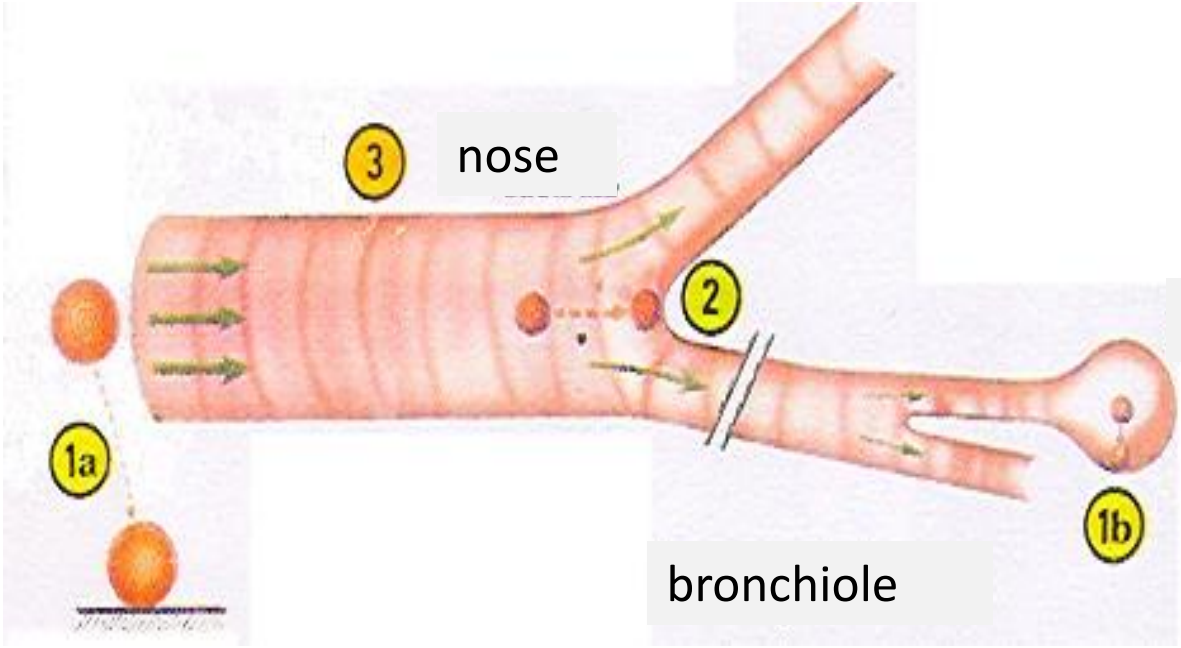
Molecular diffusion of submicronic and paucimicronic particles allow them to flow more time in the air, no subject to settling or impact as larger particles.

Studies monitoring *Ole e 1* in ambient air demonstrated that allergens are also present in fractions of ambient air that do not contain pollen

Gómez-Domenech et al. (2008)

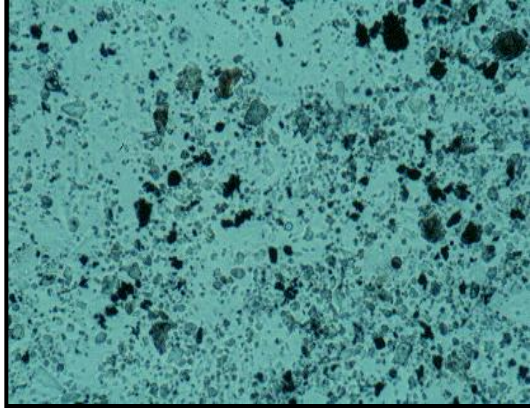


Particle Size, allergy

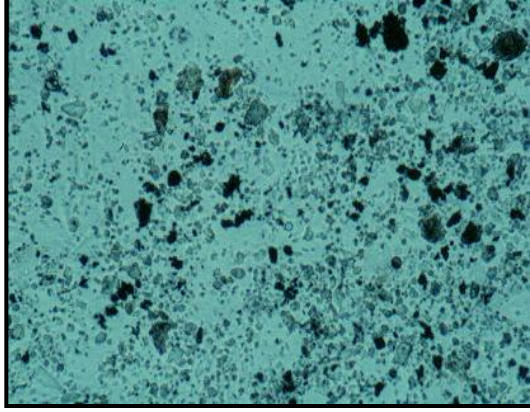


Gravity	1	Sedimentation: a) particles > 50 µm; b) particles < 10 µm
Inertia	2	Impact: 10 > particles < 50 µm
Brownian Motion	3	Particles < 10 µm

Spieksma (1998)



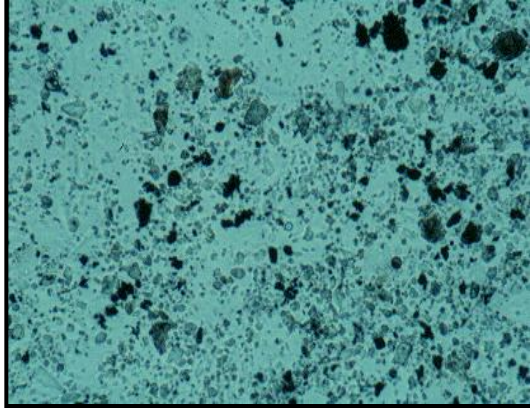
Relationship with other pollutants



Of the EPA general list of 6 principal pollutants, particulate matter is deemed to be the most hazardous in terms of its effects on the respiratory tract, since particles are small enough to reach the alveoli (Dockery & Pope, 1996)

In recent years ambient air-quality standards for particulate matter have been revised. However, particulate matter of biological origin has not received the same treatment in these directives as other air pollutants.

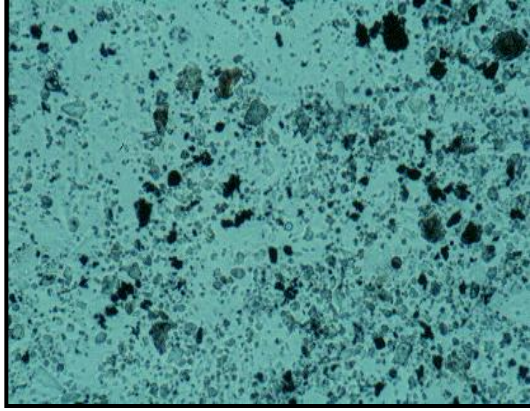
A number of papers report that the co-adjuvant action of EPA-listed pollutants and biological particles aggravates respiratory symptoms in the general population (Ishizaki et al., 1987)



Data for biological matter were obtained using Hirst-type suction volumetric samplers, applying normalized aerobiological methods

The presence of particles smaller than 10 um (PM10) was detected automatically by 2 pollutant-measuring stations managed by the Local Division of the Environmental Council over the same period.

