A study on the atmospheric pollen levels of *Artemisia* L. in Catalonia (NE Spain), 1994-2001.

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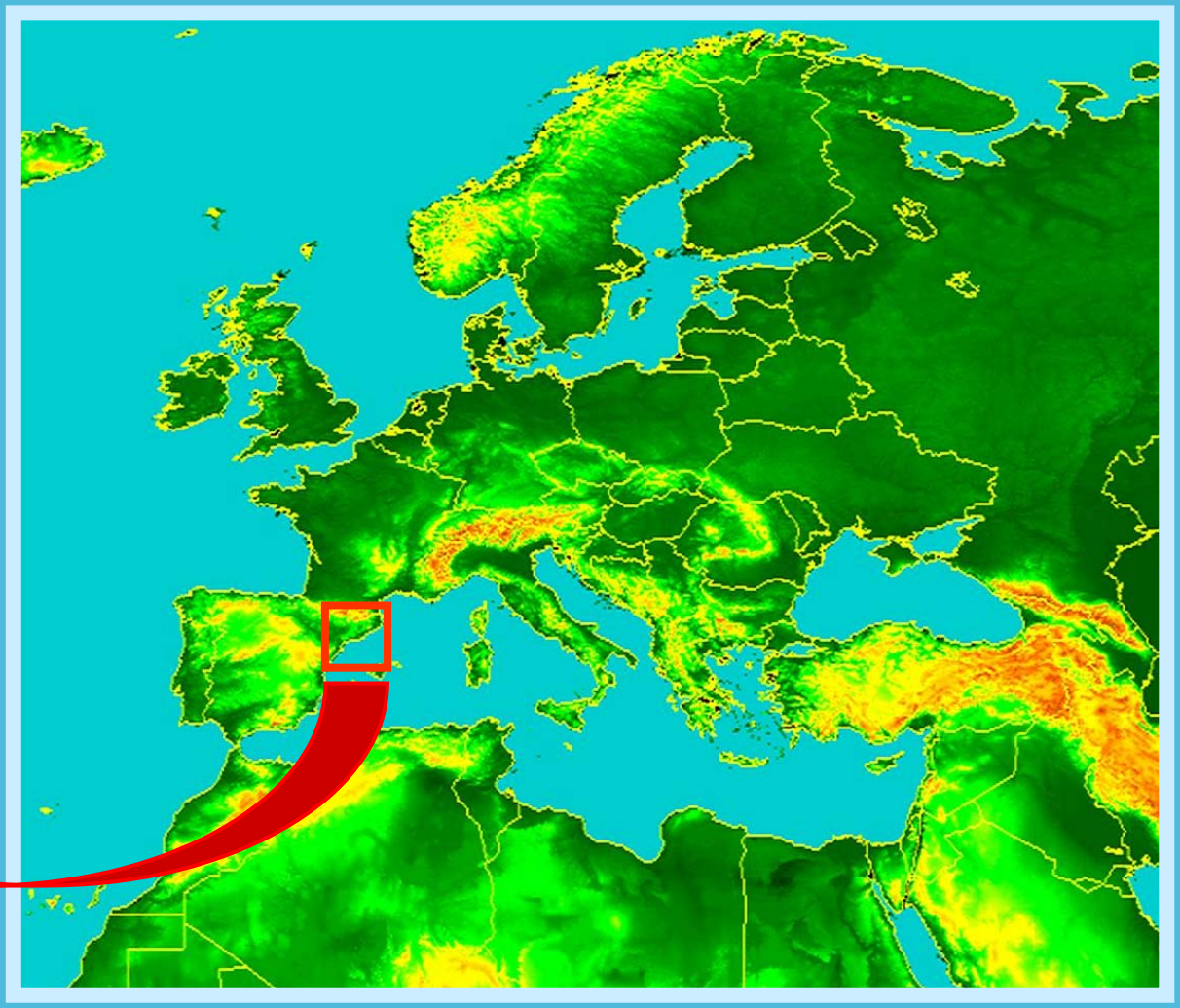
Objectives

- To list the *Artemisia* species diversity in Catalonia and related corology.
- To describe data series recorded: annual index, percentages, and maximum mean weekly and maximum mean daily concentrations.
- To plot the curves describing the dynamics of the mean weekly concentrations.
- To determine if there are any significant differences between sampling stations.
- To represent the allergenic risk levels of *Artemisia* pollen in Catalonia (XAC categorical data).

