



Short Communication

A meteorological station and a pollen trap at the botanical garden and arboretum of the University of Rome Tor Vergata

Alessandro Travaglini*, Diletta Ravaziol & Maria Grilli Caiola

Department of Biology, University of Rome Tor Vergata Via della Ricerca Scientifica, 1 I–00133 Rome

(*author for correspondence, e-mail: travaglini@uniroma2.it; fax: +39 062023500)

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Abstract

A completely automated meteorological station has been operating at the Botanical Garden and Arboretum of University of Rome Tor Vergata since 1991. As of March 1996, the meteorological station was integrated with a volumetric pollen trap.

The new airborne pollen monitoring station operates all year round, together with another centre located in Latium.

This new centre will evaluate pollen dispersal in relation to climatic data, floristic and anthesis spectra and the pollen allergy incidence in the south-eastern area of Rome.

The characteristics of this new station along with the first data collected are presented and discussed.

According to an educational program developed at the Botanical Garden, activities linked to allergenic plants have been carried out with primary and secondary school as well as university students. **Key words:** Botanical Garden, volumetric pollen trap, floristic census.

Introduction

The increase of allergy incidence, the high number of people living in the area surrounding the University of Rome Tor Vergata and the presence of only one pollen monitoring station in Latium operating January through September, *Notiziario Aerobiologico* (1997) Puddu (1994), Errigo (1991), Grilli Caiola (1996), triggered the setting up of a volumetric pollen trap at the Botanical Garden of the University of Rome Tor Vergata with the aim of working out a pollen calendar for this area.

Materials and methods

The University of Rome Tor Vergata, situated between Rome and the Alban Hills, is on the orographic left hand of the Tiber river at the foot of Latial Volcano 15 km from the city centre.

The University campus consists of 530 hectares, 160 of which are green areas partially distributed between the new buildings and partially devoted to an archaeological park; another 100 hectares are taken up by the Botanical Garden.

The whole area belongs to the municipality of Rome and is surrounded by densely populated suburbs, such as Tor Vergata, Torrenova, Giardinetti, Carcaricola reaching altogether 600,000 inhabitants.

The surrounding territory is either cultivated, or abandoned or grazed by cows, horses and sheep; in the summer arson often destroys spontaneous vegetation.

Potential vegetation of the roman countryside is Turkey oak wood and mixed oakwood with *Quercus pubescens* Willd. and *Q. cerris* L. with presence of *Q. ilex* L. and *Q. suber* L. Blasi (1994).

In Rome 1,285 species have been identified Anzalone (1984, 1994, 1996), Celesti Grapow (1995) while in Latium 3,185 species are reported, accounting for about 50% of the total species constituting the flora

Table 1. Percentage of pollen grains in Tor Vergata atmosphere during 1997

Betulaceae	0.9%	Polygonaceae	0.5%
Compositae	0.7%	Euphorbiaceae	0.9%
Corylaceae	6.1%	Myrtaceae	1.2%
Fagaceae	14.2%	Ulmaceae	0.8%
Gramineae	10.7%	Platanaceae	0.9%
Oleaceae	13.1%	Aceraceae	0.06%
Plantaginaceae	0.7%	Pinaceae	3.9%
Urticaceae	10.4%	Salicaceae	1.3%
Cupr./Taxaceae	21.6%	Cyperaceae	0.07%
Cheno./Amarantaceae	1.6%	Others and not Identified	10.4%

of Italy. From the floristic point of view Latium is therefore a region with high biodiversity.

Human presence transformed the original landscape into grazing-grounds or cultivated fields, such as vineyards and olive-groves, which were later abandoned. This causes growth of herbaceous termophile and xerophile species and abundant ruderal and cosmopolite species.

Since 1991 a meteorological station has been operating in the Botanical Garden. It is a CAE Sp 200, completely automated and equipped with pluviometer, thermoudometer, anemometer and radiometer Travaglini and Grilli Caiola (1996).

In March 1996 a volumetric pollen trap (VPPS 2000, Lanzoni) was installed on the roof of the Department of Biology building of the University of Rome Tor Vergata.

Floristic census of a section of the whole monitored area and identification of anthesis spectrum of anemophilous and entomophilous species were carried out with field-trips every ten days. Data were then compared to those of a previous census made in the same area in 1986 Travaglini et al. (1993).

The samples were determined according to Flora of Italy Pignatti (1982) and Flora Europaea Tutin et al. (1964–1980) and for nomenclature to the International Code of Botanical Nomenclature Greuter (1994). The exsiccata were stored in the Herbarium of the University of Rome of Tor Vergata.

In 1997 the weekly monitoring of airborne pollen started. The data obtained were correlated with meteorological parameters, particularly with precipitation and anthesis spectra.