Cariñanos et al. (2008)



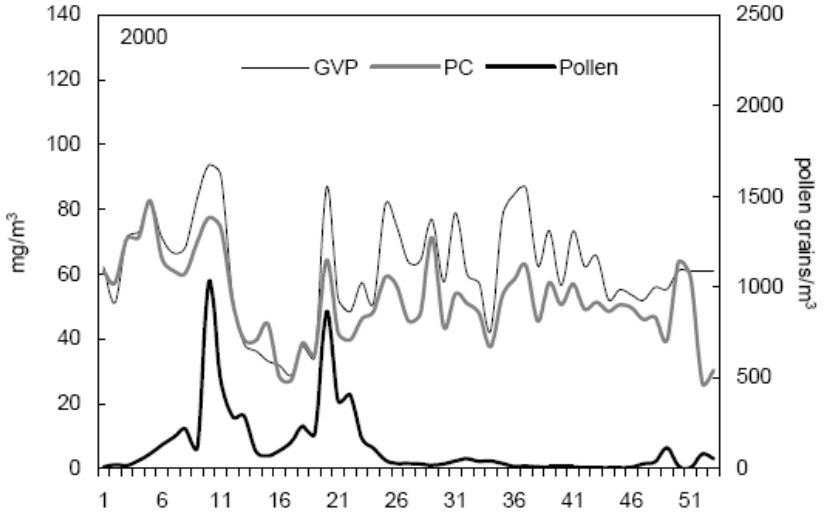
Classification:

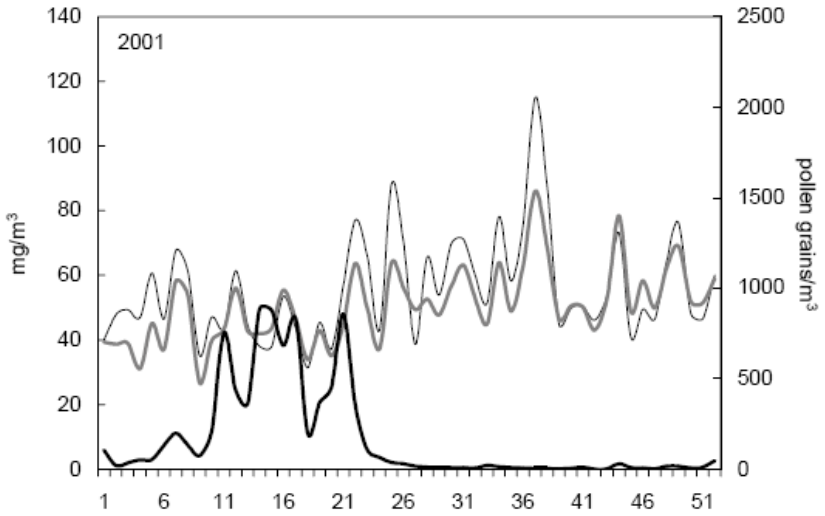
✓***border risk***, **for values of 50 pollen grains/m³ of air, i.e. counts sufficient to cause symptoms in at least 30% of allergy-sufferers;**

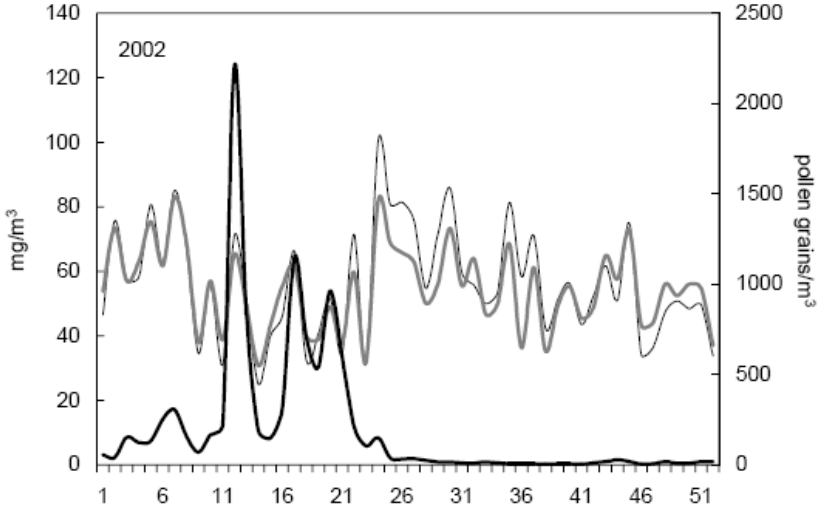
✓***acceptable risk***, **for > 100 pollen grains/m³ of air, i.e. enough to cause symptoms in 70% of the affected people;**

✓***high risk***, **for counts over 200 pollen grains/m³ of air, i.e. 100% of allergy-sufferers affected, some by acute respiratory crisis.**

Air quality standards: US-EPA guidelines for PM10 (micrograms/m³)
SAN Biological Air Quality Index (pollen grains/m³)







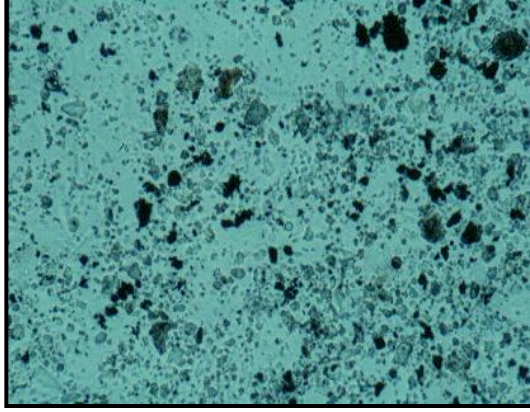
- **PM10 measured in Gran Via Parque Cabin (GVP)**
- **PM10 measured in Puerta del Colodro Cabin (PC)**
- **Total pollen grains**

Cariñanos et al. (2008)

		2000	2001	2002
	Limit values			
GVP-PM10	50 µg/m^3 (25 µg/m^3)	295	87	209
PC-PM10		177	144	222
Pollen	50 pgrains/m3	38	32	39
	Aceptable values			
GVP-PM10	150 µg/m^3 (50 µg/m^3)	0	0	0
PC-PM10		0	0	0
Pollen	100 pgrains/m^3	55	28	33
	Values of Risk			
GVP-PM10	350 µg/m3 (75 µg/m^3)	0	0	0
PC-PM10		0	0	0
Pollen	200 pgrains/m^3	58	75	59

Number of days in which concentrations of PM10 and pollen grains surpassed the limit acceptable or values of risk. In brackets under the PM10 values are indicated the reductions that was progressively applied in 2005.

Cariñanos et al. (2008)

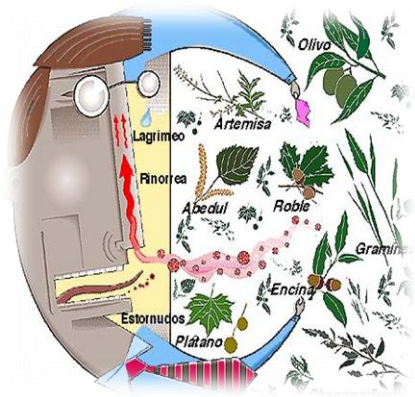


✓ **Analysis of airborne solid particulate matter showed that pollen grains are among the major particles affecting pure air quality.**

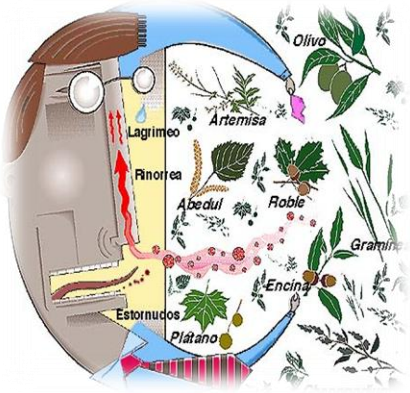
✓ **Impairment of air quality may be governed by weather conditions and by the joint effect of biological and non-biological matter.**

✓ **Information on the levels of both types of pollutants should be provided to the public to allow preventive measures to be taken.**

Cariñanos et al. (2008)



Health impacts. Pollen allergy.

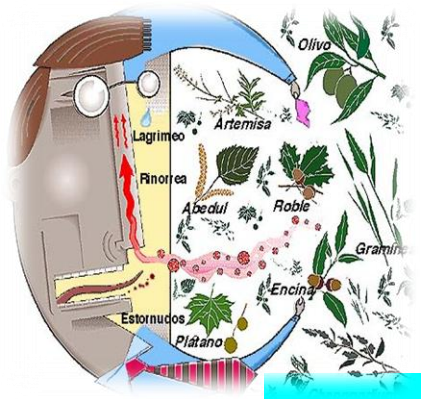


Health impacts

In 1997 an European Allergy White Paper declared Allergic Diseases to be the Public Health Problem in Europe which is so large that it should be called the *First Epidemic* of the 21st century.