Aerobiological sampling station



Geographical and climatic characteristics

Aerobiological Sampling Stations (study period)	Geographical characteristics		Climatic characteristics		
	Altitude (m.a.s.l)	Geographical Coordinates	Mean Annual Temperature (ºC)	Annual Rainfall (mm)	Phytoclimates (1)
Barcelona (1994-2001)	12	41º24' N,02º11' E	16.4	593	Fresh-Tethyc-semiarid
Bellaterra (1994-2001)	190	41º33' N, 02º07' E	15.2	594	Fresh-Continental Oriental-semihumid
Girona (1996-2001)	70	41º59' N, 02º60' E	15.0	740	Fresh-Continental Oriental-semihumid
Lleida (1996-2001)	221	41º37' N, 00º37' E	15.1	385	Fresh-Transitional-semiarid
Manresa (1996-2001)	238	41º43' N, 01º50' E	13.6	619	Fresh-Continental Oriental-semihumid
Tarragona (1996-2001)	20	41º07' N, 01º15' E	15.8	478	Fresh-Tethyc-semiarid

(1). Allue, 1990

Material and methods

- 7-days Hirst spore traps (Hirst, 1952)
- Counting method proposed by REA (Domínguez, 1991)

- Mean daily and mean weekly Artemisia pollen concentrations
- Mean weekly pollen concentration expressed in terms of allergenicity risk in categorical data (Belmonte et al 2000)

- Basic statistics
- Spearman correlations
- Ward's method (tree clustering): Squared Euclidean distances

Artemisia diversity

	Nr species	% respect world	% respect Europe (5)	Nr endemic species (5)
World	300 (2)	-	-	-
Europe	57 (5)	19.0	-	-
Spain	17 (3)	5.7	29.8	3
Catalonia	14 (4)	4.7	24.6	1

(2) Mabberley, 1987 (3) www. programanthos. org (4) Bolòs & Vigo, 1995 (5) Flora Europea, 1976

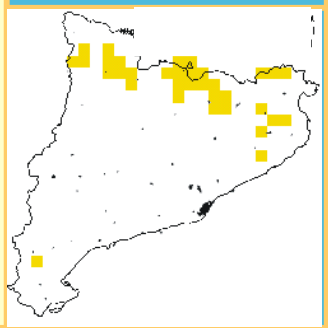
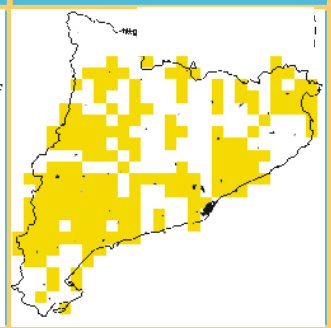
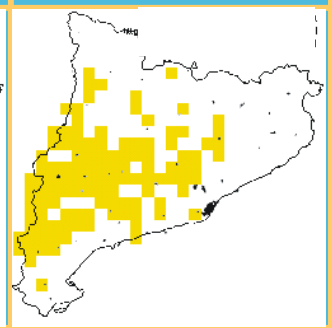
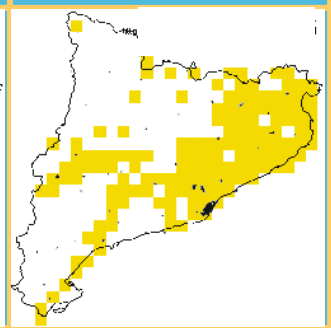
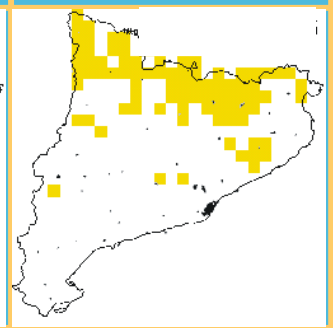
Artemisia species in Catalonia

