

Correlation between aerobiological and phytogeographical investigations in the Florence area

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ROMANO ZERBONI, MARIANGELA MANFREDI,
PAOLO CAMPI, PIER VIRGILIO ARRIGONI

SUMMARY. *The aim of our research work was to evaluate the results from our pollen count (p.c.) carried out at the Allergological Centre of Nuovo Osp. San Giovanni di Dio in Florence, in the light of orogeographical, phytogeographical and meteorological data.*

The highest p.c. was yielded by Graminaceae which appear in small quantities early in the year but increase considerably starting from April. Oleaceae too showed high pollen concentration but over a shorter length of time. The p.c. for Compositae and Urticaceae was lower. It should be noted that Cupressaceae yielded constantly high p.c. in February - March. Investigations on the allergenic flora of the surroundings were carried out concentrically in order to find out the closest and the farthest sources of pollen production. The species investigated come under 7 types of vegetation: xerophilous woods, mesophilous woods, conifers woods, parks and gardens, rural areas, meadows, border areas-weeds. A phytosociological study of the types of vegetation has made it possible to evaluate the single species quantitatively. The different sources of pollen production can be spotted by mapping these types of vegetation. The seasonal characterization of pollen production is better defined by means of periodical phenological checking of the existing allergenic flora along carefully planned routes through the areas next to the sampling station.

RIASSUNTO. *Lo scopo della ricerca è stato quello di valutare i risultati della conta pollinica effettuata presso l'U.O. di Allergologia e Immunologia Clinica del Nuovo Osp. S. Giovanni di Dio a Firenze, alla luce dei dati orogeografici, fitogeografici e meteorologici. I più alti valori di conta pollinica sono stati osservati per le Graminaceae, che compaiono precocemente in quantità modeste ma che raggiungono valori molto elevati a partire da Aprile; anche le Oleaceae hanno dato concentrazioni polliniche piuttosto elevate ma per un periodo più breve. La conta pollinica per Compositae ed Urticaceae è risultata più modesta; da segnalare la costante presenza di elevata conta pollinica per Cupressaceae in Febbraio-Marzo. Allo scopo di individuare le fonti prossime e remote della pioggia pollinica, sono state condotte, per aree concentriche, indagini sulla flora allergogena del territorio circostan-*

te. Le specie prese in considerazione possono essere ripartite in 7 tipi vegetazionali: boschi xerofili, boschi mesofili, boschi coniferati, parchi e giardini, zone agricole, zone prative naturali, aree marginali e piante infestanti. Una valutazione quantitativa delle singole specie viene desunta dallo studio fitosociologico dei tipi di vegetazione. La rilevazione cartografica di questi tipi permette di individuare le diverse fonti di provenienza del polline. La caratterizzazione stagionale della pioggia pollinica viene meglio definita mediante periodici controlli fenologici sulla flora allergogena esistente, lungo itinerari opportunamente scelti nelle zone prossime alla località di rilevazione.

Key words: Phenology, Phytogeography, Pollens.

Parole chiave: Fenologia, Fitogeografia, Pollini.

Romano Zerboni, Mariangela Manfredi, Paolo Campi, Allergologia ed Immunologia-U.O. Multizonale Nuovo Ospedale San Giovanni di Dio-Firenze.

Pier Virgilio Arrigoni, Laboratorio di Fitogeografia-Dipartimento di Biologia vegetale Università di Firenze.

1. INTRODUCTION

A pollen calendar will certainly be most useful whenever it corresponds as precisely as possible to the phytogeographic reality of the sampling area, even if this correspondence is not total for orogeographic and meteorological reasons as well as for reasons depending on the morphology, physiology and ecology of the species present in the area under investigation.

We present the preliminary data of our research whose principal aims were:

a) to check if there is a good correlation between aerobiological and phytogeographical data from our area;

b) to try to understand the reasons of certain discordances, for example between the presence of some plants in the surrounding area and the absence of their pollen in the calendar:

c) to get to know, for each taxon, the presence and abundance in the area and the flowering period with phenological checking especially for those families for which it is difficult to differentiate genera and/or species

under the optical microscope;

d) finally to select the allergen panel for testing in our area.

This research has been carried out by our Allergological Centre since 1984 together with the Laboratory of Phytogeography, Department of Vegetal Biology at the University of Florence.

2. METHODS AND MATERIALS

Pollen sampling was performed by a seven day recording volumetric pollen trap. It is a Lanzoni model VPPS 2000 working in accord to international standards (Hirst, 1952). It is placed on the roof of our hospital at about 20 m. above ground level.

In our area pollination starts with the Cupressaceae family in February-March with very high values; it goes on with Betulaceae, Salicaceae (March) and Corylaceae later on in April. The most widely represented are Graminaceae from April to July. In May-June there are Fagaceae and Oleaceae and from May to September we have Urticaceae with a drop between July

and August; Compositae are poorly represented with two peaks: one in May and the other from August to October (Zerboni et al., 1986).