Pollen identification was carried out with light microscopy (Leitz Laborlux) at 400x according to the Italian Association of Aerobiology (I. A. A.) method-

Table 2. Maximum concentration of pollen recorded during 1997 (grains/m³)

Betulaceae	15	Polygonaceae	7
Compositae	10	Euphorbiaceae	5
Corylaceae	67	Myrtaceae	31
Fagaceae	192	Ulmaceae	12
Gramineae	248	Platanaceae	17
Oleaceae	480	Aceraceae	3
Plantaginaceae	7	Pinaceae	107
Urticaceae	71	Salicaceae	41
Cupr./Taxaceae	351	Cyperaceae	1
Cheno./Amarantaceae	16		

ology, Mandrioli (1994) and according to the literature Feliziani (1986) Frenguelli (1991), Frenguelli and Mincigrucci, (1994) Ciampolini and Cresti (1981), Erdtmann (1952).

Results and discussion

In Table 1 the relative abundance percentage of pollen grains in the atmosphere of the Tor Vergata area during 1997 is reported. The maximum concentration of pollen recorded during 1997 (grains/m³) is reported in Table 2. Pollen are listed here in decreasing order: Cupressaceae/Taxaceae (21.6%), Fagaceae (14.2%), Oleaceae (13.1%), Graminae (10.7%), Urticaceae (10.4%), Corylaceae(6.1%), Pinaceae (3.9%) and Compositae (0.7%).

Cupressaceae/Taxaceae pollen is the most abundant in the atmosphere of Tor Vergata, reaching 351 grains/m³. This is due to the presence of numerous plants in renaissance villas and gardens on Alban

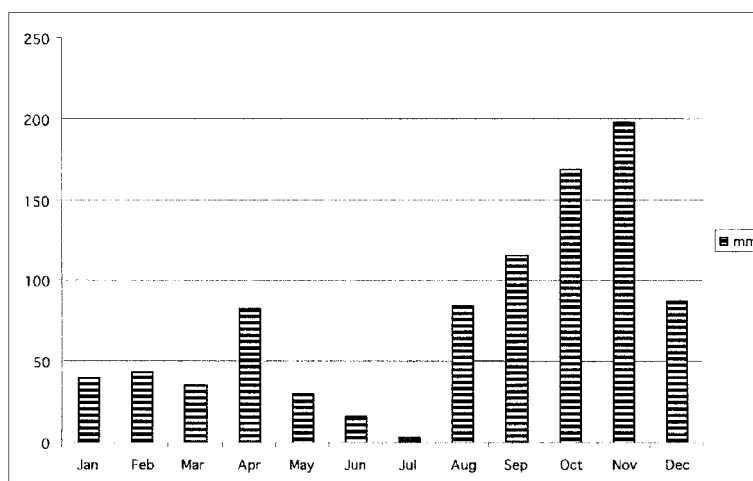


Figure 1. Precipitation recorded by Tor Vergata meteorological station during 1997.

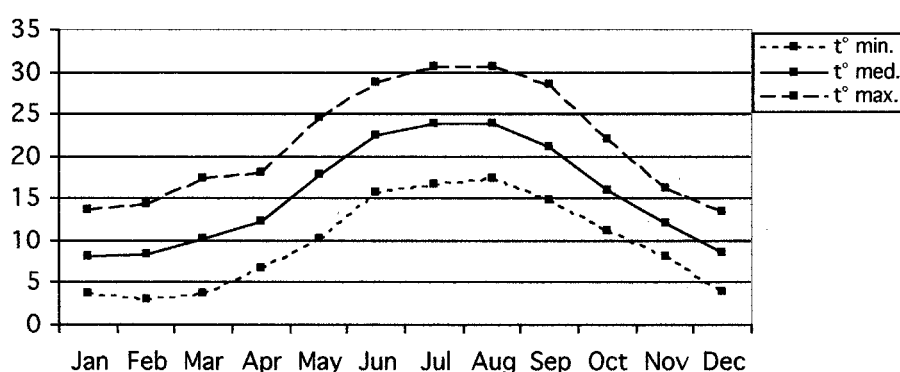


Figure 2. Thermogram recorded by the meteorological station of the Botanical Garden of University of Rome Tor Vergata.

Hills, Canini et al. (1989), as well as to the many tree-lined avenues. *Cupressus sempervirens* L. and *C. arizonica* Green. are common for hedges and borders in the suburbs of Rome. Their flowering occurs from January to March.

Fagaceae pollen presents two peaks. The first peak is in the second half of May and it is due to the blossom of several species of *Quercus* such as *Q. ilex*, *Q. cerris*, *Q. frainetto* Ten. and to *Fagus sylvatica* L.. The pollen grains of the latter probably originates from Monte Cavo which is 15 km away. The second peak occurs at the end of June and in the first week of July and it is due to the large woods of *Castanea sativa* Miller of the Alban Hills. Its maximum amount is to 192 grains/m³.