Frequency (4)	*Artemisia* species (3)
R.R.	***A. alba*** Turra (*A. camphorata* Vill., *A. biasolettiana* Vis., *A. suavis* Jord., *A. lobelii* All., *A. incanescens* Jord.)
R.R.	***A. abrotanum*** L. (*A. paniculata* Lam., *A. procera* Willd., *A. elatior* Klokov, *A. proceriformis* Krasch., *A. herbacea* Ehrh. Ex Willd.)
R.R.	***A. absinthium*** L.
R.R.	***A. annua*** L.
R.R.	***A. arborescens*** L.
R.R.	***A. barrelieri*** Bess.
R	***A. caerulescens subsp. gallica*** (Willd.) K.M. Perss.
C.C.	***A. campestris subsp. campestris*** L. (*A. campestris subsp sericea* (Fr.) Lemke & Rothm., *A. sericophylla* Rupr., *A. marschalliana* Spreng., *A. inodora* M. Bieb, *A. dniproica* Klokov, *A. campestris subsp lednicensis* (Rochel) Lemke & Rothm., *A. campestris subsp inodora* Nyman)
C.C.	***A. campestris subsp. glutinosa*** Gay ex Bess. (*A. jussieana* J. Gay ex Besser, *A. variabilis* Ten., *A. glutinosa* Gay ex Besser)
R.R.	***A. chamaemelifolia*** Vill.
R.R.	***A. eriantha*** Ten. (*A. petrosa* (Baumg) Fritsch in Kern, *A. baumgartenii* Besser, *A. villarsii* Gen& Godr.)
C.C.	***A. herba-alba*** Asso (*A. aragonensis* Lam.)
R.R.	***A. umbelliformis*** Lam. (*A. mutellina* Vill., *A. grabiellae* Br.-Bl., *A. laxa* Fritsch)
C.C.	***A. verlotiorum*** Lamotte
C.C.	***A. vulgaris*** L.

R.R.	Very rare
R.	Rare
C.C	Very common

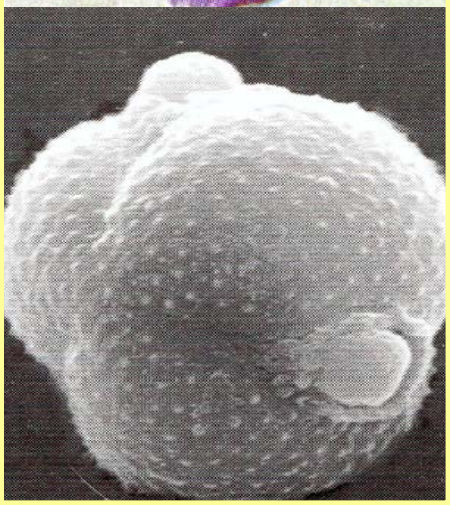
(3) www.programanthos.org (4) Bolòs & Vigo, 1995

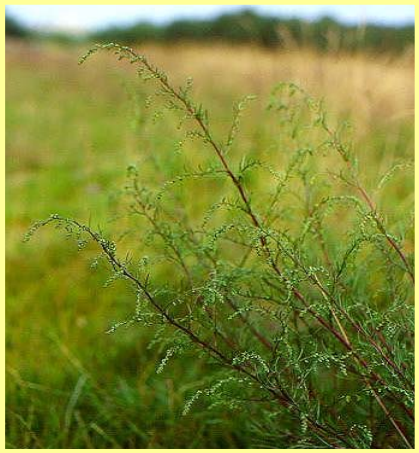
Common *Artemisia* species in Catalonia

	A. campestris subsp. *campestris* L.	*A. campestris* subsp. *glutinosa* Gay ex Bess.	*A. herba-alba* Asso	*A. verlotiorum* Lamotte	*A. vulgaris* L.
Altitude	750- 1580m	0-1500m	0-800m	0-600 (1400)m	200-1700m
Flowering period	(JL) AG - O	(JL) AG - O	(JN) S – D	JL - AG (S)	(JN) JL - S (N)
Habitat	Waste places	Waste places	Nitrophilous and dry scrubs (thyme thickests)	Nitrophilous areas and margins of wet cultures	Nitrophilous and dry places
Distribution (4) (6)	-Pyrennes -Most of continental Europe	-WMediteranean region (from Portugal to Italy and Sicilia)	-CE and S Spain -S Iran and Mediterranean region	-Mediterranean region - Asia E	-Humit Mediterranean region
					