Our hospital is in a suburb south west of Florence, in a wind-swept area; north of it there is the river Arno plane with housing estates, parks and gardens. At the extreme north edge of this plane there are reasonably high mountains-M.te Morello, 934 meters high, M.te Senario, 815 meters high. East and south of this station there is hilly country with peaks from 100 to 400 meters high. In the west there is flat country with the urban area of Scandicci interspersed with cultivated areas.

Meteorological data were supplied by a station placed on the roof of the Hospital and equipped with these sets:

- hygrothermograph
- pyranograph
- anemograph

and also by the Ximeniano Observatory of Florence.

The most useful findings for this type of survey are those about the direction of the wind. For the past twenty years Ximeniano Observatory has been carrying out an investigation on the winds which are predominant in Florence. This study has revealed that in the coldest months the winds mostly blow from north-east and south-east whereas in the warmer months-from april to september-when pollination is at its peak, they blow from west and south-west that is from flat areas intensively cultivated and from the hills both cultivated and covered with woods (Tab. I).

This research work on meteorological conditions and pollen rain will continue for many years to come, in order to try and obtain predictive data on the trend of pollen count on the basis of meteorological forecast by a

Table I. Frequency of winds according to month and direction in 1985.



FREQUENCY OF WINDS ACCORDING TO MONTH AND DIRECTION IN 1985

MONTH	N	NE	E	SE	S	SW	W	NW
JANUARY	0	11	1	(14)	1	4	0	0
FEBRUARY	0	9	0	(13)	0	4	2	0
MARCH	0	10	0	(12)	0	5	4	0
APRIL	0	8	0	1	1	6	(14)	0
MAY	0	4	0	(12)	0	4	11	0
JUNE	0	2	0	8	0	6	(14)	0
JULY	0	2	0	10	0	1	(18)	0
AUGUST	0	5	0	3	0	7	(16)	0
SEPTEMBER	0	3	0	9	0	0	(18)	0
OCTOBER	0	8	2	(19)	0	0	2	0
NOVEMBER	0	9	0	(10)	1	8	1	0
DECEMBER	0	3	0	(16)	4	7	1	0
T O T A L	0	74	3	127	7	52	101	0

* FREQUENCY = DAYS PER MONTH IN WHICH THIS DIRECTION IS PREVALENT

computed program.

The phenological checking of the flowering period on location was done for some species which were particularly interesting from an allergological point of view: *Cupressus sempervirens* L., *Populus x euroamericana* Guinier, *Salix* sp., *Juniperus communis* L. *Poa pratensis* L., *Quercus pubescens* Willd., *Pinus Pinea* L., *Erica arborea* L., *Olea europaea* L. *Plantago major* L., *Parietaria diffusa* Mert. et Koch, *Artemisia vulgaris* L. Our observations were carried out every ten days in 1986 through carefully planned routes in the area next to the sampling station. Marcello scale was used to express the intensity of flowering (Marcello, 1935).

For example we report the data relating to the flowering of two species of Cupressaceae (*Cupressus sempervirens* L. and *Juniperus communis* L.) and of two species of Oleaceae

(*Fraxinus ornus* L. and *Olea europaea* L.). Actually for these families it is not easy to distinguish the pollen of one species from that of the other. For Cupressaceae it comes out that the flowering is in accordance with the pollination: the first peak refers to *Cupressus sempervirens* L. and the second to *Juniperus communis* L. (Fig. 1). For Oleaceae the first peak refers to *Fraxinus ornus* L. The pollination of *Olea europaea* L. comes from the few individuals undamaged by frost in 1985 and is responsible of the second peak (Fig. 2).

In relation to the phytogeographical survey we used the following methods for assessing the presence and number of the allergological plants in the area investigated.

There certainly is a relationship between pollen rain and the types of vegetation present in the area. The study of vegetation and of the