Different kinds of allergies have increased to the extend that over a quarter of the population in all developed nations is now predisposed to develop allergy problems.

The overall prevalence of seasonal allergy rhinitis in Europe is approximately 15%; the current asthma prevalence rates vary from 2.5% to 10%.



Pollen allergy

The geographical distribution of plants with allergenic pollen.

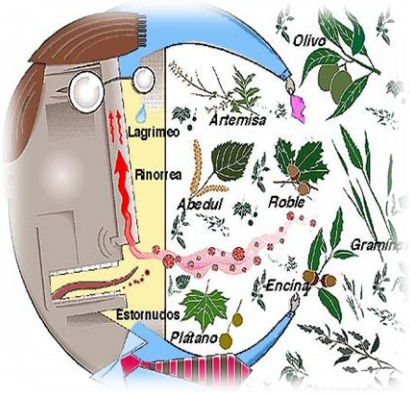
Poaceae, main cause of allergy in Europe

Betula, main cause of allergy in North, Central and Eastern Europa

Artemisia, important cause of allergy in Eastern Europa

Olea europaea, main cause of allergy in South Europa

Cupressus, main cause of winter allergy in South Europa



Pollen allergy

Knowledge of plant's geographical distribution, its flowering periods and possible variations induced by climate change scenarios is of great importance.

High levels of vehicular emissions and a western life-style are correlated with the increasing frequency of pollen induced respiratory, and people who live in urban areas tend to be more affected by pollen-induced respiratory allergy than people living in rural areas (D'Amato, 2000)

How does Global Warming influence pollen allergy?

The length of the growing season in Europe increased by 10 to 11 days during the last 30 years.

Earlier tree pollen season is more pronounced in species that flower earlier in the year.

Duration of season is extended in summer and late flowering species.

Due to the earlier onset of pollen seasons, the seasons are more often interrupted by adverse weather conditions in the late winter/early spring.

Global warming might facilitate the spread of particular species to new areas climatically suitable.

Phenology and Human Health: Allergic disorders.
Health and global environmental change
Report of a WHO meeting
Rome (Italy)16-17 January 2003

Evaluation of Climate Change Impacts in Spain

1) Change of vegetative and reproductive activity period
2) Phenological changes
3) Migrations, latitudinal and altitudinal

Fernández-González, F. et al. 2005. *Impacts on vegetal biodiversity*. In *Evaluation of Climate Change Impacts in Spain*. ECCE. Moreno, J.M. ed. Spanish Environment Minister. Madrid, España. 183-248 pp.

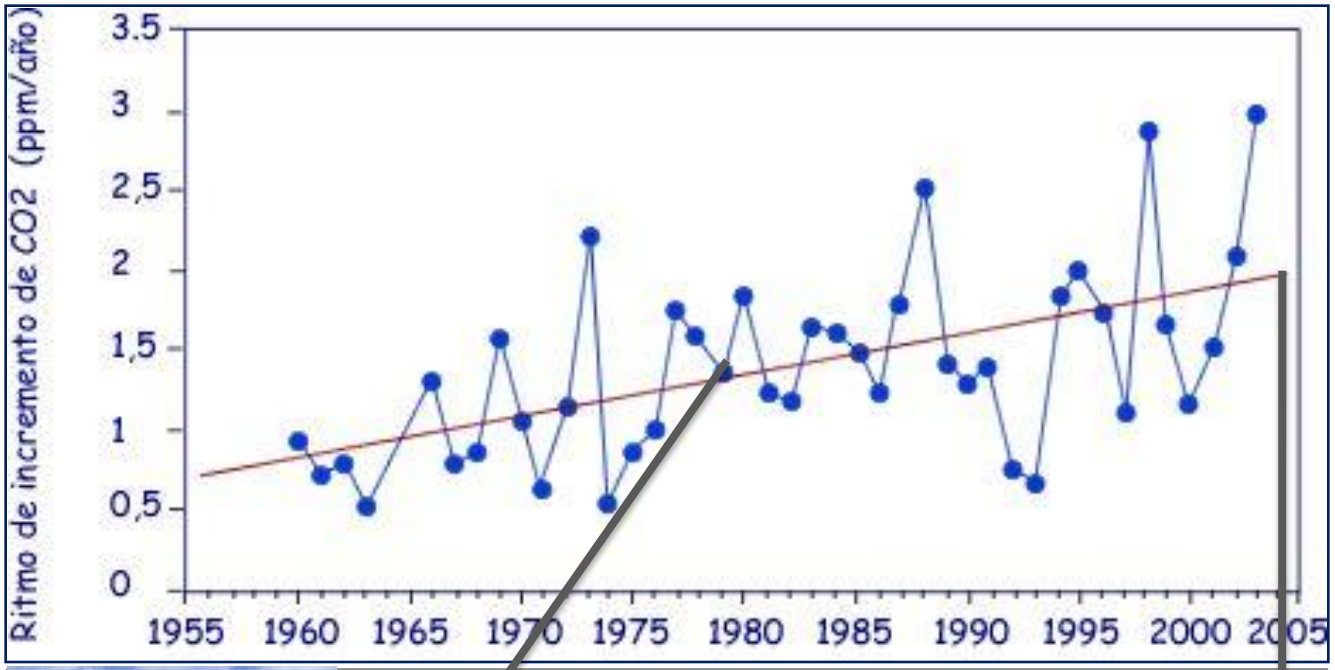
Recent impacts

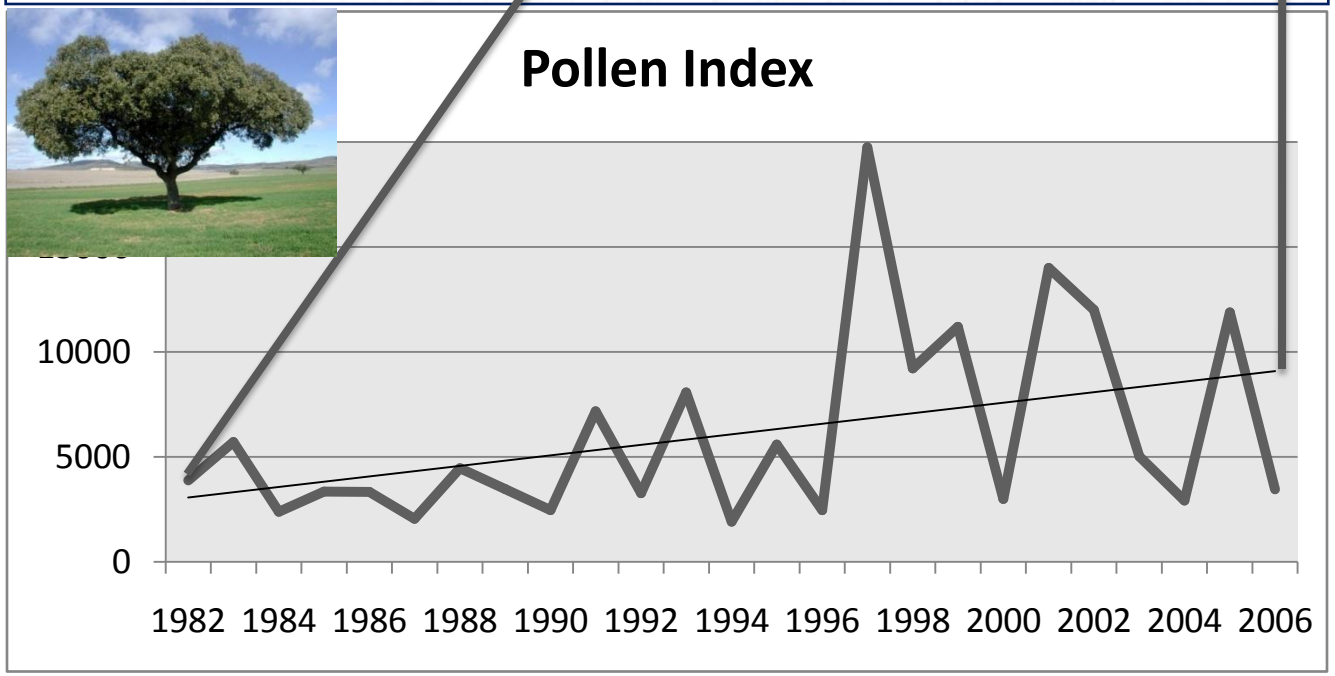
1) Change of vegetative and reproductive activity period