Oleaceae (13.1%). Pollen is mainly due to olive-groves that are also very common in Tor Vergata and on the Alban Hills; this fact explains the high pollen peak with 481/m³ in June. Pollen of *Fraxinus ornus*

L. in spring and of *Ligustrum lucidum* Aiton fil. in summer are also present.

Gramineae (10.7%). About 25 genera blossom from March to October with peaks in May and June. Wide arson and intensive ovin grazing seem to reduce grass growth and consequently the amount of airborne pollen. The effects of ovin grazing will be checked in spring 1999 when 5,000 sheep, present in the area of Tor Vergata, will be moved.

Compositae (0.7%). This family is prevalently entomophilous. Pollen reaches its maximum concentration in August and September. In September and October *Inula viscosa* (L.) Aiton and *Solidago virgaurea* L. are very abundant and blossom plenty.

Other important families are Urticaceae, Euphorbiaceae, Polygonaceae, Chenopodiaceae and Amaranthaceae. They are frequent and colonize more and more uncultivated and rural zones.

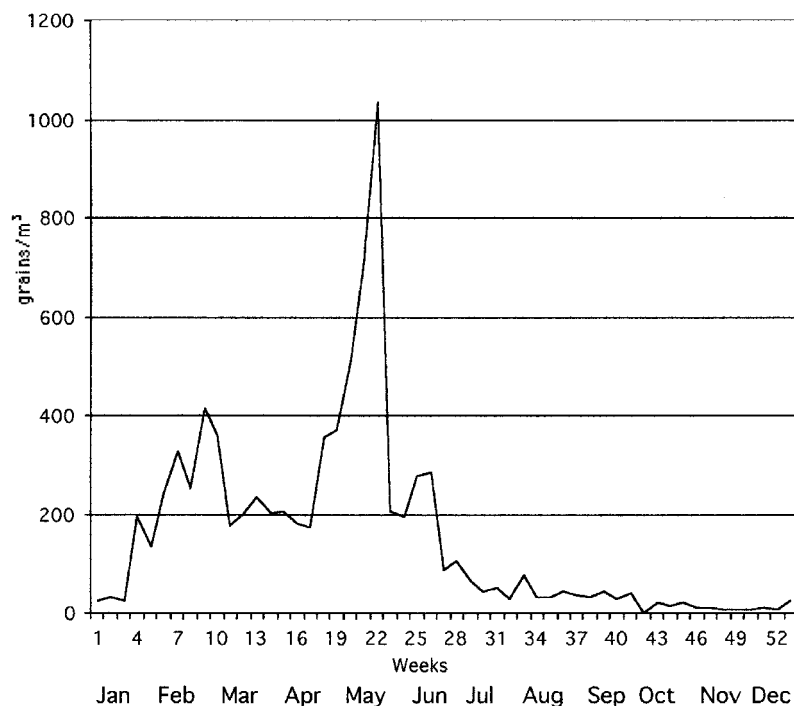


Figure 3. Total weekly pollen concentration recorded in 1997.

In Figure 1 precipitation in 1997 is reported. The pluviometric regime is Mediterranean, suboceanic type, with main minimum in summer, maximum peak in autumn and a secondary one in winter Travaglini et al. (1993).

In August 1997, 87.6 mm of rain were recorded. This value was anomalous because in the last 36 years the mean value has been 35 mm. This might explain the low pollination level recorded the following September.

In Figure 2 the minimum, medium and maximum average temperatures are reported.

For the anemometric regime the recorded data show winds coming from NE and Libeccio coming from SW in winter. In the following spring and summer the frequency of winds coming from S, SW and W increases; in autumn wind from S is dominant. Such factors contribute to characterise the above mentioned pluviometric regime.

In Figure 3 airborne pollen concentration diagram is shown. The concentration of pollen progressively increases from January to June. After July, the concentration decreases reaching very low value in November and December.

Table 3. Floristic spectrum of the studied area

	Gymnosperms	Angiosperms		Total
		Dycot.	Monocot.	
Families	2	53	3	58
Genera	4	112	17	133
Species	4	127	19	150

Comparison between pluviometric and thermometric data and airborne pollen concentration, Figures 1, 2, 3, shows that the highest concentrations of pollen was in May and June when precipitation was scarce and temperature was high. Thus the decrease in pollen concentration in April compared to March is due to increased precipitation (from 35 to 85 mm).

In Table 3 the floristic spectrum is reported: 150 herbaceous, frutescent, arboreous species belonging to 133 genera and 58 families.

Compared to the previous census by Travaglini et al. (1993) some Gramineae and fruit-bearing plants were lost whereas ruderal and cosmopolite plants increased.

Educational activity in primary and secondary schools, and of course with university students was carried out. Some field trips were done to show, pick and determine the allergenic plants in the area of the Botanical Garden and Arboretum.

With the collected species students prepared herbarium specimens. For each species morphological characteristics and flowering season were described.

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