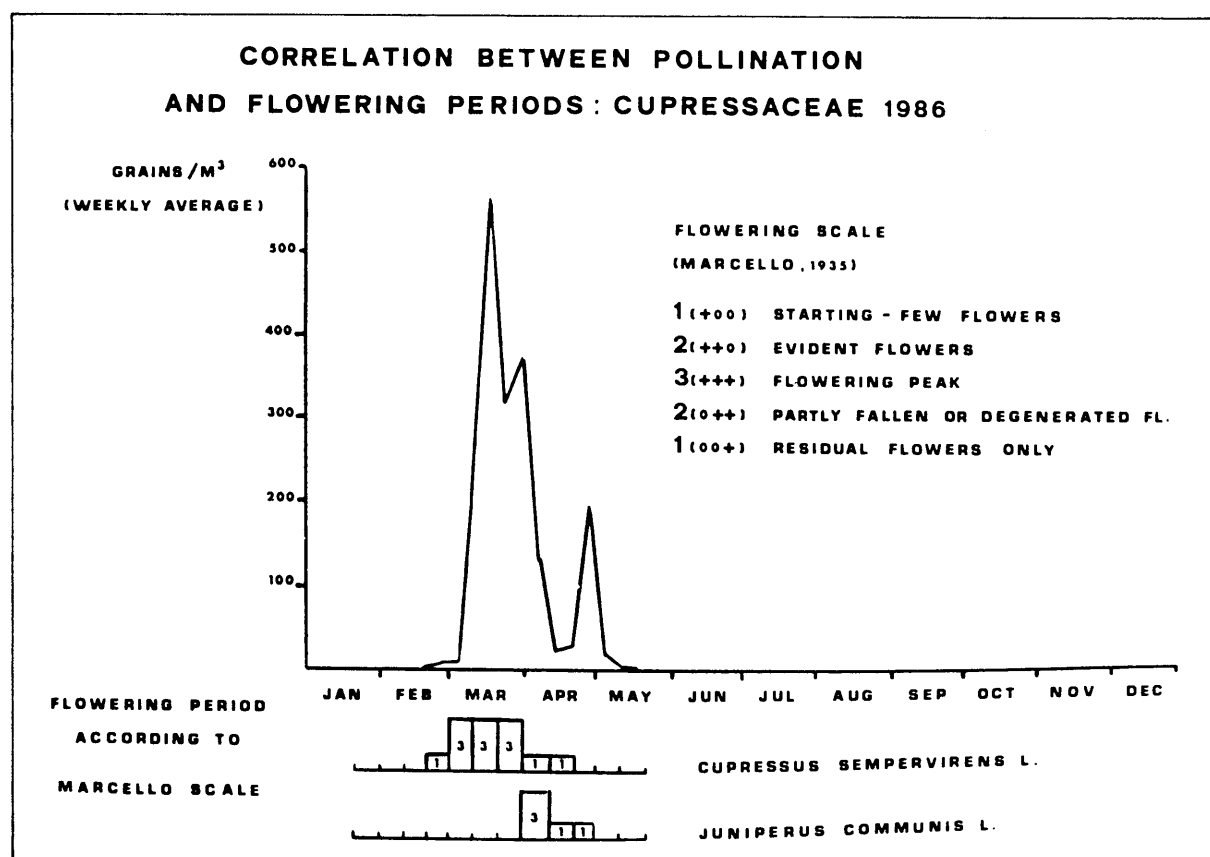


Figure 1. Correlation between flowering and pollination periods concerning Cupressaceae.