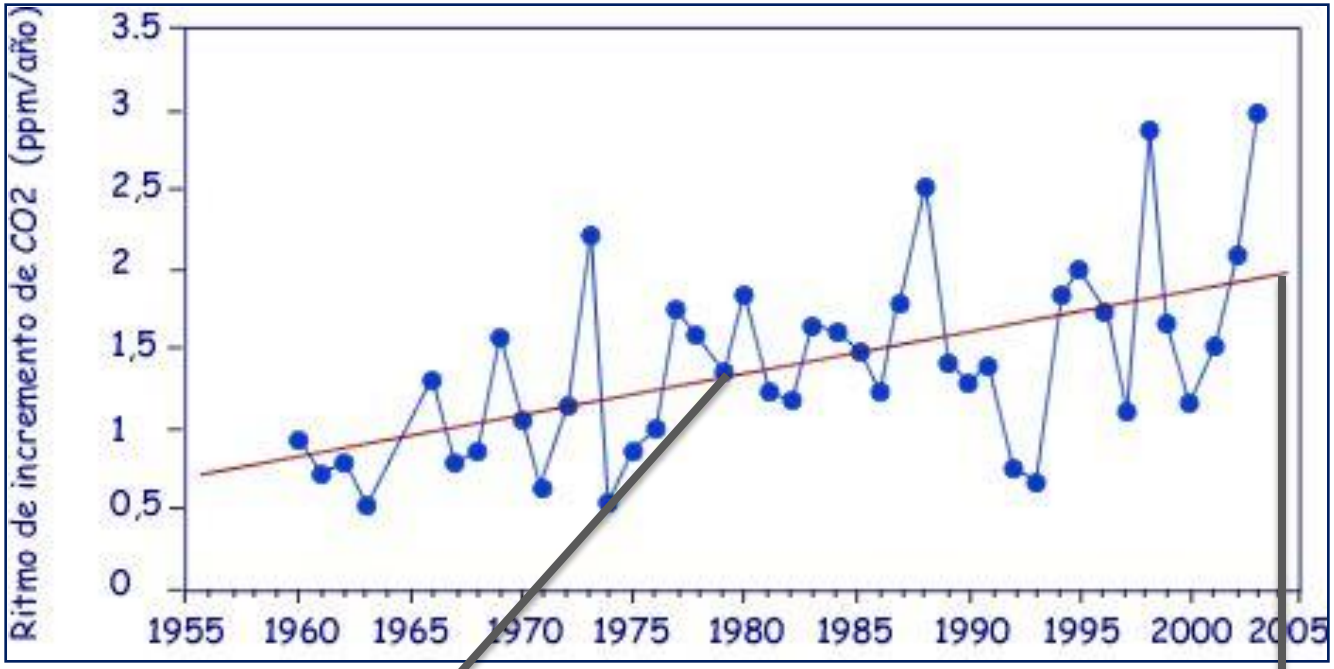
↑ CO_2 ↑ T°

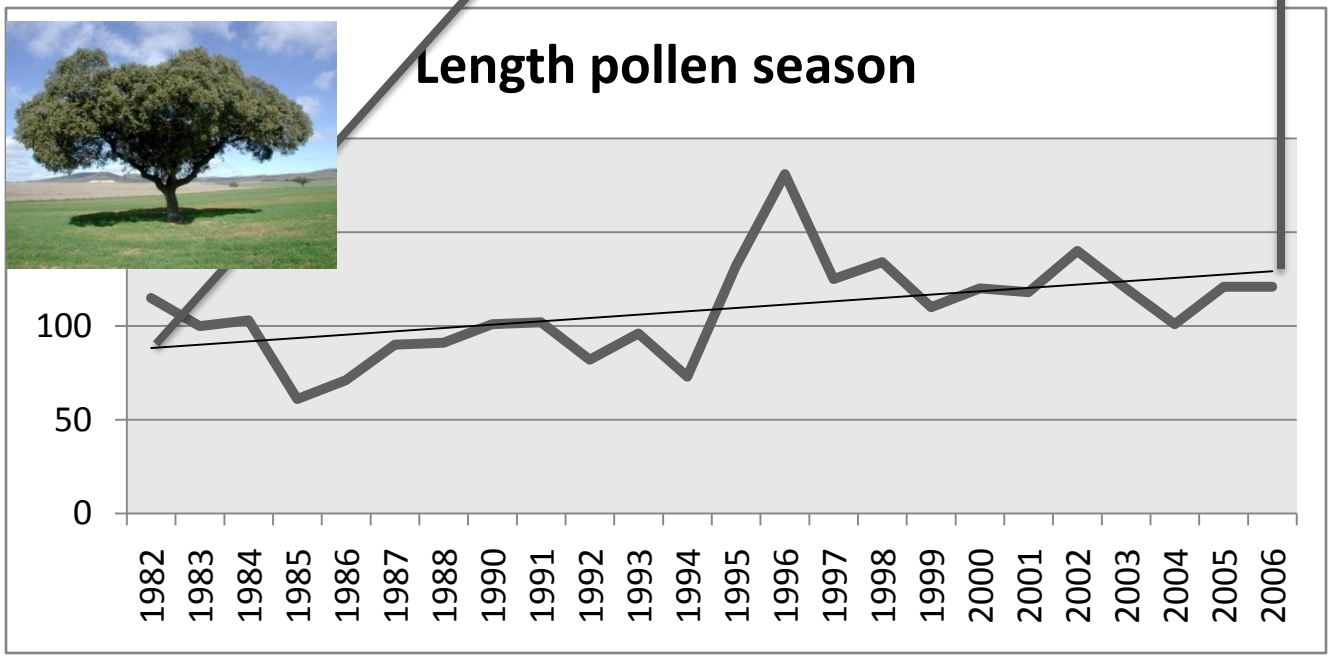
⇩ +

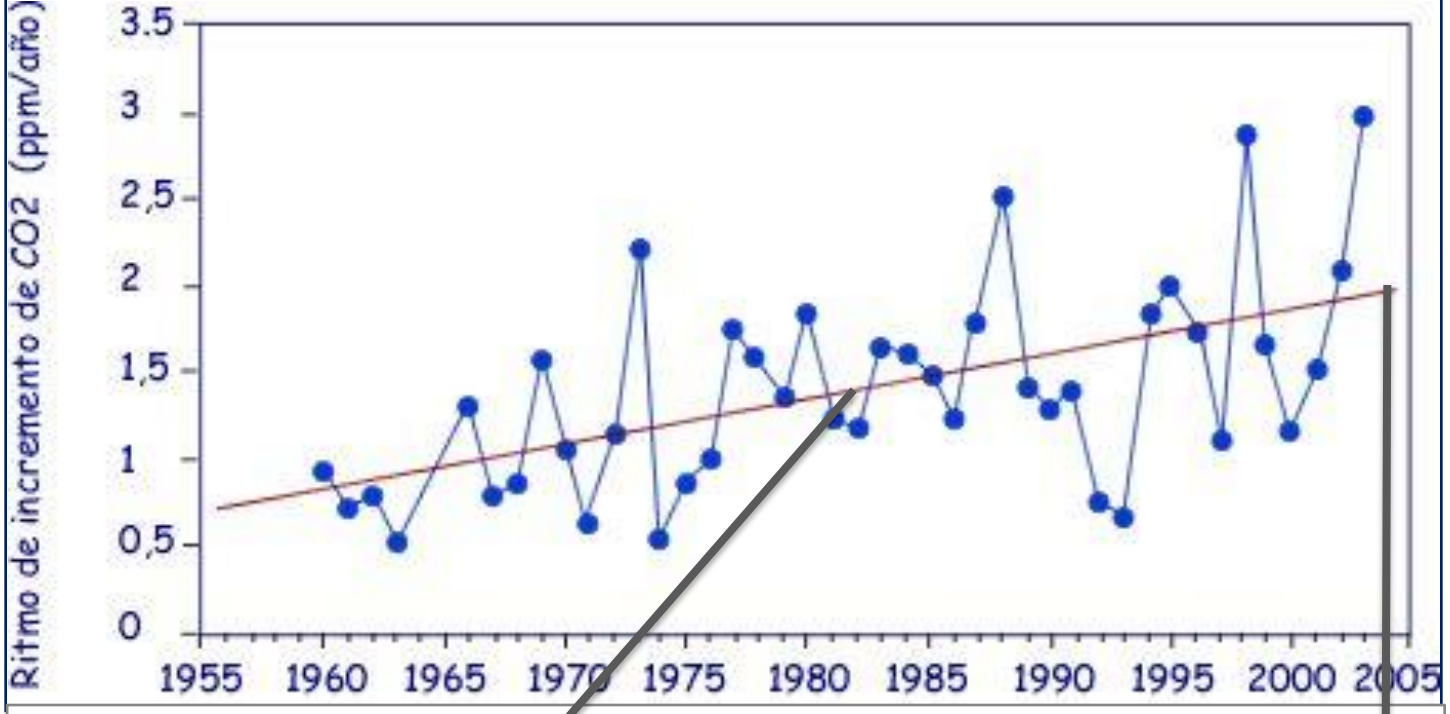
vegetative and reproductive activity increase

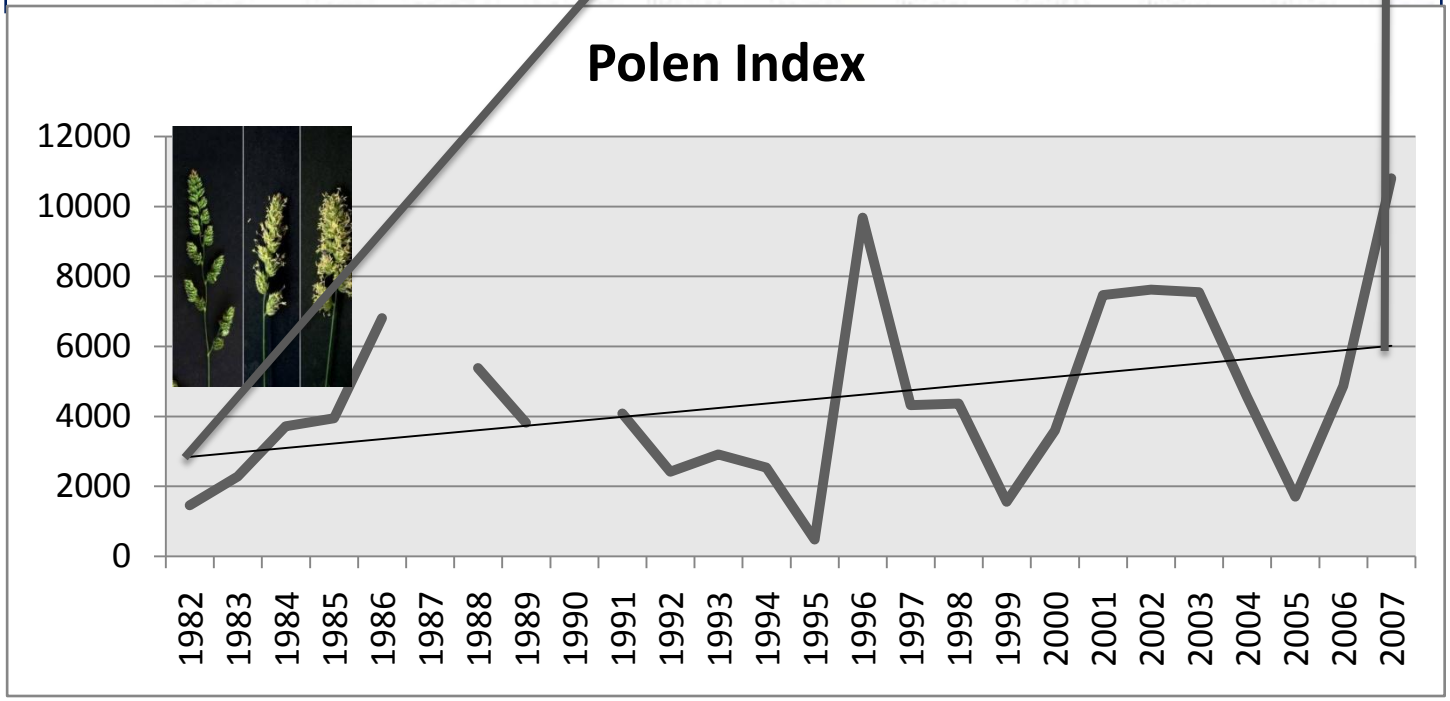