(4) Bolós & Vigo, 1995 (6) www.biodiver.ub.es/biocat/homepage.htm

Artemisia





A. campestris

A. herba-alba

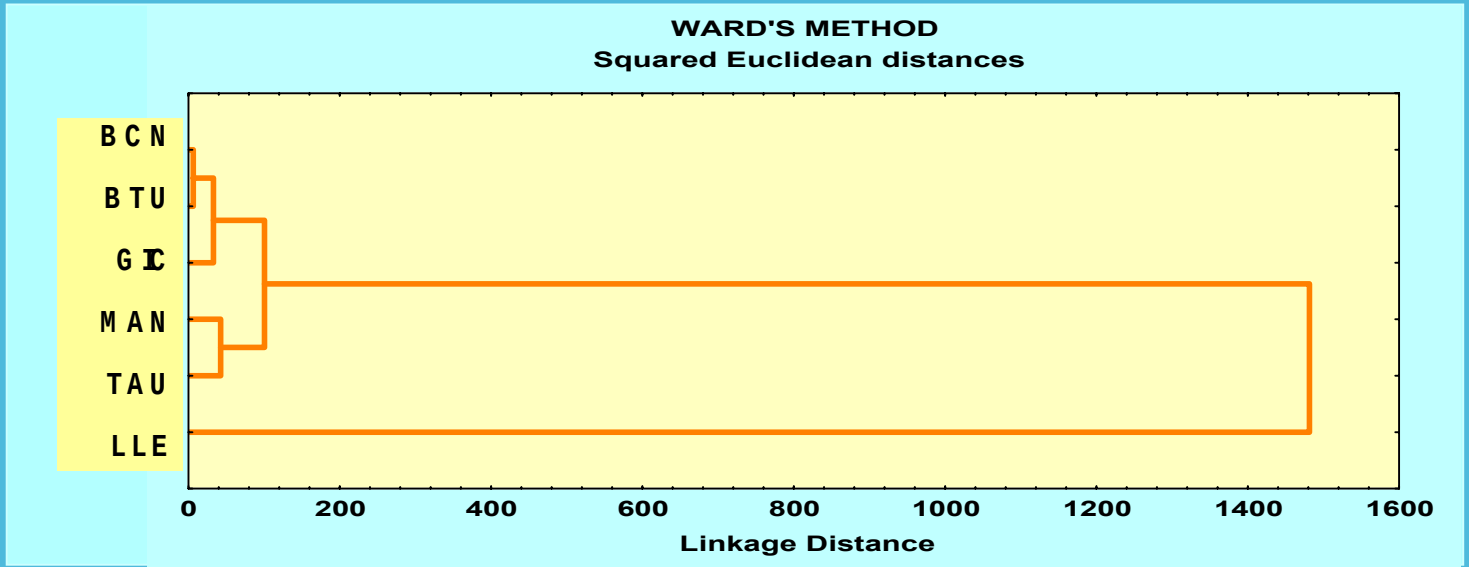
A. verlotiorum

A. vulgaris

Similitude between sampler stations

Spearman correlation P<0.001

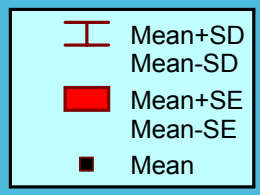
	BCN	BTU	GIC	LLE	MAN	TAU
BCN						
BTU	0,93					
GIC	0,83	0,91				
LLE	0,81	0,74	0,63			
MAN	0,94	0,91	0,83	0,88		
TAU	0,92	0,89	0,73	0,88	0,91	