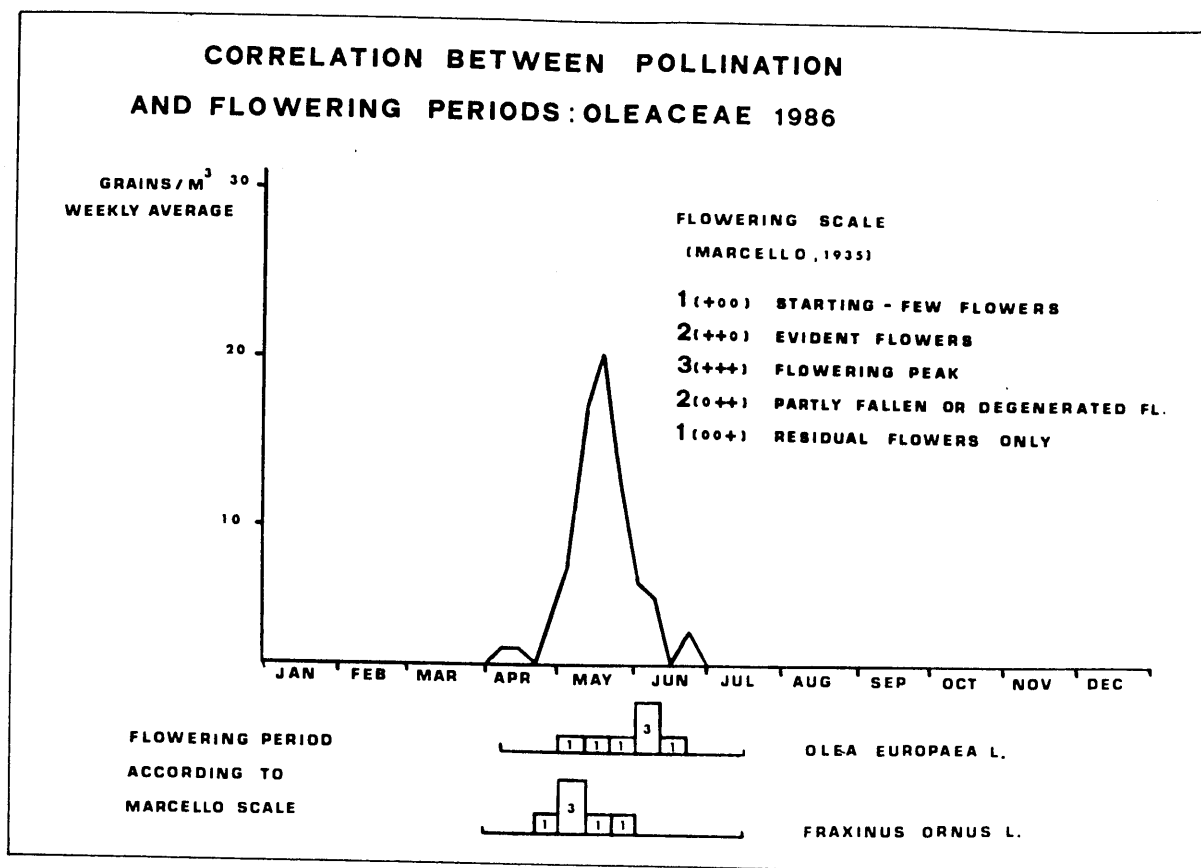


Figure 2. Correlation between flowering and pollination periods concerning Oleaceae.

floristic composition of its principal types is a means to spot the sources of pollen in a specific area. For this type of research three areas surrounding S. Giovanni di Dio Hospital and measuring 5, 10, 20 Km. in radius respectively, have been used (Fig. 3). We believe that, according to reports from the literature, most of the pollens collected with our trap come from this area. Only with reference to plants either proved or suspected of being allergenic, we collected the floristic data reported in the literature for the area mentioned before (Tabb. II, III, IV). These data provide a good indication of the frequency of these species in the territory.

Next we went through the circular areas making observations and assessing the vegetation by collecting data on the abundance-dominance of the species (according to Braun-Blanquet).

The data from references, those from our

field survey and experience have been synthetized and evaluated according to this conventional scale of abundance-dominance:

- 5 = species abundant in the area investigated
- 4 = frequent
- 3 = well represented
- 2 = scarcely present
- 1 = rare
- + = very rare.

Allergenic plants have been considered in relation to 7 types of vegetation into which are grouped those plants present in the area investigated. In the area surrounding our hospital there is flat land, highly urbanized areas, intensively cultivated zones and hilly country, covered with woods, olive groves and vineyards. Parks and gardens are very important for the production of certain types of pollen in the urban area. In them there are Betulaceae, Cupressaceae, Pinaceae, Salicaceae