Ritmo de incremento de CO2 (ppm/año)
3,5
3
2,5
2
1,5
1
0,5
0
1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005

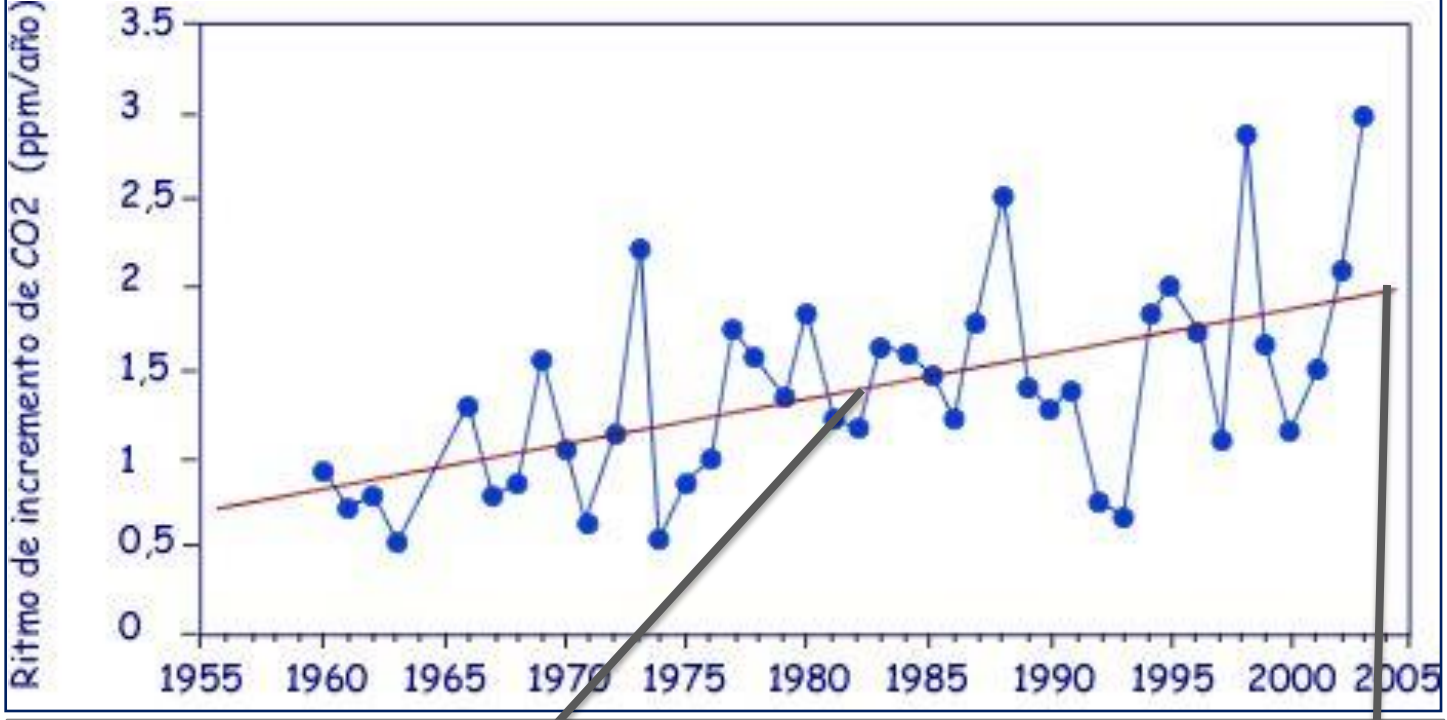

Pollen Index
10000
5000
0
1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006