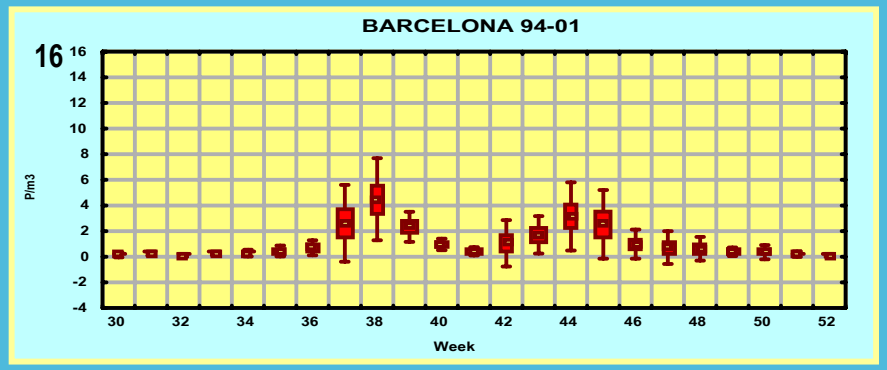


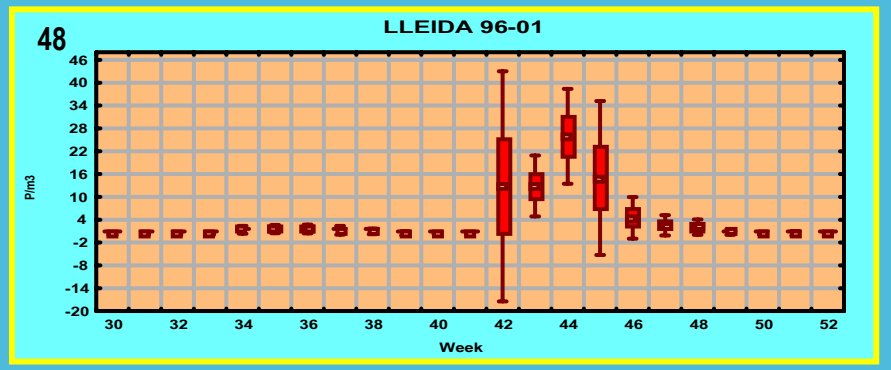
Annual pollen counts

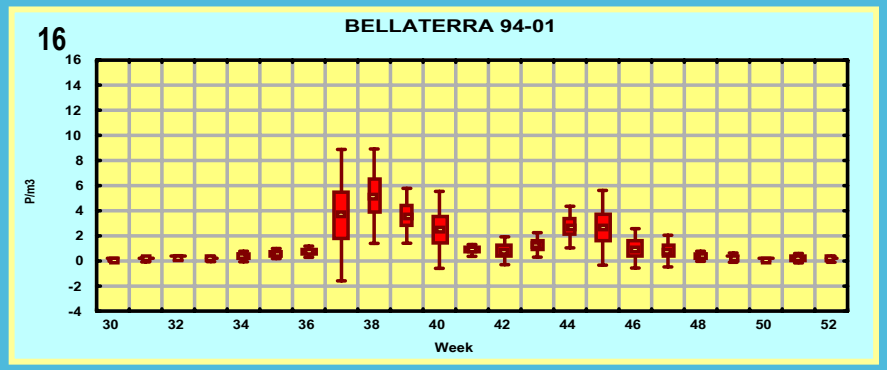
	ANNUAL				WEEKLY MAXIMUM		DAILY MAXIMUM	
	POLLEN INDEX	% TOTAL	% HERBS	% ASTERACEAE	Concentr. P/m³/week	Week Nr	Concentr. P/m³/day	Date mm dd
BARCELONA								
1994	76	0,2	1,2	62,8	2,8	39	7,7	S 20
1995	160	0,4	2,5	75,1	9,6	37	40,6	S 15
1996	244	0,5	2,8	69,9	8,6	38	17,0	S 18
1997	318	0,5	3,1	82,8	10,4	38	20,3	N 9
1998	186	0,3	2,7	70,5	6,9	44	16,8	O 31
1999	174	0,4	2,9	74,7	6,1	44	24,5	N 4
2000	128	0,2	2,1	70,3	2,6	45	7,7	N 4
2001	93	0,3	1,9	67,9	2,1	39	7,0	S 26
LLEIDA								
1996	1021	3,6	8,8	88,6	74,5	42	233,8	O 19
1997	1000	3,3	13,0	91,9	55,6	45	163,1	N 8
1998	521	1,4	4,0	78,2	40,6	44	62,3	O 31
1999	521	2,6	7,5	89,2	32,9	44	102,2	N 3
2000	233	1,0	3,5	77,2	13,6	44	22,4	O 31
2001	189	1,1	3,2	75,3	8,8	44	23,8	N 1
BCN 94-01	172	0,4	2,4	71,8	4,5	38	7,2	S 15
BTU 94-01	202	0,6	2,9	66,1	5,2	38	17,4	S 17
GIR 96-01	107	0,2	1,1	49,1	2,7	39	5,6	S 29
LLE 96-01	581	2,2	6,7	83,4	25,9	44	44,6	O 30
MAN 96-01	257	0,7	3,0	73,6	6,6	44	13,4	O 30
TAU 96-01	261	0,9	3,2	76,9	6,5	44	14,8	O 30