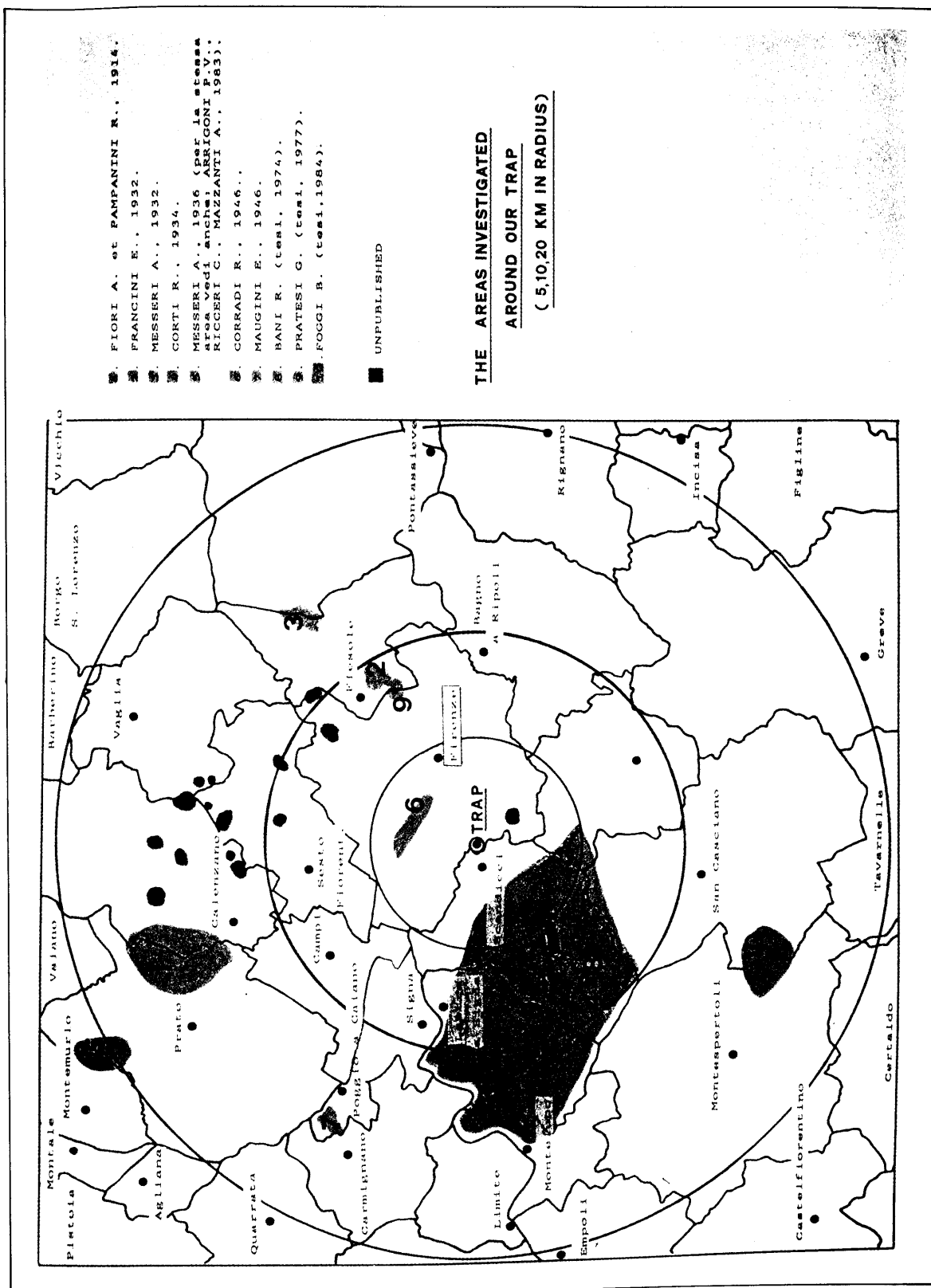


Figure 3. The areas investigated around our trap (5, 10, 20 Km. in radius): in yellow data from references, in green data from our field survey.

Table II. Floristic data from references concerning the area investigated.

	Foggi B. 1984	Protesi G. 1977	Boni R. 1974	Corradi R. 1946	Maugini E. 1945	Messeri A. 1936	Corti R. 1934	Francini E. 1932	Messeri A. 1932	Fiore A. et Pomponini R. 1914
• <i>Abies alba</i> Miller										
• <i>Acer campestre</i> L.										
• <i>Aesculus hippocastanum</i> L.										
• <i>Agrostis stolonifera</i> L. (incl. <i>A. alba</i> L.)										
• <i>Anthoxanthum odoratum</i> L.										
• <i>Artemisia verlutorum</i> Lamotte										
• <i>Artemisia vulgaris</i> L.										
• <i>Artemisia</i> sp. pl.										
• <i>Castanea sativa</i> Miller										
• <i>Chenopodium album</i> L.										
• <i>Chenopodium</i> sp. pl.										
• <i>Corylus avellana</i> L.										
• <i>Cupressus sempervirens</i> L.										
• <i>Cynodon dactylon</i> (L.) Pers.										
• <i>Dactylis glomerata</i> L.										
• <i>Dryopteris filix-mas</i> (L.) Schott										
• <i>Elymus repens</i> (L.) Gould										
• <i>Equisetum telmateia</i> Ehrh.										
• <i>Erica arborea</i> L.										
• <i>Erica scoparia</i> L.										
• <i>Fagus sylvatica</i> L.										
• <i>Festuca arundinacea</i> Schreb. (<i>F. Protensis</i> Huds.)										
• <i>Festuca</i> sp. pl.										
• <i>Fraxinus ornus</i> L.										
• <i>Helianthus tuberosus</i> L.										
• <i>Holcus lanatus</i> L.										
• <i>Hordeum bulbosum</i> L.										
• <i>Humulus lupulus</i> L.										
• <i>Juniperus communis</i> L.										
• <i>Ligustrum vulgare</i> L.										
• <i>Lilium bulbiferum</i> L. (incl. <i>L. croceum</i> Chaix)										
• <i>Lolium multiflorum</i> Lam.										
• <i>Lolium perenne</i> L.										
• <i>Lolium</i> sp. pl.										

Table III. Floristic data from references concerning the area investigated.