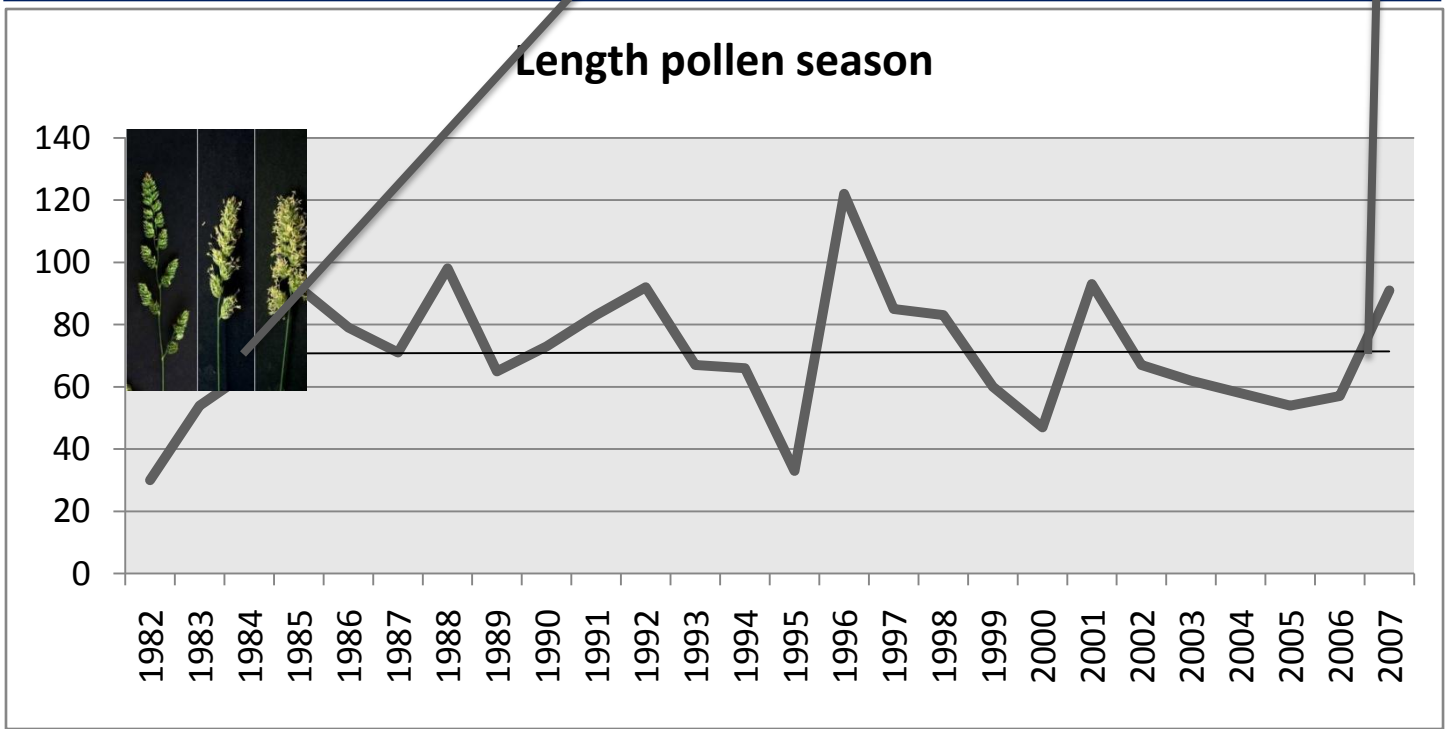

Ritmo de incremento de CO2 (ppm/año)
3,5
3
2,5
2
1,5
1
0,5
0
1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005


Length pollen season
100
50
0
1982 1983 1984 1985 1986 1987 1988 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006


Ritmo de incremento de CO2 (ppm/año)
3,5
3
2,5
2
1,5
1
0,5
0
1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005


Polen Index
12000
10000
8000
6000
4000
2000
0
1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007


Ritmo de incremento de CO2 (ppm/año)
3,5
3
2,5
2
1,5
1
0,5
0
1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005

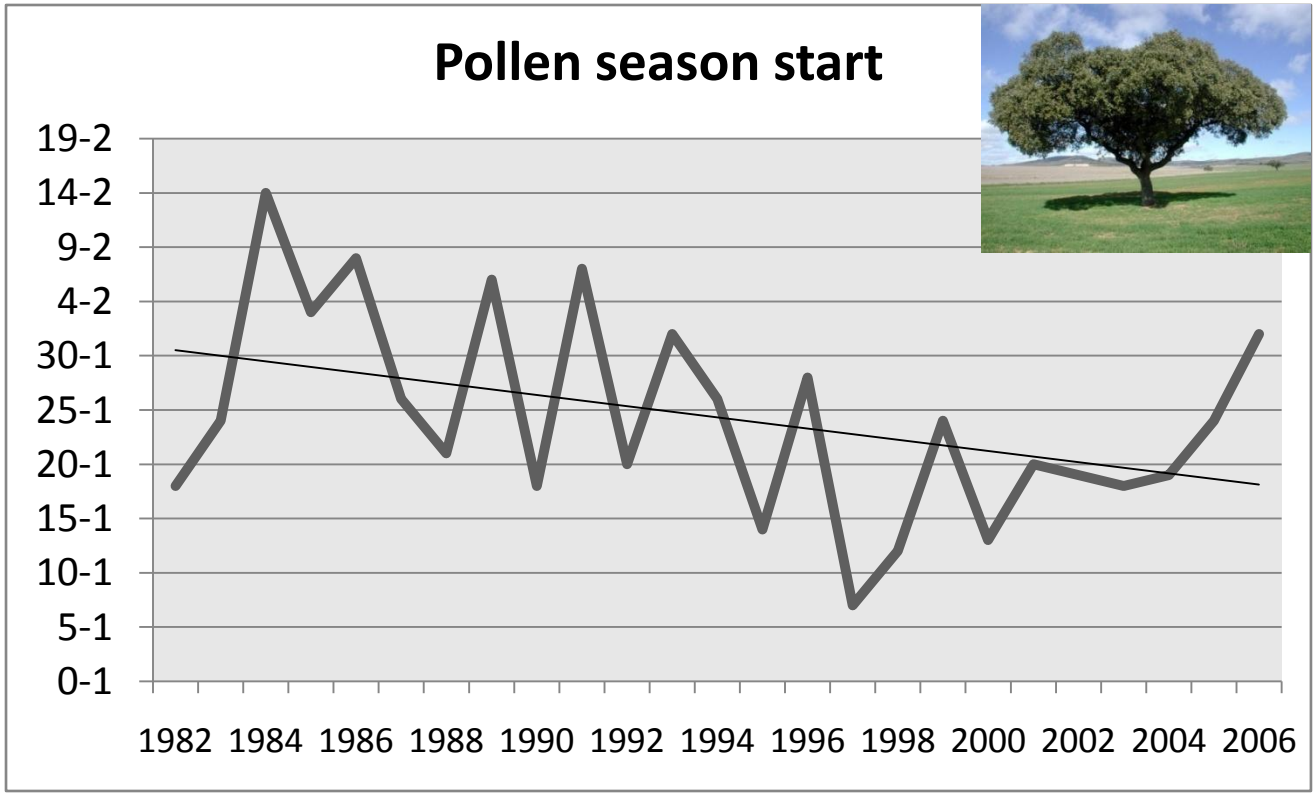

Length pollen season
140
120
100
80
60
40
20
0
1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