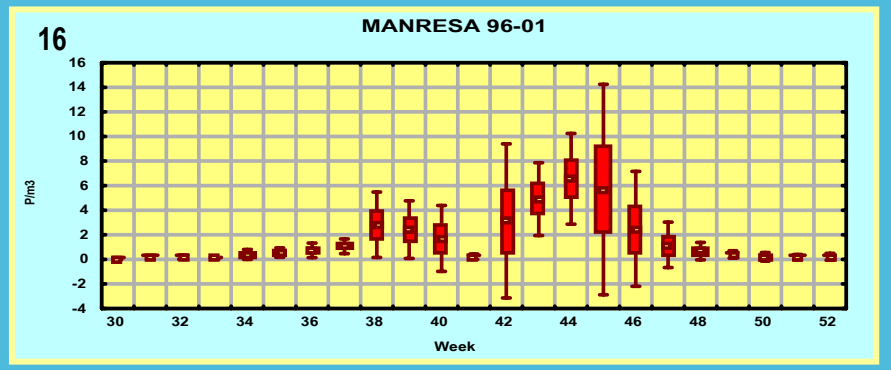
Mean weekly *Artemisia* pollen dynamics

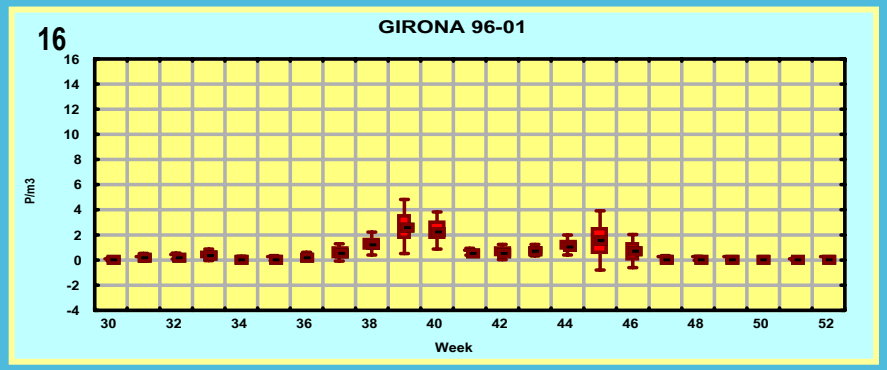


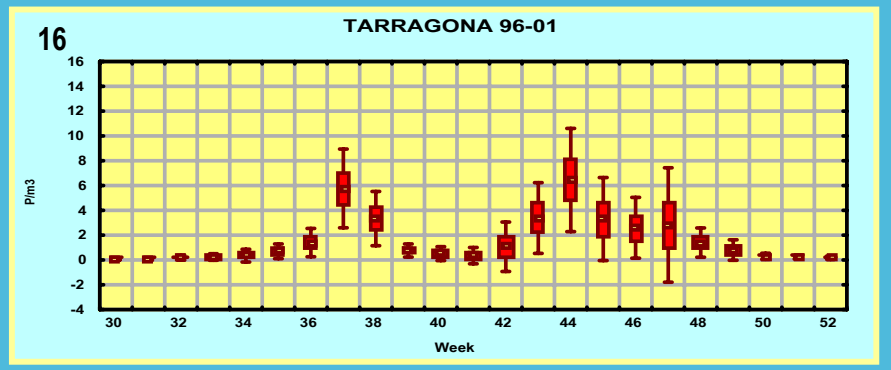




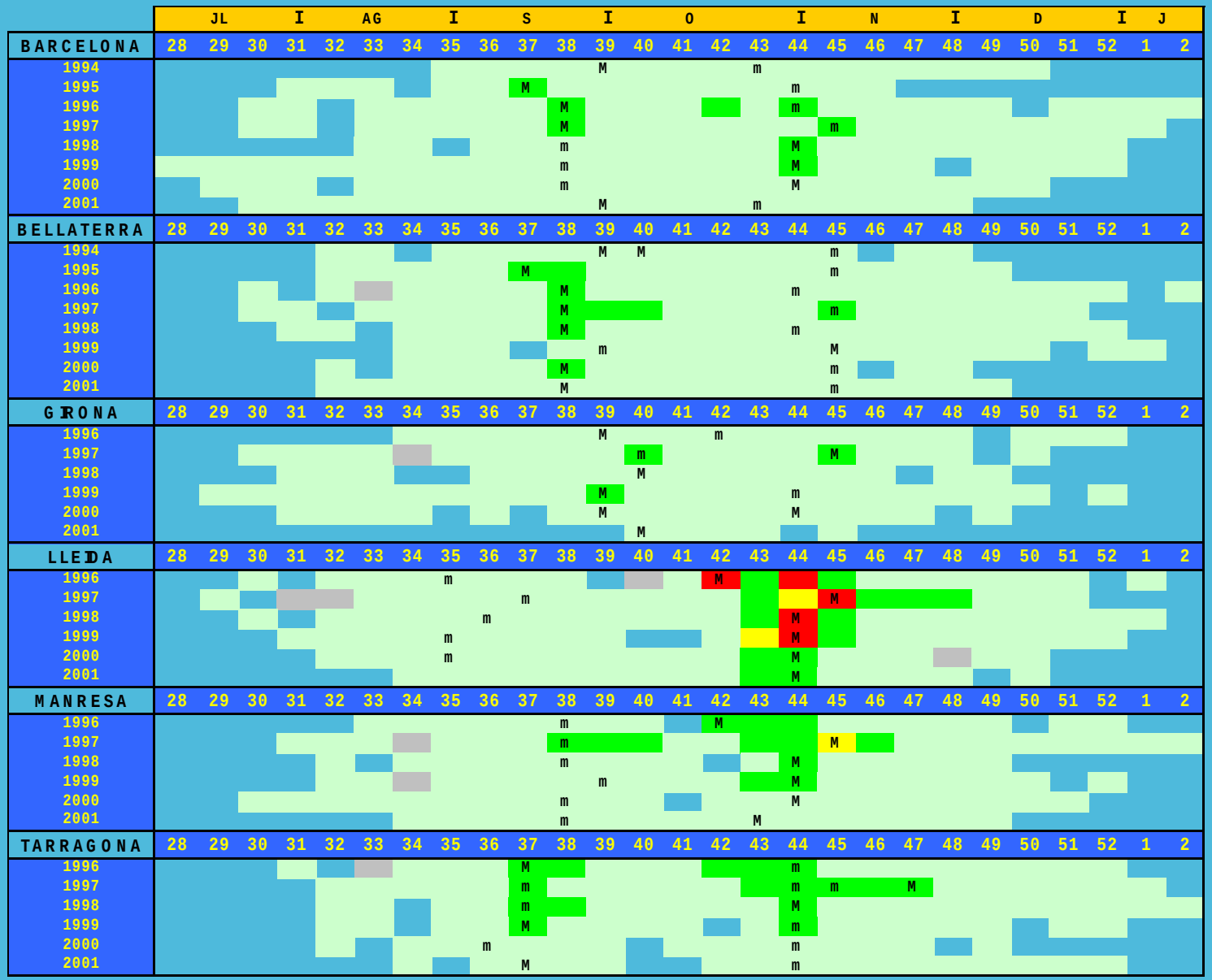








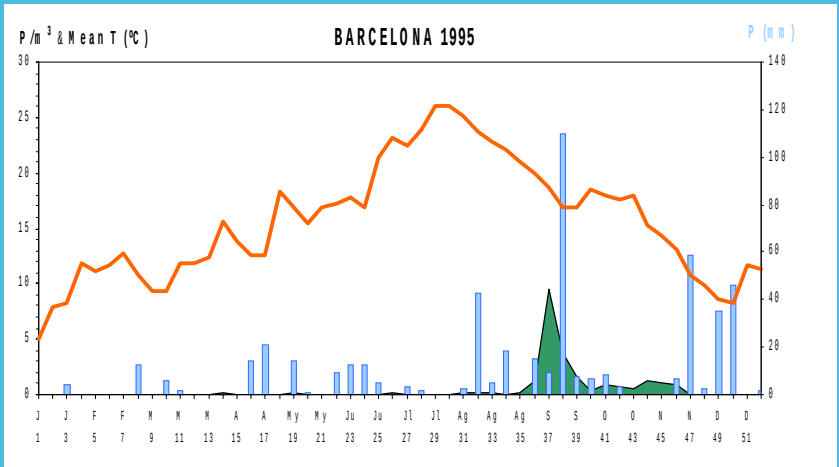
Artemisia pollen season

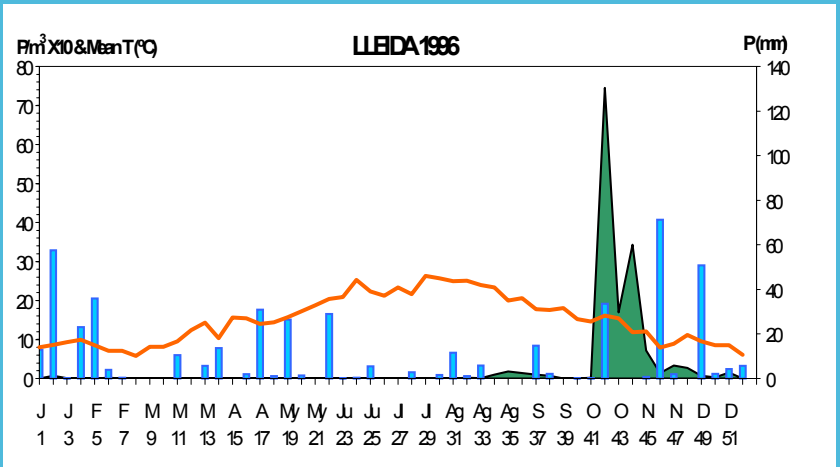


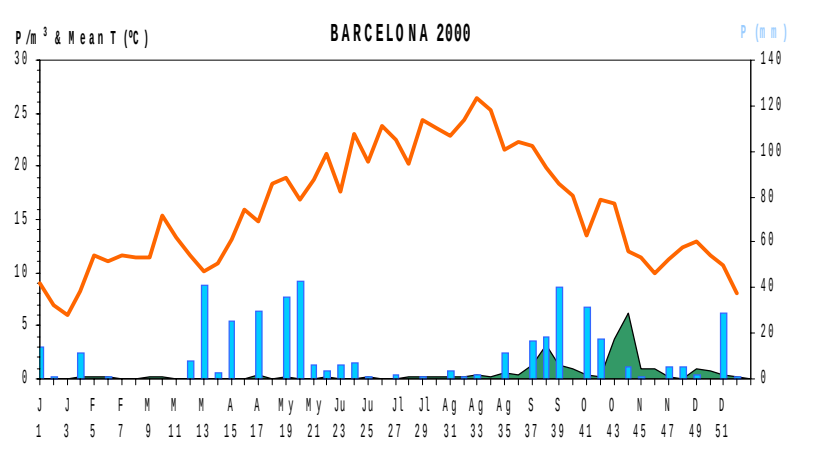
Categorical data (Belmonte et al 2000)	
	Whithout data
0	NULL = 0