	Foggi B. 1984	Protesi G. 1977	Boni R. 1974	Corradi R. 1946	Maugini E. 1945	Messeri A. 1936	Corti R. 1934	Francini E. 1932	Messeri A. 1932	Fiore A. et Pomponini R. 1914
• <i>Medicago sativa</i> L.										
• <i>Medicago</i> sp. pl.										
• <i>Mercurialis annua</i> L.										
• <i>Olea europaea</i> L.										
• <i>Osmunda regalis</i> L.										
• <i>Ostrya carpinifolia</i> Scop.										
• <i>Papaver rhoeas</i> L.										
• <i>Parietaria diffusa</i> Mert. et Koch										
• <i>Phillyrea latifolia</i> L.										
• <i>Phleum pratense</i> L.										
• <i>Pinus pinaster</i> Ait.										
• <i>Pinus pinea</i> L.										
• <i>Plantago lanceolata</i> L.										
• <i>Plantago major</i> L.										
• <i>Plantago media</i> L.										
• <i>Plantago</i> sp. pl.										
• <i>Platanus</i> sp. pl.										
• <i>Poa annua</i> L.										
• <i>Poa pratensis</i> L.										
• <i>Poa</i> sp. pl.										
• <i>Polygonum</i> sp. pl.										
• <i>Populus alba</i> L.										
• <i>Populus nigra</i> L. (incl. <i>P. americana</i>)										
• <i>Quercus cerris</i> L.										
• <i>Quercus ilex</i> L.										
• <i>Quercus pubescens</i> Willd.										
• <i>Quercus robur</i> L.										
• <i>Quercus suber</i> L.										

Table IV. Floristic data from references concerning the area investigated.

	Fiori A. et Pomponini R. 1914	Messeri A. 1932	Francini E. 1932	Corti R. 1934	Messeri A. 1936	Mougin E. 1946	Corti R. 1946	Boni R. 1974	Pratesi G. 1977	Foggi B. 1984
• Ranunculus bulbosus L.					+					
• Ranunculus sp. pl.					+	+	+			
• Robinia pseudoacacia L.					+	+	+			+
• Rumex sp. pl.					+	+	+			
• Salix sp. pl.					+	+	+			
• Sambucus ebulus L.										
• Sambucus nigra L.										
• Solidago sp. pl.										
• Sorghum halepense (L.) Pers.					+					
• Tilia sp. pl.										
• Trifolium pratense L.										
• Trifolium sp. pl.										
• Tulipa sp. pl.										
• Ulmus minor Miller										
• Urtica sp. pl.										

and Ulmaceae.

The types of vegetation considered are the following:

– *Xerophilous woods*: they mostly consist of coppice and rarely of tall trees of pubescent oak (*Quercus pubescens* Willd.). They are located on the hill slopes limiting the Florentine plane. They usually look south but, when the soil is particularly dry for the geomorphologic characteristics of the substrate, they progressively increase in sclerophyllous evergreens peculiar to the even drier woods of ilex (*Quercus ilex* L.). The most significant allergenic species of this type of vegetation are: *Quercus pubescens* Willd., *Quercus ilex* L., *Phillyrea latifolia* L., *Phillyrea angustifolia* L., *Erica arborea* L., *Juniperus communis* L.

– *Mesophilous woods*: under this heading come Turkey oak woods (*Quercus cerris* L.) and hop hornbeam woods (*Ostrya carpinifolia* Scop.). They favour the cooler northern sites, the higher areas up to a thousand meters above sea level and deeper soils.

Chestnuts appear sporadically in this type of wood, on siliceous substrate (*Castanea sativa* Mill.) and form loam of anthropic origin. The most significant species are: *Quercus cerris* L., *Ostrya carpinifolia* Scop., *Sambucus nigra* L., *Corylus avellana* L., *Castanea sativa* Mill., *Ligustrum vulgare* L., *Robinia pseudoacacia* L.

– *Conifers woods*: Generally, these woods are classified as pine-woods or cypress groves (*Pinus pinea* L. or *Pinus pinaster* Ait. and *Cupressus sempervirens* L.). Actually they are almost always woods of broadleaf plants (*Quercus pubescens* Willd., *Quercus cerris* L. etc.) variably degenerated and reforested with conifers. Our survey showed the constant presence of Fagaceae together with Pinaceae or/and Cupressaceae. Woods of conifers are reasonably frequent on the hills north and south Florence. Significant species are: *Cupressus sempervirens* L., *Pinus pinea* L., *Pinus pinaster* Ait., *Pinus nigra* L., *Fraxinus ornus* L., *Quercus pubescens* Willd.

– *Parks and gardens*: they are particularly frequent in the urban area and immediately outside Florence and therefore in the circular areas 5 and 10 Km. in radius. As shown by these data, the ornamental areas – parks and gardens – are a very important source of pollen from *Olea europaea* L., Graminaceae, Leguminosae, Compositae etc. Significant species are: *Cupressus sempervirens* L., *Quercus ilex* L., *Cedrus libani* Rich., *Aesculus hippocastanum* L., *Thuya orientalis* L., *Populus alba* L., *Tilia* sp., *Pinus* sp.