Recent impacts

2) Phenological changes

a) increase of temperature

earlier pollen season start in trees



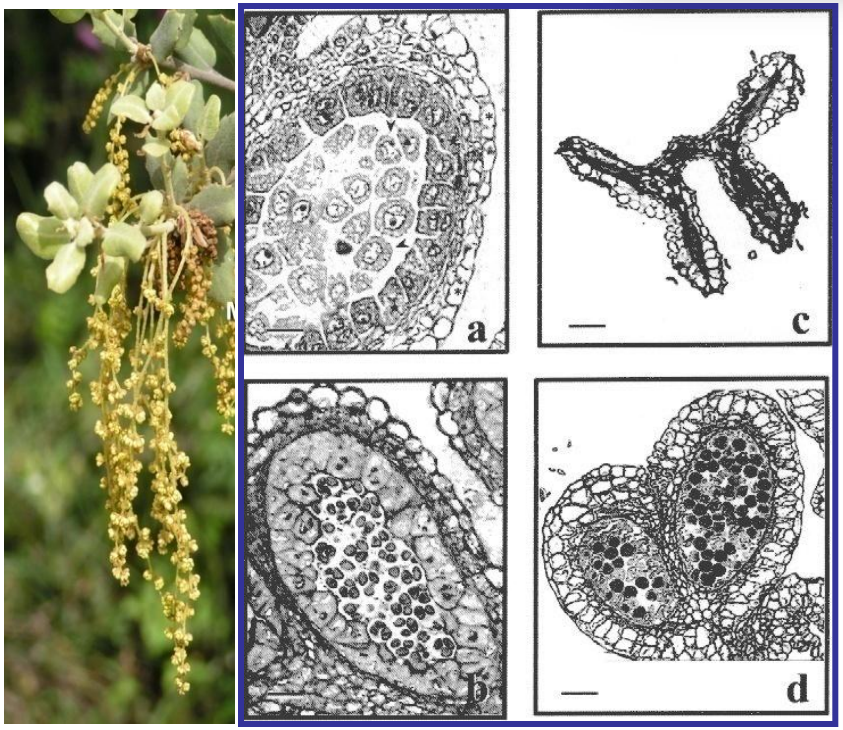
Recent impacts

2) Phenological changes

b) risk of exposure to extreme events

Due to the earlier onset of pollen seasons, the seasons are more often interrupted by adverse weather conditions in the late winter/early spring