1	0 > LOW < 5
2	5 > MEDIUM < 20
3	20 > HIGH < 30
4	VERY HIGH >30

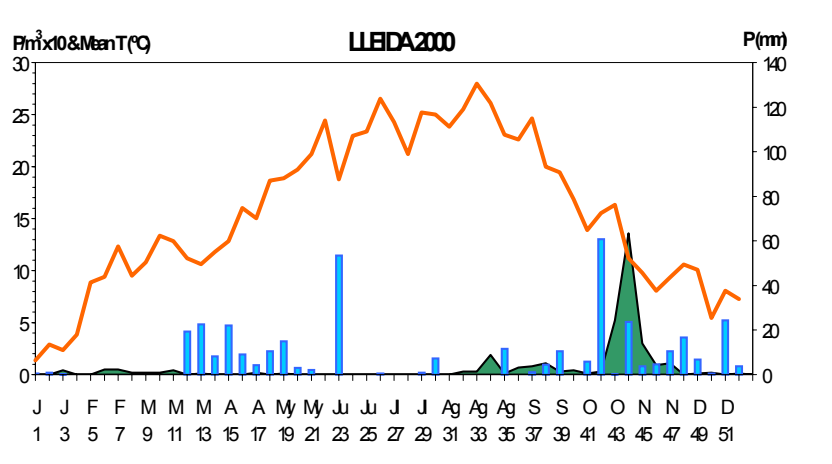
M	1st max peak
m	2nd max peak

Pollen and meteorology









Conclusions

- A similar behaviour pattern between all sampling station is observed except Lleida.
- Two pollen peaks are observed, possibly due to different *Artemisia* species. The first peak is more important in Barcelona, Bellaterra and Girona and is centred on week number 38(39). The second peak is important in Manresa and Tarragona, and specially important in Lleida. It is centred in week number 44(45).
- Considering categorical data allergenicity risk scale, only LLE presents very high values (level 4).
- More research will be done to progress in the understanding of *Artemisia* pollen in the atmosphere in Catalonia.

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