– *Rural areas*: we can distinguish between farmland in the flat area, where specialized cultivation prevails, and hilly area, where there

are different types of cultivations. In the farmland there is often a marked production of well defined types of pollen, for example *Helianthus annuus* L., *Triticum* sp., *Beta* sp. From the hills we can have substantial production of pollen from *Olea europaea* L., Gramineae, Leguminosae, Compositae etc. Significant species are: *Helianthus annuus* L., *Olea europaea* L., *Medicago sativa* L., *Trifolium pratense* L., *Zea mays* L., *Xanthium strumarium* L., *Spinacia oleracea* L., *Sorghum halepense* L.

— *Meadows*: They are grassland within woods (clearings) or cultivated lands (uncultivated land). It is generally a transitory type of vegetation which is frequent enough. Significant species are: *Dactylis glomerata* L., *Holcus lanatus* L., *Lolium perenne* L., *Papaver rhoeas* L., *Brachypodium* sp., *Festuca* sp.

— *Border areas of cultivated land and weeds*: farmland always has edges which are seldom or never cultivated and in which grow different

grasses. Partly they are species also found in meadows but more frequently we find in these border areas specialized species which settle easily and are capable of producing a large quantity of pollen. Even more specialized are weeds capable of cohabiting with cultivated plants or of developing in short period of time between cultivations. Significant species are: *Cynodon dactylon* L. Pers., *Parietaria diffusa* Mert. et Koch, *Helianthus tuberosus* L., *Polygonum* sp., *Chenopodium* sp., *Urtica* sp., *Artemisia* sp.

In Tab. V, VI and VII are reported the allergenic species in relation to 7 types of vegetation according to the conventional scale of abundance-dominance.

3. RESULTS

We thought it useful to attempt a correlation between our aerobiological data and the phyto-

Table V. Allergenic plants in relation to 7 types of vegetation.

	BORDER AREAS-WEEDS	MEADOWS	RURAL AREAS	PARKS AND GARDENS	CONIFERS WOODS	MESOPHILIOUS WOODS	XEROPHILIOUS WOODS
• <i>Abies alba</i> Miller			1				
• <i>Abies nordmanniana</i> (Stev.) Spach			2				
• <i>Acer negundo</i> L.			3				
• <i>Aesculus hippocastanum</i> L.			2				
• <i>Agrostis stolonifera</i> L.							
• <i>Anthoxanthum odoratum</i> L.							
• <i>Artemisia vulgaris</i> L. + <i>A. verlotiorum</i> Lamotte							
• <i>Carpinus betulus</i> L.							
• <i>Castanea sativa</i> Mill.							
• <i>Cedrus Libani</i> A. Rich							
• <i>Chenopodium album</i> L.							
• <i>Corylus avellana</i> L.							
• <i>Cupressus sempervirens</i> L.							
• <i>Cynodon dactylon</i> (L.) Pers.							
• <i>Dactylis glomerata</i> L.							
• <i>Dryopteris filix-mas</i> (L.) Schott							
• <i>Elymus repens</i> (L.) Gould							
• <i>Equisetum telmateja</i> Ehrh.							
• <i>Erica arborea</i> L.							
• <i>Erica scoparia</i> L.							
• <i>Fagus silvatica</i> L.							
• <i>Festuca arundinacea</i> + <i>F. pratensis</i> Huds.							
• <i>Fraxinus ornus</i> L.							
• <i>Fraxinus excelsior</i> L.							
• <i>Helianthus annuus</i> L.							
• <i>Helianthus tuberosus</i> L.							
• <i>Holcus lanatus</i> L.							
• <i>Hordeum bulbosum</i> L.							
• <i>Humulus lupulus</i> L.							
• <i>Juglans regia</i> L.							
→ • <i>Juniperus communis</i> L.							

Table VI. Allergenic plants in relation to 7 types of vegetation.

	BORDER AREAS-WEEDS	MEADOWS	RURAL AREAS	PARKS AND GARDENS	CONIFERS WOODS	MESOPHILLOUS WOODS	XEROPHILLOUS WOODS
• Juniperus oxycedrus L.	2	+	+	+	+	+	+
• Ligustrum vulgare L.	1	3	2	+	+	+	+
• Lillium candidum L.			2	+	+	+	+
• Lolium multiflorum Lam.			+	+	+	+	+
• Lolium perenne L.			+	+	+	+	+
• Medicago sativa L.			+	+	+	+	+
• Mercurialis annua L. + M. perennis L.			+	+	+	+	+
• Morus alba L. + M. nigra L.			+	+	+	+	+
• Olea europaea L.	1		1	5			1
• Osmunda regalis L.				1			1
• Ostrya carpinifolia Scop.		4	3	1			3
• Papaver rhoeas L.				3			3
• Parietaria diffusa Mert. et Koch				+			+
• Phillyrea angustifolia L.	2			+			+
• Phillyrea latifolia L.	3		1	1			1
• Phleum pratense L.	1	1	1	+	+	+	2
• Pinus pinaster Aiton				1	1	1	1
• Pinus pinea L.				1	1	1	1
• Pinus nigra Arnold				1	1	1	1
• Pinus sylvestris L. + exotic	+	+	+	+	+	+	+
• Plantago lanceolata L.	1	1	1	+	+	+	+
• Platanus sp. pl.				+	+	+	+
• Poa annua L.				+	+	+	+
• Poa pratensis L.				+	+	+	+
• Polygonum sp. pl.				+	+	+	+
• Populus alba L.				+	+	+	+
• Populus nigra + P. americana				+	+	+	+

Table VII. Allergenic plants in relation to 7 types of vegetation.