Late frost provoked inhibition of vital cycle phases

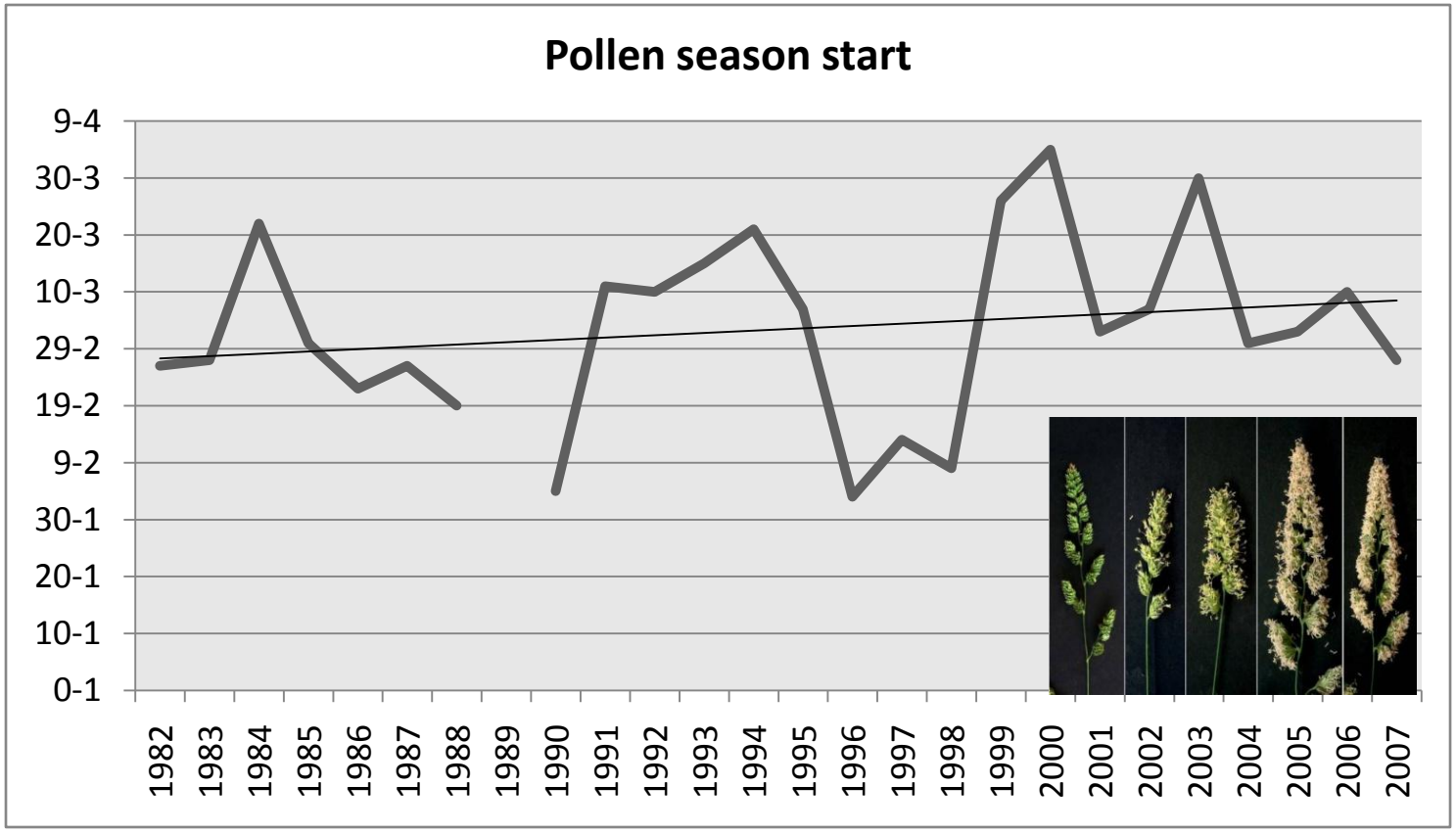


Recent impacts

2) Phenological changes

c) decrease water availability

later pollen season start in grasses

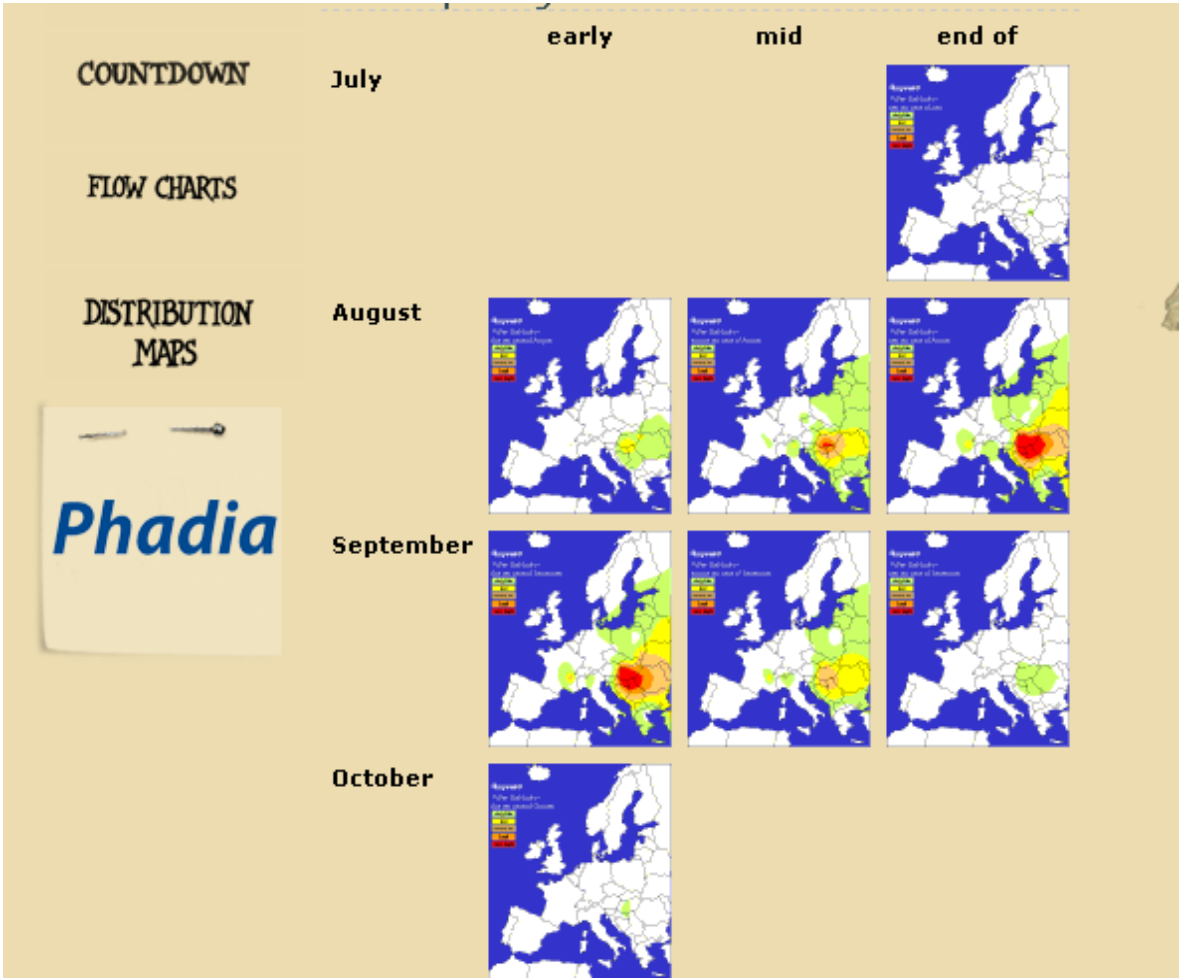


Recent impacts

3) Migrations

a) Latitudinal Migrations

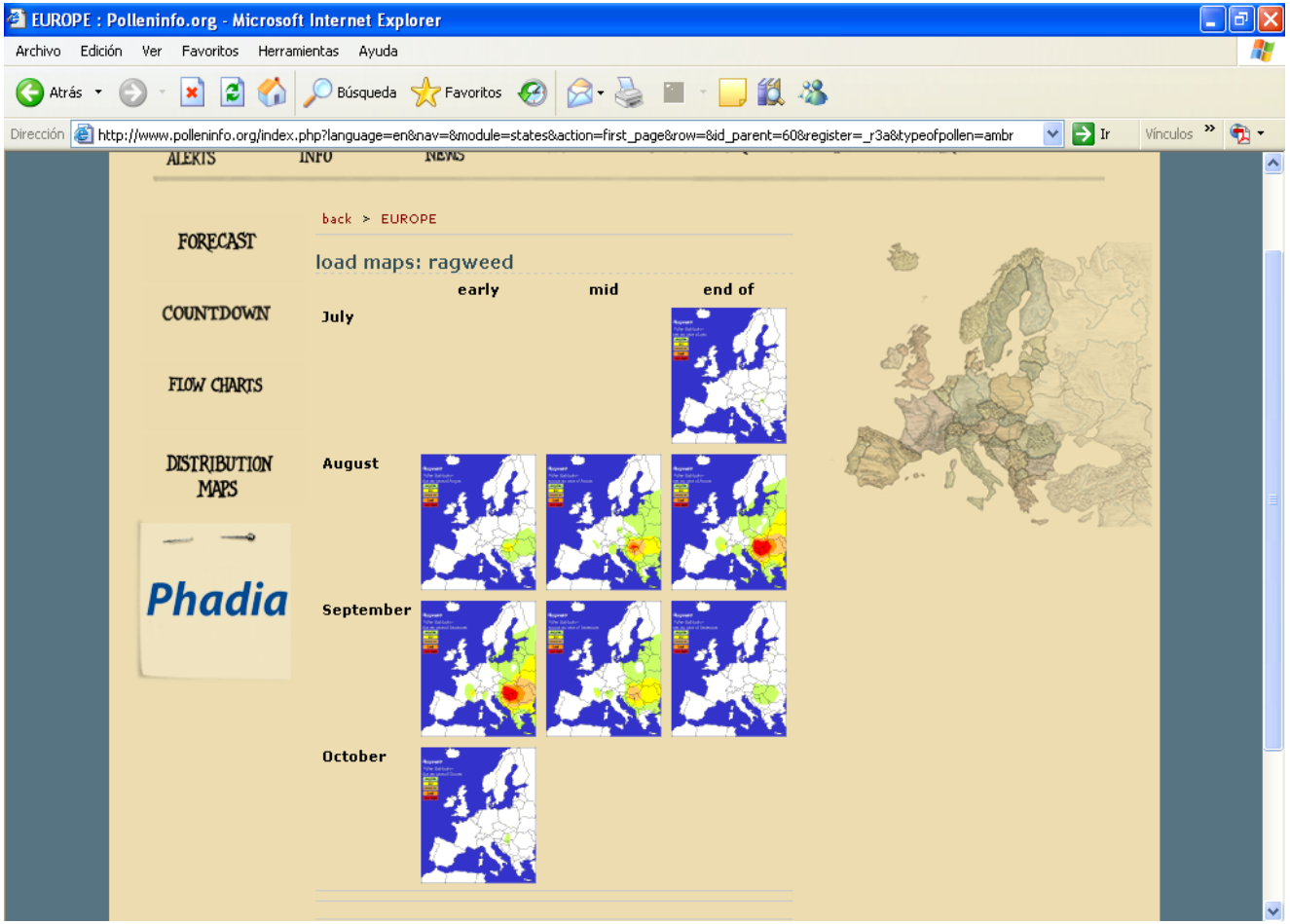
Ambrosia artemisifolia L



European Weed Research Society (EWRS)

EWRS Working Group on Invasive plants, February, 6th 2006.

The most cited: *Ambrosia artemisifolia* L (ragweed). A genus spread in North America and recently introduced in Eastern Europe. It is one of the main causes of pollinosis.



Recent impacts

3) Latitudinal and altitudinal migrations

b) Altitudinal Migrations

Warming and aridification will provoke the altitude expansion of woody and herb plants.

It will increment the fragmentation of vegetation

There is the need to better understand the relationship between the changing climate and allergic disorders, to better multidisciplinary collaboration, to improve forescasting accuracy and to test the effectiveness for forecasting methods

Phenology and Human Health: Allergic disorders.
Health and global environmental change
Report of a WHO meeting
Rome (Italy)16-17 January 2003