	BORDER AREAS-WEEDS	MEADOWS	RURAL AREAS	PARKS AND GARDENS	CONIFERS WOODS	MESOPHILLOUS WOODS	XEROPHILLOUS WOODS
• Quercus cerris L.	4	3	1	+	+	+	+
• Quercus ilex L.	3	2	1	+	+	+	+
• Quercus pubescens Willd.	4	3	1	+	+	+	+
• Quercus robur L.			+	+	+	+	+
• Quercus suber L.	+	+	+	+	+	+	+
• Robinia pseudoacacia L.	+	+	+	+	+	+	+
• Rumex sp. pl.	+	+	+	+	+	+	+
• Salix sp. pl.			+	+	+	+	+
• Sambucus ebulus L.			+	+	+	+	+
• Sambucus nigra L.		3	2	+	+	+	+
• Solidago sp. pl.		2	1	+	+	+	+
• Sorghum halepense (L.) Pers.			+	+	+	+	+
• Spinacia oleracea L.			+	+	+	+	+
• Thuja orientalis L.			+	+	+	+	+
• Tilia sp. pl.			+	+	+	+	+
• Trifolium pratense L.			+	+	+	+	+
• Tulipa sp. pl.			+	+	+	+	+
• Ulmus minor Miller			+	+	+	+	+
• Urtica sp. pl.	+	2	2	+	+	+	+
• Xanthium strumarium L.			+	+	+	+	+
• Zea mays L.			+	+	+	+	+

geographical data we could obtain about the area investigated.

As mentioned before, our results are only the beginning of a more extended and more

analytic research which will be the aim of our future work.

There are many factors which interfere between pollen production and trapping, that is:

- dispersal efficiency of the pollen
- weather factors
- morphologic, physiologic and ecologic conditions and flowering period of the pollen producer
- characteristics and site of trap.

A good agreement has been found between incidence on total pollen count and presence of the plant in the vegetation in relation to the following families: Cupressaceae, Ulmaceae, Betulaceae, Salicaceae, Graminaceae, Oleaceae, Pinaceae, Urticaceae, Compositae, Chenopodiaceae, Plantaginaceae.

In relation to some taxa, seldom or never found in pollen trap but fairly diffused in vegetation (*Tilia* sp., *Robinia pseudoacacia* L., *Medicago sativa* L., *Trifolium pratense* L., *Rumex* sp., *Polygonum* sp., *Erica arborea* L., *Erica scoparia* L., *Platanus* sp., *Aesculus hippocastanum* L.) we attempted an explanation for each one.

For example *Platanus* and *Aesculus* are trees, mostly located inside the town among high buildings; in the flowering period winds blow from our trap toward the town; there is a likely interference from pruning. Moreover for *Platanus*, we do not know how many male individuals are there and which is the biology of the hybrids.

For *Tilia* sp., *Robinia pseudoacacia* L., *Medicago sativa* L., *Trifolium pratense* L. possible explanations are that they all are entomophilous and scarce pollen producers like others entomophilous. In particular for *Medicago sativa* and *Trifolium pratense* they are cut down before the flowering period.

For *Rumex* sp., *Polygonum* sp., *Erica arborea* L., *Erica scoparia* L. they are scarce pollen producers and in particular for *Erica* sp. hidden in woods among trees.

4. CONCLUSION

From the correlation between aerobiological and phytogeographical data has come out that:

a) the principal allergologic taxa observed in the area are well represented in our pollen calendar;

b) the pollens which have been scarcely or not at all trapped belong to plants which although abundant in the area have palinologic characteristics or particular locations (for example *Tiliaceae*, which are entomophilous, and *Platanaceae*, mostly located in the town);

c) on the contrary our pollen calendar does not include taxa which are absent in the area investigated, 20 Km in radius;

d) the observations in the area on the presence, number and flowering of different species investigated, are particularly useful in connection with those families in which it is not easy to distinguish at optical microscopy the different genera and/or species;

e) these data will be useful in the selection of a panel of allergens for testing in our area.

To conclude we would like to emphasize that interdisciplinary studies are necessary to define more clearly the environmental sources of allergens.

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